

DRAFT
Project Traffic Analysis Report
(PTAR)

U.S. 41 (S.R. 45) at S.R. 54

*U.S. 41 (S.R. 45) from South of the S.R. 54 Intersection to
North of the S.R. 54 Intersection
Pasco County, Florida*

Work Program Item Segment Number: 419182-2
FAP No. 3014-067-P
ETDM Project No: 7883



*Florida Department of Transportation
District Seven*

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by the Florida Department of Transportation (FDOT) pursuant to 23 United States Code (U.S.C.) §327 and a Memorandum of Understanding dated December 14, 2016 and executed by the Federal Highway Administration (FHWA) and FDOT.

This planning product may be adopted into the environmental review process, pursuant to 23 U.S.C. §168, or the state project development process.

January 2026

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The Florida Department of Transportation (FDOT) District Seven has conducted a Project Development and Environment (PD&E) Study (FPID 419182-1-22- 01) to identify an optimum configuration for the intersection of S.R. 45 (U.S. 41)/S.R. 597 at S.R. 54 that maximizes existing and future traffic operations, minimizes costs and impacts, and is compatible with the Pasco County Vision 54/56 Study. The Pasco County MPO performed the Vision 54/56 Study starting in 2017. The task force recommended three build alternatives to FDOT for further review. Beginning in 2019, FDOT performed a Feasibility Study evaluation of these three alternatives to identify a recommended alternative. The Feasibility Study analyzed the following three alternatives:

- Feasibility Alternative 1 – a SPUI with elevated lanes on S.R. 54 over U.S. 41
- Feasibility Alternative 2 – a Parallel Flow Intersection (PFI)
- Feasibility Alternative 3 – a Continuous Flow Intersection (CFI) with elevated lanes on S.R. 54 over U.S. 41

The Feasibility Study recommended Feasibility Alternative 1 for further evaluation in the PD&E Study and was compared to the No-Build Alternative. Based on the analysis, the Feasibility Alternative 1 (SPUI with elevated lanes on S.R. 54 over U.S.41) was selected as the PD&E Build Alternative and was presented at a second Public Hearing on March 25, 2025.

However, based on input from public comments prior to the hearing, FDOT developed two additional interchange options with U.S. 41 over S.R. 54: a Diverging Diamond Interchange (DDI) and a SPUI. These two interchange options were shown at the second Public Hearing. Public input at the hearing supported the interchange options with U.S. 41 over S.R. 54 instead of Build Alternative (SPUI with elevated lanes on S.R. 54 over U.S. 41). Based on this input, the department decided to further analyze the DDI with U.S. 41 over S.R. 54 interchange option. The DDI with U.S. 41 over S.R. 54 concept became Build Alternative Option 2. These two alternatives are analyzed in this report:

- Build Alternative Option 1 is a Single Point Urban Interchange (SPUI) with S.R. 54 elevated over U.S. 41 (same as Feasibility Alternative 1)
- Build Alternative Option 2 is a Diverging Diamond Interchange (DDI) with U.S. 41 elevated over S.R. 54 and S.R. 597 (Dale Mabry Highway)

Existing Conditions

The existing traffic analysis showed that the intersection of U.S. 41 (S.R. 45) and S.R. 54 is experiencing long delays and reduction in speeds during AM and PM peak periods. In addition, the eastbound queue currently spills back over a mile in the AM peak period. During the PM peak period, the intersection is experiencing long delays and the westbound queue backup beyond the intersection of Lowe's/Village Lakes Plaza Driveway. Observations of long queues along S.R. 54 in the field are corroborated by the calibrated Vissim simulation.

Historical Crash Data

Historic crash data shows that the crash rate along U.S. 41 from Wal-Mart Driveway to Morgan Road is higher than the statewide average. The crash rate from Dale Mabry Highway from Wal-Mart Driveway to U.S. 41 is more than three times the statewide average. The most common type of crash along the U.S. 41/Dale Mabry Highway segments were rear ends, followed by sideswipes. 36% of segment crashes resulted in fatalities or injuries. The segment crash rates for S.R. 54 were all higher than the statewide average. 52% of crashes were classified as rear ends and 30% of S.R. 54 segment crashes resulted in injury. The S.R. 54 at U.S. 41 intersection crash rate was twice as high as the statewide average. A total of 427 crashes were reported with the majority being rear ends and sideswipes. Of the crashes in the dataset, 11 were classified as pedestrian or bicycle crashes. 4 of the 11 bicycle/pedestrian crashes were fatal.

Future Conditions

No-Build: The No-Build Alternative for Design Year 2045 was analyzed to identify deficiencies in the project's purpose and need. Following improvements are included within this feasibility study under No-Build condition: Traffic signal at Dale Mabry Highway and Walmart Driveway and Extension of the eastbound right and left turn lanes at the intersection of U.S. 41 (S.R. 45) and S.R. 54

It is anticipated that most intersections within the study area will be over capacity by Design Year 2045 under No-Build conditions. Key deficiencies of the No-Build include a lack of reserve capacity at the intersection of U.S. 41 (S.R. 45) and S.R. 54. The queues at this intersection are expected to propagate to adjacent intersections. The analysis shows that as traffic increases during Design Year 2045, the Level of Service (LOS) at this intersection worsens, with long delays of 481 sec/veh and 270 sec/veh during the AM and PM peak periods, respectively.

Build Alternative Option 1: Interchange Improvements at U.S. 41 and S.R. 54

- SPUI with S.R. 54 elevated over U.S. 41 (S.R. 45).
- Two through lanes in each direction are carried over U.S. 41 (S.R. 45) on structure while two lanes exit and merge to/from S.R. 54.
- The interchange will operate under one signal control.
- In the eastbound and westbound directions, two lanes exiting from S.R. 54 tie into the proposed SPUI intersection with triple left turn lanes, two through lanes, and dual right turn lanes.
- In the northbound and southbound directions, triple left turn lanes, three through lanes, and a single right turn lane have been proposed.
- Convert the bi-directional median opening at Leonard Road to a Right-In-Right-Out access only.

- Close the bi-directional or full median openings at driveways such as Sofia Drive, Hunt Road, Fire Station and Raden Drive along S.R. 54 to accommodate bridge pillars. These driveways will be converted to right-in-right-out only.
- An additional traffic signal for the northbound U.S. 41 (S.R. 45) traffic has been proposed at Dale Mabry Highway in order to help relieve severe weaving movements along U.S. 41 (S.R. 45) northbound and allow the northbound Dale Mabry Highway traffic to move across U.S. 41 (S.R. 45) to access to the right turn lanes to eastbound S.R. 54.
- Accessible pedestrian signals (APS) are proposed where pedestrian signals are provided to serve pedestrians with visual impairments.

The traffic analysis for year 2045 under this alternative illustrated composite delays weighted by volumes including the overpass traffic are 164 sec/veh and 220 sec/veh during Design Year 2045, the AM and PM peak periods, respectively. The intersection is anticipated to operate below LOS target D.

Build Alternative Option 2: Interchange Improvements at U.S. 41 and S.R. 54

- U.S. 41 will cross over S.R. 54 on a bridge with two lanes in each direction, expandable to three lanes in the future.
- Two-lane exit ramps from U.S. 41 will connect to S.R. 54, widening to two left-turn and two right-turn lanes at two crossover intersections.
- S.R. 54 Westbound: Expands from three to five lanes after the Village Lakes Shopping Plaza/Lowe's intersection, entering the first Diverging Diamond Interchange (DDI) crossover. A sixth lane will serve right turns to northbound U.S. 41. After the second crossover, four lanes are reduced to three.
- S.R. 54 Eastbound: Similar widening to five lanes approaching the interchange, with a sixth lane for right turns to southbound U.S. 41. Lane configuration mirrors westbound. After the second crossover, the outside lane becomes a right-turn lane at the Village Lakes intersection.

New Roadway Connection

- A new link between Carson Drive and S.R. 54 will follow Raden Drive, then turn east to connect at the Village Lakes signalized intersection. This requires right-of-way acquisition.

Interchange Improvements at U.S. 41 and S.R. 597/Dale Mabry Highway

- Northbound U.S. 41: Two lanes over S.R. 597/Dale Mabry Highway via a bridge.
- Southbound U.S. 41: Three lanes over S.R. 597/Dale Mabry Highway, with the third lane from S.R. 54 via a slip ramp.
- Southbound ramps connect S.R. 54 to U.S. 41 and S.R. 597/Dale Mabry Highway.
- Northbound exit ramp to S.R. 54 includes a signalized intersection at S.R. 597/Dale Mabry Highway, managing traffic and allowing a Texas U-turn.

- Northbound S.R. 597/Dale Mabry Highway to U.S. 41 uses a free-flow ramp merging south of the S.R. 54 bridge.

Additional Work

- CSX rail crossings at S.R. 54 and S.R. 597/Dale Mabry Highway will be modified for roadway improvements

Traffic analysis for the Build Alternative Option 2 during the 2045 AM peak shows a 34 percent reduction in total travel time and a 64 percent reduction in total delay compared to the No-Build conditions. The average delay per vehicle is expected to decline from 928 seconds to 226 seconds, while the average speed is expected to more than double, increasing from 10 mph to 24 mph. During the 2045 PM peak, the total travel time is expected to decrease by nearly 35 percent, and the total delay is expected to decrease by 55 percent compared to the No-Build conditions. The average delay per vehicle is projected to drop from 886 seconds to 327 seconds, and the average speed is expected to increase from 10 mph to 20 mph.

Safety Analysis

The results of the predictive safety evaluation indicate that over a 20-year evaluation period the overall **Build Alternative Option 1** condition will result in a 15% reduction in the total number of predicted crashes when compared to the No Build condition. The proposed changes to the S.R. 54 facility are predicted to reduce crashes by 35%, while the U.S. 41 (S.R. 45) and the S.R. 597/Dale Mabry Highway are predicted to have negligible changes. Furthermore, the added signalization improvements at U.S. 41 (S.R. 45) at S.R. 597/Dale Mabry Highway are anticipated to reduce crashes by 34%. Lastly, a third northbound through lane from Dale Mabry Highway to U.S. 41 is proposed to improve local operations at the apex intersection and is anticipated to improve safety.

The overall **Build Alternative Option 2** condition is anticipated to result in a 42% reduction in the total number of predicted crashes when compared to the No Build condition. The proposed changes to the S.R. 54 facility are predicted to reduce crashes by 40%. The proposed changes to the U.S. 41 facility are predicted to reduce crashes by 10%. The DDI interchange with U.S. 41 elevated is anticipated to result in a predicted crash reduction of 69%. The newly proposed ramp connections between S.R. 597/Dale Mabry Highway, U.S. 41 and S.R. 54 remove the existing intersection operation at S.R. 597 at U.S. 41, enhancing the predicted safety conditions that result in a crash reduction of 58%. User benefits for a 20-year life span of the Build Alternative 1 and Build Alternative 2 were estimated using network-wide travel time and based on 2022 dollars, the estimated user benefits per year are \$101 million and \$156 million, respectively.

The benefits of the DDI configuration extend beyond reduced congestion. By eliminating left-turn conflicts and reducing signal phases, the design enhances safety and operational efficiency. Free flow left turns onto U.S. 41 improve throughput, while the crossover design creates smoother traffic flow at the interchange. Additionally, the elevated U.S. 41 lanes allow for future expansion, supporting long-term traffic demand. *Preferred alternative will be selected in the Preliminary Engineering Report (PER).*

The Florida Department of Transportation (FDOT) District Seven is conducting a Project Development and Environment (PD&E) Study (FPID 419182-1-22- 01) to identify an optimum configuration for the intersection of S.R. 45 (U.S. 41)/S.R. 597 at S.R. 54 that maximizes existing and future traffic operations, minimizes costs and impacts, and is compatible with the Pasco County Vision 54/56 Study. The Pasco County MPO performed the Vision 54/56 Study starting in 2017. The task force recommended three build alternatives to FDOT for further review. Beginning in 2019, FDOT performed a Feasibility Study evaluation of these three alternatives to identify a recommended alternative. The Feasibility Study analyzed the following three alternatives:

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The Feasibility Study recommended Feasibility Alternative 1 for further evaluation in the PD&E Study and was compared to the No-Build Alternative. Based on the analysis, the Feasibility Alternative 1 (SPUI with elevated lanes on S.R. 54 over U.S.41) was selected as the PD&E Build Alternative and was presented at a second Public Hearing on March 25, 2025.

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- Build Alternative Option 1 is a Single Point Urban Interchange (SPUI) with S.R. 54 elevated over U.S. 41 (same as Feasibility Alternative 1)
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This Project Traffic Analysis Report (PTAR) focuses on traffic operations for Opening Year (2025), Design Year (2045), and the safety study and project impacts while following PD&E Manual guidelines.

1.1 PROJECT BACKGROUND

A Vision for the S.R. 54/56 Corridor, also known as Vision 54/56, was a study conducted by the Pasco County Metropolitan Planning Organization (MPO) designed to define a transportation vision for the future of the S.R. 54/56 corridor. The study limits extend from U.S. 19 in western Pasco County to Bruce B. Downs Boulevard east of I-75. The corridor was evaluated in two segments:

- Segment 1: U.S. 19 to West of U.S. 41 (S.R. 45)
- Segment 2: West of U.S. 41 (S.R. 45) to Bruce B. Downs Boulevard

The Vision S.R. 54/56 study was carried out in two phases:

- Phase 1: Defining the Alternatives.
- Phase 2: Evaluating the Alternatives and selecting an alternative – The purpose of Phase 2 was to:
 - Evaluate the 7 (plus 5 complementary) alternatives resulting from Phase 1.
 - Facilitate extensive public engagement and outreach.
 - Select and refine an alternative.
 - Develop an implementation plan.

Phase 2 approach included a 2-step analysis:

- Step 1: Narrow to 3 alternatives that moved forward to the next step.
- Step 2: Focused on the application of additional and more-detailed evaluation criteria.

FDOT started the original PD&E study for this intersection in 2012, however, no preferred alternative was selected. The Feasibility Study led by FDOT followed Step 2 of the Vision 54/56 study Phase 2 and evaluated various alternatives for the intersection of U.S. 41 (S.R. 45) and S.R. 54 within the same study limits as this PD&E study (WPI Seg. No: 419182-1). FDOT has held the second public hearing on March 25, 2025, and presented elevated S.R. 54 over U.S. 41 (S.R. 45) with a SPUI. Two other options featuring a preliminary concept for U.S. 41 over S.R. 54 were also presented at the meeting in 2025.

1.2 PROJECT PURPOSE AND NEED

The purpose of this PD&E study is to evaluate the No-Build and the Build Alternatives and identify required improvements for the U.S. 41 (S.R. 45) at S.R. 54 intersection to improve the flow of people and goods through the project area by increasing roadway capacity and reducing traffic congestion. The proposed improvements at the intersection of U.S. 41 (S.R. 45) and S.R. 54 will enhance the overall transportation network linking Pasco County with the Tampa Bay region.

The need for this project has been established based on traffic demand as well as population and employment growth in the area. S.R. 54 is a primary evacuation route. Improvements at the U.S. 41 (S.R. 45) and S.R. 54 intersection are included in the Pasco County MPO 2050 Long Range Transportation Plan (LRTP) Cost Feasible Plan. The latest FDOT Strategic Intermodal System (SIS) Funding Strategy First Five-Year Plan Fiscal Year (FY) 2025/2026 through FY 2029/2030 included U.S. 41 (S.R. 45) at S.R. 54 from West of Wilson Road/S.R. 54 intersection to East of Osprey Lane/S.R. 54 for interchange modification.

1.3 PROJECT LOCATION AND AREA OF INFLUENCE

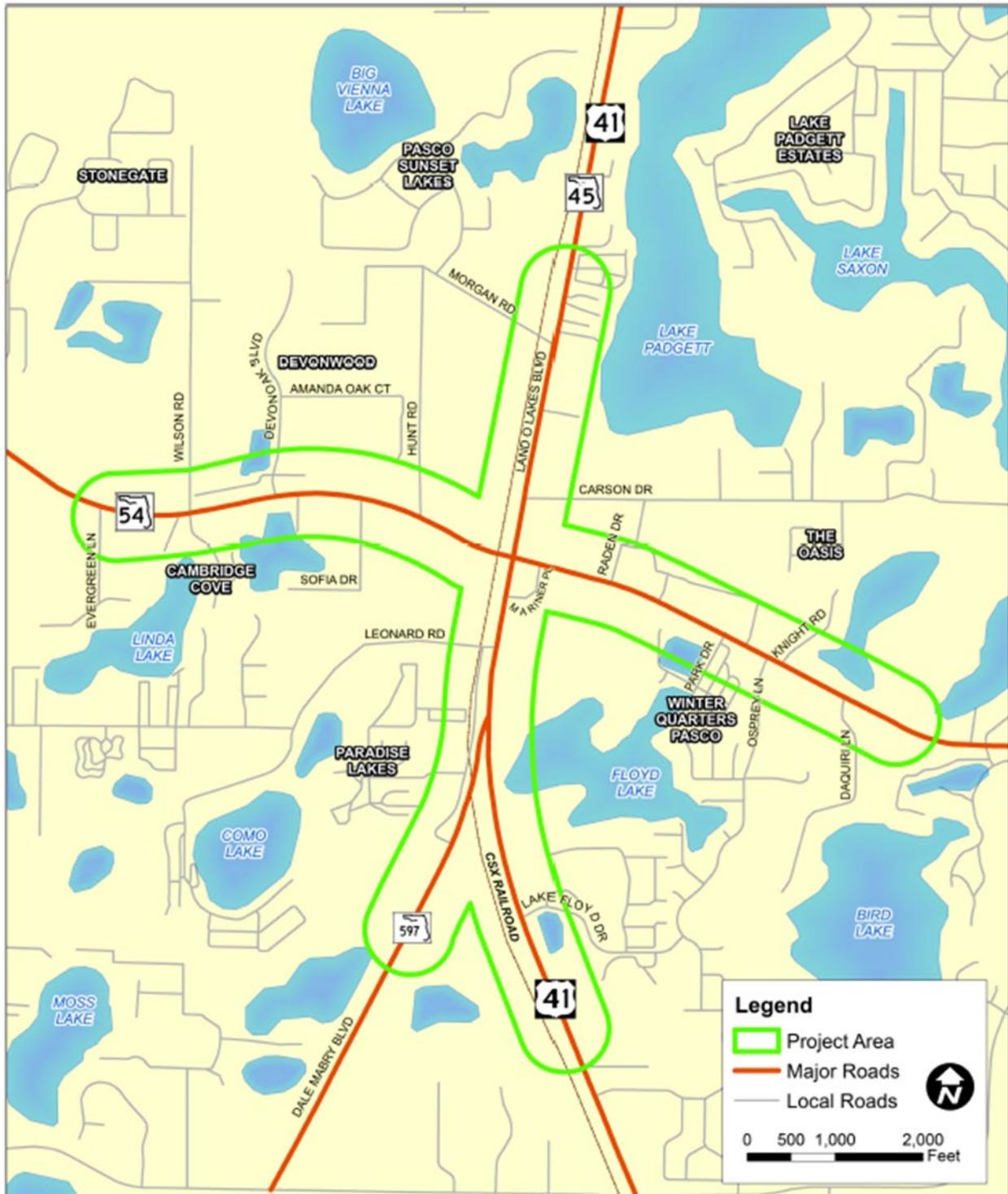
S.R. 54 is one of two existing major east-west arterials connecting eastern Pasco County to western Pasco County. S.R. 54 across Pasco County provides connections to several regional north-south routes including U.S. 19, Suncoast Parkway, U.S. 41 (S.R. 45), I-75, U.S. 301 and U.S. 98.

The study limits are approximately 1.64 miles along U.S. 41 (S.R. 45), with limits on S.R. 54 from approximately 0.8 miles east and 0.8 miles west of the U.S. 41 (S.R. 45) intersection. The following intersections are within the study area:

- U.S. 41 (S.R. 45) at S.R. 597 /Dale Mabry Highway
- U.S. 41 (S.R. 45) at S.R. 54
- S.R. 54 at Village Lakes Plaza Drive
- Walmart Way on S.R. 597/Dale Mabry Highway
- Walmart Way on U.S. 41 (S.R. 45)

Figure 1.1 shows the project location.

Figure 1.1
Project Location



This chapter highlights the traffic operations analysis methodology, and the traffic factors used in this document. The procedures implemented are documented in the approved Traffic Methodology Statements are provided in **Appendix A**.

2.1 TRAFFIC FACTORS

The traffic factors for this study are presented in **Table 2.1**. The Design Hour Factor (K) is the proportion of the Annual Average Daily Traffic (AADT) that occurs during the design hour. The Directional Distribution Factor (D) is the proportion of traffic traveling in the peak direction during the design hour. These factors represent the traffic demand a roadway is typically designed to accommodate.

The Truck Factor (T24) represents the estimated percentage of the Annual Average Daily Traffic (AADT) that is composed of trucks. The Design Hour Truck (DHT) factor is the peak hour truck factor and is estimated as one-half of the T24 factor. The Peak Hour Factor (PHF) is the ratio of total peak hour volume to the peak 15-minute rate of flow within the hour. It accounts for the variability of traffic within the hour.

A standard K-factor of **9.0%** was used for this study. The D-Factor used in the analysis was derived by considering historical traffic data and existing measured traffic characteristics from traffic counts. Portable traffic monitoring sites along S.R. 54 and U.S. 41 (S.R. 45) [available from FDOT Florida Traffic Online (2018)] were used to determine the historical D values from 2014 to 2018. The results from both methods were evaluated, and a D-Factor of 57.50% was used in the development of the existing and future Directional Design Hour Volumes (DDHVs) for this study. The peak direction of travel was assumed to be consistent with the existing counts.

The Truck Factor (T) used in the analysis was derived by considering historical traffic data and existing measured traffic. Portable traffic monitoring sites along S.R. 54 and U.S. 41 (S.R. 45) [available from FDOT Florida Traffic Online (2018)] were used to determine the historical daily truck factors (T24) from 2014 to 2018 (as available). An average of **2.5%** peak hour truck percentage was utilized for the study area.

Additional traffic design factors include:

- Peak Hour Factor (PHF): Existing PHF was used for both existing and future conditions.
- Design Speed: Posted speed plus 5 miles per hour

A memorandum was prepared for the Traffic Design Factors and was approved by FDOT, in June 2019 (including in **Appendix A**).

**Table 2.1
Traffic Factors**

Traffic Factor	Roadway	FDOT Standard/ Acceptable Range	Historic Average (FDOT)	Measured Average	Proposed Design Traffic Factor
K-Factor¹	S.R. 54, West of U.S. 41 (S.R. 45)	9.00%	9.00%	7.21%	9.00%
	S.R. 54, East of U.S. 41 (S.R. 45)	9.00%	9.00%	7.12%	
	U.S. 41 (S.R. 45), North of S.R. 54	9.00%	9.00%	6.90%	
	U.S. 41 (S.R. 45), South of Dale Mabry Highway	9.00%	9.00%	6.95%	
	Dale Mabry Highway, South of U.S. 41 (S.R. 45)	9.00%	9.00%	7.31%	
	Overall Average:		9.00%	9.00%	
D-Factor²	S.R. 54, West of U.S. 41 (S.R. 45)	50.8% - 67.1%	57.26%	54.06%	57.50%
	S.R. 54, East of U.S. 41 (S.R. 45)	50.8% - 67.1%	57.26%	54.00%	
	U.S. 41 (S.R. 45), North of S.R. 54	50.8% - 67.1%	57.26%	53.67%	
	U.S. 41 (S.R. 45), South of Dale Mabry Highway	50.8% - 67.1%	57.26%	63.42%	
	Dale Mabry Highway, South of U.S. 41 (S.R. 45)	50.8% - 67.1%	57.26%	63.14%	
	Overall Average:		57.26%	57.26%	
T-Factor³	S.R. 54, West of U.S. 41 (S.R. 45)	-	5.18%	5.12%	2.5%⁴
	S.R. 54, East of U.S. 41 (S.R. 45)	-	6.02%	4.85%	
	U.S. 41 (S.R. 45), North of S.R. 54	-	5.58%	4.91%	
	U.S. 41 (S.R. 45), South of Dale Mabry Highway	-	4.14%	4.94%	
	Dale Mabry Highway, South of U.S. 41 (S.R. 45)	-	4.36%	4.37%	
	Overall Average:		5.06%	5.06%	

¹Measured Average K-Factor provided represents the Peak-to-Daily Ratio calculated from existing (2019) counts

²FDOT Acceptable Range provided represents characteristics for an Urban Arterial

³Historic and measured value provided represents daily truck factors

⁴Proposed T-Factor for the design hour assumes that half of the daily trucks (greater of historic or measured) travel during the peak hour [FDOT Project Traffic Forecasting Handbook, 2019]

2.2 TRAFFIC OPERATIONS ANALYSIS METHODOLOGY

Detailed traffic operations analyses were performed for existing (2019), Opening Year (2025) and Design Year (2045) conditions.

Vissim microsimulation software (Version 2022-Service Package 10) was used to analyze existing and future traffic operations at a refined level for the entire study area. Vissim is a microscopic traffic flow simulation model based on car following, lane change, and queuing logic. Vissim models each individual vehicle within the network on a split-second-by-split-second basis, based on the vehicle's physical characteristics, the fundamental rules of motion, and rules of driver behavior, to determine measures of effectiveness (MOEs) for arterials and intersections.

Measures of Effectiveness (MOE) to be assessed for these alternatives in the Vissim models included the following, for AM and PM peak hours:

- Intersection node evaluation: volume, delay and maximum queue length, Level of Service (LOS) for the study area intersections, and
- Link evaluation segments: travel time, volume, and speed data.

Due to the incongruences between the Highway Capacity Manual (HCM) and microsimulation methodologies, delays estimated by microsimulation tools like Vissim cannot be accurately related to the HCM level of service criteria in **Table 2.2**.

Synchro (Version 11) analysis was conducted to provide optimized signal timings for the No-Build and Build Vissim models.

**Table 2.2
Signalized Intersection *Highway Capacity Manual* LOS Criteria**

Control Delay (sec/veh)	LOS by Volume-to-Capacity Ratio*	
	≤1.0	>1.0
<i>(HCM 7th Edition Exhibit 19-8)</i>		
≤10	A	F
>10-20	B	F
>20-35	C	F
>35-55	D	F
>55-80	E	F
>80	F	F

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

2.3 VISSIM MODEL CALIBRATION AND VALIDATION

The existing Vissim model was calibrated to follow the 2021 FDOT Traffic Analysis Handbook. The “raw” AM and PM peak hour traffic volumes were utilized to perform the model calibration process. Various Vissim parameters were modified in order to bring the model output into compliance with FDOT set targets for desired levels of accuracy between field-measured and model-derived MOEs. It should be noted that Vissim Calibrated model was prepared during the Feasibility Study and included in **Appendix C**.

2.4 TRAVEL DEMAND MODEL

To develop future-year traffic volumes, the Tampa Bay Regional Planning Model (TBRPM) version 8.2 was used, following the methodology. The base year for TBRPM v8.2 was 2010 and it includes the cost feasible scenario of 2040. The National Cooperative Highway Research Project (NCHRP) Report 765 was utilized to correct the error associated with regional model-projected traffic volumes. Traffic projections for 2045 was developed by applying a reasonable growth factor to the 2040 volumes. The development of future traffic volumes was consistent with the policies and procedures outlined in FDOT's 2019 Project Traffic Forecasting Handbook.

2.5 SAFETY STUDY

The latest five full years of crash data were acquired from the Signal Four Analytics (S4A) platform and was used to identify crash trends or patterns within the study limits. The data were screened to identify any crash events that should be removed (e.g., crashes that occurred outside the study limits, crashes that occurred in parking lots, etc.). After the initial screening, the remaining data were reviewed and summarized. Crash data summaries included the number of fatal, injury and property damage only crashes by year (as well as the total number of fatalities and injuries by year), the types of crashes, the crash locations (i.e., intersections and roadway segments), and the roadway/lighting/weather conditions associated with the crashes. Intersection and roadway segment crash rates were also calculated for the study corridor and compared to statewide average crash rates. Fatal and incapacitating injury crashes that have occurred since the end of the five-year period analyzed were also summarized. Additionally, crashes involving pedestrians and cyclists were mapped and summarized.

To compare the safety performance of the No-Build and Build alternatives, FHWA's Interactive Highway Safety Design Model (IHSDM) was utilized. IHSDM is a suite of software analysis tools used to evaluate the safety and operational effects of geometric design decisions on highways. Specifically, the IHSDM - HSM Predictive Method 2021 Release (version 17.0.0, September 2021) was used in this study, where applicable.

Existing conditions such as demographics, land use, multimodal accommodation, transit and roadway facilities are described in this chapter.

3.1 DEMOGRAPHICS AND LAND USE

Table 3.1 shows the U.S. Census population data and population projections for 2019, 2025, 2035, and 2045 for Pasco County based on the Bureau of Economic and Business Research Report (BEBR), published by the University of Florida. Between 2019 and 2045, Pasco County has an estimated growth rate of approximately 1.79% per year based on an average of high and medium population estimate.

**Table 3.1
Historical Population and Growth**

Type of Projection	Estimates 2019 Population	Population Projection			Annual Average Growth Rate (2019-2045)
		2025	2035	2045	
Pasco County					
Low Population Projection	527,122	545,800	585,600	605,200	0.57%
Medium Population Projection		586,100	659,200	711,000	1.34%
High Population Projection		623,100	738,300	833,900	2.24%

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

The existing land uses adjacent to the project location consist primarily of a mixture of urbanized residential and commercial centers. According to the Pasco County 2025 Adopted Future Land Use Unincorporated County map (See **Figure 3.1**), the project study area is primarily planned for residential with retail/office/residential and light industrial land uses.

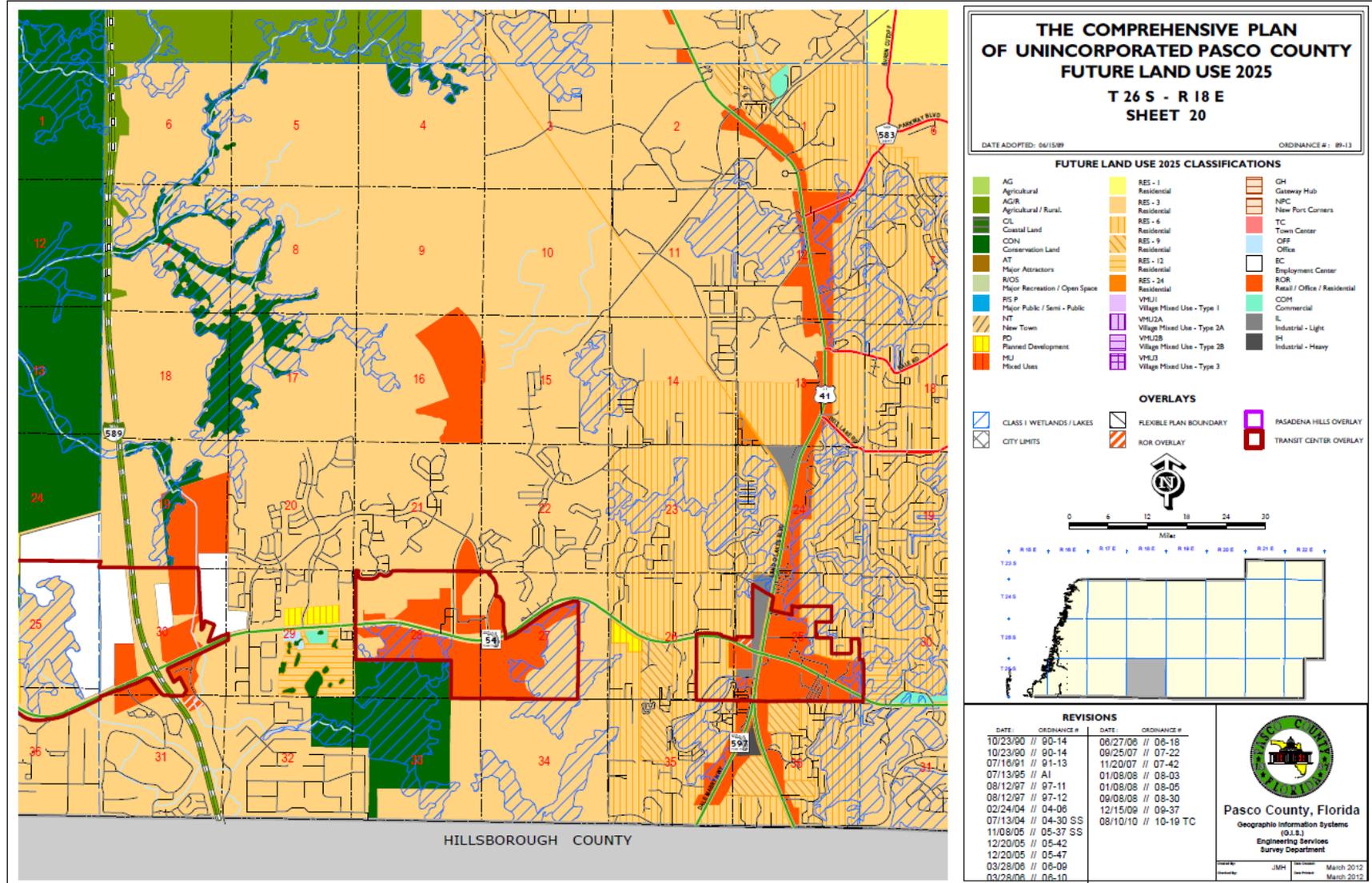
3.2 EXISTING MULTIMODAL ACCOMMODATIONS

There are no dedicated bicycle lanes currently provided along the S.R. 54 and U.S. 41 (S.R. 45) corridors within the study area, except west of U.S. 41 (S.R. 45) along S.R. 54; however, shoulders are available to accommodate bicycles. Pedestrian crosswalks are provided at all intersections of S.R. 54 with U.S. 41 (S.R. 45) and Village Lakes Plaza Drive. There are no pedestrian facilities provided along U.S. 41 (S.R. 45) on westside of the roadway. As Pasco County becomes more densely populated, transit and active transportation modes (bicycling and walking) become more instrumental in providing mobility choices. A pedestrian crossing (overpass/underpass) has been identified at this intersection under Pasco County MPO Mobility 2045 LRTP (**Appendix B**).

3.3 TRANSIT

Pasco County Public Transportation (PCPT) currently operates fixed routes along U.S. 41 (S.R. 45) and S.R. 54: PCPT’s Route 54, the Cross County Connector on S.R. 54/56, operates from U.S. 19 to Zephyrhills and Route 41 in Land O’Lakes. Future bus service including a local bus route on U.S. 41 (S.R. 45) north of S.R. 54 and S.R. 54 Express bus services are planned under Pasco County MPO Mobility 2045 LRTP Cost Affordable Plan (See **Appendix B**).

Figure 3.1
Pasco County 2025 Future Land Use Map



Source: Comprehensive Plan of Unincorporated Pasco County Future Lane Use 2025

3.4 ACCESS MANAGEMENT

The FDOT’s Access Management Guidebook 2019 has been developed to update the Median Handbook and Driveway Information Guide. U.S. 41 (S.R. 45) and S.R. 54 east of U.S. 41 (S.R. 45) have an Access Management Classification of 3, and S.R. 54 west of U.S. 41 (S.R. 45) has an Access Management Classification of 5. The minimum spacing standards for the applicable access management classes are summarized in **Table 3.2**.

**Table 3.2
Existing Access Classification and Standard for Controlled Access Facilities**

Roadway	Posted Speed (mph)	Access Class	Median Type	Median Opening Spacing (feet)		Minimum Signal Spacing (feet)
				Directional	Full	
U.S. 41 (S.R. 45)	50	3	Restrictive	1,320	2,640	2,640
S.R. 54 east of U.S. 41 (S.R. 45)	45	3	Restrictive	1,320	2,640	2,640
S.R. 54 west of U.S. 41 (S.R. 45)	45	5	Restrictive	660	2,640/1,320*	2,640/1,320*

Note: *Spacing 1,320 feet when roadway speed limit is 45 mph or below. Source: FDOT Access Management Guidebook November 2019

Median Openings

There are several un-signalized median openings along U.S. 41 (S.R. 45) and S.R. 54 (See **Table 3.3**).

**Table 3.3
Existing Median Opening within Study Area**

Road	Location	Mile Marker (MM)	Median Control	Adjacent Signalized Intersection* (ft)	Access Spacing satisfied based on Rule Chapter 14-97
U.S. 41 (S.R. 45) (Posted Speed 50 mph)	Carson Drive	1.573	Full	702	No
	Leonard Road	1.243	Bi-Directional	1040	No
	Lake Floyd Drive	0.665	Full	1779	No
	Median Opening 400 feet south of Dale Mabry Highway	0.724	Full	1468	No
Dale Mabry Highway (Posted Speed 50 mph)	Brinson Road	0.84	Full	903	No
S.R. 54 (Posted Speed 45 mph)	Sofia Road	7.936	Bi-Directional	1864	Yes
	Hunt Road	8.061	Full	1204	No

Table 3.3 (Continued)
Existing Median Opening within Study Area

Road	Location	Mile Marker (MM)	Median Control	Adjacent Signalized Intersection* (ft)	Access Spacing satisfied based on Rule Chapter 14-97
S.R. 54 (Posted Speed 45 mph)	Fire Station Driveway	0.128	Bi-Directional	676	N/A
	Raden Drive	0.216	Bi-Directional	1140	No

Note:* S.R. 54 and U.S. 41 intersection 1.44 MM along U.S. 41, 8.289 MM along S.R. 54 west of U.S. 41, 0.000 MM along S.R. 54 east of U.S. 41. Dale Mabry Highway Apex is 1.011 MM

3.5 ROADWAY FACILITIES

U.S. 41 (S.R. 45) and S.R. 54 are functionally classified as principal arterial roadways. Currently, U.S. 41 (S.R. 45) has five northbound lanes from Dale Mabry Highway to S.R. 54. From Leonard Road to S.R. 54, the outside northbound lane is marked as a right-turn lane. Along U.S. 41 (S.R. 45) south of S.R. 54, the inside northbound lane drops into the outside northbound left- turn lane. Northbound U.S. 41 (S.R. 45) includes three through lanes north of the intersection with S.R. 54.

