RS&H

Preliminary Engineering Report

Project Development and Environment (PD&E) Study to Widen Western Beltway (SR 429) from North of I-4/SR 429 Interchange to Seidel Road

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Volume No. 2
November 2022
Orange and Osceola Counties, Florida
Financial Project No.: 446164-1
EDTM No.: 14446
RS&H No.: 1004-0125-000

Prepared by RS&H, Inc. at the
direction of Florida's Turnpike Enterprise

DRAFT
PRELIMINARY ENGINEERING REPORT

Florida Department of Transportation

Florida's Turnpike Enterprise

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Widen Western Beltway (SR 429)
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PROFESSIONAL ENGINEER CERTIFICATION
PRELIMINARY ENGINEERING REPORT

Project: Widen Western Beltway (SR 429)
from North of I-4/SR 429 Interchange to Seidel Road (MP 1 to 11)
ETDM Number: 14446
Financial Project ID: 446164-1-22-01
Federal Aid Project Number: TBD

This preliminary engineering report contains engineering information that fulfills the purpose and need for the Project Development & Environment Study to Widen Western Beltway (SR 429) from north of I-4 to Seidel Road (MP 1 to 11) in Osceola and Orange Counties, Florida. I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of transportation engineering as applied through professional judgment and experience.

I hereby certify that I am a registered professional engineer in the State of Florida practicing with RS&H, Inc., and that I have prepared or approved the evaluation, findings, opinions, conclusions, or technical advice for this project.

This item has been digitally signed and sealed by *Nathan Silva* on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

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1 Project Summary

1.1 Project Description

The Florida Department of Transportation (FDOT), Florida's Turnpike Enterprise (FTE) is evaluating improvements to the Western Beltway/State Road (SR) 429 from north of Interstate 4 (I-4) in Osceola County (Milepost 1) to the Seidel Road interchange (Milepost 11) in Orange County, a distance of approximately 10 miles. The Western Beltway (SR 429) is part of a limited-access, tolled beltway around Orlando, and is part of the overall Florida's Turnpike system of tolled expressways. The existing typical section for SR 429 from I-4 to Seidel Road is a four-lane divided expressway located within approximately 300 feet of right of way (ROW). The typical section includes 10-foot paved outside shoulders and four-foot inside paved shoulders on the mainline as well as guardrail in the median. Improvements being evaluated include widening from two to four lanes in each direction, incorporating interchange modifications and safety improvements along SR 429, adding, or upgrading Intelligent Transportation Systems (ITS), and adding a potential new interchange location at Livingston Road. An adjacent project, the Poinciana Parkway Extension Connector PD&E Study (Financial Project Identification Number [FPID] 446581-1) from County Road (CR) 532 to north of the I-4/SR 429 interchange will also evaluate improvements along SR 429 from the I-4 interchange to north of Sinclair Road. If Poinciana Parkway Extension Connector moves forward, the widening of Western Beltway (SR 429) will match that project north of Sinclair Road. However, in order to maintain independent utility, should the Poinciana Parkway Extension Connector not move forward, the Western Beltway widening would continue south of Sinclair Road to the I-4 interchange. Figure 1-1 shows the Project Location Map and study limits.

1.2 Purpose & Need

The purpose of the project is to increase capacity on SR 429 from north of I-4 to Seidel Road and at the interchanges within the study limits to accommodate future traffic demand, enhance safety, improve travel time reliability, and enhance emergency evacuation.

The need for this project is to improve future traffic operations. The proposed improvements will improve the travel time reliability, enhance safety, and improve emergency response and evacuation times.

1.2.1 Project Status

The MetroPlan Orlando 2045 Metropolitan Transportation Plan (MTP) Cost Feasible Plan (CFP) includes the widening of SR 429 from I-4 to Seidel Road (MTP ID# 1019) as a partially funded

Figure 1-1: Project Location Map

project. Future phases of the project are not currently included in the MetroPlan Orlando Transportation Improvement Program (TIP) or the FDOT State Transportation Improvement Program (STIP). No federal funding is being used to complete this project. Additional coordination will take place during the PD&E Study to ensure consistency.

1.2.2 Capacity

The No-Build traffic analysis indicates that SR 429 will not meet the level of service (LOS) target (LOS D) by 2030 within the project limits. The traffic analysis shows a need for three travel lanes in each direction throughout the project limits by 2030. By Design Year 2050, Annual Average Daily Traffic (AADT) on the segment of SR 429 from north of I-4 to Seidel Road will increase substantially and ranges from 96,400 to 128,800 daily trips leading to additional congestion and degradation of LOS. North of US 192, eight travel lanes are needed by 2045. South of US 192, eight lanes are needed by 2050.

The US 192 interchange also has operational deficiencies. Long queues have been observed at the southbound off-ramp during the evening commute. The queues sporadically extend to the SR 429 mainline, impacting traffic flow and creating a safety concern. The intersections on US 192 adjacent to the SR 429 interchange operate at LOS F in the design year. The LOS failure along US 192 impacts the interchange operations and increases the ramp queues. To relieve congestion at the US 192 interchange, a new interchange is proposed at an extension of Livingston Road. The proposed Livingston Road interchange will reduce traffic demand along US 192 and the interchange ramps. The traffic volume on the US 192 ramps is anticipated to decrease by 22 percent with a reliever interchange at Livingston Road. With the addition of the Livingston Road interchange, traffic operations along US 192 are expected to improve.

1.2.3 Transportation Demand

The Florida's Turnpike Enterprise Florida Traffic Trends Report, July 2019, indicates that traffic volumes on the segment of SR 429 from I-4 to Seidel Road has experienced a 12.5% annual growth rate between 2008 and 2018. Travel forecasts show that traffic on SR 429 is expected to increase at an average yearly rate of about six percent between 2020 and 2030 and four percent between 2030 and 2050. As a result, the existing four lane capacity on SR 429 will soon be exceeded (in 2035), triggering a need for additional capacity.

1.2.4 Social Demand and Economic Development

SR 429 serves north-south trips on the west side of the Orlando metro 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. The extensive residential and commercial development in the corridor is expected to continue, and congestion on SR 429 is

expected to increase. In order to support the projected economic development and viability in the region, capacity improvements to SR 429 are needed.

1.2.5 Safety

Between 2014 and 2018, there were 161 crashes on SR 429 between the I-4 ramps and Seidel Road interchanges. Another 41 crashes were reported on the SR 429 ramps in the five-year analysis period. A higher concentration of crashes was reported in the merge/diverge areas, particularly at US 192 and I-4 interchanges.

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. 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 analysis shows that the SR 429 mainline, interchange ramps, and intersections 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 (0.46) is reported for the SR 429 mainline, followed by the US 192 ramps (0.40), and the US 192 and SR 429 ramp terminal intersections (0.37).

The SR 429 corridor is a major transportation facility within the region and a primary emergency evacuation route. Improving capacity of the mainline and interchanges will reduce congestion in the corridor. Capacity improvements would reduce emergency response times, as well as evacuation and recovery times.

1.3 Commitments

To minimize the impacts of this project to the social, cultural, natural, and physical environment, the FTE has identified the following commitments:

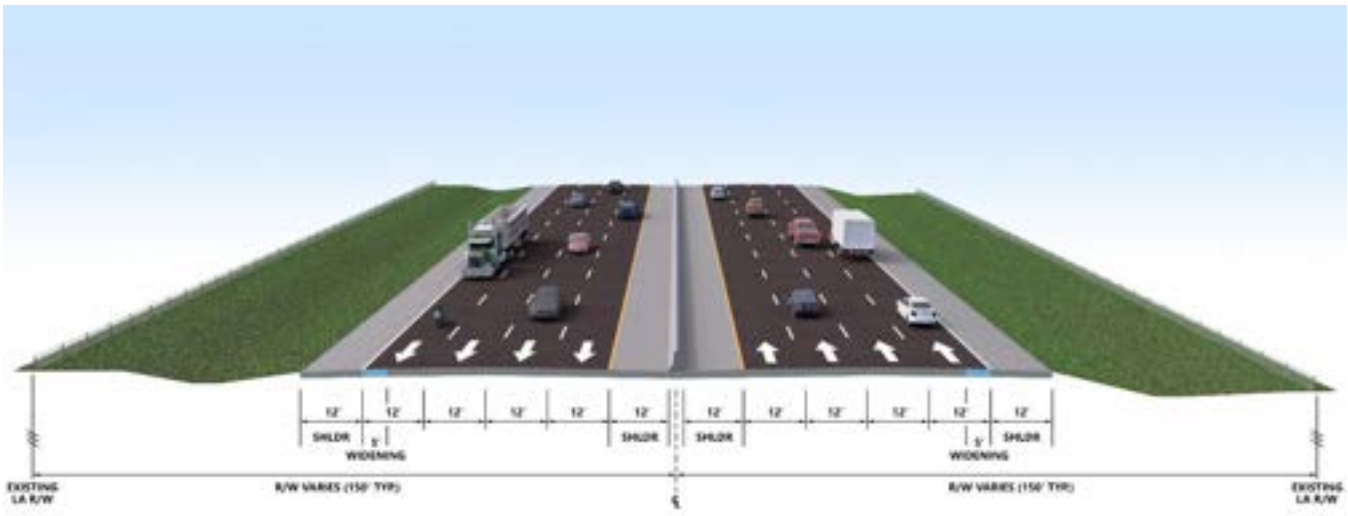
1. The FTE will conduct design-phase coverboard surveys in accordance with the most recent U.S. Fish and Wildlife Service (USFWS) guidelines to verify activity and occupancy status of the blue-tailed mole skink and sand skink. Mitigation for impacts to occupied sand skink habitat will be provided as needed.
2. The most recent version of the USFWS Standard Protection Measurer for the Eastern Indigo Snake will be adhered to during construction of the proposed project.

1.4 Alternatives Analysis Summary

For the purpose of defining the Build Alternatives, the project is separated into the SR 429 mainline and the five interchanges.

The only build alternative for the widening of SR 429 includes adding two lanes in each direction for a total of four lanes in each direction. **Error! Reference source not found.** shows the preferred typical section for the SR 429 mainline.

Figure 1-2 Proposed SR 429 Typical Section



Early phases of alternative development consisted of performing a Capacity Analysis at Junctions (CAP-X) alternative screening for each interchange. The screened alternatives were ranked based on traffic performance. The alternatives were then evaluated for functionality, safety, cost and ROW requirements. The screened alternatives were narrowed down to alternatives that were developed in Build Alternatives. These Build Alternatives were evaluated and presented at the Alternative Public Information Meeting in February 2022. Further description of this evaluation is in Section 4.6.3. Preliminary concept plans for the viable Build Alternatives are included in Appendix A.

Sinclair Road Interchange

Two Build Alternatives were considered for this interchange. Alternative 1: Traffic Signal and Alternative 2: Roundabout.

For both alternatives, additional turn lanes will be provided for the northbound and southbound off-ramps at the intersection with Sinclair Road.

Alternative 1 would add a new traffic signal to the intersection of the northbound on-ramp with Collector Road. In addition, a northbound left turn lane and a southbound right turn lane would be added to the intersection to improve traffic operations. The northbound through movement would have a continuous green at the signal.

Alternative 2 would add a roundabout at the intersection instead of the traffic signal. The roundabout would be a single lane, with a northbound through lane that bypasses the roundabout.

Livingston Road Interchange

Two Build Alternatives were considered for this proposed new interchange. Alternative 1: Partial Cloverleaf (Par-Clo) interchange and Alternative 2: T-Ramp interchange.

Alternative 1 would add a Partial Cloverleaf (Par-Clo) interchange (Type AB2) with loop ramps for the northbound on-ramp and southbound off-ramp, and diamond ramps for the northbound off-ramp and southbound on-ramp. Ramps to and from the south would be tolled electronically. The limited access ramps would add a fourth leg to the existing intersection of Livingston Road and Formosa Gardens Boulevard.

Alternative 2 is a minimization alternative that would add a T-Ramp interchange. A four-lane divided interchange access roadway would provide a limited access connection between SR 429 and the intersection of Livingston Road with Formosa Gardens Boulevard, adding a fourth leg to the local intersection. Lanes to and from the southbound ramps would cross over SR 429 to connect to the ramps at a stop-controlled T-intersection. The northbound on-ramp and off-ramp would merge and diverge with the access roadway approximately 1,600 feet west of Formosa Garden Boulevard. There are no plans for new connections to or from the west side of SR 429. The ramps to and from the south would be electronically tolled.

For both alternatives, the new interchange will create a fourth leg of the existing Livingston Road intersection with Formosa Gardens Boulevard. A traffic signal would be added, as well as dual left turn lanes for northbound to westbound traffic entering the interchange. A new left turn lane will be added for westbound Livingston Road to southbound Formosa Gardens Boulevard traffic, as well as a westbound through lane to enter the interchange. The southbound approach will include a new exclusive left turn lane onto Livingston Road, an exclusive right turn lane into the interchange, and a second southbound through lane. The eastbound approach to Formosa Gardens Boulevard from the interchange will include dual left turn lanes, a through lane, and an exclusive right turn lane. As part of the interchange, the half-mile two-lane section of Formosa Gardens Boulevard will be widened to four lanes to match the four-lane sections to the south and north of Livingston Road.

US 192 Interchange

One Build Alternative was considered for this interchange.

Operational improvements will be made to the ramp terminals and US 192. An additional eastbound through lane will be added to US 192 west of the interchange. An additional westbound through lane will be added from East Orange Lane Boulevard through the interchange. An additional northbound left and northbound right turn lane will be added to the northbound off-ramp. An additional eastbound left turn lane will be added for traffic entering the northbound on-ramp. An additional left and two additional right-turn lanes will be added to the southbound off-ramp for traffic turning onto US 192. The existing toll sites on the ramps to and from the south would be converted to electronic toll gantries.

Western Way Interchange

One Build Alternative was considered for this interchange.

The existing Par-Clo interchange configuration will be retained. Both ramp terminal intersections will be signalized. An additional lane will be added to the southbound loop off-ramp. One left turn lane and two right turn lanes will be added to the northbound off-ramp. One through lane and one right turn lane will be added to westbound Western Way at the northbound ramp terminal intersection. Two through lanes and one left turn lane will be added to eastbound Western Way at the northbound ramp terminal intersection. One left turn lane will be added to westbound Western Way at the southbound on-ramp intersection.

Seidel Road Interchange

Two Build Alternatives were considered for this interchange.

Alternative 1 would add traffic signals at the ramp terminals. No other changes on Seidel Road would be needed.

Alternative 2 would add a Double Roundabout at the interchange. The double roundabout would connect to the two ramp intersections together as part of one larger roundabout. The double roundabout would be two lanes and allow the traffic to access between Seidel Road and the ramps to and from the south.

Both alternatives will add a second westbound left turn lane approaching Avalon Road by restriping pavement recently constructed by Osceola County.

1.5 Description of Preferred Alternative

The Preferred Alternative will widen SR 429 from four to eight lanes. **Error! Reference source not found.** shows the proposed typical sections for the SR 429 widening. The preferred interchange alternatives are described below.

The Sinclair Road interchange will maintain the current configuration. Additional turn lanes will be provided for the northbound and southbound off-ramps at the intersection with Sinclair Road. A new traffic signal will be added to the intersection of the northbound on-ramp with Collector Road. In addition, a northbound left turn lane and a southbound right turn lane would be added to the intersection to improve traffic operations. The northbound through movement would have a continuous green at the signal.

The Livingston Road interchange will be a T-Ramp interchange. A four-lane divided interchange access roadway would provide a limited access connection between SR 429 and the intersection of Livingston Road with Formosa Gardens Boulevard, adding a fourth leg to the local intersection. Lanes to and from the southbound ramps would cross over SR 429 to connect to the ramps at a stop-controlled T-intersection. The northbound on-ramp and off-ramp would merge and diverge with the access roadway approximately 1,600 feet west of Formosa Garden Boulevard. There are no plans for new connections to or from the west side of SR 429. The ramps to and from the south would be electronically tolled.

In addition, the Livingston Road interchange will create a fourth leg of the existing Livingston Road intersection with Formosa Gardens Boulevard. A traffic signal would be added, as well as dual left turn lanes for northbound to westbound traffic entering the interchange. A new left turn lane will be added for westbound Livingston Road to southbound Formosa Gardens Boulevard traffic, as well as a westbound through lane to enter the interchange. The southbound approach will include a new exclusive left turn lane onto Livingston Road, an exclusive right turn lane into the interchange, and a second southbound through lane. The eastbound approach to Formosa Gardens Boulevard from the interchange will include dual left turn lanes, a through lane, and an exclusive right turn lane. As part of the interchange, the half-mile two-lane section of Formosa Gardens Boulevard will be widened to four lanes to match the four-lane sections to the south and north of Livingston Road.

The US 192 interchange will improve traffic operations at the ramp terminals and US 192. An additional eastbound through lane will be added to US 192 west of the interchange. An additional westbound through lane will be added from East Orange Lane Boulevard through the interchange. An additional northbound left and northbound right turn lane will be added to the northbound off-ramp. An additional eastbound left turn lane will be added for traffic entering

the northbound on-ramp. An additional left and two additional right-turn lanes will be added to the southbound off-ramp for traffic turning onto US 192.

The existing Par-Clo interchange configuration at Western Way will be retained. Both ramp terminal intersections will be signalized. An additional lane will be added to the southbound loop off-ramp. One left turn lane and two right turn lanes will be added to the northbound off-ramp. One through lane and one right turn lane will be added to westbound Western Way at the northbound ramp terminal intersection. Two through lanes and one left turn lane will be added to eastbound Western Way at the northbound ramp terminal intersection. One left turn lane will be added to westbound Western Way at the southbound on-ramp intersection.

The Seidel Road interchange will add traffic signals at the ramp terminals. Additionally, a second westbound left turn lane approaching Avalon Road will be added by restriping pavement recently constructed by Osceola County.

See Section 6.1 for a more detail description of each of the disciplines for the preferred alternative.

1.6 List of Technical Documents

Below is a list of all technical documents that were prepared as part of this PD&E Study.

- Location Hydraulics Report
- Pond Siting Report
- Geotechnical Report
- Bridge Analysis Technical Memorandum
- Utilities Assessment Package
- Preliminary Toll Siting Technical Memorandum
- Air Quality Technical Memorandum
- Contamination Screening Evaluation Report
- Cultural Resource Assessment Survey
- Natural Resource Evaluation
- Sociocultural Effects Evaluation
- State Environmental Impact Report
- Systems Interchange Justification Report

2 Existing Conditions

2.1 Roadway

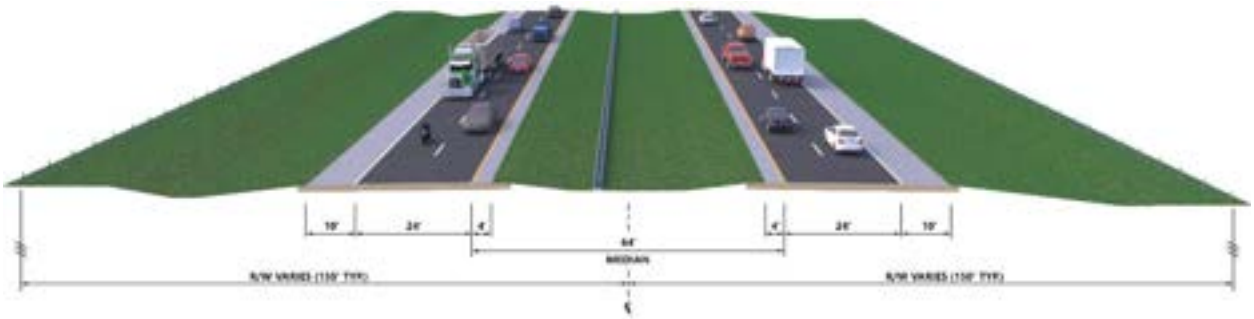
2.1.1 Typical Section

The following paragraphs discuss the existing typical sections of the major roadways located in the study area.

SR 429

The typical section for SR 429 from I-4 to Seidel Road is a four-lane divided expressway located within approximately 300 feet of ROW. The typical section includes 10-foot paved outside shoulders and 4-foot inside paved shoulders on the mainline as well as guardrail in the 64-foot median. The existing typical section is shown in Figure 2-1.

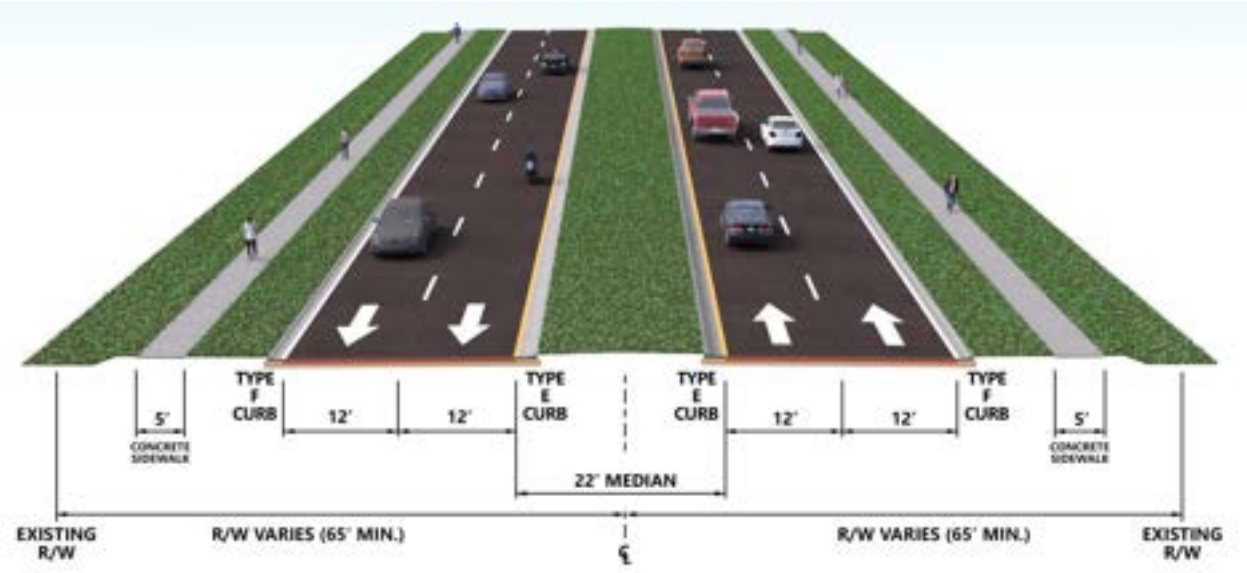
Figure 2-1 SR 429 Existing Typical Section



Sinclair Road

The typical section for Sinclair Road is a four-lane divided highway with 12-foot lanes and a 22-foot raised median. The roadway has Type E curb on the inside of the roadway and Type F curb on the outside of the roadway. There are five-foot sidewalks in each direction. There are no bicycle facilities along the roadway within the study area. The existing typical section is shown in Figure 2-2.

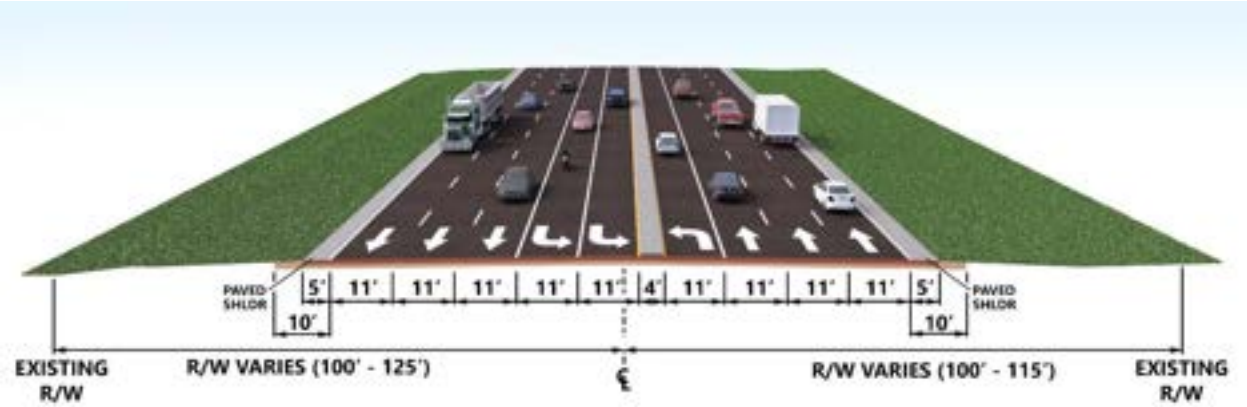
Figure 2-2 Sinclair Road Existing Typical Section



US 192

The typical section for SR 530 (US 192) is a six-lane divided highway with 11-foot lanes with a 37-foot median. Turn lanes are provided at signalized intersections. The roadway has five-foot paved shoulders on the outside and Type E curb and gutter on the inside. There are no pedestrian facilities west of SR 429 in the study area. East of the northbound off-ramp intersection there is a five-foot sidewalk on the south side of US 192. There are no bicycle facilities along the roadway within the study area. The existing typical section is shown in Figure 2-3.

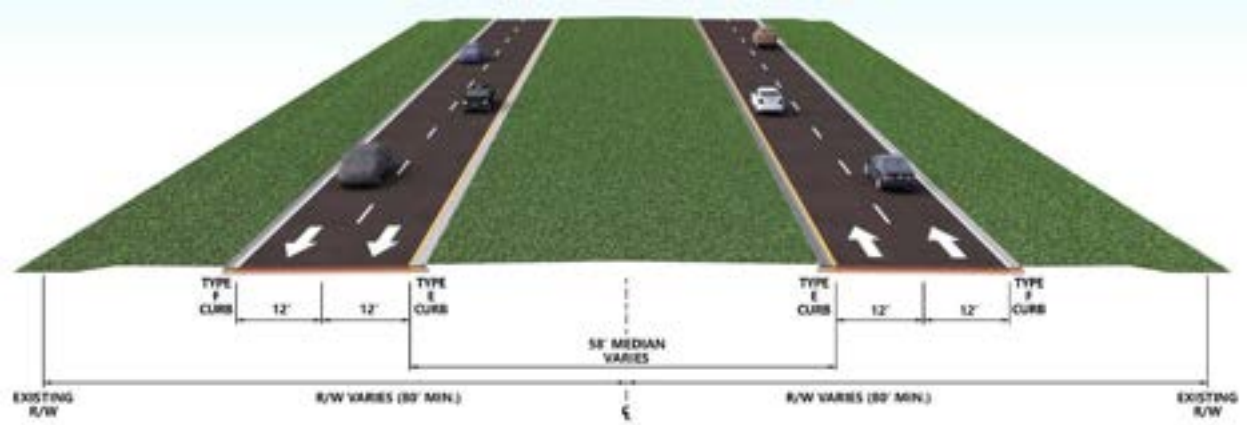
Figure 2-3 US 192 Existing Typical Section



Western Way

The typical section for Western Way is a four-lane divided highway with 12-foot lanes and a 58-foot raised median. The roadway has Type E curb on the inside of the roadway and Type F curb on the outside of the roadway. There are no pedestrian or bicycle facilities along the roadway within the study area. The existing typical section is shown in Figure 2-4.

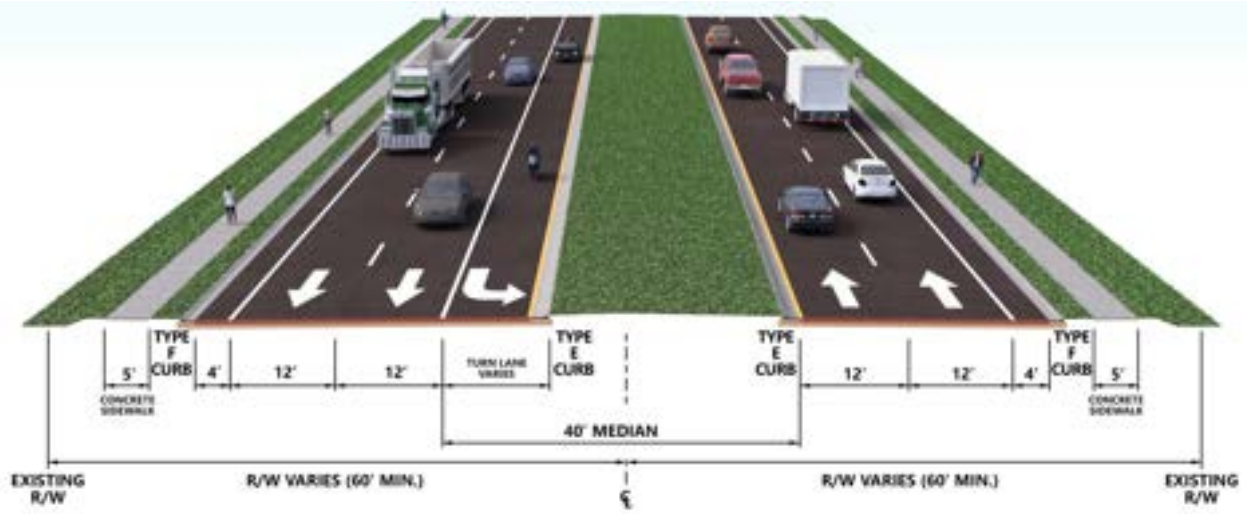
Figure 2-4 Western Way Existing Typical Section



Seidel Road

The typical section for Seidel Road is a four-lane divided highway with 12-foot lanes and a 40-foot raised median. The roadway has Type E curb on the inside of the roadway and Type F curb on the outside of the roadway. There are five-foot sidewalks in each direction as well as four-foot bicycle lanes. The existing typical section is shown in Figure 2-5.

Figure 2-5 Seidel Road Existing Typical Section



2.2 Right of Way

The existing ROW widths for the study area are summarized in Table 2-1

Table 2-1 Roadway Right of Way

Roadway	From	To	ROW Width (feet)
SR 429	I-4	Sand Hill Road	Varies (300' Standard)
SR 429	Sand Hill Road	South of Canary Island Drive	250'
SR 429	South of Canary Island Drive	North of US 192	Varies (300' Standard)
SR 429	North of US 192	South of Western Way	Varies (300-490')
SR 429	South of Western Way	Seidel Road	Varies (300' Standard)
Sinclair Road	Happy Trail	East of Connector Road	130'
US 192	W. Orange Lake Boulevard	E. Orange Lake Boulevard	Varies (213-235')
Western Way	Hartzog Road	East of NB Ramps	180'
Seidel Road	Avalon Road	Lakeshore Pointe Drive	Varies (144-147')
Livingston Road	Formosa Garden Boulevard	N. Old Lake Wilson Road	Varies (45-60')

2.3 Roadway Classification and Context Classification

SR 429 between Seidel Road and Sinclair Road is a four-lane divided expressway classified as an urban principal arterial expressway and is part of the Strategic Intermodal System (SIS) and State Highway System (SHS). Sinclair Road is a four-lane divided roadway classified as a minor collector. US 192 (SR 530) is a six-lane divided roadway classified as an urban principal arterial and is part of the SHS. Western Way is a four-lane divided roadway classified as a major collector. Seidel Road is also a four-lane divided roadway classified as a local roadway.

FDOT's context classification system describes the general characteristics of the land use, development patterns, and roadway connectivity, providing cues as to the types of uses and user groups that will likely utilize the roadway. FDOT will apply criteria and standards based on the context classification. In the case of interstates and limited-access facilities, the function of the roadway is considered complete. Consequently, no context classification is assigned for SR 429. US 192 has been assigned a preliminary context classification of C3C-Suburban Commercial. Other roads in the study area, including Sinclair Road, Livingston Road, Western Way, and Seidel Road, are non-state facilities and the maintaining agencies (Osceola and Orange Counties) have not established a context classification for these roadways.

2.4 Adjacent Land Use

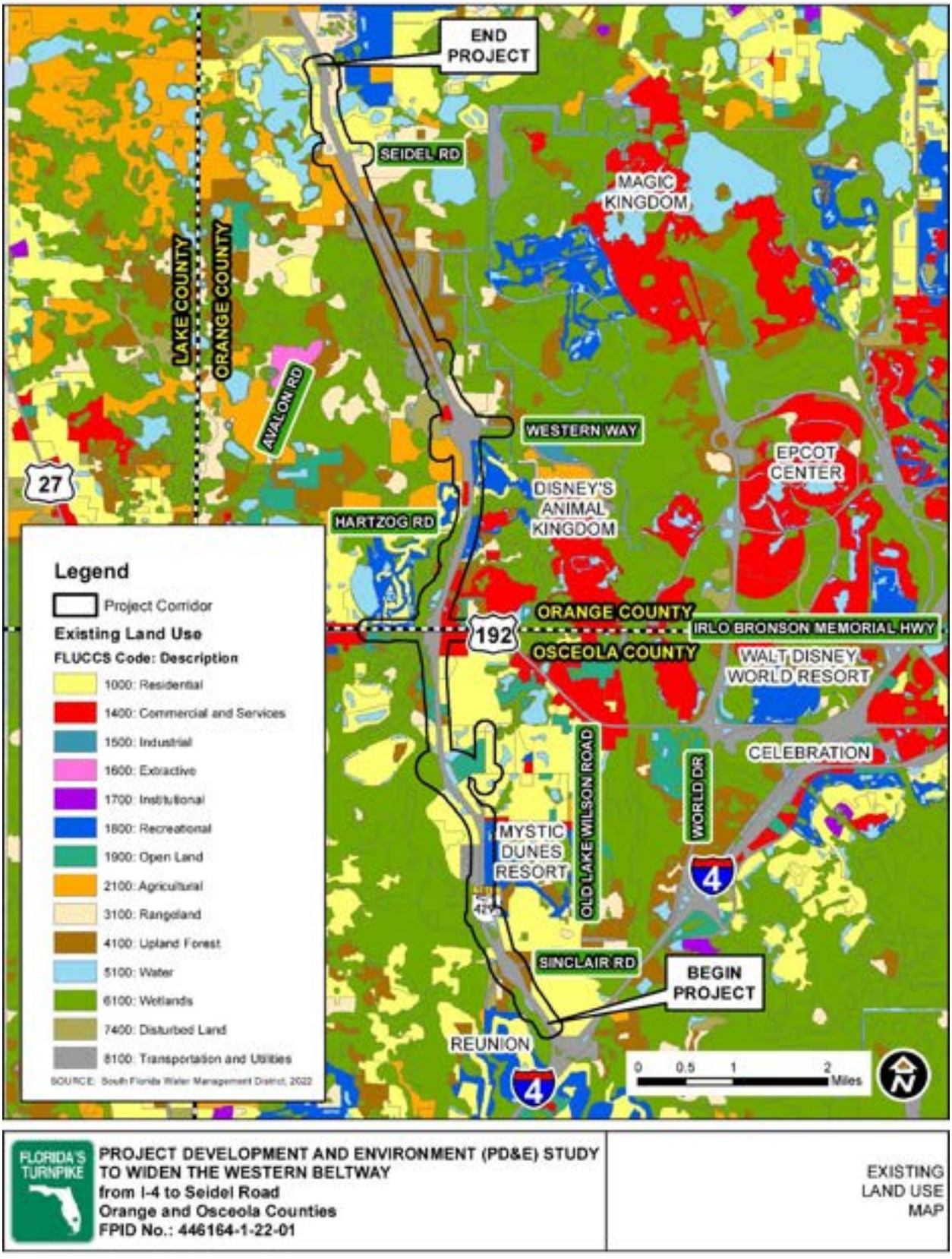
The corridor spans Osceola and Orange Counties passing west of the Walt Disney World theme parks. The existing land use in the corridor is composed predominantly of residential communities (23%) with high-density residential as the predominant residential use. The residential land is concentrated primarily in Osceola County, especially on the east side of SR 429. Wetlands comprise 20% of the adjacent land use, with large areas located west of SR 429. Recreation and open space compose 13% of the adjacent land, mostly as private golf courses adjacent to SR 429 associated with neighborhood communities. Forested land accounts for 11% of the adjacent land use, followed by rangeland (7%). Agricultural, commercial, and disturbed lands each account for about 5% of the corridor's adjacent land, with utilities comprising approximately 4%. Commercial land along the corridor is concentrated at the interchanges, especially east of SR 429 at US 192. An Existing Land Use Map is included as Figure 2-6, and Table 2-2 shows the adjacent land use composition of the SR 429 corridor.

Table 2-2: Adjacent Land Use Composition

Land Use	Percentage
Residential	23.06%
Wetlands	20.17%
Recreation/Open Space	13.40%
Forested Land	11.09%
Rangeland	6.96%
Agricultural	5.88%
Commercial	5.65%
Disturbed Lands	4.89%
Water	4.87%
Utilities	4.02%
Total	99.99%*

*Total does not add up to 100% due to rounding.

Figure 2-6: Existing Land Use Map



2.5 Access Management Classification

The Access Management Classifications for the study area roadways are identified in Table 2-3. FDOT establishes the classification for SR 429 and US 192. Osceola County establishes the classification for Sinclair Road and Livingston Road. Orange County establishes the classification for Western Way and Seidel Road.

Table 2-3: Roadway Access Management Classification

Roadway	Access Management Classification	Responsible Agency
SR 429	1	FDOT
Sinclair Road	N/A (similar to 7)	Osceola County
Livingston Road	N/A (similar to 4)	Osceola County
Formosa Gardens Boulevard	N/A (similar to 4)	Osceola County
US 192	5	FDOT
Western Way	N/A (similar to 5)	Orange County
Seidel Road	N/A (similar to 4)	Orange County

2.6 Design and Posted Speeds

The design and posted speeds for the major roadways in the study area are shown in Table 2-4.

Table 2-4: Design and Posted Speed Limits

Roadway	Design Speed	Posted Speed
SR 429	70 mph	70 mph
Sinclair Road	40 mph	35 mph
Livingston Road	40 mph	35 mph
Formosa Gardens Boulevard	40 mph	35 mph
US 192	50 mph	50-55 mph*
Western Way	45 mph	45 mph
Seidel Road	40 mph	35 mph

- Note: In April 2022, FDOT D5 completed a Target Speed Evaluation for US 192 near SR 429. They have identified a target speed of 45 mph.

2.7 Vertical and Horizontal Alignments

2.7.1 Vertical Alignment

Table 2-5 summarizes the existing vertical alignment of the Western Beltway mainline. This information was extracted from available as-built plans and existing survey.

Table 2-5: SR 429 Existing Vertical Alignment

PVI* Station	Design Speed (MPH)	Existing Vertical Curve						Curve Length Criteria	K-Value Criteria		As-Built Plan Source of Data (FPID No.)
		Type	G1 %	G2 %	A %	Length (feet)	K-Value		FDM	AASHTO	
67+50.00	70	Sag	-5	0.470	5.47	1,100	201	800	206	181	403497-2-52-01
91+00.00	70	Crest	0.47	-0.791	1.261	700	555	1,000	506	247	403497-2-52-01
98+00.00	70	Sag	-0.791	0.401	1.192	600	503	800	206	181	403497-2-52-01
105+00.00	70	Crest	0.401	-0.582	0.983	500	509	1,000	506	247	403497-2-52-01
124+00.00	70	Sag	-0.582	2.273	2.855	600	210	800	206	181	403497-2-52-01
141+00.00	70	Crest	2.273	-2.103	4.376	2190	500	1,000	506	247	403497-2-52-01
156+00.00	70	Sag	-2.103	1.388	3.491	700	201	800	206	181	403497-2-52-01
167+00.00	70	Crest	1.386	-1.386	2.772	1,400	505	1,000	506	247	403497-2-52-01
194+00.00	70	Sag	-1.386	0.227	1.613	800	496	800	206	181	403497-3-52-01
210+50.00	70	Crest	0.227	-0.779	1.006	1,300	1,291	1,000	506	247	403497-3-52-01
221+10.00	70	Sag	-0.779	0.501	1.28	800	625	800	206	181	403497-3-52-01
240+00.00	70	Crest	0.336	-0.305	0.641	1,000	1,559	1,000	506	247	403497-3-52-01
249+50.00	70	Sag	-0.305	2.786	3.091	800	259	800	206	181	403497-3-52-01
267+18.69	70	Crest	2.786	-2.687	5.473	2,737.38	500	1,000	506	247	403497-3-52-01
285+76.00	70	Sag	-2.687	-0.300	2.387	800	335	800	206	181	403497-3-52-01
293+75.00	70	Sag	-0.300	0.300	0.6	800	1,333	800	206	181	403497-3-52-01
302+00.00	70	Sag	0.300	2.352	2.052	800	390	800	206	181	403497-3-52-01
320+50.00	70	Crest	2.352	-2.530	4.882	2,500	512	1,000	506	247	403498-2-52-01
1339+00.00	70	Sag	-2.530	-0.034	2.496	800	321	800	206	181	403498-2-52-01
1360+00.00	70	Sag	-0.034	0.240	0.274	800	2,915	800	206	181	403498-2-52-01
1379+49.46	70	Sag	0.240	1.452	1.212	800	660	800	206	181	403498-2-52-01
419+00.00	70	Crest	1.452	-1.600	3.052	1,500	524	1,000	506	247	403498-3-52-01
432+00.00	70	Sag	-1.600	0.680	2.28	800	351	800	206	181	403498-3-52-01
458+00.00	70	Crest	0.680	-1.120	1.8	1,800	1,000	1,000	506	247	403498-3-52-01
481+00.00	70	Sag	-1.120	-0.360	0.76	1000	1,316	800	206	181	403498-3-52-01
490+00.00	70	Sag	-0.360	0.200	0.56	800	1,429	800	206	181	403498-3-52-01
517+00.00	70	Sag	0.200	0.662	0.462	800	500	800	206	181	403498-3-52-01
542+00.00	70	Crest	0.782	0.200	0.582	1,000	N/A	1,000	506	247	403498-3-52-01
542+00.00	70	Crest	0.662	0.200	0.462	1,000	N/A	1,000	506	247	403498-3-52-01
577+00.00	70	Crest	0.200	-0.960	1.16	1,000	N/A	1,000	506	247	403498-3-52-01
577+00.00	70	Crest	0.200	-0.746	0.946	1,000	N/A	1,000	506	247	403498-3-52-01
591+00.00	70	Sag	-0.960	0.380	1.34	800	N/A	800	206	181	403498-3-52-01
591+00.00	70	Sag	-0.746	0.380	1.126	800	N/A	800	206	181	403498-3-52-01
622+00.00	70	Crest	0.380	-1.233	1.613	1,800	N/A	1,000	506	247	403498-3-52-01
592+00.00	70	Sag	-1.233	0.906	2.139	800	N/A	800	206	181	403498-3-52-01

*Stations are taken from as-builts and may differ from those shown in the Conceptual Design plan sheets

2.7.2 Horizontal Alignment

Table 2-6 summarizes the existing horizontal alignment of the Western Beltway mainline. This information was extracted from available as-built plans and existing survey.

Table 2-6: SR 429 Existing Horizontal Alignment

PI Station*	PC Station*	PT Station*	Design Speed (MPH)	Existing Horizontal Curve		
				Radius (feet)	Length (feet)	SE
135+87.13	126+85.39	144+32.62	70	2865.00	1,747.23	0.07
205+67.78	192+69.65	217+55.81	70	3,500.00	2,486.16	0.060
240+58.10	229+09.46	251+29.23	70	3,500.01	2,219.77	0.060
320+14.90	309+12.43	330+90.75	70	5,729.58	2,178.32	0.037
321+11.47	309+12.43	332+76.41	70	5,729.58	2,363.98	0.037
1362+39.34	1358+67.99	1366+10.62	70	22,918.31	742.63	NC
372+75.39	365+48.57	380+00.00	70	10,742.96	1,451.43	0.022
434+70.84	400+00.00	467+14.23	70	10,742.96	6,714.23	0.022
1376+90.46	1373+86.33	1379+94.22	70	7,161.97	607.89	0.037
1405+41.53	1400+00.46	1410+80.56	70	7,161.97	1,080.10	0.037
439+63.77	410+80.56	467+14.23	70	10,742.95	5,633.68	0.02

*Stations are taken from as-builts and may differ from those shown in the Conceptual Design plan sheets

2.8 Pedestrian Accommodations

SR 429 is a limited-access roadway, thus, there are no pedestrian facilities located on the expressway. Pedestrian facilities can be found on the cross streets within the study area. Table 2-7 summarizes the pedestrian facilities on the cross streets.

Table 2-7: SR 429 Existing Pedestrian Facilities

CROSS STREET	PEDESTRIAN FACILITY TYPE
Sinclair Road	5’ sidewalks, both sides
Connector Road	None (Limited Access)
Livingston Road	5’ sidewalks, both sides
Formosa Gardens Boulevard	5’ sidewalk on west side, south of Livingston Road. 10’ shared use path on east side.
US 192	5’ sidewalk on south side east of SR 429 interchange
Western Way	None
Seidel Road	5’ sidewalks, both sides

2.9 Bicycle Facilities

SR 429 is a limited-access roadway, thus, there are no bicycle facilities located on the expressway. Bicycle facilities can be found on some of the cross streets within the study area. Table 2-8 summarizes the bicycle facilities on the cross streets.

Table 2-8: SR 429 Existing Bicycle Facilities

CROSS STREET	BICYCLE FACILITY TYPE
Sinclair Road	None
Connector Road	None
Livingston Road	None
Formosa Gardens Boulevard	10’ shared use path on east side.
US 192	None
Western Way	None
Seidel Road	4’ bicycle lane, both sides

2.10 Transit Facilities

There are no transit routes that exist on SR 429. However, LYNX, a transportation system providing bus service in the City of Orlando as well as Orange, Seminole, and Osceola Counties and parts of Polk County and Volusia County, provides service along US 192. Bus route 55 runs along US 192 starting at US 92 and continues west of SR 429. There are LYNX signs indicating bus stops at the intersection with West Orange Lake Boulevard as well as just east of the intersection with East Orange Lake Boulevard. There are no transit benches or shelters at these locations. In addition, a planned high-frequency premium transit route is planned to run along US 192 by 2040.

2.11 Pavement Conditions

Pavement condition surveys for 2021 for the Western Beltway (SR 429) were reviewed to assess the condition of these facilities. A scale of one to ten is used to rate the pavement conditions for cracking and ride, where “one” is the worst condition and “ten” is the best, and any rating less than six is considered deficient. Last evaluated in 2020, the Western Beltway pavement condition survey within Osceola County indicated that the portion within the study limits ranged from 6.5 to 7.5 for cracking and were 7.7 for ride. Last evaluated in 2021, the Western Beltway pavement condition survey within Orange County indicated that the portion within the study limits ranged from 3.5 to 5.5 for cracking and from 6.8 to 8.0 for ride. The portion of SR 429 within Orange County had a deficient rating of 4.5 for cracking within the study limits. The deficient pavement

conditions will be addressed with the SR 429 Milling and Resurfacing from I-4 to Seidel Road (FPID Nos. 440289-1 and 440290-1, currently under design.

2.12 Traffic Volumes and Operational Conditions

A summary of the existing traffic data and traffic operational analyses is provided in this section. More detailed information is included in the Systems Interchange Justification Report provided under separate cover.

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. The data were then aggregated and balanced for continuity of flow and consistency. The final 2020 AADT volumes are summarized in Table 2-9 and in Figure 2-7Figure 2-7: 2020 (Existing) One-Way AADTs. 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 59 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 33,300 south of US 192 to 49,700 between Western Way and Seidel Road.

Table 2-9: 2020 Annual Average Daily Traffic (AADT)

MP-Location	Western Beltway	Southbound	Northbound	Total
		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**

2,200 = Mainline volume *2,200 = Ramp volume*

Figure 2-7: 2020 (Existing) One-Way AADTs

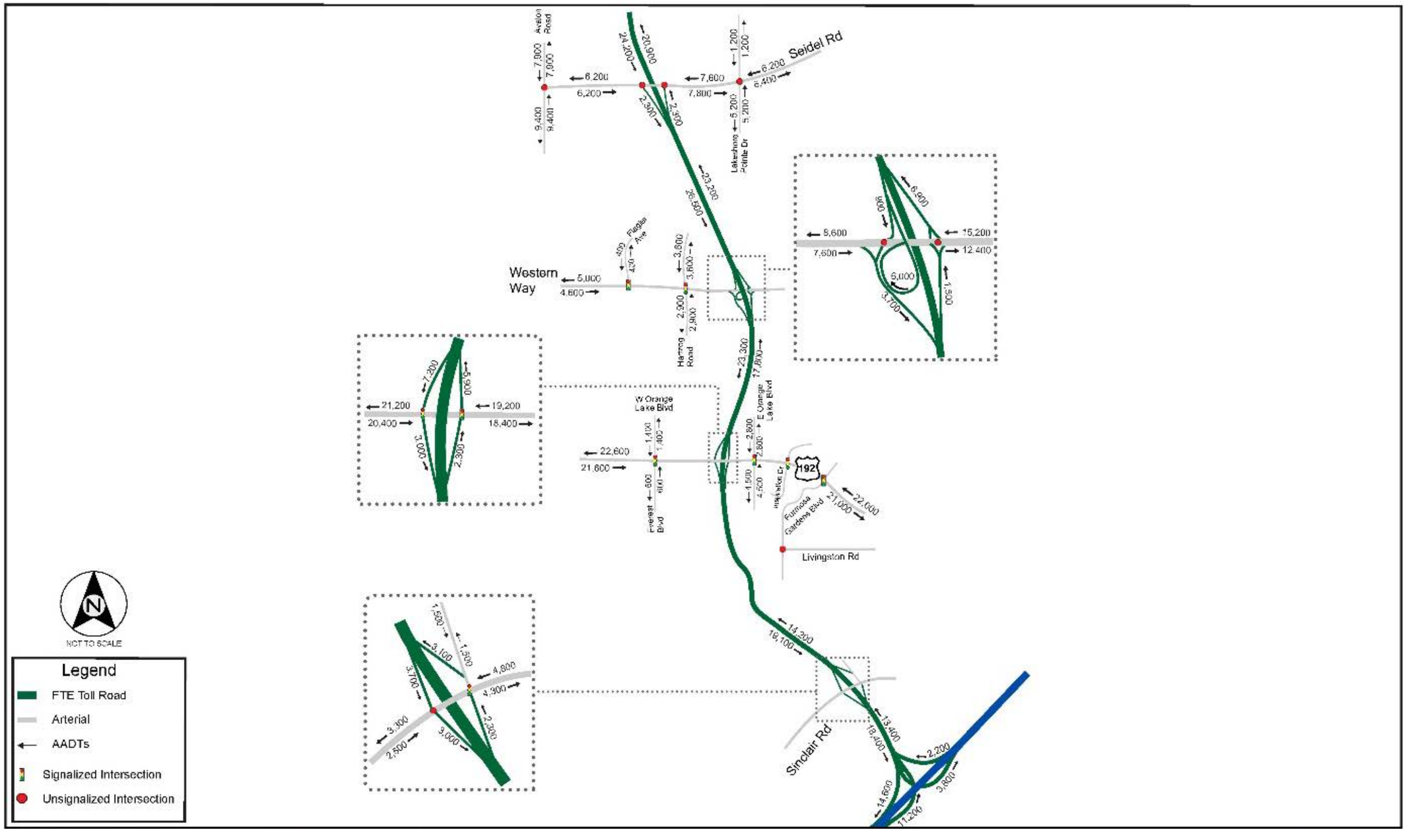


Figure 2-8 summarizes the final 2020 AM and PM peak hour volumes. The volumes show a southbound peak in the AM throughout the SR 429 mainline within the study limits. In the PM, traffic also peaks in the southbound direction south of the toll plaza but there is slightly more traffic in the northbound direction to the north of the toll plaza. Field observations and high-resolution aerial maps were used to verify the geometry. The existing lane geometry is depicted in Figure 2-9.

