



# **Project Traffic Analysis Report**

**State Road 50 (US 98/Cortez Boulevard)  
From the Brooksville Bypass to west of Interstate 75**

**Project Development and Environment Study**

**Hernando County, Florida**

**Work Program Item Segment No. 430051-1  
Federal Aid Project No. To be determined  
ETDM Project No. 13980**

**September 2019**

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 14, 2016 and executed by FHWA and FDOT.

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Hernando County

Prepared for:

Florida Department of Transportation  
District Seven



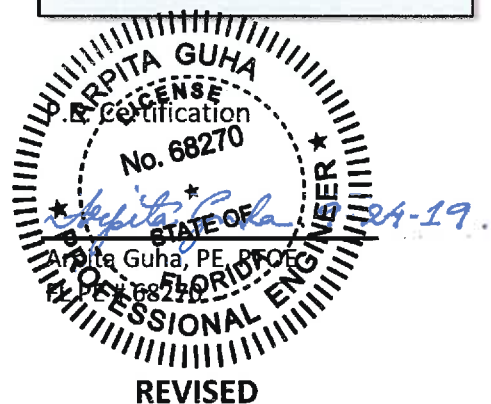
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September 2019

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*This Project Traffic Analysis Report includes a summary of data collection efforts, traffic demand projection calculations, and capacity/level of service analysis that fulfills the purpose and need for the proposed widening of SR 50 between the Brooksville Bypass and west of Interstate 75 in Hernando County, Florida.*



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## Acronyms

ADT means Average Daily Traffic

AADT means Annual Average Daily Traffic

CCC means Chairs Coordinating Committee

DDHV means Directional Design Hour Volumes

Department refers to the Florida Department of Transportation

DHV means Design Hour Volume

DHT means Design Hour Truck

DTTM means Design Traffic Technical Memorandum

ETDM means Efficient Transportation Decision Making

FDOT means Florida Department of Transportation

FTI means Florida Transportation Information

HCS means Highway Capacity Software

ITE means Institute of Transportation Engineers

LOS means Level of Service

LRTP means Long Range Transportation Plan

MPH means Miles per Hour

MPO means Metropolitan Planning Organization

NCHRP means National Cooperative Highway Research Program

OBD means Outlying Business District

PD&E means Project Development & Environment

ROW means Right of Way

SIS means Strategic Intermodal System

SR means State Road

US means United States Highway

TAZ means Traffic Analysis Zone

TBRPM means Tampa Bay Regional Planning Model

VPD means Vehicles per Day

## SECTION 1 EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study to evaluate multi-lane roadway improvement for SR 50 between the Brooksville Bypass/SR 50A/East Jefferson Street and west of Interstate 75 (Lockhart Road) in Hernando County. SR 50 is a Strategic Intermodal System (SIS) highway facility, a hurricane evacuation route, as well as a regional freight corridor for goods movement. The study limits length is approximately 8.2 miles. Another prior PD&E study evaluated improvements at the I-75 interchange, so this study only extends to Lockhart Road on the east end of the project for an effective length of 7.2 miles. The section along SR 50 to the east of Lockhart Road has been studied as a part of a separate FHWA approved PD&E Study – SR 50 (Cortez Boulevard) from Lockhart Road to US 301 (SR 35/Treiman Boulevard), WPI Segment No.: 416732-2.

The Hernando County Metropolitan Planning Organization's 2035 Long Range Transportation Plan (LRTP) Socioeconomic Projections estimate an employment increase of 117% and a population increase of 100% for Hernando County between 2006 and 2035 as 2040 LRTP was not adopted during the course of this *Design Traffic Technical Memorandum* (DTTM). The population estimate for Hernando County is 154,245 for the year 2006 and 308,584 for future year 2035 and the countywide employment estimate is 55,900 for the year 2006 and 121,576 for future year 2035. Based on the growth projected to occur within the county, SR 50 is projected by the Tampa Bay Regional Planning Model (TBRPM Version 7.2) – Cost Feasible Network to have future traffic volumes ranging from approximately 42,600 vehicles to 76,200 vehicles per day (VPD) within the project limits by 2035, which would yield a LOS F (based on 2013 FDOT Generalized Quality/Level Of Service Handbook tables) for the corridor with the current roadway configuration. These volumes would exceed roadway capacity at the adopted standards of LOS for SR 50 within the project limits per FDOT. Thus, widening of SR 50 needs to be evaluated in order to meet future transportation demand.

Study objectives include: determine proposed typical sections and develop preliminary conceptual design plans for proposed improvements, while minimizing impacts to the environment; consider agency and public comments; and ensure project compliance with all applicable federal and state laws. A *Type 2 Categorical Exclusion* is being prepared as part of this study. The highway is expected to be improved from an existing, four-lane divided rural facility to a six-lane divided facility. The proposed improvements will include construction of stormwater management and floodplain compensation facilities and various intersection improvements, in addition to multimodal facilities (pedestrian, bicycle and transit accommodations). Improvement alternatives will be identified which will improve safety, consider cost and capacity needs and meet future transportation demand.