At the existing intersection of U.S. 41 (S.R. 45) there are three southbound through lanes, two left-turn only lanes, and one right-turn only lane for a total of five lanes. Southbound U.S. 41 (S.R. 45), from S.R. 54 to Leonard Road, has four lanes. Approximately 350 feet south of Leonard Road to the junction with Dale Mabry Highway, an additional inside lane is added for a total of five southbound lanes along U.S. 41 (S.R. 45). The two southbound outside lanes are right-turn only lanes for Dale Mabry Highway, with the remaining inside three lanes continuing south on U.S. 41 (S.R. 45).

Existing Speed Limits

- U.S. 41 (S.R. 45) - 50 miles per hour (mph); S.R. 54 - 45 mph; Dale Mabry Highway - 50 mph

There are four existing signal-controlled intersections within the project limits: U.S. 41 (S.R. 45) at Walmart Way; U.S. 41 (S.R. 45) at Dale Mabry Highway (Apex); U.S. 41 (S.R. 45) at S.R. 54 and S.R. 54 at Village Lakes Plaza driveway. A traffic signal has been installed at the intersection of Dale Mabry Highway and Walmart Way in 2020.

The skewed intersection of Dale Mabry Highway and U.S. 41 (S.R. 45) configuration creates significant traffic operational challenges, including:

- U.S. 41 (S.R. 45) northbound traffic (free-flow movement) desiring to turn left on to S.R. 54 must weave with the northbound traffic on Dale Mabry Highway within a short distance (about 2,300 feet) to make the left turn movement.
- Dale Mabry Highway northbound traffic desiring to turn right on to S.R. 54 must weave with the northbound traffic on U.S. 41 (S.R. 45) within a short distance (about 2,300 feet) to make the right turn movement.

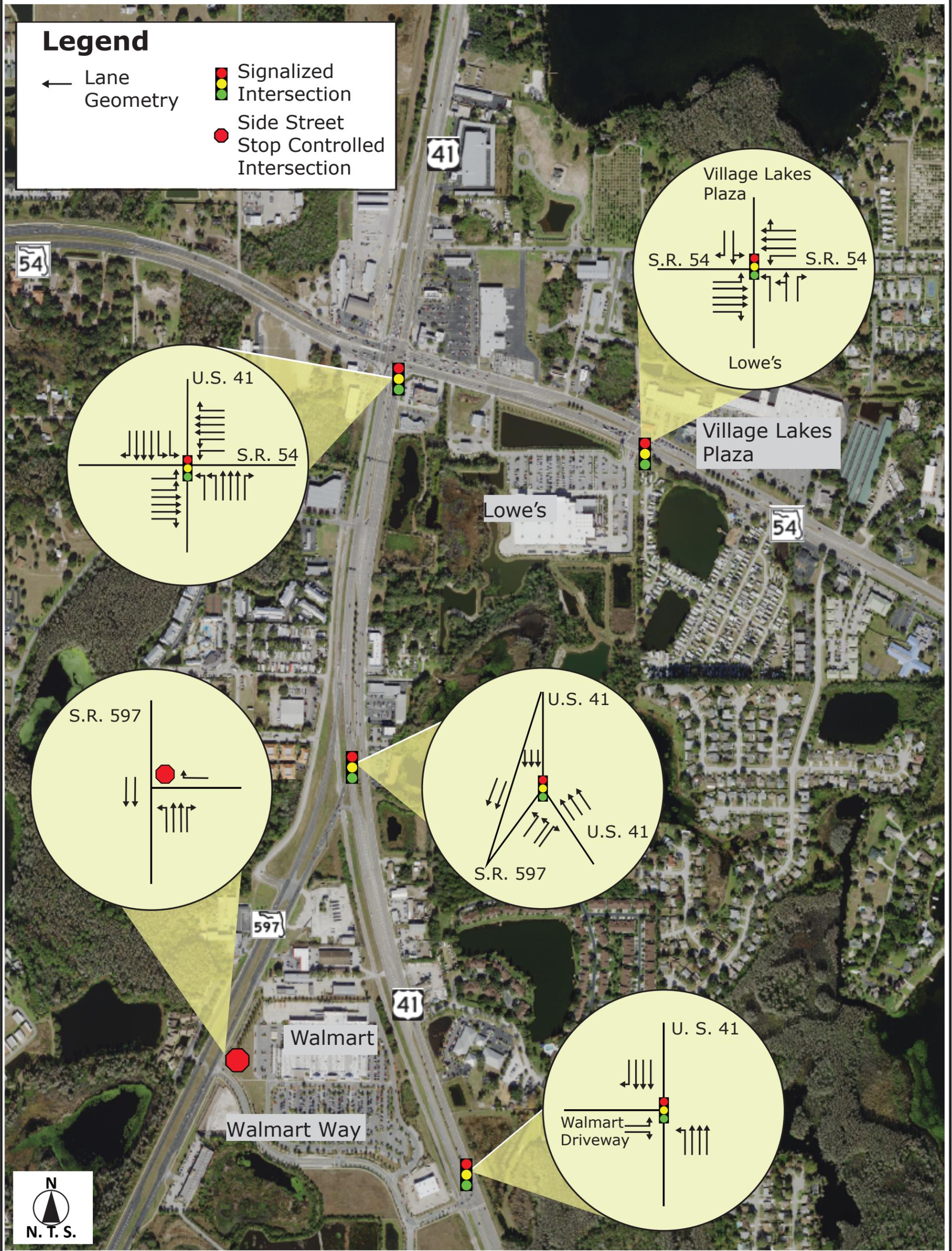
An existing railroad line (Brooksville subdivision) is located on the west side of U.S. 41 (S.R. 45). The existing roadway geometry along U.S. 41 (S.R. 45), Dale Mabry Highway, and S.R. 54 is illustrated on **Figure 3.2**.

Legend

← Lane Geometry

 Signalized Intersection

 Side Street Stop Controlled Intersection



3.6 CRASH DATA ANALYSIS

Crash data was obtained from FDOT’s Signal 4 Analytics Database (S4) along U.S. 41, Dale Mabry Highway, and S.R. 54 for the five-year period from 2018-2022. These were the latest five full years of available data at the time data was collected for this study.

The segment crash rate was quantified as the number of crashes per million vehicle miles traveled (MVMT) and was compared with the statewide average for similar roadways. The formula used to calculate the segment crash rate is as follows:

$$R=(C \times 1,000,000) / (V \times 365 \times N \times L)$$

Where,

- R = Crash rate for segment (crashes/MVMT)
- C = Total number of segment-related crashes
- N = Number of years of data
- V = Annual Average Daily Traffic (AADT) volumes for the segment
- L = Length of the segment (miles)

The intersection crash rate was quantified as the number of crashes per million entering vehicles (MEV) and was compared with the statewide average for similar roadways. The formula used to calculate the intersection crash rate is as follows:

$$R=(C \times 1,000,000) / (V \times 365 \times N)$$

Where,

- R = Crash rate for intersection (crashes/MEV)
- C = Total number of intersection-related crashes
- N = Number of years of data
- V = Annual Average Daily Traffic (AADT) volumes entering the intersection

Intersection crashes were extracted by applying a 250-foot influence area to each study intersection.

U.S. 41 (S.R. 45) and Dale Mabry Highway Corridors Crash Analyses

Table 3.4 provides a summary of the crash data and analysis along U.S. 41 (from Northwood Drive to S.R. 54) and Dale Mabry Highway (from Wal-Mart Driveway to U.S. 41). Within the five-year period (2018-2022), a total of 387 crashes were reported, with an average of 77.4 crashes per year. Within the corridor, the highest number of crashes occurred on the segment of U.S. 41 between Dale Mabry Highway and S.R. 54 with 154 crashes reported over the five-year period. Rear-end collisions were the most common crash type recorded, with 41.09% of total crashes, followed by sideswipe collisions, with 19.90%. Out of the 387 total crashes, 137 (35.40%) were crashes with injuries and 247 (63.82%) were crashes with property damage only. There were three fatal crashes recorded along the corridors.

Within the corridors, the northbound segment of U.S. 41 between Dale Mabry Highway and S.R. 54 creates a weaving zone within a short distance (about 2,300 feet). The segment of Dale Mabry Highway from Wal-Mart driveway to U.S. 41 experienced the highest crash rate, with 3.049 crashes per million vehicle miles traveled, which is more than three times the FDOT statewide average crash rate of 0.868 for a similar facility.

S.R. 54 Corridor Crash Analyses

Table 3.5 provides a summary of the crash data and analysis along S.R. 54 from Wilson Road to Osprey Lane. Over the five-year period (2018-2022), a total of 247 crashes were reported, averaging 49.4 per year. Within the corridor, the highest number of crashes occurred on the segment between Wilson Road and U.S. 41 with 120 crashes reported. Rear-end collisions were the most common crash type recorded, making up 51.82% of total crashes, followed by sideswipe collisions (15.38%). Out of the 247 total crashes, 73 (29.55%) were crashes with injuries and 174 (70.45%) were crashes with property damage only. There were no fatal crashes recorded along the corridor.

The crash rates for the S.R. 54 corridor range from 1.685 to 1.982 crashes per million vehicle miles traveled, which exceeds the statewide average. The FDOT statewide average crash rate for similar facilities is 1.566 crashes per million vehicle miles traveled.

Figures 3.3 and **3.4** graphically illustrates the crash severity and crash type along the U.S. 41 (S.R. 45)/Dale Mabry Highway and S.R. 54. **Figure 3.5** and **3.6** shows the lighting and roadway surface conditions based on each segment. As shown in those figures, majority of the crashes occur during daylight and dry conditions.

Table 3.4
2018 through 2022 – U.S. 41 (S.R. 45) and Dale Mabry Highway Segments Crash Summary

Segment ¹						Crash Type									Severity				Study Area Crash Rates	
Segment Number	Location Description	Functional Class	Begin Mile Post	End Mile Post	Length	Total	Angle ²	Rear End	Sideswipe	Head On	With Pedestrians	With Bicycles	All Other ³	Fatal	Injury	PDO	Total	Actual Crash Rate (crashes/MVMT)	Statewide Crash Rate (crashes/MVMT) ⁴	
1	U.S. 41 from Northwood Drive to Wal-Mart Driveway	Urban Arterial	0.246	0.444	0.198	5- Year	12	6	1	2	0	0	0	3	0	5	7	12	1.019	1.566
						Average	2.4	1.2	0.2	0.4	0	0	0	0.6	0	1	1.4	2.4		
2	U.S. 41 from Wal-Mart Driveway to Dale Mabry Hwy	Urban Arterial	0.444	0.969	0.525	5-Year	58	22	12	7	0	1	1	15	0	23	35	58	1.857	1.566
						Average	11.6	4.4	2.4	1.4	0	0.2	0.2	3	0	4.6	7	11.6		
3	Dale Mabry Hwy from Wal-Mart Driveway to U.S. 41	Urban Arterial	0.609	1.011	0.402	5- Year	68	11	39	6	0	3	0	9	2	21	45	68	3.049	0.868
						Average	13.6	2.2	7.8	1.2	0	0.6	0	1.8	0.4	4.2	9	13.6		
4	U.S. 41 from Dale Mabry Hwy to S.R. 54	Urban Arterial	0.969	1.445	0.476	5- Year	154	11	63	47	2	1	1	29	1	48	105	154	2.544	1.566
						Average	30.8	2.2	12.6	9.4	0.4	0.2	0.2	5.8	0.2	9.6	21	30.8		
5	U.S. 41 from S.R. 54 to Morgan Road	Urban Arterial	1.445	1.919	0.474	5- Year	95	18	44	15	0	0	1	17	0	40	55	95	2.116	1.566
						Average	19.0	3.6	8.8	3.0	0.0	0.0	0.2	3.4	0.0	8.0	11.0	19.0		
U.S. 41/Dale Mabry Highway Corridor Summary						5- Year	387	68	159	77	2	5	3	73	3	137	247	387		
						Average	77.4	13.6	31.8	15.4	0.4	1	0.6	14.6	0.6	27.4	49.4	77.4		
Crash Type and Severity Percentage								17.57%	41.09%	19.90%	0.52%	1.29%	0.78%	18.86%	0.78%	35.40%	63.82%			

See Appendix B for the segmentation graphic

Source: Florida Department of Transportation Signal Four (2018-2022)

Notes: ¹ Does not include crashes at intersections

² Includes left-turn and right-turn type crashes

³ Includes all other crash types where specific crash type is not listed

⁴ Statewide average segment crash rates based on the five-year data between 2018-2022

MVMT = million vehicle miles traveled; PDO = Property Damage Only

Statewide Crash Rate used “U | 2 | D” and “U | 3 | D”

Red highlighted: Actual Crash Rate > Statewide Average Crash Rate

Table 3.5
2018 through 2022 - S.R. 54 Segments Crash Summary

Segment ¹						Crash Type									Severity				Study Area Crash Rates	
Segment Number	Location Description	Functional Class	Begin Mile Post	End Mile Post	Length	Total	Angle ²	Rear End	Sideswipe	Head On	With Pedestrians	With Bicycles	All Other ³	Fatal	Injury	PDO	Total	Actual Crash Rate (crashes/MVMT)	Statewide Crash Rate (crashes/MVMT) ⁴	
6	S.R. 54 from Wilson Road to U.S. 41	Urban Arterial	7.565	8.289	0.724	5- Year	120	16	60	16	0	0	0	28	0	35	85	120	1.685	1.566
						Average	24.0	3.2	12	3.2	0	0	0	5.6	0	7	17	24		
7	S.R. 54 from U.S. 41 to Village Lakes Driveway	Urban Arterial	0	0.319	0.319	5- Year	72	9	39	17	1	0	0	6	0	19	53	72	1.982	1.566
						Average	14.4	1.8	7.8	3.4	0.2	0	0	1.2	0	3.8	10.6	14.4		
8	S.R. 54 from Village Lakes Driveway to Osprey Lane	Urban Arterial	0.319	0.586	0.267	5- Year	55	8	29	5	0	0	0	13	0	19	36	55	1.809	1.566
		Urban Arterial	7.565	8.289	0.724	Average	11.0	1.6	5.8	1.0	0.0	0.0	0.0	2.6	0.0	3.8	7.2	11.0		
S.R. 54 Corridor Summary						5- Year	247	33	128	38	1	0	0	47	0	73	174	247		
						Average	49.4	6.6	25.6	7.6	0.2	0	0	9.4	0	14.6	34.8	49.4		
Crash Type and Severity Percentage								13.36%	51.82%	15.38%	0.40%	0.00%	0.00%	19.03%	0.00%	29.55%	70.45%			

See Appendix B for the segmentation graphic

Source: Florida Department of Transportation Signal Four (2018-2022)

Notes: ¹ Does not include crashes at intersections

² Includes left-turn and right-turn type crashes

³ Includes all other crash types where specific crash type is not listed

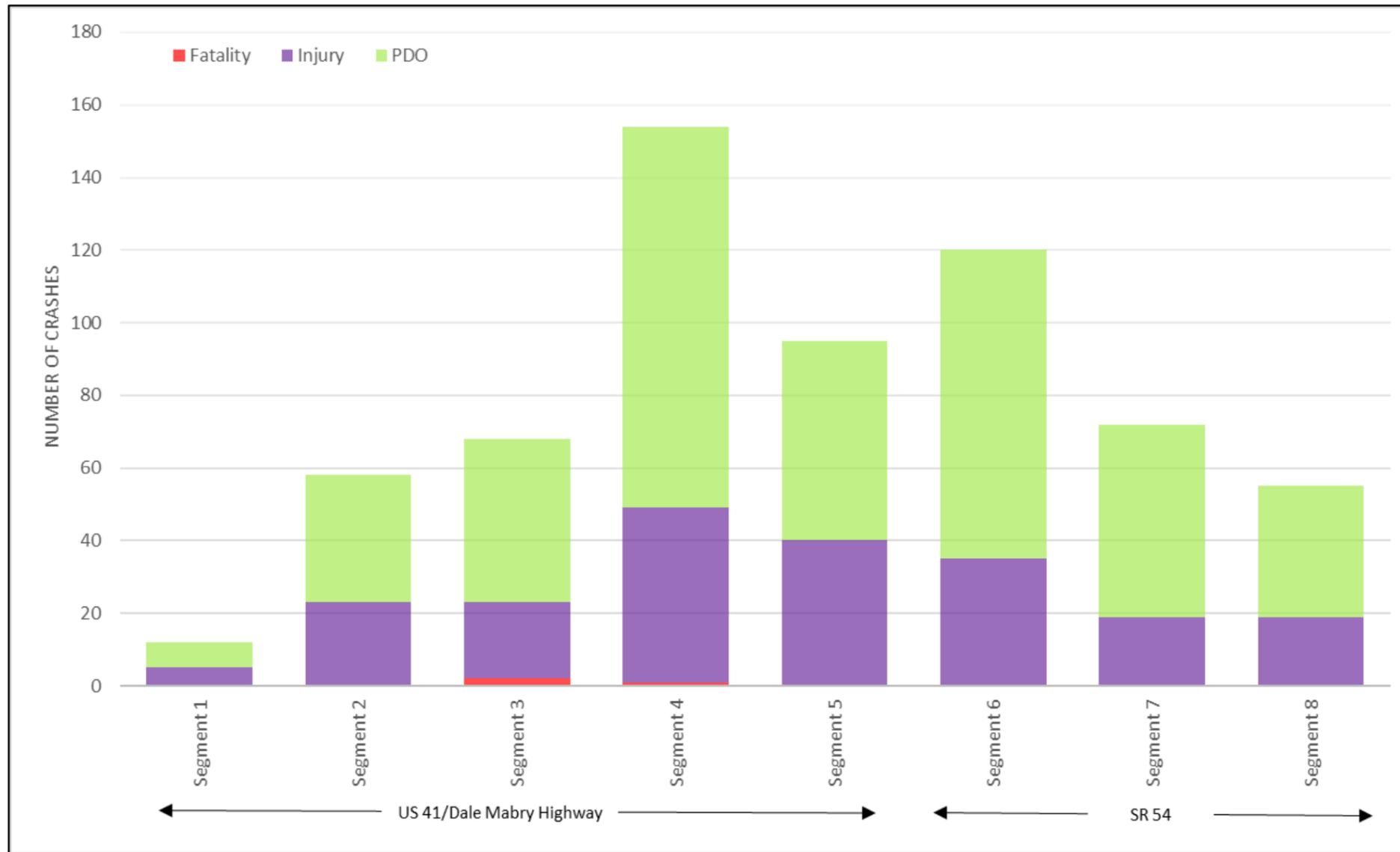
⁴ Statewide average segment crash rates based on the five-year data between 2018-2022

MVMT = million vehicle miles traveled; PDO = Property Damage Only

Statewide Crash Rate used “U | 3 | D”

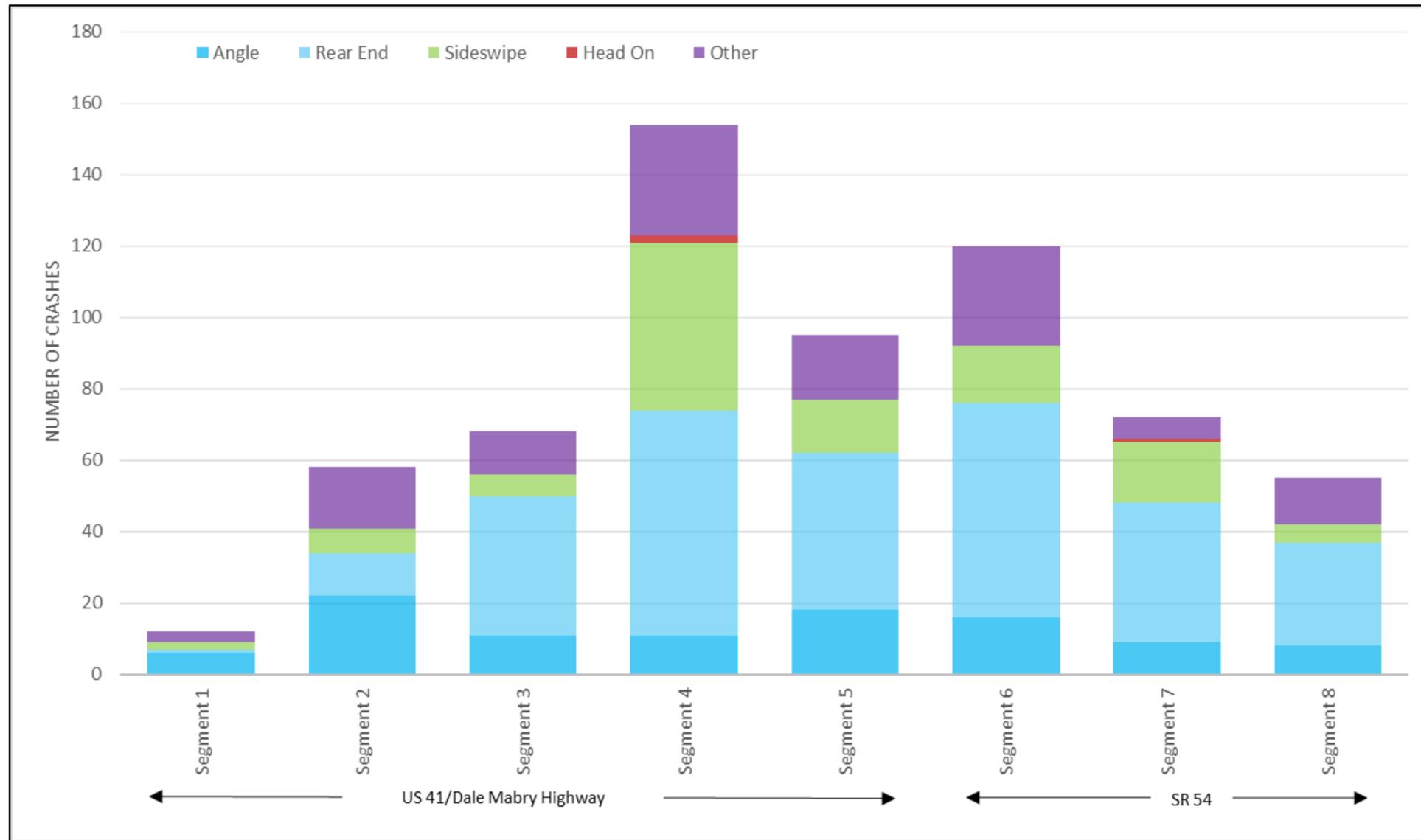
Red highlighted: Actual Crash Rate > Statewide Average Crash Rate

Figure 3.3
2018 through 2022 – Crash Summary by Severity U.S. 41 (S.R. 45), Dale Mabry Highway and S.R. 54



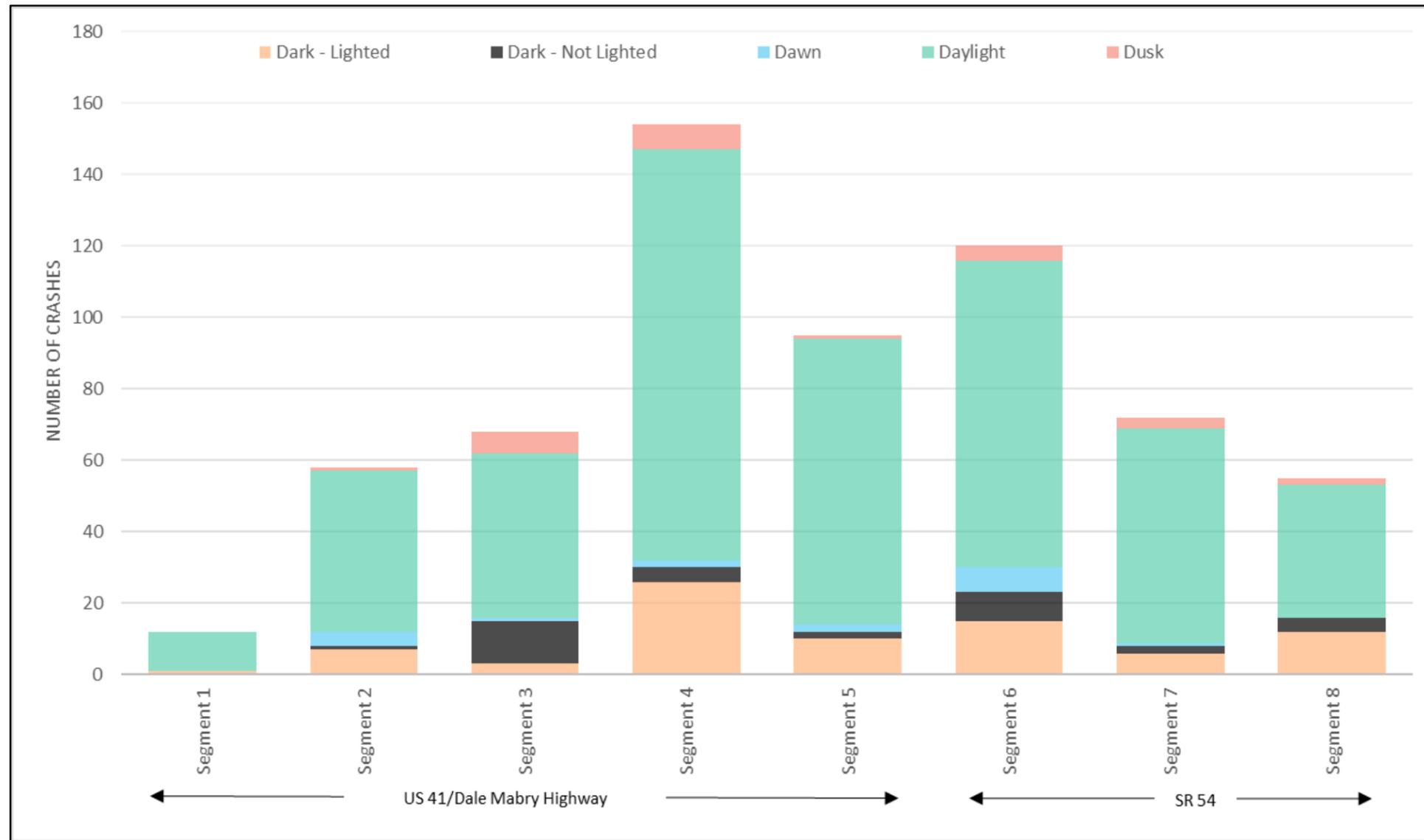
Segment 1	U.S. 41 from Northwood Drive to Wal-Mart Driveway
Segment 2	U.S. 41 from Wal-Mart Driveway to Dale Mabry Hwy
Segment 3	Dale Mabry Hwy from Wal-Mart Driveway to U.S. 41
Segment 4	U.S. 41 from Dale Mabry Hwy to S.R. 54
Segment 5	U.S. 41 from S.R. 54 to Morgan Rd
Segment 6	S.R. 54 from Wilson Rd to U.S. 41
Segment 7	S.R. 54 from U.S. 41 to Village Lake Driveway
Segment 8	S.R. 54 from Village Lakes Driveway to Osprey Ln

Figure 3.4
2018 through 2022 – Crash Summary by Type U.S. 41 (S.R. 45), Dale Mabry Highway and S.R. 54



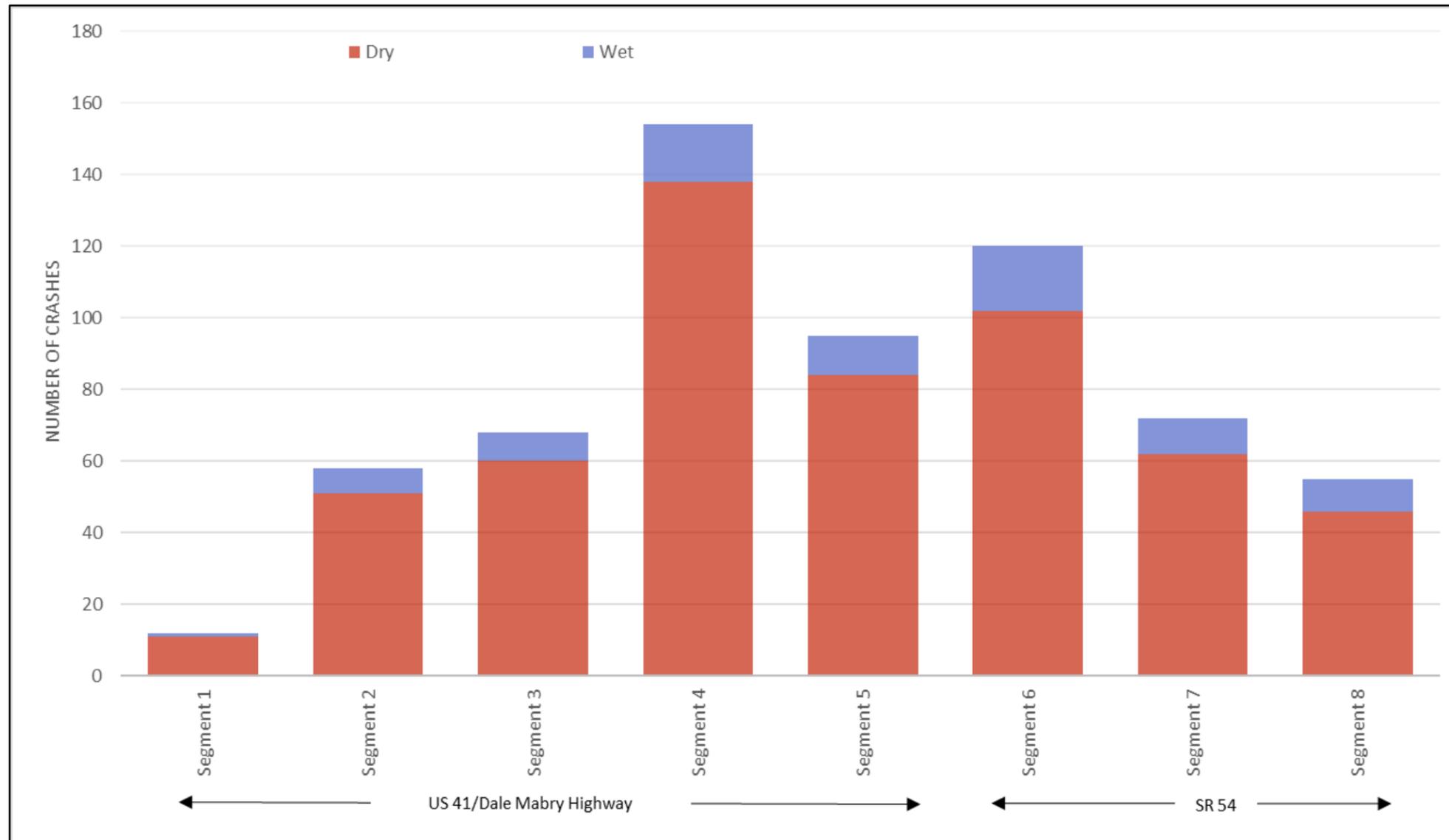
Segment 1	U.S. 41 from Northwood Drive to Wal-Mart Driveway
Segment 2	U.S. 41 from Wal-Mart Driveway to Dale Mabry Hwy
Segment 3	Dale Mabry Hwy from Wal-Mart Driveway to U.S. 41
Segment 4	U.S. 41 from Dale Mabry Hwy to S.R. 54
Segment 5	U.S. 41 from S.R. 54 to Morgan Rd
Segment 6	S.R. 54 from Wilson Rd to U.S. 41
Segment 7	S.R. 54 from U.S. 41 to Village Lake Driveway
Segment 8	S.R. 54 from Village Lakes Driveway to Osprey Ln

Figure 3.5
2018 through 2022 – Crash Summary by Lighting Condition U.S. 41 (S.R. 45), Dale Mabry Highway and S.R. 54



Segment 1	U.S. 41 from Northwood Drive to Wal-Mart Driveway
Segment 2	U.S. 41 from Wal-Mart Driveway to Dale Mabry Hwy
Segment 3	Dale Mabry Hwy from Wal-Mart Driveway to U.S. 41
Segment 4	U.S. 41 from Dale Mabry Hwy to S.R. 54
Segment 5	U.S. 41 from S.R. 54 to Morgan Rd
Segment 6	S.R. 54 from Wilson Rd to U.S. 41
Segment 7	S.R. 54 from U.S. 41 to Village Lake Driveway
Segment 8	S.R. 54 from Village Lakes Driveway to Osprey Ln

Figure 3.6
2018 through 2022 – Crash Summary by Roadway Surface Condition U.S. 41 (S.R. 45), Dale Mabry Highway and S.R. 54



Segment 1	U.S. 41 from Northwood Drive to Wal-Mart Driveway
Segment 2	U.S. 41 from Wal-Mart Driveway to Dale Mabry Hwy
Segment 3	Dale Mabry Hwy from Wal-Mart Driveway to U.S. 41
Segment 4	U.S. 41 from Dale Mabry Hwy to S.R. 54
Segment 5	U.S. 41 from S.R. 54 to Morgan Rd
Segment 6	S.R. 54 from Wilson Rd to U.S. 41
Segment 7	S.R. 54 from U.S. 41 to Village Lake Driveway
Segment 8	S.R. 54 from Village Lakes Driveway to Osprey Ln

Intersection Crash Analyses

U.S. 41 at Walmart Way

A total of 23 crashes were reported at the intersection of U.S. 41 and the Wal-Mart driveway from 2018-2022. Rear-end and left turn collisions constituted the majority (approximately 43.48% and 34.78%, respectively) of the crashes. There were 12 (52.17%) crashes with property damage only, and 10 (43.48%) were injury crashes. There was one fatal crash reported during the five-year analysis period. 26% of crashes occurred on wet roadway surfaces and 22% of crashes occurred during dark (lighted) conditions. **Figure 3.7** illustrates the crashes by type, severity, roadway surface condition, and lighting conditions.

Dale Mabry Highway at Walmart Way

A total of 6 crashes were reported at the intersection of Dale Mabry Highway and the Wal-Mart driveway from 2018-2022. They consisted of three rear-end crashes(50%), two sideswipe crashes (33%), and one left turn collision (17%). Five crashes were property damage only (83%), and one (17%) was an injury-related crash. There were no fatal crashes reported during the five-year analysis period. No crashes occurred on wet roadway surfaces and 17% of crashes occurred during dark (not lighted) conditions. **Figure 3.8** illustrates the crashes by type, severity, roadway surface condition, and lighting conditions.

U.S. 41 at Dale Mabry Highway

A total of 38 crashes were reported at the intersection of U.S. 41 and Dale Mabry Highway from 2018-2022. Rear-end and sideswipe crashes constituted the majority (approximately 65.79% and 13.16%, respectively) of the crashes. There were 23 (or 60.53%) crashes with property damage only, and 15 (or 39.47%) were injury crashes. No fatal crashes were reported during the five-year analysis period. 13% of crashes occurred on wet roadway surfaces and 21% of crashes occurred during dusk or dark conditions. **Figure 3.9** illustrates the crashes by type, severity, roadway surface condition, and lighting conditions.

S.R. 54 at U.S. 41

A total of 427 crashes were reported at the intersection of S.R. 54 and U.S. 41 from 2018-2022. Rear-end and sideswipe crashes constituted the majority (approximately 60.66% and 15.93%, respectively) of the crashes. There were 315 (or 73.77%) crashes with property damage only, and 112 (or 26.23%) were injury crashes. No fatal crashes were reported during the five-year analysis period. 11% of crashes occurred on wet roadway surfaces and 30% of crashes occurred during dusk, dawn, or dark conditions. **Figure 3.10** illustrates the crashes by type, severity, roadway surface condition, and lighting conditions.

CHAPTER 3

Existing Conditions

S.R. 54 at Village Lakes Driveway

A total of 84 crashes were reported at the intersection of S.R. 54 and Village Lakes Driveway from 2018-2022. Rear-end and left turn crashes constituted the majority (approximately 53.57% and 19.05%, respectively) of the crashes. There were 54 (or 64.29%) crashes with property damage only, and 30 (or 35.71%) were injury crashes. No fatal crashes were reported during the five-year analysis period. 18% of crashes occurred on wet roadway surfaces and 20% of crashes occurred during either dusk or dark conditions. **Figure 3.11** illustrates the crashes by type, severity, roadway surface condition, and lighting conditions.