Freeway Segment Analysis

The SR 429 mainline segments (basic, merge/diverge, and weave) within the study limits were evaluated using HCS software Version 7.9. HCS software does not analyze junctions with Lane-add, Lane-drop, Major Merge, and Major Diverge. For those cases, the HCM methodology recommends calculating the volumes to capacity ratios on the segments up and downstream of the junction to determine whether they are over or within capacity (under capacity). For diverge junctions, densities and LOS 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 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, considering a portion of traffic executing ramp to ramp movement.

As shown in Table 2-10, the freeway segments currently operate at an acceptable LOS C or better during both the AM and PM peak hours.

Figure 2-8: 2020 (Existing) Peak Hour Volumes

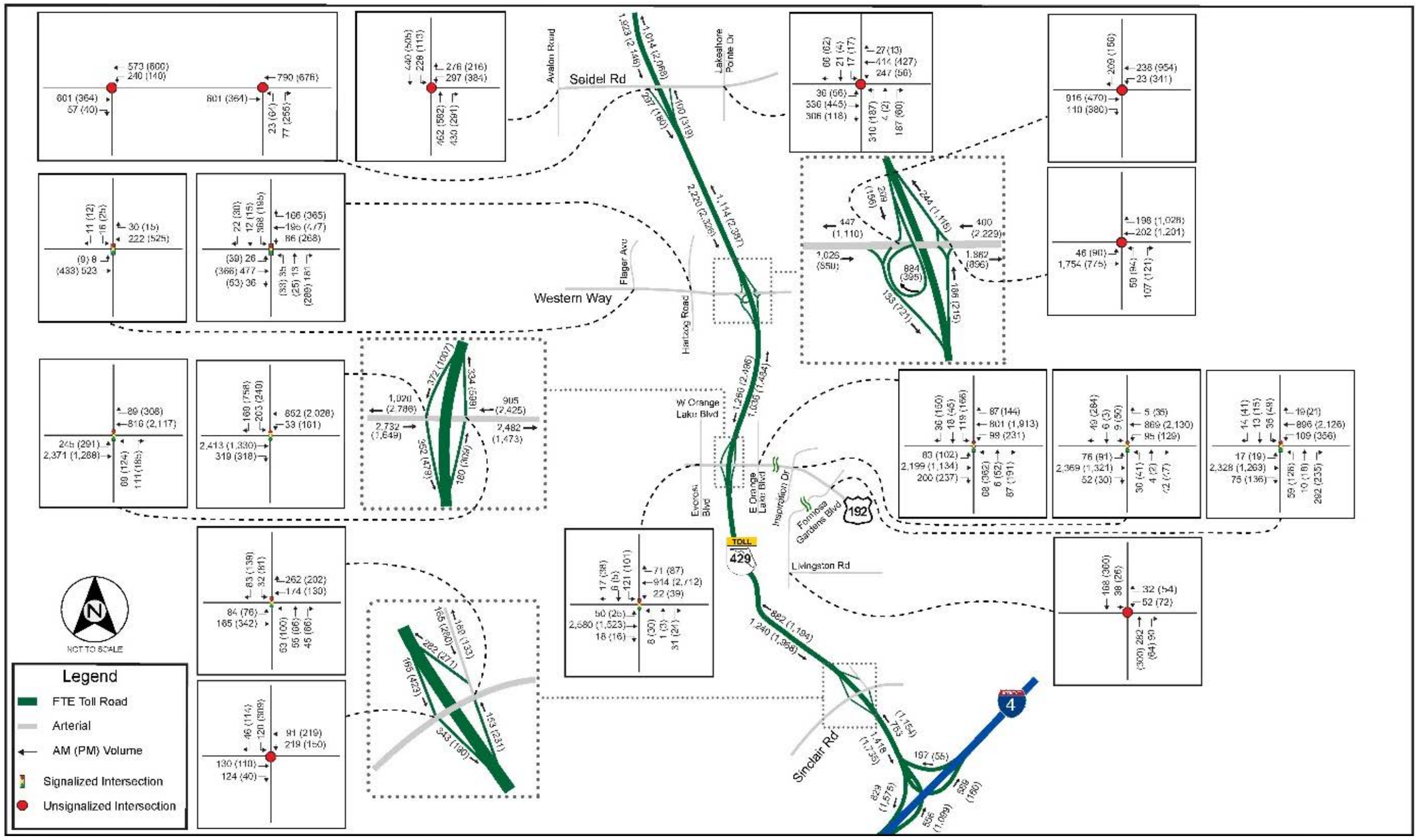


Figure 2-9: 2020 (Existing) Lane Geometry

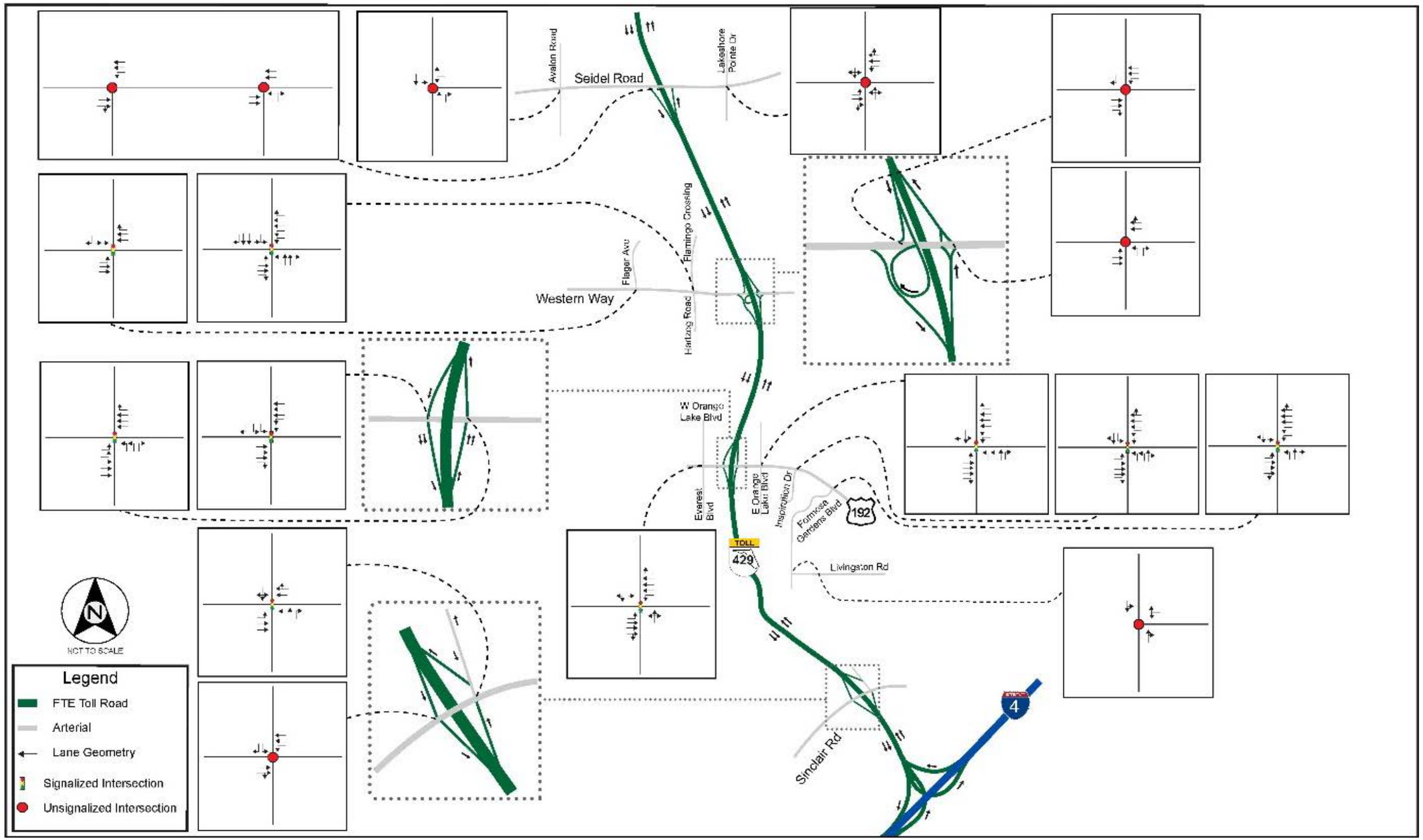


Table 2-10: 2020 (Existing) Peak Hour Freeway Mainline Segment Operations

Segment	Segment Type	Lanes	Volume (vph)		LOS/Density	
			AM	PM	AM	PM
SR 429 Southbound						
Upstream of Seidel Road On-ramp	Basic	2	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/7.5	B/18.3
Western Way On-ramp to US 192 Off-ramp	Basic	2	1,260	2,496	A/10.0	C/20.4
Western Way On-ramp to US 192 Off-ramp	Diverge	2	1,260	2,496	A/3.5	B/16.0
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/13.2	B/16.2
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; The results are based on the HCS 7.9; Truck = 7%; U/C stands for Under Capacity

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 2-11. 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. However, 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 queue backups due to its deterministic nature.

Table 2-11: 2020 (Existing) 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	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

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 2-12. 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
- Seidel Road and Lakeshore Point Drive.

Several turning movements at the intersections along US 192 are reported with unacceptable LOS F due to the heavy through traffic during the peak hours on the arterial.

Table 2-12: 2020 (Existing) AM and PM Peak Hour Synchro Intersection Level of Service/Delay (s/veh)

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	134	219	91					120		46	C (26.1)
	LOS (Delay)	Movement		A (6.0)		A (8.6)	A (0.0)					C (28.9)		A (8.9)	
		Approach		A (0.0)			A (0.0)						C (26.1)		
	Queue Length 95th (ft)	Movement		0		25						90		25	
Sinclair Road & SR 429 Northbound	Volume		88	165	8	0	176	262	58	95	83	32	0	88	A (7.6)
	LOS (Delay)	Movement	B (12.1)	A (9.8)			A (4.9)		A (9.5)	A (9.5)	A (8.7)		B (11.2)		
		Approach		B (10.5)			A (4.9)			A (7.7)			B (11.2)		
	Queue Length 95th (ft)	Movement	47	37			47		29	24	18		44		
*SR 429 Northbound Ramp & Connector Road	Volume								262	119			115		A (9.1)
	LOS (Delay)	Movement							A (9.1)				A (0.0)		
		Approach								A (8.1)			A (0.0)		
	Queue Length 95th (ft)	Movement							25				0		
US 192 & West Orange Lake Boulevard	Volume		50	2580	18	12	914	71	8	3	31	121	6	17	C (35.6)
	LOS (Delay)	Movement	F (82.2)	C (31.6)		F (155.8)	B (12.6)	A (0.2)		F (270.6)		F (130.9)	C (26.9)		
		Approach		C (32.8)			B (14.8)			F (270.6)			F (114.1)		
	Queue Length 95th (ft)	Movement	125	1313		75	113	0		#235		0	98	0	
US 192 & SR 429 Southbound	Volume		0	3419	319	59	851	0	0	0	0	203	0	169	B (15.8)
	LOS (Delay)	Movement		B (14.1)	A (0.2)	F (144.1)	A (8.8)					C (75.1)		A (9.6)	
		Approach		B (12.5)			B (13.9)						D (45.5)		
	Queue Length 95th (ft)	Movement		m133	m0	44	48					190		75	
US 192 & SR 429 Northbound	Volume		245	2371	0	0	830	89	69	0	111	0	0	0	B (18.1)
	LOS (Delay)	Movement	C (22.5)	A (1.7)			C (26.4)	A (5.5)	F (107.3)		F (86.7)				
		Approach		A (3.4)			C (24.3)			F (94.6)					
	Queue Length 95th (ft)	Movement	142	83			232	46	67		176				
US 192 & East Orange Lake Boulevard	Volume		63	2198	200	99	801	87	98	8	87	129	18	86	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 (121.3)	F (109.2)	A (8.2)		F (117.9)	A (0.8)	
		Approach		B (15.3)			C (23.6)			F (59.1)			F (80.1)		
	Queue Length 95th (ft)	Movement	183	671	29	108	90	2	92	91	0	0	291	0	
US 192 & Inspiration Drive	Volume		36	2368	52	95	869	5	30	4	62	9	6	89	C (26.6)
	LOS (Delay)	Movement	F (89.2)	C (34.6)	A (0.5)	F (129.8)	B (16.4)		F (81.8)	C (27.9)		F (106.9)	C (31.9)		
		Approach		C (36.1)			C (28.8)			F (68.6)			D (43.9)		
	Queue Length 95th (ft)	Movement	m160	827	m0	123	264		48	54		59	69		
US 192 & Formosa Gardens Boulevard	Volume		17	2325	70	109	890	19	59	10	292	95	13	34	C (34.0)
	LOS (Delay)	Movement	F (106.7)	C (29.1)		F (114.1)	B (11.5)		F (80.6)	E (79.7)	F (90.5)	F (84.9)	D (45.6)		
		Approach		C (29.6)			C (22.6)			F (90.0)			E (67.4)		
	Queue Length 95th (ft)	Movement	m42	601		128	247		134	84	412	87	32		
*Livingstone Road & Formosa Gardens Boulevard	Volume					52		52		282	99	86	168		B (19.5)
	LOS (Delay)	Movement								A (0.0)					
		Approach					B (13.5)			A (0.0)			A (9.4)		
	Queue Length 95th (ft)	Movement					25			0			25		
Western Way & Flagler Avenue	Volume		8	529	8	0	221	29	0	0	0	38	0	11	A (4.6)
	LOS (Delay)	Movement	A (1.4)	A (1.2)			A (8.1)	A (9.4)				E (94.4)		A (2.4)	
		Approach		A (1.2)			A (8.6)						C (34.3)		
	Queue Length 95th (ft)	Movement	7	68			113	38				139		8	
Western Way & Flamingo Crossing Boulevard	Volume		26	476	37	86	285	165	95	18	181	868	12	22	C (32.5)
	LOS (Delay)	Movement	E (58.0)	C (26.6)	A (0.4)	E (58.7)	C (20.4)	A (3.1)	D (54.1)	D (51.7)	C (21.1)	F (95.8)	D (40.6)	A (0.4)	
		Approach		C (26.8)			C (21.4)			C (28.0)			F (85.2)		
	Queue Length 95th (ft)	Movement	63	224	0	64	82	38	68	38	86	204	13	0	
*Western Way & SR 429 Southbound	Volume			918	110	18	238							204	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		25								25	
*Winston Way & SR 429 Northbound	Volume		48	1754			202	198	59		107				F (>999)
	LOS (Delay)	Movement	A (7.8)	A (0.2)			A (0.0)	A (0.0)	F (>999)		D (27.3)				
		Approach		A (0.2)			0			F (109.6)					
	Queue Length 95th (ft)	Movement	25						250		367				
*Seidel Road & Avalon Road	Volume					296		276		462	430	228	440		F (>999)
	LOS (Delay)	Movement				F (>999)		C (25.4)		A (0.0)	A (0.0)	F (89.1)	A (0.0)		
		Approach					F (>999)			A (0.0)			F (88.1)		
	Queue Length 95th (ft)	Movement					1125			0			225		
*Seidel Road & SR 429 Southbound	Volume			601	56	241	571								B (10.6)
	LOS (Delay)	Movement		A (0.0)	A (0.0)	B (10.6)									
		Approach		A (0.0)			B (10.6)								
	Queue Length 95th (ft)	Movement		0		50									
*Seidel Road & SR 429 Northbound	Volume			601			790		25		77				B (12.2)
	LOS (Delay)	Movement		A (0.0)			A (0.9)		C (16.1)		B (11.1)				
		Approach		A (0.0)			A (0.9)			B (12.2)					
	Queue Length 95th (ft)	Movement		0			0		25		29				
*Seidel Road & Lakeshore Point Drive	Volume		36	336	300	247	414	27	310	4	187	17	21	60	F (>999)
	LOS (Delay)	Movement	A (8.9)	A (0.2)	A (0.0)	B (13.2)	A (0.0)	A (0.0)		F (>999)			F (>999)		
		Approach		A (0.5)			B (13.2)			F (>999)			F (>999)		
	Queue Length 95th (ft)	Movement	25			75				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

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

Level Of Service (LOS) E reflecting at capacity operations
Level Of Service (LOS) F reflecting over capacity operations

Table 2-12: 2020 (Existing) AM and PM Peak Hour Synchro Intersection Level of Service/Delay (s/veh) (continued)

Intersections	Measure of Effectiveness (MOE)	Location	PM Movement/Approach LOS (Delay)												Intersection
			Eastbound			Westbound			Northbound			Southbound			PM LOS
			Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	(Delay)
*Sinclair Road & SR 429 Southbound	Volume			110	40	100	219					306		114	
	LOS (Delay)	Movement		A (0.5)		A (7.9)	A (0.0)					F (57.6)		A (9.6)	
		Approach		A (0.5)			A (1.1)						D (29.6)		D (29.6)
	Queue Length 95th (ft)	Movement		0		25						179		25	
Sinclair Road & SR 429 Northbound	Volume		76	342	0	0	180	202	100	66	66	81	0	100	
	LOS (Delay)	Movement	C (20.1)	B (17.6)			A (8.1)		A (7.7)	A (7.0)	A (3.4)		C (20.6)		B (13.4)
		Approach		B (17.9)			A (8.1)			A (6.0)			C (20.6)		
	Queue Length 95th (ft)	Movement	55	98			52		37	26	14		110		
*SR 429 Northbound Ramp & Connector Road	Volume								271	72			220		
	LOS (Delay)	Movement							A (8.5)	A (0.0)			A (0.0)		A (7.1)
		Approach								A (7.1)			A (0.0)		
	Queue Length 95th (ft)	Movement											0		
US 192 & West Orange Lake Boulevard	Volume		25	1540	16	29	2712	51	90	3	34	101	5	99	
	LOS (Delay)	Movement	F (132.8)	C (29.4)		F (132.8)	D (46.7)	A (3.6)		F (1043.6)		F (142.1)	B (18.0)		F (66.4)
		Approach		C (31.0)			D (46.6)			F (1043.6)			F (135.2)		
	Queue Length 95th (ft)	Movement	84	824		m#8	m#1178	m1		#273		0	45	0	
US 192 & SR 429 Southbound	Volume		0	1361	318	161	2030	0	0	0	0	340	0	758	
	LOS (Delay)	Movement		C (29.8)	A (0.3)	F (151.7)	B (11.1)					D (50.6)		F (189.0)	D (49.9)
		Approach		C (24.3)			C (21.6)						F (156.8)		
	Queue Length 95th (ft)	Movement		m#408	m0	170	283					183		#1758	
US 192 & SR 429 Northbound	Volume		291	1339	0	0	2117	303	134	0	185	0	0	0	
	LOS (Delay)	Movement	E (67.6)	A (1.3)			A (2.1)	A (0.4)	F (180.0)		F (92.5)				
		Approach		B (13.1)			A (2.3)			F (99.5)					B (13.0)
	Queue Length 95th (ft)	Movement	308	53			59	m1	132		279				
US 192 & East Orange Lake Boulevard	Volume		306	1173	245	831	1913	144	562	52	191	166	45	267	
	LOS (Delay)	Movement	F (102.6)	C (26.5)	A (5.1)	F (134.3)	D (54.9)	B (13.2)	F (127.3)	F (91.7)	B (14.6)		F (123.2)	B (15.9)	D (52.7)
		Approach		C (27.8)			E (67.7)			F (82.8)			E (74.4)		
	Queue Length 95th (ft)	Movement	213	210	16	#280	1081	101	#330	130	93	0	619	0	
US 192 & Inspiration Drive	Volume		91	1321	30	139	2130	35	41	2	49	50	3	284	
	LOS (Delay)	Movement	F (146.6)	C (33.2)	A (0.1)	F (130.3)	C (26.7)		F (64.9)	C (28.4)		F (100.3)	F (86.6)		D (47.1)
		Approach		C (30.5)			C (32.0)			E (60.0)			F (88.6)		
	Queue Length 95th (ft)	Movement	#263	304	0	155	668		#67	53		142	402		
US 192 & Formosa Gardens Boulevard	Volume		39	1263	136	856	2136	31	136	58	239	69	55	61	
	LOS (Delay)	Movement	F (195.6)	C (29.6)		F (169.8)	B (15.6)		F (129.1)	F (86.5)	B (14.0)	F (94.9)	C (32.1)		C (31.8)
		Approach		C (29.7)			C (38.2)			E (59.7)			E (61.3)		
	Queue Length 95th (ft)	Movement	0	360		203	787		279	58	94	129	72		
*Livingstone Road & Formosa Gardens Boulevard	Volume					71		54		830	84	39	360		
	LOS (Delay)	Movement								A (0.0)					C (16.4)
		Approach					C (16.4)			A (0.0)			A (9.3)		
	Queue Length 95th (ft)	Movement				32				0			25		
Western Way & Flagler Avenue	Volume		0	410	0	0	520	33	0	0	0	29	0	13	
	LOS (Delay)	Movement	A (2.0)	A (1.4)			B (19.4)	B (14.9)				E (57.1)		C (24.3)	
		Approach		A (1.4)			B (19.3)						B (46.5)		B (13.8)
	Queue Length 95th (ft)	Movement	4	40			274	27				29		23	
Western Way & Flamingo Crossing Boulevard	Volume		89	366	53	268	477	365	93	25	289	194	15	29	
	LOS (Delay)	Movement	E (59.8)	C (26.5)	A (0.5)	D (50.5)	B (19.4)	A (3.6)	E (62.5)	D (51.1)	C (26.1)	E (59.9)	B (45.2)	A (9.6)	C (27.2)
		Approach		C (27.9)			C (21.9)			C (26.4)			D (51.7)		
	Queue Length 95th (ft)	Movement	68	173	2	152	198	64	82	24	87	127	28	0	
*Western Way & SR 429 Southbound	Volume			470	360	341	954							156	
	LOS (Delay)	Movement		A (0.5)	A (0.0)	B (10.1)	A (0.0)							C (15.2)	C (15.2)
		Approach		A (0.5)			A (2.7)						C (15.2)		
	Queue Length 95th (ft)	Movement		0		50								60	
*Western Way & SR 429 Northbound	Volume		90	775			1301	1029	94		121				
	LOS (Delay)	Movement	B (18.0)	A (0.0)			A (0.0)	A (0.0)	F (71.8)		B (12.7)				F (58.6)
		Approach		A (1.4)			A (0.0)			F (58.6)					
	Queue Length 95th (ft)	Movement	25				0		108		25				
*Sandel Road & Avalon Road	Volume					366		216		582	291	113	505		
	LOS (Delay)	Movement				F (>999)		C (30.4)		A (0.0)	A (0.0)	C (21.6)	A (0.0)		F (>999)
		Approach					F (>999)			A (0.0)			C (21.8)		
	Queue Length 95th (ft)	Movement					1230			0			50		
*Sandel Road & SR 429 Southbound	Volume			364	40	140	600								
	LOS (Delay)	Movement		A (0.5)	A (0.0)	A (8.8)									A (8.8)
		Approach		A (0.5)			A (8.8)								
	Queue Length 95th (ft)	Movement		0		25									
*Sandel Road & SR 429 Northbound	Volume			364			877		64		293				
	LOS (Delay)	Movement		A (0.5)			A (0.0)		B (14.5)		B (11.9)				B (12.4)
		Approach		A (0.5)			A (0.0)			B (13.4)					
	Queue Length 95th (ft)	Movement		0			0		25		50				
*Sandel Road & Lakeshore Point Drive	Volume		56	666	118	56	629	13	187	2	60	17	4	63	
	LOS (Delay)	Movement	A (9.9)	A (0.0)	A (0.0)	A (9.5)	A (0.0)	A (0.0)		F (204.2)			C (17.4)		F (204.2)
		Approach		A (0.9)			A (9.5)			F (204.2)			C (17.4)		
	Queue Length 95th (ft)	Movement	25			25				458			50		

Synchro Version 11 Build 168; *Unsignalized intersection analyzed using HCS v7.9; NA - 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

2.13 Intersection Layout

Since SR 429 is a limited-access roadway, there are no signalized intersections located along it. However, there are intersections with the ramp terminals at each interchange cross street. The ramp terminal intersections at US 192 and the northbound ramp terminal intersection at Sinclair Road are signalized. The ramp terminal intersections at Western Way and Seidel Road, as well as the southbound ramp terminal for Sinclair Road, are stop controlled.

Sinclair Road

Sinclair Road is a four-lane divided urban section at the interchange with SR 429. The SR 429 northbound off-ramp intersection is signal-controlled. The off-ramp has one left turn lane, one through lane (to Connector Road), and one right turn lane. Eastbound Sinclair Road has one left turn lane to Connector Road. The southbound off-ramp is stop controlled at the intersection with Sinclair Road. The off-ramp has one left turn/through lane and one right turn lane. Westbound Sinclair Road has one left turn lane to the southbound on-ramp to SR 429.

US 192

US 192 is a six-lane divided urban section at the interchange with SR 429. The SR 429 northbound off-ramp intersection is signal-controlled. The off-ramp has two left turn lanes and one right turn lane. Eastbound US 192 has two left turn lanes to the northbound on-ramp. Westbound US 192 has one right turn lane to the northbound on-ramp. The southbound off-ramp intersection is signal-controlled. The off-ramp has two left turn lanes and one right turn lane. Westbound US 192 has two left turn lanes to the southbound on-ramp to SR 429. Eastbound US 192 has one right turn lane to the southbound on-ramp.

Western Way

Western Way is a four-lane divided urban section at the interchange with SR 429. The SR 429 northbound off-ramp is stop-controlled. The off-ramp has one left turn lane that is stop controlled and a dedicated right turn lane that is yield controlled. Eastbound Western Way has one left turn lane to the northbound on-ramp and is yield controlled. Westbound Western Way has one right turn lane to the northbound on-ramp and is yield controlled. The southbound off-ramp to westbound Western Way intersection is one lane and yield controlled. The southbound off-ramp to eastbound Western Way intersection is one lane and yield controlled. Westbound Western Way has one left turn lane to the southbound on-ramp to SR 429 that is stop controlled. Eastbound Western Way has one right turn lane to the southbound on-ramp.

Seidel Road

Seidel Road is a four-lane divided urban section at the interchange with SR 429. The interchange is a half diamond interchange. The SR 429 northbound off-ramp intersection has one left turn lane that is stop-controlled, while the right turn lane is yield controlled. Westbound Seidel Road has one left turn lane to the southbound on-ramp to SR 429 that is yield controlled.

2.14 Railroad Crossings

No railroad crossings are located within the study area.

2.15 Crash Data and Safety Analysis

A summary of the crash data and safety analysis is provided in this section. More detailed information is included in the Systems Interchange Justification Report provided under separate cover.

2.15.1 Overall Crash Data Analysis

Crash data for state roads within the project Area of Influence (AOI) were processed using the most recent five-year data from FDOT's Crash Analysis Reporting System (CARS), from 2014 through 2018. Crash data for non-state roads were obtained from the Signal Four Analytics tool, an FDOT-funded database developed in coordination with the state's CARS. Signal Four data were processed for the same time period as the CARS data. Detailed crash reports (long/short forms) were reviewed to verify the accuracy of the information obtained from the database.

A total of 647 crashes were reported within the AOI during the five-year study period from 2014 through 2018, as presented in Table 2-13. The number of crashes in the study area increased each year except 2018. Most of the crashes resulted in injury and property damage only. Seven fatal crashes were reported during the five-year analysis period.

Table 2-13: 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	9.9%
Possible Injury	16	24	28	38	28	134	20.7%
Property Damage Only	72	68	71	114	96	421	65.1%
Total	**96**	**114**	**123**	**173**	**141**	**647**	**100.0%**

Table 2-14 summarizes the crashes based on location. Forty-one percent of the crashes occurred at the intersections, 24.1 percent along the SR 429 mainline, 8.3 percent along the SR 429 ramps, and 26.6 percent at the midblock along the arterials within the project limits.

Table 2-14: 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	24.1%
SR 429 Ramps	10	9	8	14	13	54	8.3%
Intersections	48	48	54	60	55	265	41.0%
Midblock	28	40	29	48	27	172	26.6%
Total	**96**	**114**	**123**	**173**	**141**	**647**	**100.0%**

Figure 2-10 shows all fatal crashes within the study area. A total number of seven fatal crashes were reported, two (2) occurred along SR 429 mainline between Sinclair Road and US 192 interchanges, three (3) along the SR 429 ramps, and two (2) at the intersection of US 192 at East Orange Lake Boulevard and Blake Lake Road/Inspiration Drive. Four out of seven fatal crashes occurred due to off-road crash type.

Figure 2-10: Fatal Crash Location Map (2014-2018)

SR 429 Mainline from I-4 to Seidel Road Crashes

A total of 156 crashes were reported along the SR 429 mainline from I-4 to the Seidel Road interchange 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 in Figure 2-11. 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 2-11: SR 429 Mainline Crash Data Summary from I-4 to Seidel Road (2014-2018)

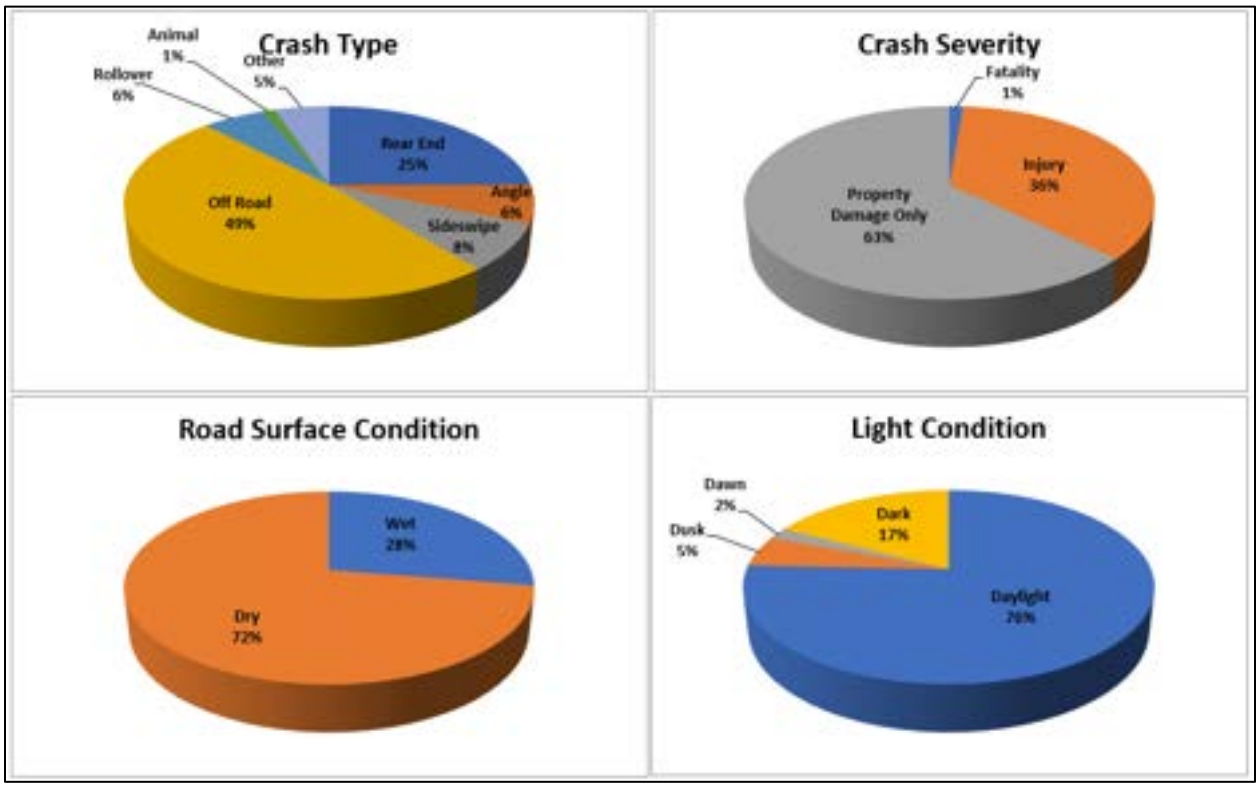


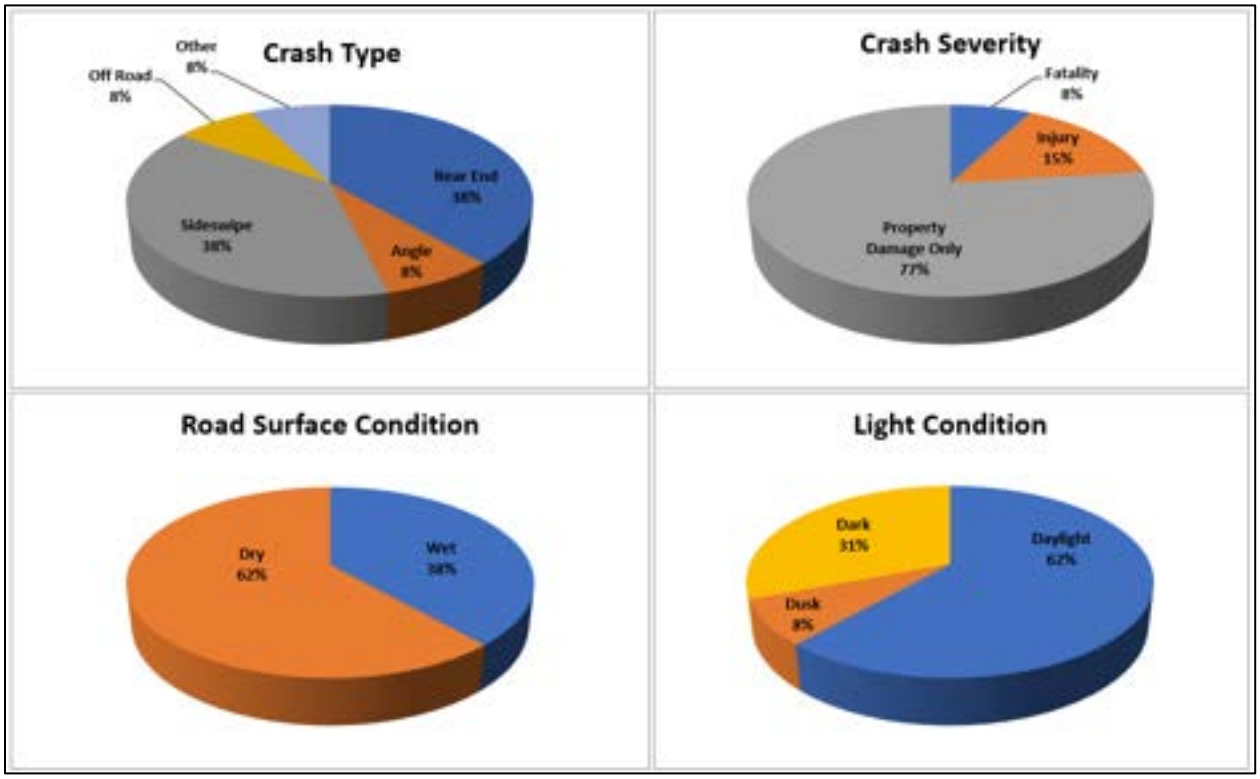
Figure 2-12 shows crash locations along the SR 429 mainline and ramps. There is a higher concentration of crashes at the merge/diverge areas of the interchanges. The highest number of crashes is reported close to the US 192 and Western Way interchanges. There is congestion at these two locations during the evening commute.

Figure 2-12: SR 429 Mainline and Ramps Historical Crash Heat Map (2014-2018)

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 crash type have the most percentage with 38 percent for each of them. The remaining three 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. The other two (2) crashes resulted in injury and the rest of them resulted in property damage only. 62 percent of crashes occurred under dry road surface conditions, mostly during the day, as shown in Figure 2-13.

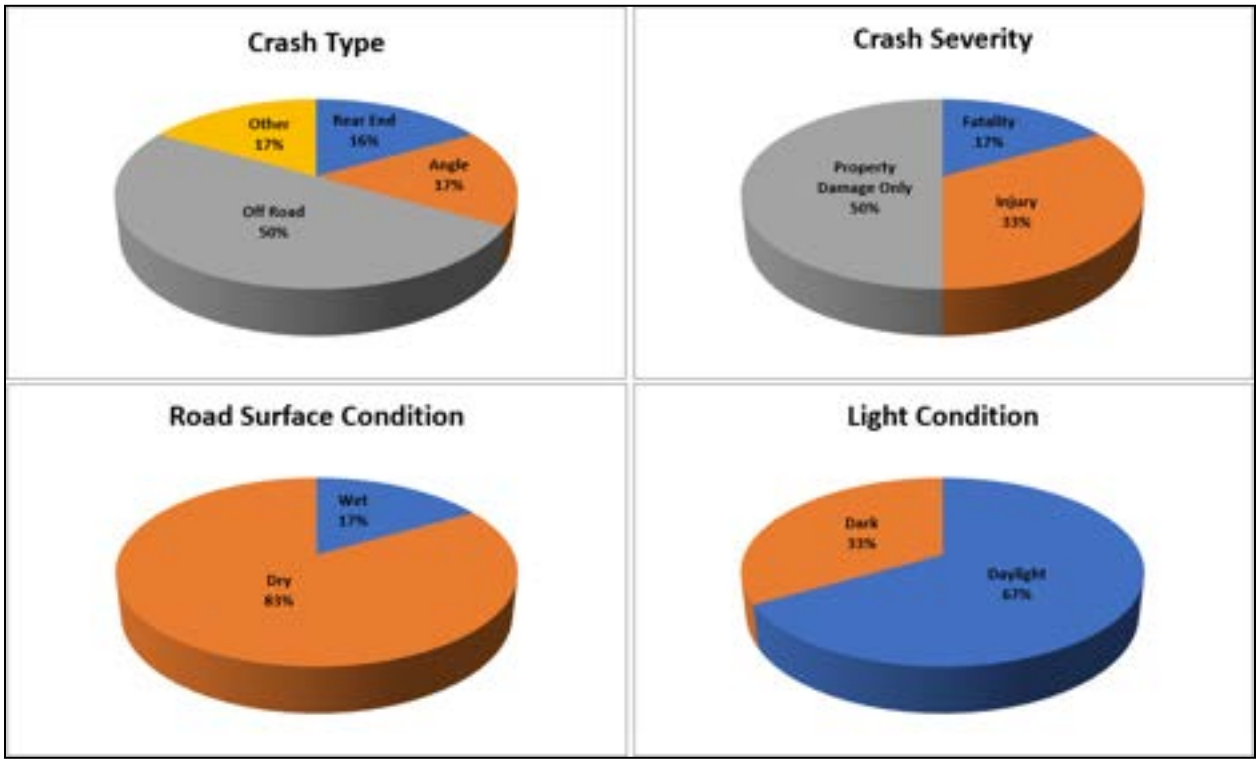
Figure 2-13: I-4 and SR 429, System-to-System Interchange Ramps Crash Data Summary (2014-2018)



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

A total of six (6) crashes were reported along the Sinclair Road interchange ramps during the five-year analysis period. Three out of 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 and occurred on either a Thursday or a Friday. The crashes occurred under dry road surface conditions, mostly during the day, as shown in Figure 2-14.

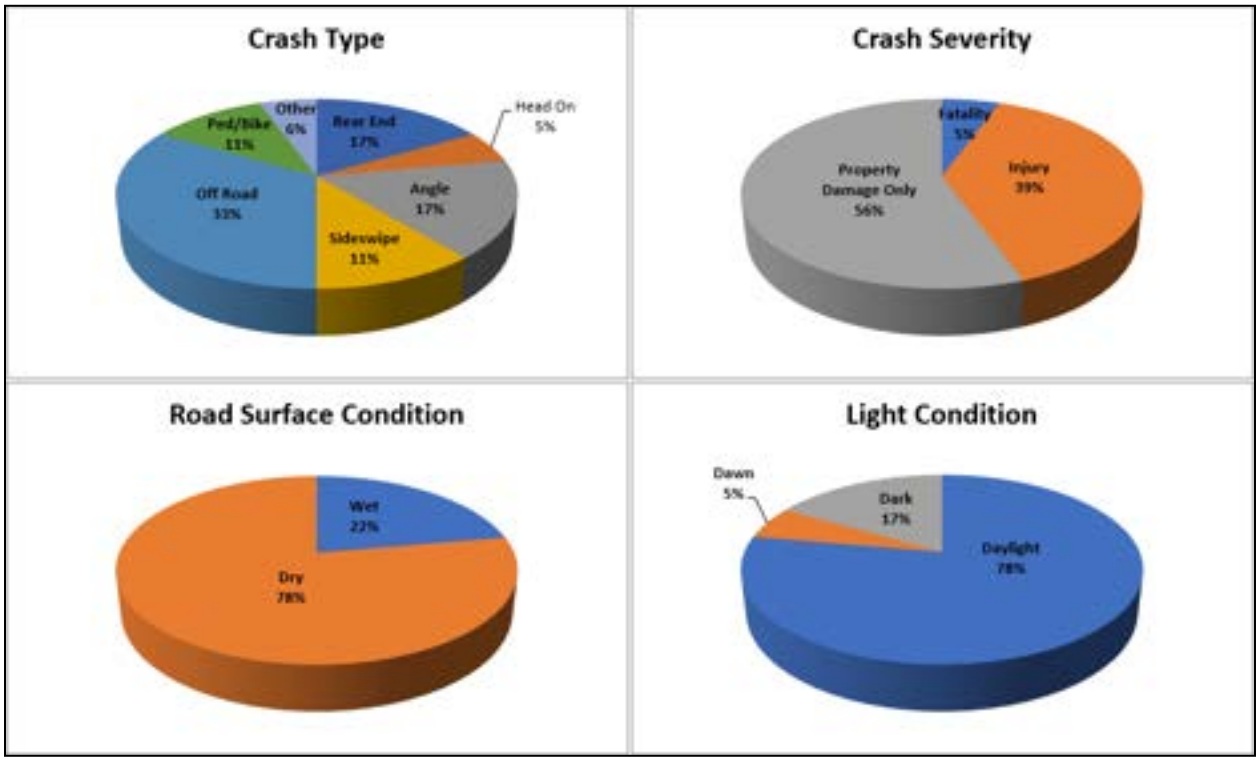
Figure 2-14: Sinclair Road and SR 429 Interchange Ramps Crash Data Summary (2014-2018)



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 in Figure 2-15, 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.

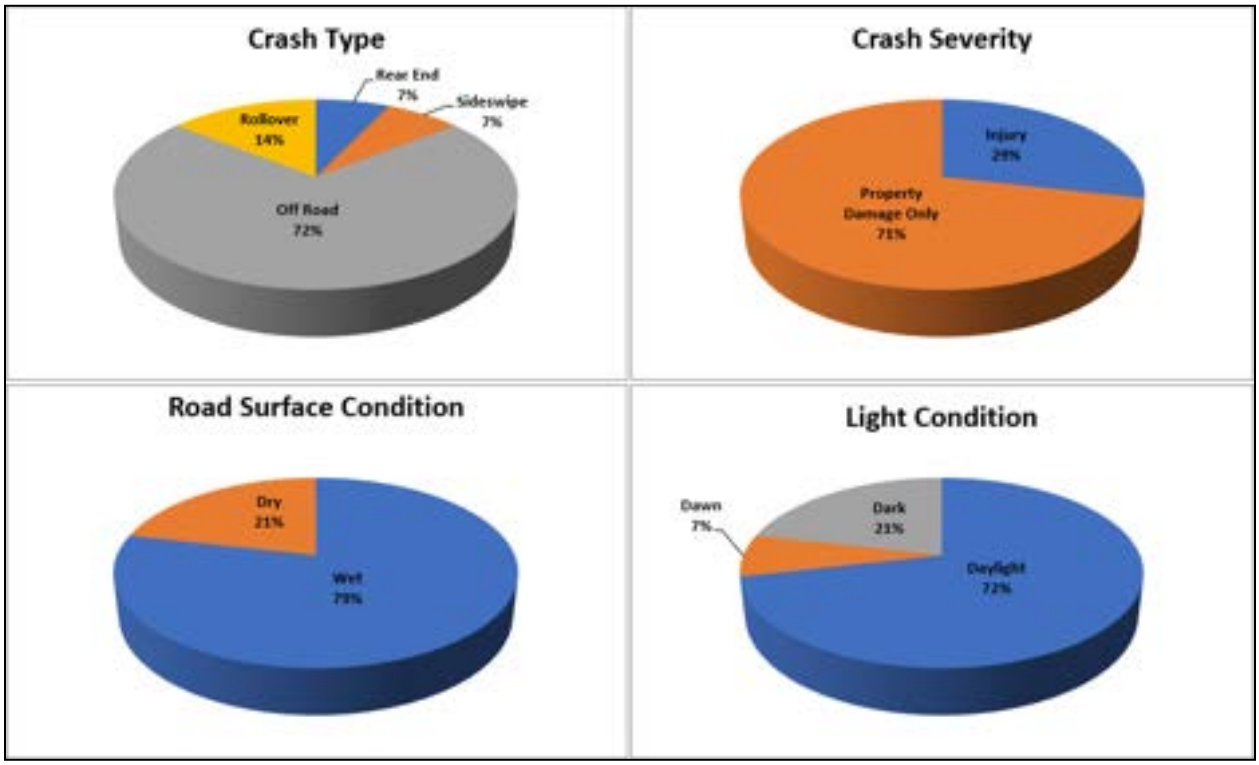
Figure 2-15: US 192 and SR 429 Interchange Ramps Crash Data Summary



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 in Figure 2-16, 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.

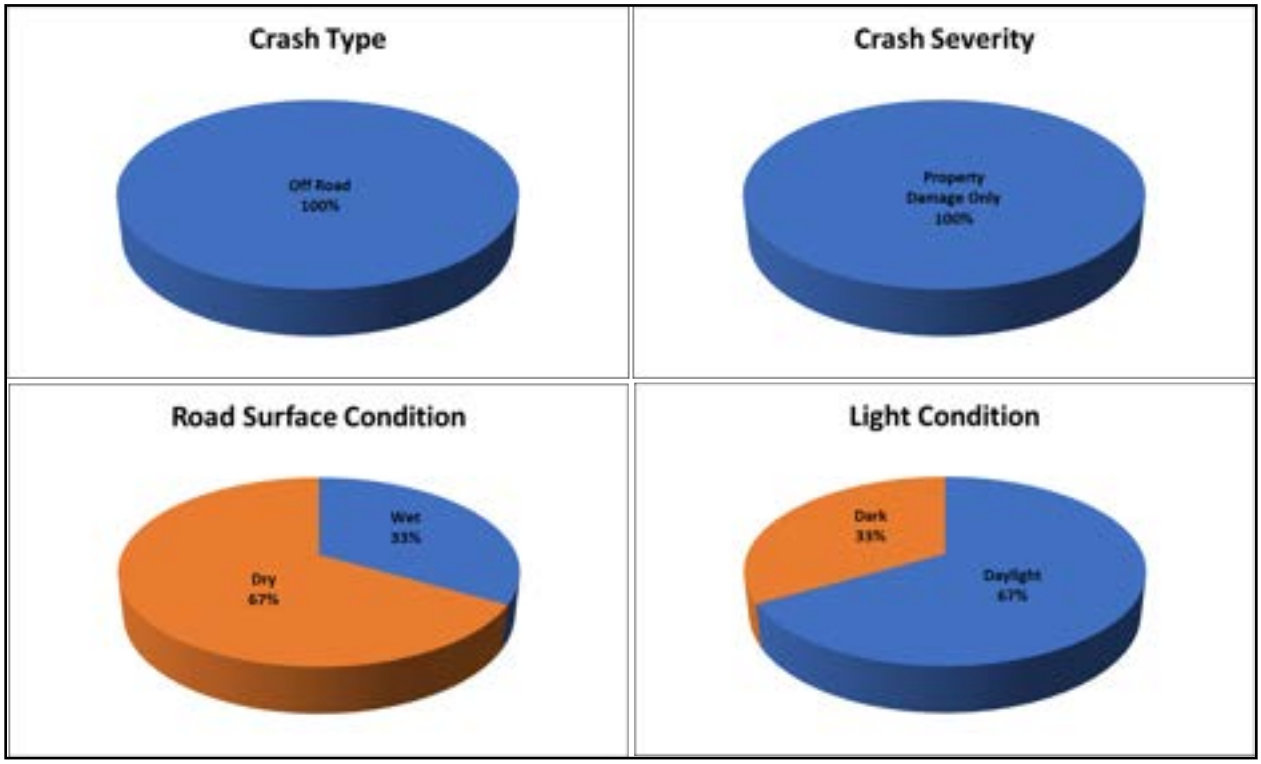
Figure 2-16: Western Way and SR 429 Interchange Ramps Crash Data Summary



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 in Figure 2-17, the crashes resulted in property damage only, under dry road surface conditions.