The proposed project is not currently included in the Hernando County Metropolitan Planning Organization (MPO) 2035 *Cost Affordable LRTP*. However, the project is included in the Capital Improvements Element of the Hernando County Comprehensive Plan.

This DTTM has been prepared for the proposed project. Analysis was performed as a part of this study for the existing year (2014) and the future years – opening year (2020), interim year (2030) and design year (2040) with the existing and the future traffic volumes.

### 1.1 EXISTING OPERATIONAL RESULTS

The operational analysis was performed for existing conditions with the existing lane geometry and 2014 traffic. The acceptable Level of Service (LOS) standard for the study corridor of SR 50 in the urbanized area from Brooksville Bypass/SR 50A/East Jefferson Street to Singer Lane is ‘LOS D’ and along SR 50 in the transitioning area between Singer Lane and I-75 is ‘LOS C’ based on the Planning Boundaries for LOS standards for Hernando County and Page 123 of the 2013 FDOT Quality/Level of Service Handbook. The existing intersection analysis showed that all of the study intersections operate at an acceptable level of service or better during both AM and PM peak periods. The existing roadway segment analysis showed that SR 50 within the study limits operates at an acceptable level of service.

**Table 1-1 Existing Year (2014) AM/PM Intersection Delay and Level of Service Summary**

Intersection	Overall Average Delay (seconds/vehicle)	Overall Intersection LOS
SR 50A/SR 50 at Cortez Boulevard/Jasmine Drive (signalized)	24.4/23.2	C/C
SR 50 at Griffin Road/Redbud Lane <sup>(1)</sup> (un-signalized)	25.6/25.6	D/D
SR 50 at Spring Lake Highway/Mondon Hill Road (signalized)	20.9/23.1	C/C
SR 50 at Lockhart Road (un-signalized)	15.6/18.5	C/C

(1) *Un-signalized Intersection – Delay/LOS along worst minor approach.*



**Table 1-2 Existing Year (2014) Roadway Segment Level of Service Summary**

Roadway Segment along SR 50	Annual Average Daily Traffic (AADT)	Existing (4-Lanes) LOS	Reference Tables from 2013 FDOT Quality/LOS Handbook
Cortez Boulevard/Jasmine Drive to Griffin Road/Redbud Lane	22,700	B	Table 1
Griffin Road/Redbud Lane to Spring Lake Highway/Mondon Hill Road	22,350	B	Table 2
Spring Lake Highway/Mondon Hill Road to Lockhart Road	18,150	B	Table 2
East of Lockhart Road	18,350	B	Table 2

**1.2 FUTURE OPERATIONAL RESULTS**

Operational analyses of future conditions for opening year 2020 and design year 2040 were conducted for both the no-build and the build conditions. Only the build condition was evaluated for the interim year 2030. The same set of traffic projections and volumes were used for both conditions. In the future year of 2035, the TBRPM Version 7.2 Cost Affordable Plan model indicates the area type along the corridor has been revised to reflect Outlying Business District (OBD) which indicates the study corridor will be urbanized with as the result of very large growth in all the forecasted socioeconomic development within the project limits. Thus, ‘LOS D’ will be used as an acceptable LOS standard for future years.

The no-build condition considered the existing lane geometry with the future traffic volumes which will be generated by all the socioeconomic growth projected to occur along the study corridor. The analysis showed that the intersections and the roadway segments deteriorated during the future years under the no-build conditions.

The operational analysis for build conditions was conducted to assess the impact of widening SR 50 in improving capacity and traffic operation along the study corridor and also, identify required turn lanes at intersections to operate at an acceptable level of service. The build condition considered widening SR 50 to six lanes within the project limits. With the proposed widening along with additional turn lane improvements at the intersections, the study intersections except the minor approaches of the un-signalized intersection at Griffin Road/Redbud Lane and the study corridor within the project limits will operate at an acceptable level of service D or better during design year 2040.

**Table 1-3 Design Year (2040) Build AM/PM Intersection Delay and Level of Service Summary**

Intersection	Overall Average Delay (seconds/vehicle)	Overall Intersection LOS
SR 50A/SR 50 at Cortez Boulevard/Jasmine Drive (signalized)	53.6/52.9	D/D
SR 50 at Griffin Road/Redbud Lane <sup>(1)</sup> (un-signalized)	>50.0/>50.0	F/F
SR 50 at Spring Lake Highway/Mondon Hill Road (signalized)	38.4/38.7	D/D
SR 50 at Lockhart Road (signalized)	51.1/50.3	D/D

(1) Un-signalized Intersection – Delay/LOS along worst minor approach.

Based on the results of the 2040 build intersection analysis shown in the table above, the minor approaches of the un-signalized intersection at Griffin Road/Redbud Lane do not operate at an acceptable level of service during AM peak or PM peak or both. The 2040 AM and PM peak hour volumes for the worst failing approach along Griffin Road/Redbud Lane is 41 vehicles per hour and 30 vehicles per hour, respectively which is low compared even with the 70% volume threshold of 70 vehicles per hour for one lane approach from Signal Warrant 3 – Peak Hour Warrant from MUTCD 2009 Edition. The 2040 AM and PM peak hour traffic volumes along Griffin Road/Redbud Lane are quite low in order for a signal to be warranted at this intersection. However, during the design phase, a complete signal warrant analysis may be performed at this location to evaluate if a traffic signal would be warranted at the intersection of SR 50 and Griffin Road/Redbud Lane.