Figure 3.7
2018 through 2022 – Crash Summary by for U.S. 41 (S.R. 45) at Walmart Way Intersection

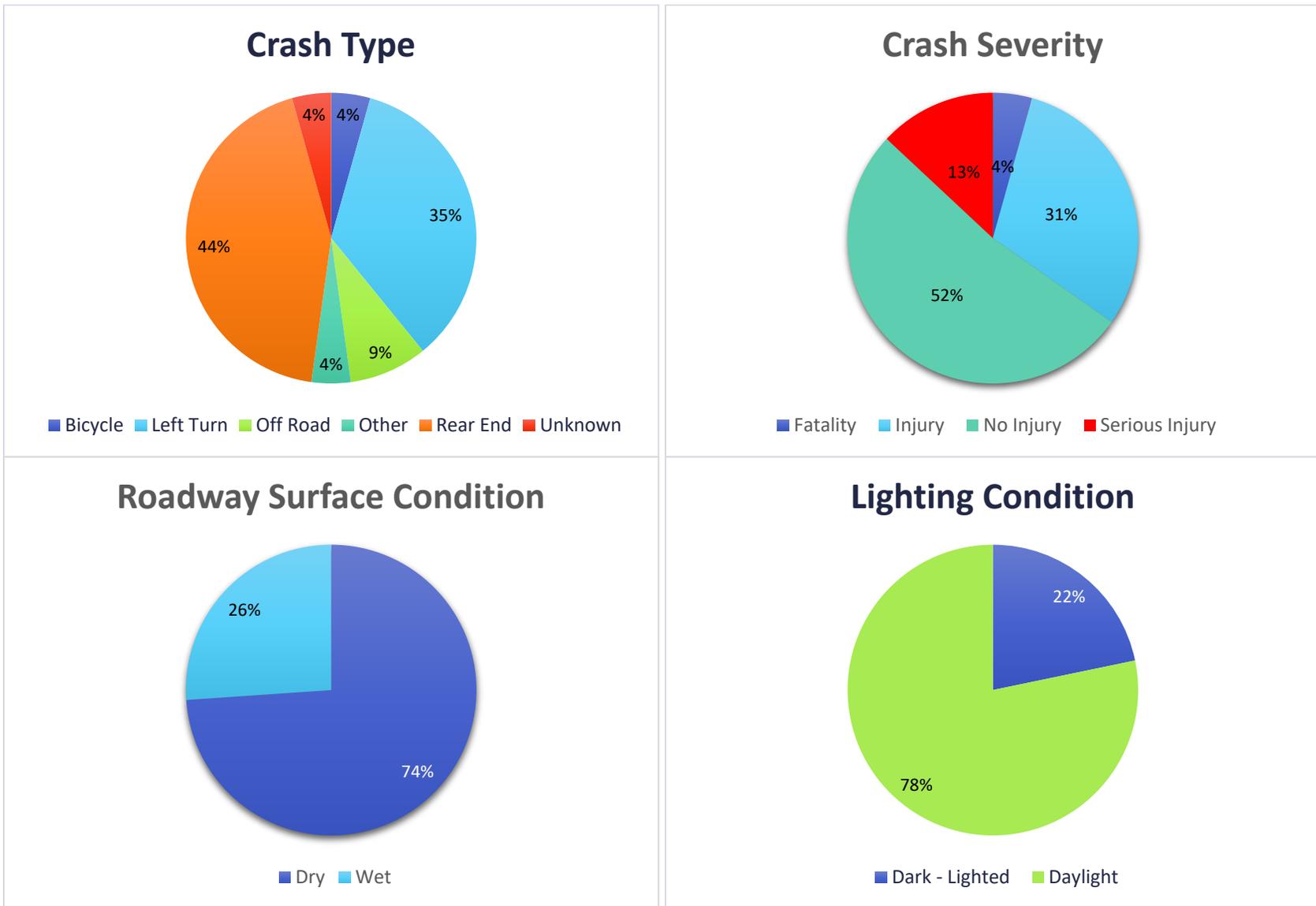


Figure 3.8
2018 through 2022 – Crash Summary by for Dale Mabry Highway at Walmart Way

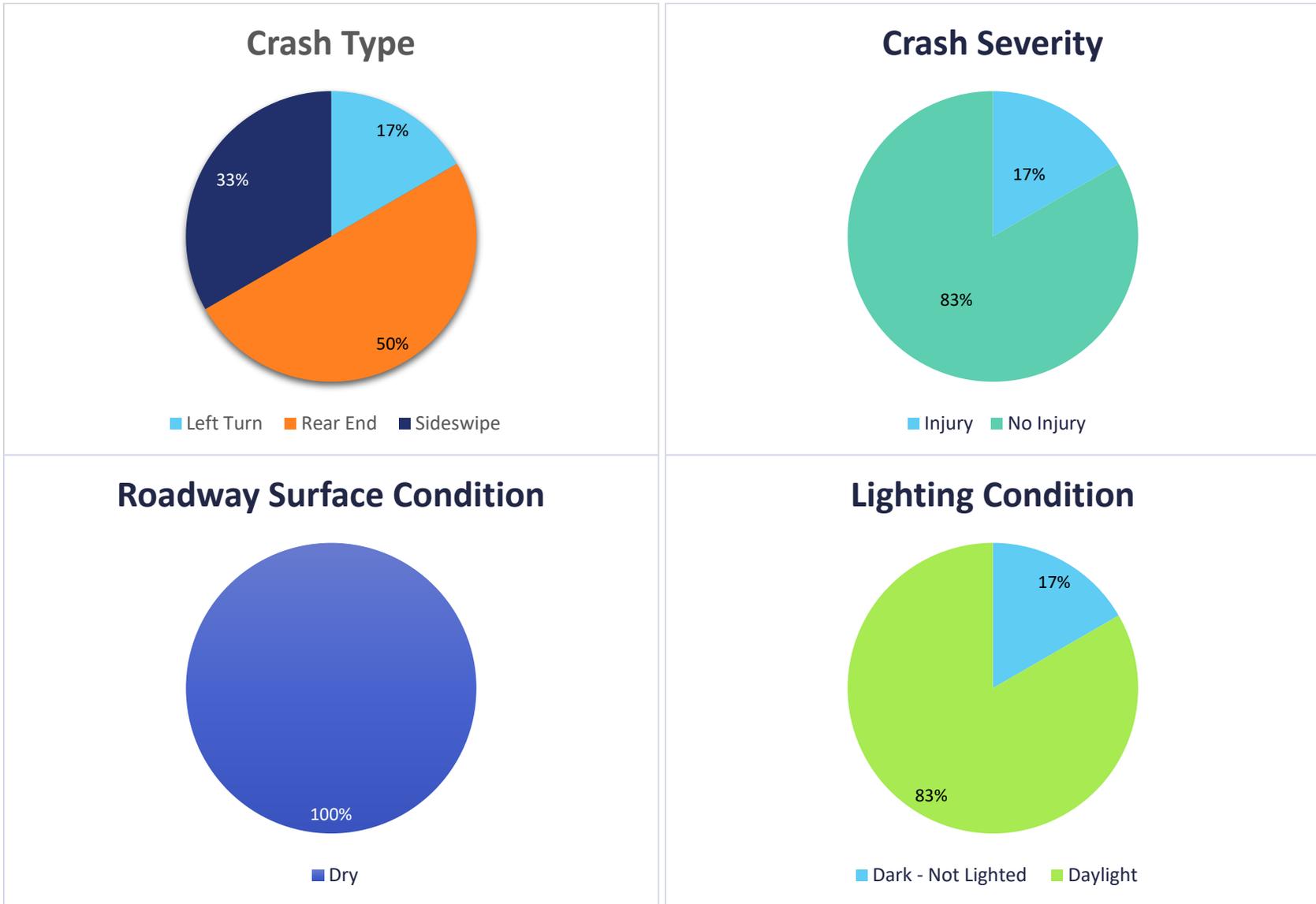


Figure 3.9
2018 through 2022 – Crash Summary by for U.S. 41 at Dale Mabry Highway

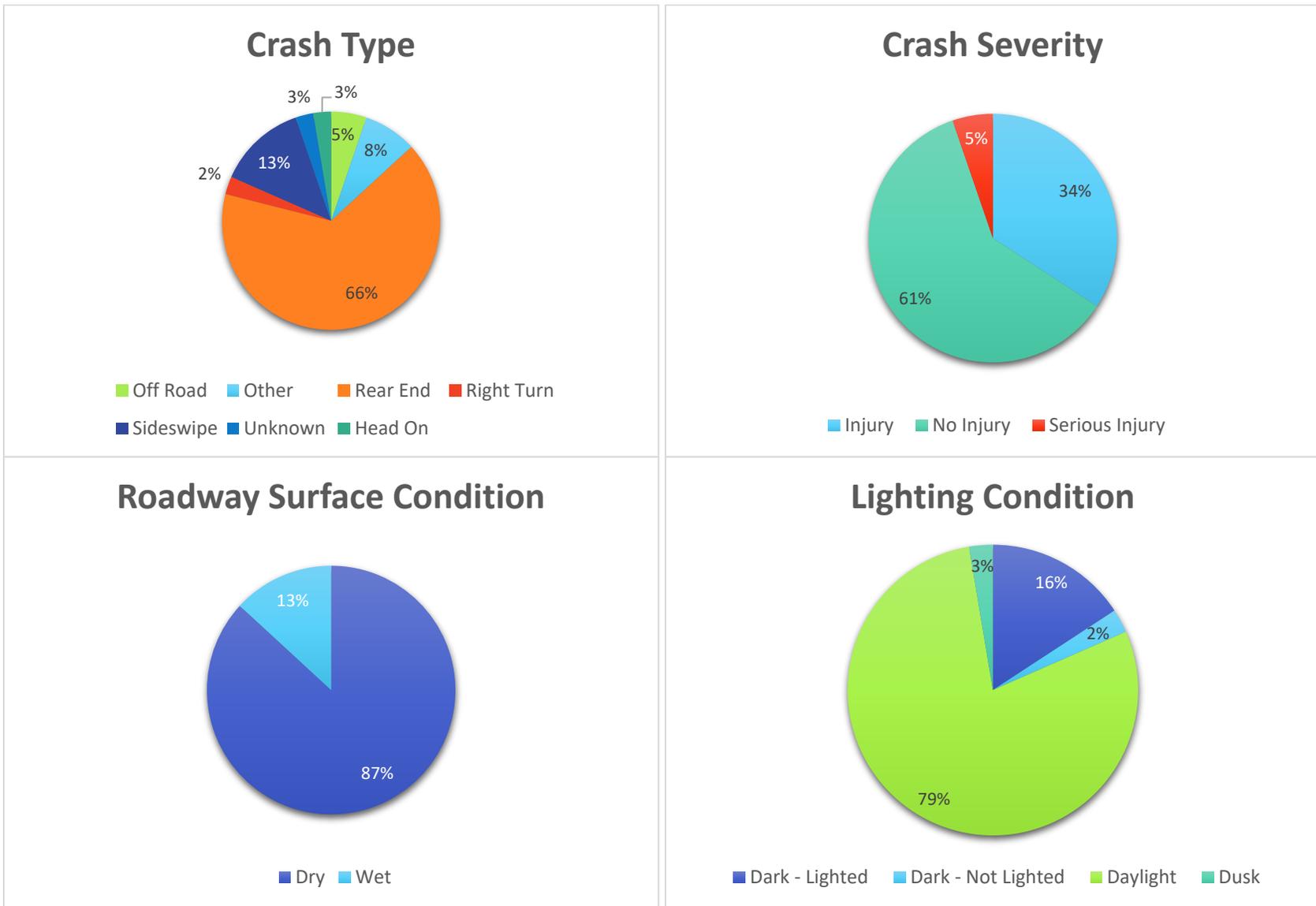


Figure 3.10
2018 through 2022 – Crash Summary by for S.R. 54 at U.S. 41

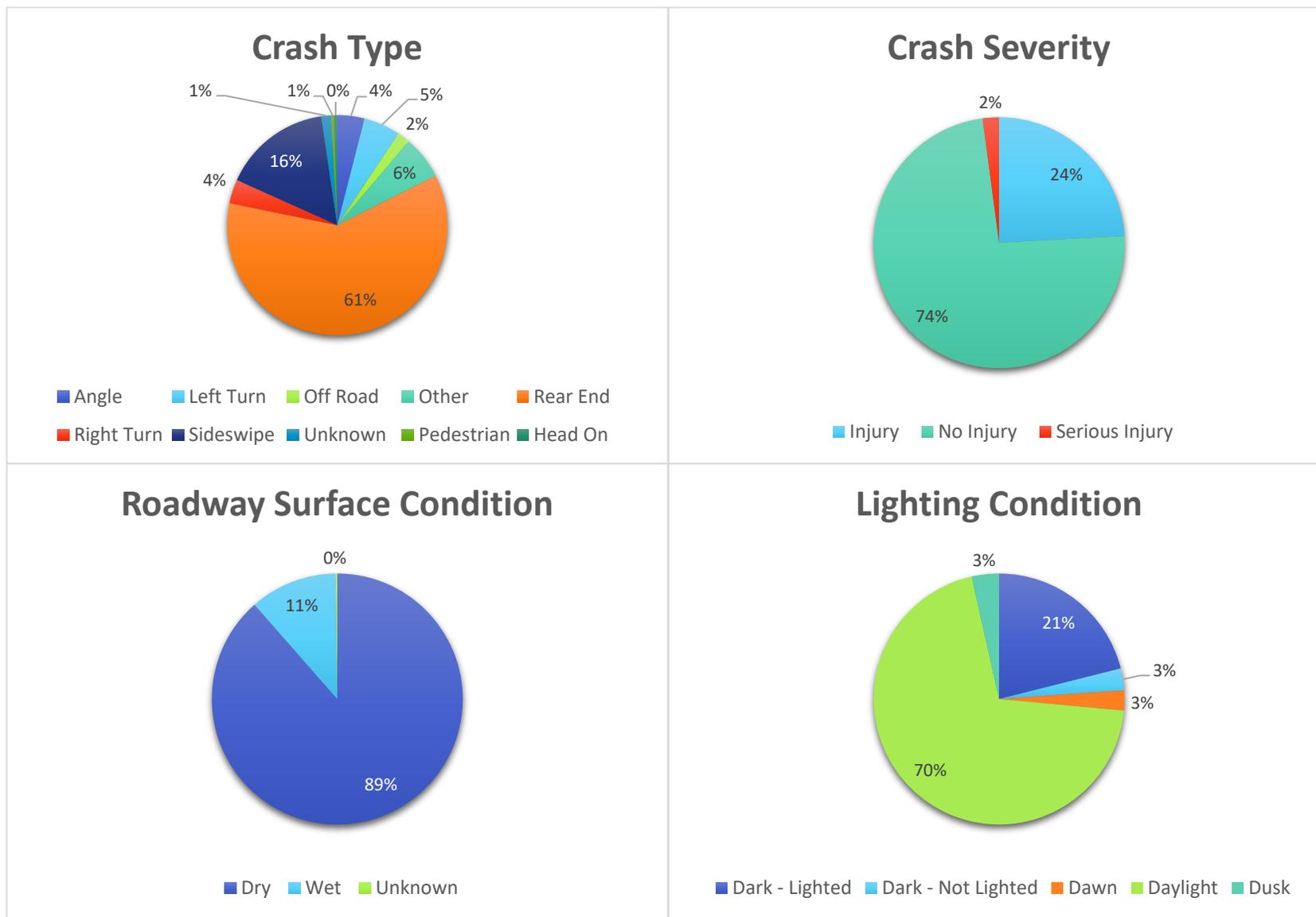
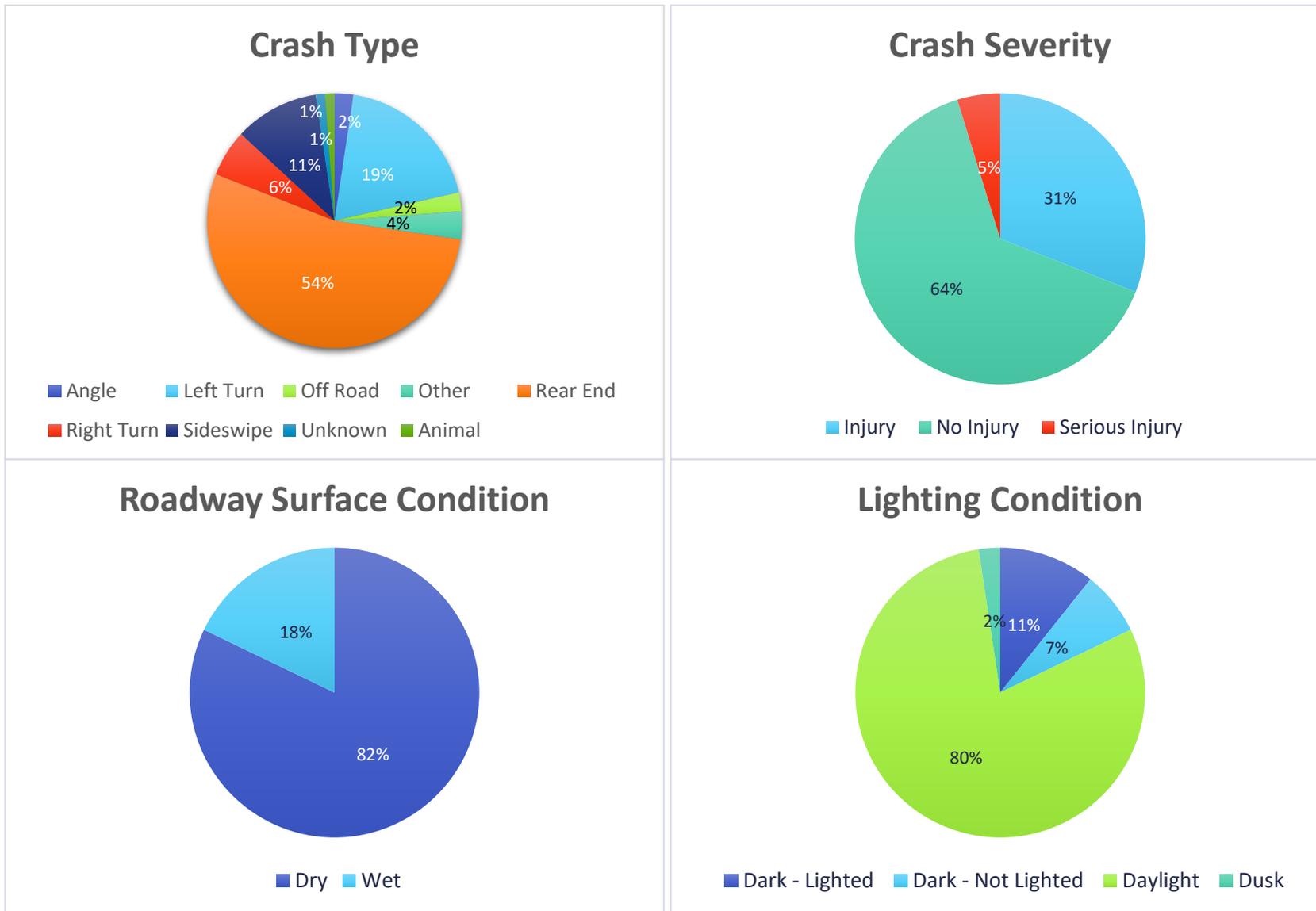


Figure 3.11
2018 through 2022 – Crash Summary by for S.R. 54 at Village Lakes Plaza Drive



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Existing Conditions

Actual crash rates at the intersections were computed and compared with average crash rates for similar facilities statewide to assess the safety conditions within the study area. Crash rates for the intersections were estimated as crashes per million entering vehicles (MEV). **Table 3.7** summarizes the crash rates, types, and severities during the five-year period. The actual crash rate for the S.R. 54 and U.S. 41 intersection exceeds the FDOT average crash rates for similar facilities and may indicate safety issues. A heat map and a severe crashes map for the study area are illustrated in **Figure 3.12** and **Figure 3.13**, respectively.

Table 3.6
2018 through 2022 – Intersections Crash Summary

Intersection Number	Location Description		Crash Type								Severity				Study Area Crash Rates	
			Total	Angle ¹	Rear End	Sideswipe	Head On	With Pedestrians	With Bicycles	All Other ²	Fatal	Injury	PDO	Total	Actual Crash Rate (crashes/MEV)	Statewide Crash Rate (crashes/MEV) ³
1	U.S. 41 at Wal-Mart Driveway	5- Year	23	8	10	0	0	0	1	4	1	10	12	23	0.345	0.632
		Average	4.6	1.6	2	0	0	0	0.2	0.8	0.2	2	2.4	4.6		
2	Dale Mabry Hwy at Wal-Mart Driveway	5- Year	6	1	3	2	0	0	0	0	0	1	5	6	0.101	0.632
		Average	1.2	0.2	0.6	0.4	0	0	0	0	0	0.2	1	1.2		
3	U.S. 41 at Dale Mabry Hwy	5- Year	38	1	25	5	1	0	0	6	0	15	23	38	0.314	0.632
		Average	7.6	0.2	5	1	0.2	0	0	1.2	0	3	4.6	7.6		
4	U.S. 41 at S.R. 54	5- Year	427	55	259	68	2	2	0	41	0	112	315	427	2.263	1.152
		Average	85.4	11.0	51.8	13.6	0.4	0.4	0.0	8.2	0.0	22.4	63.0	85.4		
5	S.R. 54 at Village Lakes Driveway	5- Year	84	23	45	9	0	0	0	7	0	30	54	84	0.693	1.152
		Average	16.8	4.6	9.0	1.8	0.0	0.0	0.0	1.4	0.0	6.0	10.8	16.8		
All Intersections Total		5- Year	578	88	342	84	3	2	1	58	1	168	409	578		
		Average	115.6	17.6	68.4	16.8	0.6	0.4	0.2	11.6	0.2	33.6	81.8	115.6		
				15.22%	59.17%	14.53%	0.52%	0.35%	0.17%	10.03%	0.17%	29.07%	70.76%			

Source: Florida Department of Transportation Signal Four (2018-2022)

Notes: ¹ Includes left-turn and right-turn type crashes

² Includes all other crash types where the specific crash type is not listed

³ Statewide average spot crash rates based on the five-year data between 2018-2022

MEV = million entering vehicles; PDO = Property Damage Only

Intersection Statewide Average Crash Rate used “IS | U | 3 | D” 3-leg and 4-leg

Red highlighted: Actual Crash Rate > Statewide Average Crash Rate

Figure 3.12
2018 through 2022 – Crash Heat Map

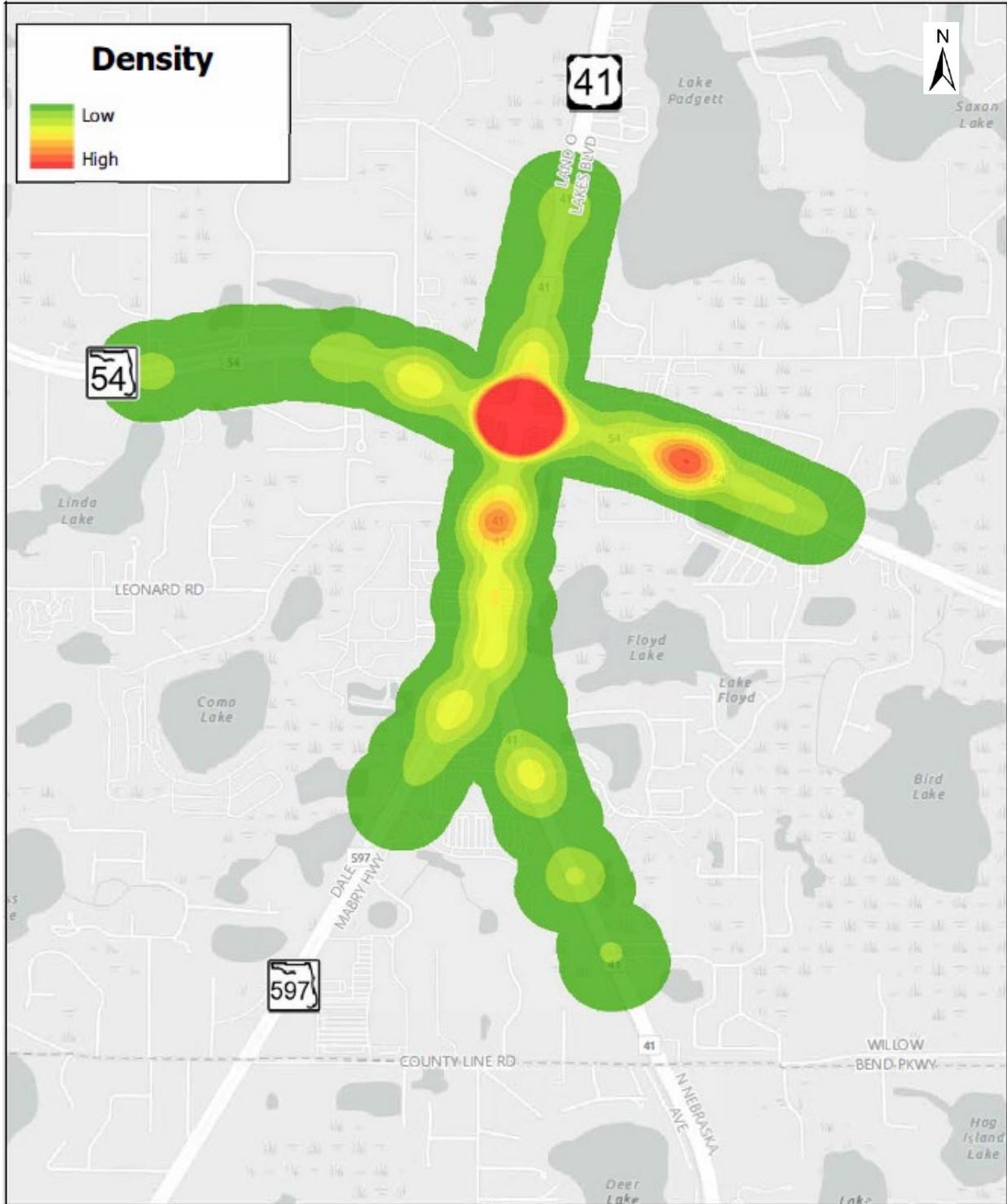
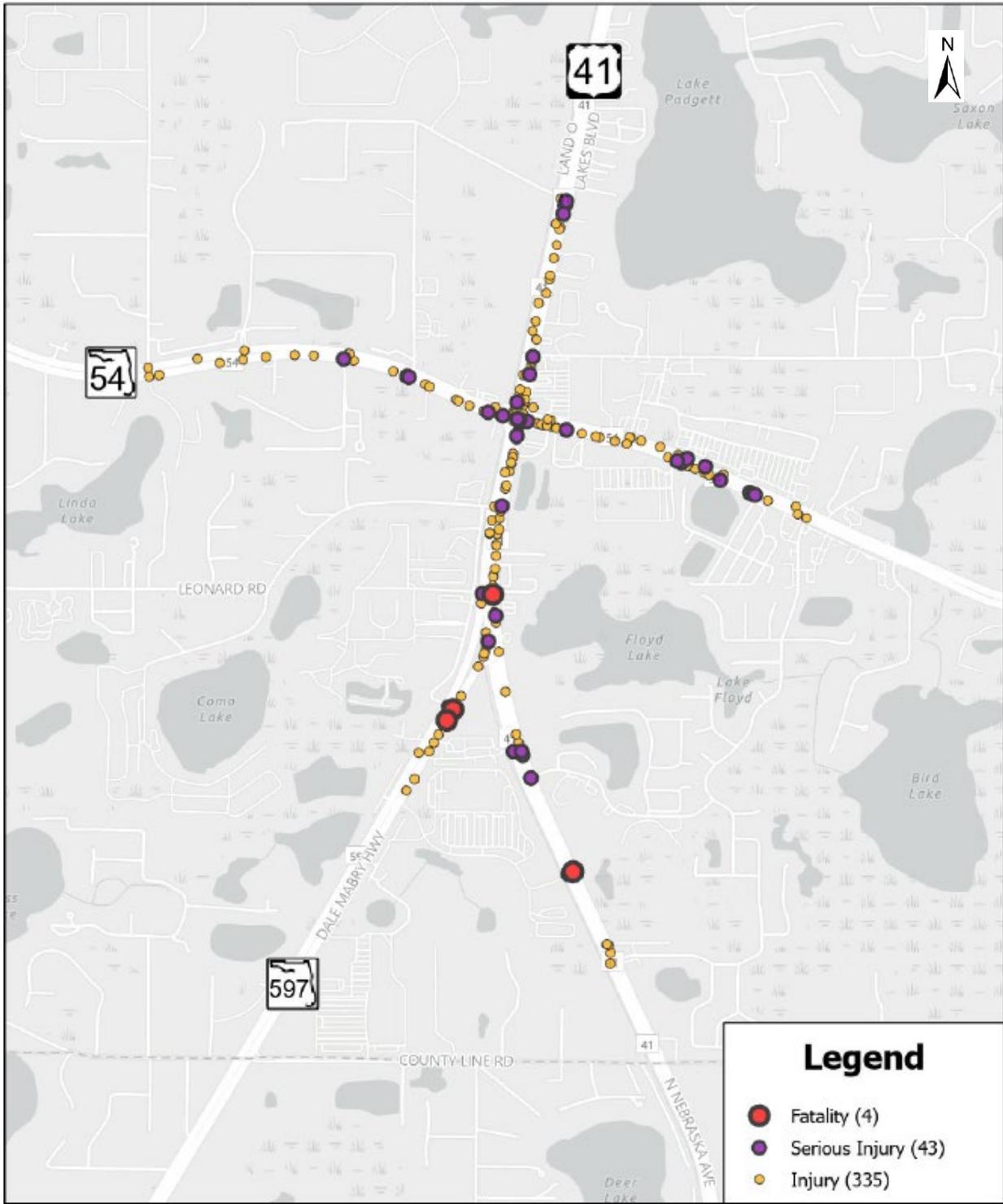


Figure 3.13
2018 through 2022 – Severity Crashes Map



3.7 PEDESTRIAN AND BICYCLE SAFETY ANALYSIS

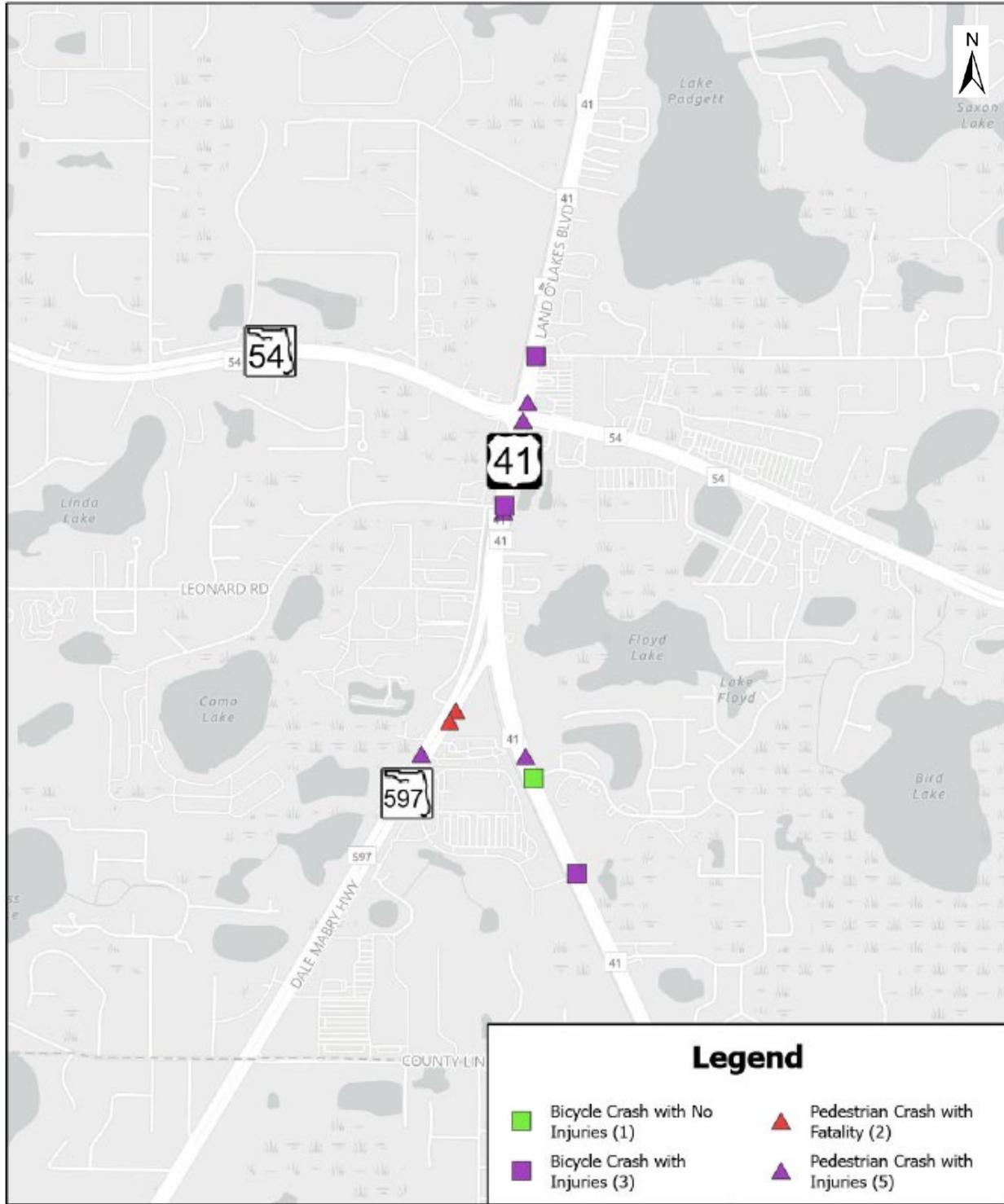
Pedestrian and bicycle crash data were obtained as part of the greater dataset. A total of 11 crashes included pedestrians and bicyclists. Three of these crashes occurred at intersections. Two were at the U.S. 41 and S.R. 54 intersection and one was at the U.S. 41 and Wal-Mart driveway. The other eight crashes occurred along U.S. 41 or Dale Mabry Highway. **Figure 3.14** shows a map of the bicycle and pedestrian crashes, along with their severity.

3.8 FATAL CRASH SUMMARIES

Four fatal crashes occurred in the study area over the five-year period. Below is a summary of each of the fatal crashes.

- This crash occurred on November 11, 2018, during dark (not lighted) and clear weather conditions. A vehicle was traveling southbound on Dale Mabry Highway and approaching the intersection of Brinson Road. A pedestrian crossed Dale Mabry Highway in the westbound direction and was fatally struck by the vehicle. The pedestrian was under the influence.
- This crash occurred on February 24, 2019, during daylight and clear weather conditions. Vehicle 1 was traveling northbound on Dale Mabry Highway approaching U.S. 41. Vehicle 2 was traveling northbound on U.S. 41 approaching the Dale Mabry intersection. The driver of Vehicle 1 made a right turn, crossing over the gore segment, and struck Vehicle 2. The front seat passenger of Vehicle 1 suffered fatal injuries. The driver of Vehicle 1 was under the influence of drugs or alcohol.
- This crash occurred on December 7, 2019, during dark (not lighted) and clear weather conditions. A vehicle was traveling southbound on Dale Mabry Highway and approaching the intersection of Brinson Road. A pedestrian crossed Dale Mabry Highway in the westbound direction and was fatally struck by the vehicle. The pedestrian was under the influence. This crash is almost identical to the one that occurred on November 11, 2018.
- This crash occurred on February 8, 2021, during dark (lighted) and clear weather conditions. Vehicle 1 was traveling southbound on U.S. 41 approaching the Wal-Mart driveway. Vehicle 2 was traveling southbound on U.S. 41 and was directly in front of Vehicle 1. The driver of Vehicle 2 activated their hazard lights due to mechanical issues and was unable to continue driving. Vehicle 1 did not observe that Vehicle 2 had stopped and collided with the rear of Vehicle 2. The driver of Vehicle 2 sustained fatal injuries.