Figure 2-17: Seidel Road and SR 429 Interchange Ramps Crash Data Summary



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 2-15.

Table 2-15: Mainline and Ramp 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	0.16	0.65	1.15	0.14
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 Osceola County, 5-year Average Crash Rate*
Western Beltway Mainline: Toll Road Urban
Western Beltway Ramps: Ramp Urban
Crash rate not available, used rate for mainline

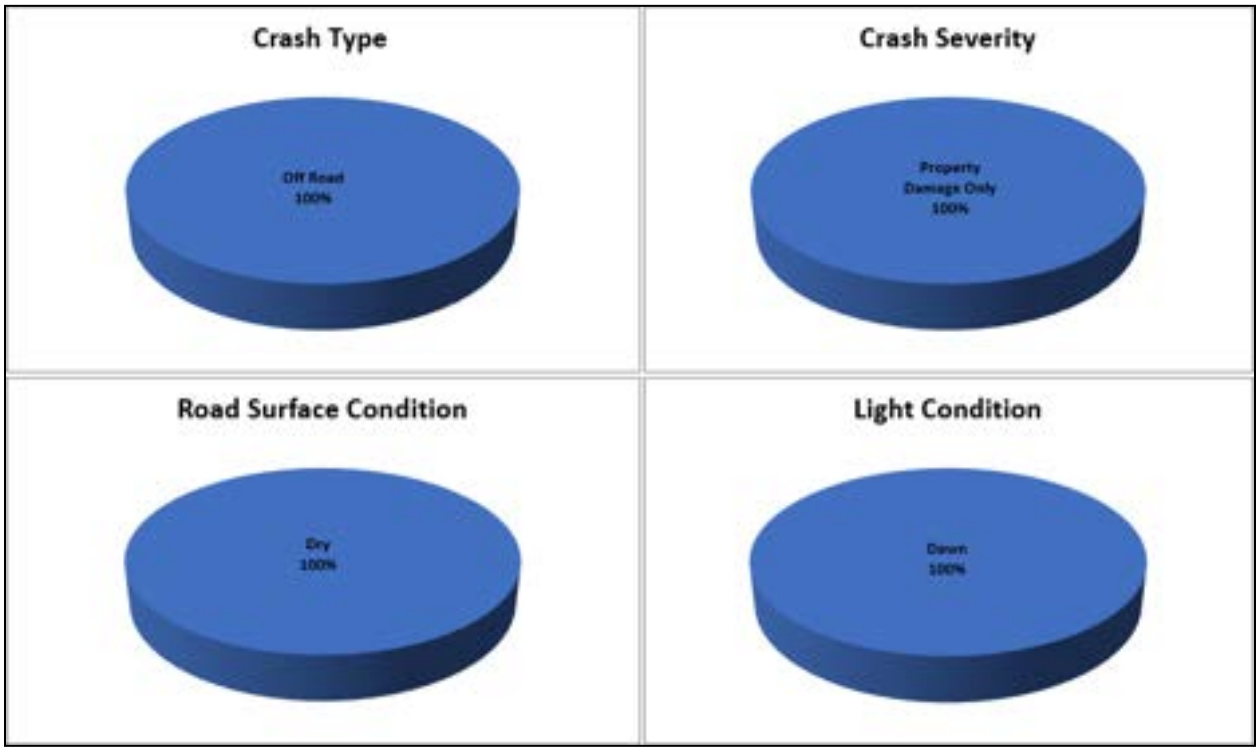
2.15.2 Intersection Crashes

Signal Four Analytics, a FDOT funded database developed in coordination with the state's CARS, 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.

Seidel Road and 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. It resulted in injury and occurred under dry road surface conditions, as shown in Figure 2-18.

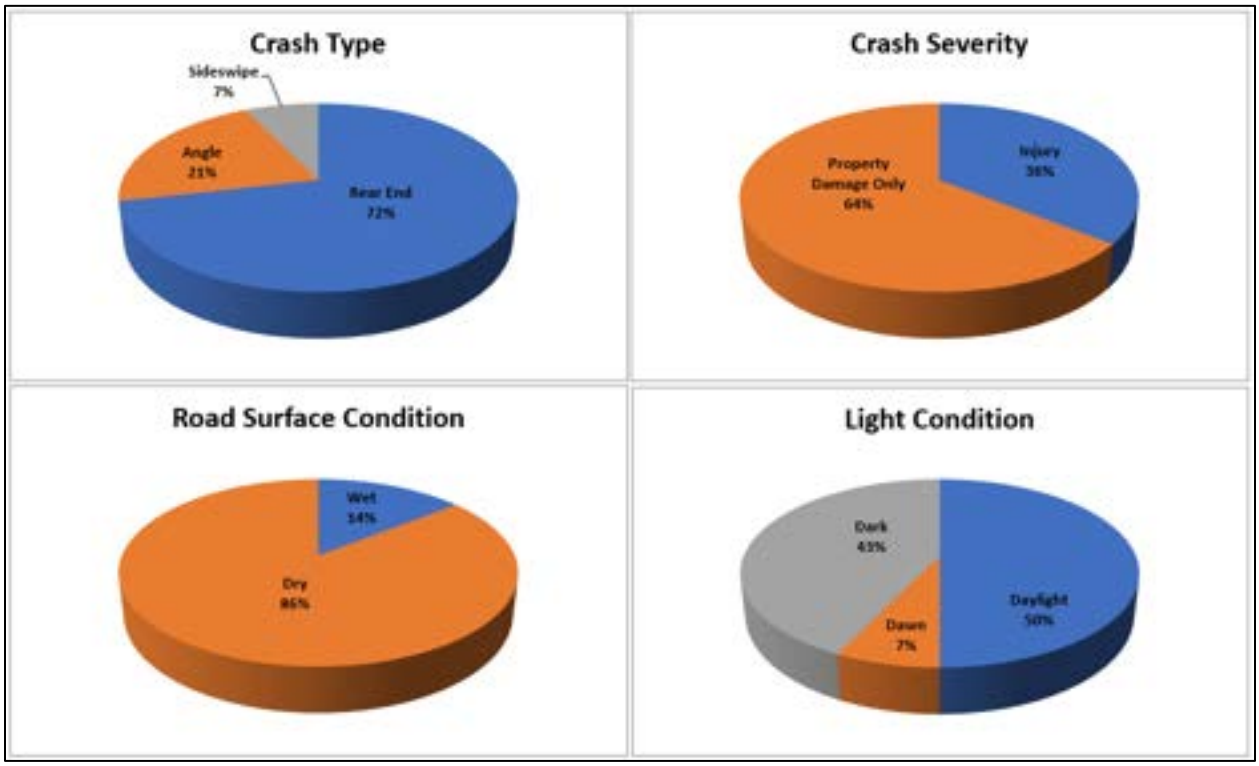
Figure 2-18: Sinclair Road and SR 429 Intersections Crash Data Summary



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 in Figure 2-19, most of the crashes were rear-end collisions. Property damage only was the most common severity types. No fatal crash was 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.

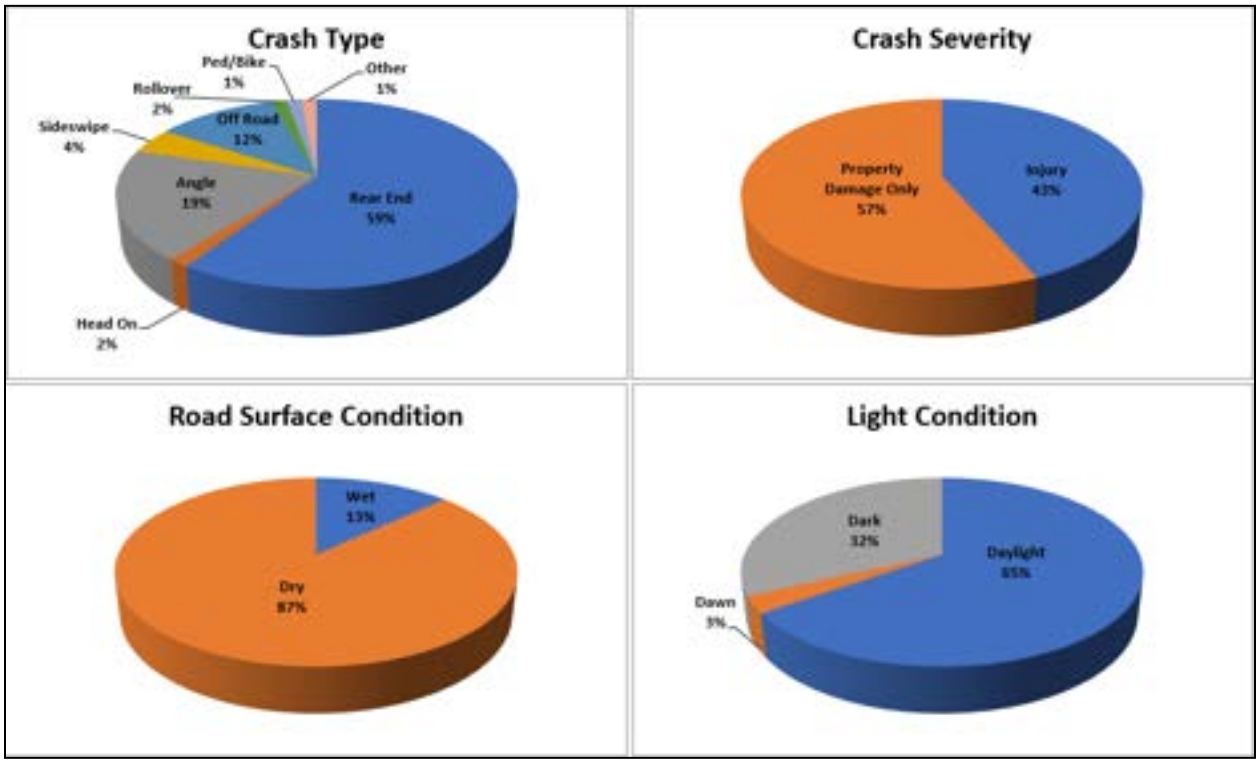
Figure 2-19: US 192 and West Orange Lake Boulevard Intersections Crash Data Summary (2014-2018)



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 intersection experiences congestion during the evening commute. As illustrated in Figure 2-20, most of the crashes were rear-end collisions. Property damage only was the most common severity types. Most of the crashes occurred under dry road surface conditions during the day. Crash occurrence was somewhat evenly distributed throughout the week.

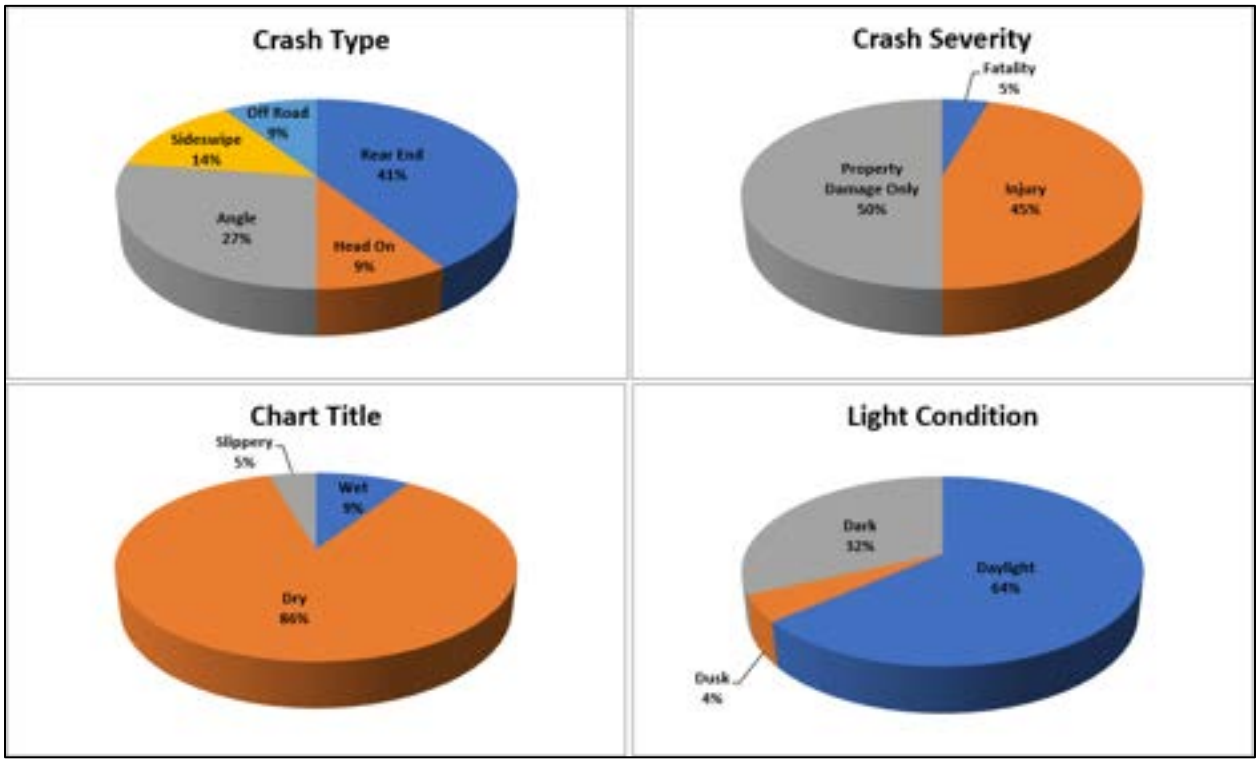
Figure 2-20: US 192 and SR 429 Intersections Crash Data Summary



US 192 and East Orange Lake Boulevard Intersection

A total of 22 crashes were reported at the US 192 and East Orange 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 2-21, 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.

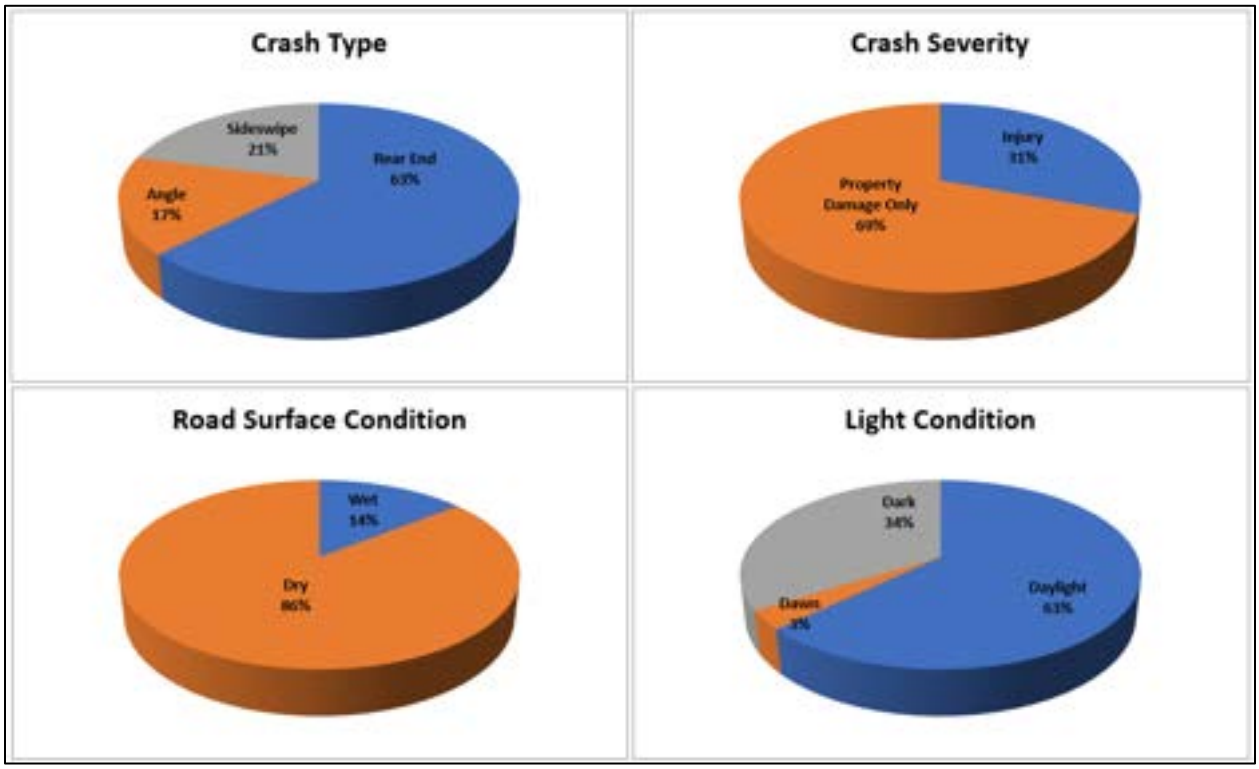
Figure 2-21: US 192 and East Orange Lake Boulevard Intersection Crash Data Summary (2014-2018)



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 31 percent of the total crashes resulted in injuries. As shown in Figure 2-22, rear-end crashes (approximately 63 percent) and sideswipe crashes (approximately 21 percent) were the prominent crash types at the intersection. Reports indicated that 86 percent of the crashes occurred during dry roadway conditions and 63 percent of the crashes occurred during daylight conditions.

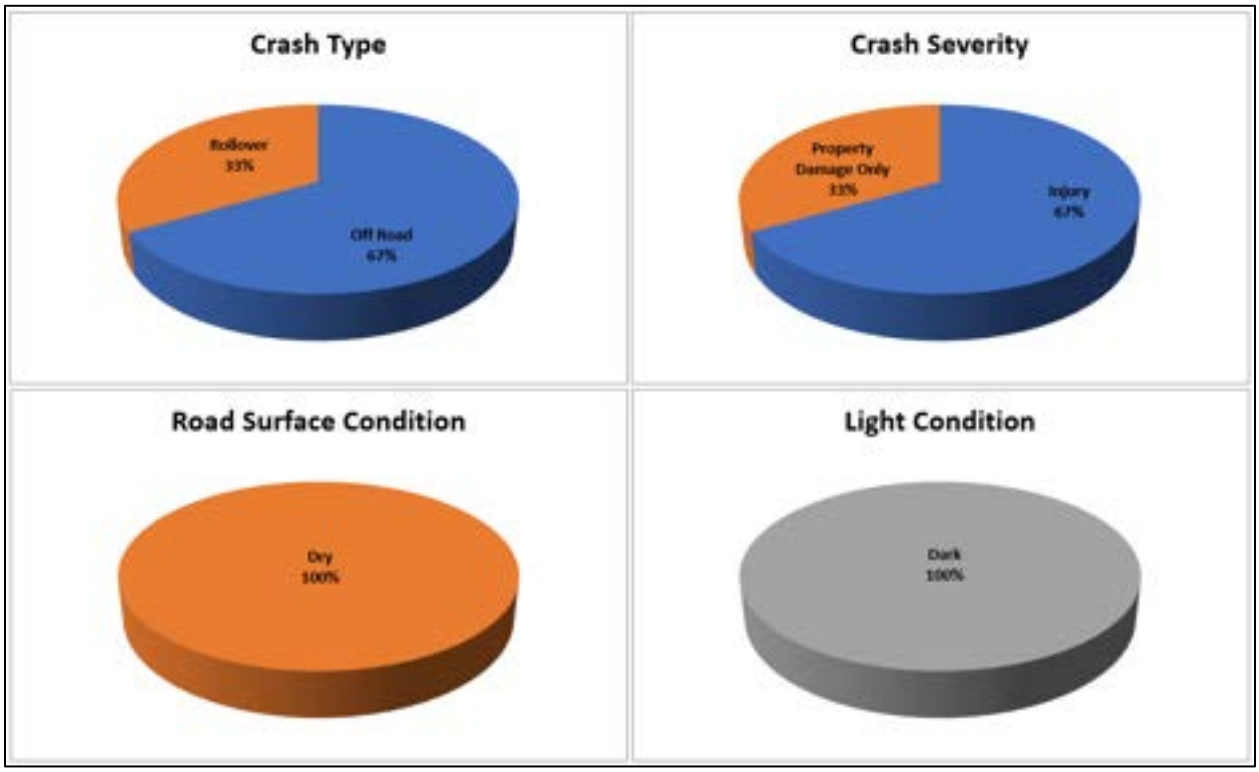
Figure 2-22: US 192 and Inspiration Road Intersection Crash Data Summary (2014-2018)



Western Way and Flamingo Road Intersection

A total of 3 crashes were reported at the Western Way and Flamingo Road intersection during the five-year analysis period. No fatal crash was reported during the study period. At least 67 percent of the total crashes resulted in injuries. As shown in Figure 2-23, 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.

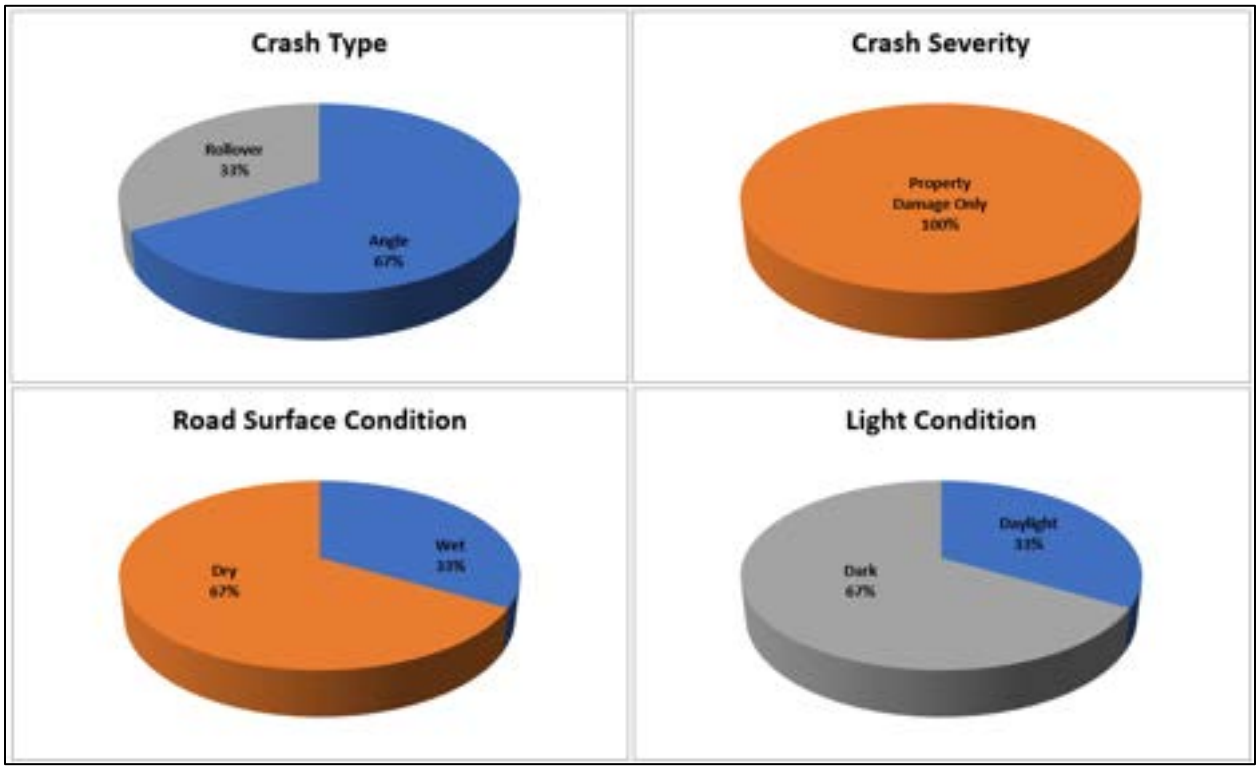
Figure 2-23: Western Way and Flamingo Road Intersection Crash Data Summary (2014-2018)



Western Way and SR 429 Ramp Terminal Intersections

A total of 3 crashes were reported at the Western Way and the SR 429 ramp terminal intersections during the five-year analysis period. All crashes resulted in injuries. As shown in Figure 2-24, angle crashes (approximately 67 percent) and rollover crashes (approximately 33 percent) were the prominent crash types at the intersection. Reports indicated that 67 percent of the crashes occurred during dry and dark roadway conditions.

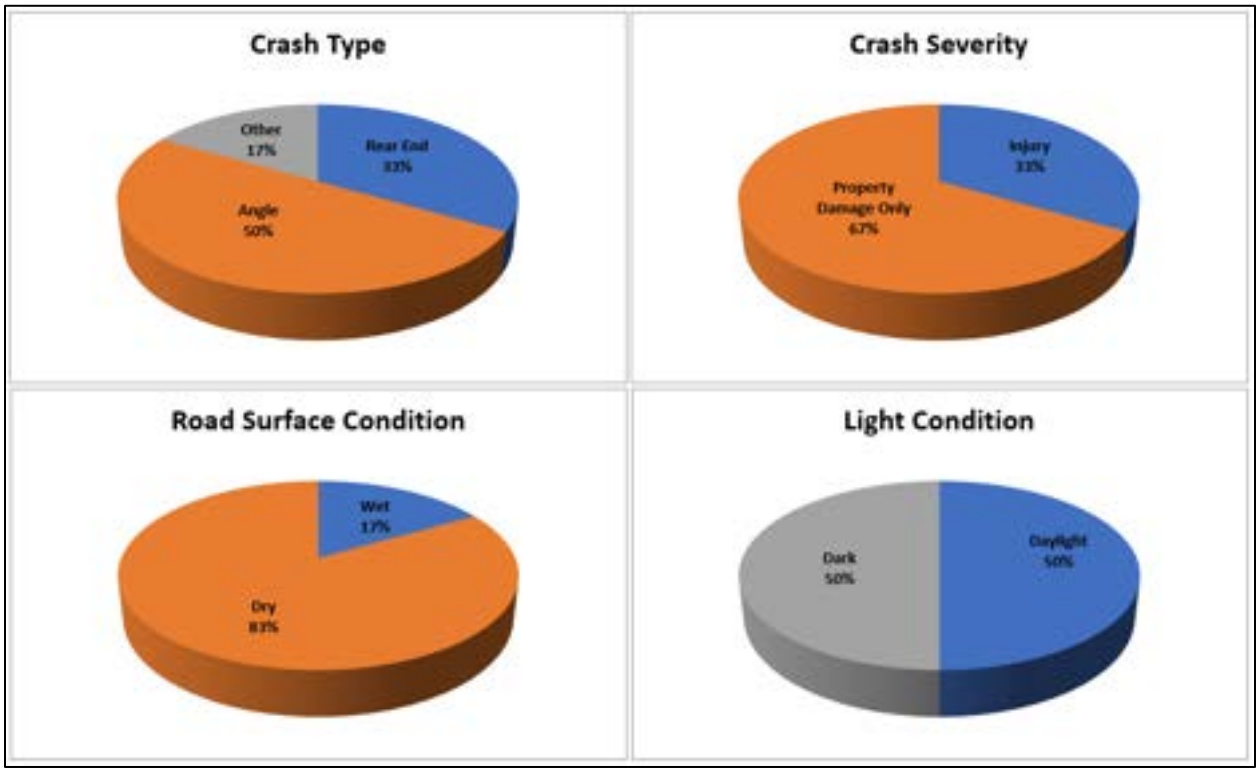
Figure 2-24: Western Way and SR 429 Ramp Terminal Intersections Crash Data Summary (2014-2018)



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. No fatal crashes were reported during the study period. At least 33 percent of the total crashes resulted in injuries. As shown in Figure 2-25, 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.

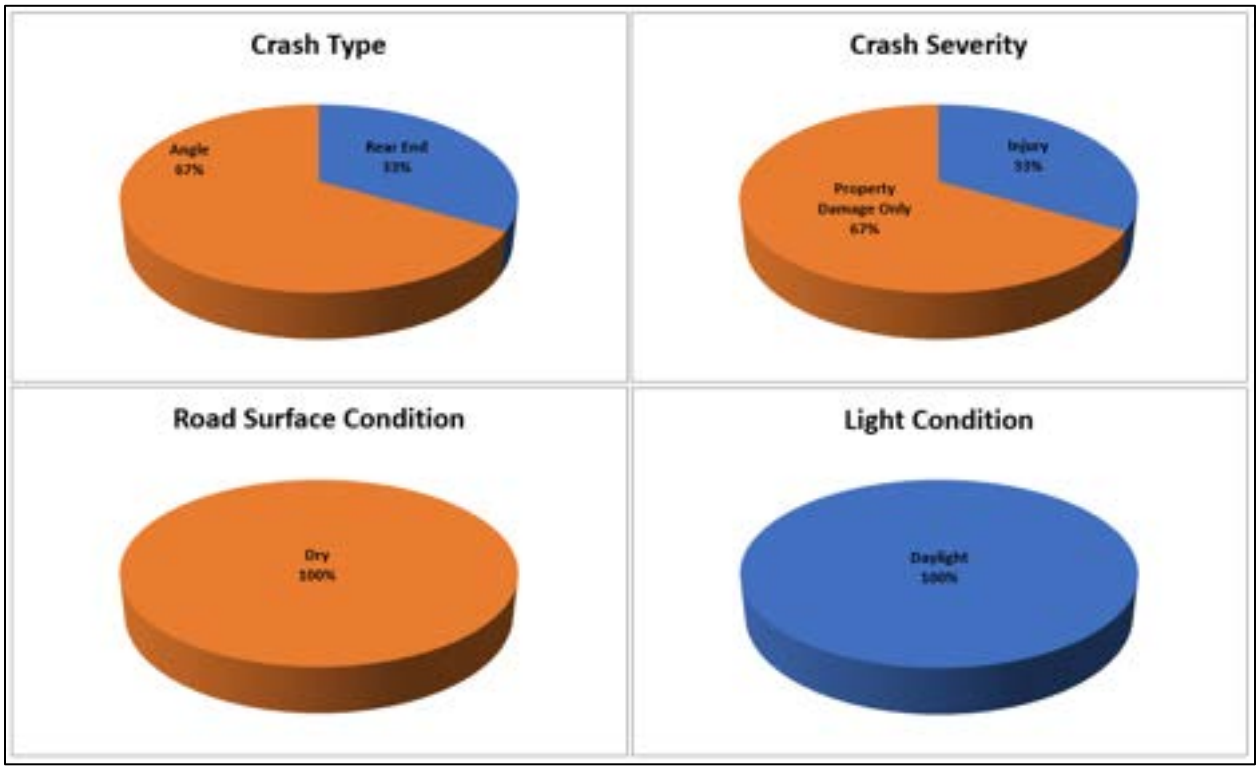
Figure 2-25: Seidel Road and Avalon Road Intersection Crash Data Summary (2014-2018)



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. No fatal crashes were reported during the study period. At least 33 percent of the total crashes resulted in injuries. As shown in Figure 2-26, angle crashes (approximately 67 percent) and rear-end crashes (approximately 33 percent) were the prominent crash types at the intersection. Reports indicated that all of the crashes occurred during dry and daylight roadway conditions.

Figure 2-26: Seidel Road and SR 429 Ramp terminal Intersections Crash Data Summary (2014-2018)



Actual crash rates at the intersections were computed and compared with average crash rates for similar 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 2-16.

Table 2-16: Crash Rates and Safety Ratios for 2014 through 2018

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

* FDOT CAR Osceola County, 5-year Average Crash Rate
Sinclair Road, Western Way, Seidel Road & SR 429 intersections: Suburban 4-5 Ln 2-Way Divided Raised
US 192 and SR 429 intersections: Urban 6+ Ln 2-Way Divided Raised
Note: CAR average crash rates for intersections include a 250 ft radius influence area

2.15.3 Crash Analysis Summary

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 (0.32).

The analysis shows that rear-end crashes were prominent at the intersections listed in Table 2-16, with 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, followed by the US 192 and Inspiration Drive (1.63). However, the overall

predicted crashes anticipated to be lower under the Build alternative when compared to the No-Build alternative due to capacity improvements and redistribution of traffic.

2.16 Drainage

The project is located in the northwest corner of Osceola County and the southwest corner of Orange County. The project lays within the Reedy Creek watershed and the overall flow pattern within the watershed in the vicinity of the project corridor is from west to east towards Reedy Creek. The existing corridor is comprised of open conveyance ditches and closed collection systems to convey runoff to stormwater management systems. Most of the corridor was constructed along a ridge with wetlands located on the west side, therefore there is minimal offsite flow discharging directly into the existing right of way. Offsite area is conveyed through the corridor through a series of cross drains. Two major waterways traverse the project corridor: Boggy Creek and Whittenhorse Creek (a Reedy Creek Tributary).

The Hydrologic Soil Group (HSG) for the soils within the project area are predominately A/D. This dual classification means the soils tend to be well drained during the dry season and poorly drained as the soil becomes saturated during the wet season. Furthermore, using the Drainage Class of the soils within the project limits vary greatly between “Excessively drained” to “Very poorly drained”. The soils identified as very poorly drained are typically associated with the low-lying swampy areas adjacent to the corridor. The upland areas surrounding the project are typically well to excessively drained.

Twenty basins have been identified with the limits of the study area as shown in Table 2-17. These basins consist of open and closed basins. Basins have been defined to corelate with currently permitted conditions within the project limits. Basin divides have been developed from existing permit information which has been supplemented with LIDAR data.

Table 2-17: Project Basin Summary

Name	Type	Receiving Waterbody
BASIN F-4	Open	Davenport Tributary
BASIN B-2	Open	Davenport Tributary
BASIN B-3	Open	Davenport Creek
BASIN B-4	Open	Davenport Creek
BASIN B-5	Open	Davenport Creek
BASIN B-6	Open	Davenport Creek
BASIN 2A-2	Open	Davenport Creek
BASIN 2A-3	Open	Boggy Creek
BASIN 2B-1	Open	Boggy Creek
BASIN 2B-2	Open	Boggy Creek
BASIN 10	Closed	-
BASIN 11	Open	RCID Perimeter Canal
BASIN 12	Open	Whittenhorse Creek
BASIN 13	Open	Whittenhorse Creek
BASIN 14	Open	Bear Bay / Whittenhorse Creek
BASIN 15	Closed	-
BASIN 1	Open	Panther Lake
BASIN 2	Open	Wetland
BASIN B (FGB)	Open	Davenport Creek
BASIN FL 530	Open	Boggy Creek

The existing roadway was permitted by the Florida Department of Environmental Protection (FDEP) in 2001. Additionally, the Reedy Creek Improvement District (RCID) entered into a drainage agreement with FTE for discharges outside the right of way. The Environmental Resource Permit (ERP) No. 49-187636001 was issued for a six-lane roadway, four lanes to be initially constructed and additional future two lanes. FDEP will be responsible for permitting the proposed improvements. The entire project corridor is located within the Reedy Creek Watershed, which is managed by RCID. Therefore, it is recommended that permitting efforts be coordinated with RCID prior to submitting to FDEP for concurrence. FDEP will be responsible for Section 404 reviews and permitting. A National Pollutant Discharge Elimination System (NPDES) permit will also be required from FDEP.

The land use along the corridor is predominately residential from the I-4 Interchange to Western Way. From Western Way to Seidel Road the adjacent land is comprised of solar farms and rapid infiltration basins (ribs) owned by Reedy Creek Improvement District. SR 429 just north of the I-4 Interchange to Seidel Road has stormwater management facilities located within the infields of the interchanges, as well as "offsite" ponds located adjacent to the roadway corridor. A combination of roadside ditches and closed collection systems convey runoff to the stormwater

management facilities for treatment and attenuation (ERP Permit No. 49-187636001). Additional information regarding the existing stormwater management facilities can be found in the Pond Siting Report provided under separate cover.

The project contains six cross drains which convey offsite flows, including those associated with Boggy Creek and Whittenhorse Creek, through the project corridor. Further information can be found in the Location Hydraulic Report (LHR), available under separate cover. Additionally, these two main waterways have floodplains associated with them. The following Flood Insurance Rate Map (FIRM) are associated with this project: 12097C0040G dated June 18, 2013, 12097C0030G dated June 18, 2013, 12095C0580F dated September 25, 2009, 12095C0390F dated September 25, 2009, and 12095C0375F dated September 25, 2009.

Although project improvements will not discharge directly to any Outstanding Florida Waters (OFW's), the project is located within the Lake Okeechobee BMAP. Phosphorus is the nutrient of concern for this BMAP. The FDEP has defined four Water Body Identification numbers (WBIDs) that encompass the study area. Of the four WBIDs, WBID 3170K is impaired for Bacteria (Fecal Coliform) and WBID 3170F4 is impaired for Dissolved Oxygen.

There are four drainage connection permits within the project corridor. They are as follows: TP-92-DC-180-18 Sinclair Road Apartments located at MP 1.5, TP-75-DC-130-18 Flamingo Crossings PD located at MP 7.5, TP-75-DC-010-08 Flamingo Crossings Phase I located at MP 7, and TP-75-DC-181-20 Horizon High School located at MP 11.

2.17 Soils and Geotechnical Data

Based on the Soil Survey of Orange County, Florida (NRCS, 1989) and the Soil Survey of Osceola County Area, Florida (NRCS, 1979), the project study area is comprised of 26 soil types. According to the Hydric Soils of Florida Handbook (Hurt, 2007), eight (8) of the soil types reported within the project study area are classified as hydric, 18 are non-hydric. Of the 18 non-hydric soils, ten (10) are reported as having hydric soil inclusions. Mapped hydric soils comprise 106.07 acres (11.67 percent) and non-hydric soils cover 801.37 acres (88.20 percent) of the project study area.

Table 2-18 lists the soil types reported within the project study area, their corresponding NRCS reference numbers reported in the Soil Survey of Orange County, Florida and Soil Survey of Osceola County Area, their hydric classification, and the approximate acreage and percentage of each soil type within the project study area.

Table 2-18: Soil Types and Coverage within the SR 429 Widening Project Study Area

Map Unit Symbol	Soil Type	Hydric Y/N	Acres in Study Area	Percent of Study Area
1A	Adamsville Sand, 0 To 2 Percent Slopes*	N	1.29	0.14
1B	Arents, Nearly Level	N	0.03	0.00
5A	Basinger Fine Sand, 0 To 2 Percent Slopes	Y	3.01	0.33
6A	Basinger Fine Sand, Depressional, 0 To 1 Percent Slopes	Y	0.06	0.01
3	Basinger Fine Sand, Frequently Ponded, 0 To 1 Percent Slopes	Y	7.62	0.84
4	Candler Fine Sand, 0 To 5 Percent Slopes	N	189.86	20.90
5B	Candler Fine Sand, 5 To 12 Percent Slopes	N	32.83	3.61
7	Candler Sand, 0 To 5 Percent Slopes	N	262.98	28.94
8	Candler Sand, 5 To 12 Percent Slopes*	N	73.96	8.14
6B	Candler-Apopka Fine Sands, 5 To 12 Percent Slopes	N	0.23	0.03
15	Hontoon Muck, Frequently Ponded, 0 To 1 Percent Slopes	Y	62.65	6.90
20	Immokalee Fine Sand*	N	50.37	5.54
16	Immokalee Fine Sand, 0 To 2 Percent Slopes*	N	18.92	2.08
22	Myakka Fine Sand, 0 To 2 Percent Slopes*	N	16.20	1.78
32	Placid Fine Sand, Frequently Ponded, 0 To 1 Percent Slopes	Y	3.81	0.42
33	Pits*	NA	0.59	0.07
34	Pomello Fine Sand, 0 To 5 Percent Slopes	N	36.06	3.97
37	Pompano Fine Sand, Frequently Ponded, 0 To 1 Percent Slopes	Y	13.46	1.48
41	Samsula-Hontoon-Basinger Association, Depressional	Y	3.43	0.38
42A	Sanibel Muck	Y	12.02	1.32
42B	Smyrna Fine Sand, 0 To 2 Percent Slopes*	N	8.22	0.90
44A	Smyrna-Smyrna, Wet, Fine Sand, 0 To 2 Percent Slopes	N	2.41	0.26
44B	Tavares Fine Sand, 0 To 5 Percent Slopes	N	23.79	2.62
46	Tavares Fine Sand, 0 To 5 Percent Slopes	N	30.18	3.32
47	Tavares-Millhopper Complex, 0 To 5 Percent Slopes*	N	35.83	3.94
54	Zolfo Fine Sand, 0 To 2 Percent Slopes*	N	17.63	1.94
		Total Hydric Soils	106.07	11.67
		Total Non-Hydric Soils	801.37	88.20
		Total Water	1.15	0.13
		Totals for Project Study Area	908.59	100.00

* May have hydric soil inclusions

2.18 Utilities

A Utility Assessment Report was prepared for this project and provides relevant information regarding the location, size, type, and characteristics of public and private utilities located within and adjacent to the project corridor. As part of the PD&E study, the utility agencies / owners (UAOs) were contacted to acquire this information

2.18.1 Utility Coordination

The preliminary utility coordination and investigation effort was conducted through written and verbal communications with the existing utility owners. A Sunshine State 811 of the Florida Design Ticket System listing of existing utility owners was acquired on May 29th, 2020.

Initially, verbal communication was made to all utility's owners outlining the investigation effort along with the project limits. The list of UAOs known to operate utilities within the project corridor are shown in Table 2-19.

Table 2-19: Utility Contact Information

Utility Agency	Utility Contact Name	Utility Contact Phone	Utility Contact Email
Bright House Networks	John Smith (Smitty)	407-448-5513	john.smith5@charter.com
CenturyLink	Ty Leslie	407-814-5293	michel.t.leslie@centurylink.com
CenturyLink fka Level 3	Xan Rypkema	720-888-1089	xan.rypkema@lumen.com
ComCast			cenflr-nfl_construction@comcast.com
Duke Energy Distribution			defdistribution@duke-energy.com
Duke Energy Transmission	Jennifer Williams	813-909-1210	jewilliams@pike.com deftransmission@duke-energy.com
Florida Gas Transmission	Joseph Sanchez	407-838-7171	joseph.e.sanchez@energytransfer.com
Gulfstream Natural Gas	Shawn Deutsher	941-723-7191	Shawn.deutsher@williams.com
Kinder Morgan	Joe Pedraza	713-420-6250	Jose_pedraza2@kindermorgan.com
Kissimmee Utility Authority	Felix Escobar	407-933-7777 ext.6600	fescobar@kua.com
Orange County Traffic	Roger Smith	4047-836-7804	Roger.smith@ocfl.net
Osceola County	Joshua Devries	407-742-0662	Joshua.devries@osceola.org
Orlando Utilities Commission	Robert Schuerle	407-434-2107	rschuerle@ouc.com
Spectra Energy-Sabal Trail	Peter Kerrigen	407-966-2928	Peter.kerrigen@enbridge.com
Summit Broadband	Michelle Daniel	407-996-1183	mdaniel@summit-broadband.com
TECO Peoples Gas	Shawn Winsor	407-420-6663	swinsor@tecoenergy.com
TOHO Water Authority	Robert Pelham	407-944-5132	rpelham@tohowater.com
Transtate Industrial Pipeline	Tom Ulmer	772-778-2255	tulmerjr@transtate.us
Uniti Fiber	James Mosley	251-645-8216	James.mosley@uniti.com
Zayo			zayoflrelocations@zayo.com

Utility owners were provided aerial based utility plans depicting SR 429 between the I-4 / SR 429 interchange and Seidel Road. Using these aerial plans as a base map, each utility owner was asked to indicate their existing and proposed utilities as well as any easements that may affect their reimbursement rights for potential relocations of their facilities. In response, most utility owners replied via written communications. The utility owners provided the requested information concerning their facilities using either the utility plans or reference documentation (i.e., "As Built" or GIS maps). "Marked" Plans or reference documentation was received from the

Utility Agency Owners and are provided in Appendix A of the Utility Assessment Report under a separate cover.

2.18.2 Existing Utility Facilities

Bright House Networks
Non-Responsive

CenturyLink
Non-Responsive

CenturyLink fka Level 3
Non-Responsive

ComCast
Greenline markups were received from Scott Osebold on 8/11/2022 via e-mail. Comcast has an existing fiber optic cable that comes from the west side of SR 429 at approximately sta. 200+46 and crosses SR 429 and then turn and goes north along Formosa Gardens Boulevard. They also have a fiber optic cable that crosses SR 429 along the south side of Funie Steed Road.

Duke Energy Distribution
Duke Energy Distribution has overhead facilities that come from the east along Sand Hill Road and turn to the north and continue along the east side of Formosa Gardens Boulevard where they continue along Formosa Gardens Boulevard with crossings at approximately STA. 165+35 and at STA. 180+ 80.

At Indian Creek Boulevard, they have six underground circuits on the south side.

At Funie Steed Road and Seidel Road, Duke has underground 7.2/12.47kv on the south side.

At US 192, Duke Energy has overhead and underground facilities 7.2/12.47kv. They are underground under the bridge on both sides of the road. On the south side of the bridge their facilities feed both toll plazas located along both the on and off ramps of SR 429. To the east Duke Distribution has both underground and overhead facilities along US 192.

They also have 7.2/12.47kv underground facilities a West Orange Lake Boulevard.

At approximately STA. 510+90, Duke Energy comes from the west and goes north along SR 429. Then at approximately STA. 540+80, they go underbuilt on Duke Energy Transmission poles.

Duke Energy Transmission
Duke Energy has overhead Transmission both 69KV and 230kv lines that run on the west side of SR 429 to the north at approximately STA. 225+80 and cross SR 429 and then go along the back of ponds and continue north and go back west to cross SR 429 back on the west side. Then they continue north along SR 429 and cross US 192 and continue north and cross SR 429. Duke Energy facilities appear to go in and out of a 30-foot easement along the project area.

At US 192, Duke Energy has 69kv overhead facilities that run along the south side crossing just before Inspiration Drive.

Florida Gas Transmission
Non-Responsive

Gulfstream Natural Gas
Non-Responsive

Kinder Morgan
Non-Responsive

Kissimmee Utility Authority
Non-Responsive

Orange County Traffic
Non-Responsive

Osceola County Traffic
Osceola County Traffic has two 2-inch directional bore conduits with a 72ct fiber optic cable that runs along US 192 on the north side with a pull box on the east side of the off ramp of SR 429 then cross US 192 to the south and goes along the LA ROW to an existing Turnpike splice vault with 200 LF of slack.

Orlando Utilities Commission
Non-Responsive

Sabal Trail Transmission

Sabal Trail Transmission has an existing 36-inch High-Pressure Natural Gas Pipeline that is in an easement to the west of Sand Hill Road and turns and goes west away from SR 429 at approximately STA. 160+10.

Summit Broadband

Summit Broadband has an existing underground 48ct fiber optic cable in conduit that comes from the west at Wyndham Palms and crosses SR 429 at approximately STA. 200+55 and goes into a hand hole located at approximately STA. 200+55 on the east side of Formosa Gardens Boulevard. Then the fiber continues east away from project. There is a 144ct fiber in conduit that comes out of the same hand hole and continues north along the east side of Formosa Gardens Boulevard and at Livingston Road into handhole and continues east along Livingston Road.

Summit Broadband also has an existing underground 48ct fiber optic cable in conduit that runs from the west along the south side of Funie Steed Road. This 48ct fiber goes aerial on the east side of the bridge and continues east on Duke Energy's pole line.

At US 192, Summit Broadband has an existing 144ct fiber in conduit that runs on the south side. Summit Broadband also has a 144ct fiber along Flamingo Crossing Boulevard running along the west side into a handhole located on the northwest corner of Flamingo Crossing Boulevard and Western Way, then continues to the south.

TECO Peoples Gas

TECO Peoples Gas has an existing 2" gas main that runs along the east side of Indian Creek Boulevard

At US 192 TECO Peoples Gas has a 4" coated steel gas main on the north side. With a few crossings.

TECO also has a 2" coated steel gas main the runs east west along W Orange Lake Boulevard and crosses SR 429 at approximately STA. 410+43 and continues east.

At Seidel Road, they have an existing 4" PE gas main that runs along the north side.

On Sand Hill Road, TECO has a 2" PE gas main that comes from the north at Water Oak Ct. and crosses and serves a home on the south side of road.

At Flamingo Crossings Boulevard, TECO has a 2" coated steel that runs north and south along the west side and crosses Western Way.

TOHO Water Authority
Non-Responsive

Transtate Industrial Pipeline
No Facilities e-mail received 3/9/2022 from Tom Ulmer.

Uniti Fiber
No Facilities e-mail received 8/16/2022 from James Mosley.