**Table 1-4 Design Year (2040) Build Roadway Segment Analysis Summary**

Roadway Segment along SR 50	Annual Average Daily Traffic (AADT)	Build (6-Lanes) LOS	Reference Tables from 2013 FDOT Quality/LOS Handbook
Cortez Boulevard/Jasmine Drive to Griffin Road/Redbud Lane	51,450	B	Table 1
Griffin Road/Redbud Lane to Spring Lake Highway/Mondon Hill Road	47,400	B	Table 1
Spring Lake Highway/Mondon Hill Road to Lockhart Road	59,100	C	Table 1

### **1.3 CONCLUSIONS**

Operational analyses of future conditions for years 2040 and 2020 were conducted for both the No-Build and the Build conditions as a part of this study. For future year 2030 only build condition was analyzed. The No-Build condition considered the existing geometry. The analysis showed that the study intersections and roadway segments deteriorated during the future years under the No-Build conditions. The build condition considered widening SR 50 to six lanes within the project limits. Operational analysis for build conditions showed that widening of SR 50 to six lanes from Brooksville Bypass (SR 50A/East Jefferson Street) to west of I-75 (Lockhart Road) with additional improvements at the intersections will result in improved traffic operation and reduced delay by 2040 along SR 50 within the project limits and also, at the study intersections with intersection turn lane improvements. Pedestrian crosswalks, pedestrian ramps and pedestrian signals will be provided per FDOT standards as a part of the design for the widening project. Also, crosswalks will be provided at all un-signalized intersections per FDOT- District Seven standards. Pedestrian and bicycle safety will be enhanced by providing sidewalks and bike lanes along the entire project corridor.

## SECTION 2 TRAFFIC ANALYSIS ASSUMPTIONS

This section includes the summary of the assumptions used to prepare the traffic analysis including traffic projections.

### 2.1 TRAFFIC FORECASTING ASSUMPTIONS SUMMARY

- a. Traffic forecast method - Traffic forecasting was conducted using the Tampa Bay Regional Planning Model (TBRPM) version 7.2. A base year (2006) model validation (reasonableness check) was performed for the study area along SR 50 from Brooksville Bypass (SR 50A/East Jefferson Street) to west of I-75 (Lockhart Road). Adjustments were made to the base year model to improve the accuracy levels of the model volumes. These subarea refinements including modifications to centroid connectors, facility types and area types were applied (as appropriate) to the future year 2035 model along SR 50 within project limits. The opening year (2020), interim year (2030) and design year (2040) AADT were obtained by interpolation and extrapolation between the existing (2014) AADT and the established 2035 future model volumes as the TBRPM based on 2040 LRTP was not released during the course of this Project Traffic Analysis Report to determine for the SR 50 volumes and the major side-streets volumes within the project limits. The detailed information on the Development of Future Traffic Volumes is included in **Appendix H**.
- b. Travel Demand Model - Tampa Bay Regional Planning Model (TBRPM) version 7.2
  - Date of Adoption of Long Range Transportation Plan (LRTP): The 2035 LRTP was adopted December 15, 2009 and amended for the last time November 19, 2013.
  - Base Model Year: TBRPM version 7.2 has a base year of 2006.
  - Horizon Year of the travel demand model: TBRPM version 7.2 has a horizon year of 2035.
  - MPO website which includes documentation of the LRTP:  
<https://www.hernandocounty.us/departments/departments-f-m/metropolitan-planning-organization/programs-and-plans/long-range-transportation-plan-lrtp-documents>
- c. Changes in land use, economy, population, and employment – The Hernando County Metropolitan Planning Organization’s 2035 LRTP Socioeconomic Projections estimate an employment increase of 117% and a population increase of 100% for Hernando County between 2006 and 2035. The population estimate for Hernando County is 154,245 for the year 2006 and 308,584 for future year 2035 and the countywide employment estimate is 55,900 for the year 2006 and 121,576 for future year 2035.
- d. Data Collection Year – August and September of Year 2014