Figure 3.14
2018 through 2022 – Bike and Pedestrian Crashes

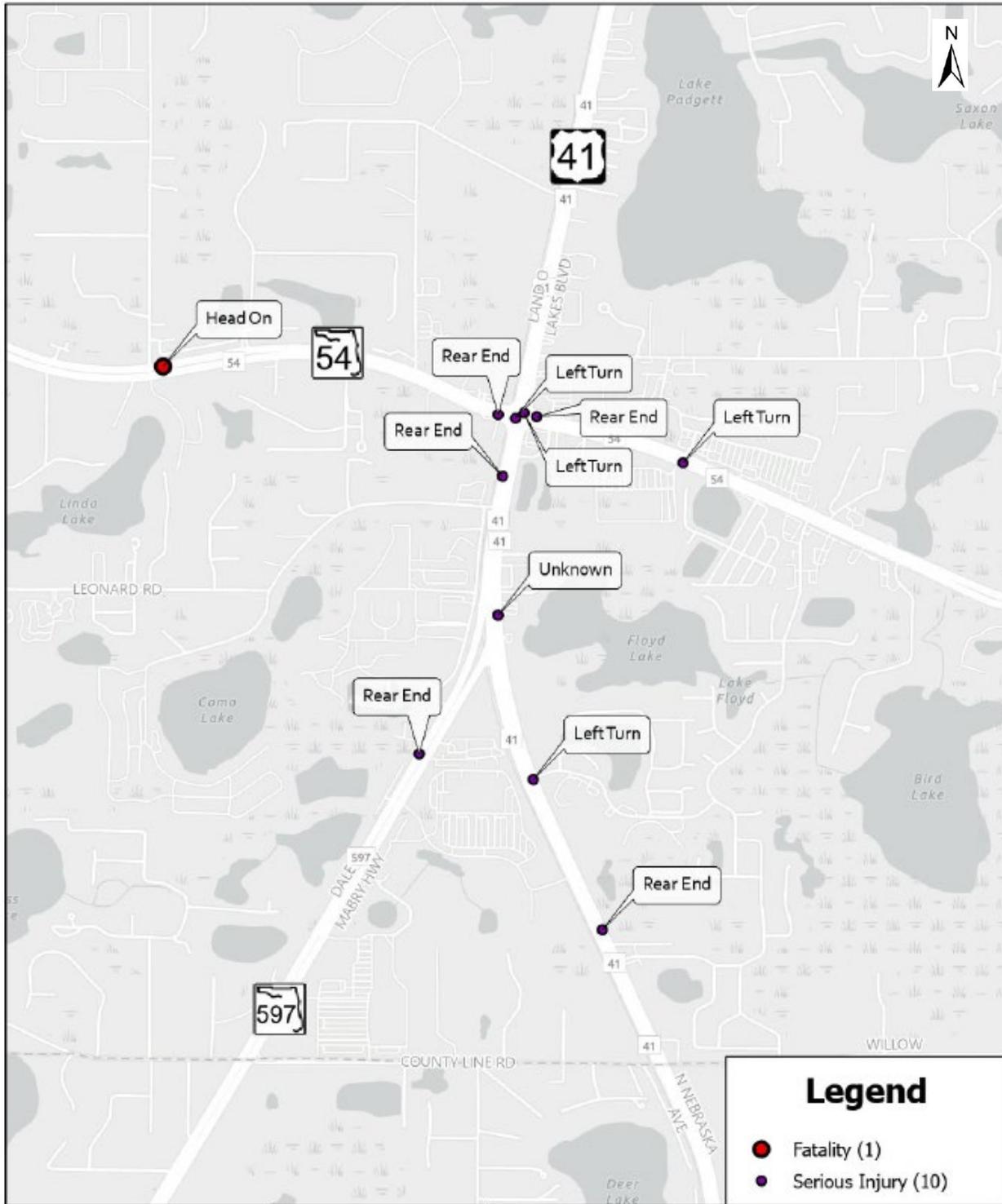


3.9 RECENT SEVERE CRASHES

More recent severe crash data (January 1, 2023 – December 30, 2023) was also collected from Signal 4. Within the study area, there were ten crashes that resulted in serious injury and one crash that resulted in a fatality. These severe crashes were rear ends, left turns, and head on collisions. **Figure 3.15** shows a map of the recent severe crashes. Below is a summary of the fatal crash.

- This crash occurred on October 16, 2023, during dark (lighted) and clear weather conditions. Vehicle 1 was traveling eastbound on S.R. 54 approaching Wilson Rd. Vehicle 2 was traveling westbound on S.R. 54 approaching Wilson Rd. Vehicle 1 then crossed over the center median of S.R. 54 and struck Vehicle 2 head on. The driver of Vehicle 1 sustained fatal injuries.

Figure 3.15
Recent Severity Crashes and Crash Type



Existing traffic data, Vissim model calibration, and traffic operational analyses are provided in this chapter. Model development and parameter adjustments were performed using the latest techniques and best engineering practices in order to replicate existing field conditions. A Vissim Calibration Technical Memorandum was prepared and approved by FDOT in April 2020. The memo and supporting documentation are provided in **Appendix C**.

4.1 EXISTING TRAFFIC DATA

72-hour classification tube counts (bi-directional approach volumes at 15-minute increments with hourly totals) and concurrent 4-hour (two-hour AM and two-hour PM) vehicle turning movements (TMC) (at 15-minute increments with hourly totals) for peak periods (7AM to 9 AM and 4 PM to 6 PM) were conducted in mid-May 2019 within the study area. Miovision cameras were used to collect vehicle turning movements counts including pedestrian and bicycle counts at the intersections listed below:

- U.S. 41 (S.R. 45) at Dale Mabry Highway/ S.R. 597 (signalized),
- U.S. 41 (S.R. 45) at S.R. 54 (signalized)
- S.R. 54 at Village Lakes Plaza Drive (signalized)
- Walmart Way on Dale Mabry Highway(unsignalized)
- Walmart Way on U.S. 41 (S.R. 45) (signalized)

The 72-hour classification tube counts were collected at the following locations:

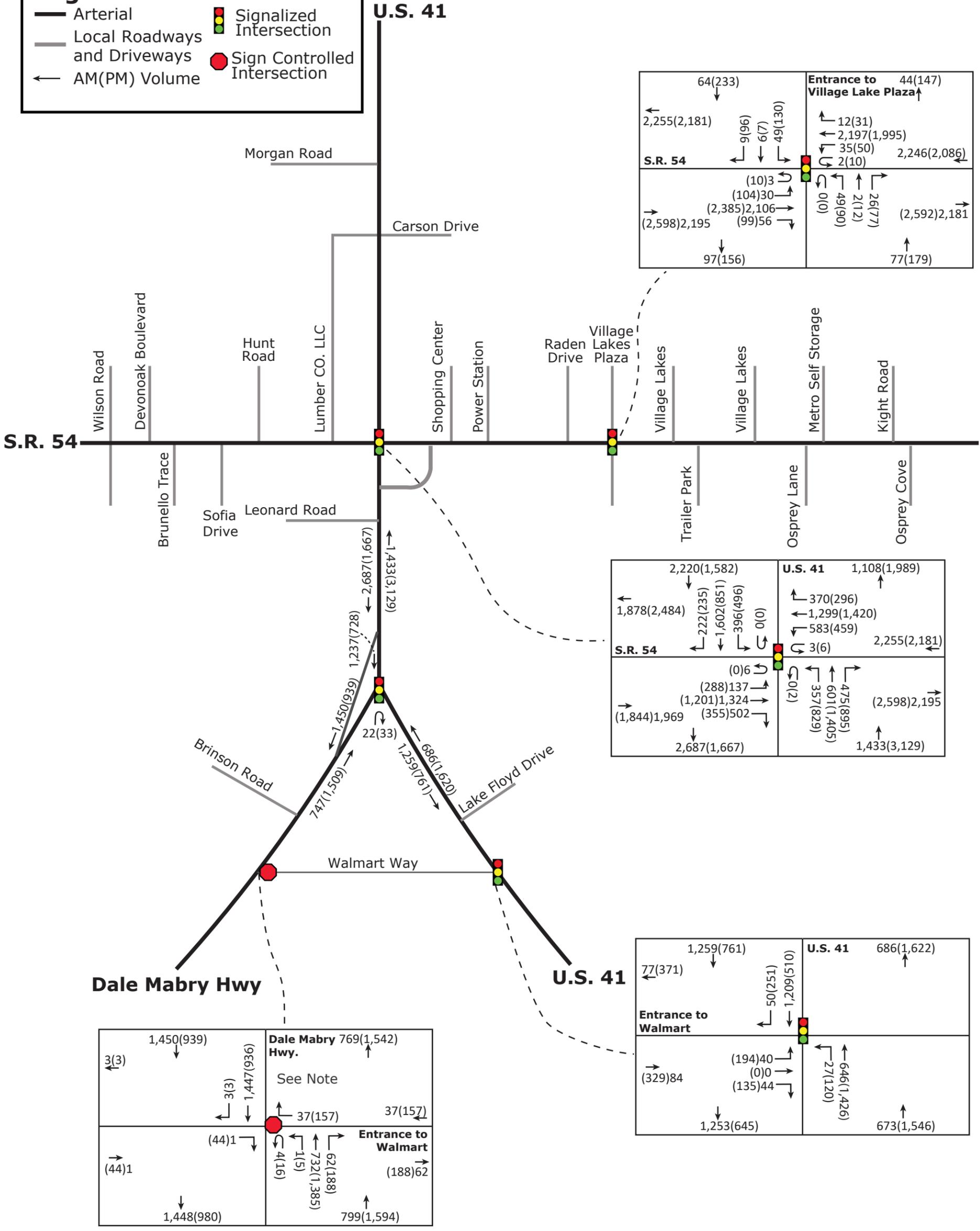
- U.S. 41 (S.R. 45) (south of Dale Mabry Highway, between Dale Mabry Highway and S.R. 54 and north of S.R. 54),
- Dale Mabry Highway/ S.R. 597 [south of U.S. 41 (S.R. 45)], and
- S.R. 54 [west of U.S. 41 (S.R. 45) and east of U.S. 41 (S.R. 45)]

Figure 4.1 summarizes the raw 2019 AM and PM volumes.

Travel time runs were conducted for the two-hour AM and PM peak periods (7 AM to 9 AM and 4 PM to 6 PM) on May 7, 2019 (Tuesday). The “floating car” method of data collection was employed to determine travel times on the roadway network. This method consists of a vehicle equipped with a GPS device traveling with the mainstream traffic and recording the vehicle’s position at one second time intervals. **Tables 4.1** and **4.2** show the summary of the travel times for U.S. 41 (S.R. 45) and S.R. 54 and AM and PM peak periods, respectively.

Legend

- Arterial
- Local Roadways and Driveways
- AM(PM) Volume
- Signalized Intersection
- Sign Controlled Intersection



Note: At the time the traffic counts were collected, the Dale Mabry Highway and Walmart Way intersection was unsignalized, however, there currently exists a traffic signal.



U.S. 41 (S.R. 45) at S.R. 54
PD&E STUDY

Existing Raw Traffic Counts

Figure
4.1

Table 4.1
2019 (Existing) Travel Times during AM Peak Hour

From	To	Peak Hour Travel Times (Seconds)	
U.S. 41 (S.R. 45) Northbound			
Northwood Drive	Walmart Way	26	217
Walmart Way	Dale Mabry Highway	41	
Dale Mabry Highway	S.R. 54	115	
S.R. 54	Morgan Road	35	
U.S. 41 (S.R. 45) Southbound			
Morgan Road	S.R. 54	211	301
S.R. 54	Dale Mabry Highway	34	
Dale Mabry Highway	Walmart Way	43	
Walmart Way	Northwood Drive	13	
S.R. 54 Eastbound			
Devonoak Blvd.	S.R. 45 (U.S.41)	297	359
S.R. 45 (U.S.41)	Daiquiri Lane	62	
S.R. 54 Westbound			
Daiquiri Lane	U.S. 41 (S.R. 45)	172	220
U.S. 41 (S.R. 45)	Devonoak Blvd.	47	

Table 4.2
2019 (Existing) Travel Times during PM Peak Hour

From	To	Peak Hour Travel Time (Seconds)	
U.S. 41 (S.R. 45) Northbound			
Northwood Drive	Walmart Way	14	255
Walmart Way	Dale Mabry Highway	39	
Dale Mabry Highway	S.R. 54	165	
S.R. 54	Morgan Road	36	
U.S. 41 (S.R. 45) Southbound			
Morgan Road	S.R. 54	167	299
S.R. 54	Dale Mabry Highway	77	
Dale Mabry Highway	Walmart Way	42	
Walmart Way	Northwood Drive	13	
S.R. 54 Eastbound			
Devonoak Blvd.	S.R. 45 (U.S.41)	219	284
S.R. 45 (U.S.41)	Daiquiri Lane	65	
S.R. 54 Westbound			
Daiquiri Lane	U.S. 41 (S.R. 45)	291	334
U.S. 41 (S.R. 45)	Devonoak Blvd.	43	

Signal timing data was provided by Pasco County Traffic Operations Division. Field reviews were conducted to confirm signal phasing and posted speeds. High- resolution aerial maps were used to develop the Vissim roadway network. The length of the acceleration and deceleration lanes was maximized to include the taper section as recommended for Vissim modeling.

The high - resolution aerials were also used to identify intersection layout, verify channelization patterns and to measure the length of the left and right turn storage bays. The entry links for arterials were extended to over half a mile to provide adequate distance for lane change maneuvers and ensure that all traffic demand entered the network.

Vehicle Models and Distribution

The North America Vehicle Models and Distributions developed by PTV America in January 2010 were adopted in this study. PTV America developed the vehicles distribution for cars and trucks based on vehicle sales data.

Speed Distribution

Speed distribution was developed based on posted speed limits. The speed distributions shown in **Table 4.3** were used. All speed distributions assumed an 85th percentile speed equal to the posted speed. The upper speed distribution limit was set to be 5 mph greater than the posted speed and the lower limit 5 mph lower than the posted speed. The upper speed represents free flow conditions. Trucks were modeled at a 5 mph lower speed than cars. Distributions for reduced speed areas were also developed for left turn movements, right turn movements and free or channelized right turns.

**Table 4.3
Speed Distribution Thresholds**

Facility or Function Type	Posted Speed (mph)	Lower Limit	85% Percentile	Upper Limit
Arterials	50	45	50	55
	45	40	45	50
	40	35	40	45
	35	30	35	40
	30	25	30	35
	25	20	25	30
	20	15	20	25
Left Turn Movement*	n/a	12	15	21
Right Turn Movement*	n/a	8	10	15
Free or Channelized Right Turn*	n/a	15	20	25

*Reduced Speed Area

Traffic Composition

The traffic composition (i.e., car and truck percentages) at entry links was derived from classification counts collected in mid - May 2019. For modeling purposes, two vehicle categories were created: cars and Heavy Goods Vehicles (HGV). HGV is a naming convention used in Vissim software. For purposes of this study, the term HGV is used interchangeably with truck. Peak period truck proportions varied based on facility. An average 2.5% peak hour truck percentage was utilized.

Vehicle Inputs

A four - hour analysis period was selected to ensure that traffic operations were accurately modeled. The factors shown in **Table 4.4** were developed using daily traffic counts to distribute the peak hour traffic throughout the peak period. A 30 - minute seeding period was coded. The second hour represented the peak hour. Traffic volumes were entered in 15 - minute increments as stochastic values.

**Table 4.4
Peak Period Vehicle Input Distributions**

Hour	AM Period		PM Period	
	Hourly Proportion ¹	Distribution	Hourly Proportion	Distribution
30 Minute Seeding		11.35% 13.51%		22.57% 22.88%
Hour 1	78.08%	16.42% 18.50% 21.40% 21.75%	95.87%	22.07% 24.02% 24.60% 25.19%
Hour 2 (Peak)	100.00%	24.40% 24.53% 25.08% 25.98%	100.00%	24.60% 25.46% 25.79% 24.15%
Hour 3	94.82%	23.93% 24.22% 24.30% 22.37%	89.86%	24.97% 22.18% 21.69% 21.02%
Hour 4	87.90%	22.51% 22.75% 22.25% 20.39%	67.46%	18.66% 16.35% 17.04% 15.40%

¹Percent of peak hour

The four-hour analysis period provided adequate time for congestion buildup and dissipation. According to approach counts collected for this study, the four-hour AM peak period is from 6 AM to 10 AM and PM peak period is from 3:45 PM to 7:45 PM. The second (2nd) hour is the peak hour with highest volumes during AM and PM peak periods. During the AM peak period, the peak hour

(2nd hour) is from 7 AM to 8 AM. During the PM peak period, the peak hour (2nd hour) is from 4:45 PM to 5:45 PM.

The model was checked to identify and correct coding errors. Inputs were reviewed as follows:

- Link and connectors’ geometry, lengths, number of lanes, and speeds were checked.
- Priority rules, conflict areas, reduced speed areas, signals and stop signs were verified.
- Driving behavior types were verified for arterials.
- Vehicle proportions at each entry point were checked.
- Turn proportions at intersections were checked.
- Traffic simulation was observed several times to assess the reasonableness of the microsimulation model.

4.2 CALIBRATION CRITERIA

The Vissim model was calibrated in accordance with the latest FDOT guidelines: FDOT Traffic Analysis Handbook: A Reference for Planning and Operations, March 2021. These criteria are presented in **Table 4.5** and were applied in this study.

**Table 4.5
Classical Model Calibration Targets**

Criteria and Measures	Calibration Acceptance Targets
Hourly Flows, Model Versus Observed	
Individual Link Flows	
Within 100 veh/h, for Flow < 700 veh/h	> 85% of cases
Within 15%, for 700 veh/h < Flow < 2700 veh/h	> 85% of cases
Within 400 veh/h, for Flow > 2700 veh/h	> 85% of cases
Sum of All Link Flows	Within 5% of sum of all link counts
GEH Statistic < 5 for Individual Link Flows	> 85% of cases
GEH Statistic for Sum of All Link Flows	GEH < 5 for sum of all link counts
Travel Times, Model Versus Observed	
Journey Times, Network	
Within 15% (or 1 min, if higher)	> 85% of cases
Visual Audits	
Individual Link Speeds	
Visually Acceptable Speed-Flow Relationship	To analyst's satisfaction
Bottlenecks	
Visually Acceptable Queuing	To analyst's satisfaction

Source: FDOT Traffic Analysis Handbook (2021)

The Geoffrey E. Havers (GEH) Statistic is a measure for comparing modeled and observed volumes which overcomes the inconsistencies inherent in comparing a wide range of volumes. The GEH is computed as follows:

$$GEH = \sqrt{\frac{2(M - C)^2}{M + C}}$$

Where:

- M: simulated traffic volume
- C: observed count

As displayed in **Table 4.5**, in terms of calibration of traffic flow, the acceptable threshold of the difference between actual traffic demand and simulated traffic volumes is within 100 vph (vehicles per hour) in case of volumes less than 700 vph. The acceptable threshold is within 15% in case of volumes between 700 vph and 2,700. In terms of calibration of travel times, the acceptable threshold of difference between field and simulated travel times is one (1) minute. In terms of GEH statistics, the acceptable threshold is five (5) minutes. If 85% of all cases, including traffic volumes, travel times, and GEH statistics, fall within acceptable thresholds, the model is considered satisfying calibration targets.

Driving Behavior Calibration

The factors that define driving behaviors in Vissim are generally classified as car following and lane change parameters. Five driving parameter sets were created for the arterials: basic, defensive, extra defensive, saturated, and saturated aggressive. The network model was calibrated by changing the default values for a few of these parameters within a reasonable range, as allowed in **Table 4.6** Vissim Model Calibration Parameters. The ideal flow rate is inherently adjusted to an actual flow in the network model depending on vehicle interactions, signal control, intersection geometry, truck proportion, proximity of adjacent intersections, etc. By default, arterials were coded with the basic arterial parameters. The defensive, extra defensive, saturated and saturated aggressive driving parameter sets were created by adjusting the basic arterial driving parameters to model congested traffic conditions along U.S. 41 (S.R. 45) and S.R. 54. Adjusted driver behavior parameters are contained in **Table 4.7**, Adjusted Driver Behavior Parameters.

Calibration of the model was based on traffic volumes, travel time, visual observations at select critical locations to ensure that it accurately represented field conditions.

**Table 4.6
Vissim Model Calibration Parameters**

	Default Value	Allowed Range
<i>Arterial Car Following</i>		
Average standstill distance	6.56 ft	>3.28 ft
Additive part of safety distance	2.00 ft	1 to 3.5 ft
Multiplicative part of safety distance	3.00 ft	2.00 to 4.500 ft
<i>Lane Change</i>		
Maximum deceleration	-13.12 ft/S ² (Own*) -9.84 ft/S ² (Trail*)	<-12 ft/S ² <-8 ft/S ²
-1 ft/S ² per distance	100 ft (Arterial)	>50 ft
Accepted deceleration	-3.28 ft/S ² (Own) -1.64 ft/S ² (Trail)	<-2.5 ft/S ² <-1.5 ft/S ²
Waiting time before diffusion	60 s	Use Default
Min. headway (front/rear)	1.64 ft	1.5 to 6 ft
Safety distance reduction factor	0.6	0.1 to 0.9
Max. deceleration for cooperative braking	-9.84 ft/S ²	-32.2 to -3 ft/S ²
Overtake reduced speed areas	Depends on field observations	
Advanced Merging	Checked	
Emergency stop	16.4 ft	Depends on field observations
Lane Change	656.2 ft	>656.2 ft
Reduction factor for changing lanes before Signal	0.6	default
Cooperative Lane change	Unchecked	Checked especially for freeway merge/diverge areas

Source: FDOT Traffic Analysis Handbook (2021)

Own*: a leading vehicle

Trail*: a vehicle follows a leading vehicle

**Table 4.7
Adjusted Driver Behavior Parameters**

Driver Behavior Parameters		Units	Default Value	Basic Arterial	Saturated Arterial	Saturated Aggressive	Defensive	Extra Defensive
Car Following	Average standstill distance	ft	6.56	6.56	6.56	5	10	15
	Additive part of safety distance	ft	2.00	2.00	2.5	1	3.5	3.5
	Multiplicative part of safety distance	ft	3.00	3.00	3.5	2	4.5	4.5
Lane Change	Max deceleration (Own)	ft/s ²	-13.12	-13.12	-13.12	-13.12	-12	-12
	Max deceleration (Trailing)	ft/s ²	-9.84	-9.84	-9.84	-9.84	-8	-8
	-1ft/s ² per distance	ft	100	100	100	100	100	150
	Accepted deceleration (Own)	ft/s ²	-3.28	-3.28	-3.28	-3.28	-2.5	-2.5
	Accepted deceleration (Trailing)	ft/s ²	-3.28	-3.28	-3.28	-3.28	-1.5	-1.5
	Min.net headway (front to rear)	ft	1.64	1.64	1.64	1.64	6	6
	Max deceleration for cooperative braking	ft/s ²	-9.84	-9.84	-9.84	-9.84	-4	-3
	Cooperative lane change		No	No	No	Yes	No	No

4.4 TRAFFIC VOLUME CALIBRATION

Field - collected traffic volume data was utilized to calibrate the model’s intersection throughput. The raw traffic data was balanced along the corridor to develop a set of traffic volumes for each hour within the AM and PM peak periods.

In the model, a combination of nodes and data collection points were used to collect traffic volumes. Nodes were used to collect traffic volumes at intersections and data collection points were used to collect volumes at midblock points of U.S. 41 (S.R. 45) and S.R. 54 segments.

Due to the stochastic nature of microsimulation models, the results from individual runs can vary and may have a higher standard deviation for facilities operating at or near capacity. Thus, it is necessary to perform multiple runs with different random seeds to gain an accurate reflection of the performance of the model. Vissim has a multiple run capability where the user can specify the initial random seed number, number of runs, and increments for the random seed in each of the multiple runs. In this project, all results were based on the average of ten (10) multiple runs with different random seeds.

The average throughput results from the model were compared to the balanced existing traffic volumes. Through successive iterations and adjustments of parameters within the reasonable ranges

the differences between model and balanced field volumes were reduced until they fell within the desired thresholds.

A summary of calibration results for intersections during the AM and PM peak hours is presented in **Table 4.8** and **4.9**.

As displayed in Tables **4.8** and **4.9**, a total of forty-five (45) movements were assessed for calibration. For movements with volumes less than 700 vph, the acceptable threshold is 100 vph. For movements with volumes between 700 and 2,700 vph, the acceptable threshold is 15%. All the movements fall into the acceptable range and satisfy the GEH test. Therefore, the volumes for intersections are considered satisfying the calibration targets.

A summary of calibration results for roadway segments during the AM and PM peak hours are presented in **Table 4.10** and **4.11**.

Table 4.8
Vissim Intersection Calibration Results– Existing Year 2019 AM Peak Hour

Intersection	Movement	AM Raw Data (VPH)	AM Simulated (VPH)	Difference in Volume (Flow < 700 vph)	Difference in percentage (700<Flow<2,700 vph)	GEH
U.S. 41 (S.R. 45) and S.R. 54	Overall	7877	7536	341		3.9
	SBLT	396	389	7		0.4
	SBTH	1602	1539		4%	1.6
	SBRT	222	213	9		0.6
	NBLT	357	313	44		2.4
	NBTH	601	594	7		0.3
	NBRT	475	476	-1		0.0
	EBLT	137	121	16		1.4
	EBUT	6	6	0		0.0
	EBTH	1324	1206		9%	3.3
	EBRT	502	438	64		3.0
	WBLT	583	569	14		0.6
	WBUT	3	2	1		0.6
	WBTH	1299	1304		0%	0.1
WBRT	370	366	4		0.2	
S.R. 54 and Lowe's/Village Lakes Plaza Driveway	Overall	4582	4433	149		2.2
	SBLT	49	48	1		0.1
	SBTH	6	6	0		0.0
	SBRT	9	10	-1		0.3
	NBLT	49	47	2		0.3
	NBTH	2	3	-1		0.6
	NBRT	26	25	1		0.2
	EBLT	30	27	3		0.6
	EBUT	3	3	0		0.0
	EBTH	2106	1979		6%	2.8
	EBRT	56	50	6		0.8
	WBLT	35	34	1		0.2
	WBUT	2	2	0		0.0
	WBTH	2197	2188		0%	0.2
WBRT	12	11	1		0.3	
U.S. 41 (S.R. 45) and Dale Mabry Highway	Overall	2006	1934	72		1.6
	SBTH	1237	1164		6%	2.1
	NBTH	747	748		0%	0.0
	NBRT	22	22	0		0.0
U.S. 41 (S.R. 45) and Walmart Way	Overall	2016	1936	80		1.8
	SBTH	1209	1136		6%	2.1
	SBRT	50	44	6		0.9
	NBLT	27	27	0		0.0
	NBTH	646	641	5		0.2
	EBLT	40	42	-2		0.3
EBRT	44	46	-2		0.3	
Dale Mabry Highway and Walmart Way	Overall	2287	2239	48		1.0
	SBTH	1447	1395		4%	1.4
	SBRT	3	0	3		2.4
	NBTH	732	737		-1%	0.2
	NBLT	1	1	0		0.0
	NBUT	4	4	0		0.0
	NBRT	62	66	-4		0.5
	EBRT	1	1	0		0.0
WBRT	37	35	2		0.3	

Table 4.9
Vissim Intersection Calibration Results– Existing Year 2019 PM Peak Hour

Intersection	Movement	PM Raw Data (VPH)	PM Simulated (VPH)	Difference in Volume (Flow < 700 vph)	Difference in percentage (700<Flow<2,700 vph)	GEH
U.S. 41 (S.R. 45) and S.R. 54	Overall	8736	8633	103		1.1
	SBLT	496	502	-6		0.3
	SBTH	851	850		0%	0.0
	SBRT	235	236	-1		0.1
	NBLT	829	834		1%	0.2
	NBTH	1405	1380		-2%	0.7
	NBRT	895	896		0%	0.0
	EBLT	288	277	11		0.7
	EBUT	0	0	0		0.0
	EBTH	1201	1166		-3%	1.0
	EBRT	355	332	23		1.2
	WBLT	459	459	0		0.0
	WBUT	6	5	1		0.4
	WBTH	1420	1403		-1%	0.5
WBRT	296	293	3		0.2	
S.R. 54 and Lowe's/Village Lakes Plaza Driveway	Overall	5096	5017	79		1.1
	SBLT	130	129	1		0.1
	SBTH	7	8	-1		0.4
	SBRT	96	93	3		0.3
	NBLT	90	85	5		0.5
	NBTH	12	11	1		0.3
	NBRT	77	79	-2		0.2
	EBLT	104	104	0		0.0
	EBUT	10	10	0		0.0
	EBTH	2385	2344		-2%	0.8
	EBRT	99	97	2		0.2
	WBLT	50	45	5		0.7
	WBUT	10	10	0		0.0
	WBTH	1995	1973		-1%	0.5
WBRT	31	29	2		0.4	
U.S. 41 (S.R. 45) and Dale Mabry Highway	Overall	2270	2282	-12		0.3
	SBTH	728	709		-3%	0.7
	NBTH	1509	1536		2%	0.7
	NBRT	33	37	-4		0.7
U.S. 41 (S.R. 45) and Walmart Way	Overall	2638	2623	15		0.3
	SBTH	510	506	4		0.2
	SBRT	251	246	5		0.3
	NBLT	120	126	-6		0.5
	NBTH	1428	1415		-1%	0.3
	EBLT	194	198	-4		0.3
EBRT	135	132	3		0.3	
Dale Mabry Highway and Walmart Way	Overall	2734	2732	2		0.0
	SBTH	936	923		-1%	0.4
	SBRT	3	0	3		2.4
	NBTH	1385	1400		1%	0.4
	NBLT	5	5	0		0.0
	NBUT	16	16	0		0.0
	NBRT	188	184	4		0.3
	EBRT	44	44	0		0.0
WBRT	157	160	-3		0.2	

Table 4.10
Vissim Segments Calibration Results– Existing 2019 AM Peak Hour

Roadway	From	To	Dir.	Traffic Demand(vph)	Traffic Simulated(vph)	GEH
S.R. 54	West	U.S. 41 (S.R. 45)	EB	1963	1872	2.1
S.R. 54	U.S. 41 (S.R. 45)	East	EB	2195	2068	2.8
S.R. 54	East	U.S. 41 (S.R. 45)	WB	2255	2248	0.1
S.R. 54	U.S. 41 (S.R. 45)	West	WB	1878	1831	1.1
U.S. 41 (S.R. 45)	South	Walmart	NB	673	668	0.2
U.S. 41 (S.R. 45)	Walmart	Dale Mabry Highway	NB	686	683	0.1
U.S. 41 (S.R. 45)	Dale Mabry Highway	S.R. 54	NB	1433	1423	0.3
U.S. 41 (S.R. 45)	S.R. 54	North	NB	1108	1083	0.8
U.S. 41 (S.R. 45)	North	S.R. 54	SB	2220	2206	0.3
U.S. 41 (S.R. 45)	S.R. 54	Dale Mabry Highway	SB	2687	2555	2.6
U.S. 41 (S.R. 45)	Dale Mabry Highway	Walmart	SB	1259	1173	2.5
U.S. 41 (S.R. 45)	Walmart	South	SB	1253	1183	2.0
Dale Mabry Highway	South	Walmart	NB	799	807	0.3
Dale Mabry Highway	Walmart	U.S. 41 (S.R. 45)	NB	769	772	0.1
Dale Mabry Highway	U.S. 41 (S.R. 45)	Walmart	SB	1450	1394	1.5
Dale Mabry Highway	Walmart	South	SB	1448	1401	1.2
			SUM	24076	23367	4.6

Table 4.11
Vissim Segments Calibration Results– Existing 2019 PM Peak Hour

Roadway	From	To	Dir.	Traffic Demand(vph)	Traffic Simulated(vph)	GEH
S.R. 54	West	U.S. 41 (S.R. 45)	EB	1844	1831	0.3
S.R. 54	U.S. 41 (S.R. 45)	East	EB	2598	2557	0.8
S.R. 54	East	U.S. 41 (S.R. 45)	WB	2181	2164	0.4
S.R. 54	U.S. 41 (S.R. 45)	West	WB	2484	2495	0.2
U.S. 41 (S.R. 45)	South	Walmart	NB	1548	1543	0.1
U.S. 41 (S.R. 45)	Walmart	Dale Mabry Highway	NB	1622	1616	0.1
U.S. 41 (S.R. 45)	Dale Mabry Highway	S.R. 54	NB	3131	3139	0.1
U.S. 41 (S.R. 45)	S.R. 54	North	NB	1989	1950	0.9
U.S. 41 (S.R. 45)	North	S.R. 54	SB	1582	1581	0.0
U.S. 41 (S.R. 45)	S.R. 54	Dale Mabry Highway	SB	1667	1646	0.5
U.S. 41 (S.R. 45)	Dale Mabry Highway	Walmart	SB	761	747	0.5
U.S. 41 (S.R. 45)	Walmart	South	SB	645	639	0.2
Dale Mabry Highway	South	Walmart	NB	1594	1606	0.3
Dale Mabry Highway	Walmart	U.S. 41 (S.R. 45)	NB	1542	1560	0.5
Dale Mabry Highway	U.S. 41 (S.R. 45)	Walmart	SB	939	923	0.5
Dale Mabry Highway	Walmart	South	SB	980	989	0.3
			SUM	27107	26986	0.7

As displayed in **Tables 4.10** and **4.11**, each individual roadway segment falls into the acceptable range and satisfies the GEH test. The GEH statistics for the combined volume on all roadway segments are smaller than 5.0, which also satisfies the criteria target. Therefore, the volumes for roadway segments are considered satisfying the calibration targets.

4.5 TRAVEL TIME CALIBRATION

The average travel times collected from field data were utilized in the calibration process to compare with simulated travel times derived from Vissim simulations.

The travel time results from Vissim were compared with field collected data during the calibration process. The model parameters were adjusted within reasonable ranges through several iterations until the model travel times were within one minute of the observed (field collected) travel time.

Table 4.12 and **4.13** summarize the travel time comparisons between model and field data for the AM and PM peak hours respectively.

Table 4.12
Travel Time Comparisons - Existing 2019 AM Peak Hour Conditions

	From	To	Sim. Peak Hour Travel Time (Seconds)	Peak Hour Field Time (Seconds)	Difference (Seconds)
S.R. 54 WB	Daiquiri Lane	Devonoak Blvd.	161	220	(59)
S.R. 54 EB	Devonoak Blvd.	Daiquiri Lane	312	359	(47)
U.S. 41 (S.R. 45) NB	Northwood Dr.	Morgan Road	214	217	(3)
U.S. 41 (S.R. 45) SB	Morgan Road	Northwood Dr.	261	301	(40)

Table 4.13
Travel Time Comparisons - Existing 2019 AM Peak Hour Conditions

	From	To	Sim. Peak Hour Travel Time (Seconds)	Peak Hour Field Time (Seconds)	Difference (Seconds)
S.R. 54 WB	Daiquiri Lane	Devonoak Blvd.	277	334	(57)
S.R. 54 EB	Devonoak Blvd.	Daiquiri Lane	307	284	23
U.S. 41 (S.R. 45) NB	Northwood Dr.	Morgan Road	244	255	(11)
U.S. 41 (S.R. 45) SB	Morgan Road	Northwood Dr.	248	299	(51)

4.6 VISUAL OBSERVATIONS

Visual observations of the Vissim simulation during 4-hour peak periods evidenced buildup and dissipation of congestion consistent with observations made in the field. Traffic simulations during the AM and PM peak hours generally match the field traffic conditions as documented in *Section 4.1* Traffic Data Collection.

The intersection of U.S. 41 (S.R. 45) and S.R. 54 is experiencing severe congestion during the AM and PM peak hours. The queue length along westbound approach is considerably longer during the PM

peak hour than the AM peak hour. During the PM peak hours, weaving activities from U.S. 41 and Dale Mabry Highway northbound approaches cause severe congestion along U.S. 41, located north of the apex intersection with Dale Mabry Highway.

4.7 CALIBRATION ACCEPTANCE

The calibrated model results for both existing AM and PM conditions indicate that all three calibration criteria including simulated volumes, travel times, and visual observations are satisfied. Therefore, it can be concluded that the calibrated model reasonably depicts existing traffic operations, and it can be used to evaluate future alternatives.

4.8 EXISTING TRAFFIC OPERATION PERFORMANCE

4.8.1 Existing Traffic Operation Based on Raw Counts

This section summarizes the Vissim output and traffic operational results for the intersections. The results presented in this section correspond to traffic counts collected during the AM and PM peak hours.

The second (2nd) hour is the peak hour with highest volumes during the AM and PM peak periods; however, the congestion continues to grow into the third (3rd) hour. Measures of effectiveness, including delay, levels of service, and maximum queue lengths derived from Vissim simulations were reported in **Tables 4.14** thru **4.17** for the peak hour (2nd) and the 3rd hour under the existing conditions. As displayed in Table 4.16, during the third (3rd) hour in the AM peak period, the intersection of U.S. 41 and S.R. 54 is experiencing severe congestion with level of service F. Especially, the maximum queue along eastbound can extend over a mile. During the PM peak period, the intersection of U.S. 41 (S.R. 45) and S.R. 54 is also experiencing severe congestion. The maximum westbound queue extends beyond the intersection with Lowe's/Village Lakes Plaza Driveway. Occurrences of extremely long queues along S.R. 54 from Vissim simulation are also corroborated by field observations, as described in *Section 4.1* Traffic Data Collection.

A comparison of maximum queue lengths at the intersection of U.S. 41 and S.R. 54 derived from the Vissim simulation versus the field observations is displayed in **Tables 4.18** and **4.19**. In this study, a quantitative comparison of model and real - world queues was not performed. In general, the simulated queue lengths match the field observations.

Three calibration criteria, including simulated volumes, travel times, and visual observations were evaluated and all three were satisfied. Therefore, it was concluded that the calibrated model reasonably depicts existing traffic operations, and it can be used to evaluate future alternatives.