Zayo
Non-Responsive

2.19 Lighting

Conventional roadway lighting is provided on both sides of SR 429. Along SR 429, lighting poles are located at a distance of between 200 to 220 feet apart between I-4 and Sinclair Road, 220 feet apart between Sinclair Road and Western Way, and 230 feet apart between Western Way and Seidel Road. Conventional roadway lighting is also provided on the on ramps from Sinclair Road, US 192, Western Way, and Seidel Road as well as the off ramps to these four roadways.

Conventional lighting is provided on Sinclair Road, US 192, and Western Way within the vicinity of the interchange. There is no lighting provided along Seidel Road.

2.20 Signs

Within the project limits, existing signing includes overhead and ground-mounted guide signs, including regulatory signs, warning signs, information signs, toll road signs, enhanced reference signs, general service signs, object marker signs, and other single post, and multi-column ground mounted signs. Currently, existing guide signs are located along Sinclair Road, US 192, Western Way and Seidel Road approaching SR 429.

2.21 Aesthetic Features

The SR 429 Western Beltway widening will encompass five interchanges within the corridor (I-4, Sinclair Rd, US 192, Western Way, and Seidel Rd). The interchanges all have received a high level of landscape plantings consisting of mainly of different species of palm trees and canopy trees such as Sabal Palms, Bismarck Palms, Date Palms, Ribbon Palms, Mule Palms, Oak Trees, Pine Trees, Red Cedar Trees, Bald Cypress Trees, Maple Trees, Crape Myrtle Trees, and other native species. Shrubs and shorter accent vegetation include the use of Saw Palmetto, native shrubs, and native grasses to enhance the understory and to provide slope coverage. Many of the shrub beds were in poor conditions with old plantings and sections have died out leaving large bare

areas. The mainline planting consists of Sabal Palms, Oaks, Pines, Cypress, and Red Cedars planted along the right of way and swales providing some visual buffer to surrounding properties. Additional buffering is needed due to the close proximity of the adjacent residential developments (both single family and multifamily) and the lack of sound walls along the corridor. The age of the landscape varied greatly and many of the interchange and mainline plants were in need of improvements to enhance the aesthetics within the corridor. Other areas had been installed within the last few years. Figure 2-27 Shows examples of the landscaping in the project corridor.

Figure 2-27: Landscaping in the Project Study Limits

The bridges, overpasses, and MSE walls in the project corridor are Category 1 Structures. They have received enhanced aesthetic treatments and class 5 coatings, particularly at US 192. Figure 2-28 shows the MSE walls at the US 192 interchange.

Figure 2-28: MSE Walls at the US 192 Interchange

2.22 Bridges and Structures

There are 16 existing bridges and three culverts within the project limits. Bridge and culvert information pertinent to the study was compiled from as-built construction plans, inspection reports, and load ratings.

The following two (2) overpass bridges were reviewed to ensure that the proposed widening would have no adverse effects to the existing structure:

- Bridge No. 920607 Sinclair Road over SR 429
- Bridge No. 924178 Indian Creek Boulevard over SR 429

The following fourteen (14) bridges are anticipated to be affected by the widening of the mainline SR 429. The existing typical sections are described below.

SR 429 Southbound over Sand Hill Road (Bridge No. 920603)

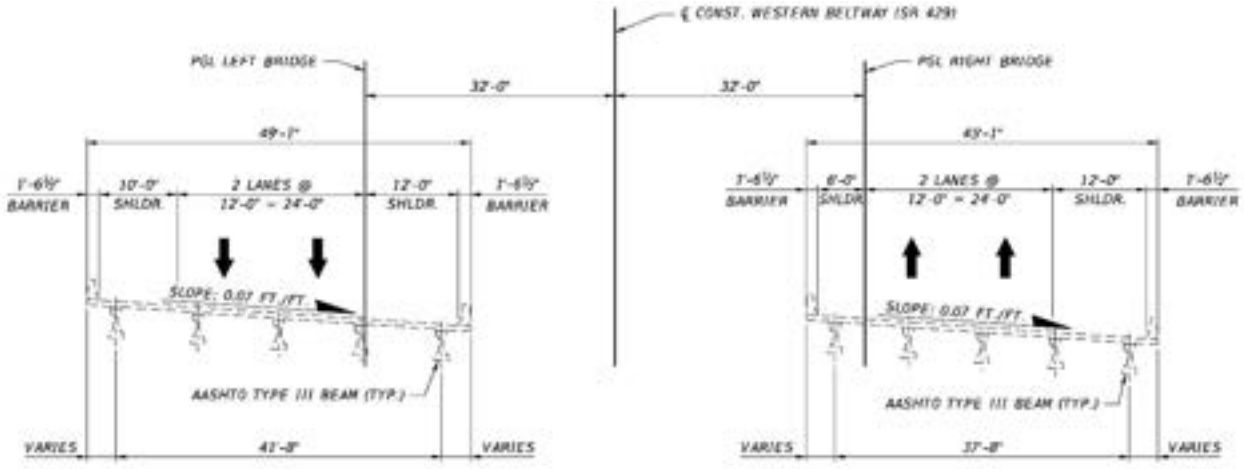
The existing bridge (No. 920603) was constructed in 2006 under FPID 403497-2-52-01. The bridge consists of prestressed concrete girders with a concrete deck superstructure supported by end bents on prestressed concrete pile foundations. The total bridge length of the single span bridge is 70'-8 3/16" and has a width of 49'-1" based on the existing bridge plans. Figure 2-29 shows the existing typical section of the bridge. The provided vertical clearance below the bridge is 19'-1". The existing bridge typical section consists of two 12'-0" travel lanes, a 12'-0" inside shoulder, and a 10'-0" outside shoulder. The bridge is superelevated through the horizontal curve with a cross slope of 0.07 ft/ft. The existing approach slabs have asphalt overlays and are 30'-0" in length. The latest inspection report dated 11/04/2021 states the bridges have a sufficiency rating of 99.4 and a health index of 99.73. The inventory load rating is

1.01 and the operating load rating is 1.75. The inspection report indicated that the substructure has an overall NBI rating of 7 (Good). The inspection report also indicated an overall NBI rating of 8 (Very Good) for both the deck and superstructure. For these reasons, a bridge widening is possible on Bridge No. 920603.

SR 429 Northbound over Sand Hill Road (Bridge No. 920604)

The existing bridge was constructed in 2006 under FPID 403497-2-52-01. The bridge has prestressed concrete girders with a concrete deck superstructure supported by end bents on prestressed concrete pile foundations. The total bridge length of the single span bridge is 70′-8 3/16″ and has a width of 45′-1″ based on the existing bridge plans. Figure 2-29 shows the existing typical section of the bridge. The provided vertical clearance below the bridge is 16′-7″. The existing bridge typical section consists of two 12′-0″ travel lanes, a 6′-0″ inside shoulder and a 12′-0″ outside shoulder. The bridge is superelevated through the horizontal curve with a cross slope of 0.07 ft/ft. The existing approach slabs have asphalt overlays and are 30′-0″ in length. The latest inspection report dated 11/04/2021 has a sufficiency rating of 98.4 and a health index of 99.82. The inventory load rating is 1.13 and the operating load rating is 1.88. The inspection report indicated that the substructure has an overall NBI rating of 7 (Good). The inspection report also indicated an overall NBI rating of 8 (Very Good) for both the deck and superstructure. For these reasons, a bridge widening is possible on Bridge No. 920604.

Figure 2-29: SR 429 Over Sand Hill Road Existing Typical Section (Bridge Nos. 920603 and 920604)



EXISTING TYPICAL SECTION
BRIDGE NOS. 920603 & 920604
WESTERN BELTWAY (SR 429) OVER SAND HILL ROAD

SR 429 Southbound over Funie Steed Road (Bridge No. 920605)

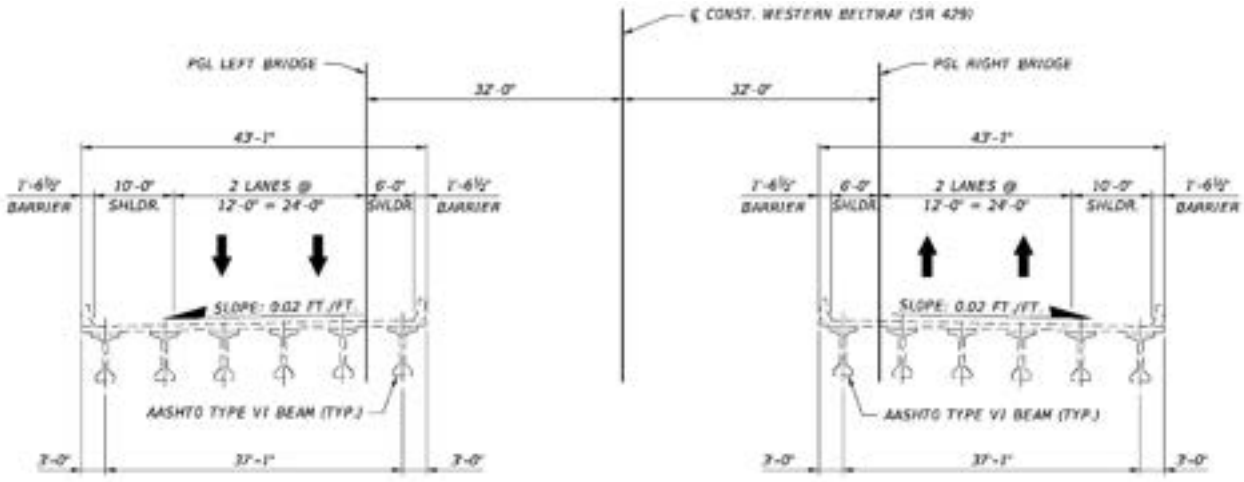
The existing bridge, Bridge No. 920605, was constructed in 2006. The bridge has prestressed concrete girders with a concrete deck superstructure supported by end bents on prestressed concrete pile foundations. The total bridge length of the single span bridge is 142′-6 3/16″ and

has a width of 43′-1″ based on the existing bridge plans. Figure 2-30 shows the existing typical section of the bridge. The provided vertical clearance below the bridge is 18′-3 13/16″. The existing bridge typical section consists of two 12′-0″ travel lanes, a 6′-0″ inside shoulder, and a 10′-0″ outside shoulder. The bridge is superelevated through the horizontal curve with a cross slope of 0.02 ft/ft. The existing approach slabs have asphalt overlays and are 30′-0″ in length. The latest inspection report dated 11/4/2021 has a sufficiency rating of 98.4 and a health index of 98.76. The inventory load rating is 1.514 and the operating load rating is 1.691. The inspection report indicated that the substructure, deck, and superstructure have overall NBI ratings of 7 (good). For these reasons, a bridge widening is possible on Bridge No. 920605.

SR 429 Northbound over Funie Steed Road (Bridge No. 920606)

The existing bridge, Bridge No. 920606, was constructed in 2006. The bridge has prestressed concrete girders with a concrete deck superstructure supported by end bents on prestressed concrete pile foundations. The total bridge length of the single span bridge is 142′-6 3/16″ and has a width of 43′-1″ based on the existing bridge plans. Figure 2-30 shows the existing typical section of the bridge. The provided vertical clearance below the bridge is 18′-9 1/2″. The existing bridge typical section consists of two 12′-0″ travel lanes, a 6′-0″ inside shoulder, and a 10′-0″ outside shoulder. The bridge is superelevated through the horizontal curve with a cross slope of 0.02 ft/ft. The existing approach slabs have asphalt overlays and are 30′-0″ in length. The latest inspection report dated 11/04/2021 has a sufficiency rating of 99.5 and a health index of 98.7. The inventory load rating is 1.514 and the operating load rating is 1.691. The inspection report indicated that the substructure, superstructure, and deck have overall NBI ratings of 7 (good). For these reasons, a bridge widening is possible on Bridge No. 920606.

Figure 2-30: SR 429 Over Funie Steed Road Existing Typical Section (Bridge Nos. 920605 and 920606)



EXISTING TYPICAL SECTION
BRIDGE NOS. 920605 & 920606
WESTERN BELTWAY (SR 429) OVER FUNIE STEED ROAD

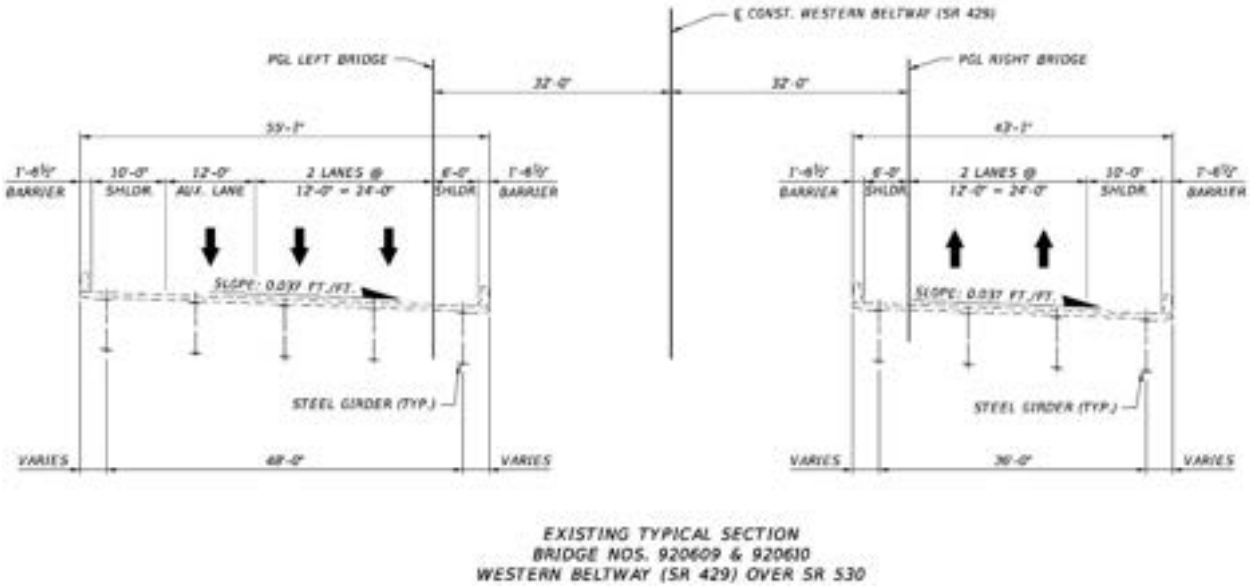
SR 429 Southbound over SR 530 (US 192) (Bridge No. 920609)

The existing bridge, Bridge No. 920609 (formerly 750614), was constructed in 2006. The bridge consists of steel girders with a concrete deck superstructure supported by end bents on prestressed concrete pile foundations. The total bridge length of the single span bridge is 174'-5 1/8" and has a width of 55'-1" based on the existing bridge plans. Figure 2-31 shows the existing typical section of the bridge. The provided vertical clearance below the bridge is 19'-4 3/16". The existing bridge typical section consists of three 12'-0" travel lanes, a 6'-0" inside shoulder, and a 10'-0" outside shoulder. The bridge is superelevated through the horizontal curve with a cross slope of 0.037 ft/ft. The existing approach slabs have asphalt overlays and are 30'-0" in length. The latest inspection report dated 11/03/2021 has a sufficiency rating of 98.4 and a health index of 99.48. The inventory load rating is 1.53 and the operating load rating is 2.56. The inspection report indicated that the substructure, deck, and superstructure all have NBI ratings of 7 (good). For these reasons, a bridge widening is possible on Bridge No. 920609.

SR 429 Northbound over SR 530 (US 192) (Bridge No. 920610)

The existing bridge, Bridge No. 920610 (formerly 750615), was constructed in 2006. The bridge has steel girders with a concrete deck superstructure supported by end bents on prestressed concrete pile foundations. The total bridge length of the single span bridge is 174'-5 1/8" and has a width of 43'-1" based on the existing bridge plans. Figure 2-31 shows the existing typical section of the bridge. The provided vertical clearance below the bridge is 16'-11 1/8". The existing bridge typical section consists of two 12'-0" travel lanes, a 6'-0" inside shoulder, and a 10'-0" outside shoulder. The bridge is superelevated through the horizontal curve with a cross slope of 0.037 ft/ft. The existing approach slabs have asphalt overlays and are 30'-0" in length. The latest inspection report dated 11/03/2021 has a sufficiency rating of 99.5 and a health index of 99.71. The inventory load rating is 1.54 and the operating load rating is 2.56. The inspection report indicated that the substructure has an overall NBI rating of 7 (good). The inspection report also indicated an overall NBI rating of 7 (good) and 8 (very good) for the deck and superstructure, respectively. For these reasons, a bridge widening is possible on Bridge No. 920610.

Figure 2-31: SR 429 Over SR 530 (US 192) Existing Typical Section (Bridge Nos. 920609 and 920610)



EXISTING TYPICAL SECTION
BRIDGE NOS. 920609 & 920610
WESTERN BELTWAY (SR 429) OVER SR 530

SR 429 Southbound over West Orange Lake Boulevard (Bridge No. 750616)

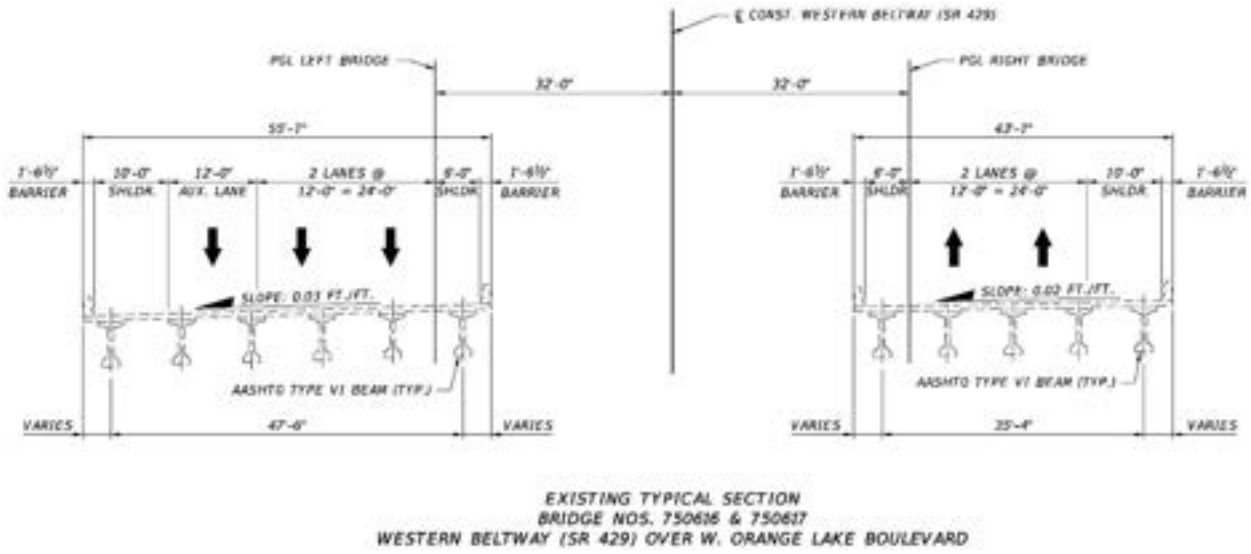
The existing bridge, Bridge No. 750616, was constructed in 2006. The bridge has steel girders with a concrete deck superstructure supported by end bents on prestressed concrete pile foundations. The total bridge length of the single span bridge is 134'-6" and has a width of 55'-1" based on the existing bridge plans. Figure 2-32 shows the existing typical section of the bridge. The provided vertical clearance below the bridge is 18'-7 3/4". The existing bridge typical section consists of three 12'-0" travel lanes, a 6'-0" inside shoulder, and a 10'-0" outside shoulder. The bridge is superelevated through the horizontal curve with a cross slope of 0.03 ft/ft. The existing approach slabs have asphalt overlays and are 30'-0" in length. The latest inspection report dated 11/03/2021 has a sufficiency rating of 98.6 and a health index of 98.62. The inventory load rating is 1.197 and the operating load rating is 2.536. The inspection report indicated that the substructure has an overall NBI rating of 8 (very good). The inspection report also indicated an overall NBI rating of 8 (very good) and 7 (good) for the deck and superstructure, respectively. For these reasons, a bridge widening is possible on Bridge No. 750616.

SR 429 Northbound over West Orange Lake Boulevard (Bridge No. 750617)

The existing bridge, Bridge No. 750617, was constructed in 2006. The bridge has steel girders with a concrete deck superstructure supported by end bents on prestressed concrete pile foundations. The total bridge length of the single span bridge is 134'-6" and has a width of 43'-1" based on the existing bridge plans. Figure 2-32 shows the existing typical section of the bridge. The provided vertical clearance below the bridge is 18'-7 ¾". The existing bridge typical section consists of two 12'-0" travel lanes, a 6'-0" inside shoulder, and a 10'-0" outside shoulder. The bridge is superelevated through the horizontal curve with a cross slope of 0.02 ft/ft. The

existing approach slabs have asphalt overlays and are 30'-0" in length. The latest inspection report dated 11/03/2021 has a sufficiency rating of 99.3 and a health index of 99.43. The inventory load rating is 1.519 and the operating load rating is 2.868. The inspection report indicated overall NBI ratings of 7 (good) for the substructure, deck, and superstructure. For these reasons, a bridge widening is possible on Bridge No. 750617.

Figure 2-32: SR 429 Over West Orange Lake Boulevard Existing Typical Section (Bridge Nos. 750616 and 750617)

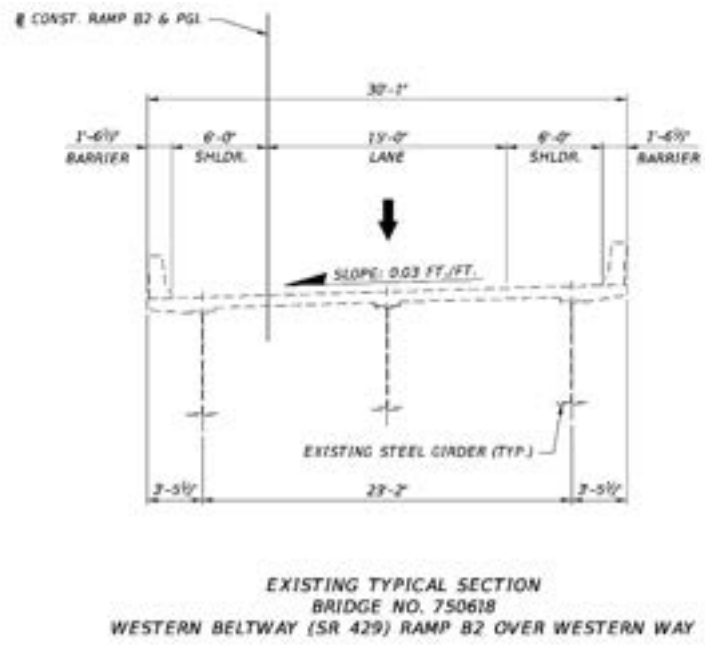


EXISTING TYPICAL SECTION
BRIDGE NOS. 750616 & 750617
WESTERN BELTWAY (SR 429) OVER W. ORANGE LAKE BOULEVARD

SR 429 Southbound Off-Ramp over Western Way (Bridge No. 750618)

The existing bridge, Bridge No. 750618, was constructed in 2006. The bridge has steel girders with a concrete deck superstructure supported by end bents on prestressed concrete pile foundations. The total bridge length of the single span bridge is 174'-6" and has a width of 30'-1" based on the bridge existing bridge plans. Figure 2-33 shows the existing typical section of the bridge. The provided vertical clearance below the bridge is 17'-3". The existing bridge typical section consists of one 15'-0" travel lane, a 6'-0" inside shoulder, and a 6'-0" outside shoulder. The bridge is superelevated through the horizontal curve with a cross slope of 0.03 ft/ft. The existing approach slabs have asphalt overlays and are 30'-0" in length. The latest inspection report dated 11/02/2021 has a sufficiency rating of 98.5 and a health index of 99.69. The inventory load rating is 1.114 and the operating load rating is 2.183. The inspection report indicated overall NBI ratings of 7 (good) for the substructure, deck, and superstructure. For these reasons, a bridge widening is possible on Bridge No. 750618.

Figure 2-33: SR 429 SB Off-Ramp Over Western Way Existing Typical Section (Bridge No. 750618)



SR 429 Southbound over Western Way (Bridge No. 750619)

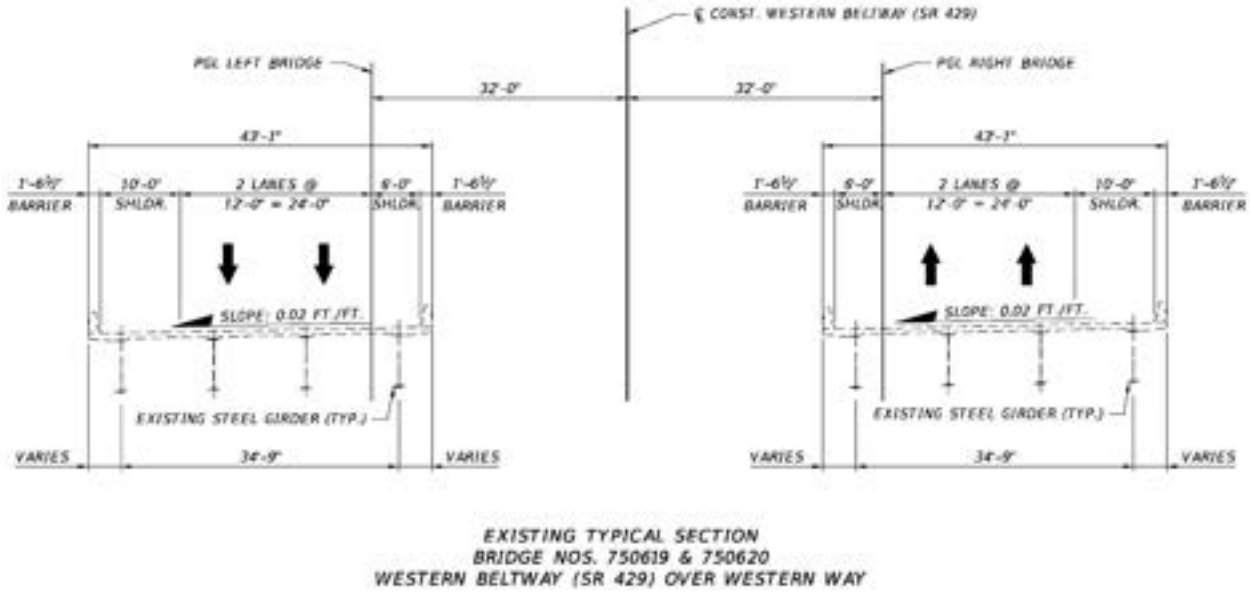
The existing bridge, Bridge No. 750619, was constructed in 2006. The bridge has steel girders with a concrete deck superstructure supported by end bents on prestressed concrete pile foundations. The total bridge length of the single span bridge is 172'-0" and has a width of 43'-1" based on the existing bridge plans. Figure 2-34 shows the existing typical section of the bridge. The provided vertical clearance below the bridge is 16'-11 ¼". The existing bridge typical section consists of two 12'-0" travel lanes, a 6'-0" inside shoulder, and a 10'-0" outside shoulder. The bridge is superelevated through the horizontal curve with a cross slope of 0.02 ft/ft. The existing approach slabs have asphalt overlays and are 30'-0" in length. The latest inspection report dated 11/02/2021 has a sufficiency rating of 99.3 and a health index of 99.71. The inventory load rating is 1.108 and the operating load rating is 2.056. The inspection report indicated overall NBI ratings of 8 (very good) for the substructure, deck, and superstructure. For these reasons, a bridge widening is possible on Bridge No. 750619.

SR 429 Northbound over Western Way (Bridge No. 750620)

The existing bridge, Bridge No. 750620, was constructed in 2006. The bridge has steel girders with a concrete deck superstructure supported by end bents on prestressed concrete pile foundations. The total bridge length of the single span bridge is 172'-0" and has a width of 43'-1" based on the existing bridge plans. Figure 2-34 shows the existing typical section of the bridge. The provided vertical clearance below the bridge is 16'-11 1/4". The existing bridge typical section consists of two 12'-0" travel lanes, a 6'-0" inside shoulder, and a 10'-0" outside shoulder. The bridge is superelevated through the horizontal curve with a cross slope of 0.02 ft/ft. The existing approach slabs have asphalt overlays and are 30'-0" in length. The latest

inspection report dated 11/02/2021 has a sufficiency rating of 99.3 and a health index of 99.7. The inventory load rating is 1.108 and the operating load rating is 2.056. The inspection report indicated overall NBI ratings of 7 (good) for the substructure, deck, and superstructure. For these reasons, a bridge widening is possible on Bridge No. 750620.

Figure 2-34: SR 429 Over Western Way Existing Typical Section (Bridge Nos. 750619 and 750620)



EXISTING TYPICAL SECTION
BRIDGE NOS. 750619 & 750620
WESTERN BELTWAY (SR 429) OVER WESTERN WAY

SR 429 Southbound over Seidel Road (Bridge No. 750621)

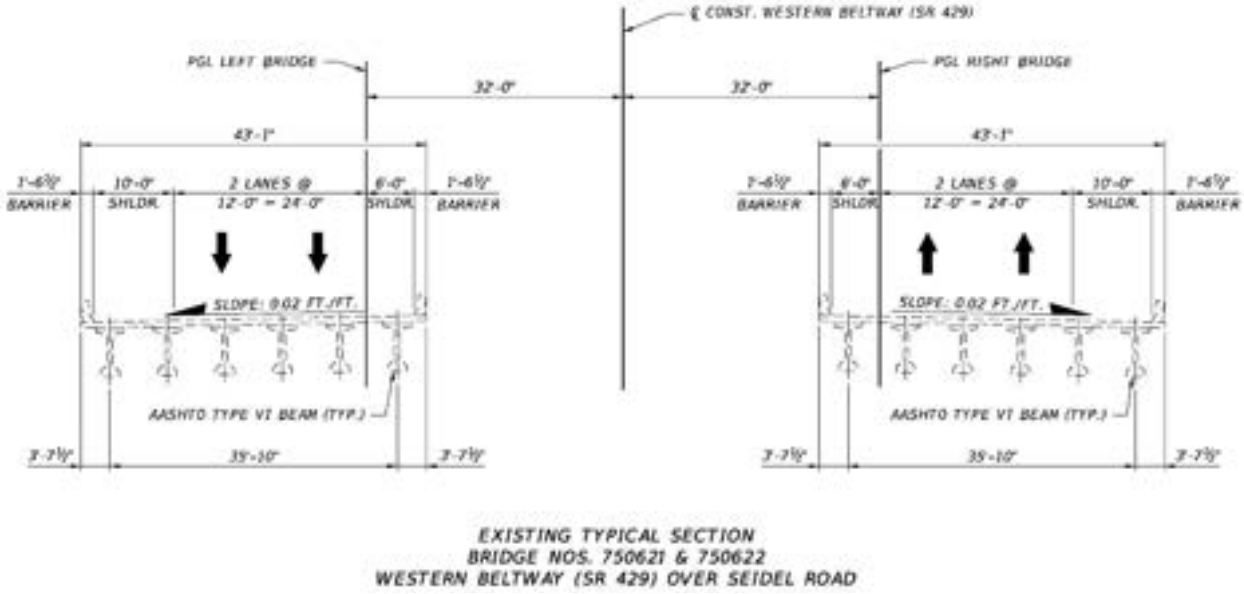
The existing bridge, Bridge No. 750621, was constructed in 2005. The bridge has prestressed concrete girders with a concrete deck superstructure supported by end bents on prestressed concrete pile foundations. The total bridge length of the single span bridge is 143'-6" and has a width of 43'-1" based on the existing bridge plans. Figure 2-35 shows the existing typical section of the bridge. The provided vertical clearance below the bridge is 18'-3 3/4". The existing bridge typical section consists of two 12'-0" travel lanes, a 6'-0" inside shoulder, and a 10'-0" outside shoulder. The bridge is superelevated through the horizontal curve with a cross slope of 0.02 ft/ft. The existing approach slabs have asphalt overlays and are 30'-0" in length. The latest inspection report dated 10/04/2021 has a sufficiency rating of 97.2 and a health index of 99.08. The inventory load rating is 1.184 and the operating load rating is 1.309. The inspection report indicated overall NBI ratings of 7 (good) for the substructure, deck, and superstructure. For these reasons, a bridge widening is possible on Bridge No. 750621.

SR 429 Northbound over Seidel Road (Bridge No. 750622)

The existing bridge, Bridge No. 750622, was constructed in 2005. The bridge has prestressed concrete girders with a concrete deck superstructure supported by end bents on prestressed concrete pile foundations. The total bridge length of the single span bridge is 143'-6" and has a width of 43'-1" based on the bridge existing bridge plans. Figure 2-35 shows the existing typical section of the bridge. The provided vertical clearance below the bridge is 18'-3 ¾". The existing bridge typical section consists of two 12'-0" travel lanes, a 6'-0" inside shoulder, and a 10'-0"

outside shoulder. The bridge is superelevated through the horizontal curve with a cross slope of 0.02 ft/ft. The existing approach slabs have asphalt overlays and are 30'-0" in length. The latest inspection report dated 10/04/2021 has a sufficiency rating of 97.2 and a health index of 99.52. The inventory load rating is 1.184 and the operating load rating is 1.309. The inspection report indicated overall NBI ratings of 7 (good) for the substructure, deck, and superstructure. For these reasons, a bridge widening is possible on Bridge No. 750622.

Figure 2-35: SR 429 Over Seidel Road Existing Typical Section (Bridge Nos. 750621 and 750622)

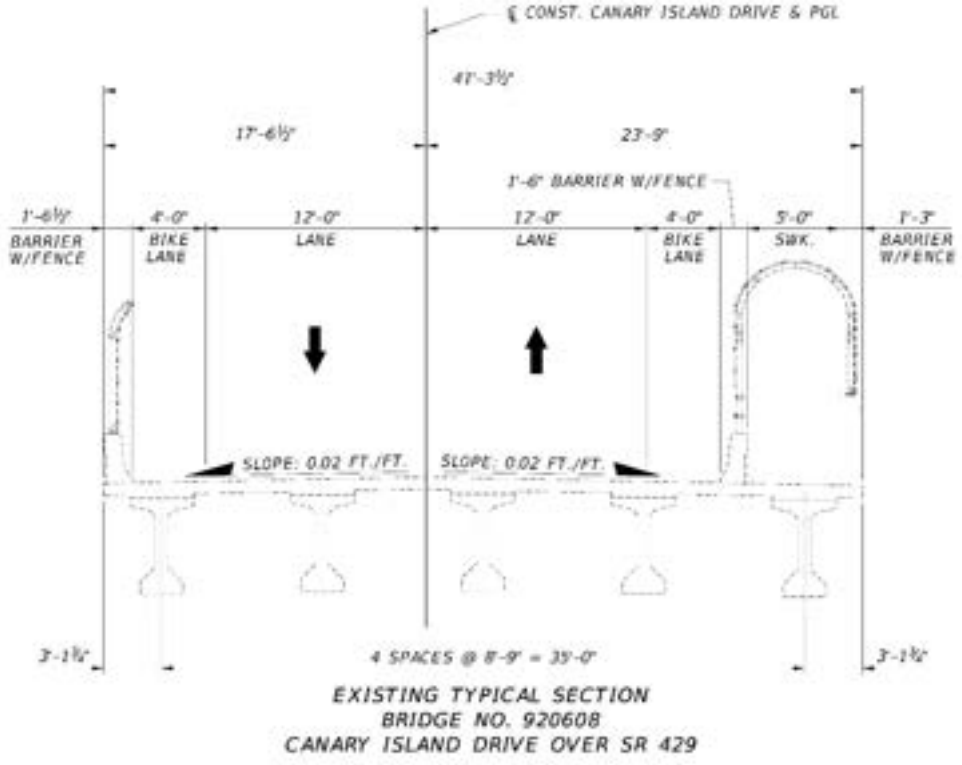


Canary Island Drive over SR 429 (Bridge No. 920608)

The existing bridge, Bridge No. 920608, was constructed in 2006. The bridge over SR 429 is a two-span bridge that provides two travel lanes and a barrier separated sidewalk on the south side. The existing typical section for bridge 920608 is shown in Figure 2-36. The bridge is located over a curve of SR 429; therefore SR 429 is in superelevation. From the as-built plans, the superelevation slope for both directions of travel is 0.06 Ft./Ft. The as-built plans also state the minimum vertical clearance for the bridge is 16.95 feet. The approximate location of the minimum vertical clearance is the outside edge of travel lane in the northbound direction of SR 429. The vertical curve of the bridge shows the longitudinal grade of the bridge is (-)0.547% to the east side of SR 429. A survey of the bridge shows that the minimum vertical clearance of the bridge is less than that shown in the as-built plans. Information provided from a field review by FTE Structures Maintenance shows the minimum vertical clearance is 16.14 feet at the outside edge of the paved shoulder at the south edge of beam 2-5. Pier shielding for Bridge No. 920608 currently exists along SR 429 in the form of concrete median barrier. The latest inspection report dated 11/05/2021 has a sufficiency rating of 78 and a health index of 97.65. The inventory load rating is 1.406 and the operating load rating is 1.543. The inspection report indicated overall NBI ratings of 7 (good) for the substructure, deck, and superstructure. While the sufficiency rating is

less than 90, it does not indicate a need for replacement. For these reasons, this bridge can remain if the minimum vertical clearance can be maintained after widening of SR 429.

Figure 2-36: Canary Island Drive over SR 429 Existing Typical Section (Bridge No. 920608)



Indian Creek Boulevard over SR 429 (Bridge No. 924178)

The existing bridge, Bridge No. 924178, was constructed in 2001. The bridge over SR 429 is a two-span bridge that provides two travel lanes and a sidewalk on the south side. The bridge has prestressed concrete girders with a concrete deck superstructure supported by end bents on prestressed concrete pile foundations. The total bridge length of the two-span bridge is 230'-0" and has a width of 45'-0" based on the existing bridge plans. The provided vertical clearance below the bridge is 16'-8". The existing horizontal clearance distance is 30'. Pier shielding for Bridge No. 924178 currently exists along SR 429 in the form of concrete median barrier. The latest inspection report dated 11/05/2021 has a sufficiency rating of 89.4 and a health index of 98.99. The inventory load rating is 0.808 and the operating load rating is 1.047. While the inventory load rating is less than one, this structure is not proposed for widening. The inspection report indicated that the substructure has an overall NBI rating of 7 (good). The inspection report also indicated an overall NBI rating of 7 (good) and 8 (very good) for the deck and superstructure, respectively. The proposed widening will not result in substandard vertical or horizontal clearance under the bridge. For these reasons, this bridge can remain after widening of SR 429.

Sinclair Road over SR 429 (Bridge No. 920607)

The existing bridge, Bridge No. 920607 (Osceola County facility) was constructed in 2004. The bridge over SR 429 is a two-span bridge that provides four travel lanes and a barrier separated sidewalk on both sides. The as-built plans show the minimum vertical clearance for the bridge is 16.6 feet. The existing horizontal clearance distance is greater than 30'. Pier shielding for Bridge No. 920607 currently exists along SR 429 in the form of guardrail. The inspection report dated 9/22/2017 has a sufficiency rating of 100 and a health index of 99.98. The inventory load rating is 1.37 and the operating load rating is 2.29. The inspection report indicated overall NBI ratings of 8 (very good) for the substructure, deck, and superstructure. The proposed widening will not result in substandard vertical or horizontal clearance under the bridge. For these reasons, this bridge can remain after widening of SR 429.

SR 429 over Boggy Creek Culvert (Bridge No. 750623)

The existing bridge culvert, Bridge No. 750623, was constructed in 2006. It is a triple 12' X 6' box culvert, approximately 417' long. The latest inspection report dated 11/16/2021 has a sufficiency rating of 85 and a health index of 66.23. The inspection report indicated a load rating analysis was not necessary due to the depth of fill over the structure, greater than 8 feet and exceeds span length. The overall condition of the culvert is "Good" with minor deterioration of the culvert itself. For these reasons, an extension of the box culvert is possible on Bridge No. 750621. The hydraulic capacity of this structure is sufficient.

SR 429 over Whittenhorse Creek Culvert (Bridge No. 750637)

The existing bridge culvert, Bridge No. 750637, was constructed in 2006. It is a double 10.2' X 4' box culvert, approximately 200' long. The latest inspection report dated 11/2/2021 has a sufficiency rating of 85 and a health index of 66.76. The inspection report indicates the culvert has an inventory load rating of 42.7 tons and an operating load rating of 71.2 tons. The overall condition of the culvert is "Good" with minor deterioration of the culvert itself. For these reasons, an extension of the box culvert is possible on Bridge No. 750637. The hydraulic capacity of this structure is sufficient.

SR 429 over Golf Cart Path (Bridge No. 75Q016)

The existing box culvert, Bridge No. 75Q016, was constructed in 2006. It is a 10.0' X 15.0'' box culvert, approximately 175' long. The inspection report dated 4/2/2018 has a sufficiency rating of 85 and a health index of 99.11. The overall condition of the culvert is "Good" with minor deterioration of the culvert itself. For these reasons, an extension of the box culvert is possible on Bridge No. 75Q016.

3 Project Design Controls & Criteria

3.1 Roadway Context Classification

FDOT's context classification system describes the general characteristics of the land use, development patterns, and roadway connectivity, providing cues as to the types of uses and user groups that will likely utilize the roadway. FDOT will apply criteria and standards based on the context classification. In the case of interstates and limited-access facilities, the function of the roadway is considered complete. Consequently, no context classification is assigned for SR 429. US 192 has been assigned a preliminary context classification of C3C-Suburban Commercial. Other roads in the study area, including Sinclair Road, Livingston Road, Western Way, and Seidel Road, are non-state facilities and the maintaining agencies (Osceola and Orange Counties) have not established a context classification for these roadways.

3.2 Design Control and Criteria

The design criteria and standards are based on design parameters outlined in A Policy on Geometric Design of Highways and Streets (AASHTO, 2011), FDOT Design Manual (FDM) (FDOT, 2022), Turnpike Design Handbook (TDH) (FTE, 2022), Load Rating Manual (FDOT, 2022), Roadside Design Guide (AASHTO, 2011) Load and Resistance Factor Design (LRFD) Bridge Design Specifications (AASHTO, Ninth Edition), Turnpike Supplemental to the FDOT Structures Manual (FTE, 2022), Turnpike Supplemental to the FDOT Drainage Manual (FTE, 2022) and General Tolling Requirements (GTR) (FTE 2021). The criteria are summarized in Table 3-1

Table 3-1: Roadway Design Criteria

Design Element	Design Standard	Source
General Criteria		
Functional Classification	Principal Arterial Expressway, Strategic Intermodal System	FDOT Straight-Line Diagrams (SLDs)
Design Speed Mainline Ramps • Loop and Semi-Direct • Outer Cloverleaf • Intermediate Portions of Long Ramps • Direct Connections	 70 mph 30 mph 35 mph 40 mph 50 mph	 Turnpike Design Handbook (TDH) Section 201.5.1 FDOT Design Manual (FDM) Table 201.5.2
Horizontal Geometry Criteria		
Lane Width Mainline Ramps • One-lane • Two-lane	 12 feet (mainline) 15 feet (one-lane ramp) 24 feet (two-lane ramp)	 FDM Section 211.2 FDM Section 211.2.1 FDM Section 211.2.1
Shoulder Width Mainline Ramps • One-lane • Two-lane	 12 feet inside and outside 6 feet inside and outside 4 feet inside / 10 feet outside	 TDH Section 211.4 FDM Section 211.4
Median Width Mainline Sinclair Road Livingston Road Formosa gardens Boulevard US 192 Western Way Seidel Road	 26 feet (with barrier) 60 feet (w/o barrier, D.S. ≥ 60 mph) 22 feet (C3 Suburban, D.S. = 40 mph) 22 feet (C3 Suburban, D.S. = 40 mph) 22 feet (C3 Suburban, D.S. = 40 mph) 30 feet (C3 Suburban, D.S. = 50 mph) 22 feet (C3 Suburban, D.S. = 45 mph) 22 feet (C3 Suburban, D.S. = 40 mph)	 FDM Table 211.3.1 FDM Table 210.3.1
Sidewalk Width (not applicable for SR 429) **Cross Roads**	6-feet (minimum)	FDM Table 222.1.1
Shared-Use Path Width		FDM, Section 224.4

Design Element	Design Standard	Source
(not applicable for SR 429) • US 192 (C3C) • Western Way • Seidel Road	12 feet (standard) 10 feet (with limited ROW) 8 feet minimum (if constrained)	
Bicycle Lane Width (not applicable for SR 429) • US 192 (C3C) • Western Way • Seidel Road	7 feet (buffered)	FDM, Section 223.2.1.1
Border Width	94 feet (new construction) 10 feet (minimum for maintenance in conjunction with roadside barriers)	FDM Sections 211.6 and 211.6.1
Clear Zone Width	Design Speed ≥ 60 mph • 36 feet (travel lanes and multilane ramps) • 24 feet (auxiliary lanes and single lane ramps) Design Speed = 55 mph • 30 feet (travel lanes and multilane ramps) • 18 feet (auxiliary lanes and single lane ramps) Design Speed = 45-50 mph • 24 feet (travel lanes and multilane ramps) • 14 feet (auxiliary lanes and single lane ramps) Design Speed = 40 mph • 18 feet (travel lanes and multilane ramps) • 10 feet (auxiliary lanes and single lane ramps) Design Speed = 35 mph • 14 feet (travel lanes and multilane ramps) • 10 feet (auxiliary lanes and single lane ramps)	FDM Table 215.2.1
Rate of Superelevation	0.10 (maximum)	FDM Section 210.9
Minimum Curve Radius	Mainline (70 mph D.S.) 1,637 feet	FDM Table 210.9.1

Design Element	Design Standard	Source
Length of Horizontal Curve	Mainline (70 mph D.S.) • 2,100 feet (desirable) • 1,050 feet (minimum) Ramp (≤ 45mph D.S.) 400 feet (minimum)	FDM Table 211.7.1
Maximum Deflection without Curve	2° 00' 00" (D.S. ≤ 40 mph) 0° 45' 00" (D.S ≥ 45 mph)	FDM Section 211.7.1
Maximum Deflection through Intersection	16° 00' (D.S. ≤ 20 mph) 11° 00' (D.S = 25 mph) 8° 00' (D.S = 30 mph) 6° 00' (D.S = 35 mph) 5° 00' (D.S = 40 mph) 3° 00' (D.S = 45 mph)	FDM Table 212.7.1
Vertical Geometry Criteria		
Stopping Sight Distance SR 429 Ramps	 861 ft (D.S = 70 mph, 3% Down) 780 ft (D.S. = 70 mph, 3% Up) 218 ft (D.S = 30 mph, 7% Down) 182 ft (D.S. = 30 mph, 7% Up) 271-333 ft (D.S = 35-40 mph, 6% Down) 229-278 ft (D.S. = 35-40 mph, 6% Up) 392-464 ft (D.S = 45-50 mph, 5% Down) 335-393 ft (D.S. = 45-50 mph, 5% Up)	 FDM Table 211.10.1 FDM Table 211.10.2
Maximum Profile Grade SR 429 Ramps	 3% (D.S. = 70 mph) 7% (D.S = 30 mph) 6% (D.S = 35-40 mph) 5% (D.S. = 45-50 mph)	FDM Table 211.9.1
Minimum Length of Vertical Curve	Sag = 800 feet Crest (open highway) = 1,000 feet Crest (within interchanges) = 1,800 feet	FDM Table 211.9.3
Crest Vertical Curve (K- Value) SR 429 Ramps	 506 (D.S. = 70 mph, new construction) 31 (D.S. = 30 mph, new construction) 47 (D.S. = 35 mph, new construction)	FDM Table 211.9.2

Design Element	Design Standard	Source
	70 (D.S. = 40 mph, new construction) 98 (D.S. = 45 mph, new construction) 136 (D.S. = 50 mph, new construction)	
Sag Vertical Curve (K- Value) SR 429 Ramps	 206 (D.S. = 70 mph) 37 (D.S. = 30 mph) 49 (D.S. = 35 mph) 64 (D.S. = 40 mph) 79 (D.S. = 45 mph) 96 (D.S. = 50 mph)	FDM Table 211.9.2
Maximum Change in Grade without Vertical Curve SR 429 Ramps	 0.20% (D.S. = 70 mph) 1.00% (D.S. = 30 mph) 0.90% (D.S. = 35 mph) 0.80% (D.S. = 40 mph) 0.70% (D.S. = 45 mph) 0.60% (D.S. = 50 mph)	FDM Table 210.10.2
Vertical Clearance	16.5 feet (new bridges) 16.0 feet (existing bridges)	FDM Table 260.6.1
Base Clearance	3 feet min. from bottom of roadway base to water elevation	FDM Section 210.10.3
	Linear Treatment Swale: base clearance water elevation = weir elevation. Ponds: base clearance water elevation = 24-hr design high water elevation. No ponds or linear swales = base clearance water elevation = seasonal high-water table.	Turnpike Supplement to FDOT Drainage Manual, Section 5.41.1
Stormwater Management Criteria		
Water Quantity	Wet detention: First 1-inch of total runoff from developed project or 2.5-inches of runoff from impervious area, whichever is greater. Dry Retention: 50 percent of wet detention.	SFWMD Handbook Vol. II
Water Quality*	Open Basins: Post development flow must	SFWMD Handbook

Design Element	Design Standard	Source
***- RCID has more stringent requirements, see Pond Siting Report for detailed information.**	not exceed pre-development peak discharge for the 25-yr/72-hr storm. RCID design event is the 50-yr/72-hr storm. Closed Basin: Post development flow must not exceed pre-development peak discharge for the 100-yr/72-hr storm.	Vol. II

4 Alternatives Analysis

4.1 Previous Planning Studies

There are no previous planning studies for the SR 429 corridor. There are five Developments of Regional Impacts (DRI) within the project area. Four of the DRIs are in Osceola County and one is located in Orange County. Three of the four DRIs in Osceola County have been rescinded. The Osceola County DRIs include:

- Mystic Dunes – Rescinded
- Fantasy Heights – Fully built out
- Formosa Gardens – Rescinded
- Rolling Oaks – Rescinded

Also in Osceola County is a development called Everest Place located on the west side of SR 429, south of US 192. It is a master planned community that will include a retail town center, medical center, offices, resorts and residential homes.