- e. Analysis years –
- Opening Year – 2020
  - Interim Year – 2030
  - Design Year – 2040
- f. Model Output Conversion Factor (MOCF) – MOCF factor of 0.93 was used based on 2013 Peak Season Factor Category Report from 2013 Florida Transportation Information (FTI) DVD.
- g. K Factor – A standard K factor of 9.0% per the FDOT *2014 Project Traffic Forecasting Handbook* along SR 50 and all the side-streets.
- h. D Factor - The recommended D-factor along the SR 50 study corridor is 52.35% based on the 72-hour classification counts conducted. The D-factor from the recently conducted classification counts were compared with the historical D-factors along the study corridor over a period of five years and was found to be in line with the historical values as shown in **Appendix B**. The recommended D-factor along SR 50 is within the acceptable range identified in the *2014 FDOT Project Traffic Forecasting Handbook*. D-factor along the side-streets that were used in the development of the existing AM and PM peak hour traffic volumes were estimated from the actual AM and PM peak hour turning movement counts. Information for D-factor for SR 50 and the side-streets are provided in **Appendix B**.
- i. T Factor - Recommended daily truck percentage ( $T_{24}$ ) along the study corridor based on the 72-hour classification counts are 20.2% between Brooksville Bypass/SR 50A/East Jefferson Street and Spring Lake Highway/Mondon Hill Road; and, 15.9% between Spring Lake Highway/Mondon Hill Road and west of I-75 (Lockhart Road). For the existing and future analysis along the side-streets, design hour truck (DHT) will be used based on the AM and PM peak hour turning movement counts. DHT for SR 50 is assumed to be half of  $T_{24}$ , rounded up to the nearest percent. Information on DHT for side-streets is provided in **Appendix B**.

## **2.2 TRAFFIC ANALYSIS ASSUMPTIONS SUMMARY**

- a. Study Area - The study area for this project includes the corridor of SR 50 located in Hernando County, Florida from Brooksville Bypass (SR 50A/East Jefferson Street) to west of I-75 (Lockhart Road). This includes two signalized and two un-signalized intersections and the roadway segments between them.
- SR 50A/SR 50 at Cortez Boulevard/Jasmine Drive (Signalized)
  - SR 50 at Griffin Road/Redbud Lane (Un-Signalized)
  - SR 50 at Spring Lake Highway/Mondon Hill Road (Signalized)

- SR 50 at Lockhart Road (Un-Signalized)
- b. Key input parameters – The following are the key input parameters for the traffic analysis:
- Design hour (AM and PM peak hour) traffic volumes.
  - Design hour truck factor.
  - Peak Hour Factor (PHF) of 0.95 used in both the existing and the future analysis.
  - Existing signal timing for Existing Traffic Analysis. Signal timings have been optimized for future year no-build and build conditions.
- c. Analysis method and/or tools – SYNCHRO Version 8.0 (Build 805) was used as the analysis tool for the signalized intersections and Highway Capacity Software (HCS+) Version 5.6 was used for the un-signalized study intersections. The SR 50 roadway segments within the study limits were analyzed using the 2013 FDOT Generalized Quality/Level Of Service Handbook tables. Queue length analysis was based on ITE Red-Time formula.
- d. Analysis period – Traffic analysis was performed for the AM and PM peak periods.
- e. Performance Measures of Effectiveness (MOE) – MOEs used for intersection analysis are overall intersection delay (in seconds/vehicle) and overall intersection level of service. The roadway segment level of service is based on the annual average daily traffic (AADT). The acceptable Level of Service (LOS) standard for the study corridor of SR 50 in the urbanized area from Brooksville Bypass (SR 50A/East Jefferson Street) to Singer Lane is 'LOS D' and along SR 50 in the transitioning area between Singer Lane and I-75 is 'LOS C' This was approved by Florida Department of Transportation as a part of the Traffic Methodology included in **Appendix C**.

## **SECTION 3 INTRODUCTION**

### **3.1 PD&E STUDY PURPOSE**

The objective of this Project Development and Environment (PD&E) study is to assist the Florida Department of Transportation (FDOT) in reaching a decision on the type, location, and conceptual design of the proposed improvements for widening SR 50 between the Brooksville Bypass/SR 50A/East Jefferson Street and Interstate 75 in Hernando County.

The PD&E study satisfies all applicable requirements in order for this project to advance to subsequent project development phases (design, right of way [ROW] acquisition, and construction). This project was screened through FDOT's Efficient Transportation Decision Making (ETDM) process as project #13980. A Final Programming Screen Summary Report was published on January 7, 2014. A Type 2 Categorical Exclusion will be prepared as part of this study.