Table 4.14
Existing Conditions AM Peak Hour (2nd) Vissim Intersection Performance

Intersection	Movement	AM Volume (VPH) Demand	Delay (Seconds)	Level of Service	Max Queue Length (Feet)
U.S. 41 (S.R. 45) and S.R. 54	Overall	7877	110	F	
	SBLT	396	104	F	397
	SBTH	1602	94	F	1722
	SBRT	222	40	D	114
	NBLT	357	321	F	932
	NBTH	601	88	F	498
	NBRT	475	6	A	137
	EBLT	137	215	F	171
	EBUT	6	197	F	171
	EBTH	1324	204	F	4441
	EBRT	502	155	F	34
	WBLT	583	89	F	491
	WBUT	3	103	F	491
	WBTH	1299	46	D	900
WBRT	370	7	A	151	
S.R. 54 and Lowe's/Village Lakes Plaza Driveway	Overall	4582	9	A	
	SBLT	49	86	F	150
	SBTH	6	10	B	150
	SBRT	9	11	B	150
	NBLT	49	87	F	96
	NBTH	2	78	E	96
	NBRT	26	12	B	94
	EBLT	30	7	A	30
	EBUT	3	14	B	30
	EBTH	2106	5	A	324
	EBRT	56	7	A	324
	WBLT	35	7	A	44
	WBUT	2	8	A	44
	WBTH	2197	9	A	754
WBRT	12	7	A	766	
U.S. 41 (S.R. 45) and Dale Mabry Highway	Overall	2006	28	C	
	SBTH	1237	27	C	336
	NBTH	747	31	C	438
	NBRT	22	7	A	71
U.S. 41 (S.R. 45) and Walmart Way	Overall	2016	5	A	
	SBTH	1209	2	A	97
	SBRT	50	4	A	38
	NBLT	27	4	A	36
	NBTH	646	4	A	108
	EBLT	40	47	D	100
EBRT	44	52	D	102	
Dale Mabry Highway and Walmart Way	Overall	2287	1	A	
	SBTH	1447	1	A	0
	SBRT	3	0	A	0
	NBTH	732	0	A	3
	NBLT	1	1	A	0
	NBUT	4	3	A	11
	NBRT	62	1	A	3
	EBRT	1	10	B	27
WBRT	37	13	B	104	

Table 4.15
Existing Conditions PM Peak Hour (2nd) Vissim Intersection Performance

Intersection	Movement	PM Volume (VPH) Demand	Delay (Seconds)	Level of Service	Max Queue Length (Feet)
U.S. 41 (S.R. 45) and S.R. 54	Overall	8736	110	F	
	SBLT	496	112	F	863
	SBTH	851	101	F	947
	SBRT	235	26	C	132
	NBLT	829	107	F	605
	NBTH	1405	103	F	718
	NBRT	895	30	C	0
	EBLT	288	183	F	260
	EBUT	0	0	A	260
	EBTH	1201	193	F	2509
	EBRT	355	129	F	17
	WBLT	459	96	F	356
	WBUT	6	86	F	356
	WBTH	1420	113	F	1767
WBRT	296	55	E	181	
S.R. 54 and Lowe's/Village Lakes Plaza Driveway	Overall	5096	32	C	
	SBLT	130	76	E	243
	SBTH	7	18	B	243
	SBRT	96	34	C	243
	NBLT	90	75	E	127
	NBTH	12	75	E	127
	NBRT	77	12	B	116
	EBLT	104	12	B	126
	EBUT	10	36	D	126
	EBTH	2385	9	A	436
	EBRT	99	2	A	436
	WBLT	50	28	C	62
	WBUT	10	40	D	62
	WBTH	1995	56	E	1607
WBRT	31	39	D	1619	
U.S. 41 (S.R. 45) and Dale Mabry Highway	Overall	2270	50	D	
	SBTH	728	42	D	362
	NBTH	1509	55	E	1181
	NBRT	33	14	B	76
U.S. 41 (S.R. 45) and Walmart Way	Overall	2638	19	B	
	SBTH	510	2	A	118
	SBRT	251	29	C	185
	NBLT	120	20	B	113
	NBTH	1428	9	A	335
	EBLT	194	84	F	531
	EBRT	135	82	F	333
Dale Mabry Highway and Walmart Way	Overall	2734	2	A	
	SBTH	936	1	A	0
	SBRT	3	0	A	0
	NBTH	1385	1	A	53
	NBLT	5	1	A	0
	NBUT	16	3	A	29
	NBRT	188	1	A	53
	EBRT	44	10	A	96
WBRT	157	18	B	130	

Table 4.16
Existing Conditions AM (3rd) Vissim Intersection Performance

Intersection	Movement	AM Volume (VPH) Demand	Delay (Seconds)	Level of Service	Max Queue Length (Feet)
U.S. 41 (S.R. 45) and S.R. 54	Overall	7470	162	F	
	SBLT	375	106	F	325
	SBTH	1519	99	F	1753
	SBRT	211	43	D	124
	NBLT	339	604	F	1268
	NBTH	570	89	F	458
	NBRT	450	6	A	287
	EBLT	130	359	F	178
	EBUT	6	357	F	178
	EBTH	1255	360	F	6504
	EBRT	476	303	F	23
	WBLT	553	86	F	503
	WBUT	3	85	F	503
	WBTH	1232	46	D	840
WBRT	351	6	A	155	
S.R. 54 and Lowe's/Village Lakes Plaza Driveway	Overall	4344	9	A	
	SBLT	46	91	F	147
	SBTH	6	9	A	147
	SBRT	9	11	B	147
	NBLT	46	94	F	93
	NBTH	2	99	F	93
	NBRT	25	12	B	86
	EBLT	28	8	A	39
	EBUT	3	15	B	39
	EBTH	1997	5	A	252
	EBRT	53	5	A	252
	WBLT	33	7	A	47
	WBUT	2	10	B	47
	WBTH	2083	9	A	702
WBRT	11	6	A	714	
U.S. 41 (S.R. 45) and Dale Mabry Highway	Overall	1902	28	C	
	SBTH	1173	27	C	303
	NBTH	708	31	C	421
	NBRT	21	8	A	67
U.S. 41 (S.R. 45) and Walmart Way	Overall	1912	5	A	
	SBTH	1146	2	A	94
	SBRT	47	4	A	37
	NBLT	26	4	A	36
	NBTH	613	4	A	109
	EBLT	38	51	D	86
	EBRT	42	51	D	100
Dale Mabry Highway and Walmart Way	Overall	2169	1	A	
	SBTH	1372	1	A	0
	SBRT	3	0	A	0
	NBTH	694	0	A	0
	NBLT	1	1	A	0
	NBUT	4	4	A	14
	NBRT	59	1	A	0
	EBRT	1	11	B	36
WBRT	35	13	B	103	

Table 4.17
Existing Conditions PM (3rd) Vissim Intersection Performance

Intersection	Movement	PM Volume (VPH) Demand	Delay (Seconds)	Level of Service	Max Queue Length (Feet)
U.S. 41 (S.R. 45) and S.R. 54	Overall	7850	98	F	
	SBLT	446	93	F	638
	SBTH	765	75	E	556
	SBRT	211	10	A	122
	NBLT	745	99	F	813
	NBTH	1263	90	F	671
	NBRT	804	21	C	8
	EBLT	259	192	F	281
	EBUT	0	0	A	281
	EBTH	1079	192	F	2496
	EBRT	319	126	F	33
	WBLT	412	88	F	339
	WBUT	5	89	F	339
	WBTH	1276	94	F	1750
WBRT	266	42	D	172	
S.R. 54 and Lowe's/Village Lakes Plaza Driveway	Overall	4579	28	C	
	SBLT	117	77	E	237
	SBTH	6	16	B	237
	SBRT	86	24	C	237
	NBLT	81	81	F	128
	NBTH	11	76	E	128
	NBRT	69	11	B	116
	EBLT	93	9	A	96
	EBUT	9	33	C	96
	EBTH	2143	9	A	345
	EBRT	89	2	A	345
	WBLT	45	27	C	56
	WBUT	9	26	C	56
	WBTH	1793	48	D	1459
WBRT	28	36	D	1470	
U.S. 41 (S.R. 45) and Dale Mabry Highway	Overall	2040	42	D	
	SBTH	654	41	D	364
	NBTH	1356	44	D	992
	NBRT	30	11	B	71
U.S. 41 (S.R. 45) and Walmart Way	Overall	2370	18	B	
	SBTH	458	2	A	95
	SBRT	226	26	C	179
	NBLT	108	17	B	89
	NBTH	1283	7	A	294
	EBLT	174	84	F	409
	EBRT	121	83	F	346
Dale Mabry Highway and Walmart Way	Overall	2457	2	A	
	SBTH	841	0	A	0
	SBRT	3	0	A	0
	NBTH	1245	1	A	28
	NBLT	4	1	A	0
	NBUT	14	2	A	27
	NBRT	169	1	A	28
	EBRT	40	10	A	92
WBRT	141	17	B	134	

Table 4.18
Comparison of Queue Lengths of Vissim vs. Field 2019 AM Peak Period
Intersection of U.S.41 and S.R.54

Direction.	Storage Length (Feet)	Vissim Max Queue Length (Feet)*	Max Queue Length/Field Observation (Feet)
Northbound Left	835	1,268	1,450
Northbound through ¹	-	498	
Northbound Right ¹	-	287	
Southbound Left	465	397	2,150
Southbound Through ¹	-	1,753	
Southbound Right	345	124	
Eastbound Left	510	178	6,140
Eastbound Through ¹	-	6,504	
Eastbound Right	280	34	
Westbound Right	375	155	700
Westbound Through ¹	-	840	
Westbound Left	800	503	

* Longest Queue during the peak period ¹Continuous lane with long storage

Table 4.19
Comparison of Queue Lengths of Vissim vs. Field 2019 PM Peak Period
Intersection of U.S.41 and S.R.54

Direction	Storage Length (Feet)	Vissim Max Queue Length (Feet)*	Field Observation (Feet)
Northbound Left	835	605	800
Northbound through ¹	-	718	
Northbound Right ¹	-	0	
Southbound Left	465	863	950
Southbound Through ¹	-	947	
Southbound Right	345	132	
Eastbound Left	510	281	2,400
Eastbound Through ¹	-	2,509	
Eastbound Right	280	33	
Westbound Right	375	181	1,600
Westbound Through ¹	-	1,767	
Westbound Left	800	356	

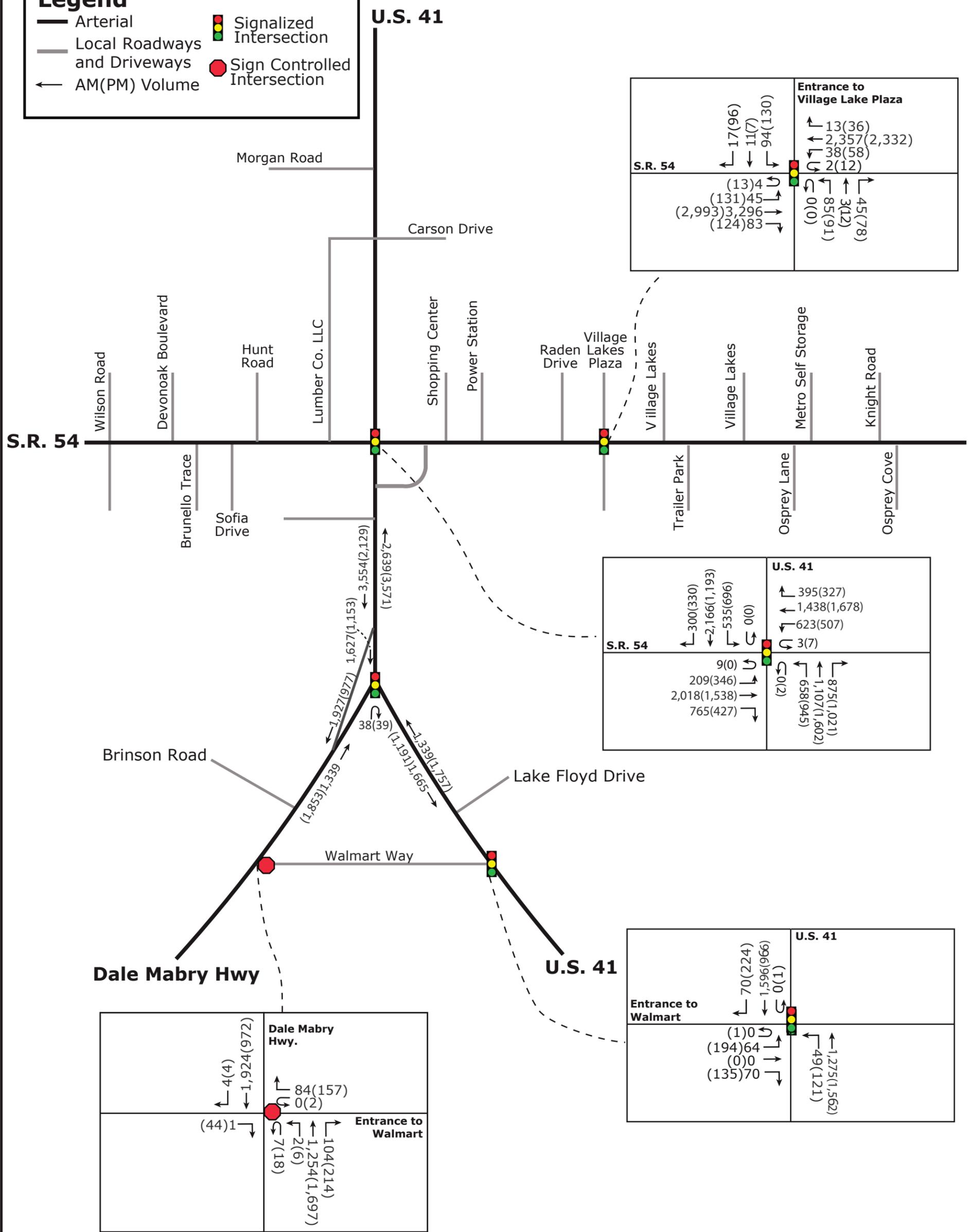
* Longest Queue during the peak period ¹Continuous lane with long storage

4.8.2 Existing Traffic Operations based on DDHVs

In addition to the evaluation of the existing conditions with raw traffic counts, the existing conditions were also evaluated using the DDHVs. The existing conditions with DDHVs represent conditions with existing traffic demand instead of traffic counts. Measures of Effectiveness (MOE) including delay per vehicle, LOS, maximum queue lengths were summarized for major intersections in the study area. As displayed in **Tables 4.20** and **4.21**, during the AM peak hour, the delay per vehicle for the intersection of U.S. 41 and S.R. 54 is 286 seconds with LOS F. During the PM peak hour, the delay per vehicle is 258 seconds with LOS F. The DDHVs for the existing conditions can be found in **Figure 4.2**.

Legend

-  Arterial
-  Local Roadways and Driveways
-  AM(PM) Volume
-  Signalized Intersection
-  Sign Controlled Intersection



**U.S. 41 (S.R. 45) at S.R. 54
PD&E STUDY**

Existing Directional Design Hour Volumes

**Figure
4.2**

Table 4.20
Existing Conditions w/DDHVs - AM Peak Hour Vissim Intersection Performance

Intersection	Movement	AM Volume (VPH) Demand	Delay (Seconds)	Level of Service	Max Queue Length (Feet)
U.S. 41 (S.R. 45) and S.R. 54	Overall	11101	286	F	
	SBLT	535	282	F	1076
	SBTH	2166	279	F	5589
	SBRT	300	221	F	142
	NBLT	658	1116	F	2897
	NBTH	1107	290	F	1587
	NBRT	875	89	F	1889
	EBLT	209	376	F	164
	EBTH	2018	377	F	6800
	EBRT	765	316	F	24
	WBLT	623	96	F	489
	WBTH	1438	51	D	1355
WBRT	395	11	B	189	
S.R. 54 and Lowe's/Village Lakes Plaza Driveway	Overall	6093	11	B	
	SBLT	94	86	F	225
	SBTH	11	10	B	225
	SBRT	17	15	B	225
	NBLT	85	87	F	135
	NBTH	3	76	E	135
	NBRT	45	14	B	105
	EBLT	45	7	A	42
	EBTH	3296	6	A	366
	EBRT	83	5	A	366
	WBLT	38	12	B	69
	WBTH	2357	14	B	1026
WBRT	13	14	B	1038	
U.S. 41 (S.R. 45) and Dale Mabry Highway	Overall	2966	456	F	
	SBTH	1627	31	C	310
	NBTH	1301	984	F	2734
	NBRT	38	566	F	67
U.S. 41 (S.R. 45) and Walmart Way	Overall	3187	5	A	
	SBTH	1596	2	A	111
	SBRT	70	4	A	40
	NBLT	49	4	A	60
	NBTH	1275	5	A	211
	EBLT	64	41	D	116
EBRT	70	43	D	158	
Dale Mabry Highway and Walmart Way	Overall	3380	404	F	
	SBTH	1924	1	A	0
	SBRT	4	0	A	0
	NBTH	1254	934	F	2573
	NBLT	2	638	F	0
	NBRT	104	698	F	2573
	EBRT	1	11	B	21
WBRT	84	970	F	410	

Table 4.21
Existing Conditions w/DDHVs - PM Peak Hour Vissim Intersection Performance

Intersection	Movement	PM Volume (VPH) Demand	Delay (Seconds)	Level of Service	Max Queue Length (Feet)
U.S. 41 (S.R. 45) and S.R. 54	Overall	10617	258	F	
	SBLT	696	515	F	5612
	SBTH	1193	422	F	5610
	SBRT	330	317	F	256
	NBLT	945	172	F	653
	NBTH	1602	161	F	627
	NBRT	1021	97	F	0
	EBLT	346	414	F	275
	EBTH	1538	433	F	6818
	EBRT	427	362	F	14
	WBLT	507	105	F	323
	WBTH	1678	127	F	1791
	WBRT	327	69	E	190
S.R. 54 and Lowe's/Village Lakes Plaza Driveway	Overall	6113	114	F	
	SBLT	130	76	E	251
	SBTH	7	26	C	251
	SBRT	96	44	D	251
	NBLT	91	78	E	129
	NBTH	12	72	E	129
	NBRT	78	11	B	113
	EBLT	131	12	B	118
	EBTH	2993	9	A	271
	EBRT	124	3	A	271
	WBLT	58	209	F	35
	WBTH	2332	265	F	6007
	WBRT	36	238	F	6019
U.S. 41 (S.R. 45) and Dale Mabry Highway	Overall	2492	210	F	
	SBTH	1153	43	D	570
	NBTH	1814	359	F	2694
	NBRT	39	187	F	72
U.S. 41 (S.R. 45) and Walmart Way	Overall	3396	42	D	
	SBTH	966	4	A	320
	SBRT	224	18	B	156
	NBLT	121	26	C	109
	NBTH	1562	59	E	1441
	EBLT	194	94	F	304
Dale Mabry Highway and Walmart Way	Overall	3112	516	F	
	SBTH	972	0	A	0
	SBRT	4	0	A	0
	NBTH	1697	542	F	2585
	NBLT	6	311	F	0
	NBRT	214	366	F	2585
	EBRT	44	10	A	105
WBRT	157	3150	F	426	

Network-wide statistics during the AM (6:00 to 10:00 AM) and PM (3:45 to 7:45 PM) peak periods for the existing conditions with DDHVs are listed in **Table 4.22**.

Table 4.22
2019 Existing Conditions w/DDHVs Network Performance Statistics

Statistics	Year 2019	
	AM Peak Period	PM Peak Period
Total travel time [hour]	7,220	9,352
Total delay time [hour]	5,399	7,386
Average delay time[second]	552.7	673
Average speed [mph]	12	10
Percent demand served	82%	92%

As shown in **Table 4.22**, during the AM peak period, the unmet demand is 18% and the network-wide average speed is 12 mph. During the PM peak period, the unmet demand is 8% and the network-wide average speed is 10 mph. It is evident that some improvements are needed to accommodate the actual traffic demand.

5.1 TRAVEL DEMAND MODEL

This section provides information on the development of traffic forecasts from the Travel Demand Model Development Report approved by FDOT in September 2019 which is provided in **Appendix D**.

5.1.1 Travel Demand Model Version

The available version of the TBRPM v8.2 was utilized to develop the future year daily traffic projections for this project. The calibration and validation of travel demand models is essential to accurately predict future traffic conditions. The model calibration process adjusts parameter values until the predicted travel matches the observed travel within the study area for the base year. For purposes of travel demand forecasting, it is assumed these parameters will remain constant over time. Based on the results of the TBRPM review, validation was conducted to further refine the traffic forecasting capabilities of the model in the study area.

5.1.2 Model Calibration and Validation

This study adopted the TBRPM v8.2 with base year 2010 and horizon year 2040. TBRPM uses Cube-Voyager as the Florida Standard Urban Transportation Model Structure (FSUTMS) modeling platform for highway and transit travel estimation. The modeling efforts focused on 2010 base year calibration included but is not limited to the following items:

- Verified 2010 socioeconomic data and highway network.
- Reviewed speed, capacity, and facility types.
- Reviewed the reasonableness of trip distribution and assignment.
- Adjusted model to represent reasonable path building.

As shown in **Table 5.1**, the travel demand model overrepresented traffic on U.S. 41 (S.R. 45) to the south of S.R. 54 by 15%, while it showed 14% lower than the 2010 traffic count to the north of S.R. 54. Model overrepresented traffic along S.R. 54 by 5% to the east of U.S. 41 (S.R. 45), and underrepresented traffic by 10% to the west of U.S. 41 (S.R. 45).

At a corridor level, the base year (2010) model generated lower traffic than counts (year 2010) along S.R. 54 between U.S. 41 (S.R. 45) and Suncoast Parkway. Also, the model capacity of S.R. 54 along this section was lower than capacity along S.R. 54 between U.S. 41 (S.R.54) and Bexley Village Drive. The volume to count ratio along U.S. 41 (S.R. 45) between S.R. 54 and County Line Road was over 1.0. Areawide average V/C ratio is 0.96. County Line Road between Dale Mabry Highway and U.S. 41 (S.R. 45) have a model volume lower than 18.75%, Willow Bend Parkway between U.S. 41 (S.R. 45) and Collier Parkway have a model volume lower than 12.72% and Willow Bend Parkway between County Line Road and Bell Lake Road have model volume lower than 40%. **Table 5.2** illustrates the volume to count ratio at the corridor level before calibration.

Table 5.1
Volume to Count Ratio at Intersection of U.S. 41 (S.R. 45) and S.R. 54 – Base Year 2010 (before calibration)

U.S. 41 (S.R. 45) and S.R. 54 Intersection	Model Volume (PSWADT)	Model Count (PSWADT)	Volume/Count Ratio
U.S. 41 (S.R. 45), North of S.R. 54	40,300	47,000	0.86
U.S. 41 (S.R. 45), South of S.R. 54	67,200	58,500	1.15
S.R. 54, East of U.S. 41 (S.R. 45)	58,900	56,000	1.05
S.R. 54, West of U.S. 41 (S.R. 45)	42,900	47,500	0.90

Note: PSWADT – Peak Season Weekday Average Daily Traffic

Table 5.2
Volume to Count Ratio at Corridor Level – Base Year 2010 (before calibration)

Corridors	Model Volume (PSWADT)	Model Count (PSWADT)	Volume/Count Ratio
S.R. 54 between U.S. 41 (S.R. 45) and Bexley Village Drive	39,600	43,670	0.91
Lutz Lake Fern Road between Suncoast Parkway and Dale Mabry Highway	19,200	13,500	1.42
Dale Mabry Highway between U.S. 41 (S.R. 45) and County Line Road	30,400	30,250	1.0
U.S. 41 (S.R. 45) between S.R. 54 and County Line Road	50,000	45,000	1.11
County Line Road between Dale Mabry Highway and U.S. 41 (S.R. 45)	7,800	9,600	0.81
Willow Bend Parkway between U.S. 41 (S.R. 45) and Collier Parkway	9,600	11,000	0.87
Willow Bend Parkway between County Line Road and Bell Lake Road	10,100	16,840	0.60
Areawide Average V/C Ratio			0.96

Note: PSWADT – Peak Season Weekday Average Daily Traffic

Model validation was conducted to further refine the traffic forecasting capabilities of the model in the study area. Trip distribution was further analyzed to verify the travel patterns, and the model was enhanced to reasonably represent the existing (year 2019) turning movements and directionalities. The model validation process included but is not limited to the following items:

- Refinement to locations of centroids and centroid connectors
- Link coding including facility type, area type, number of lanes, etc.,
- Review socioeconomic data within the study area

Table 5.3 illustrates the volume to count ratios at the intersection of U.S. 41 (S.R. 45) and S.R. 54 after the calibration process. Volume to count ratios are closer to 1.0 and within the acceptable percent of error based on the FSUTMS standards for divided arterials. The areawide average volume to count (V/C) ratio is calculated to assess how well the model is performing. The closer the V/C ratio is to 1.0, the better the model reflects the representative count data. The areawide V/C for all the model links with counts is 0.99 (See **Table 5.4**), which reflects an improvement in the study area as a result of the model adjustments. The model performance improved in terms of turning movement percentages in

a way that the difference between adjusted model turning volume percentage and existing 2019 turning movement count percentage was reduced to less than 10%.

**Table 5.3
Volume to Count Ratio at Intersection of U.S. 41 (S.R. 45) and S.R. 54 – Base Year 2010 (after calibration and validation)**

U.S. 41 (S.R. 45) and S.R. 54 Intersection	Model Volume (PSWADT)	Model Count (PSWADT)	Volume/Count Ratio
U.S. 41 (S.R. 45), North of	43,800	47,000	0.93
S.R. 45 (U.S.41), South of S.R.	63,800	58,500	1.09
S.R. 54, East of U.S. 41 (S.R.	55,800	56,000	1.00
S.R. 54, West of U.S. 41 (S.R.	48,300	47,500	1.02

Note: PSWADT – Peak Season Weekday Average Daily Traffic

**Table 5.4
Volume to Count Ratio at Corridor level – Base Year 2010 (after calibration and validation)**

Corridors	Model Volume (PSWADT)	Model Count (PSWADT)	Volume/Count Ratio
S.R. 54 between U.S. 41 (S.R. 45) and Bexley Village Drive	45,500	43,670	1.04
Lutz Lake Fern Road between Suncoast Parkway and Dale Mabry Highway	17,300	13,500	1.28
Dale Mabry Highway between U.S. 41 (S.R. 45) and County Line Road	28,000	30,250	0.93
U.S. 41 (S.R. 45) between S.R. 54 and County Line Road	48,400	45,000	1.08
County Line Road between Dale Mabry Highway and U.S. 41 (S.R. 45)	8,600	9,600	0.90
Willow Bend Parkway between U.S. 41 (S.R. 45) and Collier Parkway	11,500	11,000	1.05
Willow Bend Parkway between County Line Road and Bell Lake Road	10,600	16,840	0.63
Areawide Average V/C Ratio			0.99

Note: PSWADT – Peak Season Weekday Average Daily Traffic

5.2 SOCIOECONOMIC DATA DEVELOPMENT

The TBRPM 2040 Cost Affordable Network served as the base network for the Design Year alternatives. This network was reviewed and revised as necessary to ensure that the appropriate transportation improvements are included for the Design Year consistent with the Mobility 2040 Pasco LRTP based on the methodology.

The 2040 model was evaluated by comparing the model socio-economic data with the Development of Regional Impact (DRI) projects and Master Planned Unit Development (MPUD) projects approved within the area of influence. There are four approved Development of Regional Impact (DRIs) projects scheduled to build out by the year 2045 within the area of influence:

- Connerton DRI# 233(5,000 Acres) is located at the southeast corner of S.R. 52 and S.R. 45 (U.S. 41).
- Suncoast Crossing DRI# 246 (689 Acres) is located at the southeast and west corner of S.R. 54 and Suncoast Parkway.
- Long Lake Ranch DRI #247 (742 Acres) is located south of S.R. 54 between U.S. 41 (S.R. 45) and Suncoast Parkway.
- Sunlake Center DRI #248 (150 Acres) is located north of S.R. 54 between U.S. 41 (S.R. 45) and Suncoast Parkway.

The MPUDs are located within the area of influence:

- Paradise Lakes Resort
- Woodville Palms
- Caliente Resorts
- Cross Park
- Lester Dairy
- Shoppes at Ballantrae Village
- Sandridge
- Smith 54 MPUD
- Concord Station (fka Ledantec)
- Sable Ridge
- Bexley South
- The Oaks
- FCI
- Willow Bend
- Birren
- Pristine Lake
- Collier Place / Phase 2
- Oakstead
- The Groves
- Plantation Palms
- Enclave at Lake Padgett (fka Dawnglo Landings)
- Wilderness Lake Preserve (aka Bay Lake)
- Suncoast Meadows

- U.S. 41 (S.R. 45)-Dale Mabry
- Lake Linda
- Sapphire Village
- Ballantrae (fka Aprile)
- Hayman/Fuentes Farm
- Asbel Creek
- Magnolia Point
- Dupree Preserves
- Tierra del Sol (fka Sawgrass)
- Stonegate (fka Williams Property)
- Asbel Estates (fka Scheublein)
- Morsani
- Devonwood
- Tuscany (aka Lakeshore Ranch)
- Dale Mabry Town Center
- Peninsular Preserve
- Orange State Groves
- Terra-Bella
- Bexley North
- Zona Law
- Tibbetts Land at Growers Corner
- Causeway Center Commercial

5.3 NETWORK DEVELOPMENT

S.R. 54 in the model has been defined as a 6-lane roadway without Express Lane. The following revisions were made to the model:

- U.S. 41 (S.R. 45) and S.R. 54 intersection has been coded to show grade separation of S.R. 54 (four-lane overpass), over U.S. 41 (S.R. 45).
- S.R. 54 and Collier Parkway has been coded to show grade separation of S.R. 54 (four-lane overpass), over Collier Parkway.

5.4 TRAVEL DEMAND FORECASTING

The resulting Peak Season Weekday Average Daily Traffic (PSWADT) volumes were reviewed for reasonableness. The National Cooperative Highway Research Project (NCHRP) Report 765, ratio and difference smoothing method was applied to get the updated 2040 AADTs. Then the linear growth rate between 2019 and 2040 was estimated. Design Year 2045 AADTs were developed by applying

Linear Trend Growth Rates (Shown in **Table 5.5**) to existing 2019 AADTs. Opening Year 2025 volumes were developed by interpolating between the existing year 2019 and Design Year 2045.

Table 5.5
Traffic projections for Design Year 2045 (S.R. 54 elevated over U.S. 41)

Location	2019 AADTs	Linear Trend Growth Rate	2025 AADTs	2045 AADTs
S.R. 54, East of U.S. 41 (S.R. 45)	63,000	2.04%	70,600*	96,000*
S.R. 54, West of U.S. 41 (S.R. 45)	58,000	2.65%	67,200*	98,000*
U.S. 41 (S.R. 45), North of S.R. 54	58,000	0.85%	61,000	71,000
U.S. 41 (S.R. 45), South of S.R. 54	69,000	1.03%	73,200	87,000
U.S. 41 (S.R. 45), South of Dale Mabry Highway	34,000	1.02%	36,000	43,000
Dale Mabry Highway, South of U.S. 41 (S.R. 45)	35,000	0.99%	37,000	44,000

Note - * Including S.R. 54 Overpass AADT of 50,000 for Design Year.

As part of the ongoing evaluation of intersection improvements alternatives at this intersection, a travel demand modeling effort was required to assess the potential performance of an overpass concept where U.S. 41 is elevated over S.R. 54. The Tampa Bay Regional Planning Model (TBRPM) version 8.2 was utilized for this analysis, consistent with previous modeling efforts for the project. The model was updated based on following criteria:

- Applying the previously established No-Build scenario from TBRPM v8.2 as the baseline.
- Incorporated a new elevated overpass facility along U.S. 41 into the network, modeled as a two-lane facility in each direction over S.R. 54.
- A new connection (2-lane roadway) between Carson Dr. and S.R. 54 was incorporated using the Village Lakes Shopping Plaza and the existing signalized intersection. The connection was restricted to Right-In-Right-Out driveway at U.S. 41.
- In the U.S. 41 over S.R. 54 option, the Leonard Road connection was shifted south of the Apex and relocated to Dale Mabry Highway due to the configuration of the southbound on-ramp.
- Applying socioeconomic data from the Travel Demand Forecasting Technical Memorandum, September 2019.

The Peak Season Weekday Average Daily Traffic (PSWADT) was compared with the previous Feasibility Study results (See **Appendix D**). The project team deems that the difference in volumes is not significant (average 2.08% difference), the traffic projections from the Feasibility Study were used and manually distributed for the new Build Alternative Option 2. **Table 5.6** shows the traffic projection for U.S. 41 elevated over S.R. 54.

Table 5.6
Traffic projections for Design Year 2045 (U.S. 41 elevated over S.R. 54)

Location	2019 AADTs	Linear Trend Growth Rate	2025 AADTs	2045 AADTs
S.R. 54, East of U.S. 41 (S.R. 45)	63,000	2.04%	70,600*	96,000
S.R. 54, West of U.S. 41 (S.R. 45)	58,000	2.65%	67,200*	98,000
U.S. 41 (S.R. 45), North of S.R. 54	58,000	0.85%	61,000	71,000
U.S. 41 (S.R. 45), South of S.R. 54	69,000	1.03%	73,200	87,000*
U.S. 41 (S.R. 45), South of Dale Mabry Highway	34,000	1.02%	36,000	43,000
Dale Mabry Highway, South of U.S. 41 (S.R. 45)	35,000	0.99%	37,000	44,000

Note: *Include the U.S. 41 overpass AADT of 38,000 vpd for Design Year. The difference in traffic volume if U.S. 41 is carried over S.R. 54 versus the SR 54 over US 41 has been included in Appendix D.

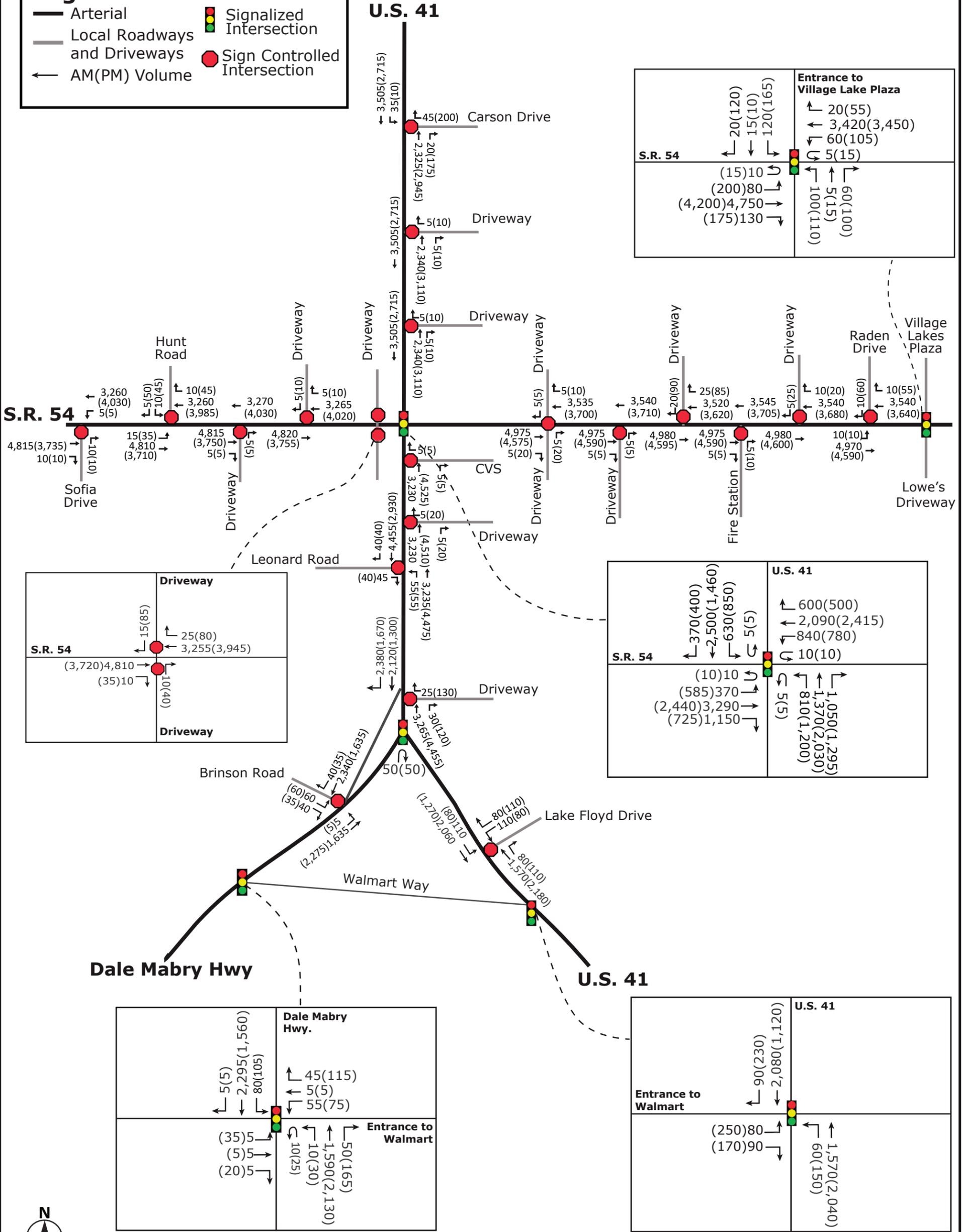
5.5 FUTURE YEAR TRAFFIC FORECAST

Future year Design Hour Volumes were developed by applying the recommended design traffic factors described in *Section 2.3* (K-Factor = 9.0 percent; D-Factor = 57.5 percent) to the future year AADTs. At the intersections, the future turning movement volumes were obtained by applying the existing turning movement percentages to the approach volumes. The Directional Design Hour Volumes (DDHVs) were reviewed for reasonableness and adjusted to ensure consistent volume flow between intersections. The driveway volumes within the study were obtained from Institute of Transportation Engineers (ITE) Trip Generation Handbook, 10th Edition. The peak direction of travel was maintained consistently with the existing counts. Detailed calculation is attached in **Appendix D**.