The Orange County DRI is the Orange Lake Resort and Country Club which is still current. A new 324 multi-family unit residential development called Elysian Apartments is planned at the intersection of Seidel Road and Avalon Road.

4.2 No-Build (No Action) Alternative

For capacity improvements to SR 429 between I-4 and Seidel Road, two alternatives were evaluated: the No-Build Alternative and the Build Alternative. The No-Build Alternative would not make any capacity improvements in the SR 429 corridor beyond any that are currently planned. The only planned roadway improvements to this segment of SR 429 and Seidel Road is a project to mill and resurface SR 429 from I-4 to Seidel Road, but this project would not add any capacity.

The No-Build Alternative assumes that the existing four mainline lanes would remain on SR 429 through the design year 2050. The No-Build traffic analysis indicates that by the Year 2030, a four-lane SR 429 will operate below the acceptable level of Service C.

Certain advantages would be associated with the implementation of the No-Build Alternative, including:

- No acquisition of right of way
- No design, right of way or construction costs
- No inconvenience to the traveling public and property owners during construction
- No impacts to utilities
- Reduced impacts to the adjacent natural, physical and human environment

The potential disadvantages of the No-Build Alternative include:

- Increase in traffic congestion and user costs due to increased travel times along SR 429 and through the existing interchanges at Sinclair Road, US 192, Western Way, and Seidel Road
- Increase in crash potential due to congestion
- Increase in travel times and reduced reliability of travel times
- Increase in emergency vehicle response time
- Increase in vehicle emission pollutants due to increased traffic congestion
- Does not meet the project's Purpose and Need

The No-Build Alternative will remain under consideration throughout the alternatives analysis and evaluation process.

4.3 Transportation Systems Management and Operational Alternatives (TSM&O)

The Transportation System Management and Operations (TSM&O) Alternative includes strategies with the operational objective of preserving the capacity and improving the security, safety, and reliability of the transportation system, while minimizing all environmental impacts. These strategies may include upgrades or additions to the existing facility, such as:

- Ramp signals
- Arterial traffic management systems
- Traffic incident management
- Work zone traffic management
- Road weather management
- Traveler information services
- Congestion pricing
- Parking management
- Traffic control
- Commercial vehicle operations
- Transit priority signals systems
- Freight management

TSM&O improvements alone do not sufficiently address the purpose and need, and the disadvantages of the No-Build Alternative will remain.

Due to traffic queues from the SR 429 southbound off-ramp to US 192 backing up onto the mainline, several TSM&O alternatives were evaluated for implementation in advance of the

ultimate preferred improvement project. The traffic analysis indicates some improvement is needed today due to the high p.m. peak hour volumes exiting SR 429 to travel both eastbound and westbound on US 192.

Option 1 would reconfigure the ramp terminal intersection with US 192 to include three right turn lanes and three left turn lanes as shown in Figure 4-1 and Appendix A. Modifications to the number of lanes on the off-ramp would also be required in order to maximize vehicle storage on the ramp. The estimated construction cost for this alternative is $4.47 million. The total cost including design, construction and project unknowns is approximately $6.46 million. There is no anticipated throw away work with this alternative. The LRE estimate is provided in Appendix E. Option 1 was eliminated from further consideration since it does not adequately address the queuing issue on the ramp.

Figure 4-1: US 192 Southbound Off-ramp TSM&O Option 1

Option 2 would route the southbound US 192 off-ramp traffic through the existing southbound cash toll plaza. AET conversion of SR 429 is planned for mid-2023. At that point, all mainline traffic will use the existing mainline electronic Toll Gantries. The on ramp between the southbound Toll Plaza and southbound SR 429 will be removed since cash will no longer be collected. A two-lane ramp would be constructed between the toll plaza and the widened southbound off-ramp. SB SR 429 traffic heading to US 192 will exit at the existing Toll Plaza. They will utilize the existing cash lanes which will be converted to SunPass and Toll by Plate.

Traffic will continue on new two-lane ramp between Toll Plaza and US 192. This option is provided in Appendix A. The estimate construction cost for Option 2 is $13.49 million. The total cost including design, construction and project unknowns is approximately $19.56 million. There is approximately $4.79 million associated with throw away work with this option. The LRE estimate is provided in Appendix E.

Option 3 would extend a southbound auxiliary lane between Western Way and US 192 ramps. AET conversion of SR 429 is planned for mid-2023. At that point, all mainline traffic will use the existing mainline electronic Toll Gantries. The on ramp between the southbound Toll Plaza and southbound SR 429 will be removed since cash will no longer be collected. The existing southbound Toll Gantry can accommodate three lanes. The mainline would be widened to the inside. The new SR 429 southbound off-ramp exit gore will be shifted north, approximately 1,550 feet, from existing location. At the new SR 429 SB off-ramp, the three mainline lanes will split to two lanes to US 192 and two lanes would continue on SR 429. The existing SR 429 SB auxiliary lane south of the exit to US 192 will be striped out as only two lanes will be needed south of the ramp with the new ramp configuration. This option is provided in Appendix A. The estimate construction cost for this option is $18.5 million. The total cost including design, construction and project unknowns is approximately $26.82 million. There is approximately $2.98 million associated with throw way work with this option. The LRE estimate is provided in Appendix E. Option 3 was eliminated from further consideration due to the higher costs and not addressing the queue backup as well as Option 2.

The implementation of a Hard Shoulder Running (HSR) concept, similar to the system currently being constructed by the Central Florida Expressway (CFX) Authority along SR 429 to the north of this project segment is a longer-term TSM&O option that was considered during this PD&E study. The preliminary analysis concluded the implementation of a HSR system onto the existing four-lane Western Beltway configuration would not be reasonable or feasible given the current and projected traffic volumes and characteristics. However, it was agreed that a HSR system should be reconsidered during final design to determine if features such as full-depth shoulders, wider shoulder widths (i.e., 16 feet), infrastructure for overhead supplemental signage, etc. should be implemented.

4.4 Future Conditions

The Future Land Use (FLU) in Osceola County is dominated by tourist, commercial and residential land uses, with some institutional and conservation areas. The FLU in Orange County is commercial, part of the Village of Horizon West, or part of incorporated Bay Lake. The City of Bay Lake is governed by the Reedy Creek Improvement District Comprehensive Plan. The FLU within the Bay Lake area of Orange County includes public facility and mixed use.

Future traffic conditions information is included in the Systems Interchange Justification Report provided under a separate cover.

4.5 Build Alternatives

4.5.1 SR 429 Mainline Widening Typical Section

One Build Alternative was evaluated for improving the SR 429 mainline; widening from four lanes (two lanes in each direction) to eight lanes (four lanes in each direction). The proposed mainline typical section is shown in Figure 4-2. Both inside and outside widening will be required. Reconstruction of the inside 13 feet of existing pavement will allow the roadway crown to be located at the center of the four-lane pavement. Widening to the inside will be 11 feet for the roadway and also include a 26-foot median with two 12-foot paved shoulders and a two-foot concrete barrier wall. The outside of the roadway will be widened five feet. The mainline widening occurs entirely within the existing ROW.

The median width varies in two locations through curves where a wider median is needed to meet sight distance requirements. This will result in a variable median width on one side of the median barrier wall through the curves. The first location is between Sinclair Road and Sand Hill Road in the southbound direction. The maximum paved width between the barrier wall and the southbound edge of travel lane is 23.5 feet. The second location is near the Canary Island Drive overpass in the northbound direction. The maximum paved width between the barrier wall and the northbound edge of travel lane is 29.5 feet.

In addition, the curve through the Livingston Road interchange was flattened to accommodate the required sight distance, but the median width will remain a consistent 26 feet. The revised mainline alignment remains within the existing ROW.

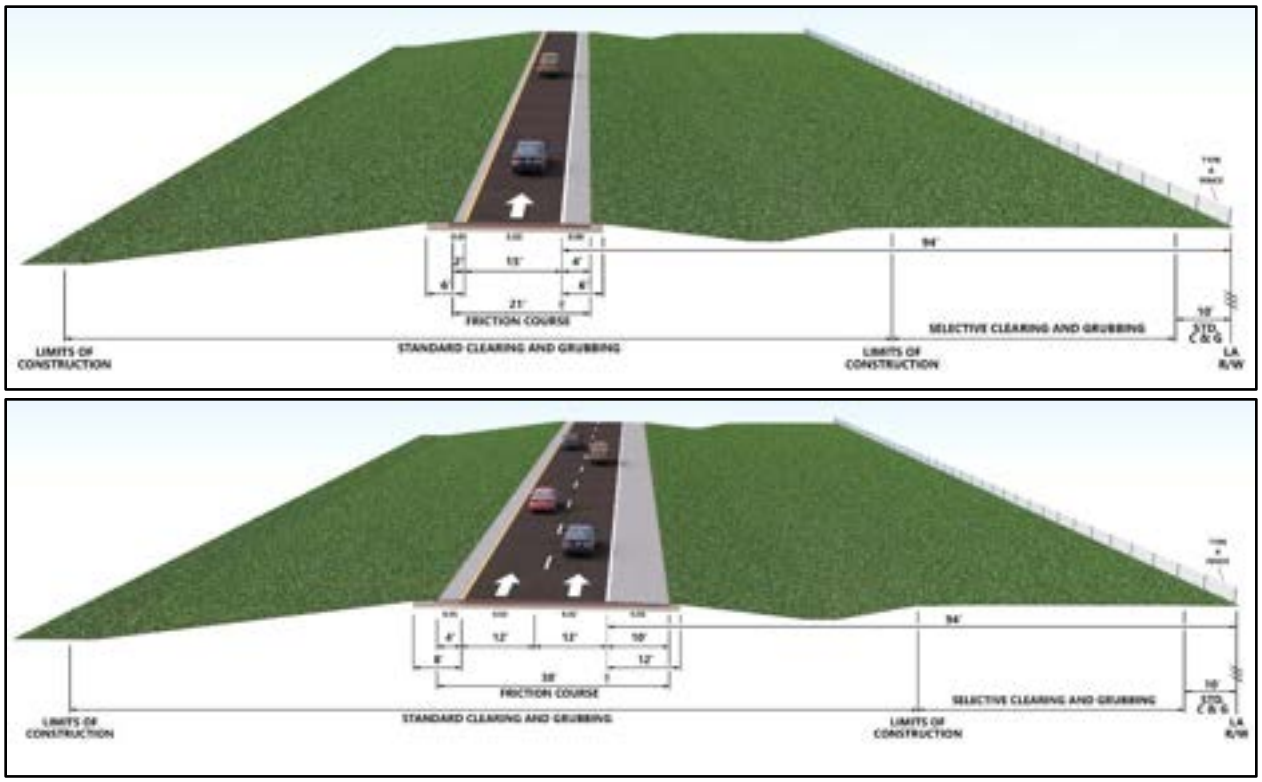
The Concept Plans for the SR 429 widening alternative is provided in Appendix A

Figure 4-2: Proposed SR 429 Mainline Typical Section

Ramp Typical Sections

Proposed single- and double-lane ramp typical sections are shown in Figure 4-3.

Figure 4-3: Proposed SR 429 Ramp Typical Sections



4.5.2 SR 429 at Canary Island Drive Overpass

The proposed widening of SR 429 from four lanes to eight lanes creates a substandard vertical clearance issue under the Canary Island Drive bridge (FDOT bridge #920608). This bridge is relatively new and in excellent condition (Sufficiency Rating of 98.9 and a Health Index of 99.6). The existing vertical clearance in the northbound direction is 16.14 feet. It is located in an area where SR 429 is in a superelevated curve. To address insufficient stopping sight distance with the inside widening, the SR 429 median width is proposed to be increased. With the widening of SR 429 to the outside through the curve, the vertical clearance would be reduced to less than 14 feet at the northbound edge of paved shoulder.

A preliminary analysis of five alternatives was performed to address the issue:

- Alternative 1 - Realignment of SR 429
- Alternative 2 - Lowering the profile of northbound SR 429
- Alternative 3 - Replacing the superstructure of the Canary Island Drive bridge
- Alternative 4 - Jacking the superstructure of the Canary Island Drive bridge
- Alternative 5 - Replacement of the Canary Island Drive bridge

Alternative 1 evaluated shifting the SR 429 northbound lanes towards the median to address the vertical clearance issue. It was eliminated as not viable due to conflicts with the existing median pier of the Canary Island Drive bridge.

Alternative 2 evaluated lowering the northbound SR 429 profile to achieve the required minimum vertical clearance without impacting the Canary Island Drive bridge. A preliminary drainage analysis was performed to determine the impacts to drainage. The analysis identified multiple options that would address the drainage with a lowered mainline profile. The estimated construction cost for this alternative is approximately $5.5 million.

Alternative 3 evaluated replacing the superstructure of the Canary Island Drive bridge. The existing AASHTO Type VI beams are 6 feet tall. Replacing them with Florida I-Beams (FIB) 54 reduces the height of the beams by 1.5 feet. This distance did not address the vertical clearance issue. Therefore, the alternative was eliminated.

Alternative 4 evaluated jacking the superstructure to achieve the required minimum clearance. This alternative would require modifications to the substructure, MSE walls, approach slab as well as reconstruction of the roadway approaches. The maintenance of traffic would require a detour during the construction. The Windsor Palms neighborhood would need to use the Indian Creek Road bridge to cross SR 429. This would require a detour through the Indian Creek subdivision to access the bridge. The existing connection between the neighborhoods would need to be reconstructed to allow for the traffic to travel between the two neighborhoods. The

detour would be disruptive to the Indian Creek neighborhood with all traffic for Windsor Palm required to travel through a portion of the Indian Creek neighborhood. The estimated construction cost for this alternative is approximately $1.4 million.

Alternative 5 evaluated replacing the entire Canary Island Drive bridge. The new bridge would be constructed just north of the existing bridge. The roadway approaches would be reconstructed and would eliminate the reverse curves in the roadway alignment. The existing bridge would be removed after construction of the new bridge. This alternative would require maintenance of traffic coordination with SR 429 widening during construction. The estimated construction cost for this alternative is approximately $3.8 million.

The alternatives in the evaluation matrix in Table 4-10 included Alternative 2, lowering the northbound SR 429 profile.

4.5.3 SR 429 Interchanges

All of the existing interchanges were evaluated for Design Year 2050 traffic. Several sketch-level concepts were developed for each location, and projected traffic volumes were modeled to determine operational performance of each configuration using the Capacity Analysis for Planning of Junctions (Cap-X) Tool, a simple and cost-effective sketch-planning tool that helps users focus on more effective intersection and interchange designs prior to conducting more demanding traffic simulations. Then geometry was preliminarily evaluated for relative cost, and potential impacts to the local residential developments, utilities, and the environment. In general, if the existing interchange configurations can accommodate Design Year 2050 traffic with an acceptable LOS, it was selected for further evaluation since costs and impacts would be minimized.

4.5.3.1 Sinclair Road Interchange

The Poinciana Parkway Extension Connector (FPID: 446581-1), from CR 532 to north of I-4, includes an evaluation of improvements at the Sinclair Road interchange. However, should the No-Build Alternative be selected for the Poinciana Parkway Extension Connector, improvements at the Sinclair Road interchange will be included with the Widen Western Beltway PD&E Study.

Full Diamond

The existing Full Diamond configuration will operate adequately for Design Year 2050 traffic with minor operational improvements at the ramp termini, including adding a northbound left turn lane on the northbound off-ramp, a westbound right turn lane onto Collector Road, a southbound right turn lane from Collector Road, a southbound left turn lane from the southbound off-ramp, and an eastbound right turn lane onto the southbound on-ramp. A new traffic signal will also be added to the southbound ramp terminal intersection with Sinclair Road.

The two existing toll sites on the ramps to and from the south will be converted to electronic toll gantries. No bicycle lanes are present along Sinclair Road, east and west of the interchange, so no bicycle lanes are proposed. Adding bicycle lanes would require widening of the Sinclair Road bridge.

Two alternatives were evaluated at the northbound on-ramp from Collector Road, including adding a roundabout or a signal. For Alternative 1, a new traffic signal would be added to the intersection of the northbound on-ramp with Collector Road. In addition, a northbound left turn lane and a southbound right turn lane would be added to the intersection to improve traffic operations. The concept for Alternative 1 is shown in Figure 4-4. The northbound through movement would have a continuous green at the signal. Alternative 2 would add a roundabout at the intersection instead of the traffic signal. The roundabout would be a single lane, with a northbound through lane that bypasses the roundabout. The concept for Alternative 2 is shown in Figure 4-5. The Concept Plans for the Sinclair Road interchange Alternatives are also provided in Appendix A.

Additional traffic analysis of the roundabout intersection indicated a southbound bypass lane was needed to accommodate the traffic accessing the northbound on-ramp. Two additional alternatives were evaluated to accommodate this additional improvement to the intersection.

Alternative 2A includes a southbound bypass lane which requires shifting the roundabout south and east to provide the required minimum curve radius for that movement. This shift in the location of the roundabout caused a realignment of Connector Road which pushed the roundabout intersection and approaches into the residential community along Connector Road, resulting in impacts to seven parcels and four residential relocations.

Figure 4-4: Sinclair Road Alternative 1 Traffic Signal

Figure 4-5: Sinclair Road Alternative 2 Roundabout

Alternative 2B includes a southbound bypass lane which requires shifting the roundabout north to provide the required minimum curve radius for that movement. This shift in the location of the roundabout caused a realignment of Connector Road which pushed the roundabout intersection and approaches into a wetland located north of the existing intersection. In addition, shifting the intersection north will require raising the elevation of the northbound on-

ramp as well as raising the roundabout intersection in order to tie into the profile of the northbound mainline as it approaches the bridge over Sand Hill Road.

4.5.3.2 Livingston Road Interchange

A new interchange location was evaluated near the existing two-lane Livingston Road. The purpose of the new interchange is to improve connectivity and relieve congestion at the US 192 interchange. The adjacent intersections along US 192 east and west of the interchange operate at LOS F conditions in both the No-Build and Build conditions. The LOS failure along US 192 will impact the interchange operations and increase ramp queues. The proposed Livingston Road interchange will reduce traffic demand along US 192 and the interchange ramps. The traffic volume on the US 192 ramps is anticipated to decrease by 22 percent with a reliever interchange at Livingston Road. With the addition of the Livingston Road interchange, traffic operations along US 192 are expected to improve. This new interchange can allow the US 192 improvements to be scaled back with an approximate savings of $1 million for construction.

A four-lane divided interchange access roadway would provide a limited access connection between SR 429 and the intersection of Livingston Road with Formosa Gardens Boulevard, adding a fourth leg to the local intersection. This interchange would be located approximately 2.25 miles north of Sinclair Road, and 1.5 miles south of US 192 interchange. Four interchange configurations were considered.

Full Diamond Interchange Option

A full Diamond interchange configuration was dismissed due to the proximity of the northbound on-ramp and the southbound off ramp to the US 192 ramps not allowing adequate weaving distance.

Split Diamond Interchange Option

A Split Diamond interchange was evaluated with southbound on- and northbound off-ramps terminating at Livingston Road, and the southbound off and northbound on-ramps terminating at Sand Hill Road. One benefit of this configuration is that it could allow the existing Sinclair Road interchange to be removed, which would extend the northbound weaving section for traffic coming from I-4. The Split Diamond interchange configuration was also dismissed for two reasons: 1) Sand Hill Road cannot be widened from two to four lanes without significant impacts to existing homes along Sand Hill Road, 2) Osceola County has plans to extend Sinclair Road to the west, providing a connection to US 27, and c) the additional weaving distance south of Sinclair Road is not needed; so, removing the interchange does not provide critical benefits.

Partial Cloverleaf

A Partial Cloverleaf (Par-Clo) interchange (Type AB2) was evaluated with loop ramps for the northbound on-ramp and southbound off-ramp, and diamond ramps for the northbound off-ramp and southbound on-ramp. All of the ramps would be located south of the Livingston Road, as shown in Figure 4-6, providing adequate weaving between the Livingston Road and US 192 interchanges while avoiding impacts to the Oak Island Cove residential development south of US 192. Ramps to and from the south would be tolled electronically. The Par-Clo was selected for further evaluation to be evaluated against the No-Build option at this interchange. This alternative was identified as Alternative 1.

As part of the interchange, the half-mile two-lane section of Formosa Gardens Boulevard will be widened to four lanes to match the four-lane sections to the south and north of Livingston Road.

The new interchange will create a fourth leg of the existing Livingston Road intersection with Formosa Gardens Boulevard. A traffic signal would be added, as well as dual left turn lanes for northbound to westbound traffic entering the interchange. A new left turn lane will be added for westbound Livingston Road to southbound Formosa Gardens Boulevard traffic, as well as a westbound through lane to enter the interchange. The southbound approach will include a new exclusive left turn lane onto Livingston Road, an exclusive right turn lane into the interchange, and a second southbound through lane. The eastbound approach to Formosa Gardens Boulevard from the interchange will include dual left turn lanes, a through lane, and an exclusive right turn lane.

T-Ramp Interchange

A minimization alternative was evaluated for this proposed interchange. This alternative changed the partial cloverleaf interchange to a T-Ramp interchange, see

Figure 4-7. The ramps for Livingston Road would cross over SR 429 with a new bridge and form a T-intersection with the southbound on-ramp and off-ramps. The northbound off-ramp and on-ramp would directly tie into the Livingston Road intersection. Portions of the existing stormwater pond on the east side of SR 429 would need to be filled in. The drainage analysis is identifying alternative pond locations to compensate for the lost volume as well as for the additional impervious area of the interchange. The ramps to and from the south would be electronically tolled. This alternative reduced impacts to wetlands and conservation easements on the west side of SR 429. This alternative was identified as Alternative 2.

As part of the interchange, the half-mile two-lane section of Formosa Gardens Boulevard will be widened to four lanes to match the four-lane sections to the south and north of Livingston Road.

The new interchange will create a fourth leg of the existing Livingston Road intersection with Formosa Gardens Boulevard. A traffic signal would be added, as well as dual left turn lanes for northbound to westbound traffic entering the interchange. A new left turn lane will be added for westbound Livingston Road to southbound Formosa Gardens Boulevard traffic, as well as a westbound through lane to enter the interchange. The southbound approach will include a new exclusive left turn lane onto Livingston Road, an exclusive right turn lane into the interchange, and a second southbound through lane. The eastbound approach to Formosa Gardens Boulevard from the interchange will include dual left turn lanes, a through lane, and an exclusive right turn lane.

The Concept Plans for the Livingston Road interchange Alternatives are also provided in Appendix A.

Figure 4-6: Livingston Road Interchange Alternative 1 Partial Cloverleaf

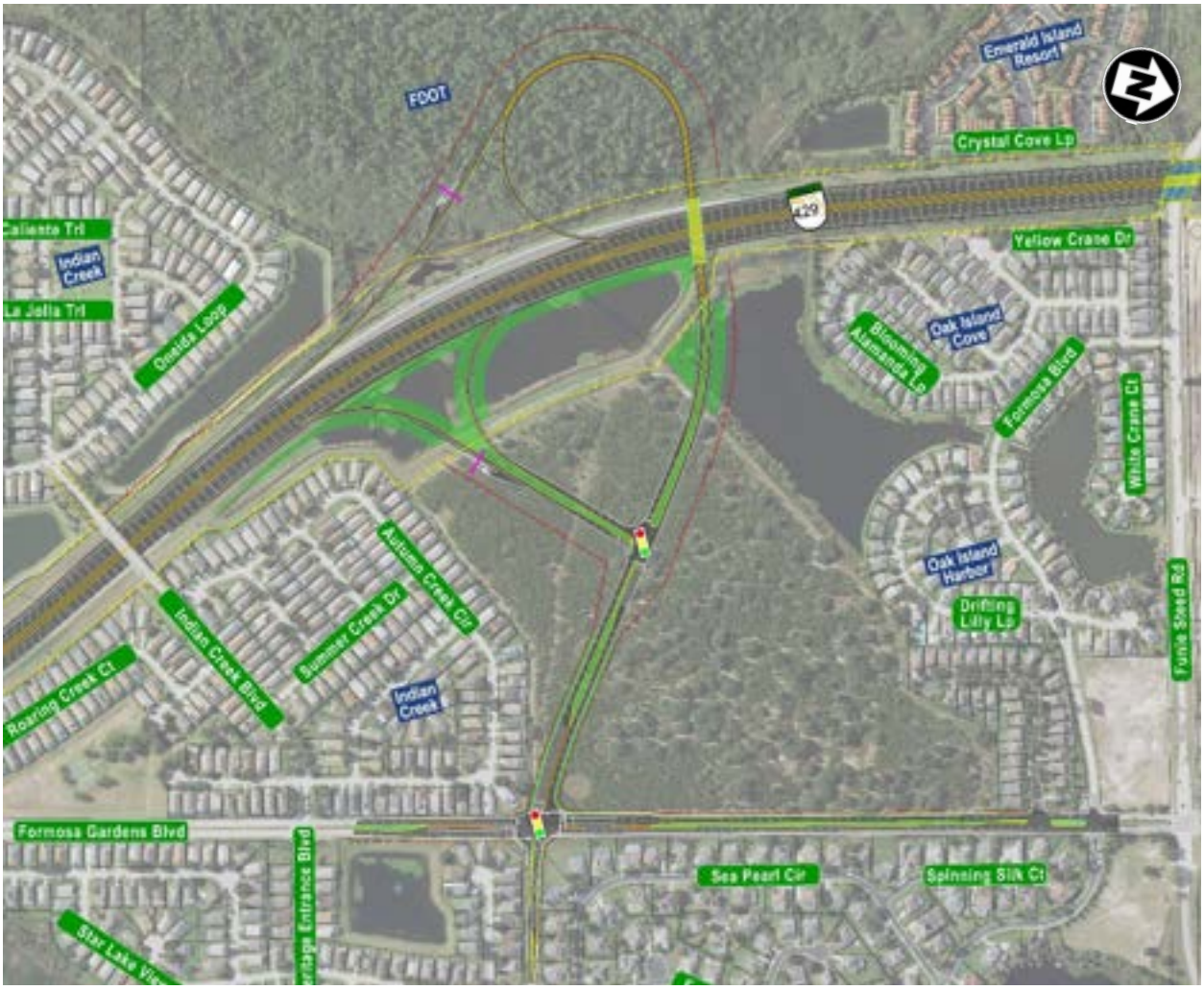


Figure 4-7: Livingston Road Interchange Alternative 2 T-Ramp Interchange

4.5.3.3 US 192 Interchange

Six interchange configurations were considered at the sketch level. A CAP-X screening matrix is shown in Table 4-1. A description of each location and the decision whether or not to carry each alternative forward for further evaluation follows.

Table 4-1: US 192 CAP-X Screening Matrix

Interchange Type	V/C Ratio		Conflict Points	Preliminary Rank	Comments
	AM	PM			
Diamond*	0.90	0.99	26	1	- Widening roadway under bridge may impact the retaining wall - Utility Impact - power poles on S. and W. side of interchange - **Required geometry 2 NB right lanes, 2 SB right lanes, 4 EB through lanes and 4 WB through lanes**
Diverging Diamond Interchange	0.90	0.93	14	2	- Widening roadway under bridge may impact the retaining wall - Utility Impact - power poles on south side and west side of interchange - **Proximity of intersection on east might impact operations as queue spill over is common for closely spaced intersections** - **Required geometry - 2 SB right lanes, 4 EB through lanes and 4 WB through lanes**
Single Point Urban Interchange	0.97	0.93	26	3	- Widening roadway under bridge may impact the retaining wall - Utility Impact - power poles on south side and west side of interchange - **Required geometry - 3 SB left lanes, 2 SB right lanes, 4 EB through lanes and 4 WB through lanes**

Displaced Left Turn	0.87	0.96	16	4	- Widening roadway under bridge may impact the retaining wall - Utility Impact - power poles on south side and west side of interchange - **East crossover intersection potentially be placed between 2 closely spaced intersections (NB Ramps and E Orange Lake Blvd)** - **Required geometry - 3 SB right lanes and 4 EB through lanes**
Partial Cloverleaf B (Exit Ramps)	**1.11**	0.88	12	5	- Utility Impact - power poles on south side and west side of interchange - Impacts the development in NE quadrant. Potential configuration with SW loop only. SBL demand is 700 vph/350 vph during AM/PM peak hours - **Required geometry - 2 SB right lanes and 4 EB through lanes**
Partial Cloverleaf A (Entry Ramps)	0.85	0.82	12	6	- Utility Impact - power poles on south side and west side of interchange - Impacts the development in SE quadrant. WBL demand is low 90 vph/250 vph during AM/PM peak hours - **Required geometry - 3 SB left lanes, 4 EB through lanes and 4 WB through lanes**

*Existing configuration
Base Condition - Existing geometry -
- SB Ramp intersection – 3 lane EB through & WB through, 1 channelized EB right, 2 lane WB left, 1 SB right and 2 lane SB left
- NB Ramp intersection – 3 lane EB through & WB through, 2 lane EB left, 1 lane WB right, 2 lane NB left & 1 lane NB right

Diverging Diamond

While the Diverging Diamond can accommodate Design Year 2050 traffic, it would require reconstruction of the interchange, adding cost and potential impacts. In addition, even after reconfiguring the interchange, the proximity of intersection on the east side could impact operations as queues could spill over from the East Orange Lake Boulevard/Rolling Oats Boulevard intersection, which 750 feet from the northbound ramp terminals. In addition, widening US 192 under the SR 429 bridges may impact the retaining wall structure. Therefore, it was dismissed from further consideration.

Single Point Urban Interchange

While the Single Point Urban Interchange (SPUI) can accommodate Design Year 2050 traffic, it would require reconstruction of the interchange, adding cost and potential impacts. In addition, widening US 192 under the SR 429 bridges may impact the retaining wall structure. Therefore, it was dismissed from further consideration.

Displaced Left Turn

While the Displaced Left Turn interchange (DLT) can accommodate Design Year 2050 traffic, it would require reconstruction of the interchange. Widening US 192 under the SR 429 bridge would impact the retaining wall structure and the SR 429 bridges over US 192, adding cost and potential impacts. In addition, the proximity of intersection on the east side could impact operations since the crossover intersection would be too close to the East Orange Lake Boulevard/Rolling Oats Boulevard intersection, which is closely spaced 750 feet from the northbound ramp terminals. Therefore, it was dismissed from further consideration.

Partial Cloverleaf (Type B)

The Vehicle to Capacity (V/C) ratio of the Par-Clo (Type B) interchange configuration exceeds 1.0 in the AM peak hour. In addition, this configuration could impact the development in the northeast quadrant. Therefore, it was dismissed from further consideration.

Partial Cloverleaf (Type A)

While the Par-Clo (Type A) interchange configuration generally accommodates Design Year 2050 traffic, it would require reconstruction of the interchange and potentially impact the development in the southeast quadrant. Therefore, it was dismissed from further consideration.

Existing Diamond

Since the existing full Diamond interchange configuration (with added turn lanes) can accommodate the Design Year 2050 traffic at an acceptable LOS without requiring full reconstruction of the interchange or the SR 429 bridges over US 192, it was selected for further evaluation. However, some queuing may result due to the proximity of the East Orange Lake

Boulevard/Rolling Oats Boulevard intersection, which is 750 feet from the northbound ramp terminals. In addition, an evaluation of widening US 192 under the SR 429 bridge was done to determine that the retaining wall structure would not be impacted for this option. Operational improvements will be made to the ramp terminals and US 192. An additional eastbound through lane will be added to US 192 west of the interchange. An additional westbound through lane will be added from East Orange Lane Boulevard through the interchange. An additional northbound left and northbound right turn lane will be added to the northbound off-ramp. An additional eastbound left turn lane will be added for traffic entering the northbound on-ramp. An additional left and two additional right-turn lanes will be added to the southbound off-ramp for traffic turning onto US 192. The existing toll sites on the ramps to and from the south would be converted to electronic toll gantries. The Build Alternative for US 192 is shown in Figure 4-8. The Concept Plans for the US 192 interchange alternative is provided in Appendix A.

Figure 4-8: US 192 Interchange Build Alternative

4.5.3.4 Western Way Interchange

Eight interchange configurations were considered at the sketch level for Western Way. A CAP-X screening matrix is shown in

Table 4-2. A description of each location and the decision whether or not to carry each alternative forward for further evaluation follows.

Table 4-2: Western Way CAP-X Screening Matrix

Type	V/C Ratio		Conflict Points	Preliminary Rank	Comments
	AM	PM			
Partial Cloverleaf (Type B) *	0.60	0.90	12	1	- Existing number of turn lanes sufficient with NB left loop ramp (NE quadrant) - Add 1 lane to loop ramp
Single Point	0.93	0.84	26	2	- Potential Impact to bridge retaining wall - **Required geometry - 2 NB right lanes, 3 SB left lanes, 3 EB through lanes, 2 WB left lanes**
Diamond	0.89	0.85	26	3	- Potential Impact to bridge retaining wall **- Required geometry - 2 NB right lanes, 3 SB left lanes, 4 EB through lanes and 2 WB left lanes**
Displaced Left Turn	0.91	0.88	16	4	**- Signalized intersection on the west side is very close to the interchange** - Utility poles on the west side of interchange - Potential Impact to bridge retaining wall **- Required geometry - 2 NB right lanes, 3 SB left lanes, 3 EB through lanes**
Partial Cloverleaf (Type A)	0.76	0.64	12	5	- Utility poles on west side of the interchange - Impact to development on NW and SE quadrants - Potential Impact to bridge retaining wall **- Required geometry - 3 SB left lanes and 3 EB through lanes**

Diverging Diamond Interchange	0.93	0.90	14	6	**- Signalized intersection on the west side is very close to the interchange.** - Utility poles on the west side of interchange - Potential Impact to bridge retaining wall **- Required geometry - 2 NB right lanes, 3 SB left lanes, 3 EB through lanes**

*Existing configuration
Base Condition - Existing geometry

- SB Ramp intersection – 2 lane EB through & WB through, 1 channelized EB right, 1 lane WB left, 1 SB right and 1 loop ramp SB left which merges on EB Western Way as lane add
- NB Ramp intersection – 2 lane EB through & WB through, 1 lane EB left & WB right, 1 lane NB left & NB right

CAP-X Analysis assumes ramp terminal intersections to be signalized

Partial Cloverleaf (Type B)

The existing Par-Clo interchange configuration can accommodate the Design Year 2050 traffic at an acceptable LOS while only requiring the addition of one lane to the existing single-lane loop ramp. The existing turn lanes are adequate. This alternative would not require full reconstruction of the SR 429 bridges over Western Way and would minimize impacts to existing utilities. Therefore, it was selected for further evaluation. The Build Alternative for Western Way is shown in

Figure 4-9. The Concept Plans for the Western Way interchange alternative is provided in Appendix A.

Single Point Urban Interchange

While the Single Point Urban Interchange (SPUI) can accommodate Design Year 2050 traffic, it would require reconstruction of the interchange, adding cost and potential impacts. In addition, widening Western Way under the SR 429 bridges may impact the retaining wall structure. Therefore, it was dismissed from further consideration.

Diamond

While the Diamond can accommodate Design Year 2050 traffic, it would require reconstruction of the interchange, adding cost and potential impacts. In addition, widening Western Way under the SR 429 bridges may impact the retaining wall structure. Triple left turn lane were considered for the southbound off-ramp, but operational performance did not meet acceptable LOS. Therefore, the Diamond was dismissed from further consideration

Displaced Left Turn

While the DLT interchange can accommodate Design Year 2050 traffic, it would require reconstruction of the interchange. Widening Western Way under the SR 429 bridges would impact the retaining wall structure and the SR 429 bridges, adding cost and potential impacts. In addition, the proximity of the Hartog Road intersection on the west side could impact operations since the crossover intersection would be too close to the side road intersection, which is closely spaced 550 feet from the southbound ramp terminals. Therefore, it was dismissed from further consideration.

Figure 4-9: Western Way Interchange Build Alternative

Partial Cloverleaf (Type A)

While the Par-Clo (Type A) interchange configuration generally accommodates Design Year 2050 traffic, it would require reconstruction of the interchange, impact utility poles on west side

of the interchange, impact the development in the northwest and southeast quadrants, and potentially impact the SR 429 bridge retaining wall. Therefore, it was dismissed from further consideration.

Diverging Diamond

While the Diverging Diamond can accommodate Design Year 2050 traffic, it would require reconstruction of the interchange, adding cost and potential impacts. It would impact utility poles on west side of the interchange, and potentially impact the SR 429 bridge retaining wall. In addition, the proximity of the Hartog Road intersection on the west side could impact operations since the crossover intersection would be too close to the side road intersection, which is closely spaced 550 feet from the southbound ramp terminals. Therefore, it was dismissed from further consideration.

Partial Parallel Flow Interchange

Another configuration called a Partial Parallel Flow Intersection (PPFI) was investigated. This concept would convert the interchange to a modified diamond configuration but would pull one off ramp to the opposite side to terminate across from the off-ramp in the opposite direction. An example is shown in

Figure 4-10, below. This concept would require reconstruction of the interchange but was shown to provide only minimal benefit to operations. Therefore, it was dismissed from further consideration.

Figure 4-10: Example of Partial Parallel Flow Interchange

Southbound to Eastbound Flyover

This alternative would remove the loop ramp and add a southbound to eastbound flyover in its place. While operations would be adequate, it requires the additional cost of construction the flyover. In addition, a flyover could have potential impacts to the Duke Energy transmission line, environmental impacts in the southeast quadrant, and could impact the Disney property east of the interchange. Since adding a lane to the existing loop is less costly and performs adequately, the flyover alternative was dismissed from further consideration.

4.5.3.5 Seidel Road Interchange

Six interchange configurations were considered at the sketch level for Seidel Road. A CAP-X screening matrix is shown in

Table 4-3. A description of each location and the decision whether or not to carry each alternative forward for further evaluation follows.

Table 4-3: Seidel Road CAP-X Screening Matrix

Type	V/C Ratio		Conflict Points	Preliminary Rank	Comments
	AM	PM			
Half Diamond *	0.85	0.88	12	1	- Existing geometry with signal control at both ramp terminals
Single Point Urban Interchange	0.82	0.71	11	2	- Widening the roadway under bridge may impact the retaining wall structure - Utility Impact - power poles on south side and west side of interchange
Diverging Diamond Interchange	0.71	0.71	8	3	- Widening the roadway under bridge may impact the retaining wall structure - Utility Impact - power poles on south side and west side of interchange - Proximity of intersection on east and west might impact operations as queue spill over is common for closely spaced intersections
Displaced Left Turn Interchange	0.63	0.66	9	4	- Widening the roadway under bridge may impact the retaining wall structure - Utility Impact - power poles on south side and west side of interchange - Crossover intersections potentially be placed between 2 closely spaced intersections

Partial Cloverleaf (Type A)	0.58	0.44	6	5	- Utility Impact - power poles on south side and west side of interchange - Potential configuration with NW loop only. WBL demand is 680 vph/440 vph during AM/PM peak hours
Partial Cloverleaf (Type B)	0.63	0.51	6	6	- Utility Impact - power poles on south side and west side of interchange - Impacts the development on NE quadrant.

*Existing configuration
Base Condition - Existing geometry

- SB Ramp intersection – 2 lane EB through & WB through, EB right shared with EB through, 1 lane WB left
- NB Ramp intersection – 2 lane EB through & WB through, 1 lane NB left & NB right

CAP-X Analysis assumes ramp terminal intersections to be signalized

Half Diamond

Since SR 429 is a CFX facility north of Seidel Road, and since CFX has no plans to add ramps to and from the north side of Seidel Road, the existing Half Diamond interchange with ramps to and from the south only, was evaluated at the sketch-level. The existing Half-Diamond interchange configuration and lane geometry performs adequately in Design Year 2050 and requires minimal modifications, including adding traffic signals at the ramp terminals. Therefore, it was selected for further analysis. The existing toll sites on the ramps to and from the south would be converted to electronic toll gantries.

Three alternatives were initially considered for the half diamond interchange: 1) signal control with a westbound Turbo Lane (signal bypass lane), 2) roundabouts at each ramp terminal, and 3) a "Peanut" or Double Roundabout. The Turbo Lane portion was dismissed from further consideration since the westbound traffic using the Turbo Lane would immediately encounter the recently constructed traffic signal at Avalon Road, diminishing the benefits of the Turbo Lane. The roundabout at each ramp terminal alternative was dismissed since full roundabouts were not necessary for a Half Diamond interchange. Alternative 1, Traffic Signals at the ramp terminals (without a Turbo Lane), was developed and the concept is shown in Figure 4-11. Alternative 2, Double Roundabout at the interchange, was developed and the concept is shown in Figure 4-12. The Concept Plans for the Seidel Road interchange alternatives are provided in Appendix A.

Single Point Urban Interchange

The SPUI would require reconstruction of the interchange. Widening Seidel Road under the SR 429 bridge may impact the retaining wall structure. In addition, the power poles on south side

and west side of interchange could be impacted. Since the existing Half diamond performs adequately ant a lower cost, the SPUI was dismissed from further consideration.

Diverging Diamond

The Diverging Diamond would require reconstruction of the interchange. Widening Seidel Road under the SR 429 bridge may impact the retaining wall structure. In addition, the power poles on the south side and west side of interchange could be impacted. The proximity of the Avalon Road and Lakeshore Point Drive intersections on the west and east sides, respectively, might

impact operations as queues could spill over with the closely spaced intersections. Therefore, the Diverging Diamond was dismissed from further consideration.

Figure 4-11: Seidel Road – Alternative 1 Traffic Signals

Displaced Left Turn

The DLT would require reconstruction of the interchange. Widening Seidel Road under the SR 429 bridge may impact the retaining wall structure. In addition, the power poles on the south

side and west side of interchange could be impacted. In addition, the proximity of the intersection on the east side could impact operations since the crossover intersection would be placed between the two closely spaced ramp terminal intersections. Therefore, the DLT was dismissed from further consideration.

Partial Cloverleaf (Types A and B)

While the Par-Clo (Type A) interchange configuration performs well with Design Year 2050 traffic, it would require reconstruction of the interchange, potentially impact utility poles on the south and west sides of the interchange and impact the existing residential development in the northeast quadrant. Therefore, it was dismissed from further consideration.

Figure 4-12: Seidel Road – Alternative 2 Double Roundabouts

4.5.3.6 Ramp Toll Sites and Mainline Toll Plaza

All Electronic Tolling (AET) will be incorporated into the concepts. Eight dedicated AET lanes are needed by 2046.

The existing ramp toll plazas for the Sinclair Road, US 192 and Seidel Road interchanges will be replaced with all electronic toll gantries.

The SR 429 mainline toll plaza and toll gantries will need to be replaced due to the widening of SR 429. The existing toll gantries cannot accommodate an eight-lane typical section.

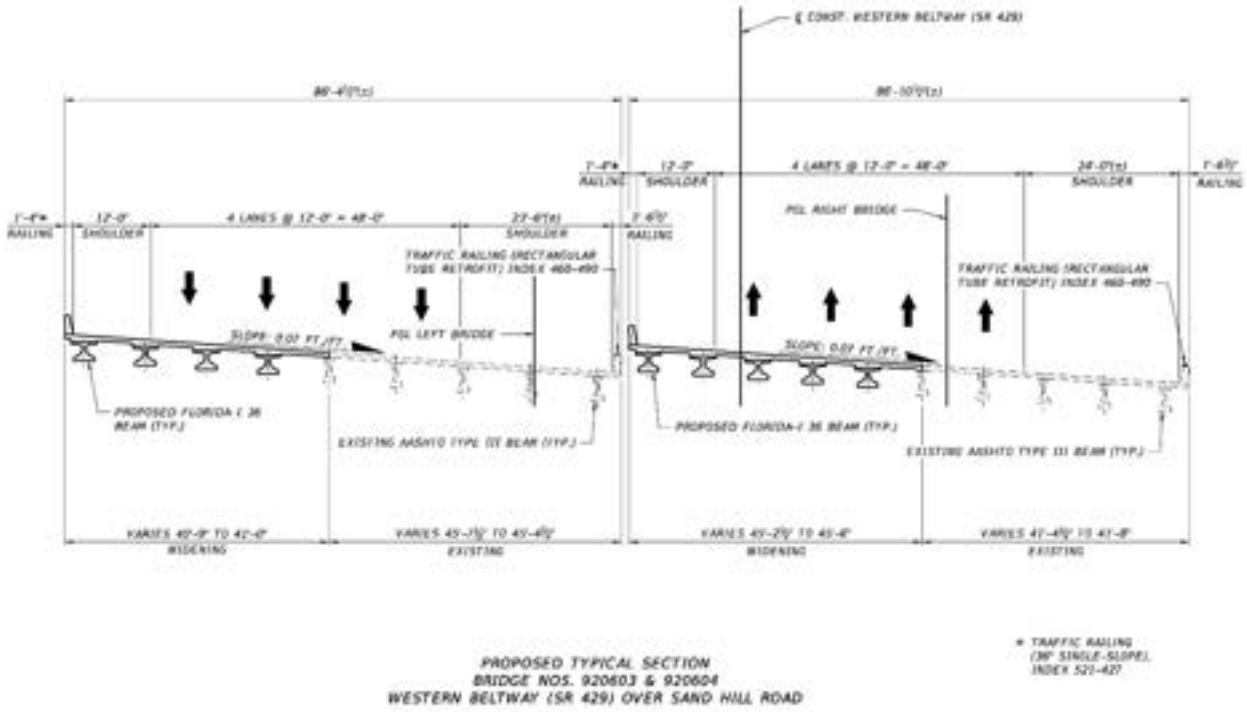
4.5.4 Proposed Structures

The following describes the proposed bridge structures and provides typical sections for each bridge.

SR 429 over Sand Hill Road

The existing bridges will be widened from two to four lanes. The proposed bridge widening for both bridges is to the outside. This maintains the existing minimum vertical clearance for both bridges. The southbound bridge widening will range from 45'-7.5" to 45'-4.5". The northbound bridge widening will range from 41'-4.5" to 41'-8". The southbound bridge will have four 12-foot lanes, 12-foot outside shoulder, and a 23.5-foot inside shoulder. The wider inside shoulder is to achieve the required sight distance on the mainline curve. The northbound bridge will have four 12-foot lanes, 12-foot inside shoulder, and a 24-foot outside shoulder. The wider outside shoulder is to achieve the required sight distance on the mainline curve. The aesthetic treatment for Bridge No. 920604 and Bridge No. 920603 should conform to Level One as indicated in the FDOT Design Manual (FDM), Chapter 121. The proposed typical section is shown in Figure 4-13.

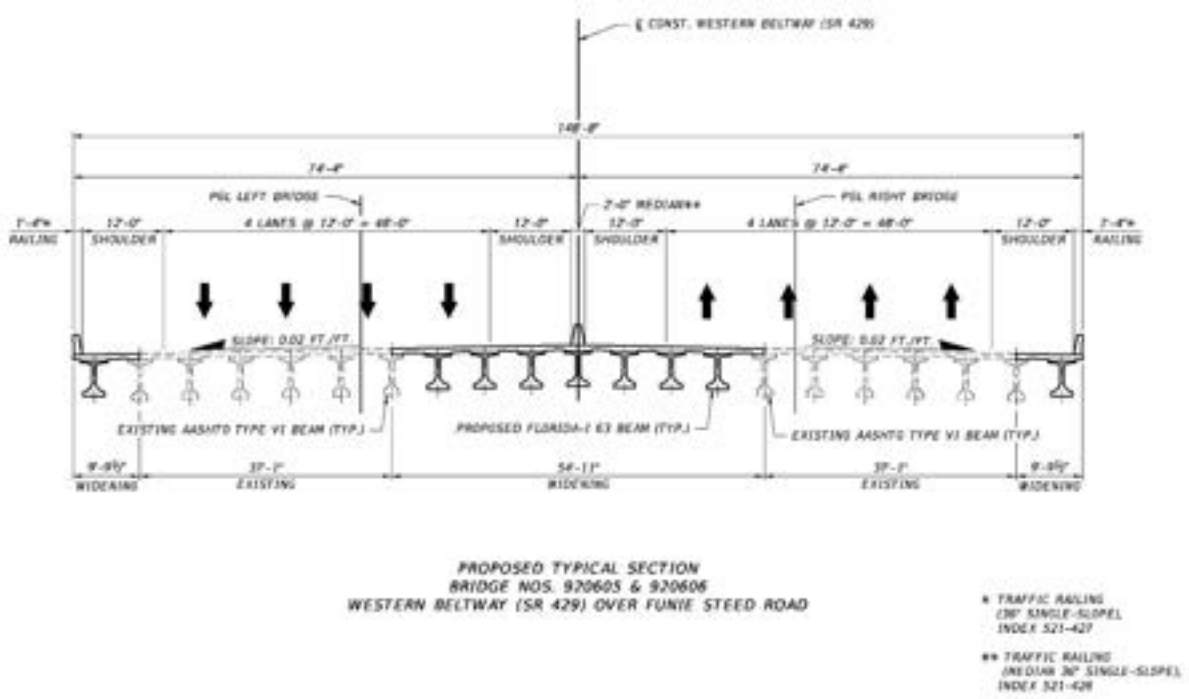
Figure 4-13: SR 429 over Sand Hill Road Proposed Typical Section



SR 429 over Funie Steed Road

The existing bridges will be widened from two to four lanes. The proposed bridge widening for both bridges is to the inside and outside, enclosing the bridges in the median. The vertical clearance for both bridges will not be below the minimum vertical clearance of 16′-0″ per FDM Table 260.6.1. The southbound bridge will have four 12-foot lanes and 12-foot inside and outside shoulders. The northbound bridge will have four 12-foot lanes and 12-foot inside and outside shoulders. The bridge widening will be 9′-9.5″ to the outside and 54′-11″ to the inside. The aesthetic treatment for Bridge No. 920605 and Bridge No. 920606 should conform to Level One as indicated in the FDOT Design Manual (FDM), Chapter 121. The proposed typical section is shown in Figure 4-14.