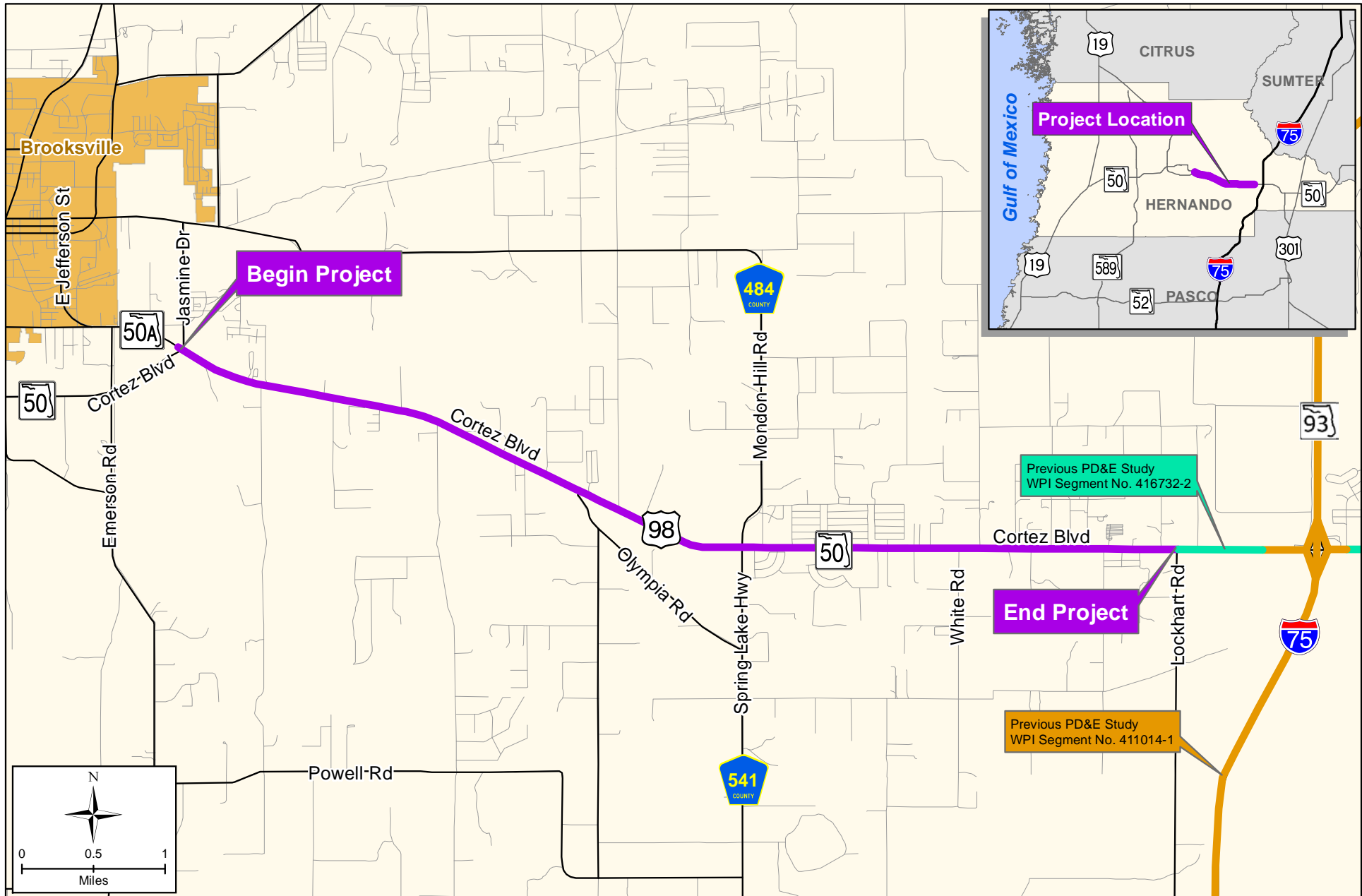
### **3.2 EXISTING FACILITY AND PROPOSED IMPROVEMENTS**

Within the project limits, SR 50 is currently a four-lane rural highway with 4-ft paved outside shoulders and typically a 46-ft grassed median. The existing right of way (ROW) is 200 feet wide. The posted speed limits vary from 45 mph to 60 mph. Major intersections within the project limits occur at Cortez Boulevard/Jasmine Drive, Griffin Road/Redbud Lane, CR 484/Spring Lake Highway and Lockhart Road (west of I-75). There is a short segment with existing sidewalk located near the west end of the project. There is a bridge culvert within the project limits located over the Bystream Overflow. This 53-ft bridge culvert was constructed in 1997 and has a sufficiency rating of 80 and a health index of 80.3 (inspected January 31, 2013).

Typical section alternatives will include rural and suburban typical sections. A "No-Build" Alternative is also being evaluated. Future phases for this proposed project are not currently included in FDOT's current adopted 5-year work program. A separate PD&E study has been approved by the FHWA for the segment directly to the east, between Lockhart Road and US 301/SR 35, which includes the SR 50/I-75 interchange, and improvements are planned at this interchange as part of a separate design-build project.

Expected improvements include widening SR 50 to six lanes as well as intersection improvements and bicycle and pedestrian facilities within the project limits. As stated earlier, the "No-Build" Alternative where no widening is proposed will also be considered during the PD&E study.

As a part of the widening project of SR 50 to six lanes, the design speed may be reduced to 50 mph from beginning of the project to Griffin Road/Redbud Lane and from Lockhart Road to I-75; and, remain 65 mph for the section of the project from Griffin Road/Redbud Lane to Lockhart Road. Pedestrian crosswalks, pedestrian ramps, pedestrian signals will be provided per FDOT standards as a part of the design for the widening project. Also, crosswalks will be provided at all un-signalized intersections within the project limits per FDOT- District Seven standards.