The overpass DDHVs were developed by applying design traffic factors described in *Section 2.3* (K-Factor = 9.0 percent; D-Factor = 57.5 percent) to the AADT of 36,800 and 50,000 vehicles per day (vpd) for Opening and Design years, respectively for Build Alternative Option 1. The overpass volumes during peak hour peak direction (2,590 vph) and off-peak direction (1,910 vph) were subtracted from the at-grade intersection along S.R. 54 east and westbound through movements under 2045 Build Alternatives with elevated S.R. 54. A similar procedure was applied for Opening Year 2025 overpass volumes development. Weaving volumes along U.S. 41 (S.R. 45) northbound were calculated utilizing the proportion of traffic from Dale Mabry Highway and U.S. 41 (S.R. 45). A comparable approach was used for Build Alternative Option 2, where DDHVs were developed by applying the same K and D factors to overpass AADT values of 32,000 and 38,000 vehicles per day for the Opening and Design years, respectively, followed by a manual adjustment. **Figures 5.1 through 5.6 illustrate** the projected traffic for Opening and Design Years for the No-Build and the Build Alternatives, respectively.

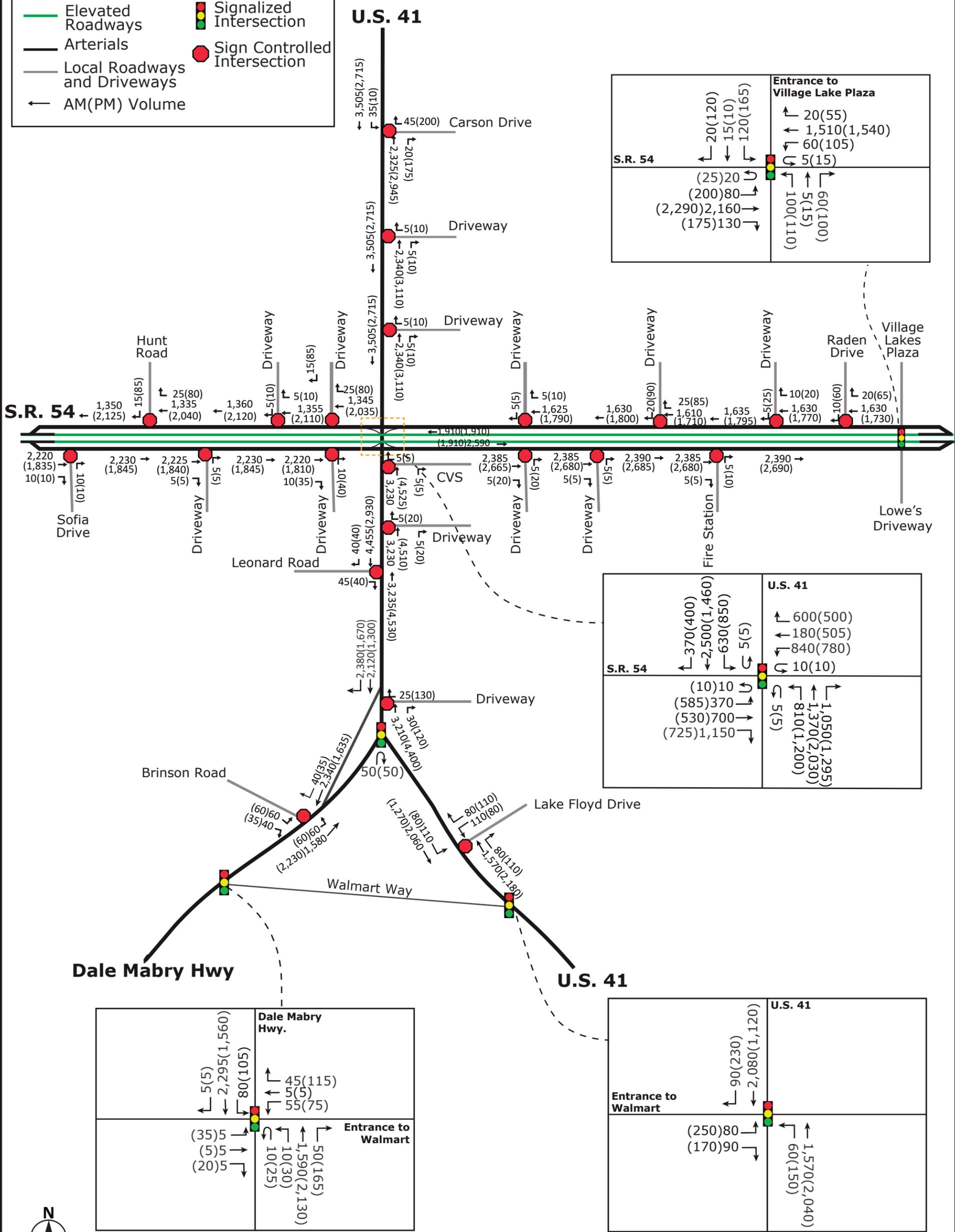
Legend

- Arterial
- Local Roadways and Driveways
- AM(PM) Volume
- Signalized Intersection
- Sign Controlled Intersection



Legend

-  Elevated Roadways
-  Arterials
-  Local Roadways and Driveways
-  AM(PM) Volume
-  Signalized Intersection
-  Sign Controlled Intersection



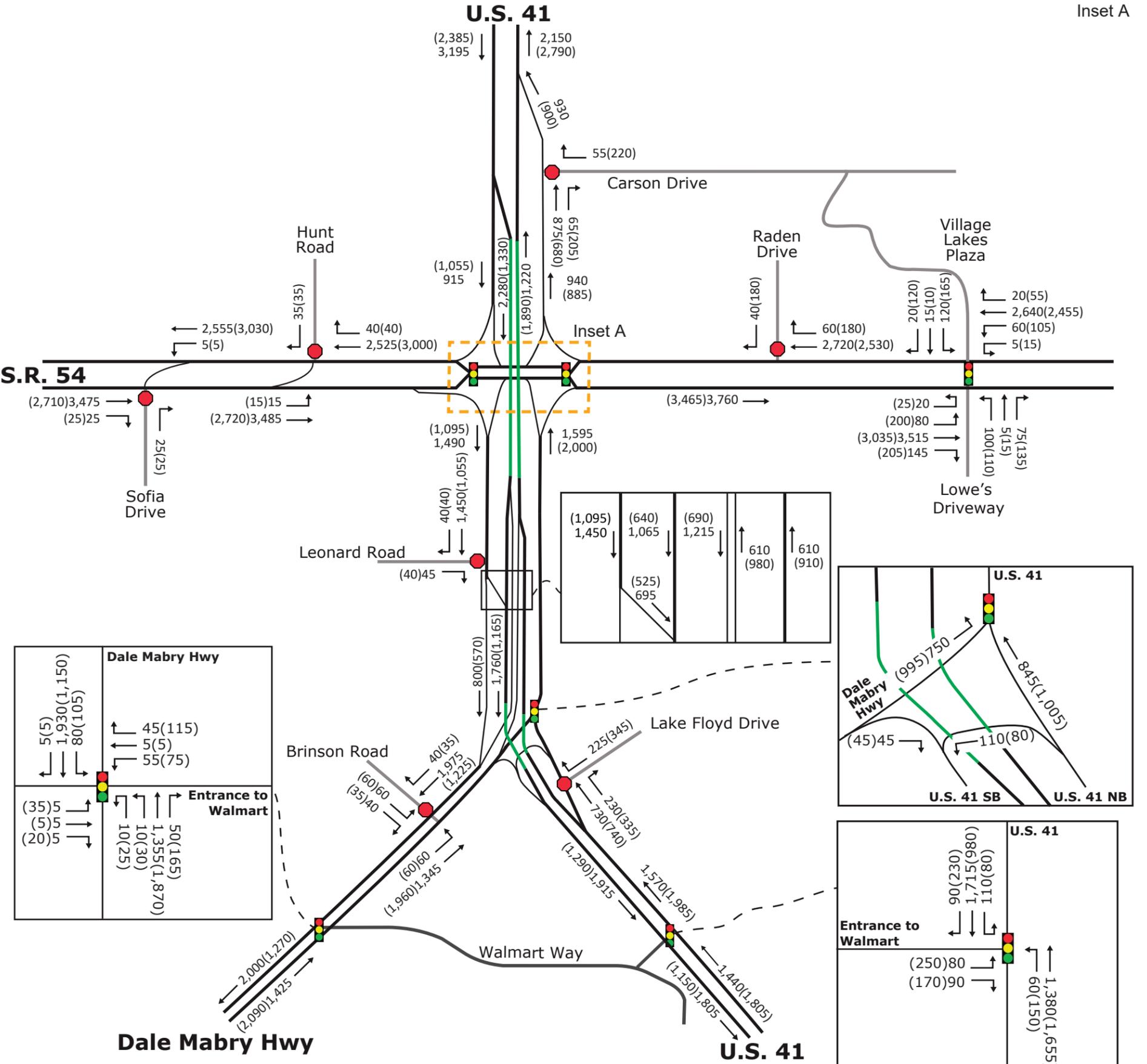
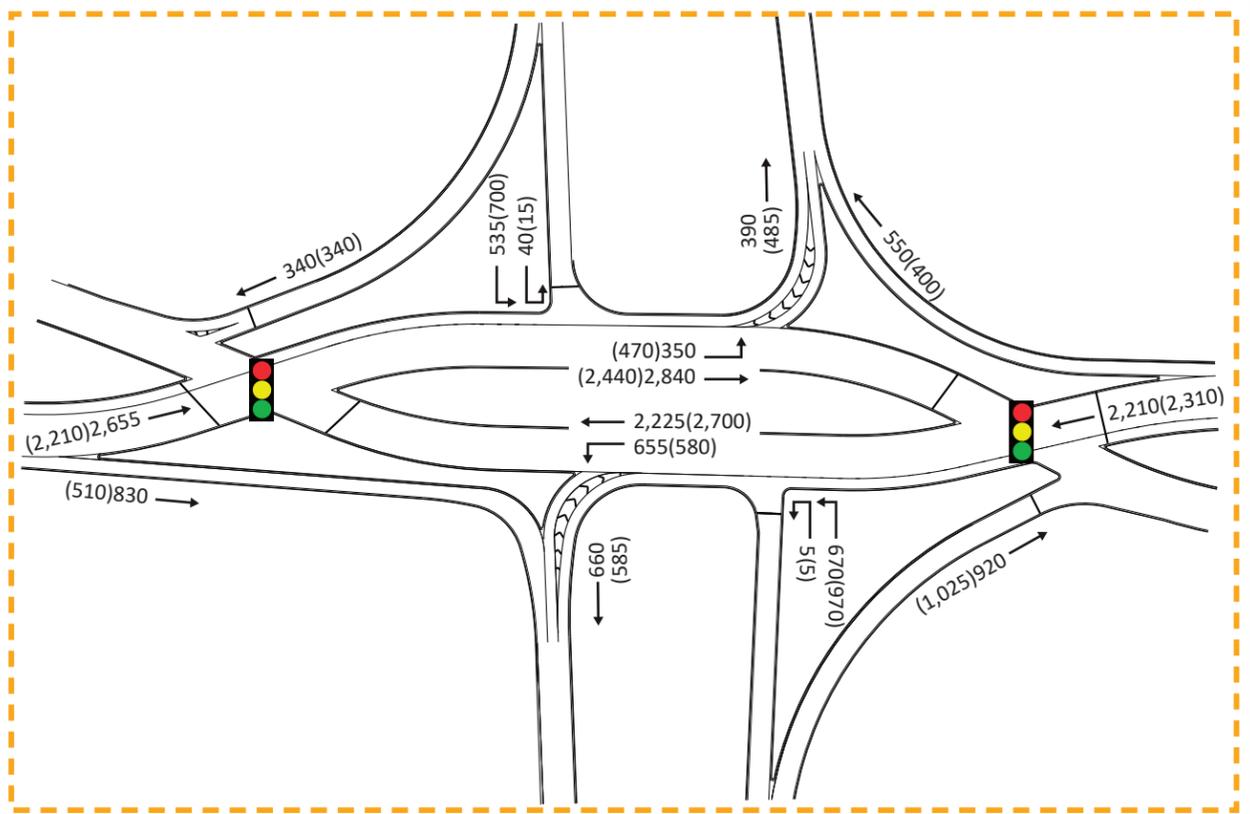
**U.S. 41 (S.R. 45) at S.R. 54
PD&E STUDY**

**Build Alternative Option 1
Single-Point Urban Interchange (SPUI)
2045 Build Directional Design Hour Volumes**

**Figure
5.4**

Legend

- Elevated Roadways
- Arterials
- Local Roadways and Driveways
- ← AM(PM) Volume
- Signalized Intersection
- Sign Controlled Intersection

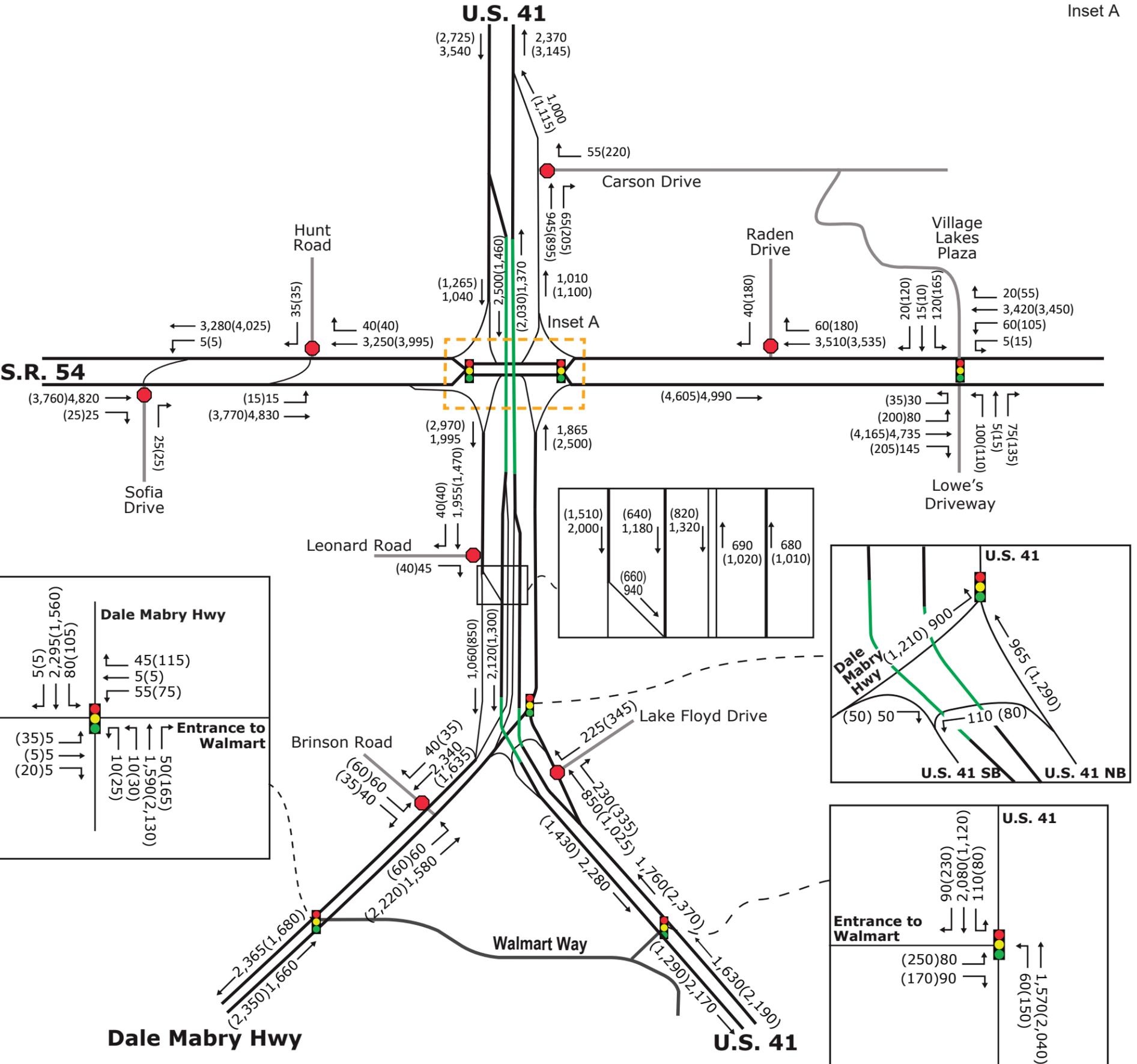
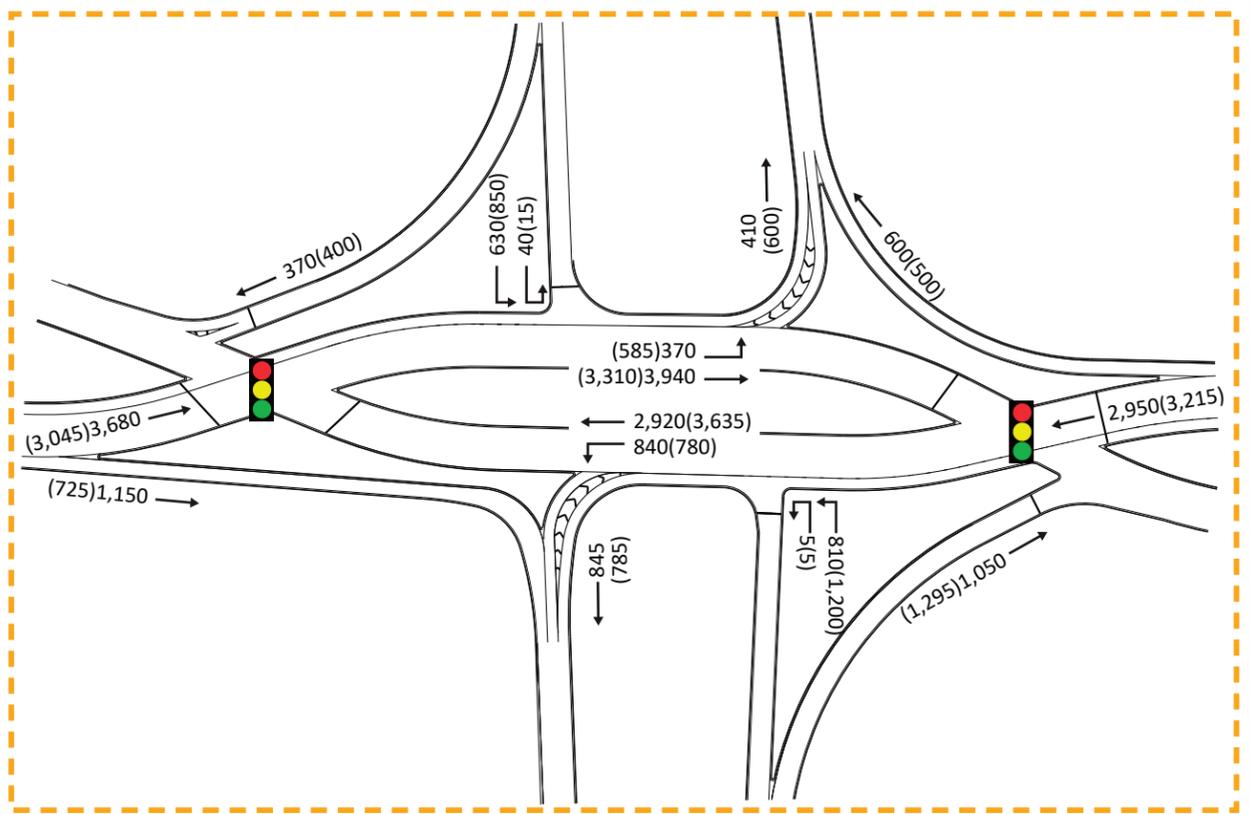


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	<p>U.S. 41 (S.R. 45) at S.R. 54 PD&E STUDY</p>	<p>Build Alternative Option 2 Diverging Diamond Interchange (DDI) 2025 Build Directional Design Hour Volumes</p>	<p>Figure 5.5</p>
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Legend

-  Elevated Roadways
-  Arterials
-  Roadways and Driveways
-  AM (PM) Volume
-  Signalized Intersection
-  Sign Controlled Intersection



Proposed Build Alternatives are described in this section as well as the corresponding traffic operations analysis.

6.1 ANALYSIS ALTERNATIVES

The No-Build Alternative was analyzed to identify deficiencies related to the purpose and need for the project. The following improvements are included within the study under the No-Build condition:

- Traffic signal at Dale Mabry Highway and Walmart Way
- Extension of the eastbound right and left turn lanes at the intersection of U.S. 41 (S.R. 45) and S.R. 54

The lane configuration for the No-Build Alternative is depicted on **Figure 6.1**.

6.1.1 Build Alternatives

Build Alternative Option 1: Elevated S.R. 54 over U.S. 41 (S.R. 45) with a SPUI configuration is described below (See **Figure 6.2**):

- Single Point Urban Interchange (SPUI) with S.R. 54 elevated over U.S. 41 (S.R. 45).
- Two through lanes in each direction are carried over U.S. 41 (S.R. 45) on structure while two lanes exits and merges to/from S.R. 54.
- The interchange with two crossover intersections will operate under a single traffic signal controller .
- In the eastbound and westbound directions, these ramps tie into the existing intersection with triple left turn lanes, two through lanes, and dual right turn lanes. The ramps refer to the two exit lanes from S.R. 54.
- In the northbound and southbound directions, triple left turn lanes, three through lanes, and a single right turn lane have been proposed.
- Convert the Leonard Road bi-directional median opening to Right-In-Right-Out access only.
- Close bi-directional or full median opening driveways such as Sofia Drive, Hunt Road, Fire Station and Raden Drive along S.R. 54. These roads will become right-in-right-out only to accommodate bridge pillars.
- An additional traffic signal for the northbound U.S. 41 (S.R. 45) traffic has been proposed at Dale Mabry Highway to help relieve severe weaving movements along U.S. 41 (S.R. 45) northbound and allow the northbound Dale Mabry Highway traffic to move across U.S. 41 (S.R. 45) to provide access to the right turn lanes to eastbound S.R. 54.
- Accessible pedestrian signals (APS) are generally proposed where pedestrian signals are provided to serve pedestrians with visual impairments.

Build Alternative Option 2: Elevated U.S. 41 over S, R. 54 with a DDI configuration is described below (See **Figure 6.3**)

At S.R 54, U.S. 41 will carry two lanes in each direction over S.R. 54 via a bridge. The bridge will be expandable to three lanes in each direction for future traffic demand. Two lane exit ramps from U.S. 41 in either northbound or southbound direction will connect to S.R. 54. The northbound and southbound exit ramps will widen to two left turn lanes and two right turn lanes at the intersection with S.R. 54. Along S.R. 54, the westbound lanes will widen from three lanes to five lanes after the signalized intersection at the Village Lakes Shopping Plaza/Lowe's driveway. The five lanes will enter the first crossover intersection of the DDI. Prior to the first crossover intersection, a sixth lane will be developed for right turns only to northbound U.S. 41. Of the five lanes entering the first crossover intersection, the inside lane will be a left turn only lane and the adjacent lane will be a shared left/through lane. The remaining three lanes will be through lanes. Four lanes will enter the 2nd crossover intersection. After the 2nd crossover intersection, the inside lane will merge and end. Three lanes will continue westbound.

Similarly, the eastbound lanes will widen from three lanes to five lanes as they approach the interchange. The five lanes will enter the first crossover intersection of the DDI. Prior to the crossover intersection, a sixth lane will be developed for right turns only to southbound U.S. 41. Of the five lanes entering the first crossover intersection, the inside lane will be a left turn only lane and the adjacent lane will be a shared left/through lane. The remaining three lanes will be through lanes. Four lanes will enter the 2nd crossover intersection. After the 2nd crossover intersection, the outside lane will become a right turn only lane at the signalized intersection at the Village Lakes Shopping Plaza/Lowe's driveway. Three lanes will continue eastbound.

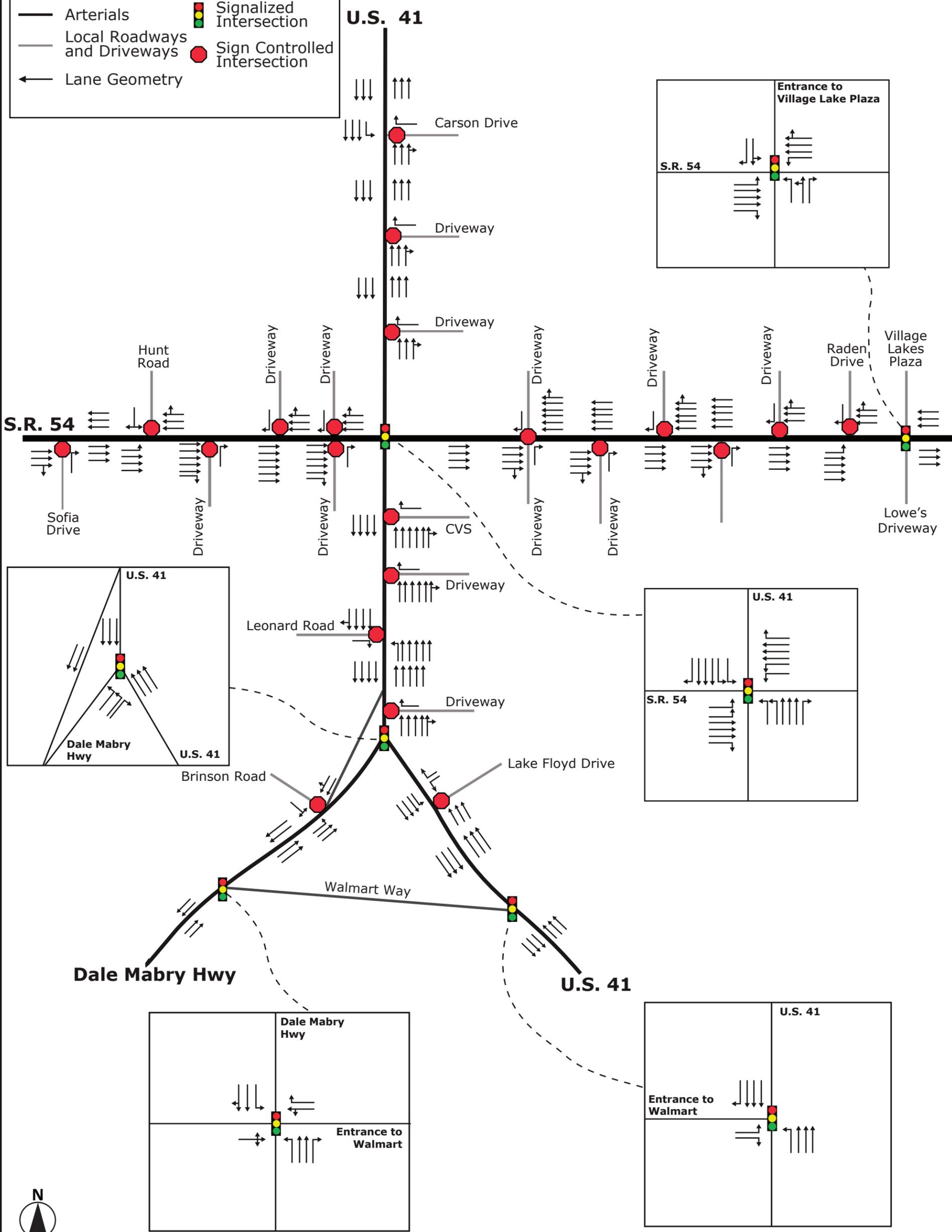
A new roadway connection will be provided between Carson Drive and S.R. 54, east of U.S. 41. From Carson Drive, the new connection will use the existing Raden Drive alignment before turning east towards the Village Lakes Shopping Plaza. The roadway will then connect to the existing signalized intersection of S.R. 54 at the Village Lakes Shopping Plaza/Lowe's driveway. This new roadway connection will require ROW acquisition to make the roadway available for public use.

At S.R. 597 (Dale Mabry Highway), northbound U.S. 41 will carry two lanes over S.R. 597 via a bridge. Southbound U.S. 41 will carry three lanes over S.R. 597 via a bridge. The third lane will come from S.R. 54 via a single lane southbound slip ramp. For the southbound direction, ramps are provided from S.R. 54 to southbound U.S. 41 and southbound S.R. 597. For the northbound direction of U.S. 41, the two-lane exit ramp from U.S. 41 to S.R. 54 will provide a signalized intersection at S.R. 597. The signal will manage the traffic from northbound U.S. 41 to S.R. 54 and northbound S.R. 597 to S.R. 54. This intersection will allow a northbound U.S. 41 to southbound U.S. 41 U-turn via a "Texas U-turn". Traffic from northbound S.R. 597 to northbound U.S. 41 will utilize a free flow ramp and merge onto U.S. 41 elevated lanes south of the bridge over S.R. 54.

The existing CSX rail crossings at S.R. 54 and S.R. 597 will be modified to accommodate roadway improvements.

Legend

- Arterials
- Local Roadways and Driveways
- ← Lane Geometry
-  Signalized Intersection
-  Sign Controlled Intersection

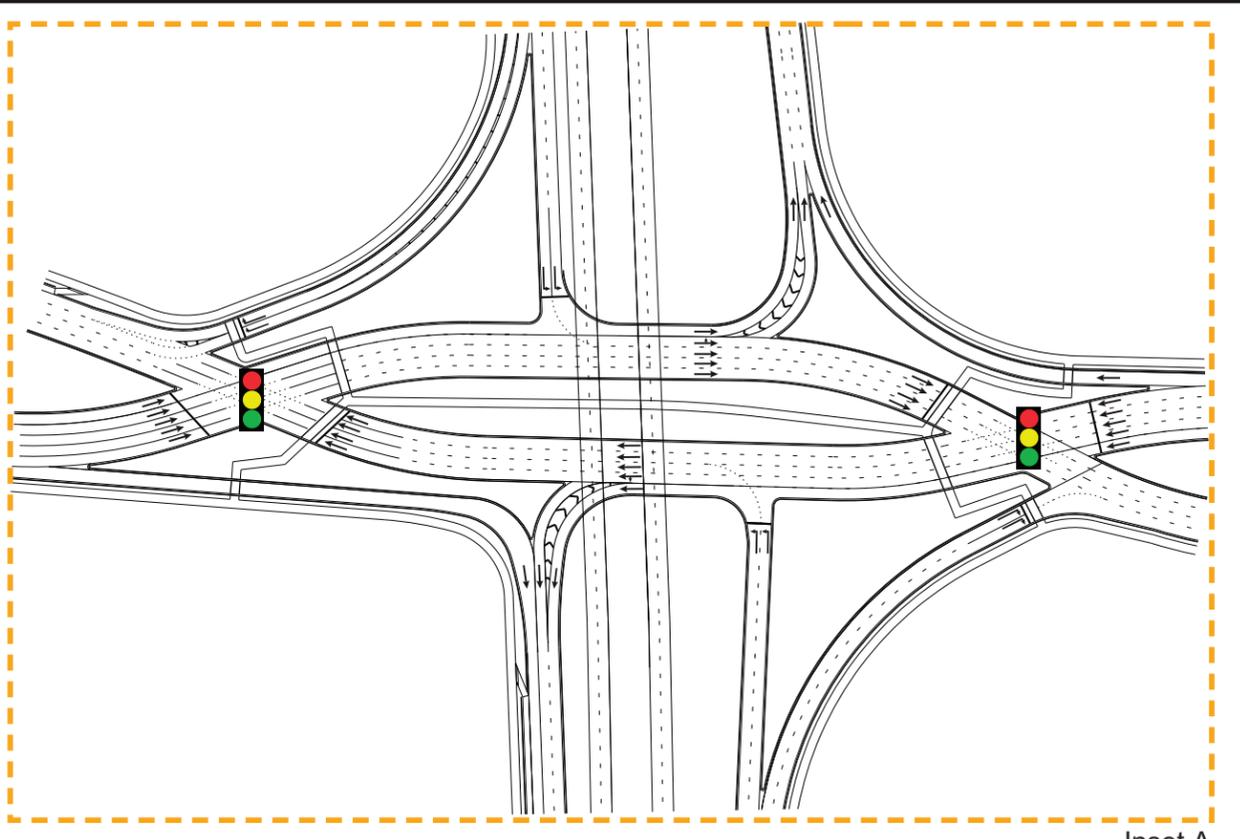


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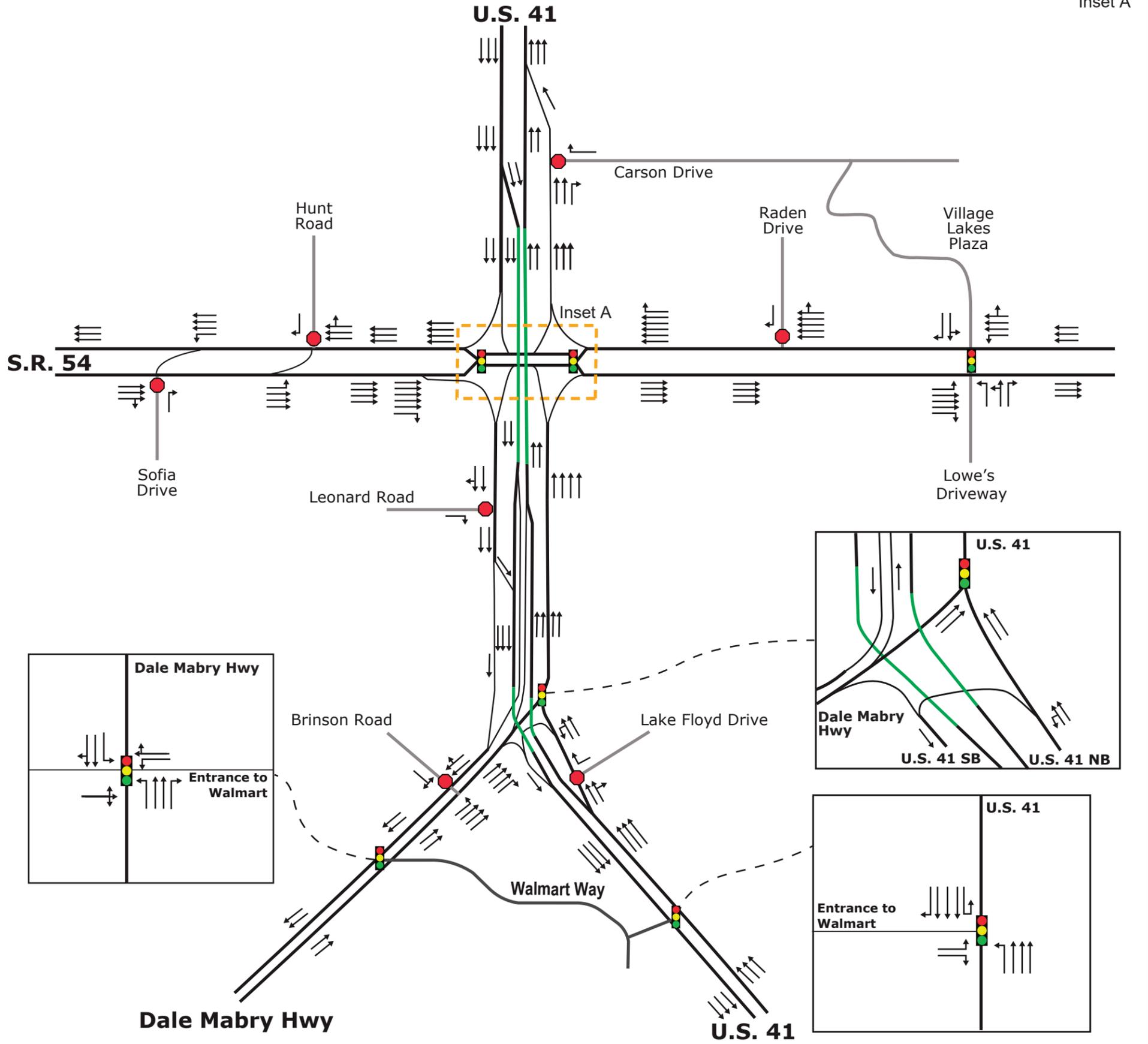
	<p>U.S. 41 (S.R. 45) at S.R. 54 PD&E STUDY</p>	<p>2045 No-Build Directional Geometry</p>	<p>Figure 6.1</p>
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Legend

- Elevated Roadways
- Arterials
- Roadways and Driveways
- Lane Geometry
- Signalized Intersection
- Sign Controlled Intersection



Inset A



Note: This is a conceptual level graphic created for planning and discussion purposes only. It is not intended for use in PD&E, Design or Construction.

	<p>U.S. 41 (S.R. 45) at S.R. 54 PD&E STUDY</p>	<p>Build Alternative Option 2 Diverging Diamond Interchange (DDI) 2045 Build Lane Geometry</p>	<p>Figure 6.3</p>
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6.2 FUTURE OPERATIONAL PERFORMANCE

Vissim driving behavior parameters used to calibrate the existing conditions model were carried over to the future year analysis. The future conditions Vissim analysis was performed for the purpose of evaluating the following alternatives for Design Year 2045:

- No-Build Alternative
- Build Alternative Option 1: Elevated S.R. 54 over U.S. 41 (S.R. 45) with SPUI
- Build Alternative Option 2: Elevated U.S. 41 (S.R. 45) over S.R. 54 with DDI

Synchro (Version 11) analysis was conducted to provide optimized signal timings for the No-Build and Build Vissim models. The signal timing offsets were manually adjusted in Vissim for all alternatives.

No-Build Alternative

The No-Build Alternative was evaluated for comparison purposes as well as to identify deficiencies and justify the need for improvements. The MOEs including delay per vehicle, LOS, maximum queue length as well as unmet demand were summarized for major intersections in the study area.