Figure 4-14: SR 429 over Funie Steed Road Proposed Typical Section



PROPOSED TYPICAL SECTION
BRIDGE NOS. 920605 & 920606
WESTERN BELTWAY (SR 429) OVER FUNIE STEED ROAD

* TRAFFIC RAILING (36" SINGLE-SLOPE) INDEX 521-427

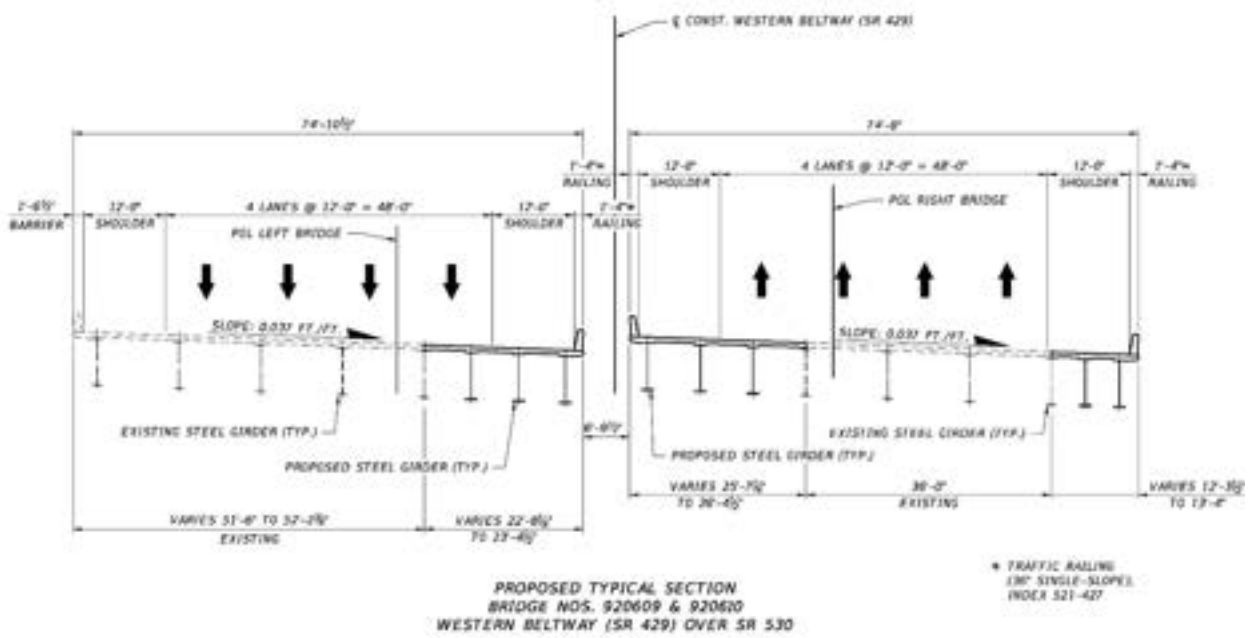
** TRAFFIC RAILING (MEDIAN 36" SINGLE-SLOPE) INDEX 521-428

SR 429 over SR 530 (US 192)

The existing southbound bridge will be widened from three to four lanes. The existing northbound bridge will be widened from two to four lanes. The proposed bridge widening for the southbound bridge is to the inside. The proposed bridge widening for the northbound bridge is to the inside and outside. The vertical clearance for both bridges will not be below the minimum vertical clearance of 16′-0″ per FDM Table 260.6.1. The southbound bridge will have four 12-foot lanes and 12-foot inside and outside shoulders. The northbound bridge will have four 12-foot lanes and 12-foot inside and outside shoulders. The bridge widening for the southbound bridge will vary from 22′-8.125″ to 23′-4.5″ to the inside. The bridge widening for the northbound bridge will vary from 12′-3.5″ to 13′-4″ to the outside and from 25′-7.25″ to 26′-

4.5" to the inside. The aesthetic treatment for Bridge No. 920609 and Bridge No. 920610 should conform to Level One as indicated in the FDOT Design Manual (FDM), Chapter 121. The proposed typical section is shown in Figure 4-15.

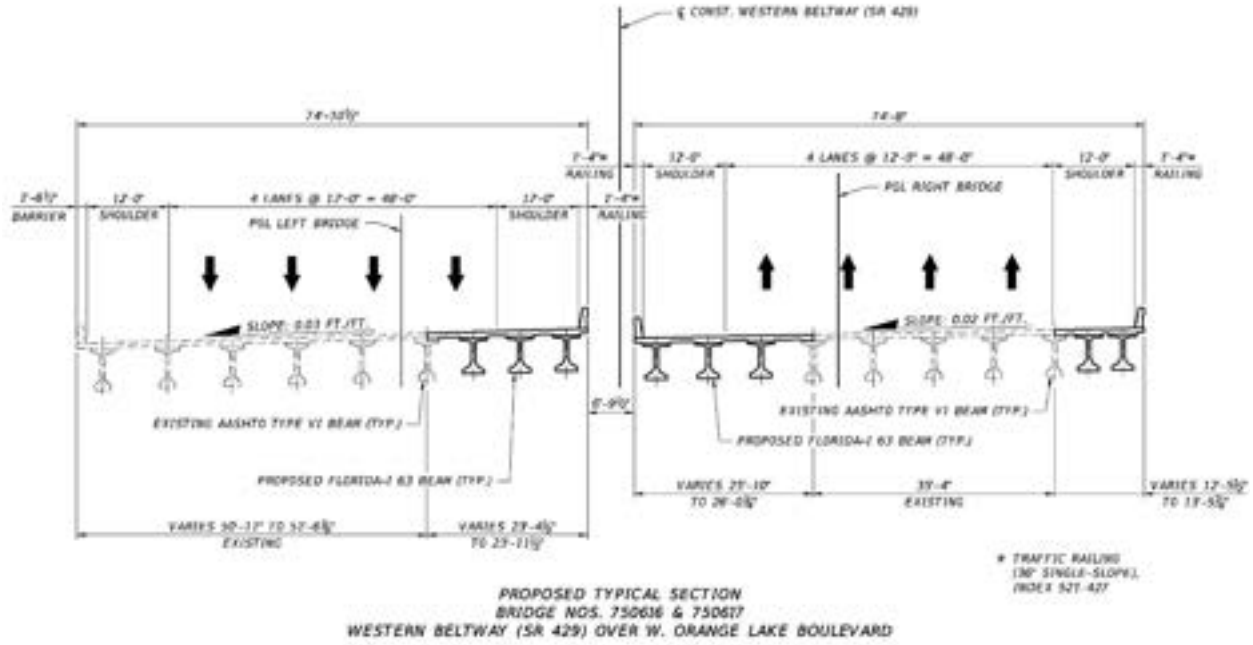
Figure 4-15: SR 429 over SR 530 (US 192) Proposed Typical Section



SR 429 over West Orange Lake Boulevard

The existing southbound bridge will be widened from three to four lanes. The existing northbound bridge will be widened from two to four lanes. The proposed bridge widening for the southbound bridge is to the inside. The proposed bridge widening for the northbound bridge is to the inside and outside. The vertical clearance for both bridges will not be below the minimum vertical clearance of 16'-0" per FDM Table 260.6.1. The southbound bridge will have four 12-foot lanes and 12-foot inside and outside shoulders. The northbound bridge will have four 12-foot lanes and 12-foot inside and outside shoulders. The bridge widening for the southbound bridge will vary from 23'-4.125" to 23'-11.5" to the inside. The bridge widening for the northbound bridge will vary from 12'-5.5" to 13'-5.875" to the outside and from 25'-10" to 26'-0.75" to the inside. The aesthetic treatment for Bridge No. 750616 and Bridge No. 750617 should conform to Level One as indicated in the FDOT Design Manual (FDM), Chapter 121. The proposed typical section is shown in Figure 4-16.

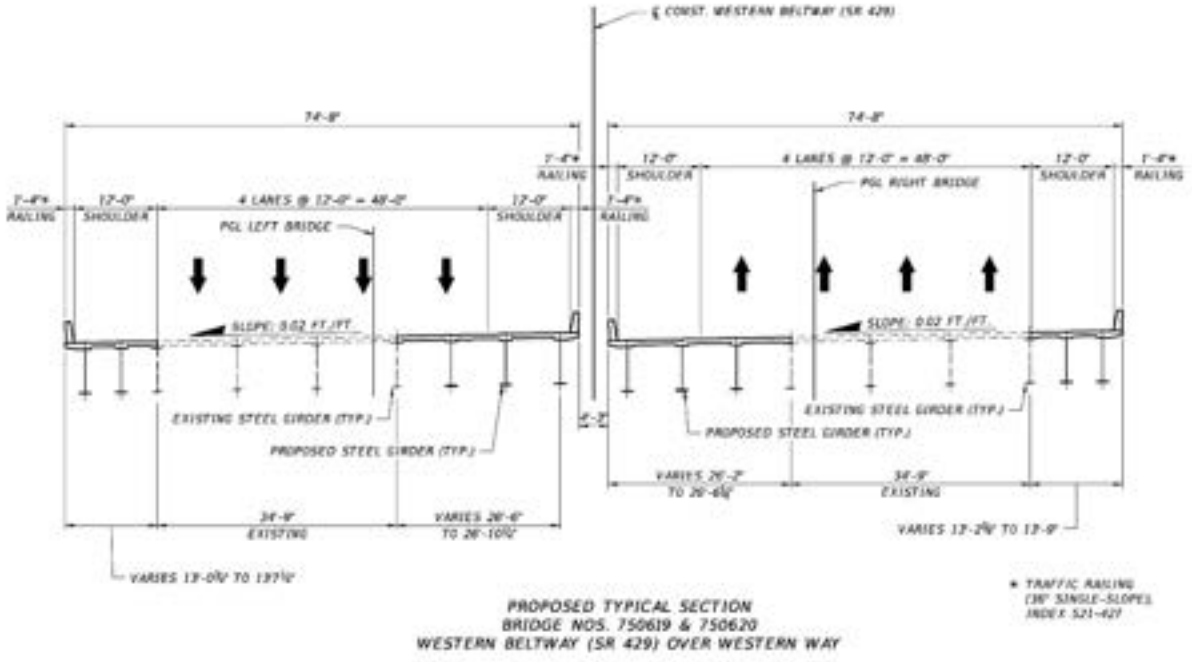
Figure 4-16: SR 429 over West Orange Lake Boulevard Proposed Typical Section



SR 429 over Western Way

The existing southbound bridge will be widened from two to four lanes. The existing northbound bridge will be widened from two to four lanes. The proposed bridge widening for both bridges is to the inside and outside. The vertical clearance for both bridges will not be below the minimum vertical clearance of 16′-0″ per FDM Table 260.6.1. The bridges will have four 12-foot lanes and 12-foot inside and outside shoulders. The bridge widening for the southbound bridge will vary from 13′-0.75″ to 13′-7.25″ to the outside and from 26′-6″ to 26′-10.25″ to the inside. The bridge widening for the northbound bridge will vary from 13′-2.625″ to 13′-9″ to the outside and from 26′-2″ to 26′-6.25″ to the inside. The aesthetic treatment for Bridge No. 750619 and Bridge No. 750620 should conform to Level One as indicated in the FDOT Design Manual (FDM), Chapter 121. The proposed typical section is shown in Figure 4-17.

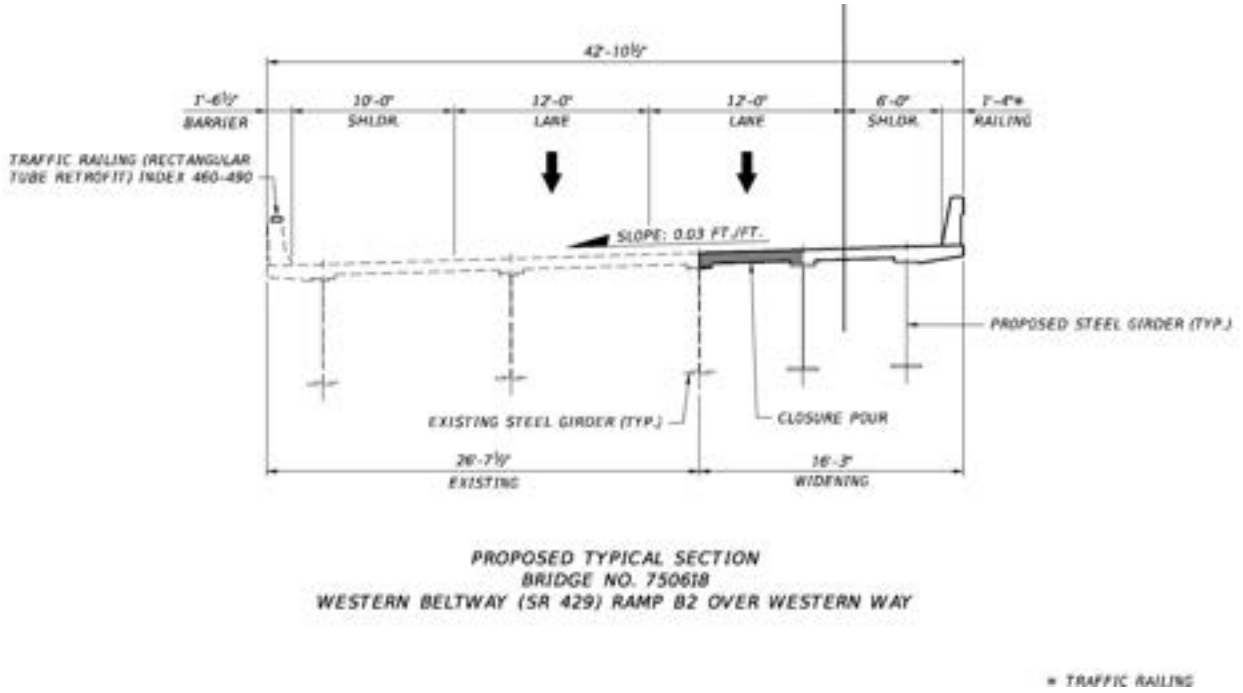
Figure 4-17: SR 429 over Western Way Proposed Typical Section



SR 429 Southbound Off-Ramp over Western Way

The existing southbound off-ramp bridge will be widened from one to two lanes. The proposed bridge widening is to the inside. The vertical clearance for the bridge will not be below the minimum vertical clearance of 16′-0″ per FDM Table 260.6.1. The bridge will have two 12-foot lanes, a 6-foot inside shoulder and a 10-foot outside shoulder. Bridge shoulder widths are from FDOT FDM Figure 260.1.1. The bridge widening for the ramp bridge will be 16′-3″ to the inside. The aesthetic treatment for Bridge No. 750618 should conform to Level One as indicated in the FDOT Design Manual (FDM), Chapter 121. The proposed typical section is shown in Figure 4-18.

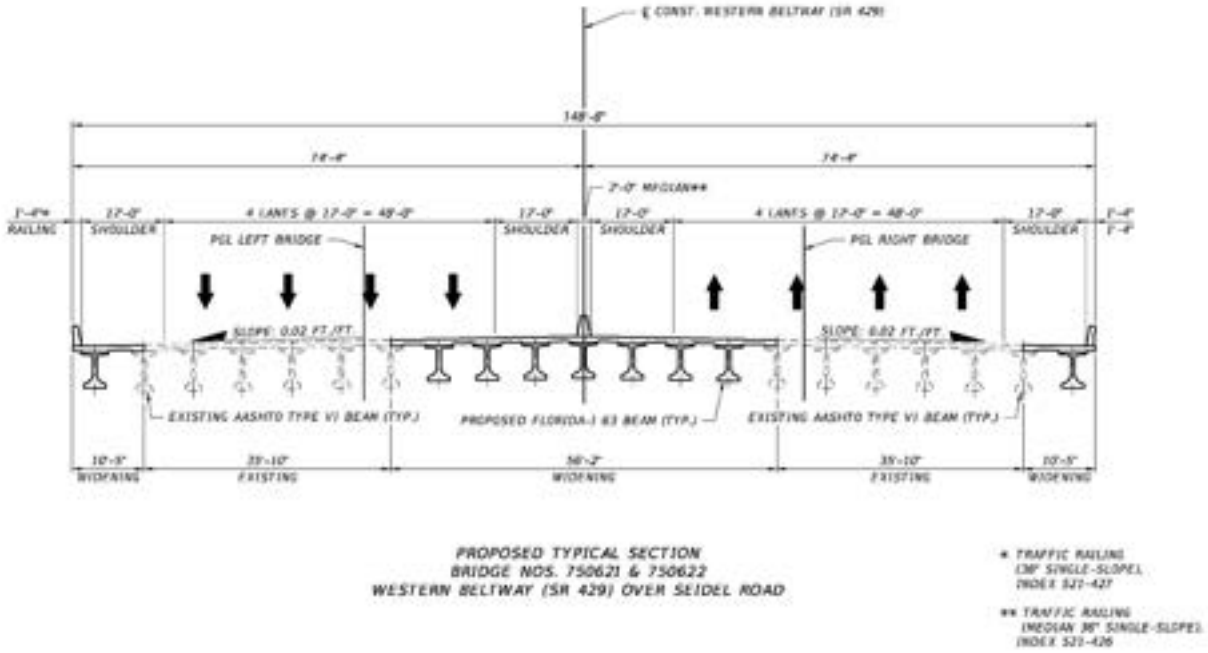
Figure 4-18: SR 429 Southbound Off-Ramp over Western Way Proposed Typical Section



SR 429 over Seidel Road

The existing bridges will be widened from two to four lanes. The proposed bridge widening for both bridges is to the inside and outside, enclosing the bridges in the median. The vertical clearance for both bridges will not be below the minimum vertical clearance of 16′-0″ per FDM Table 260.6.1. The bridges will have four 12-foot lanes and 12-foot inside and outside shoulders. The bridge widening for the both bridges will be 10′-5″ to the outside. The inside widening between the two bridges will be 56′-2″. The aesthetic treatment for Bridge No. 750621 and Bridge No. 750622 should conform to Level One as indicated in the FDOT Design Manual (FDM), Chapter 121. The proposed typical section is shown in Figure 4-19.

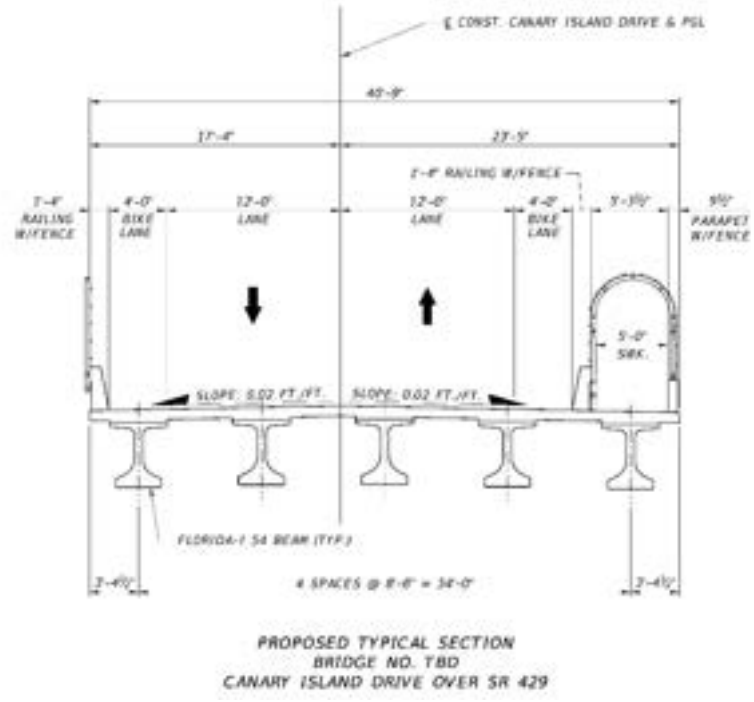
Figure 4-19: SR 429 over Seidel Road Proposed Typical Section



Canary Island Dr over SR 429

The existing bridge will be replaced. The proposed bridge typical section for this bridge consists of one (1) 12'-0" eastbound travel lane, a 4'-0" eastbound bike lane, one (1) westbound travel lane, a 4'-0" westbound bike lane, and a 5'-0" sidewalk protected by a traffic railing. The vertical clearance will meet the minimum vertical clearance of 16'-6" per FDM Table 260.6.1. A new bridge number will be requested during the Design Phase. The aesthetic treatment for the new bridge should conform to Level One as indicated in the FDOT Design Manual (FDM), Chapter 121. Pier protection will be evaluated and installed as necessary along SR429 to protect the bridge. At a minimum, additional pier shielding will be required. The proposed typical section is shown in Figure 4-20.

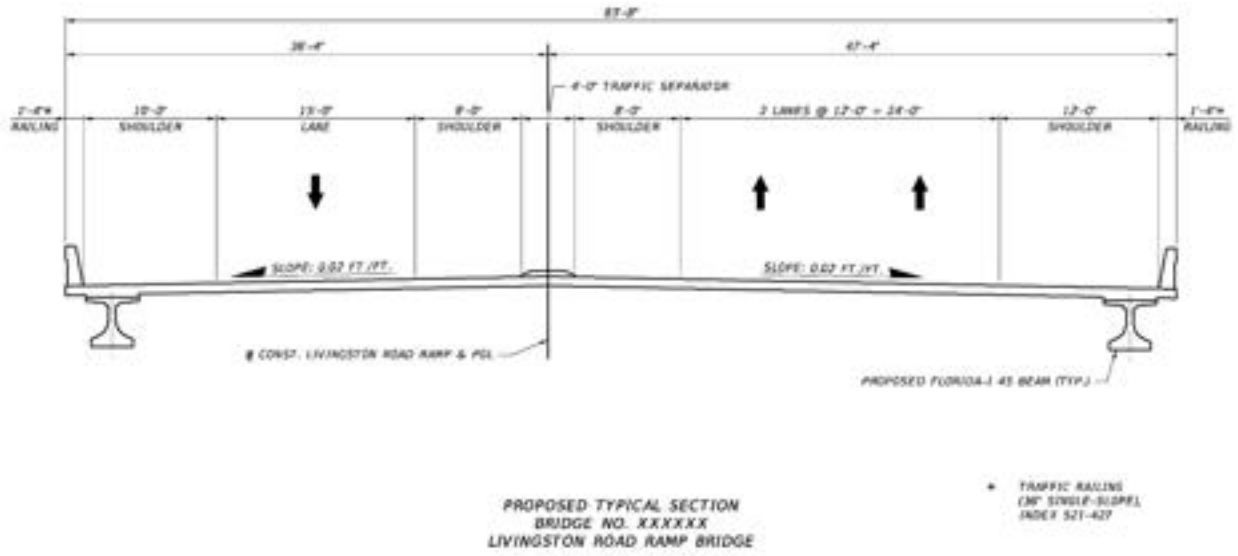
Figure 4-20: Canary Island Drive over SR 429 Proposed Typical Section



Livingston Road Ramp over SR 429

The new bridge will be constructed as part of this proposed interchange. The proposed bridge typical section for this bridge consists of two (2) 12'-0" eastbound travel lanes, a 12'-0" outside shoulder, 8'-0" inside shoulder, one (1) 15'-0" westbound travel lane, a 10'-0" outside shoulder, and 8'-0" inside shoulder. The vertical clearance will meet the minimum vertical clearance of 16'-6" per FDM Table 260.6.1. A bridge number will be requested during the Design Phase. The aesthetic treatment for this bridge should conform to Level One as indicated in the FDOT Design Manual (FDM), Chapter 121. Pier protection will be evaluated and installed as necessary along SR429 to protect the bridge. At a minimum, additional pier shielding will be required. The proposed typical section is shown in Figure 4-21.

Figure 4-21: Livingston Road Ramp over SR 429 Proposed Typical Section



Indian Creek Boulevard over SR 429

Pier shielding currently exists along SR 429 in the form of concrete median barrier. However, this pier shielding will be modified when SR 429 is widened. Pier protection will be evaluated and installed as necessary along SR429 to protect the bridge when SR 429 is widened. At a minimum, additional pier shielding will be required.

Sinclair Road over SR 429

Pier shielding currently exists along SR 429 in the form of guardrail. However, this shielding will be removed when SR 429 is widened. Pier protection will be evaluated and installed as necessary along SR429 to protect the bridge when SR 429 is widened. At a minimum, additional pier shielding will be required.

SR 429 over Boggy Creek Culvert

The existing culvert over Boggy Creek will not require an extension to accommodate the outside widening of SR 429. As noted in Section 2.22, this culvert is in “good” condition and can be extended.

SR 429 over Whittenhorse Creek Culvert

The existing culvert over Whittenhorse Creek will need to be extended to accommodate the outside widening of SR 429. As noted in Section 2.22, this culvert is in “good” condition and can be extended.

SR 429 over Golf Cart Path

The existing culvert over the golf cart path Creek will need to be extended to accommodate the outside widening of SR 429. As noted in Section 2.22, this culvert is in “good” condition and can be extended.

4.6 Comparative Alternatives Evaluation

The subsequent sections compare the alternatives described above in terms of engineering, socioeconomic, environmental, physical, traffic, and safety impacts, as well as cost estimates for each of the Build Alternatives. Table 4-4 through Table 4-9 show the evaluation matrix for SR 429 mainline, Sinclair Road interchange, Livingston Road interchange, US 192 interchange, Western Way interchange, and Seidel Road interchange. Table 4-10 shows the complete evaluation matrix for all the alternatives.

Table 4-4: SR 429 Mainline Evaluation Matrix

SR 429 Mainline	Alternative 1	No-Build
Additional Right of Way Required (acres)	0.0	0
Total Parcels Impacted	0	0
Total Relocations	0	0
Wetland Impacts (acres)	0	0
Conservation Easement Impacts (acres)	0	0
Meets Project Purpose and Need	✓	✗
Meets Future 2050 Traffic Operation Needs	✓	✗
Estimated Construction Cost ($ millions)	$190.77	$0.00
Estimated ROW Cost ($ millions)	$0.00	$0.00

Table 4-5: Sinclair Road Interchange Evaluation Matrix

Sinclair Road Interchange	Alternative 1 Traffic Signal	Alternative 2 Roundabout	Alternative 2A Roundabout	Alternative 2B Roundabout	No-Build
Additional Right of Way Required (acres)	0.00	0.00	0.74	0.00	0.00
Total Parcels Impacted	0	0	7	0	0
Total Relocations	0	0	4	0	0
Wetland Impacts (acres)	0.00	0.00	0.00	1.72	0.00
Conservation Easement Impacts (acres)	0.00	0.00	0.00	0.00	0.00
Meets Project Purpose and Need	✓	✗	✓	✓	✗
Meets Future Traffic Operation Needs	✓	✗	✓	✓	✗
Reduces Vehicle Conflicts	✓	✓	✓	✓	✗
Estimated Construction Cost ($ millions)	$11.93	$13.47	>$13.47*	>>$13.47*	$0.00
Estimated ROW Cost ($ millions)	$0.00	$0.00	**	$0.00	$0.00

*Construction cost expected to exceed $13.47 million.

** Not calculated. Impacts to seven parcels with up to four residential relocations is more impactful than the other alternatives.

Table 4-6: Livingston Road Interchange Evaluation Matrix

Livingston Road Interchange	Alternative 1 Par-Clo	Alternative 2 T-Ramp	No-Build
Additional Right of Way Required (acres)	38.14	15.80	0.00
Total Parcels Impacted	19	18	0
Total Relocations	1	1	0
Primary Wetland Impacts (acres)	7.27	5.19	0.00
Secondary Wetland Impacts (acres)	14.29	6.82	0.00
Conservation Easement Impacts (acres)	9.46	1.91	0.00
Sand Skink Habitat Impacts (acres)	12.67	8.46	0.00
Meets Project Purpose and Need	✓	✓	✗
Meets Future Traffic Operation Needs	✓	✓	✗
Relieves US 192 Traffic	✓	✓	✗
Construction Cost ($ million)	$50.24	$46.32	$0.00
Reduction in US 192 Interchange Construction Cost ($ millions)	-$1.00	-$1.00	$0.00
Estimated ROW Cost ($ millions)	$8.44	$8.89	$0.00

Table 4-7: US 192 Interchange Evaluation Matrix

US 192 Interchange	Build Alternative	No-Build
Additional Right of Way Required (acres)	0.11	0.00
Total Parcels Impacted	7	0
Total Relocations	0	0
Wetland Impacts (acres)	0.00	0.00
Conservation Easement Impacts (acres)	0.00	0.00
Meets Project Purpose and Need	✓	✗
Meets Future Traffic Operation Needs	✓	✗
Construction Cost ($ millions)	$21.04	$0.00
Estimated ROW Cost ($ millions)	$1.43	$0.00

Table 4-8: Western Way Interchange Evaluation Matrix

Western Way Interchange	Build Alternative	No-Build
Additional Right of Way Required (acres)	0.09	0.00
Total Parcels Impacted	4	0
Total Relocations	0	0
Wetland Impacts (acres)	0.00	0.00
Conservation Easement Impacts (acres)	0.00	0.00
Meets Project Purpose and Need	✓	✗
Meets Future Traffic Operation Needs	✓	✗
Reduces Future Vehicle Conflicts	✓	✗
Construction Cost ($ millions)	$12.71	$0.00
Estimated ROW Cost ($ millions)	$0.50	$0.00

Table 4-9: Seidel Road Interchange Evaluation Matrix

Seidel Road Interchange	Alternative 1 Traffic Signals	Alternative 2 Roundabouts	No-Build
Additional Right of Way Required (acres)	0.00	0.59	0.00
Total Parcels Impacted	0	5	0
Total Relocations	0	0	0
Wetland Impacts (acres)	0.00	0.00	0.00
Conservation Easement Impacts (acres)	0.00	0.00	0.00
Meets Project Purpose and Need	✓	✓	✗
Meets Future Traffic Operation Needs	✓	✓	✗
Reduces Future Vehicle Conflicts	✓	✓	✗
Construction Cost ($ millions)	$8.77	$9.75	$0.00
Estimated ROW Cost ($ millions)	$0.25	$1.16	$0.00

Table 4-10: Overall SR 429 Evaluation Matrix

Evaluation Parameters	Mainline SR 429 Widening					No-Build Alternative
	Livingston Road ParClo Ramp Interchange Sinclair Road Signals/ Seidel Road Signals	Livingston Road ParClo Ramp Interchange Sinclair Road Roundabout/ Seidel Road Signals	Livingston Road ParClo Ramp Interchange Sinclair Road Signals/ Seidel Road Roundabout	Livingston Road ParClo Ramp Interchange Sinclair Road Roundabout/ Seidel Road Roundabout	Livingston Road T-Ramp Interchange Sinclair Road Signals/ Seidel Road Signals	
Purpose and Need						
Meets Purpose and Need	✓	✓	✓	✓	✓	✗
Traffic Effectiveness						
Meets Future Traffic Operation Needs	✓	✓	✓	✓	✓	✗
Improves Regional Connectivity	✓	✓	✓	✓	✓	✗
Improves Travel Times & Reliability	✓	✓	✓	✓	✓	✗
Improves Safety by Reducing Congestion	✓	✓	✓	✓	✓	✗
Reduces Vehicle Conflicts at Intersections	✓	✓	✓	✓	✓	✗
Improves Emergency Response Time and Evacuation	✓	✓	✓	✓	✓	✗
Potential Right of Way Impacts						
Right of Way Required (acres)	38.51	38.51	39.10	39.10	16.01	0.00
Number of Parcels Impacted	31	31	36	36	29	0
Number of Potential Residential Relocations	1	1	1	1	1	0
Pedestrian and Bicycle Accommodations						
Improves Pedestrian Facilities	✓	✓	✓	✓	✓	✗
Improves Bicycle Facilities	✓	✓	✓	✓	✓	✗
Natural/Cultural/Physical Environmental Effects						
Known Previously Recorded National Register Eligible Archaeological Sites Effected	0	0	0	0	0	0
Known Previously Recorded National Register Eligible Historic Sites Effected	0	0	0	0	0	0
Potential Noise Impacts	TBD	TBD	TBD	TBD	TBD	0
Primary Wetland/Surface Water Impacts (acres)	7.27	7.27	7.27	7.27	5.19	0.00
Secondary Wetland/Surface Water Impacts (acres)	14.29	14.29	14.29	14.29	6.82	0.00
Floodplain Impacts (acres)	24.35	24.38	24.35	24.38	21.63	0.00

Evaluation Parameters	Mainline SR 429 Widening					No-Build Alternative
	Livingston Road ParClo Ramp Interchange Sinclair Road Signals/ Seidel Road Signals	Livingston Road ParClo Ramp Interchange Sinclair Road Roundabout/ Seidel Road Signals	Livingston Road ParClo Ramp Interchange Sinclair Road Signals/ Seidel Road Roundabout	Livingston Road ParClo Ramp Interchange Sinclair Road Roundabout/ Seidel Road Roundabout	Livingston Road T-Ramp Interchange Sinclair Road Signals/ Seidel Road Signals	
Protected Species and Habitat Impacts	Low	Low	Low	Low	Low	N/A
Sand Skink Habitat Impacts (acres)	12.67	12.67	12.67	12.67	8.46	0.00
Conservation Easement Impacts (acres)	9.46	9.46	9.46	9.46	1.91	0.00
Potential Utility Impacts	Yes	Yes	Yes	Yes	Yes	No
Potential Contamination Sites (medium or high)	1	1	1	1	1	0
Estimates in 2022 Present Day Costs ($ millions)						
Construction	$295.61	$296.91	$296.58	$297.88	$291.63	$0.00
Right of Way	$13.69	$14.59	$14.59	$13.69	$12.81	$0.00
Final Design (10%)	$29.56	$29.69	$29.66	$29.79	$29.16	$0.00
Construction Engineering and Inspection (10%)	$29.56	$29.69	$29.66	$29.79	$29.16	$0.00
Wetland Mitigation	$1.19	$1.19	$1.19	$1.19	$0.74	$0.00
Sand Skink Habitat Mitigation	$0.38	$0.38	$0.38	$0.38	$0.25	$0.00
Total Costs ($ millions)	$369.99	$372.44	$372.06	$372.72	$363.75	$0.00

4.6.1 Social and Economic Impacts

A sociocultural effects evaluation was prepared as a separate document to support this section's assertions. A demographic analysis of the corridor indicated the study corridor has a lower percentage of minority residents and a lower percentage of low-income residents as compared to the rest of Orange and Osceola Counties. The study corridor also has a lower percentage of populations with limited English proficiency (LEP) as compared to Orange and Osceola Counties with the exception of two Census block groups (408.05 and 408.06) in Osceola County with LEP percentages at or above the County average. The corridor also has a higher elderly population percentage as compared to the County averages.

Because the proposed widening of the SR 429 occurs within the existing ROW, no social or economic impacts to the community are anticipated from the mainline widening. SR 429 already separates the corridor's existing neighborhoods, and no changes in existing connections between neighborhoods is anticipated.

The proposed new interchange at Livingston Road will convert approximately 15.8 acres of land currently designated as timberland to a transportation use, removing this land from the Osceola County tax base. The change in land use could also potentially increase the development potential of the remaining acreage. The new interchange offers a new connection for the community to SR 429 and is also anticipated to draw traffic currently accessing SR 429 from Sinclair Road and from US 192. This change in traffic patterns is expected to increase traffic on roadway segments that connect to the Livingston Road interchange, including Formosa Gardens Boulevard, Funie Steed Road, and Livingston Road.

4.6.2 Right of Way Impacts and Relocation Potential

The ROW impacts for the four alternatives with the Partial Cloverleaf interchange at Livingston Road ranged from 38.51 to 39.10 acres. The number of parcels impacted ranged from 31 to 36. There are nine residential properties impacted by the improvements.

The alternative with the T-Ramp interchange at Livingston Road requires 16.01 acres of ROW, with 29 parcels impacted. The same nine residential properties are impacted by this alternative's improvements.

Livingston Road Interchange

At the Livingston Road interchange, Alternative 1 improvements would require approximately 38.14 acres of additional ROW, impacting a total of 19 parcels. On the east side of the interchange, there are 14 properties impacted with nine being residential properties. There is one potential residential relocation. On the west side of the interchange, there are five

properties impacted, none of which require relocation. There are no residential properties impacted on the west side.

At the Livingston Road interchange, Alternative 2 improvements would require approximately 15.80 acres of additional ROW, impacting a total of 18 parcels. On the east side of the interchange, there are 14 properties impacted with nine being residential properties. There is one potential residential relocation. On the west side of the interchange, there are four properties impacted, none of which require relocation. There are no residential properties impacted on the west side.

Both alternatives for the Livingston Road interchange will potentially require one residential relocation. It is the same property for both alternatives. The potential relocation is due to improvements at Livingston Road and Formosa Gardens Boulevard for the Livingston Road interchange, as shown in Figure 4-22. The addition of a 2nd northbound left turn lane shifts the northbound lanes of Formosa Gardens to the east. The widening impacts four residential properties east of Formosa Gardens Boulevard and one residential property on the west side of Formosa Gardens Boulevard. The property at 7966 Golden Pond Court may require relocation due to impacts to the property.

Figure 4-22: Potential Residential Relocation

US 192 Interchange

At the US 192 interchange, the Build Alternative improvements would require approximately 0.11 acres of additional ROW, impacting a total of seven parcels. On the east side of the interchange, there are six commercial properties impacted, none of which require relocation. On

the west side of the interchange, there is one undeveloped property impacted, which does not require relocation.

Western Way Interchange

At the Western Way interchange, the Build Alternative improvements would require approximately 0.09 acres of additional ROW, impacting a total of four parcels. On the east side of the interchange, all four impacted parcels are undeveloped properties, none of which require relocation.

Seidel Road Interchange

At the Seidel Road interchange, the Alternative 1 improvements do not require any additional ROW. However, the ROW on both sides of Seidel Road will be converted from non-limited access ROW to limited access ROW between SR 429 and Avalon Road. Two parcels will be impacted by this conversion of ROW.

The Alternative 2 improvements would require approximately 0.59 acres of additional ROW. This would impact five parcels. On the east side of the interchange, there are three undeveloped properties impacted, none of which require relocation. On the west side of the interchange, there is one undeveloped parcel in the southwest quadrant impacted, which does not require relocation. There is one undeveloped parcel in the northwest quadrant impacted. However, a new apartment complex, Elysian Apartments, is planned to be constructed in this undeveloped parcel. The preliminary site plan indicates the ROW impacts would impact 13 parking spaces as well as circulation of the parking lot for the complex. Additionally, the existing non-limited access ROW along both sides of Seidel Road between SR 429 and Avalon Road would need to be converted to limited access ROW.

4.6.3 Environmental Impacts

This section summarizes the results of the natural resources analysis for the project area. The No-Build Alternative would have no impacts to natural resources.

Wetlands

For the Build Alternatives, potential direct and secondary impacts to wetlands and surface waters were assessed. Direct impacts included the area of wetlands within the proposed ROW. Secondary impacts included wetland areas directly adjacent to the direct impacts, extending outside the proposed ROW up to 150 feet.

The four alternatives with the Par-Clo interchange at Livingston Road would have 7.27 acres of direct wetland impacts and 14.29 acres of secondary impacts.

The alternative with the T-Ramp interchange at Livingston Road would have 5.19 acres of direct wetland impacts and 6.82 acres of secondary impacts.

Conservation Easements

Conservation easements are located within the project study area, west of SR 429 at the proposed Livingston Road interchange. Impacts to these conservation easements are proposed in all of the alternatives.

The four alternatives with the Par-Clo interchange at Livingston Road would have 9.46 acres of conservation easement impacts.

The alternative with the T-Ramp interchange at Livingston Road would have 1.91 acres of conservation easement impacts.

Floodplains

Floodplain impacts are anticipated for all the Build alternatives.

The four alternatives with the Par-Clo interchange at Livingston Road would have between 24.35 and 24.38 acres of floodplain impacts.

The alternative with the T-Ramp interchange at Livingston Road would have 21.63 acres of floodplain impacts.

Protected Species and Habitat

The Build Alternatives were evaluated for impacts to protected species and habitats. All of the Build Alternatives are anticipated to have low impacts. The impacts to sand skink habitat were calculated for the Build Alternatives.

The four alternatives with the Par-Clo interchange at Livingston Road would have 12.67 acres of impacts to sand skink habitat.

The alternative with the T-Ramp interchange at Livingston Road would have 8.46 acres of impacts to sand skink habitat.

Archaeological and Historic Sites

The Build Alternatives were evaluated for impacts to previously recorded National Register Eligible Archaeological and Historic sites.

All Build Alternatives will have no impacts to previously recorded National Register Eligible Archaeological and Historic sites.

4.6.4 Physical Impacts

This section summarizes the results of the physical resources analysis for the project area. The No-Build Alternative would have no impacts to physical resources.

Noise

A noise analysis will be conducted for the Preferred Alternative. The results can be found in the Noise Study Report provided under a separate cover.

Air Quality

An air quality screening has been conducted for the build alternative. Based on the results from the screening model, the highest project-related CO one- and eight-hour levels are not predicted to meet or exceed the one- or eight-hour National Ambient Air Quality Standards for this pollutant with either the Build or No Build Alternatives. As such, the project "passes" the screening model.

Contamination Sites

The Build Alternatives were evaluated for potential impacts to medium or high contamination sites. The initial high-level evaluation of the corridor identified one potential medium contamination site. This was reflected in the evaluation matrix shown in Table 4-10. A more detailed analysis indicated there are six potential contamination sites (medium) located along the corridor associated with the Build Alternatives. There are two potential contamination sites (medium) associated with potential drainage sites. The sites included previous agricultural land use, a former landfill, a former railroad and an ethylene dibromide (EDB) groundwater contamination zone. Additional information can be found in the Contamination Screening Evaluation Report.

Railroad

There are no railroads within the project area, so the Build Alternative will have no impacts.

4.6.5 Drainage Impacts

With the exception of the new Livingston Road Interchange and the Formosa Garden Boulevard improvements, it is anticipated that treatment and attenuation of the new impervious pavement can be provided within existing stormwater management facilities.

For the Livingston Road interchange, Alternative 1 (Partial Cloverleaf) will have a greater impact to existing drainage features, floodplains, and wetlands/conservation area than Alternative 2 (T-

Ramp). Existing drainage feature impacts include the northeast corner of the existing stormwater management pond (SMA #3) located within the Indian Creek at Fantasy Heights subdivision. In addition to impacting the pond itself, the outfall swale which services the Indian Creek at Fantasy Heights subdivision's stormwater management facilities SMA #2 and SMA #3 will be impacted as well. The partial cloverleaf ramp will also impact an existing floodplain compensation site located north of Indian Creek at Fantasy Heights subdivision. It is estimated the proposed ramp will have approximately 2.50 ac-ft of encroachment into the Boggy Creek Swamp floodplain. A benefit of this alternative is that stormwater management facilities can be placed within the infield of the ramp, thus providing treatment for the new impervious area with little drainage infrastructure.

The Alternative 2 (T-Ramp) interchange does not impact offsite drainage facilities to the extent as Alternative 1 (Partial Cloverleaf). Only the existing outfall swale that services SMA #2 and SMA #3 would need to be realigned or enclosed in a closed storm sewer system to the outfall of Boggy Creek Swamp. This alternative does not significantly impact the existing floodplain compensation site, nor does it encroach into the floodplain associated with Boggy Creek Swamp. This configuration does require more drainage infrastructure to convey runoff from the roadway into a stormwater management facility. Three new pond site alternatives are being evaluated for the interchange. Two are located west of SR 429 and one is located adjacent to the interchange within the remnant of the vacant parcel east of SR 429.

Formosa Garden Boulevard was originally permitted in 1991 as part of the Formosa Gardens subdivision development (ERP No. 49-00507-S). The existing roadway discharges into a pond within the subdivision where the runoff is treated and attenuated. The proposed widening of Formosa Garden Boulevard will require the new impervious area to be treated and attenuated. As part of the drainage analysis three pond alternatives were identified for these improvements. One of the alternatives is located within the vacant parcel associated with the Livingston Road Interchange, located in the northwest quadrant of the Livingston Road and Formosa Gardens Boulevard intersection. The other two alternatives are existing off-site ponds.

4.6.6 Traffic and Safety

Traffic and safety criteria for the evaluation matrix were based on qualitative measurements that focused on driver expectations/vehicle movements, conflict points, and bicycle/pedestrian safety, where applicable.

4.6.7 Stakeholder Input

Stakeholder input included 47 questions/comments submitted in advance of the Alternatives Public Information Meeting held in February 2022. Of these, 33 were questions received about the project related to noise, property value concerns, ROW impacts, and environmental impacts.

Twelve (12) comments were received in opposition to the project, citing concerns over air and noise pollution, quality of life impacts, property value concerns, and environmental impacts. Two (2) comments were received in support of the project. A complete record of all public comments, questions, and responses can be found in the Comments and Coordination Report prepared under a separate cover.

4.6.8 Cost Estimates

The construction costs for the four alternatives with the Partial Cloverleaf interchange at Livingston Road ranged from $295.61 to $297.88 million. The cost estimate for the alternative with the T-Ramp interchange at Livingston Road is $291.63 million.

ROW costs for the four alternatives with the Partial Cloverleaf interchange at Livingston Road ranged from $13.69 to $14.59 million. The ROW cost for the alternative with the T-Ramp interchange at Livingston Road is $12.81 million.

Final Design (estimated at 10% of construction costs) costs for the four alternatives with the Partial Cloverleaf interchange at Livingston Road ranged from $29.56 to $29.79 million. The Final Design cost for the alternative with the T-Ramp interchange at Livingston Road is $29.16 million.

Construction Engineering and Inspection (estimated at 10% of construction costs) for the four alternatives with the Partial Cloverleaf interchange at Livingston Road ranged from $29.56 to $29.79 million. The Construction Engineering and Inspection cost for the alternative with the T-Ramp interchange at Livingston Road is $29.16 million.

The wetland mitigation costs for the four alternatives with the Partial Cloverleaf interchange at Livingston Road are $1.19 million. The wetland mitigation cost for the alternative with the T-Ramp interchange at Livingston Road is $0.74 million.

The sand skink habitat mitigation costs for the four alternatives with the Partial Cloverleaf interchange at Livingston Road are $0.38 million. The wetland mitigation cost for the alternative with the T-Ramp interchange at Livingston Road is $0.25 million.

The total costs for the four alternatives with the Partial Cloverleaf interchange at Livingston Road ranged from $369.99 to $372.44 million. The total cost estimate for the alternative with the T-Ramp interchange at Livingston Road is $363.75 million.

For construction cost estimates, after selection of the Preferred Alternative the LRE was revised to reflect a change in the Structural Course from Traffic E for SR 429 mainline to Traffic Level E. This along with increases in unit costs from the previous LREs (done in December 2021) resulted

in a higher construction cost for the Preferred Alternative as compared to the construction costs for the alternatives evaluated in Table 4-10.

4.7 Selection of the Preferred Alternative

Each of the alternatives have distinct advantages and disadvantages. Below is a summary of the Preferred Alternative based on the engineering and environmental analysis results. The Concept Plans for the Preferred Alternative is provided in Appendix B.

4.7.1 SR 429 Mainline Widening

Since widening to eight lanes meets the Purpose and Need and future year 2050 traffic operational needs, requires no additional ROW, and has minimal environmental impacts, it is recommended as the Preferred Alternative.

4.7.2 Sinclair Road Interchange Improvements

Alternative 1 (Traffic Signal) is recommended as the Preferred Alternative for this location. Alternative 1 meets the Purpose and Need as well as the future year 2050 traffic demands with minimal impacts and a lower construction cost. Alternative 2 does not meet the future traffic demands without the additional southbound bypass lane. The two additional alternatives, 2A and 2B, that included the additional southbound bypass lane created ROW impacts to a residential community, or wetland impacts along with a higher construction cost.

4.7.3 Canary Island Drive Overpass

The Value Engineering (VE) Study recommended to retain the northbound SR 429 profile. They evaluated the same alternatives as described in Section 4.5.2. The VE study recommended Alternative 4, jacking the bridge and constructing a detour road for traffic during construction. However, the decision was made to select Alternative 5, replacement of the Canary Island Drive bridge, as the recommended alternative for the overall Preferred Alternative. This alternative is cheaper than lowering the northbound SR 429 profile. While more expensive than jacking the bridge, this alternative allows the existing bridge to remain operational while constructing the replacement bridge. A detour for the existing traffic using the bridge would not be required.