### **3.3 PROJECT PURPOSE AND NEED**

The purpose of this project is to address projected roadway congestion for SR 50 due to future growth along the project corridor and within Hernando County. Increasing roadway capacity along this segment of SR 50 will accommodate future growth, provide for enhanced emergency response times and emergency evacuation, and work in conjunction with other projects planned or underway to increase the capacity of SR 50. The existing annual average daily traffic (AADT) within the study limits varied between 18,150 and 22,700 vehicles per day (VPD) in 2014. The Hernando County Metropolitan Planning Organization's 2035 LRTP Socioeconomic Projections estimate an employment increase of 117% and a population increase of 100% for Hernando County between 2006 and 2035. The population estimate for Hernando County is 154,245 for the year 2006 and 308,584 for future year 2035 and the countywide employment estimate is 55,900 for the year 2006 and 121,576 for future year 2035. Based on the growth projected to occur within the corridor, SR 50 is projected by the Tampa Bay Regional Planning Model (TBRPM Version 7.2) – Cost Feasible Network to have future traffic volumes ranging from approximately 42,600 vehicles to 76,200 vehicles per day (VPD) within the project limits by 2035, which would yield a LOS F (based on 2013 FDOT Generalized Quality/Level Of Service Handbook tables) for the corridor with the current roadway configuration. These volumes would exceed roadway capacity at the adopted standards of LOS for SR 50 within the project limits per FDOT. Proposed future laneage will be based on the results of the traffic study being conducted as part of this PD&E study.

The 2035 LRTP lists improving SR 50 to 8 lanes as a need, but it only shows expansion to 6 lanes between Lockhart and I-75 in the *Cost Affordable Plan*. The adopted 2040 LRTP is consistent with this.

A more detailed discussion of the project's purpose and need is included in the ETDM *Programming Screen Summary Report*, and a shorter version will be provided in the *Type 2 Categorical Exclusion* prepared as part of this study.

### **3.4 REPORT PURPOSE**

This Project Traffic Analysis Report (PTAR) is one of the several documents being prepared as a part of this PD&E study. The purpose of this report is to document the need for future widening of the SR 50 project corridor and identify the roadway improvements required within the project limits from Brooksville Bypass (SR 50A/East Jefferson Street) to west of I-75 (Lockhart Road) for improved traffic operation. The analyses performed in this PTAR are to support decisions related to project alternatives. In addition, this PTAR summarizes existing conditions, development of existing and future traffic projections and analysis of existing and future traffic conditions along with proposed recommendations.

## **SECTION 4 TRAFFIC ANALYSIS METHOD**

### **4.1 OVERVIEW**

The following section will summarize the methodology used in the traffic study including data collection, traffic factors, traffic forecasting, design hour traffic development, level of service criteria, and operational analysis. The approved traffic methodology has been included in **Appendix C**.

### **4.2 AREA OF INFLUENCE**

The study area for this project includes the corridor of SR 50 located in Hernando County, Florida from Brooksville Bypass (SR 50A/East Jefferson Street) to the west to west of I-75 (Lockhart Road) to the east. In the future build condition, the conceptual design will reflect widening of SR 50 within project limits along with intersection improvements needed as identified by the traffic operational analysis.

### **4.3 DATA COLLECTION**

Traffic data and different transportation data were gathered from multiple sources. The different data sources included the following:

- Field Traffic Counts
- 2013 Florida Transportation Information (FTI) DVD
- Cube FSUTMS Travel Demend Model – Tampa Bay Regional Planning Model (TBRPM) version 7.2
- Florida Department of Transportation (FDOT)

### **4.4 BASE TRAFFIC DATA AND TRAFFIC FACTORS**

A comprehensive traffic count program was performed for the SR 50 study corridor. The counts were collected during the months of August and September of 2014. The traffic count data included 72-hour classification counts performed at two locations, 72-hour approach machine counts performed at approaches of the study intersections, and 8-hour turning movement counts performed at four key study intersections along the study corridor. The collected field traffic count data is included in **Appendix A**.

The 72-hour bi-directional classification counts were conducted at the following locations:

- SR 50 – West of Spring Lake Highway/Mondon Hill Road
- SR 50 – East of Spring Lake Highway/Mondon Hill Road

The 72-hour bi-directional volume counts were conducted at the following locations:

- SR 50A – West of Cortez Boulevard/Jasmine Drive
- SR 50 – East of Cortez Boulevard/Jasmine Drive
- Cortez Boulevard – South of SR 50
- Jasmine Drive – North of SR 50
- SR 50 – West of Griffin Road/Redbud Lane
- SR 50 – East of Griffin Road/Redbud Lane
- Griffin Road – South of SR 50
- Redbud Lane – North of SR 50
- SR 50 – West of Spring Lake Highway/Mondon Hill Road
- SR 50 – East of Spring Lake Highway/Mondon Hill Road
- Spring Lake Highway – South of SR 50
- Mondon Hill Road – North of SR 50
- SR 50 – West of Lockhart Road
- SR 50 – East of Lockhart Road
- Lockhart Road – South of SR 50

The 8-hour turning movement counts were conducted between 7:00 AM – 9:00 AM, 11:00 AM – 1:00 PM and 2:00 PM – 6:00 PM at the following study intersections:

- SR 50A/SR 50 at Cortez Boulevard/Jasmine Drive (Signalized)
- SR 50 at Griffin Road/Redbud Lane (Un-Signalized)
- SR 50 at Spring Lake Highway/Mondon Hill Road (Signalized)
- SR 50 at Lockhart Road (Un-Signalized)

#### **4.4.1 Traffic Factors**

The design hour traffic factors recommended for the SR 50 PD&E study include a standard K factor of 9.0% per the *2014 Project Traffic Forecasting Handbook* along SR 50 and all the side-streets. The recommended D-factor along the SR 50 study corridor is 52.35% based on the 72-hour classification counts conducted. The D-factor from the recently conducted classification counts were compared with the historical D-factors along the study corridor over a period of five years and was found to be in line with the historical values as shown in **Appendix B**. The recommended D-factor along SR 50 is within the acceptable range identified in the *2014 FDOT Project Traffic Forecasting Handbook*. D-factor along the side-streets that were used in the development of the

existing AM and PM peak hour traffic volumes were estimated from the actual AM and PM peak hour turning movement counts. Information for D-factor for SR 50 and the side-streets are provided in **Appendix B**. These recommended K and D factors will be used for the development of existing and future traffic volumes.

Recommended daily truck percentage ( $T_{24}$ ) along the study corridor based on the 72-hour classification counts are 20.2% between Brooksville Bypass/SR 50A/East Jefferson Street and Spring Lake Highway/Mondon Hill Road; and, 15.9% between Spring Lake Highway/Mondon Hill Road and west of I-75. For the existing and future analysis along the side-streets, design hour truck (DHT) will be used based on the AM and PM peak hour turning movement counts. DHT for SR 50 is assumed to be half of  $T_{24}$ , rounded up to the nearest percent. Information on DHT for side-streets is provided in **Appendix B**.

**Table 4-1** below shows the recommended design traffic factors for the SR 50 corridor.

**Table 4-1 Recommended K, D, T Factors along SR 50**

SR 50	Standard K	D	Daily Truck ( $T_{24}$ )	Design Hour Truck (DHT)
Brooksville Bypass/SR 50A/East Jefferson Street to Spring Lake Highway/ Mondon Hill Road	9.00%	52.35%	20.2%	10.0%
Spring Lake Highway/ Mondon Hill Road to I-75			15.9%	8.0%

Peak Hour Factor (PHF) of 0.95 has been used in the existing and future analysis for this study.

#### 4.5 ANALYSIS YEARS

The following analysis years have been identified for this study:

Existing Year: 2014  
 Opening Year: 2020  
 Interim Year: 2030  
 Design Year: 2040

#### 4.6 TRAVEL DEMAND FORECASTING

Future year traffic volumes were developed using the Tampa Bay Regional Planning Model (TBRPM) Version 7.2. As indicated in the traffic methodology, already approved by FDOT – District Seven in September 2014, only one set of future traffic volumes were developed that will be used

for both the no-build and the build conditions. The approved traffic methodology is included in **Appendix C**.

#### **4.7 DEVELOPMENT OF DESIGN TRAFFIC**

The future year AM and PM directional design hour traffic volumes (DDHV) were obtained by multiplying the future year annual average daily traffic (AADT) volumes by the recommended K and D factors, respectively. These estimated DDHVs were then distributed at the study intersections by applying the existing turning percentages from the existing traffic counts. As in the existing year (2014), westbound is considered to be the peak direction along SR 50 within the project limits during the AM peak period and eastbound is considered to be the peak direction during the PM peak period in the development of the peak hour turning volumes. Peak direction for each side-street was obtained from the existing traffic counts and has been included in **Appendix B**.

#### **4.8 LEVEL OF SERVICE CRITERIA**

The acceptable LOS standard is 'LOS D' for the study corridor of SR 50 in the urbanized area between Brooksville Bypass (SR 50A/East Jefferson Street) and Singer Lane. For the remaining of the study corridor between Singer Lane and I-75, the area is transitioning and therefore, acceptable LOS will be considered to be 'LOS C' based on the Planning Boundaries for LOS standards for Hernando County. However, in the future year of 2035, the TBRPM Version 7.2 Cost Affordable Plan model indicates the area type along the corridor has been revised to reflect Outlying Business District (OBD) which indicates the study corridor will be urbanized with as the result of very large growth in all the forecasted socioeconomic development within the project limits. Thus, 'LOS D' will be used as an acceptable LOS standard for future years.

#### **4.9 ANALYSIS PROCEDURES**

SYNCHRO Version 8.0 (Build 805) was used as the analysis tool for the signalized intersections within the study limits from Brooksville Bypass (SR 50A/East Jefferson Street) to west of I-75 (Lockhart Road). The Highway Capacity Software (HCS+) Version 5.6 was used for the un-signalized study intersections. The SR 50 roadway segments within the study limits were analyzed using the 2013 FDOT Generalized Quality/Level Of Service Handbook tables. For the study intersections, the measure of effectiveness (MOE) is delay and LOS; and, for roadway segments, the MOE is AADT and LOS.