2025 Opening Year

As displayed in **Tables 6.1** and **6.2**, the unmet demand for the intersection of U.S. 41 (S.R. 45) and S.R. 54 is 30% during the AM peak hour and 24% during the PM peak hour. The percentage of unmet demand reflects the traffic demand that fails to be loaded in the network. Peak hours tend to be extended so that unmet demand can be loaded during post peak hours. During the AM peak hour, the delay per vehicle is 253 seconds with a LOS F. During the PM peak hour, the delay per vehicle is 270 seconds with LOS F.

2045 Design Year

As displayed in **Tables 6.3** and **6.4**, the unmet demand for the intersection of U.S. 41 (S.R. 45) and S.R. 54 is 51% during the AM peak hour and 41% during the PM peak hour. During the AM peak hour, the delay per vehicle is 481 seconds with a LOS F. During the PM peak hour, the delay per vehicle is 270 seconds with LOS F.

Table 6.1
2025 No-Build AM Peak Hour Vissim Intersection Performance

Intersection	Movement	AM Volume (VPH) Demand	Unmet Demand	Delay (Seconds)	Level of Service	Max Queue Length (Feet)
U.S. 41 (S.R. 45) and S.R. 54	Overall	12,180	30%	253	F	
	SBTH	2,280	35%	342	F	10,377
	SBRT	340	37%	269	F	137
	SBLT	535	35%	356	F	401
	NBTH	1,220	24%	154	F	2,665
	NBLT	670	39%	799	F	2,875
	NBRT	920	26%	32	C	211
	EBLT	350	43%	248	F	272
	EBRT	830	39%	176	F	-
	EBTH	2,290	39%	298	F	6,797
	WBRT	550	14%	56	E	926
	WBLT	655	17%	244	F	1,749
WBTH	1,540	14%	107	F	1,776	
S.R. 54 and Lowe's/Village Lakes Plaza Driveway	Overall	6760	25%	102	F	
	SBLT	120	-2%	111	F	253
	SBTH	15	7%	36	D	253
	SBRT	20	-5%	104	F	253
	NBLT	100	5%	171	F	171
	NBTH	5	-40%	135	F	171
	NBRT	60	0%	16	B	85
	EBLT	80	39%	46	D	57
	EBTH	3520	34%	46	D	1,475
	EBRT	130	33%	41	D	1,475
	WBLT	60	3%	126	F	46
	WBTH	2630	15%	180	F	5,963
WBRT	20	0%	154	F	5,975	
U.S. 41 (S.R. 45) and Dale Mabry Highway	Overall	3220	38%	212	F	
	SBTH	1760	31%	42	D	467
	NBTH	1415	47%	421	F	1,839
	NBRT	45	49%	259	F	69
U.S. 41 (S.R. 45) and Wal-Mart Driveway	Overall	3415	17%	10	A	
	SBTH	1715	32%	10	A	329
	SBRT	90	32%	10	A	84
	NBLT	60	2%	5	A	58
	NBTH	1380	0%	5	A	182
	EBLT	80	-1%	53	D	148
EBRT	90	4%	55	E	172	
Dale Mabry and Wal-Mart Driveway	Overall	3550	35%	152	F	
	SBLT	80	35%	16	B	50
	SBTH	1930	33%	9	A	610
	SBRT	5	40%	7	A	610
	NBTH	1355	41%	363	F	7,986
	NBLT	10	40%	189	F	31
	NBRT	50	32%	242	F	48
	EBLT	5	0%	92	F	8,167
	EBRT	5	0%	57	E	112
	EBTH	5	40%	61	E	73
	WBLT	55	-4%	57	E	-
WBTH	5	-20%	60	E	79	
WBRT	45	9%	173	F	8,167	

Table 6.2
2025 No-Build PM Peak Hour Vissim Intersection Performance

Intersection	Movement	PM Volume (VPH) Demand	Unmet Demand	Delay (Seconds)	Level of Service	Max Queue Length (Feet)
U.S. 41 (S.R. 45) and S.R. 54	Overall	11,645	24%	270	F	
	SBTH	1,330	20%	349	F	10,388
	SBRT	340	19%	268	F	1,260
	SBLT	700	24%	517	F	10,392
	NBTH	1,890	23%	210	F	2,815
	NBLT	970	24%	359	F	2,816
	NBRT	1,025	26%	47	D	26
	EBLT	470	29%	459	F	1,750
	EBRT	510	27%	239	F	2
	EBTH	1,720	27%	385	F	6,826
	WBRT	400	18%	145	F	1,794
	WBLT	580	27%	190	F	510
WBTH	1,710	25%	153	F	1,794	
S.R. 54 and Lowe's/Village Lakes Plaza Driveway	Overall	6,560	24%	141	F	
	SBLT	165	15%	178	F	327
	SBTH	10	30%	172	F	327
	SBRT	120	8%	212	F	327
	NBLT	110	2%	189	F	207
	NBTH	15	-7%	171	F	207
	NBRT	100	-3%	12	B	91
	EBLT	200	25%	14	B	163
	EBTH	3060	25%	9	A	317
	EBRT	175	23%	3	A	317
	WBLT	105	20%	225	F	58
	WBTH	2445	28%	317	F	6,011
WBRT	55	29%	278	F	6,023	
U.S. 41 (S.R. 45) and Dale Mabry Highway	Overall	3,240	38%	238	F	
	SBTH	1165	21%	31	C	500
	NBTH	2030	47%	358	F	1,832
	NBRT	45	47%	198	F	71
U.S. 41 (S.R. 45) and Wal-Mart Driveway	Overall	3,435	10%	17	B	
	SBTH	980	22%	13	B	415
	SBRT	230	23%	32	C	232
	NBLT	150	4%	16	B	115
	NBTH	1655	1%	11	B	390
	EBLT	250	8%	48	D	296
EBRT	170	9%	45	D	262	
Dale Mabry and Wal-Mart Driveway	Overall	3,580	37%	432	F	
	SBLT	105	25%	43	D	52
	SBTH	1150	24%	32	C	177
	SBRT	5	40%	62	E	177
	NBTH	1870	49%	735	F	9,307
	NBLT	30	53%	487	F	64
	NBRT	165	47%	539	F	118
	EBLT	35	-6%	150	F	9,489
	EBRT	20	-10%	83	F	212
	EBTH	5	0%	90	F	173
	WBLT	75	-1%	53	D	8
WBTH	5	20%	51	D	70	
WBRT	115	5%	118	F	9,489	

Table 6.3
2045 No-Build AM Peak Hour Vissim Intersection Performance

Intersection	Movement	AM Volume (VPH)	Demand	Unmet Demand	Delay (Seconds)	Level of Service	Max Queue Length (Feet)
U.S. 41 (S.R. 45) and S.R. 54	Overall	15,070	51%	481	F		
	SBTH	2,500	41%	337	F	10,382	
	SBRT	370	43%	269	F	154	
	SBLT	630	41%	370	F	3,429	
	NBTH	1,370	28%	197	F	2,883	
	NBLT	810	56%	998	F	2,888	
	NBRT	1,050	47%	84	F	91	
	EBLT	370	82%	762	F	142	
	EBRT	1,150	81%	616	F	5	
	EBTH	3,290	82%	1104	F	6,803	
	WBRT	600	26%	49	D	266	
	WBLT	840	29%	90	F	514	
WBTH	2,090	28%	87	F	1,792		
S.R. 54 and Lowe's/Village Lakes Plaza Driveway	Overall	8780	50%	83	F		
	SBLT	120	-5%	145	F	279	
	SBTH	15	-7%	51	D	279	
	SBRT	20	-5%	134	F	279	
	NBLT	100	10%	186	F	167	
	NBTH	5	-20%	168	F	167	
	NBRT	60	10%	9	A	64	
	EBLT	80	69%	15	B	53	
	EBTH	4750	69%	6	A	311	
	EBRT	130	68%	6	A	311	
	WBLT	60	20%	132	F	52	
	WBTH	3420	29%	188	F	6,014	
WBRT	20	20%	161	F	6,026		
U.S. 41 (S.R. 45) and Dale Mabry Highway	Overall	3815	57%	405	F		
	SBTH	2120	47%	25	C	333	
	NBTH	1645	69%	886	F	1,833	
	NBRT	50	76%	650	F	68	
U.S. 41 (S.R. 45) and Walmart Way	Overall	3970	26%	9	A		
	SBTH	2080	48%	9	A	269	
	SBRT	90	47%	10	A	62	
	NBLT	60	2%	5	A	63	
	NBTH	1570	0%	5	A	189	
	EBLT	80	-3%	54	D	147	
EBRT	90	4%	57	E	173		
Dale Mabry and Walmart Way	Overall	4150	55%	594	F		
	SBLT	80	48%	12	B	52	
	SBTH	2295	48%	13	B	304	
	SBRT	5	60%	4	A	304	
	NBTH	1590	71%	1475	F	9,322	
	NBLT	10	70%	969	F	13	
	NBRT	50	66%	1226	F	19	
	EBLT	5	0%	188	F	9,504	
	EBRT	5	0%	54	D	109	
	EBTH	5	40%	58	E	70	
	WBLT	55	-4%	56	E	2	
WBTH	5	-20%	56	E	66		
WBRT	45	2%	360	F	9,504		

Table 6.4
2045 No-Build PM Peak Hour Vissim Intersection Performance

Intersection	Movement	PM Volume (VPH) Demand	Unmet Demand	Delay (Seconds)	Level of Service	Max Queue Length (Feet)
U.S. 41 (S.R. 45) and S.R. 54	Overall	14,680	41%	270	F	
	SBTH	1,460	33%	326	F	10,392
	SBRT	400	33%	268	F	769
	SBLT	850	36%	571	F	10,395
	NBTH	2,030	32%	198	F	2,901
	NBLT	1,200	44%	439	F	2,902
	NBRT	1,295	45%	61	E	53
	EBLT	585	48%	389	F	452
	EBRT	725	48%	232	F	9
	EBTH	2,440	46%	368	F	6,828
	WBRT	500	34%	146	F	1,796
	WBLT	780	46%	201	F	502
WBTH	2,415	45%	151	F	1,794	
S.R. 54 and Lowe's/Village Lakes Plaza Driveway	Overall	8,705	44%	150	F	
	SBLT	165	42%	303	F	334
	SBTH	10	50%	347	F	334
	SBRT	120	38%	385	F	334
	NBLT	110	3%	274	F	250
	NBTH	15	-7%	258	F	250
	NBRT	100	-4%	13	B	92
	EBLT	200	43%	14	B	157
	EBTH	4200	43%	7	A	290
	EBRT	175	42%	3	A	290
	WBLT	105	39%	226	F	41
	WBTH	3450	48%	319	F	6,015
WBRT	55	47%	273	F	6,027	
U.S. 41 (S.R. 45) and Dale Mabry Highway	Overall	3,635	55%	357	F	
	SBTH	1300	35%	19	B	292
	NBTH	2285	67%	550	F	1,826
	NBRT	50	68%	335	F	64
U.S. 41 (S.R. 45) and Walmart Way	Overall	3,960	17%	55	E	
	SBTH	1120	37%	12	B	273
	SBRT	230	37%	24	C	172
	NBLT	150	5%	54	D	151
	NBTH	2040	5%	80	E	2,090
	EBLT	250	11%	78	E	304
EBRT	170	11%	46	D	277	
Dale Mabry and Walmart Way	Overall	4,250	54%	660	F	
	SBLT	105	41%	44	D	50
	SBTH	1560	38%	20	C	197
	SBRT	5	60%	3	A	197
	NBTH	2130	71%	1203	F	9,309
	NBLT	30	73%	758	F	44
	NBRT	165	69%	911	F	58
	EBLT	35	-6%	181	F	9,490
	EBRT	20	-10%	81	F	214
	EBTH	5	0%	93	F	175
	WBLT	75	-1%	52	D	-
WBTH	5	20%	47	D	67	
WBRT	115	5%	188	F	9,490	

**Table 6.5
No-Build Network Performance Statistics**

Statistics	Year 2025		Year 2045	
	AM Peak Period	PM Peak Period	AM Peak Period	PM Peak Period
Total travel time [hour]	9,963	12,183	11,879	13,876
Total delay time [hour]	7,216	9,292	9,385	11,042
Average delay time[second]	648	741	928	886
Average speed [mph]	13	11	10	10
Percent demand served	83%	91%	61%	72%

Network-wide statistics during peak periods for the No-Build Alternative are listed in **Table 6.5**. As shown in **Table 6.5**, during the 2045 Design Year, the unmet demand reaches up to 39% during the AM peak period and 28% during the PM peak period. The network-wide average speed during both AM and PM peak hours is merely 10 mph in the design year. It is evident that improvements are required to relieve congestion. Without any improvement, a large percentage of traffic demand is anticipated to take parallel routes to reach its destination to avoid the congested study area.

Build Alternative Option 1 (SPUI)

Under the SPUI configuration, S.R. 54 elevated through lanes are proposed over U.S. 41 (S.R. 45). Northbound left turn traffic and southbound left turn traffic will be allowed to move concurrently during the same signal phase. MOEs including delay per vehicle, LOS, maximum queue length as well as unmet demand are summarized for major intersections in the study area.

2025 Opening Year

As displayed in **Tables 6.6** and **6.7**, the unmet demand for the intersection of U.S. 41 (S.R. 45) and S.R. 54 are 14% during the AM peak hour and 9% during the PM peak hour. During the AM peak hour, the delay per vehicle is 199 seconds with a LOS F. During the PM peak hour, the delay per vehicle is 190 seconds with a LOS F.

2045 Design Year

As displayed in **Tables 6.8** and **6.9**, the unmet demand for the intersection of U.S. 41 (S.R. 45) and S.R. 54 are 23% during the AM peak hour and 30% during the PM peak hour. During the AM peak hour, the delay per vehicle is 234 seconds with a LOS F. During the PM peak hour, the delay per vehicle is 298 seconds with a LOS F.

Table 6.6
2025 Build Alternative Option 1 AM Peak Hour Vissim Intersection Performance

Intersection	Movement	AM Volume (VPH) Demand	Unmet Demand	Delay (Seconds)	Level of Service	Max Queue Length (Feet)
U.S. 41 (S.R. 45) and S.R. 54	Overall	8,870	14%	199	F	
	SBTH	2,280	21%	196	F	10,102
	SBRT	340	22%	117	F	9,128
	SBLT	535	23%	263	F	10,097
	NBTH	1,220	15%	52	D	1,398
	NBLT	670	-9%	104	F	1,431
	NBRT	920	-5%	46	D	1,442
	EBLT	350	23%	236	F	265
	EBRT	830	31%	548	F	2,684
	EBTH	390	23%	660	F	2,682
	WBRT	550	8%	145	F	1,064
	WBLT	655	1%	107	F	406
	WBTH	130	1%	178	F	402
S.R. 54 and Lowe's/Village Lakes Plaza Driveway	Overall	3450	5%	31	C	
	SBLT	120	2%	110	F	261
	SBTH	15	-27%	105	F	261
	SBRT	20	-5%	98	F	261
	NBLT	100	4%	109	F	276
	NBTH	5	-20%	114	F	276
	NBRT	60	0%	123	F	268
	EBLT	80	10%	140	F	315
	EBTH	1620	9%	15	B	610
	EBRT	130	7%	9	A	60
	WBLT	60	-2%	115	F	218
	WBTH	1220	1%	22	C	671
	WBRT	20	10%	25	C	671
U.S. 41 (S.R. 45) and Dale Mabry Highway	Overall	4625	8%	48	D	
	SBTH	1760	19%	48	D	700
	NBTH (U.S. 41)	1430	1%	24	C	650
	NBRT (U.S. 41)	30	-3%	21	C	650
	NBTH(Dale Mabry)	1360	2%	74	E	1,278
	NBRT (Dale Mabry)	45	-2%	42	D	218
U.S. 41 (S.R. 45) and Wal-Mart Driveway	Overall	3415	10%	12	B	
	SBTH	1715	19%	13	B	551
	SBRT	90	11%	11	B	102
	NBLT	60	3%	6	A	56
	NBTH	1380	0%	5	A	181
	EBLT	80	4%	51	D	142
	EBRT	90	2%	54	D	169
Dale Mabry Highway and Wal-Mart Driveway	Overall	3550	13%	10	A	
	SBLT	80	29%	11	B	46
	SBTH	1930	20%	11	B	675
	SBRT	5	20%	7	A	675
	NBTH	1355	3%	7	A	403
	NBLT	10	0%	9	A	31
	NBRT	50	0%	5	A	53
	EBLT	5	-20%	62	E	60
	EBRT	5	0%	50	D	60
	EBTH	5	0%	59	E	60
	WBLT	55	4%	54	D	56
	WBTH	5	-20%	53	D	17
WBRT	45	7%	8	A	15	

Table 6.7
2025 Build Alternative Option 1 PM Peak Hour Vissim Intersection Performance

Intersection	Movement	PM Volume (VPH)	Demand	Unmet Demand	Delay (Seconds)	Level of Service	Max Queue Length (Feet)
U.S. 41 (S.R. 45) and S.R. 54	Overall	8,825	9%	190	F		
	SBTH	1,330	17%	264	F	9,606	
	SBRT	340	16%	155	F	9,645	
	SBLT	700	15%	494	F	9,600	
	NBTH	1,890	9%	189	F	2,182	
	NBLT	970	5%	108	F	2,181	
	NBRT	1,025	12%	130	F	1,969	
	EBLT	470	2%	120	F	351	
	EBRT	510	7%	211	F	1,212	
	EBTH	310	4%	122	F	1,205	
	WBRT	400	2%	96	F	738	
	WBLT	580	3%	94	F	356	
	WBTH	300	2%	125	F	656	
S.R. 54 and Lowe's/Village Lakes Plaza Driveway	Overall	3,740	5%	66	E		
	SBLT	165	5%	92	F	297	
	SBTH	10	0%	94	F	297	
	SBRT	120	3%	90	F	297	
	NBLT	110	3%	312	F	924	
	NBTH	15	13%	528	F	924	
	NBRT	100	9%	623	F	926	
	EBLT	200	14%	112	F	473	
	EBTH	1650	9%	24	C	440	
	EBRT	175	9%	5	A	71	
	WBLT	105	6%	106	F	299	
	WBTH	1035	-1%	39	D	740	
WBRT	55	-7%	46	D	740		
U.S. 41 (S.R. 45) and Dale Mabry Highway	Overall	5,090	8%	188	F		
	SBTH	1165	10%	85	F	805	
	NBTH (U.S. 41)	1785	17%	366	F	3,137	
	NBRT (U.S. 41)	120	18%	351	F	3,137	
	NBTH (Dale Mabry)	1975	-1%	81	F	1,941	
	NBRT (Dale Mabry)	45	-4%	49	D	132	
U.S. 41 (S.R. 45) and Wal-Mart Driveway	Overall	3,435	14%	137	F		
	SBTH	980	12%	26	C	466	
	SBRT	230	12%	52	D	337	
	NBLT	150	13%	135	F	188	
	NBTH	1655	13%	221	F	3,673	
	EBLT	250	25%	148	F	306	
Dale Mabry Highway and Wal-Mart Driveway	Overall	3,580	3%	15	B		
	SBLT	105	10%	20	C	69	
	SBTH	1150	10%	9	A	321	
	SBRT	5	20%	9	A	321	
	NBTH	1870	-1%	17	B	880	
	NBLT	30	0%	9	A	56	
	NBRT	165	-2%	9	A	117	
	EBLT	35	-11%	53	D	153	
	EBRT	20	-10%	47	D	153	
	EBTH	5	0%	55	E	153	
	WBLT	75	-5%	49	D	55	
	WBTH	5	-40%	49	D	97	
WBRT	115	1%	10	B	727		

Table 6.8
2045 Build Alternative Option 1 AM Peak Hour Vissim Intersection Performance

Intersection	Movement	AM Volume (VPH) Demand	Unmet Demand	Delay (Seconds)	Level of Service	Max Queue Length (Feet)
U.S. 41 (S.R. 45) and S.R. 54	Overall	10,570	23%	234	F	
	SBTH	2,500	34%	249	F	10,105
	SBRT	370	36%	150	F	9,138
	SBLT	630	35%	305	F	10,100
	NBTH	1,370	2%	62	E	1,505
	NBLT	810	8%	180	F	1,510
	NBRT	1,050	4%	49	D	1,525
	EBLT	370	42%	241	F	215
	EBRT	1,150	46%	507	F	2,686
	EBTH	700	42%	604	F	2,685
	WBRT	600	7%	92	F	1,015
	WBLT	840	4%	175	F	944
WBTH	180	3%	121	F	304	
S.R. 54 and Lowe's/Village Lakes Plaza Driveway	Overall	4280	14%	20	C	
	SBLT	120	2%	109	F	261
	SBTH	15	-27%	103	F	261
	SBRT	20	-5%	98	F	261
	NBLT	100	4%	112	F	284
	NBTH	5	0%	119	F	284
	NBRT	60	0%	144	F	272
	EBLT	80	20%	132	F	231
	EBTH	2160	23%	6	A	204
	EBRT	130	22%	9	A	50
	WBLT	60	10%	118	F	177
	WBTH	1510	2%	12	B	567
WBRT	20	-5%	25	C	567	
U.S. 41 (S.R. 45) and Dale Mabry Highway	Overall	5465	14%	50	D	
	SBTH	2120	31%	50	D	751
	NBTH (U.S. 41)	1620	1%	34	C	733
	NBRT (U.S. 41)	30	3%	33	C	733
	NBTH (Dale Mabry)	1645	5%	65	E	1,487
	WBRT (Dale Mabry)	50	0%	47	D	394
U.S. 41 (S.R. 45) and Walmart Way	Overall	3970	16%	10	A	
	SBTH	2080	30%	10	A	570
	SBRT	90	29%	9	A	65
	NBLT	60	3%	5	A	51
	NBTH	1570	0%	5	A	209
	EBLT	80	4%	51	D	146
EBRT	90	2%	56	E	172	
Dale Mabry Highway and Walmart Way	Overall	4150	18%	10	A	
	SBLT	80	39%	13	B	47
	SBTH	2295	29%	10	A	513
	SBRT	5	20%	9	A	513
	NBTH	1590	2%	7	A	524
	NBLT	10	0%	12	B	34
	NBRT	50	0%	5	A	57
	EBLT	5	-20%	62	E	60
	EBRT	5	0%	47	D	60
	EBTH	5	0%	60	E	60
	WBLT	55	4%	54	D	53
WBTH	5	-20%	54	D	38	
WBRT	45	7%	8	A	48	

As displayed in Table 6.8, the average delay at the intersection of U.S. 41 and S.R. 54 is anticipated to be 234 seconds per vehicle with a total volume of 10,570 vehicles per hour (vph). The projected volumes on the four-lane overpass are 2,590 vph along the eastbound approach and 1,910 vph along the westbound approach. To account for the free-flow traffic on the overpass, the composite delay weighted by volume was calculated to include traffic on both surface roads and the overpass, assuming no delay for the traffic on the overpass.

The formula to calculate the composite delay is shown below:

$$Composite\ Delay = \frac{Intersection\ Delay\ X\ Intersection\ Volume + 0\ X\ Overpass\ Volume}{Intersection\ Volume + Overpass\ Volume}$$

As a result, the composite delay for the intersection of U.S. 41 and S.R. 54 is anticipated to be 164 seconds per vehicle for the design year 2045 AM conditions.

Table 6.9
2045 Build Alternative Option 1 PM Peak Hour Vissim Intersection Performance

Intersection	Movement	PM Volume (VPH) Demand	Unmet Demand	Delay (Seconds)	Level of Service	Max Queue Length (Feet)
U.S. 41 (S.R. 45) and S.R. 54	Overall	10,860	30%	298	F	
	SBTH	1,460	34%	325	F	10,094
	SBRT	400	34%	193	F	10,133
	SBLT	850	34%	545	F	10,088
	NBTH	2,030	40%	222	F	2,410
	NBLT	1,200	32%	145	F	2,410
	NBRT	1,295	37%	250	F	2,197
	EBLT	585	30%	241	F	348
	EBRT	725	40%	689	F	2,720
	EBTH	530	32%	643	F	2,718
	WBRT	500	5%	171	F	1,227
	WBLT	780	2%	119	F	845
WBTH	505	8%	215	F	1,221	
S.R. 54 and Lowe's/Village Lakes Plaza Driveway	Overall	4,885	19%	64	E	
	SBLT	165	4%	95	F	300
	SBTH	10	0%	103	F	300
	SBRT	120	3%	108	F	300
	NBLT	110	4%	261	F	1,022
	NBTH	15	13%	1021	F	1,022
	NBRT	100	30%	1472	F	1,023
	EBLT	200	34%	121	F	395
	EBTH	2290	33%	4	A	80
	EBRT	175	33%	5	A	51
	WBLT	105	8%	105	F	275
	WBTH	1540	0%	29	C	856
WBRT	55	-4%	48	D	856	
U.S. 41 (S.R. 45) and Dale Mabry Highway	Overall	5,925	35%	441	F	
	SBTH	1300	21%	98	F	857
	NBTH (U.S.41)	2170	56%	873	F	3,146
	NBRT (U.S. 41)	120	53%	768	F	3,146
	NBTH (Dale Mabry)	2285	21%	212	F	1,960
	NBRT (Dale Mabry)	50	36%	245	F	1,547
U.S. 41 (S.R. 45) and Walmart Way	Overall	3,960	45%	679	F	
	SBTH	1120	25%	14	B	236
	SBRT	230	24%	33	C	189
	NBLT	150	62%	825	F	179
	NBTH	2040	59%	1206	F	17,132
	EBLT	250	35%	286	F	321
EBRT	170	36%	66	E	265	
Dale Mabry Highway and Walmart Way	Overall	4,250	20%	152	F	
	SBLT	105	26%	35	D	67
	SBTH	1560	23%	22	C	395
	SBRT	5	20%	8	A	395
	NBTH	2130	20%	260	F	16,332
	NBLT	30	23%	158	F	57
	NBRT	165	21%	211	F	150
	EBLT	35	-11%	73	E	153
	EBRT	20	-10%	47	D	153
	EBTH	5	0%	53	D	153
	WBLT	75	-7%	50	D	63
	WBTH	5	-40%	52	D	103
WBRT	115	0%	51	D	16,506	

As displayed in Table 6.9, the average delay at the intersection of U.S. 41 and S.R. 54 is anticipated to be 298 seconds per vehicle with a total volume of 10,860 vehicles per hour (vph). The projected volume on the four-lane overpass is 1,910 vph along either the eastbound approach or the westbound approach. To account for the free-flow traffic on the overpass, the composite delay weighted by volume was calculated in the same manner as for the AM conditions.

As a result, the composite delay for the intersection of U.S. 41 and S.R. 54 is anticipated to be 220 seconds per vehicle for the design year 2045 PM conditions.

**Table 6.10
Build Alternative Option 1 Network Performance Statistics**

Statistics	Year 2025		Year 2045	
	AM Peak Period	PM Peak Period	AM Peak Period	PM Peak Period
Total travel time [hour]	8,596	8,047	10,220	20,321
Total delay time [hour]	4,584	4,096	5,880	15,719
Average delay time[second]	353	297	415	1,024
Average speed [mph]	20	22	19	10
Percent demand served	96%	100%	86%	89%

Network-wide statistics during the AM (6:00 to 10:00 AM) and PM (3:45 to 7:45 PM) peak periods in years 2025 and 2045 for the SPUI alternative are listed in **Table 6.10**. As displayed in Table 6.10, during the AM peak period of the Design Year 2045, the unmet demand is 14% and the network-wide average speed is 19 mph. During the PM peak period, the unmet demand is 9% and the network-wide average speed is 10 mph. Note that elevated lanes with free-flow traffic have been incorporated into the Vissim model; therefore, the network-wide statistics for the SPUI model also include free-flow traffic on these elevated lanes.

Build Alternative Option 2

Under the DDI configuration, the elevated U.S. 41 through lanes are proposed to pass over S.R. 54. Traffic along S.R. 54 will be temporarily shifted to the left side of the roadway, allowing free-flow left turns onto the U.S. 41, reducing the number of signal phases, and improving safety and operational efficiency by eliminating left-turn movements that conflict with opposing traffic. Drivers will cross over at the signalized intersections on either side of U.S. 41 and then cross back to the right side, creating a smoother traffic flow at the S.R. 54 and U.S. 41 intersection. MOEs including delay per vehicle, LOS, maximum queue length as well as unmet demand are summarized for major intersections in the study area.

2025 Opening Year

As shown in **Tables 6.11** and **6.12**, the intersection of the U.S. 41 (S.R. 45) southbound approach and S.R. 54 exhibits 2% unmet demand during the AM peak hour and 13% during the PM peak hour. During the AM peak hour, the average delay per vehicle is 35 seconds, corresponding to LOS D. During the PM peak hour, the average delay increases to 179 seconds, corresponding to LOS F.

The intersection of the U.S. 41 (S.R. 45) northbound approach and S.R. 54 exhibits 2% unmet demand during AM peak hour and 11% unmet demand during the PM peak hour. During the AM peak hour, the average delay per vehicle is 47 seconds, corresponding to LOS D. During the PM peak hour, the average delay increases to 51 seconds, also corresponding to LOS D.

2045 Design Year

As shown in **Tables 6.13** and **6.14**, the intersection of the U.S. 41 (S.R. 45) southbound approach and S.R. 54 exhibits 22% unmet demand during the AM peak hour and 27% during the PM peak hour. During the AM peak hour, the average delay per vehicle is 64 seconds, corresponding to LOS E. During the PM peak hour, the average delay increases to 200 seconds, corresponding to LOS F.

The intersection of the U.S. 41 (S.R. 45) northbound approach and S.R. 54 exhibits 21% unmet demand during AM peak hour and 24% unmet demand during the PM peak hour. During the AM peak hour, the average delay per vehicle is 72 seconds, corresponding to LOS E. During the PM peak hour, the average delay is 67 seconds, also corresponding to LOS D.

Table 6.11
2025 Build Alternative Option 2 AM Peak Hour Vissim Intersection Performance

Intersection	Movement	AM Volume (VPH)	Demand	Unmet Demand	Delay (Seconds)	Level of Service	Max Queue Length (Feet)
U.S. 41 and S.R. 54 Southbound	Overall	7,285	2%	35	D		
	SBLT	575	1%	56	E	425	
	SBRT	340	-1%	30	C	170	
	EBTH	2,655	2%	50	D	2,320	
	EBRT	830	3%	9	A	2,064	
	WBLT	660	4%	4	A	538	
	WBTH	2,225	3%	32	C	695	
U.S. 41 and S.R. 54 Northbound	Overall	7,585	2%	47	D		
	NBLT	675	3%	35	D	473	
	NBRT	920	3%	47	D	723	
	EBLT	390	1%	3	A	310	
	EBTH	2,840	2%	18	B	399	
	WBTH	2,210	3%	100	F	1,129	
	WBRT	550	2%	26	C	872	
S.R. 54 and Lowe's/Village Lakes Driveway	Overall	6,820	3%	55	E		
	SBLT	120	38%	1,252	F	1,353	
	SBTH	15	27%	1,193	F	1,353	
	SBRT	20	35%	1,036	F	229	
	NBLT	100	3%	118	F	155	
	NBTH	5	20%	93	F	155	
	NBRT	75	-3%	33	C	155	
	EBLT	80	5%	115	F	287	
	EBUT	20	5%	122	F	287	
	EBTH	3,515	3%	18	B	645	
	EBRT	145	6%	24	C	645	
	WBLT	60	12%	221	F	1,618	
	WBUT	5	20%	218	F	1,618	
	WBTH	2,640	1%	29	C	1,618	
WBRT	20	-15%	33	C	1,618		
U.S. 41 and Dale Mabry	Overall	1,705	3%	50	D		
	EBLT	750	4%	95	F	758	
	NBTH	845	2%	14	B	426	
	NBUT	110	2%	12	B	193	
U.S. 41 and Wal-Mart	Overall	3,525	1%	7	A		
	SBTH	1,715	2%	7	A	268	
	SBRT	90	-2%	3	A	46	
	SBUT	110	-2%	7	A	88	
	NBLT	60	0%	11	B	60	
	NBTH	1,380	0%	5	A	190	
	EBLT	80	5%	52	D	156	
EBRT	90	1%	10	B	115		
Dale Mabry and Wal-Mart	Overall	3,435	2%	9	A		
	SBLT	80	8%	12	B	67	
	SBTH	1,930	2%	8	A	711	
	SBRT	5	0%	6	A	711	
	NBTH	1,355	2%	8	A	402	
	NBLT	10	0%	15	B	36	
	NBUT	10	-20%	10	A	36	
	NBRT	50	0%	3	A	37	
	EBLT	5	0%	57	E	55	
	EBTH	5	20%	57	E	55	
	EBRT	5	0%	49	D	55	
	WBLT	55	-4%	58	E	127	
WBTH	5	-20%	11	B	3		
WBRT	45	-4%	7	A	75		

Table 6.12
2025 Build Alternative Option 2 PM Peak Hour Vissim Intersection Performance

Intersection	Movement	PM Volume (VPH) Demand	Unmet Demand	Delay (Seconds)	Level of Service	Max Queue Length (Feet)
U.S. 41 and S.R. 54 Southbound	Overall	7,060	13%	179	F	
	SBLT	715	-1%	51	D	610
	SBRT	340	-1%	19	B	119
	EBTH	2,210	24%	456	F	6,596
	EBRT	510	23%	233	F	6,350
	WBLT	585	10%	4	A	526
	WBTH	2,700	8%	35	C	864
U.S. 41 and S.R. 54 Northbound	Overall	7,635	11%	51	D	
	NBLT	975	1%	62	E	1,079
	NBRT	1,025	-2%	34	C	668
	EBLT	485	22%	5	A	636
	EBTH	2,440	17%	65	E	913
	WBTH	2,310	11%	57	E	789
	WBRT	400	12%	9	A	522
S.R. 54 and Lowe's/Village Lakes Driveway	Overall	6,650	13%	179	F	
	SBLT	165	61%	1,593	F	1,445
	SBTH	10	60%	1,598	F	1,445
	SBRT	120	63%	1,345	F	1,464
	NBLT	110	3%	95	F	183
	NBTH	15	-13%	95	F	183
	NBRT	135	-3%	27	C	183
	EBLT	200	15%	344	F	1,177
	EBUT	25	20%	330	F	1,177
	EBTH	3,035	12%	27	C	1,155
	EBRT	205	13%	26	C	1,155
	WBLT	105	49%	845	F	6,242
	WBUT	15	47%	853	F	6,242
	WBTH	2,455	10%	186	F	6,242
WBRT	55	0%	174	F	6,242	
U.S. 41 and Dale Mabry	Overall	2,080	0%	52	D	
	EBLT	995	-1%	77	E	1,186
	NBTH	1,005	0%	29	C	641
	NBUT	80	-4%	25	C	403
U.S. 41 and Wal-Mart	Overall	3,515	3%	16	B	
	SBTH	980	6%	9	A	210
	SBRT	230	5%	12	B	151
	SBUT	80	0%	12	B	92
	NBLT	150	3%	17	B	104
	NBTH	1,655	0%	7	A	257
	EBLT	250	5%	102	F	314
EBRT	170	4%	23	C	306	
Dale Mabry and Wal-Mart	Overall	3,385	2%	13	B	
	SBLT	105	6%	22	C	92
	SBTH	1,150	7%	8	A	335
	SBRT	5	20%	6	A	335
	NBTH	1,870	0%	13	B	929
	NBLT	30	7%	9	A	49
	NBUT	25	0%	8	A	49
	NBRT	165	-1%	5	A	388
	EBLT	35	-9%	55	D	124
	EBTH	5	0%	52	D	124
	EBRT	20	-5%	57	E	124
	WBLT	75	0%	51	D	148
WBTH	5	-20%	11	B	99	
WBRT	115	-3%	7	A	96	

Table 6.13
2045 Build Alternative Option 2 AM Peak Hour Vissim Intersection Performance

Intersection	Movement	AM Volume (VPH) Demand	Unmet Demand	Delay (Seconds)	Level of Service	Max Queue Length (Feet)
U.S. 41 and S.R. 54 Southbound	Overall	9,635	22%	64	E	
	SBLT	670	5%	97	F	1,447
	SBRT	370	2%	51	D	188
	EBTH	3,680	26%	98	F	6,583
	EBRT	1,150	26%	40	D	6,327
	WBLT	845	26%	5	A	556
	WBTH	2,920	20%	41	D	885
U.S. 41 and S.R. 54 Northbound	Overall	9,765	21%	72	E	
	NBLT	815	4%	36	D	627
	NBRT	1,050	7%	97	F	1,285
	EBLT	410	24%	2	A	577
	EBTH	3,940	24%	36	D	863
	WBTH	2,950	26%	138	F	1,233
	WBRT	600	25%	39	D	976
S.R. 54 and Lowe's/Village Lakes Driveway	Overall	8,830	23%	135	F	
	SBLT	120	48%	1,532	F	1,341
	SBTH	15	40%	1,475	F	1,341
	SBRT	20	45%	1,373	F	593
	NBLT	100	19%	522	F	355
	NBTH	5	20%	590	F	355
	NBRT	75	-1%	80	F	355
	EBLT	80	21%	203	F	684
	EBUT	30	27%	282	F	684
	EBTH	4,750	21%	48	D	1,193
	EBRT	130	17%	56	E	1,193
	WBLT	60	27%	277	F	6,660
	WBUT	5	60%	251	F	6,660
	WBTH	3,420	26%	180	F	6,660
WBRT	20	15%	156	F	6,660	
U.S. 41 and Dale Mabry	Overall	1,975	3%	52	D	
	EBLT	900	4%	91	F	936
	NBTH	965	3%	19	B	553
	NBUT	110	2%	14	B	321
U.S. 41 and Wal-Mart	Overall	4,080	7%	7	A	
	SBTH	2,080	12%	7	A	292
	SBRT	90	16%	4	A	39
	SBUT	110	17%	7	A	79
	NBLT	60	2%	12	B	62
	NBTH	1,570	0%	5	A	212
	EBLT	80	5%	52	D	156
EBRT	90	1%	11	B	126	
Dale Mabry and Wal-Mart	Overall	4,035	8%	13	B	
	SBLT	80	11%	16	B	69
	SBTH	2,295	13%	14	B	879
	SBRT	5	0%	9	A	879
	NBTH	1,590	2%	8	A	500
	NBLT	10	10%	17	B	28
	NBUT	10	10%	15	B	28
	NBRT	50	0%	3	A	8
	EBLT	5	0%	57	E	55
	EBTH	5	20%	59	E	55
	EBRT	5	0%	50	D	55
	WBLT	55	-2%	57	E	127
WBTH	5	-20%	11	B	14	
WBRT	45	-7%	7	A	76	

The average delay for the intersection of the S.R. 54 southbound approach and U.S. 41 is anticipated to be 64 seconds per vehicle, with a total volume of 9,635 vehicles per hour (vph). The average delay for the intersection of the S.R. 54 northbound approach and U.S. 41 is anticipated to be 72 seconds per vehicle, with a total volume of 9,765 vph. The projected volume on the four-lane overpass is 3,870 vph. Accounting for the free-flow traffic on the overpass, the composite delay for the U.S. 41 and S.R. 54 intersections under 2045 AM conditions is anticipated to be 57 seconds per vehicle.