4.7.4 Proposed Livingston Road Interchange

Both Alternatives 1 and 2 meet the project Purpose and Need and the future traffic demands. Alternative 2 has fewer acres of ROW impacts than Alternative 1 as well as fewer acres of wetlands, sand skink habitat, and conservation easements impacted. Alternative 2 also has lower construction costs and overall costs than Alternative 1. Therefore, Alternative 2 is recommended as the Preferred Alternative.

A revision to Alternative 2 was made to eliminate the potential residential relocation associated with the interchange improvements. The width of the widened portion of Formosa Gardens

Boulevard just south of Livingston Road was reduced. This was accomplished by reducing the width of the through lanes to 11 feet. In addition, the width of the existing 10-foot shared use path on the east side of Formosa Gardens Boulevard was reduced to 8 feet for a length of approximately 350 feet.

4.7.5 US 192 Interchange Improvements

The Build Alternative meets the project Purpose and Need as well as the future traffic demands with minimal environmental impacts. Therefore, it is recommended as the Preferred Alternative.

A TSM&O project is proposed at the SR 429 southbound exit ramp to US 192 for implementation in advance of the ultimate Preferred Alternative. The traffic analysis indicates this improvement is needed today due to the high p.m. peak hour volumes exiting SR 429 to travel both eastbound and westbound on US 192. The recommended option, Option 2, would reconfigure the ramp terminal intersection with US 192 to include three right turn lanes and three left turn lanes. In addition, it would route the southbound US 192 off-ramp traffic through the existing southbound cash toll plaza. AET conversion of SR 429 is planned for mid-2023. At that point, all mainline traffic will use the existing mainline electronic Toll Gantries. The on ramp between the southbound Toll Plaza and southbound SR 429 will be removed since cash will no longer be collected. A two-lane ramp would be constructed between the toll plaza and the widened southbound off-ramp. SB SR 429 traffic heading to US 192 will exit at the existing Toll Plaza. They will utilize the existing cash lanes which will be converted to SunPass and Toll by Plate. Traffic will continue on new two-lane ramp between Toll Plaza and US 192.

4.7.6 Western Way Interchange Improvements

The Build Alternative meets the project Purpose and Need as well as the future traffic demands with minimal environmental impacts. Therefore, it is recommended as the Preferred Alternative.

4.7.7 Seidel Road Interchange Improvements

Alternative 1 is recommended as the Preferred Alternative since it meets the 2050 traffic demands with no ROW impacts, no roadway construction along Seidel Road, no decrease in safety and lower construction cost.

4.7.8 Preferred Alternative Evaluation Matrix

Table 4-11 provides the evaluation matrix for the No-Build Alternative and the Preferred Alternative. This evaluation matrix will be provided at the Public Hearing.

Table 4-11: Preferred Alternative Evaluation Matrix

Evaluation Parameters	Preferred Alternative	No-Build Alternative
Purpose and Need		
Meets Purpose and Need	✓	✗
Meets Future Traffic Operation Needs	✓	✗
Improves Regional Connectivity	✓	✗
Improves Travel Times & Reliability	✓	✗
Improves Safety by Reducing Congestion	✓	✗
Reduces Vehicle Conflicts at Intersections	✓	✗
Improves Emergency Response Time and Evacuation	✓	✗
Right of Way Required (acres)	15.88	0.00
Number of Parcels Impacted	29	0
Number of Potential Residential Relocations	0	0
Improves Pedestrian Facilities	✓	✗
Improves Bicycle Facilities	✓	✗
Natural/Cultural/Physical Environmental Effects		
Known Previously Recorded National Register Eligible Archaeological Sites Effected	0	0
Known Previously Recorded National Register Eligible Historic Sites Effected	0	0
Potential Noise Impacts	TBD	0
Primary Wetland/Surface Water Impacts (acres)	5.19	0.00
Secondary Wetland/Surface Water Impacts (acres)	6.02	0.00
Floodplain Impacts (acres)	21.63	0.00
Protected Species and Habitat Impacts	Low	N/A
Sand Skink Habitat Impacts (acres)	8.46	0.00
Conservation Easement Impacts (acres)	1.91	0.00
Potential Utility Impacts	Yes	No

Potential Contamination Sites (medium/high)	8/0	0/0
Estimates in 2022 Present Day Costs ($ millions)		
Construction	$321.70	$0.00
Right of way	$11.21	$0.00
Final Design (10%)	$32.17	$0.00
Construction Engineering and Inspection (10%)	$32.17	$0.00
Wetland Mitigation	$0.74	$0.00
Sand Skink Habitat Mitigation	$0.25	$0.00
Total Costs ($ millions)	$398.24	$0.00

5 Project Coordination & Public Involvement

5.1 Agency Coordination

5.1.1 Efficient Transportation Decision Making

The Efficient Transportation Decision Making (ETDM) process is the FDOT's procedure for reviewing qualifying transportation projects to consider potential environmental effects in the Planning phase. This process provides stakeholders the opportunity for early input, involvement, and coordination, provides for the early identification of potential project effects, and informs the development of scopes for projects advancing to the PD&E phase.

Stakeholders involved in the ETDM process generally include Transportation Planning Organizations (TPOs), county and municipal governments, federal and state agencies, Native American tribes, and the public. To facilitate intergovernmental interaction, each of the seven geographic FDOT Districts has an Environmental Technical Advisory Team (ETAT). ETAT members and the public have the opportunity to provide input to the FDOT regarding a project's potential effects on the natural, physical, cultural, and community resources throughout the planning phase of project delivery. These comments help to determine the feasibility of a proposed project, focus the issues to be addressed during the PD&E phase, allow for early identification of potential avoidance, minimization, and mitigation opportunities, and promote efficiency and consistency during project development.

For this study, ETAT members included:

- U.S. Environmental Protection Agency;
- South Florida Water Management District (SFWMD);
- Florida Department of State;
- U.S. Army Corps of Engineers;
- National Park Service;
- Seminole Tribe of Florida;
- Florida Department of Agriculture and Consumer Services;
- FDOT Office of Environmental Management;
- Saint Johns River Water Management District (SJRWMD);
- Southwest Florida Water Management District;
- Florida Department of Environmental Protection;
- Florida Fish and Wildlife Conservation Commission;
- U.S. Coast Guard;
- National Marine Fisheries Service;
- Natural Resources Conservation Service;
- US Fish and Wildlife Service;

- Florida Department of Economic Opportunity; and
- US Forest Service.

The ETDM Summary Report is provided in Appendix C

5.2 Public Involvement

Two public meetings will be conducted for this study: an Alternatives Public Information Meeting and a Public Hearing. The following sections provide summaries of these meetings. The Comments and Coordination Report, available under a separate cover, contains a more detailed summary of each meeting and includes the public comments from each meeting.

5.2.1 Alternatives Public Information Meeting

A Hybrid Alternatives Public Information Meeting was held in February 2022 and was composed of a Virtual Meeting and an In-Person Meeting. The virtual component was held on Tuesday, February 23, 2022, from 5:30 p.m. until 6:00 p.m., while the in-person component was held on Thursday, February 24, from 5:30 p.m. until 7:30 p.m. at the AdventHealth Nicholson Center.

Public meeting invitation letters were sent by e-mail to 47 elected officials and 77 appointed officials, and 17 interested parties/organizations. Letters were mailed to 1,918 property owners and tenants adjacent to the study area. The Alternatives Public Information Meeting was advertised in the Orlando Sentinel on Sunday, February 6, 2022, and the El Sentinel Spanish newspaper on Saturday, February 5, 2022. An advertisement was published in The Florida Administrative Register (FAR) on February 8, 2022. FTE distributed a press release on February 10, 2022, to local media, and notices were posted on the project website at www.SR429I-4toSeidel.com and the FDOT public notices website.

The public was invited to attend the Virtual Public Information Meeting at 5:30 p.m. Attendees had the opportunity to listen to the FTE project manager introduce the project and team members before watching the Project Video Presentation which described project and proposed alternatives. A "Question" feature was open for the duration of the meeting which allowed the viewers to write questions in to be submitted to the public record. At the conclusion of the meeting, the consultant project manager answered questions submitted by participants during registration. Unanswered questions were responded to via e-mail to the e-mail address provided during the registration after the meeting.

A total of 53 people signed into the virtual meeting (16 FTE and consultant employees), and 45 questions and comments were received.

The public was invited to attend the In-Person Alternatives Public Information Meeting at any time between 5:30 p.m. and 7:30 p.m. Attendees had an opportunity to view a continuous looping presentation that provided a general overview of the project. Attendees also had an opportunity to view several project displays, including concepts, information about the study process, and information about current conditions and future traffic projections. Interactive Smart Boards also were used to allow community members to focus on a specific area of the project, ask questions and provide feedback. A Turnpike Traffic Noise video and an FDOT ROW video were also available for viewing. Members of the project team, including engineers and experts on traffic and noise, were available to discuss the project with attendees and answer questions.

A total of 49 people attended the In-Person Alternatives Public Information Meeting (19 FTE and consultant employees), and two questions and comments were received. More information on the Alternatives Public Information Meeting is provided in the Comments and Coordination Report, under a separate cover.

5.2.2 Public Hearing

This section will be completed after the public hearing is held.

5.2.3 Stakeholder Meeting

Throughout the duration of this PD&E Study, meetings were held with stakeholders that had interest in the project. At the meetings, stakeholders were updated on project developments and were asked to share information that could assist the project team in the development of the alternatives. A list of the meetings as of May 19, 2022, is shown below in Table 5-1.

Table 5-1: Stakeholder Meetings

Stakeholder	Meeting Description	Date(s)
FDOT, District 5	Coordination Meeting	3/11/2021 9/30/2021 1/28/2022 3/7/2022
CFX	Coordination Meeting	3/30/2021
Osceola County	Coordination Meeting	4/20/2021 3/07/2022
Orange County	Coordination Meeting	3/11/2022
Reedy Creek Improvement District	Coordination Meeting	5/19/2021 3/3/2022
Mattamy Homes	Coordination Meeting	8/18/2021
Walt Disney Company	Coordination Meeting	8/18/2021 3/3/2022
Reunion Community Development District, East and West	Coordination Meeting	3/10/2022
Osceola County Schools	Coordination Meeting	3/24/2022
City of Bay Lake	Coordination Meeting	3/03/2022
Florida Department of Environmental Protection (FDEP)	Pre-Application Meeting	4/11/2022

6 Design Features and Preferred Alternatives

6.1 Engineering Details of the Preferred Alternative

As discussed at the end of Chapter 4, the Preferred Alternative consists of an eight-lane widening of SR 429, Sinclair Road interchange – Alternative 1, Canary Island Dr bridge – Alternative 5, Livingston Road interchange – Alternative 2, US 192 interchange – Build Alternative, Western Way interchange – Build Alternative, and Seidel Road interchange – Alternative 1, as described in the subsequent sections.

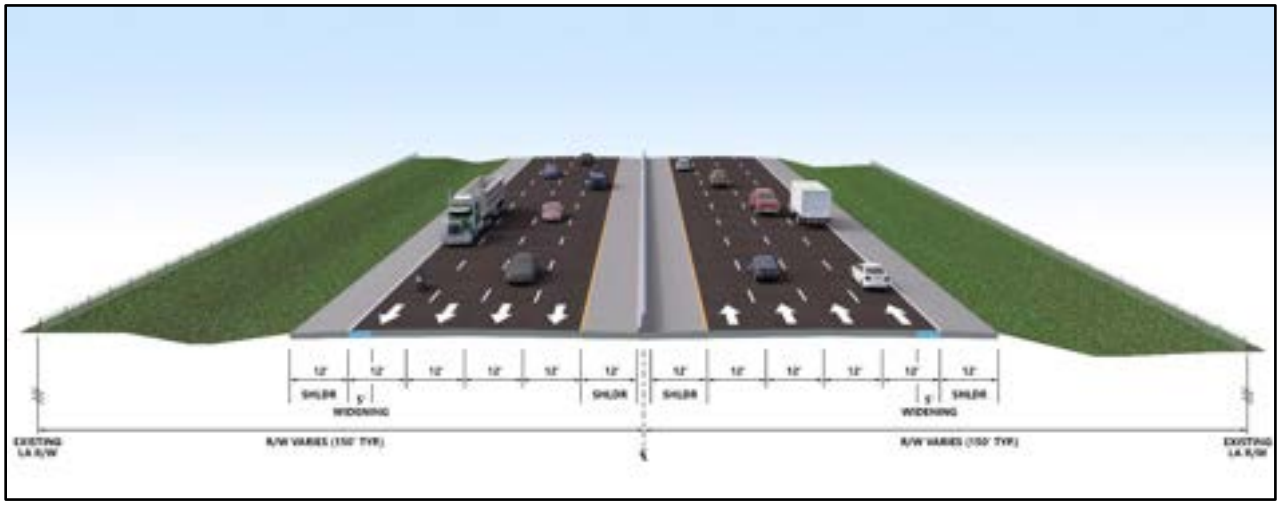
6.1.1 Typical Sections

The Preferred Alternative for improving the SR 429 mainline widens SR 429 from four lanes (two lanes in each direction) to eight lanes (four lanes in each direction). The proposed mainline typical section is shown in Figure 6-1. Both inside and outside widening will be required. Reconstruction of the inside 13 feet of existing pavement will allow the roadway crown to be located at the center of the four-lane pavement. Widening to the inside will be 11 feet for the roadway and also include a 26-foot median with two 12-foot paved shoulders and a two-foot concrete barrier wall. The outside of the roadway will be widened five feet. The mainline widening occurs entirely within the existing ROW.

The median width varies in two locations through curves where a wider median is needed to meet sight distance requirements. This will result in a variable median width on one side of the median barrier wall through the curves. The first location is between Sinclair Road and Sand Hill Road in the southbound direction. The maximum paved width between the barrier wall and the southbound edge of travel lane is 23.5 feet. The second location is near the Canary Island Drive overpass in the northbound direction. The maximum paved width between the barrier wall and the northbound edge of travel lane is 29.5 feet.

In addition, the curve through the Livingston Road interchange was flattened to accommodate the required sight distance, but the median width will remain a consistent 26 feet. The revised mainline alignment remains within the existing ROW.

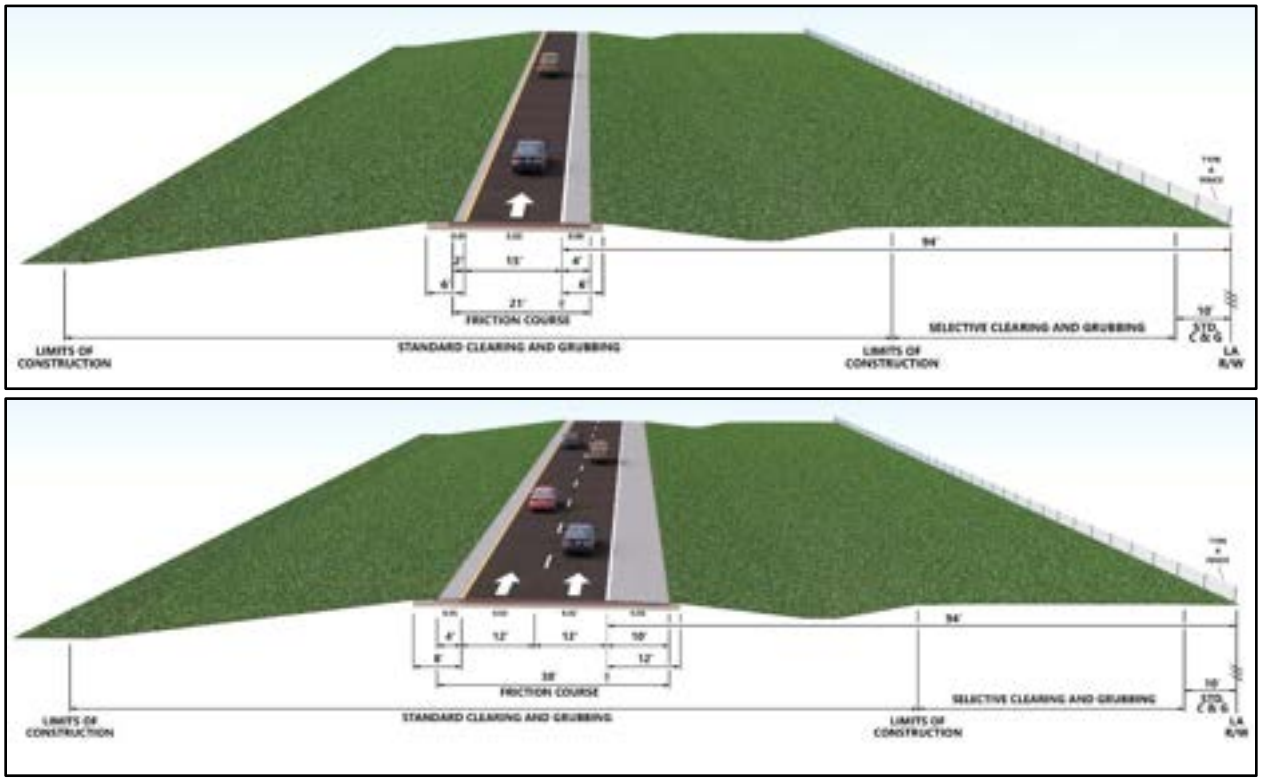
Figure 6-1: Proposed SR 429 Mainline Typical Section



Ramp Typical Sections

Proposed single-lane and double-lane ramp typical sections are shown in Figure 6-2.

Figure 6-2: Proposed SR 429 Ramp Typical Sections



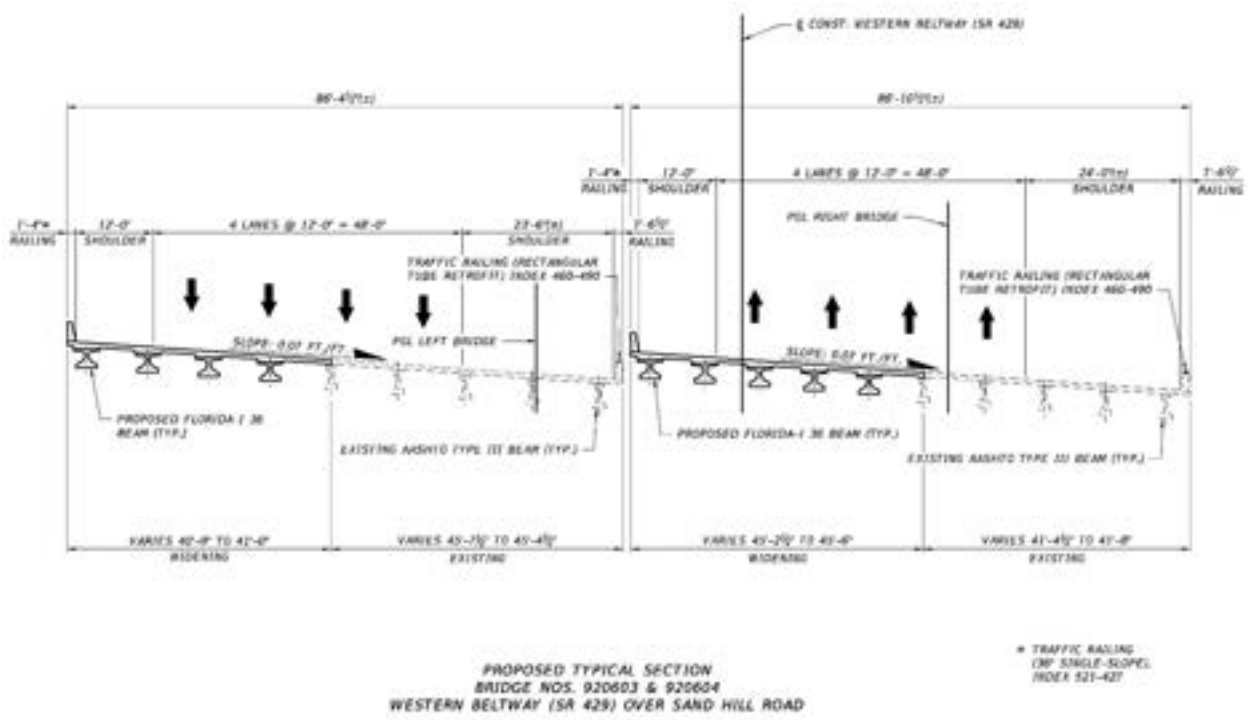
6.1.2 Bridge and Structures

The following describes the proposed bridge structures and provides typical sections for each bridge for the Preferred Alternative.

SR 429 over Sand Hill Road

The existing bridges will be widened from two to four lanes. The proposed bridge widening for both bridges is to the outside. This maintains the existing minimum vertical clearance for both bridges. The southbound bridge widening will range from 45'-7.5" to 45'-4.5". The northbound bridge widening will range from 41'-4.5" to 41'-8". The southbound bridge will have four 12-foot lanes, 12-foot outside shoulder, and a 23.5-foot inside shoulder. The wider inside shoulder is to achieve the required sight distance on the mainline curve. The northbound bridge will have four 12-foot lanes, 12-foot inside shoulder, and a 24-foot outside shoulder. The wider outside shoulder is to achieve the required sight distance on the mainline curve. The aesthetic treatment for Bridge No. 920604 and Bridge No. 920603 should conform to Level One as indicated in the FDOT Design Manual (FDM), Chapter 121. The proposed typical section is shown in Figure 6-3.

Figure 6-3: SR 429 over Sand Hill Road Proposed Typical Section

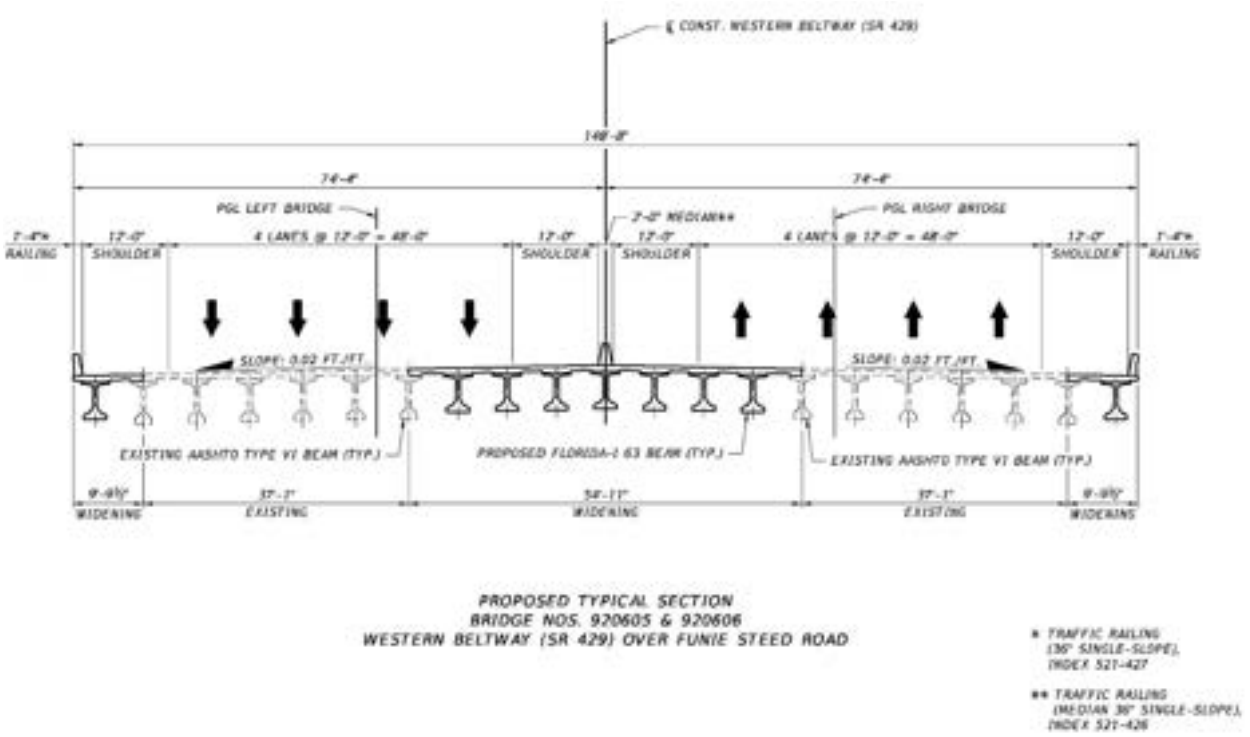


SR 429 over Funie Steed Road

The existing bridges will be widened from two to four lanes. The proposed bridge widening for both bridges is to the inside and outside, enclosing the bridges in the median. The vertical clearance for both bridges will not be below the minimum vertical clearance of 16'-0" per FDM

Table 260.6.1. The southbound bridge will have four 12-foot lanes and 12-foot inside and outside shoulders. The northbound bridge will have four 12-foot lanes and 12-foot inside and outside shoulders. The bridge widening will be 9′-9.5″ to the outside and 54′-11″ to the inside. The aesthetic treatment for Bridge No. 920605 and Bridge No. 920606 should conform to Level One as indicated in the FDOT Design Manual (FDM), Chapter 121. The proposed typical section is shown in Figure 6-4.

Figure 6-4: SR 429 over Funie Steed Road Proposed Typical Section

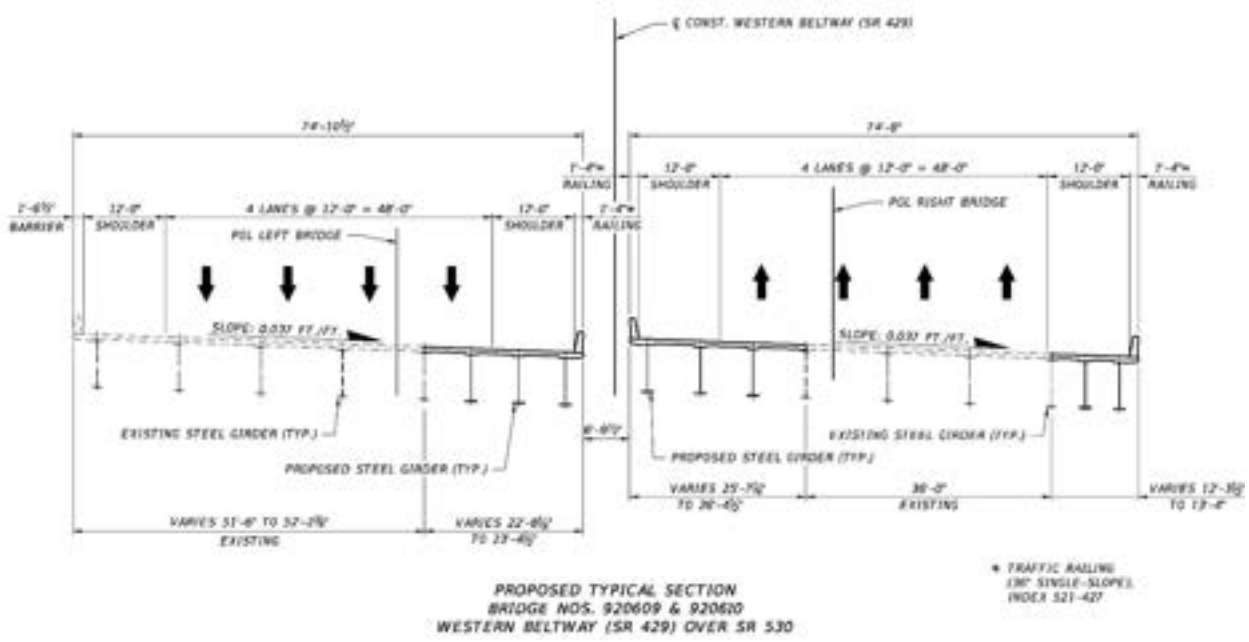


SR 429 over SR 530 (US 192)

The existing southbound bridge will be widened from three to four lanes. The existing northbound bridge will be widened from two to four lanes. The proposed bridge widening for the southbound bridge is to the inside. The proposed bridge widening for the northbound bridge is to the inside and outside. The vertical clearance for both bridges will not be below the minimum vertical clearance of 16′-0″ per FDM Table 260.6.1. The southbound bridge will have four 12-foot lanes and 12-foot inside and outside shoulders. The northbound bridge will have four 12-foot lanes and 12-foot inside and outside shoulders. The bridge widening for the southbound bridge will vary from 22′-8.125″ to 23′-4.5″ to the inside. The bridge widening for the northbound bridge will vary from 12′-3.5″ to 13′-4″ to the outside and from 25′-7.25″ to 26′-4.5″ to the inside. The aesthetic treatment for Bridge No. 920609 and Bridge No. 920610 should

conform to Level One as indicated in the FDOT Design Manual (FDM), Chapter 121. The proposed typical section is shown in Figure 6-5.

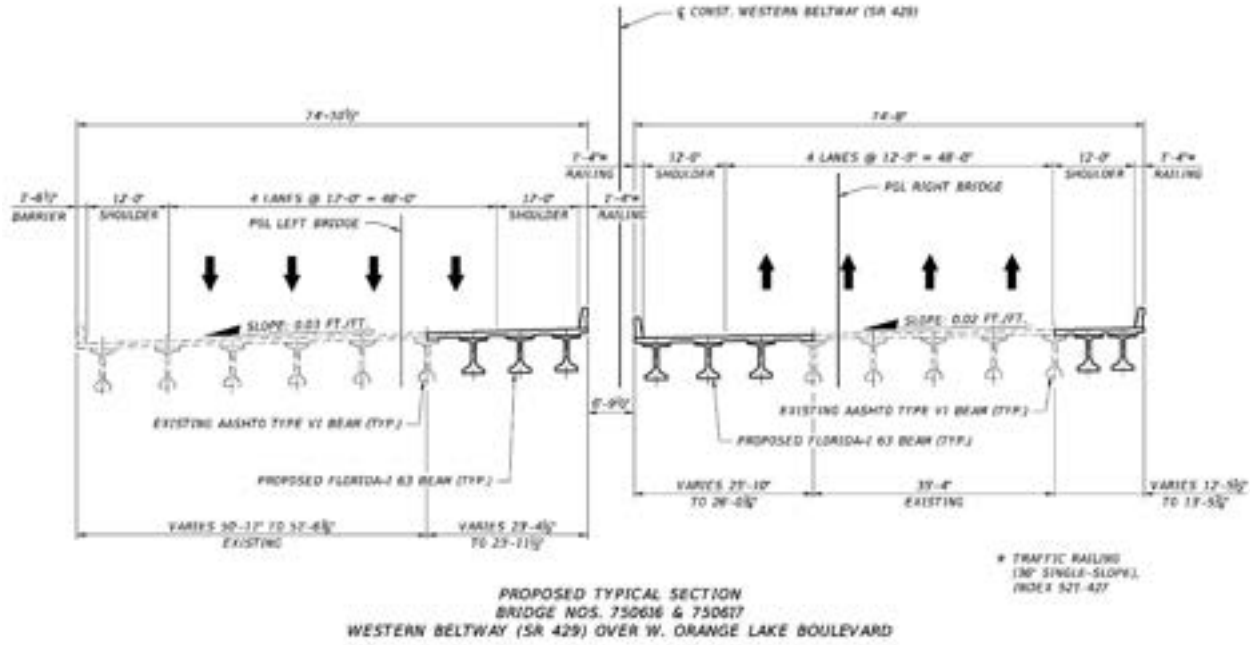
Figure 6-5: SR 429 over SR 530 (US 192) Proposed Typical Section



SR 429 over West Orange Lake Boulevard

The existing southbound bridge will be widened from three to four lanes. The existing northbound bridge will be widened from two to four lanes. The proposed bridge widening for the southbound bridge is to the inside. The proposed bridge widening for the northbound bridge is to the inside and outside. The vertical clearance for both bridges will not be below the minimum vertical clearance of 16'-0" per FDM Table 260.6.1. The southbound bridge will have four 12-foot lanes and 12-foot inside and outside shoulders. The northbound bridge will have four 12-foot lanes and 12-foot inside and outside shoulders. The bridge widening for the southbound bridge will vary from 23'-4.125" to 23'-11.5" to the inside. The bridge widening for the northbound bridge will vary from 12'-5.5" to 13'-5.875" to the outside and from 25'-10" to 26'-0.75" to the inside. The aesthetic treatment for Bridge No. 750616 and Bridge No. 750617 should conform to Level One as indicated in the FDOT Design Manual (FDM), Chapter 121. The proposed typical section is shown in Figure 6-6.

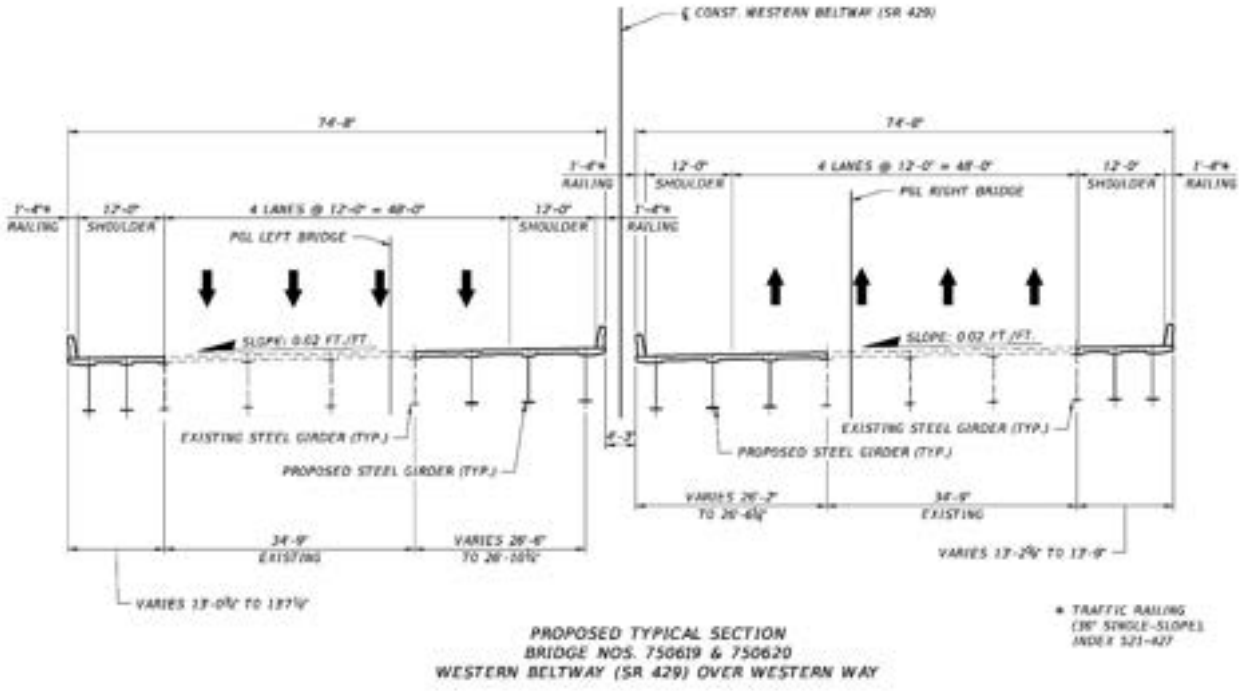
Figure 6-6: SR 429 over West Orange Lake Boulevard Proposed Typical Section



SR 429 over Western Way

The existing southbound bridge will be widened from two to four lanes. The existing northbound bridge will be widened from two to four lanes. The proposed bridge widening for both bridges is to the inside and outside. The vertical clearance for both bridges will not be below the minimum vertical clearance of 16′-0″ per FDM Table 260.6.1. The bridges will have four 12-foot lanes and 12-foot inside and outside shoulders. The bridge widening for the southbound bridge will vary from 13′-0.75″ to 13′-7.25″ to the outside and from 26′-6″ to 26′-10.25″ to the inside. The bridge widening for the northbound bridge will vary from 13′-2.625″ to 13′-9″ to the outside and from 26′-2″ to 26′-6.25″ to the inside. The aesthetic treatment for Bridge No. 750619 and Bridge No. 750620 should conform to Level One as indicated in the FDOT Design Manual (FDM), Chapter 121. The proposed typical section is shown in Figure 6-7.

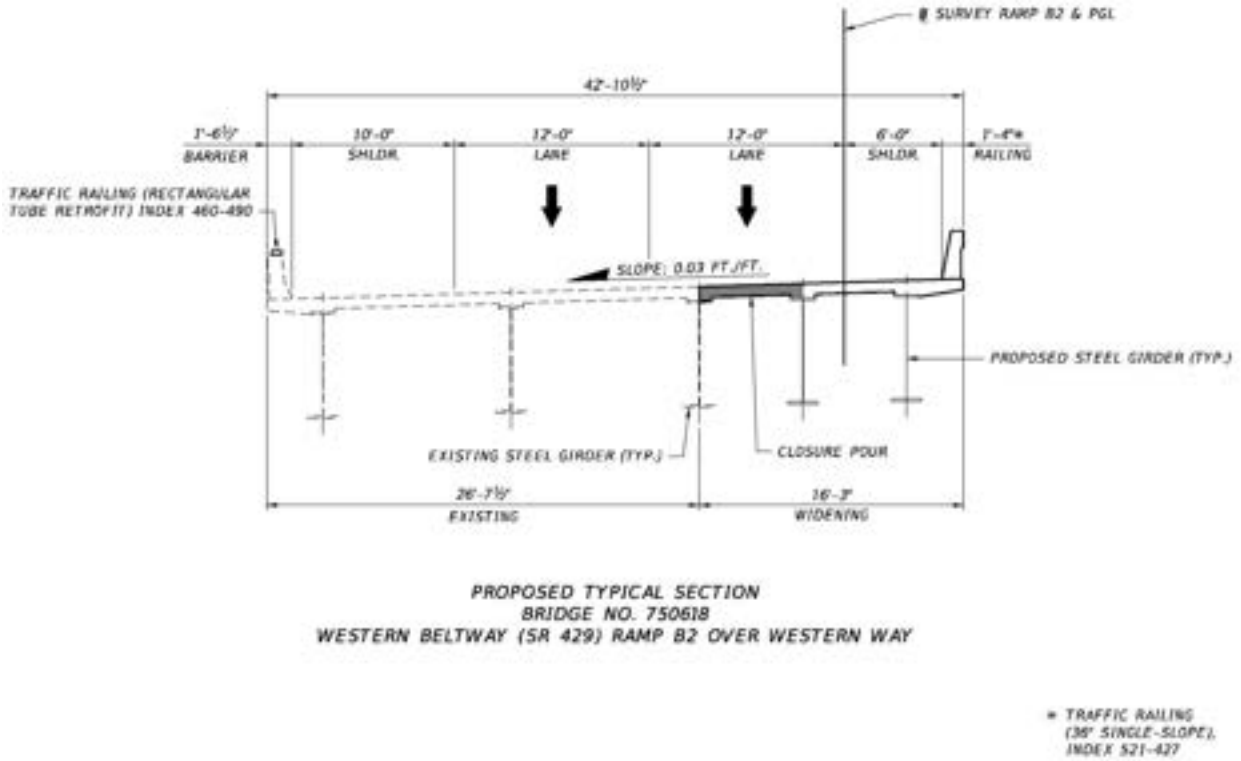
Figure 6-7: SR 429 over Western Way Proposed Typical Section



SR 429 Southbound Off-Ramp over Western Way

The existing southbound off-ramp bridge will be widened from one to two lanes. The proposed bridge widening is to the inside. The vertical clearance for the bridge will not be below the minimum vertical clearance of 16'-0" per FDM Table 260.6.1. The bridge will have two 12-foot lanes, a 6-foot inside shoulder and a 10-foot outside shoulder. Bridge shoulder widths are from FDOT FDM Figure 260.1.1. The bridge widening for the ramp bridge will be 16'-3" to the inside. The aesthetic treatment for Bridge No. 750618 should conform to Level One as indicated in the FDOT Design Manual (FDM), Chapter 121. The proposed typical section is shown in Figure 6-8.

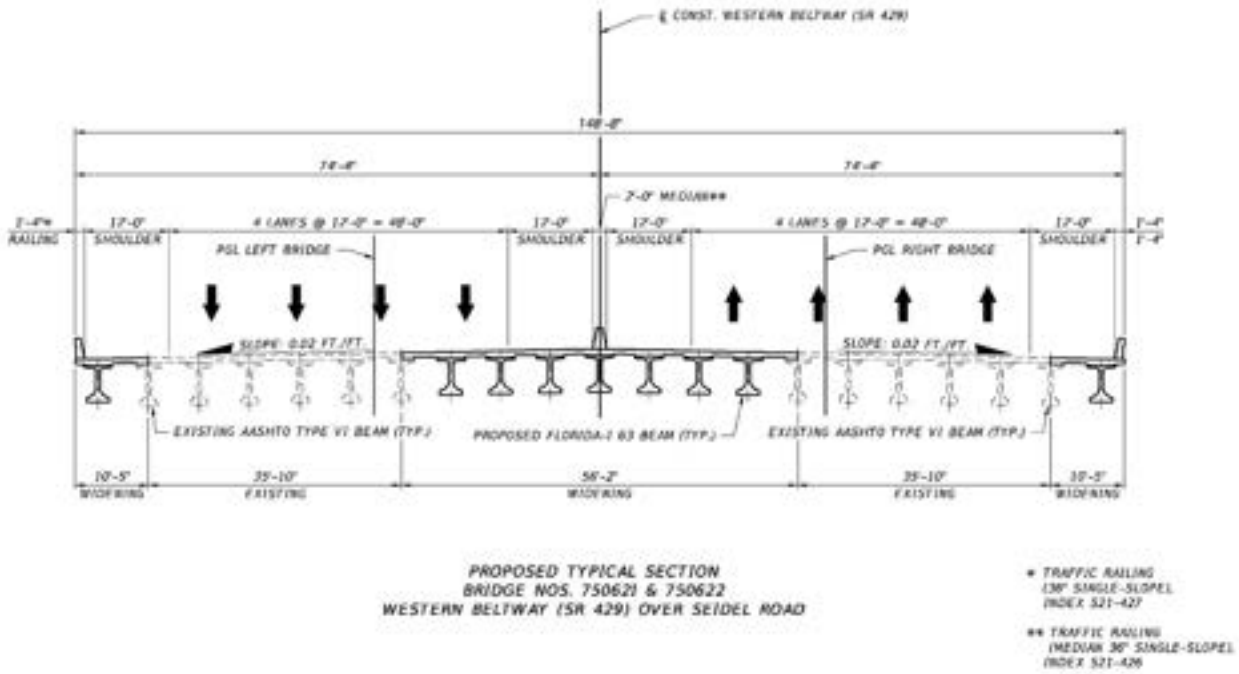
Figure 6-8: SR 429 Southbound Off-Ramp over Western Way Proposed Typical Section



SR 429 over Seidel Road

The existing bridges will be widened from two to four lanes. The proposed bridge widening for both bridges is to the inside and outside, enclosing the bridges in the median. The vertical clearance for both bridges will not be below the minimum vertical clearance of 16'-0" per FDM Table 260.6.1. The bridges will have four 12-foot lanes and 12-foot inside and outside shoulders. The bridge widening for the both bridges will be 10'-5" to the outside. The inside widening between the two bridges will be 56'-2". The aesthetic treatment for Bridge No. 750621 and Bridge No. 750622 should conform to Level One as indicated in the FDOT Design Manual (FDM), Chapter 121. The proposed typical section is shown in Figure 6-9.

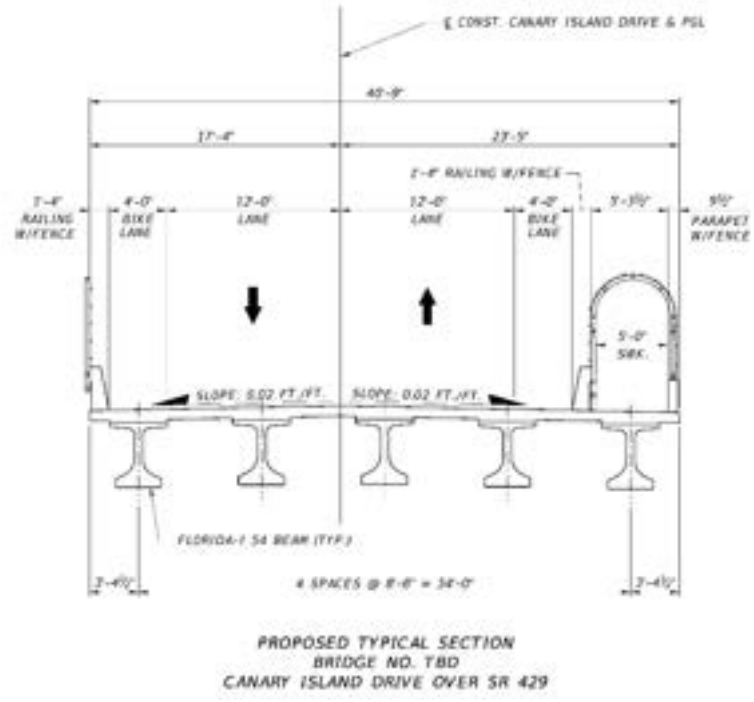
Figure 6-9: SR 429 over Seidel Road Proposed Typical Section



Canary Island Dr over SR 429

The existing bridge will be replaced. The proposed bridge typical section for this bridge consists of one (1) 12′-0″ eastbound travel lane, a 4′-0″ eastbound bike lane, one (1) westbound travel lane, a 4′-0″ westbound bike lane, and a 5′-0″ sidewalk protected by a traffic railing. The vertical clearance will meet the minimum vertical clearance of 16′-6″ per FDM Table 260.6.1. A new bridge number will be requested during the Design Phase. The aesthetic treatment for this new bridge should conform to Level One as indicated in the FDOT Design Manual (FDM), Chapter 121. Pier protection will be evaluated and installed as necessary along SR429 to protect the bridge. At a minimum, additional pier shielding will be required. The proposed typical section is shown in Figure 6-10.

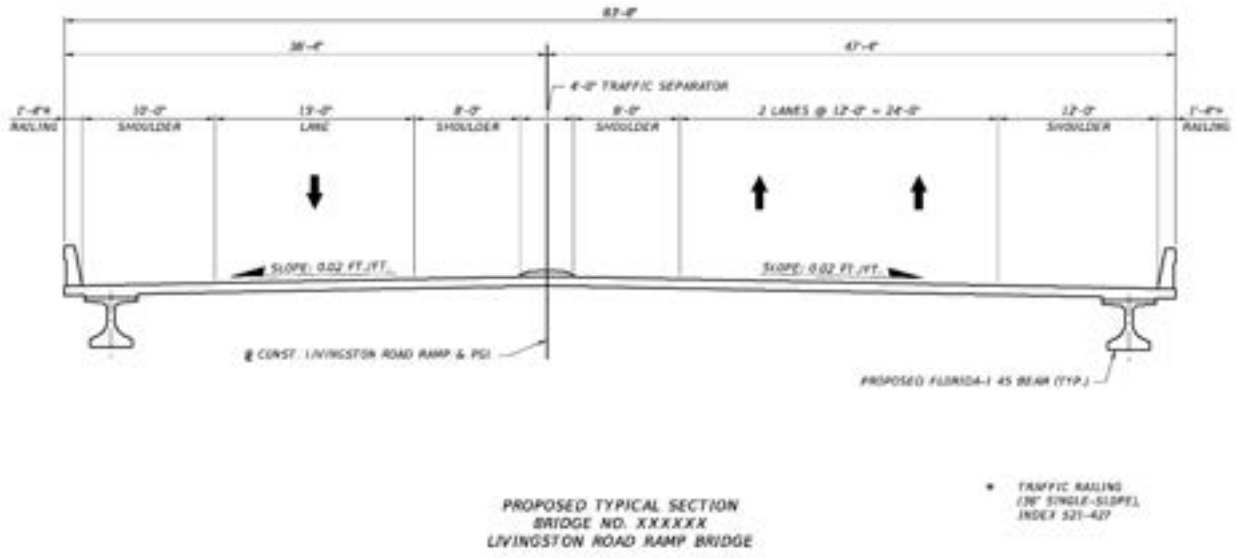
Figure 6-10: Canary Island Drive over SR 429 Proposed Typical Section



Livingston Road Ramp over SR 429

The new bridge will be constructed as part of this proposed interchange. The proposed bridge typical section for this bridge consists of two (2) 12'-0" eastbound travel lanes, a 12'-0" outside shoulder, 8'-0" inside shoulder, one (1) 15'-0" westbound travel lane, a 10'-0" outside shoulder, and 8'-0" inside shoulder. The vertical clearance will meet the minimum vertical clearance of 16'-6" per FDM Table 260.6.1. A bridge number will be requested during the Design Phase. The aesthetic treatment for this bridge should conform to Level One as indicated in the FDOT Design Manual (FDM), Chapter 121. Pier protection will be evaluated and installed as necessary along SR429 to protect the bridge. At a minimum, additional pier shielding will be required. The proposed typical section is shown in Figure 6-11.

Figure 6-11: Livingston Road Ramp over SR 429 Proposed Typical Section



Indian Creek Boulevard over SR 429

Pier shielding currently exists along SR 429 in the form of concrete median barrier. However, this pier shielding will be modified when SR 429 is widened. Pier protection will be evaluated and installed as necessary along SR429 to protect the bridge when SR 429 is widened. At a minimum, additional pier shielding will be required.

Sinclair Road over SR 429

Pier shielding currently exists along SR 429 in the form of guardrail. However, this shielding will be removed when SR 429 is widened. Pier protection will be evaluated and installed as necessary along SR429 to protect the bridge when SR 429 is widened. At a minimum, additional pier shielding will be required.

SR 429 over Boggy Creek Culvert

The existing culvert over Boggy Creek will not require an extension to accommodate the outside widening of SR 429. As noted in Section 2.22, this culvert is in “good” condition and has sufficient hydraulic capacity for the proposed condition.

SR 429 over Whittenhorse Creek Culvert

The existing culvert over Whittenhorse Creek will need to be extended to accommodate the outside widening of SR 429. As noted in Section 2.22, this culvert is in “good” condition and can be extended. This culvert has sufficient hydraulic capacity for the proposed condition.

SR 429 over Golf Cart Path

The existing culvert over the golf cart path Creek will need to be extended to accommodate the outside widening of SR 429. As noted in Section 2.22, this culvert is in “good” condition and can be extended.

6.1.3 Right of Way Relocations

The Preferred Alternative does require additional ROW from 29 parcels. The total area required is 16.01 acres. There are no commercial or residential relocations.

6.1.4 Horizontal and Vertical Geometry

The Preferred Alternative is widening the existing SR 429 mainline. Therefore, the horizontal and vertical alignment of SR 429 will generally remain the same as the existing. However, there are three horizontal curves on SR 429 that will be adjusted to address horizontal sight distance issues in the ultimate condition. The locations of these curves are:

- Between Sinclair Road and Sand Hill Road
- Canary Island Dr overpass
- Proposed Livingston Road interchange

The geometry data for the SR 429 mainline curves are provided in Appendix B.

The existing alignment of the cross streets at the existing interchanges will remain the same. The alignments of the ramps will change to accommodate the additional travel lanes and to maintain toll plaza operations during construction. The proposed alignments of the ramps are provided in the geometry sheets provided in Appendix B.

The Livingston Road interchange is a new interchange. The ramps to and from SR 429 will be new alignment between Formosa Gardens Boulevard and SR 429. At the proposed interchange, SR 429 will remain at-grade and the ramps will be elevated over SR 429. The geometry data for the interchange ramp curves are provided in Appendix B.

The new bridge for Canary Island Drive will require new alignment of the roadway. The geometry data for the Canary Island Drive bridge are provided in Appendix B.

6.1.5 Bicycle and Pedestrian Accommodations

SR 429 is a limited-access roadway, thus, the Preferred Alternative for improvements along SR 429 does not include pedestrian or bicycle facilities located on the expressway.

At the Sinclair Road interchange, there are five-foot sidewalks located on both sides of the roadway. No bicycle lanes are currently present along Sinclair Road, east and west of the interchange, so no bicycle lanes are proposed. Adding bicycle lanes would require widening of the Sinclair Road bridge.

At the proposed Livingston Road interchange, there are no existing pedestrian or bicycle facilities. There are no pedestrian or bicycle facilities proposed for the section of Livingston Road

between Formosa Gardens Boulevard and SR 429. This section of Livingston Road connects to SR 429 a limited access facility. Therefore, there is no need for any pedestrian or bicycle facilities on this section of Livingston Road. However, the widening of Formosa Gardens Boulevard north of Livingston Road will add a six-foot sidewalk along the west side of the roadway for the length of the widening. Formosa Gardens Boulevard has a 10-foot shared use path on the east side of the roadway, so no additional bicycle facilities are proposed. A small section of the existing shared use path just south of Livingston Road will be reduced to eight feet for a short distance (approximately 350 feet) in order to accommodate the widening of Formosa Gardens Boulevard and to avoid a potential residential relocation.

At the US 192 interchange, six-foot sidewalks on both sides of the roadway will be added as part of the improvements to US 192. In addition, seven-foot bicycle lanes will also be added along both sides of US 192 for the length of the improvements.

At the Western Way interchange, based on coordination with Disney and Reedy Creek Improvement District staff, bicycle and pedestrian accommodations are not included along Western Way due to safety issues with the free flow movements of the loop ramp as well as the southbound to westbound ramp. Disney stated they are transporting employees through the interchange using shuttle buses.

Finally, at the Seidel Road interchange, no changes are proposed to the existing sidewalks and bicycle lanes along Seidel Road.

6.1.6 Transit Accommodations

There are no transit routes on SR 429. So, no transit accommodations are planned for SR 429. Along US 192, the existing transit accommodation for stops on bus route 55 will be maintained. No additional transit accommodations are planned as part of this project.

6.1.7 Access Management

For SR 429, the only access management change planned is the addition of the Livingston Road interchange connecting Livingston Road to SR 429. The interchange will provide full access to SR 429. The proposed interchange is more than two miles from the Sinclair Road interchange and approximately 1.25 miles south of US 192 interchange.

The widening of Formosa Gardens Boulevard from two lanes to four lanes will change the roadway from undivided to divided. This will restrict left turns along this segment of the roadway. However, currently, there are no driveways along Formosa Garden Boulevard in this section of roadway. The Public Hearing for this PD&E study will meet the requirement for Florida Statute 335.199 for public notification of property owners of the change in access.

There are no planned access management changes proposed at the other interchanges.

6.1.8 Intersection and Interchange Concepts

This section will describe the interchange concepts and the traffic control types for the intersections. The Preferred Alternative Concept Plans are provided in Appendix B.

6.1.8.1 Sinclair Road Interchange

The existing configuration of the Sinclair Road interchange will be retained with the Preferred Alternative.

The signalized intersection of Sinclair Road and the northbound off-ramp/Connector Road, already signalized, will provide one through lane, two left turn lanes, and one right turn lane for the northbound off-ramp. Westbound Sinclair Road will provide two through lanes and one right turn lane. Southbound Connector Road will provide one left turn lane and one right turn lane.

The intersection of Sinclair Road and the southbound ramps will be signalized. The southbound off-ramp will provide two left turn lanes and one right turn lane. Eastbound Sinclair Road will provide two through lanes and one right turn lane.

The intersection of Connector Road and the northbound on-ramp will be signalized. Northbound Connector Road will provide one through lane and one left turn lane. Southbound Connector Road will one through lane and one right turn lane. The northbound through lane for Connector Road will have a continuous green signal. The northbound left turn lane and the southbound lanes will be controlled by the traffic signal.

6.1.8.2 Livingston Road Interchange

A four-lane divided interchange access roadway would provide a limited access connection between SR 429 and the intersection of Livingston Road with Formosa Gardens Boulevard, adding a fourth leg to the local intersection. Lanes to and from the southbound ramps would cross over SR 429 to connect to the ramps at a stop-controlled T-intersection. The northbound on-ramp and off-ramp would merge and diverge with the access roadway approximately 1,600 feet west of Formosa Garden Boulevard. There are no plans for new connections to or from the west side of SR 429. The ramps to and from the south would be electronically tolled.

The new interchange will create a fourth leg of the existing Livingston Road intersection with Formosa Gardens Boulevard. A traffic signal would be added, as well as dual left turn lanes for northbound to westbound traffic entering the interchange. A new left turn lane will be added for westbound Livingston Road to southbound Formosa Gardens Boulevard traffic, as well as a

westbound through lane to enter the interchange. The southbound approach will include a new exclusive left turn lane onto Livingston Road, an exclusive right turn lane into the interchange, and a second southbound through lane. The eastbound approach to Formosa Gardens Boulevard from the interchange will include dual left turn lanes, a through lane, and an exclusive right turn lane. As part of the interchange, the half-mile two-lane section of Formosa Gardens Boulevard will be widened to four lanes to match the four-lane sections to the south and north of Livingston Road.

6.1.8.3 US 192 Interchange

The existing configuration of the US 192 interchange will be retained with the Preferred Alternative.

The signalized intersection of US 192 and the northbound ramps will provide two left turn lanes and three right turn lanes for the northbound off-ramp, four through lanes and one right turn lane for westbound US 192, and three through lanes and three left turn lanes for eastbound US 192.

The signalized intersection of US 192 and the southbound ramps will provide three through lanes, two left turn lanes, and one right turn lane for westbound US 192, three trough lanes, one left turn lane, and one right turn lane for eastbound US 192, and four through lanes and one right turn lane for eastbound US 192.

The signalized intersection of US 192 and E. Orange Lake Boulevard will provide three left turn lanes and three right turn lanes for the southbound off-ramp, four through lanes and two left turn lane for westbound US 192, and four through lanes and one right turn lane for eastbound US 192. For E. Orange Lake Boulevard, one through lane, two left turn lanes, and one right turn lane for northbound traffic and one left turn lane, one through/shared left turn lane, and one right turn lane for southbound traffic.

6.1.8.4 Western Way Interchange

The existing configuration of the Western Way interchange will be retained with the Preferred Alternative.

The intersection of Western Way and the northbound ramps will be signalized. The northbound off-ramp will provide two left turn lanes and three right turn lanes. Westbound Western Way will provide three through lanes and two right turn lanes. Eastbound Western Way will provide four through lanes and two left turn lanes.

The intersection of Western Way and the southbound on-ramp will be signalized. Westbound Western Way will provide two through lanes and two left turn lanes. Eastbound Western Way will provide two through lanes. The southbound off-ramps (eastbound and westbound) will be free flow.

The intersection of Western Way and Hartzog Road will retain the same number of turn lanes.

6.1.8.5 Seidel Road Interchange

The existing configuration of the Seidel Road interchange will be retained with the Preferred Alternative.

The intersection of Seidel Road and the northbound off-ramp will be signalized. The northbound off-ramp will maintain the one left turn lane and one right turn lane configuration at the intersection.

The intersection of Seidel Road and the southbound on-ramp will be signalized. Westbound Seidel Road will maintain the two through lanes and one left turn configuration at the intersection. Eastbound Seidel Road will maintain the one through lane and one through/shared right turn lane configuration at the intersection.

6.1.9 Intelligent Transportation Systems and TSM&O Strategies

The existing ITS system for SR 429 will be modified to accommodate the widening of SR 429 from four to eight lanes, improvements to the existing interchanges, and the construction of the new interchange at Livingston Road. The modifications will be in accordance with the Florida Design Manual and the Turnpike Design Handbook.

The recommended TSM&O option for the SR 429 southbound off-ramp at US 192 is Option 2. This option is provided in Appendix A. The estimate construction cost for this option is $13.49 million. The total cost including design, construction and project unknowns is approximately $19.56 million. There is approximately $4.79 million associated with throw away work with this option. The LRE estimate is provided in Appendix E. The traffic analysis indicates that this option mitigates queuing on the ramp until 2040. A benefit/cost (B/C) analysis was performed on this option. The B/C ratio is approximately 5.1.

The implementation of a Hard Shoulder Running (HSR) concept, similar to the system currently being constructed by the Central Florida Expressway (CFX) Authority along SR 429 to the north of this project segment is a longer term TSM&O option that was considered during this PD&E study. The preliminary analysis concluded the implementation of a HSR system onto the existing four-lane Western Beltway configuration would not be reasonable or feasible given the current

and projected traffic volumes and characteristics. However, it was agreed that a HSR system should be reconsidered during final design to determine if features such as full-depth shoulders, wider shoulder widths (i.e. 16 feet), infrastructure for overhead supplemental signage, etc. should be implemented.

The intersection of Sinclair Road and Happy Trails is currently an unsignalized intersection with a full median opening. It is approximately 450 feet from the proposed signalized intersection of Sinclair Road and the southbound SR 429 ramps. Due to the proximity of the intersections, changes to the Happy Trails intersection may be needed. TSM&O improvements at this intersection will be further evaluated during design.

6.1.10 Utilities

A Utility Assessment Package Report, August 2022, was prepared to document the existing or planned utilities in accordance with FDOT PD&E Manual, Part 2, Chapter 21 (FDOT 2019). Twenty (20) Utility Agencies/Owners (UAOs) were initially identified as potentially having facilities within the project study limits through a Sunshine 811 design ticket. Follow-up information provided by the identified UAOs resulted in seven UAOs providing information on facilities within the project area. Two UAOs indicated that they had no facilities in the project area. Eleven UAOs provided no responses to requests for information. The seven confirmed UAOs with facilities along the project are summarized in Table 6-1.

Table 6-1: Utility Facilities Along SR 429

Utility Agency/Owner	Utility Type	General Location
Comcast	Buried fiber optic cable	Crossing of SR 429 just south of Canary Island Drive and at Funie Steed Road
Duke Energy Distribution	7.2/1.47 kV overhead and underground distribution	Multiple locations: Formosa Gardens Boulevard, Sand Hill Rd, Indian Creek Boulevard, Funie Steed Road, US 192, Mainline Toll Plaza, W Orange Lake Boulevard, Hartzog Road, Seidel Road
Duke Energy Transmission	230 kV overhead transmission 69 kV overhead transmission	SR 429 – west side US 192 – south side
Osceola County Traffic	Buried fiber optic cable	US 192
Sabal Trail Transmission	36” high pressure natural gas pipeline	West side of Sand Hill Rd
Summit Broadband	Buried fiber optic cable	Multiple locations: Crossing of SR 429 just south of Canary Island Drive, Funie Steed Road, and US 192. Along Formosa Garden Boulevard and Livingston Road.
TECO Peoples Gas	2” and 4” gas mains	Multiple Locations: Indian Creek Boulevard, US 192, W Orange Lake Boulevard, Seidel Road, Snad Hill Rd, and Flamingo Crossings Boulevard

As reflected in Table 6-1, most of the utilities cross over or under Florida's Turnpike mainline or interchange ramps. Actual utility impacts will be verified during the design phase, when a detailed survey and subsurface utility information is available. The proposed project is expected to have no significant utility impacts.

6.1.11 Drainage and Stormwater Management Facilities

Project improvements will be designed to meet the regulatory requirements of the applicable water management districts, Reedy Creek Improvement District (RCID), the requirements outlined in the FDOT Drainage Manual, and the requirements of FTE. The project is located within the SFWMD jurisdiction, however FDEP reviewed and issued the original Environmental Resource Permit (ERP) in 2001. FDEP has indicated they will be responsible for issuing a permit for the proposed improvements associated with this study. In addition, the project is within the

Reedy Creek Watershed, therefore approval from RCID will be required as well. The FDEP ERP application should be submitted to RCID for approval prior to submitting to FDEP. FDEP will be responsible for Section 404 reviews and permitting. A National Pollutant Discharge Elimination System (NPDES) permit will also be required from FDEP.

Meetings were held with RCID, FDEP, SFWMD, Osceola County, and Orange County as part of the coordination efforts of this project. During these meetings the potential opportunities for implementing a joint use or regional stormwater facility were discussed. FDEP and SFWMD stated they were open to the use of regional ponds, but no specific opportunities were identified during or after these meetings for any of the agencies and municipalities. Appendix D provides meeting minutes of these coordination meetings.

The analysis identified potential pond sites based on recent aerials and other preliminary data. Once the potential pond sites were narrowed down to three alternatives, a more detailed analysis was conducted utilizing the following parameters: ROW requirements, easement requirements, atypical construction costs for a given pond site, hazardous materials, threatened endangered & significant species, maintenance, cultural resources, wetland impacts, floodplain impacts and impacts to other relevant features as noted in the pond site evaluation matrix provided in the *Pond Siting Report*. In conjunction with this analysis, a *Contamination Screening Evaluation Report*, *Natural Resource Evaluation*, and a *Cultural Resource Assessment Survey* were prepared and are provided under separate cover with this submittal. The preferred alternative for each basin and anticipated ROW needs associated with the preferred alternatives are outlined in Table 6-2. The evaluation matrix which contains the details of the analysis has been provided in the *Pond Siting Report*.

Table 6-2: Preferred Pond Alternatives and Anticipated Right of Way

Basin	Preferred Alternative	Anticipated Right of Way Requirements (acres)
2A-2	1	12.42[1, 2]
FGB (Basin B)	3	4.80[1]

1. Pond to be placed within remnant parcel of land being purchased for proposed roadway alignment.
2. A portion of proposed Pond 2A-2 will be located within the existing ROW.

6.1.12 Floodplain Analysis

The proposed widening of SR 429 from 4-lanes to 8-lanes from MP 0.5 to MP 11.5 and associated interchange improvements will result in minor impacts to the adjacent FEMA floodplains. The anticipated floodplain encroachments due to the proposed roadway widening were calculated and mitigation alternatives were identified. The floodplain impact calculations are conservative and should be revised during design when survey, geotechnical data, and

proposed cross sections are available. Floodplain compensation should be provided in stormwater management facilities to the maximum extent possible.

Replacement drainage structures for this project are limited to hydraulically equivalent structures which are not expected to increase the backwater surface elevations. The limitations to the hydraulic equivalency proposed are due to restrictions imposed by the geometrics of design, existing development, cost feasibility, or practicability. An alternative encroachment location is not considered since it does not meet the project's purpose and need or is economically unfeasible.

Furthermore, the project will not affect existing floodplain elevations or extents. There will be no significant change in the potential for interruption or termination of emergency service or emergency evacuation routes as the result of construction of this project. Therefore, it has been determined that these encroachments are not significant.

6.1.13 Transportation Management Plan

Maintaining traffic flow throughout construction is vital given that any disruption to the traffic flow can impact a primary Florida transportation artery, SR 429, as well as key arterials such as US 192. Efficient construction of bridge structures, bridge flyovers, on/off ramps, and overall coordination with the affected stakeholders will be crucial for the project's success. A Transportation Management Plan (TMP) will be prepared for each stand-alone project consisting of strategies to manage the work zone impacts of the project. The scope, content, and degree of detail will vary based upon the expected work zone impacts of the project. The TMP shall consist of three major components (1) Temporary Traffic Control Plan, (2) Transportation Operations Plan and (3) Public Information Plan, reference; FDOT Design Manual, Section 240.1.2.

A specific detailed Temporary Traffic Control Plan will be analyzed for each project in the design phases. Traffic control will enable the number of existing travel lanes to remain open during construction while reconstruction and widening is completed. Maintaining toll operations at all toll plazas is also critical for the traffic control plan. Construction will be staged to allow temporary and permanent pavement and bridges from early phases to be available for lane shifts to allow for subsequent construction. Construction will also be staged to prevent long term ramp closures, and bridge widening will be coordinated with roadway lane shifts. Lane widths may be reduced to 11 feet. However, a single 12-foot lane must be provided in either direction to accommodate truck traffic. Temporary night-time detours will be required along crossroads and ramps while overhead work is being performed to construct the recommended bridges, bridge widening, and overhead sign structures over the roadways below.

It is also recommended to integrate smart work zones in the overall maintenance of traffic (MOT). Smart work zones utilize the existing Intelligent Transportation System (ITS) infrastructure to increase work zone safety. These smart work zones can include automated queue warning technologies, portable traffic sensors and navigation application sensors.

6.1.14 Special Features

The Preferred Alternative will provide noise barriers to address increased traffic noise due to the increase in traffic volumes.

The Preferred Alternative will require new mechanically stabilized earth (MSE) walls for the southbound ramps at the proposed Livingston Road interchange. The MSE walls will reduce the amount of additional ROW required on the west side of SR 429 at the interchange.

6.1.15 Design Variations and Design Exceptions

If deemed necessary, two specific deviations may occur: (1) Design Exception or (2) Design Variation. A Design Exception is required when the design criteria applied falls below the minimums established by AASHTO. A Design Variation is required when design criteria applied falls below FDOT established criteria and the deviation is not covered by the Design Exception. While the recommended alternative includes reconstruction of the vast majority of the corridor within the PD&E limits, some infrastructure will remain, and deficiencies will have to be documented during future design phases. Table 6-3 summarizes the 10 critical design elements and specifies whether AASHTO or FDOT design criteria are satisfied, or if a design exception/variation is required for the specific design element of the proposed improvements or existing conditions. No impacts to the 10 critical design elements are anticipated. However, 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.

Table 6-3: Design Exceptions and Variations – 10 Controlling Elements

Design Element	Design Variation < FDOT and > AASHTO	Design Exception < AASHTO
1. Design Speed	Satisfied	Satisfied
2. Lane Width	Satisfied	Satisfied
3. Shoulder Width	Satisfied	Satisfied
4. Horizontal Curve Radius	Satisfied	Satisfied
5. Superelevation Rate	Satisfied	Satisfied
6. Stopping Sight Distance	Satisfied	Satisfied
7. Maximum Grade	Satisfied	Satisfied
8. Cross Slope	Satisfied	Satisfied
9. Vertical Clearance	Satisfied	Satisfied
10. Design Loading Structural Capacity	Satisfied	Satisfied

6.1.16 Cost Estimates

The total estimated cost for the Preferred Alternative is $398.24 million. The LRE cost estimate is included in Appendix E. A breakdown of the costs associated with the Preferred Alternative is as follows:

- Construction Cost: $321.70 million
- Final Design Costs: $32.17 million
- CEI Costs: $32.17 million
- Right of Way Costs: $11.21 million
- Wetland Mitigation Costs: $0.74 million
- Sand Skink Mitigation Costs: $0.25 million

The Engineering and CEI costs are estimated based on 10% and 10% of construction costs, respectively. The costs do not include the cost to relocate utilities. Determination of which utilities will require relocation will be determined with detailed survey information during the preliminary design phase of the project.

6.1.17 Project Phasing

An evaluation was performed to separate portions of the Western Beltway (SR 429) widening into phases to be implemented as funding becomes available.

The future traffic analysis indicates that the entire project will need to be widened to six lanes by 2030. The section of SR 429 between US 192 and Seidel Road will need to be widened to eight lanes by 2045. The section between I-4 and US 192 will need to be widened to eight lanes by

2050. The US 192 interchange is located at approximately mile marker 5.5, which is about half the length of the corridor.

Currently, there are operational issues associated with the SR 429 southbound off-ramp intersection with US 192. In the afternoons, delays at the signalized intersection cause traffic to back up from the ramp onto the mainline. Short-term TSM&O improvements to improve the operation of the signalized intersection and add storage on the off-ramp are being considered, as discussed in Section 6.1.9.

Most of the ROW required for the proposed Livingston Road interchange and the associated stormwater ponds are located on a single vacant parcel. Development of this parcel would negatively impact the likelihood of FTE acquiring the parcel and building the proposed interchange. Therefore, it is important to acquire the ROW for the interchange as soon as possible.

Based on the current and future traffic needs, the location of US 192 in the project corridor and the need for a new interchange at Livingston Road, it is recommended to separate the corridor into eight phases. The eight phases are shown in Figure 6-12.

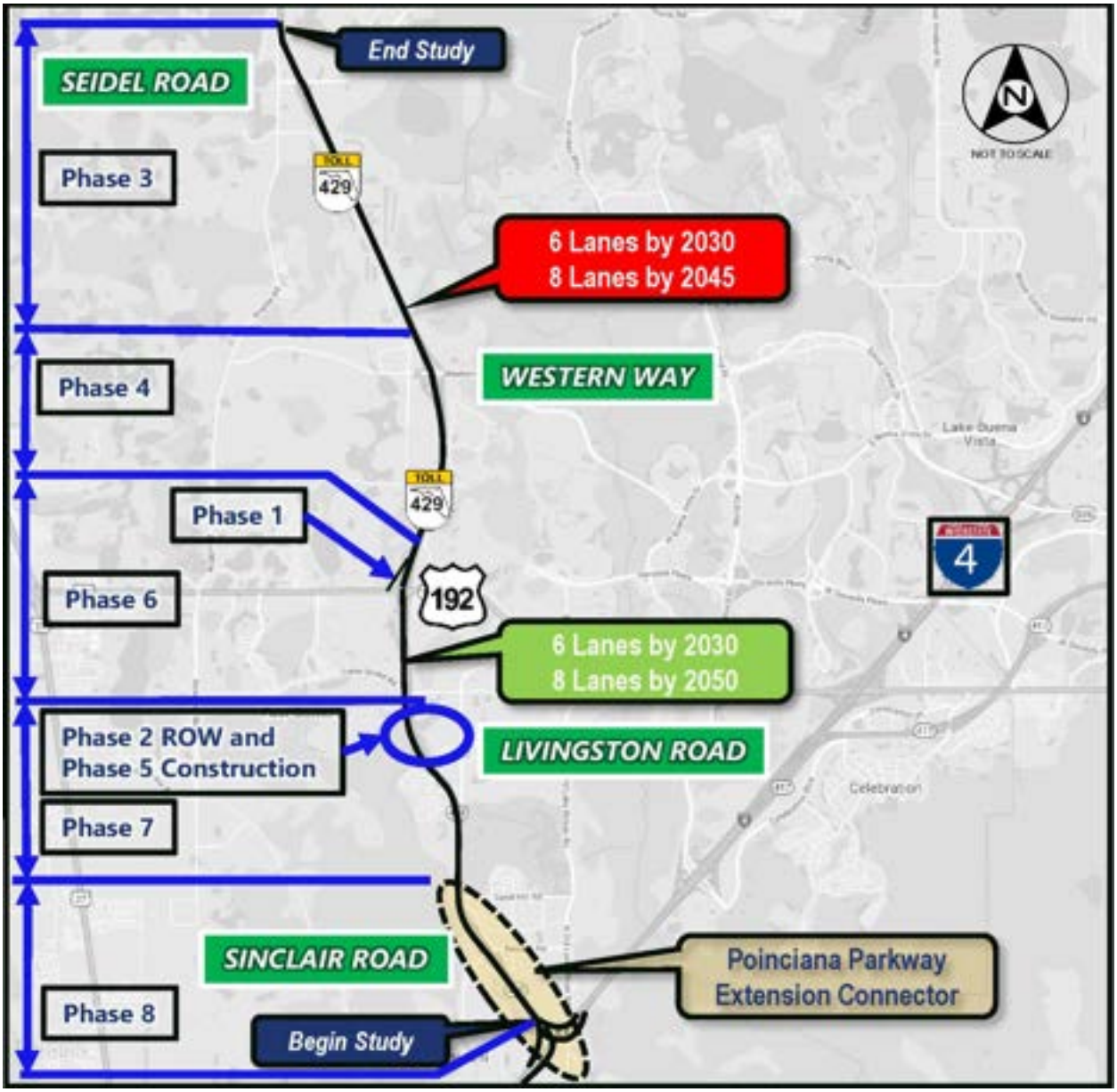
The 1st phase would construct improvements to the SR 429 southbound off-ramp. The additional turn lanes at the intersection along with adding lanes to the off-ramp to increase storage would address the current issues. The existing ramp gore would remain to allow the south bound toll plaza to remain operational.

The 2nd phase would be to purchase the required ROW for the Livingston Road interchange. Actual construction of the interchange would occur at a later phase. As mentioned above, acquiring the necessary ROW early is necessary to reduce the possibility of the development of the vacant parcel that contains most of the interchange improvements.

The 3rd phase would construct the segment of SR 429 from north of Western Way to north of Seidel Road, including the Seidel Road interchange improvements.

The 4th phase would construct the segment of SR 429 from north of US 192 to Western Way, including the Western Way interchange. This section would also include the conversion of the mainline toll plaza to all electronic tolling.

Figure 6-12: SR 429 Project Phasing Segments



The 5th phase would construct is the Livingston Road interchange. This segment will relieve the congestion on US 192 as well at the US 192 interchange.

The 6th phase would construct the segment of SR 429 from north of Livingston Road to US 192, including the US 192 interchange. This construction project will connect the improved southbound ramp from segment #1 to the ultimate conditions, shifting the exit gore point north to increase queue storage.

The 7th phase would construct the segment of SR 429 from north of Sand Hill Road to north of Livingston Road.

The 8th phase would construct the segment of SR 429 from I-4 to north of Sand Hill Road. This would include the improvements to the Sinclair Road interchange. It should be noted that this section overlaps with the improvements for the Poinciana Parkway Extension Connector PD&E (FPID 446581-1). That project has been prioritized by FTE for design and construction. Therefore, this last phase may be constructed by the Poinciana Parkway Extension Connector project.

6.2 Summary of Environmental Impacts

6.2.1 Future Land Use

The Future Land Use (FLU) in Osceola County is dominated by tourist, commercial and residential land uses, with some institutional and conservation areas. The FLU in Orange County is commercial, part of the Village of Horizon West, or part of incorporated Bay Lake.

The City of Bay Lake is governed by the Reedy Creek Improvement District Comprehensive Plan.1 The FLU within the Bay Lake area of Orange County includes public facility and mixed use. The Resort Areas Map identifies the study area as part of the Flamingo Crossings/SR 429 Resort Area. Although mixed use is not specifically defined for this area, existing developments have included commercial businesses, resorts, restaurants, and campus style apartments.

The Preferred Alternative is not anticipated to affect the existing character or use of the surrounding area, except at the proposed new interchange with Livingston Road and the Seidel Road interchange. At the Livingston Road interchange, the Preferred Alternative is not consistent with the future land use plans. The vacant land with a low-density residential land use would need to be changed to transportation use with the Preferred Alternative. There will not be changes to existing or planned recreational space, nor will changes to adopted land use plans or growth management policies be required.

At the Seidel Road interchange, the Preferred Alternative will change the ROW along Seidel Road between SR 429 and Avalon Road to limited access ROW. Therefore, the two parcels on the either side of Seidel Road will not have access to their property from Seidel Road. However, they will retain access to their property from Avalon Road. This will impact the planned 324 multi-family unit residential development called Elysian Apartments in the northeast quadrant of the intersection of Seidel Road and Avalon Road.

6.2.2 Section 4(f)

There are no Section 4(f) sites in this project area.

6.2.3 Cultural Resources

A Cultural Resources Assessment Survey (CRAS) was conducted within the study area to locate, identify, and aerially delimit any archaeological sites and historic resources (e.g. structures, buildings, bridges, cemeteries, linear resources, historic districts) within the project's Area of Potential Effect (APE). As defined in 36 CFR Part 800.16(d), and recognized by Chapter 267, F.S., the APE is the "geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." The CRAS was prepared in accordance with Part 2, Chapter 8 of the FDOT PD&E Manual and the Cultural Resource Management Standards and Operational Manual: Module 3 (Florida Division of Historical Resources [FDHR] 2003). Principal Investigators meet the Secretary of the Interior's Professional Qualification Standards (48 FR 44716) for archaeology, history, architecture, architectural history, or historic architecture. The CRAS documents resources' significance in terms of eligibility criteria for listing in the National Register of Historic Places (NRHP). Surveys were completed in accordance with Section 106 of the National Historic Preservation Act of 1966 (Public Law 89-655, as amended), as implemented by 36 CFR 800 (Protection of Historic Properties, effective August 2004), as well as Chapters 267 and 373, Florida Statues (F.S.), Chapter 1A-46, Florida Administrative Code (FAC), and Florida's Coastal Management Program. The results of the CRAS are summarized below.

The archaeological APE consisted of the footprint of the existing and proposed ROW containing the proposed improvements. To account for the proposed widening of the existing SR 429 facility, as well as the potential for elevated ramps and bridges, the historic resources APE consisted of the footprint of all existing and proposed ROW, as well as a buffer of 250 feet out from the footprint of the existing and proposed ROW. A search of the Florida Master Site File Search (FMSF) identified 24 previously conducted cultural resource surveys that contain or partially contain the project APE. Only ten of the 58 previously recorded sites in the FMSF are located within or adjacent to the archaeological APE as summarized in Table 6-4.

Table 6-4: Previously Recorded Archaeological Resources Within or Adjacent to the Archaeological APE

FMSF No.	Site Name	Site Type	SHPO National Register Evaluation
8OR3219	Whittenhorse Creek 2	Precontact Artifact Scatter and Habitation Site	Ineligible
8OR4300	Hognose Snake	Precontact Artifact Scatter Consisting of One Lithic Waste Flake and One St. Johns Plain Pottery Sherd	Ineligible
8OR9986	Reddy Creek III	Precontact Lithic Scatter	Ineligible
8OR10241	North of RIBS #1	Precontact Lithic Scatter	Ineligible
8OS49	Davenport Swamp	Reported General Vicinity Location of Lithic Surface Scatter on Interface of Swamp and Former Grove	Not Evaluated
8OS139	World Golf and Tennis V	Precontact Lithic Scatter Consisting of One Lithic Waste Flake and One Biface Fragment (Likely Would Have Been Considered Two Archaeological Occurrences Today)	Ineligible
8OS1777	North Point	Precontact Artifact Scatter with St. Johns Plain Pottery Sherds	Ineligible
8OS1778	Boggy Swamp	Single St. Johns Plain Pottery Sherd	Ineligible
8OS1780	Wetland Site	Precontact Artifact Scatter	Ineligible
8OS1937	Fowler 2	Precontact Artifact Scatter with a St. Johns Plain Pottery Sherd	Ineligible

* As recorded in the FMSF, may require re-evaluation within the project APE; Due to COVID-19 safety protocols, the FMSF data may not be current

No archaeological sites were newly identified within the archaeological APE during the current CRAS. The majority of the archaeological APE is located within areas of existing road ROW that have been previously surveyed for archaeological resources during the 1996 CRAS of the Western Beltway (SR 429) (ACI 1996: FMSF Manuscript No. 4578) or areas of existing road ROW that have been previously disturbed during the construction of the Western Beltway (SR 429), Sinclair Road, Connector Road, Formosa Gardens Boulevard, W. Irlo Bronson Memorial Highway (US 192), Western Way, and Seidel Road and their co-located drainage facilities and underground facilities.

While subsurface testing was not feasible within much of the APE due to the presence of hardscape, underground utilities, drainage ditches, excavated ponds, wetlands, and standing water, 51 shovel tests were excavated where feasible within newly proposed ROW. One archaeological occurrence, A.O. #1, was identified as a result of subsurface testing. This occurrence consisted of a lone non-diagnostic, utilized, lithic flake recovered from a single shovel test. A.O. #1 was bounded by sets of two shovel tests, all devoid of cultural material, at 12.5 m intervals in each of the four cardinal directions. No diagnostic artifacts were identified and finds of these type do not meet the minimum criteria for listing in the National Register. The results of the current survey, as well as past testing conducted within the current APE during previous survey efforts, indicate a low potential for encountering intact archaeological deposits or significant archaeological sites within the archaeological APE. No extant historic resources were identified within the project APE during the background research or historic resources field survey efforts.
Additional information regarding historical and cultural resources is provided in a separate report, titled Cultural Resource Assessment Survey for Widen Western Beltway (SR 429), from North of the I-4/SR 429 Interchange to Seidel Road, dated July 2022, under separate cover. Coordination with the State Historic Preservation Office (SHPO) is ongoing regarding concurrence with these findings.

6.2.4 Wetlands

Although unavoidable wetland impacts will occur as a result of the proposed build alternatives, these wetlands are located adjacent to, and/or within, the existing roadway ROW and were previously disturbed by urban development, roadway construction, maintenance activities, and the invasion of nuisance and exotic species. Wetlands to be impacted by the proposed improvements include mixed forested wetlands and freshwater marshes located at the proposed Livingston Road traffic interchange and surface waters impacted consist of reservoirs (Table ES-4). Conservation easements are also present within the Preferred Alternative. Impacts resulting from the Preferred Alternative include 5.19 acres of wetlands and 6.73 acres of surface waters. There are 1.89 acres of wetland conservation easements within the Preferred Alternative. A description of land use, dominant vegetation, soil types, and other pertinent remarks regarding these communities is provided in subsequent sections of this report. The Uniform Mitigation Assessment Methodology (UMAM) analysis was performed on representative wetland impact areas. Construction of the Preferred Alternative results in an estimated loss of 3.84 functional units.

Wetland impacts which will result from the construction of this project will be mitigated pursuant to Section 373.4137, F.S., to satisfy all mitigation requirements of Part IV of Chapter 373, F.S., and 33 U.S.C. §1344. Compensatory mitigation for this project will be completed

through the use available credits at a private mitigation bank and any other mitigation options that satisfy state and federal requirements.

Final determination of jurisdictional boundaries, in addition to mitigation requirements, will be coordinated between FTE and permitting agencies during the final design phase of the project. The results of this PD&E Study indicate there are no practicable alternatives to the proposed impacts due to the need for a roadway widening to reduce traffic congestion and safety considerations. In accordance with Presidential Executive Order 11990, the FTE has undertaken all actions to minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities. The FTE has determined that there is no practicable alternative to construction impacts occurring in wetlands. The proposed project will have no significant short-term or long-term adverse impacts to wetlands because any unavoidable impacts to wetlands will be mitigated to achieve no net loss of wetland function. Furthermore, all wetland impacts have been avoided and minimized to the greatest extent possible and have been limited to those areas which are required to meet minimum safety requirements.

6.2.5 Protected Species and Habitat

Based on the information collected and field reviews, a list of protected species with the potential to occur within the project study area was generated. This list includes a total of 58 federal or state protected species that have the potential for occurrence within the project study area. These protected species include 39 floral, six (6) reptilian, and 13 avian species.

For Federally Protected Species, it has been determined that the project will have "may affect, not likely to adversely affect" on the American Alligator (Alligator mississippiensis), Blue-tailed Mole Skink (Plestiodon egregius lividus) and Sand Skink (Plestiodon reynoldsi). For the Eastern Indigo Snake (Drymarchon couperi), it is reasonable to expect that this species could utilize suitable habitat within the project study area. To minimize potential adverse impacts to the eastern indigo snake, FTE will implement the USFWS Standard Protection Measures for the Eastern Indigo Snake (updated August 2013) during construction.

The Wood Stork (Mycteria americana) is a large, white, wading bird that is listed as threatened by the USFWS. As part of this project, impacts to wetlands within the project study area will be mitigated for within the CFA of one (1) or more of the affected rookeries or at a regional mitigation bank that has been approved by the USFWS or pursuant to Section 373.4137, F.S. Therefore, it has been determined that the proposed project "may affect, not likely to adversely affect" the wood stork.

For State Protected Species, the Bald Eagle (Haliaeetus leucocephalus) is a large raptor with a distinctive white head and yellow bill. This species has been federally de-listed by the USFWS. However, it remains federally protected under the Bald and Golden Eagle Protection Act (BGEPA) in accordance with the 16 United States Code 668 and the Migratory Bird Treaty Act of 1918. In addition, the FWC has implemented a bald eagle management plan (FWC 2008). The bald eagle tends to utilize riparian habitat associated with coastal areas, lake shorelines, and river banks. Nests are generally located near water bodies that provide a dependable food source. The Florida Audubon closely monitors nests within Florida and maintains a website of known bald eagle nest locations, which was last updated in 2021. According to this database, one (1) active bald eagle nest is located within one (1) mile of the project study area. Bald eagle nest OS193 is located approximately 0.8 miles (4,118 feet) west of Western Beltway (SR 429) (Figure 4-2). The project is located outside of the primary (330 feet) and secondary (660 feet) nest buffer zones. Nest OS193 was last surveyed and determined active in 2021. No bald eagle nests were observed within 660 feet of the project study area during field reviews. During design and permitting, FTE will survey the project study area for eagle nests. If a nest is observed within 660 feet of the project limits, FTE will coordinate with the USFWS to secure all necessary permits.

6.2.6 Essential Fish Habitat

The proposed project is not located within or near any coastal resources and will not involve Essential Fish Habitat as none exists within the project study area. This was confirmed by the National Marine Fisheries Service (NMFS) in the ETDM comments.

6.2.7 Highway Traffic Noise

A noise analysis has been conducted for the Preferred Alternative. The results of the analysis indicate there are potential reasonable and feasible noise walls that will address noise impacts along the corridor for the Preferred Alternative. Table 6-5A presents a summary of the potentially feasible and reasonable noise barriers evaluation along the northbound lanes. Table 6-5B presents a summary of the potentially feasible and reasonable noise barriers evaluation along the southbound lanes. The preliminary locations of the noise walls are shown in Appendix B. The noise walls will be further analyzed during the design phase and the limits of the walls may be adjusted. Further information can be found in the *Noise Study Report* provided under a separate cover.

Table 6-5A: Potentially Feasible and Reasonable Noise Barrier Evaluation Summary (Northbound Lanes)

Noise Sensitive Area	Number of Impacted Residences	Noise Barrier Approx. Begin Station	Noise Barrier Approx. End Station	Preliminary Noise Barrier Height (ft.)	Preliminary Noise Barrier Length (ft.)[1]	Preliminary Noise Barrier Location	Preliminary Noise Barrier Cost[2]	Number of Residences Potentially Benefited by a Noise Barrier[3]		Cost per Benefited Residence
								Impacted	Total	
NOISE BARRIERS EAST OF SR 429 (NORTHBOUND LANES)										
NB12	191	61+00	106+40	22	4,622	ROW	$3,050,520	161	184	$16,578.91
NB09 and 10		143+90	208+40	22	5,032	ROW	$3,321,120			
		142+20	144+20	14	250	Shoulder	$84,0000			
		141+70	142+20	8	50	Shoulder/Structure	$12,000			
	111						$3,417,120	103	168	$20,340.00
NB08		211+20	220+50	20	977	ROW	$586,200			
		221+00	231+00	20	1,390	ROW	$834,000			
		231+00	241+00	16	1,349	ROW	$647,520			
	43				3,716		$2,067720	41	67	$30,861.49
NB07 and 06		286+00	308+00	22	2,200	ROW	$1,452,000			
		251+50	266+80	14	2,107	Shoulder	$884,940			
		266+80	268+50	8	168	Shoulder/Structure	$40,320			
		268+50	289+50	14	1,525	Shoulder	$640,500			
	504						$3,017,760	449	686	$4,339.07
NB01		631+40	649+00	22	1,759	ROW	$1,160,940			
		615+20	621+50	14	656	Shoulder	$275,520			
		621+50	623+00	8	157	Shoulder/Structure	$37,680			
		623+00	639+00	14	1,587	Shoulder	$666,540			
	41						$2,140,680	39	53	$40,390.19

1 Full height is for length indicated. The length for any required taper in height at a shoulder noise barrier termination would be in addition to the length indicated.

2 Unit cost of $30/ft2 for all non-shoulder noise barriers.

3 Total includes impacted/benefited residences and residences with a predicted noise level that does not approach or exceed 67 dBA but are incidentally benefited.

Table 6-6B: Potentially Feasible and Reasonable Noise Barrier Evaluation Summary (Southbound Lanes)

Noise Sensitive Area	Number of Impacted Residences	Noise Barrier Approx. Begin Station	Noise Barrier Approx. End Station	Preliminary Noise Barrier Height (ft.)	Preliminary Noise Barrier Length (ft.)[1]	Preliminary Noise Barrier Location	Preliminary Noise Barrier Cost[2]	Number of Residences Potentially Benefited by a Noise Barrier[3]		Cost per Benefited Residence
								Impacted	Total	
NOISE BARRIERS WEST OF SR 429 (SOUTHBOUND LANES)										
SB07		213+30	220+60	20	700	ROW	$420,000			
		221+10	235+00	20	1,399	ROW	$839,400			
	47						$1,259,400	29	30	$41,980.00
SB06		253+50	267+70	14	1,422	Shoulder	$597,240			
		267+70	269+30	8	155	Shoulder/Structure	$37,200			
		269+30	273+50	14	422	Shoulder	$177,240			
	67						$811,680	61	78	$10,406.15
SB04 and 05		426+60	450+00	22	2,696	ROW	$1,799,360			
		1388+10	1391+80	14	330	Shoulder	$138,600			
		411+66	413+08	8	169	Shoulder/Structure	$40,560			
		413+08	428+20	14	1,465	Shoulder	$615,300			
	466						$2,573,820	275	381	$6,755.43
SB02		591+00	612+50	22	2,150	ROW	$1,419,000			
		600+00	604+00	14	399	Shoulder	$167,580			
	212						$1,586,580	188	216	$7,345.28

1 Full height is for length indicated. The length for any required taper in height at a shoulder noise barrier termination would be in addition to the length indicated.

2 Unit cost of $30/ft2 for all non-shoulder noise barriers.

3 Total includes impacted/benefited residences and residences with a predicted noise level that does not approach or exceed 67 dBA but are incidentally benefited.

6.2.8 Contamination

Based on this contamination screening evaluation, a total of forty-five contamination sites were identified within the project limits. Table 6-7 presents a summary of the risk ratings assigned for each contamination site/facility:

Table 6-7: Summary of Risk Ratings – Mainline Sites

High	Medium	Low	No
0	30	10	5

Table 6-8 presents a summary of the risk ratings assigned for drainage sites:

Table 6-8: Summary of Risk Ratings – Drainage Sites

High	Medium	Low	No
0	2	0	5

Based on the conclusions of this study and the risk ratings noted above, the following recommendations are made.

- Additional information may become available or site-specific conditions may change from the time this report was prepared and should be considered prior to acquiring (if required) and/or proceeding with roadway construction. If the preferred alignment or drainage location changes, and/or new potential contamination sites have been constructed, this report should be revised and updated to reflect those changes.
- For the locations rated "No" or "Low" for contamination, no further action is required. These locations have been determined not to have a contamination risk level which warrants further assessment at this time.
- Level II testing is recommended for the thirty-one mainline sites rated Medium (none were rated High), and one of the two drainage sites rated Medium. Although the Alt 3 (Formosa Gardens Boulevard) drainage site was assigned a risk rating of Medium, no testing is recommended since it was not selected as the preferred drainage site. A site specific Level II scope of services should be developed for each of these sites to be reviewed and approved by the District Contamination Impact Coordinator (DCIC). The scope of services should include a boring location plan depicting the soil and groundwater testing locations, including the contamination source (i.e. tanks, stained soil, etc.), sample depth intervals, and analytical parameters. The Level II can include hazardous material surveys, land boundary surveys, soil borings, monitor well installation, soil and groundwater sampling, laboratory testing, mounding analysis, the use of an Organic Vapor Analyzer (OVA), and Ground Penetrating Radar (GPR). Level II testing is performed by the

Contamination Assessment and Remediation Contractor (CAR) and coordinated with the Florida Turnpike Enterprise DCIC and the Project Manager. Further evaluation and Level II testing, if deemed appropriate by the DCIC, is recommended for the following:

- Groves/Row Crops/Planted Pine Trees (Site 1 and Alt 1 Preferred) – Level II testing should include the collection of soil samples for laboratory analysis. Laboratory analysis of soil samples may include the following: Arsenic by United States Environmental Protection Agency (EPA) Method 6010, Organochlorine Pesticides by EPA Method 8081, Organophosphorus Pesticides by EPA Method 8141, and Chlorinated Herbicides by EPA Method 8151. Detections in the soil above the regulatory standard may require additional soil samples for delineation purposes and groundwater samples. Level II testing costs are estimated at $5,000 to $10,000 per site. If Level III support is needed for National Pollution Discharge Elimination System permitting and treatment, costs can reach up to $100,000 per site.
- Bridges (Sites 2 to 19) and Toll Plazas/Toll Gantries (Sites 20 to 27) - In accordance with PD&E Manual, Part 2, Chapter 20, Section 20.2.2.2, projects which involve existing bridges, building structures, and possibly existing or abandoned utilities which will be moved or demolished may need surveys or screenings for ACMs, Lead-Based Paint (LBP), and/or other MBCs. Additionally, after review of the final design plans, additional structures may require one or more of these surveys. Asbestos samples should be collected by EPA/AHERA (Environmental Protection Agency/Asbestos Hazard Emergency Response Act) accredited inspectors, and testing should be performed by a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory. Laboratory testing for asbestos should include Polarized Light Microscopy and point count analysis (when appropriate) by EPA Method 600/R-93/116. Laboratory analysis for metal-based coatings should include arsenic, cadmium, hexavalent chromium, lead and zinc using EPA Method 6010. Laboratory analysis for metal-based coatings should include arsenic, cadmium, hexavalent chromium, lead and zinc using EPA Method 6010.
- Landfill (Site 32) – Level II testing for soil and groundwater should include Volatile Organic Compounds (VOCs) by EPA Method 8260, PAHs by EPA Method 8270, TRPH by FL PRO, including fractionation when applicable. OVA screening is also recommended. Based on a review of historical aerial photographs, and regulatory file information, buried debris does not appear to be an issue within the ROW. Soil gas monitoring for combustible gases (i.e. methane) may also be warranted. Level II testing costs are estimated at $5,000 to $10,000 per site. If Level III support is needed for National Pollution Discharge Elimination System permitting and treatment, costs can reach up to $100,000 per site.
- Former Railroad (Site 37) – Level II testing should include the collection of soil samples for laboratory analysis. Laboratory analysis may include the following: Arsenic by EPA Method 6010, PAHs by EPA Method 8270, Organochlorine Herbicides by EPA Method 8081, Organophosphorus Herbicides by EPA Method 8141, and Chlorinated Herbicides by EPA Method 8151. Detections in the soil above the regulatory standard may require

additional soil samples for delineation purposes and groundwater samples. Level II testing costs are estimated at $5,000 per site.

- EDB (Site 42) – Level II testing should include the collection of soil samples for laboratory analysis of Ethylene Dibromide by EPA Method 8011. Detections in the soil above the regulatory standard may require additional soil samples for delineation purposes and groundwater samples. Level II testing costs are estimated at $5,000 per site.

- Once final design plans are available, additional review is recommended in consideration of dewatering operations that may be necessary under the National Pollutant Discharge Elimination System Generic Permit for Stormwater Discharges from Large and Small Construction Activities. Verification testing may be warranted for contamination issues within 500 feet of the dewatering area.
- During construction, if abnormal conditions are encountered or exposed indicating the presence of contaminated materials, cease operations immediately in the vicinity and notify the FTE's DCIC. The presence of tanks or barrels; discolored earth, metal, wood, ground water, etc.; visible fumes; abnormal odors; excessively hot earth; smoke; or other conditions that appear abnormal may indicate the presence of contaminated materials and must be treated with extreme caution. These unidentified contamination areas should be managed in accordance with FDOT Specification 120-1.2 Unidentified Areas of Contamination.

Further information can be found in the *Contamination Screening Evaluation Report* provided under a separate cover.

7 Appendix

Appendix A
Build Alternatives Considered

Appendix B
Preferred Alternative

Appendix C
ETDM Summary Report

Appendix D
Drainage Coordination Meeting Minutes

Appendix E
Long Ranges Estimate