Table 6.14
2045 Build Alternative Option 2 PM Peak Hour Vissim Intersection Performance

Intersection	Movement	PM Volume (VPH) Demand	Unmet Demand	Delay (Seconds)	Level of Service	Max Queue Length (Feet)
U.S. 41 and S.R. 54 Southbound	Overall	9,455	27%	200	F	
	SBLT	865	3%	166	F	3,962
	SBRT	400	-1%	63	E	165
	EBTH	3,045	46%	459	F	6,598
	EBRT	725	45%	237	F	6,352
	WBLT	785	24%	5	A	549
	WBTH	3,635	18%	42	D	895
U.S. 41 and S.R. 54 Northbound	Overall	10,125	24%	67	E	
	NBLT	1,205	4%	135	F	2,402
	NBRT	1,295	0%	55	D	2,124
	EBLT	600	44%	4	A	633
	EBTH	3,310	35%	61	E	911
	WBTH	3,215	25%	73	E	1,034
	WBRT	500	25%	16	B	767
S.R. 54 and Lowe's/Village Lakes Driveway	Overall	8,785	26%	139	F	
	SBLT	165	62%	1,628	F	1,404
	SBTH	10	60%	1,603	F	1,404
	SBRT	120	63%	1,381	F	1,422
	NBLT	110	3%	96	F	183
	NBTH	15	-7%	100	F	183
	NBRT	135	-4%	31	C	183
	EBLT	200	24%	181	F	1,023
	EBUT	35	29%	180	F	1,023
	EBTH	4,165	25%	24	C	1,151
	EBRT	205	27%	33	C	1,151
	WBLT	105	50%	604	F	6,655
	WBUT	15	53%	620	F	6,655
WBTH	3,450	26%	152	F	6,655	
WBRT	55	20%	147	F	6,655	
U.S. 41 and Dale Mabry	Overall	2,580	1%	76	E	
	EBLT	1,210	-1%	93	F	1,665
	NBTH	1,290	2%	62	E	1,333
	NBUT	80	-3%	51	D	1,095
U.S. 41 and Wal-Mart	Overall	4,040	6%	15	B	
	SBTH	1,120	16%	10	B	240
	SBRT	230	16%	11	B	118
	SBUT	80	10%	13	B	85
	NBLT	150	-1%	16	B	115
	NBTH	2,040	0%	8	A	300
	EBLT	250	5%	102	F	315
EBRT	170	4%	23	C	306	
Dale Mabry and Wal-Mart	Overall	4,055	7%	17	B	
	SBLT	105	22%	29	C	81
	SBTH	1,560	17%	11	B	493
	SBRT	5	20%	10	A	493
	NBTH	2,130	0%	19	B	1,500
	NBLT	30	7%	15	B	56
	NBUT	25	4%	13	B	56
	NBRT	165	1%	9	A	965
	EBLT	35	-9%	56	E	124
	EBTH	5	0%	52	D	124
	EBRT	20	-5%	57	E	124
	WBLT	75	0%	51	D	149
WBTH	5	0%	12	B	95	
WBRT	115	-3%	8	A	96	

For the PM peak period in the Vissim model, the westbound signal timing phase is modified to incorporate an additional phase to accommodate the substantial northbound left turn demand (1,205 vph). The extended westbound phase also enhances operational efficiency for the northbound right turn movement (1,295 vph), which operates concurrently under a shadowed condition. Furthermore, the closely spaced downstream intersection at Lowe’s/Village Lakes Plaza functions as a metering point for westbound traffic, effectively regulating upstream arrival flow and contributing to reduced average delay along the westbound approaches at the DDI ramp terminals. The average delay for the intersection of the S.R. 54 southbound approach and U.S. 41 is anticipated to be 200 seconds per vehicle, with a total volume of 9,455 vehicles per hour (vph). The average delay for the intersection of the S.R. 54 northbound approach and U.S. 41 is anticipated to be 67 seconds per vehicle, with a total volume of 10,125 vph. The projected volume on the four-lane overpass is 3,490 vph. Accounting for the free-flow traffic on the overpass, the composite delay for the U.S. 41 and S.R. 54 intersections under 2045 PM conditions is anticipated to be 111 seconds per vehicle.

Table 6.15
Build Alternative Option 2 Network Performance Statistics

Statistics	Year 2025		Year 2045	
	AM Peak Period	PM Peak Period	AM Peak Period	PM Peak Period
Total travel time [hour]	5,016	7,368	7,798	8,985
Total delay time [hour]	1,158	3,778	3,422	4,951
Average delay time[second]	85	276	226	327
Average speed [mph]	34	22	24	20
Percent demand served	100%	98%	91%	88%

Network-wide statistics during the AM (6-10 AM) and PM (3:45 to 7:45 PM) peak periods in years 2025 and 2045 for the DDI alternative are listed in **Table 6.15**. As displayed in **Table 6.15**, during the AM peak period of the design year 2045, the unmet demand is 9% and the network-wide average speed is 24 mph. During the PM peak period, the unmet demand is 12% and the network-wide average speed is 20 mph. Note that elevated lanes with free-flow traffic have been incorporated into the Vissim model; therefore, the network-wide statistics for the DDI model also include free-flow traffic on these elevated lanes.

6.3 USER BENEFIT ANALYSIS

Travel time/delay reduction was considered as a key element for user benefit analysis. The procedure to calculate user benefits is as follows:

- Estimate average travel times for No-Build and Build Alternatives.
- Establish appropriate travel time unit cost values (dollars per hour) for both passenger cars and trucks.
- Calculated the total value of travel time savings for the project.

Texas Transportation Institute’s (TTI’s) Urban Mobility Report 2021 was utilized to estimate average cost of one-hour of vehicle delay for both passenger cars and trucks.

Based on the TTI 2021 Urban Mobility Report, the cost of a person’s hour in congestion is \$20.17, and the value of a truck’s delay time is \$55.24 per hour. The discount rate is 4%, and there are 250 working days per year (assuming an average of 2 weeks of vacation). These factors were considered in the user benefit estimations.

User benefit for a 20-year life span of the proposed Build Alternative Option 1 (SPUI) and Build Alternative Option 2(DDI) was estimated using network-wide travel time. Based on 2022 dollars, the estimated user benefits per year are \$ 101 million and \$156 million, for Build Alternative Option 1 and 2, respectively. Supporting documentation are included in **Appendix F**. At this point in the study, the comparative evaluation of alternatives is based strictly on travel time savings and does not include a comparison of construction or Right of Way costs.

6.4 FUTURE SAFETY ANALYSIS

A predictive safety evaluation was conducted to evaluate three alternatives: the No Build Alternative, which does not implement any significant changes to existing conditions, and the Build Alternative Option 1 which introduces a SPUI as well as additional improvements to the adjacent facilities and intersections and Build Alternative Option 2 with DDI.

The predictive safety evaluation consisted of a 20-year comparative analysis from 2025 to 2045. The analysis limits for this study consist of 2.07 miles of U.S. 41 (S.R. 45), 1.38 miles of S.R. 54, and 0.32 miles of S.R. 597. In addition, two intersection locations were evaluated, as listed below:

- U.S. 41 (S.R. 45) at S.R. 54
- U.S. 41 (S.R. 45) at S.R. 597/Dale Mabry Highway

6.4.1 Methodology

The predictive safety evaluation presented in this document is based on the principles and methods of the Highway Safety Manual (HSM). The Interactive Highway Safety Design Model (IHSDM) contains a Crash Prediction Module which is “a faithful software implementation of the Highway Safety Manual’s (HSM) Part C: predictive Method”. The IHSDM 2021 Release, 17.0.0 – Sep 22, 2021 was utilized for this effort.

The IHSDM incorporates the latest safety performance functions and crash modification factors developed to evaluate the facilities, intersections, and interchanges considered at this study location. The IHSDM Version 17.0.0 incorporates the findings from the NCHRP Project 17-58 (“Safety Production Models for 6-Lane and One-Way Urban and Suburban Arterials”), NCHRP Project 17-45 (“Safety Prediction Methodology and Analysis Tool for Freeways and Interchanges”) and NCHRP Project 17-68 (“Intersection Crash Prediction Methods for the Highway Safety Manual”) which includes the latest safety performance functions for Single-Point Diamond Interchanges. For this analysis the consideration of a DDI was also required. At this time the IHSDM does not include a specific model or template for DDIs, however strategies to model DDIs include modeling them into component parts such as ramp terminals and crossings or applying CMF clearinghouse for converting at-grade intersections to a DDI. The approach taken for this analysis was to model based on component parts. Given the significant difference between the No Build and the Build alternatives, the Empirical Bayes methodology was not applicable.

6.4.2 Facilities, Segmentation, and Data Input

The network developed for this effort consists of various sites which are evaluated individually per the HSM analysis approach. The IHSDM automatically segments the sites into the necessary sections required to apply the correct Safety Performance Functions (SPFs) and Crash Modification Factors (CMFs) based on user inputs.

The key data inputs required to conduct a predictive safety analysis include Annual Average Daily Traffic data and roadway geometry. **Figure 6.4** below illustrates a simplified graphic of the No Build AADTs utilized for this evaluation. **Figure 6.5 and 6.6** below illustrates a simplified graphic of the Build Alternative Option 1 and Build Alternative Option 2 conditions AADTs utilized for this evaluation. The geometric inputs were obtained from design files and verified through aerial photography were appropriate.

Figure 6.4
No Build 2025 and 2045 AADTs

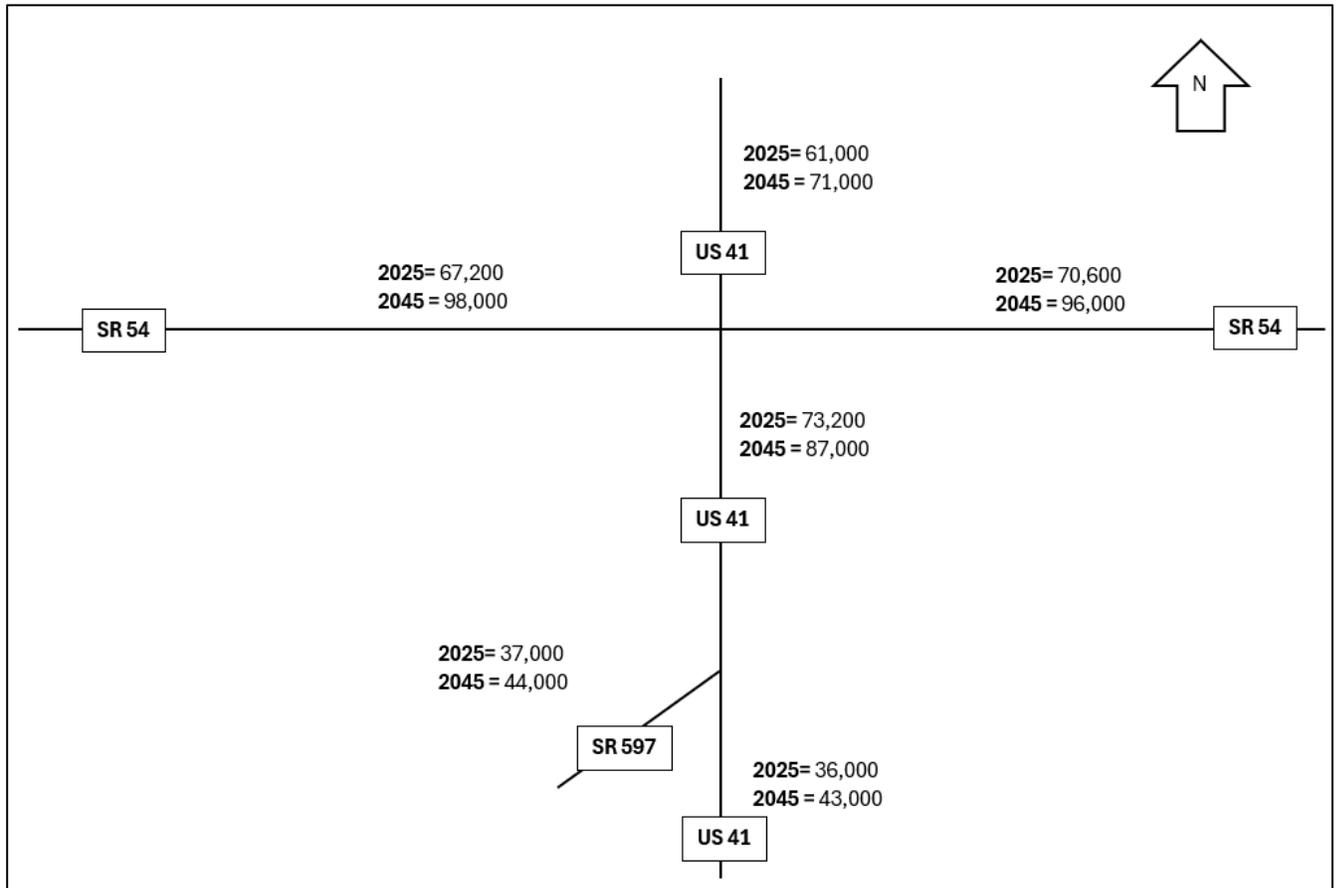


Figure 6.5
Build Alternative Option 1 2025 and 2045 AADTs

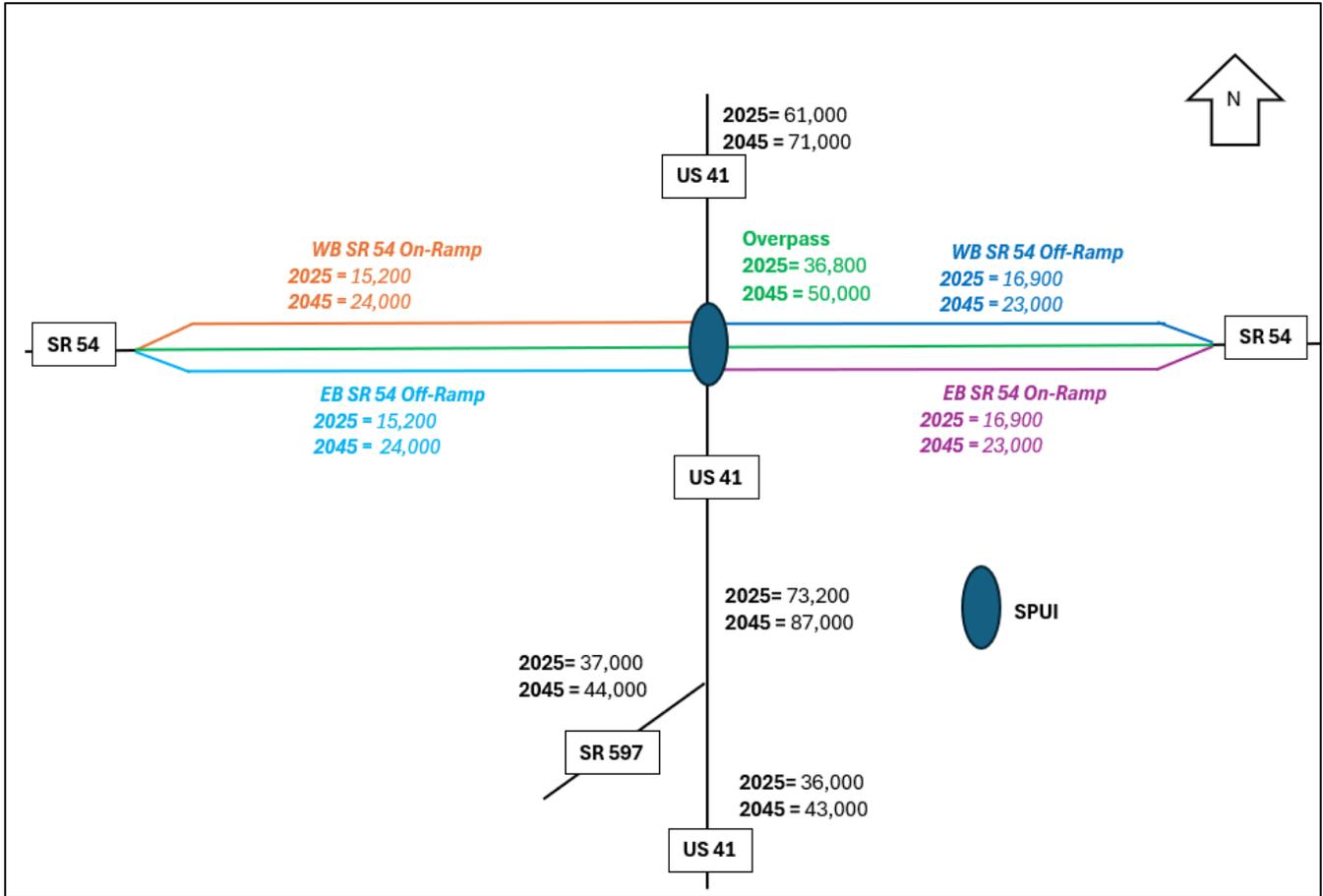
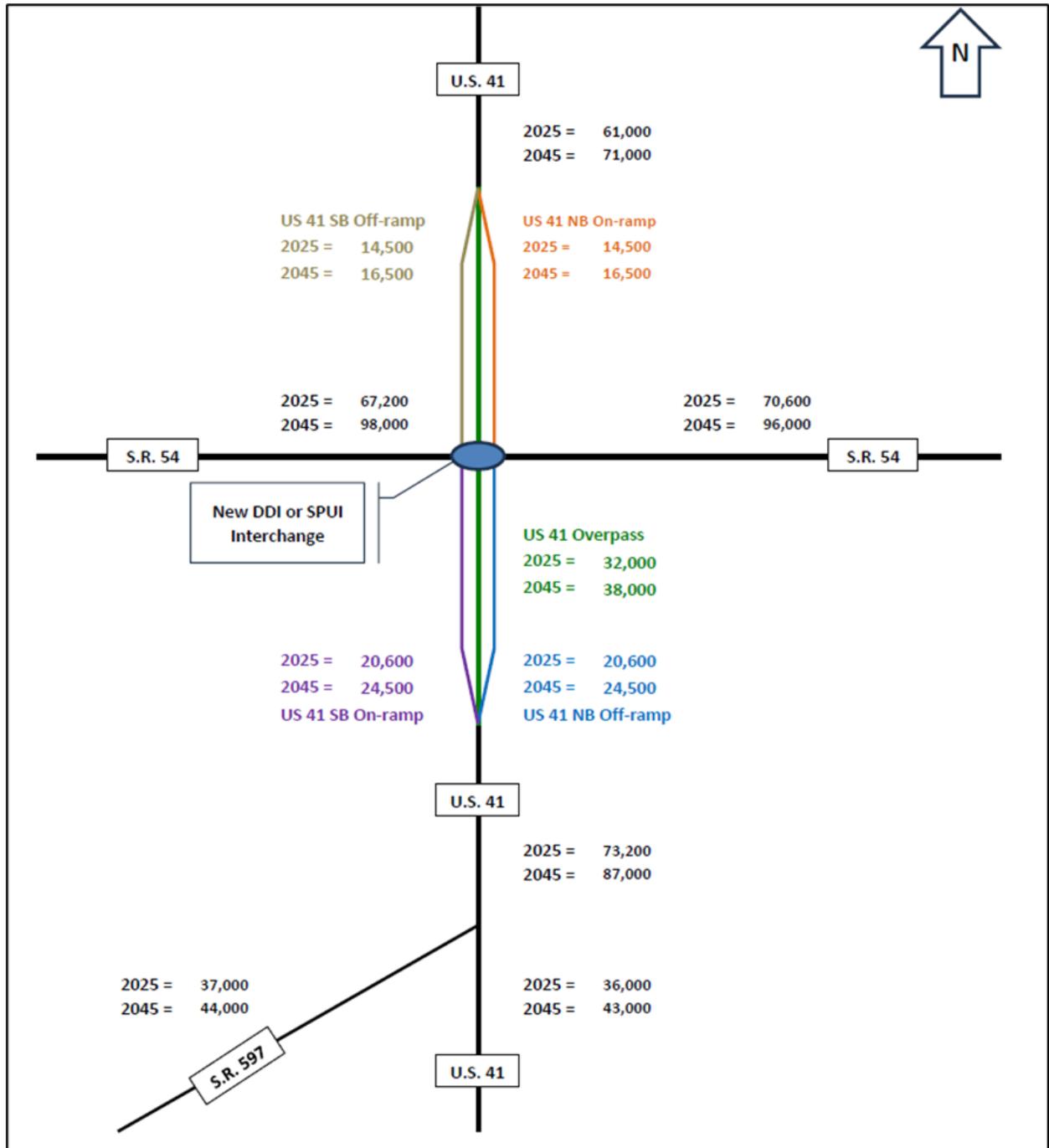


Figure 6.6
Build Alternative Option 2 2025 and 2045 AADTs



6.4.3 HSM Safety Performance Functions

The SPFs that were applied to each facility are described in the following sections.

S.R. 54

S.R. 54 under No Build conditions was evaluated as an Urban/Suburban Arterial Segment Six-lane Divided roadway.

S.R. 54 under Build Alternative Option 1 conditions was evaluated as the following:

- Elevated S.R. 54: Four Lane Freeway roadway
- EB S.R. 54 West of U.S. 41: Freeway Ramp and C-D Road Two-lane Ramp Exit roadway
- EB S.R. 54 East of U.S. 41: Freeway Ramp and C-D Road Two-lane Ramp Entrance roadway
- WB S.R. 54 West of U.S. 41: Freeway Ramp and C-D Road One-lane Ramp Entrance roadway
- WB S.R. 54 East of U.S. 41: Freeway Ramp and C-D Road Two-lane Ramp Exit roadway

S.R. 54 under Build Alternative 2 and Build Alternative 3 conditions were evaluated as the following:

- East Bound S.R. 54: Urban/Suburban Arterial Segment Three-lane One-Way Arterial
- West Bound S.R. 54: Urban/Suburban Arterial Segment Three-lane One-Way Arterial

U.S. 41

U.S. 41 under No Build and Build Alternative Option 1 conditions was evaluated as an Urban/Suburban Arterial Six Lane Divided Segment roadway.

U.S. 41 under Build Alternative Option 2 was evaluated as a Four Lane Freeway roadway for the elevated portion and a Urban/Suburban Arterial Segment Six-lane Divided roadway at the at-grade segments. It should be noted that under Build Alternative Option 2, the complexity of the geometry required the evaluation of various segments such as ramps and access roads be evaluated as freeway ramps and C-D Road One-Lane Ramps, Two-Lane Ramps and Urban/Suburban Arterial Segments One-lane and Two-lane One-Way Arterials.

S.R. 597/Dale Mabry Highway

S.R. 597/Dale Mabry Highway under No Build and Build Alternatives conditions was evaluated as an Urban/Suburban Arterial Segment Four-lane Divided roadway.

U.S. 41 at S.R. 54 (Intersection)

- Under No Build conditions, U.S. 41 at S.R. 54 was evaluated as an Urban/Suburban Arterial Intersection Four-Legged Signalized.
- Under Build Alternative Option 1 U.S. 41 at S.R. 54 was evaluated as a Single-point Diamond Interchange.

Under Build Alternative Option 2 U.S. 41 at S.R. 54 was evaluated as a DDI by considering two three-lane one-way arterials, and two signalized intersections at their crossing points.

U.S. 41 at S.R. 597/Dale Mabry Highway (Intersection)

Under No Build and Build conditions, U.S. 41 at S.R. 597/Dale Mabry Highway was evaluated as an Urban/Suburban Arterial Intersection Three-Legged Signalized.

Crash Modification Factors

Supplementary CMFs were applied to the evaluation at the sites listed below. Each CMF was obtained from the Crash Modification Factors Clearinghouse. Details of the CMFs can be found in Appendix A.

- U.S. 41 at S.R. 54 Build Condition – Install lighting at interchanges. Applicable to KABC crashes only, not property damage only (PDO) crashes. (CMF ID: 1284)
- U.S. 41 at S.R. 597/Dale Mabry Highway Build Condition – Convert continuous Green T-Intersection to conventional T-Intersection. Applicable to all crash types. (CMF ID: 10664)

Lighting was considered at all facilities in No Build and Build conditions. Given that the Single-Point Urban Interchange at U.S. 41 at S.R. 54 is evaluated as a site-set under Build Alternative Option 1, incorporating lighting was not readily available through the IHSDM interface, hence the “install lighting at interchanges” CMF was applied to maintain a parallel comparison. Under Build Alternative Option 1 conditions at U.S. 41 at S.R. 597/Dale Mabry Highway, a noteworthy improvement consists of the introduction of signal control to the existing northbound through movement that operates as a free flow movement in No Build condition. Hence, the “Convert continuous Green T-Intersection to conventional T-Intersection” CMF was determined to be the most appropriate to capture the overall safety benefits of introducing signal control to the northbound through movement.

It should be noted, that under Build Alternative Option 2, the intersection of S.R. 597/Dale Mabry Highway at U.S. 41 is benefited by the elimination of the at-grade signalized intersection which is a significant safety improvement. The safety performance however is now experienced within the newly proposed ramps from/to 597/Dale Mabry Highway, while the segment that connects S.R. 597/Dale Mabry Highway to the U.S. 41 Access Road cannot be evaluated under current HSM methodologies (a three-leg signalized intersection connecting S.R. 597/Dale Mabry Highway a one-way two lane connector to U.S. 41 access road a one-way two lane connector), the best comparison of safety benefits can be concluded by comparing the predictive safety performance of the intersection condition to the predictive safety performance of the newly proposed ramp conditions.

6.4.4 Analysis Results

The results are demonstrated in **Table 6.11** below and illustrate the 20-year predicted Total Predicted Crashes for each facility evaluated. Detailed output of the IHSDM evaluation can be found in **Appendix G**. It should be noted that the values for the segments listed in the table below do not match the IHSDM segment outputs because the segment outputs include both the predicted crashes for the segment and intersection(s) along the segment. Thus, the predicted crashes at the intersection(s) must be subtracted from the IHSDM output total for the segment to calculate the predicted crash rate for the segment.

Table 6.16
Predictive Safety Evaluation Results

2025 - 2045 Total Predicted Crashes	No Build	Build Alternative Option 1 SPUI S.R. 54 Elevated	Build Alternative Option 1 % Change*	Build Alternative Option 2 DDI U.S. 41 Elevated	Build Alternative Option 2 % Change*
S.R. 54	1262	--	-35%	557	-40%
Elevated S.R. 54*	--	419			
EB S.R. 54 West of U.S. 41*		91			
EB S.R. 54 East of U.S. 41*		88			
WB S.R. 54 West of U.S. 41*		148			
WB S.R. 54 East of U.S. 41*		74			
S.R. 54 Ramps to Elevated U.S. 41		--		196	
U.S. 41		724	729	1%	--
Elevated U.S. 41*	--	--	--	51	
U.S. 41 Ramps and Access Roads*	--	--	--	598	
S.R. 597	101	102	1%	102	1%
S.R. 597 Ramps to Elevated U.S. 41 *	--	--	--	--	
S.R. 54 at U.S. 41	905	--	6%	--	-69%
S.R. 54 at U.S. 41-SPUI Interchange*	--	962			
S.R. 54 at U.S. 41-DDI Interchange*	--	--		282	
S.R. 597 at U.S. 41	354	235	-34%	--	-58%
S.R. 597 Ramps to Elevated U.S. 41 *	--	--		148	
TOTAL	3,346	2,848	-15%	1,934	-42%

*Build Conditions

+When Compared to No-Build

It should be noted that AADT is a key input used in the predictive method. Certain limitations exist in terms of reliable results when predicting crashes outside the range of AADT values used to develop the SPF. The following facility types listed below were noted to have AADT values that exceed the applicable range of the SPF model limits and hence should be evaluated with caution.

- **No Build**
 - **U.S. 41 at S.R. 54:** Urban/Suburban Arterial Intersection Four-Legged Signalized.
 - **U.S. 41 at S.R. 597/Dale Mabry Highway:** Urban/Suburban Arterial Intersection Three-Legged Signalized
- **Build Alternative Option 1 – SPUI S.R. 54 Elevated**
 - **U.S. 41 at S.R. 54:** Single Point Diamond Interchange
 - **U.S. 41 at S.R. 597/Dale Mabry Highway:** Urban/Suburban Arterial Intersection Three-Legged Signalized
 - **S.R. 54 EB East of U.S. 41:** Freeway Ramp Entrance
 - **S.R. 54 WB West of U.S. 41:** Freeway Ramp Entrance
- **Build Alternative Option 2 – DDI U.S. 41 Elevated**
 - **S.R. 54:** Urban/Suburban Arterial Segment Three-lane One-Way Arterial

- **S.R. 54:** Urban/Suburban Arterial Segment Three-lane One-Way Arterial
- **U.S. 41 at S.R. 54:** Urban/Suburban Intersection Four-Legged Signalized

The results of the predictive safety evaluation indicate that over a 20-year evaluation period the overall Build Alternative Option 1 condition is anticipated to result in a 15% reduction in the total number of predicted crashes when compared to the No Build condition. The proposed changes to the S.R. 54 facility are predicted to reduce crashes by 35%, while the U.S. 41 and the S.R. 597/Dale Mabry Highway are predicted to have negligible changes. The SPUI interchange with S.R. 54 elevated is anticipated to result in a predicted crash increase of 6%. Furthermore, the added signalization improvements at U.S. 41 at S.R. 597/Dale Mabry Highway are anticipated to reduce crashes by 34%.

The results of the predictive safety evaluation indicate that over a 20-year evaluation period the overall Build Alternative Option 2 condition is anticipated to result in a 42% reduction in the total number of predicted crashes when compared to the No Build condition. The proposed changes to the S.R. 54 facility are predicted to reduce crashes by 40%. The proposed changes to the U.S. 41 facility are predicted to reduce crashes by 10%. The DDI interchange with U.S. 41 elevated is anticipated to result in a predicted crash reduction of 69%. The newly proposed ramp connections between S.R. 597/Dale Mabry Highway, U.S. 41 and S.R. 54 remove the existing intersection operation at S.R. 597 at U.S. 41, enhancing the predicted safety conditions that result in a crash reduction of 58%. The overpass traffic was considered in the safety evaluation. Note that generally, a lower volume AADT Section will result in fewer crashes. Hence the safety benefits do include the overpass predicted safety crashes.

The Florida Department of Transportation (FDOT) District Seven has conducted a Project Development and Environment (PD&E) Study (FPID 419182-1-22- 01) to identify an optimum configuration for the intersection of S.R. 45 (U.S. 41)/S.R. 597 at S.R. 54 that maximizes existing and future traffic operations, minimizes costs and impacts, and is compatible with the Pasco County Vision 54/56 Study. These two alternatives are analyzed in this report:

- Build Alternative Option 1 is a Single Point Urban Interchange (SPUI) with S.R. 54 elevated over U.S. 41 (same as Feasibility Alternative 1)
- Build Alternative Option 2 is a Diverging Diamond Interchange (DDI) with U.S. 41 elevated over S.R. 54 and S.R. 597 (Dale Mabry Highway)

Existing Conditions

The existing traffic analysis shows that the intersection of U.S. 41 (S.R. 45) and S.R. 54 is experiencing long delays and reduction in speed during AM and PM peak periods. In addition, the eastbound queue currently spills back over a mile in the AM peak period. During the PM peak period, the intersection is experiencing long delays and the westbound queue backup beyond the intersection of Lowe's/Village Lakes Plaza Driveway. Occurrences of long queues along S.R. 54 in the field are from are also corroborated by Vissim simulation.

Historical Crash Data

Historic crash data shows that the crash rate along U.S. 41 from Wal-Mart Driveway to Morgan Road is higher than the statewide average. The crash rate from Dale Mabry Highway from Wal-Mart Driveway to U.S. 41 is more than three times the statewide average. The most common type of crash along the U.S. 41/Dale Mabry Highway segments were rear ends, followed by sideswipes. 36% of segment crashes resulted in fatalities or injuries. The segment crash rates for S.R. 54 were all higher than the statewide average. 52% of crashes were considered rear ends and 30% of S.R. 54 segment crashes resulted in injury. The S.R. 54 at U.S. 41 intersection crash rate was twice as high as the statewide average. A total of 427 crashes were reported with the majority being rear ends and sideswipes. Out of all the crashes included in the dataset, 11 were classified as pedestrian or bicycle crashes. 4 of the 11 bicycle/pedestrian crashes were fatal.

Future Conditions

No-Build: The No-Build Alternative for Design Year 2045 was analyzed in order to identify deficiencies related to the purpose and need for the project.

It is anticipated that most of the intersections within the study area will be over capacity by the Design Year 2045 under No-Build conditions. Key deficiencies of the No-Build include no reserve capacity at the intersection of U.S. 41 (S.R. 45) and S.R. 54. The queues at this intersection are expected to propagate onto other adjacent intersections. The analysis shows that as traffic increases during Design Year 2045, the LOS at this intersection worsens, with long delays of 481 sec/veh and 270 sec/veh during the AM and PM peak periods, respectively.

Build Alternatives: The traffic analysis for year 2045 under Build Alternative Option 1 illustrated composite delays weighted by volumes including the overpass traffic are 164 sec/veh and 220 sec/veh during Design Year 2045, the AM and PM peak periods, respectively. The intersection is anticipated to operate below LOS target D.

Traffic analysis for the Build Alternative Option 2 during the 2045 AM peak shows a 34 percent reduction in total travel time and a 64 percent reduction in total delay compared to the No-Build conditions. The average delay per vehicle is expected to decline from 928 seconds to 226 seconds, while the average speed is expected to more than double, increasing from 10 mph to 24 mph. During the 2045 PM peak, the total travel time is expected to decrease by nearly 35 percent, and the total delay is expected to decrease by 55 percent compared to the No-Build conditions. The average delay per vehicle is projected to drop from 886 seconds to 327 seconds, and the average speed is expected to increase from 10 mph to 20 mph.

Safety Analysis

The results of the predictive safety evaluation indicate that over a 20-year evaluation period the overall **Build Alternative Option 1** condition will result in a 15% reduction in the total number of predicted crashes when compared to the No Build condition. The proposed changes to the S.R. 54 facility are predicted to reduce crashes by 35%, while the U.S. 41 (SR 45) and the S.R. 597/Dale Mabry Highway are predicted to have negligible changes. Furthermore, the added signalization improvements at U.S. 41 (SR 45) at S.R. 597/Dale Mabry Highway are anticipated to reduce crashes by 34%. Lastly, a third northbound through lane from Dale Mabry Highway to US 41 is proposed to improve local operations at the apex intersection and is anticipated to improve safety.

The overall **Build Alternative Option 2** condition is anticipated to result in a 42% reduction in the total number of predicted crashes when compared to the No Build condition. The proposed changes to the S.R. 54 facility are predicted to reduce crashes by 40%. The proposed changes to the U.S. 41 facility are predicted to reduce crashes by 10%. The DDI interchange with U.S. 41 elevated is anticipated to result in a predicted crash reduction of 69%. The newly proposed ramp connections between S.R. 597/Dale Mabry Highway, U.S. 41 and S.R. 54 remove the existing intersection operation at S.R. 597 at U.S. 41, enhancing the predicted safety conditions that result in a crash reduction of 58%. The overpass traffic was considered in the safety evaluation. User benefit for a 20-year life span of the Build Alternative 1 and Build Alternative 2 were estimated using network-wide travel time and based on 2022 dollars, the estimated user benefits per year are \$101 million and \$156 million, respectively.

The benefits of the DDI configuration extend beyond reduced congestion. By eliminating left-turn conflicts and reducing signal phases, the design enhances safety and operational efficiency. Free flow left turns onto U.S. 41 improve throughput, while the crossover design creates smoother traffic flow at the interchange. Additionally, the elevated U.S. 41 lanes allow for future expansion, supporting long-term traffic demand. *Preferred alternative will be selected in the Preliminary Engineering Report (PER).*

APPENDICES

PROVIDED ELECTRONICALLY