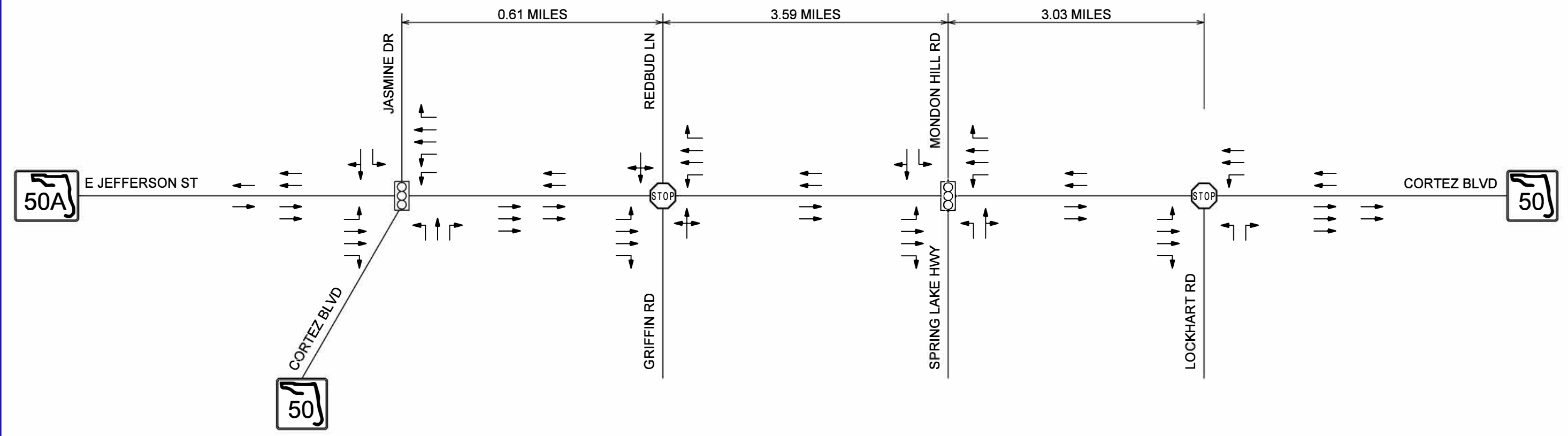
## SECTION 5 EXISTING CONDITIONS ANALYSIS





The following section provides an evaluation of the existing conditions within the influence area. The discussion items include transportation systems information, existing traffic data, and existing operating conditions.

### **5.1 EXISTING TRANSPORTATION NETWORK**

The existing transportation network within the study limits comprises of SR 50 in Hernando County which is currently a four-lane rural highway with 4-ft paved outside shoulders and typically a 46-ft grassed median. The existing right of way (ROW) is 200 feet wide. The posted speed limits vary from 45 mph to 60 mph. Major intersections within the project limits occur at Cortez Boulevard/Jasmine Drive, Griffin Road/Redbud Lane, CR 484/Spring Lake Highway and Lockhart Road (west of I-75). The intersections of SR 50 at Cortez Boulevard/Jasmine Drive and CR 484/Spring Lake Highway are signalized.

The existing lane geometry is shown in **Figure 5-1**.



Legend	
	TRAFFIC SIGNAL
	STOP SIGN (SIDE STREET ONLY)
	TRAVEL LANES
	DISTANCE IN FEET



**SR 50 PD&E Study**  
*From Brooksville Bypass/SR 50A/East Jefferson Street to Interstate 75*  
 WPI Number: 430051-1  
 Hernando County

## Existing Lane Geometry

Figure 5-1

## 5.2 CRASH ANALYSIS

Crash data along SR 50 within the project limits was obtained from the FDOT crash records database for the 5-year period 2013 through 2017. There were a total of 280 crashes reported within the project limits during this 5-year period which involved 238 injuries and 5 fatalities. **Table 5-1** below summarizes the 5-year crash history along the study corridor. As a part of the analysis, the number of crashes that occurred at night was also summarized. The crash rate was calculated and compared to the statewide crash rate for similar type roadway segments. Statewide crash rates obtained from FDOT has been included in **Appendix G** along with the crash data information.

**Table 5-1 Summary of Crash Analysis along SR 50**

SR 50 from Brooksville Bypass/SR 50A/E Jefferson St (MP 10.312) to I-75 (MP 4.020) in Hernando County	Year					Five Year Total
	2013	2014	2015	2016	2017	
No. of Fatal Crashes	1	0	0	1	3	5
No. of Injury Crashes	25	25	26	43	23	142
No. of Property Damage Only Crashes	29	30	26	18	30	133
<b>Total Crashes</b>	<b>55</b>	<b>55</b>	<b>52</b>	<b>62</b>	<b>56</b>	<b>280</b>
Night-time crashes	23	23	18	25	30	119
<i>Average Crash Rate with Average AADT of 20,400</i>						<i>0.91</i>
<i>Statewide 5-Year Average Crash Rate for Suburban Segments*</i>						<i>1.669</i>

\*Obtained from FDOT – District Seven

Note: The La Rose Road/Nature Coast Boulevard intersection is included in the crash summary to document any influence with the adjacent I-75 interchange.

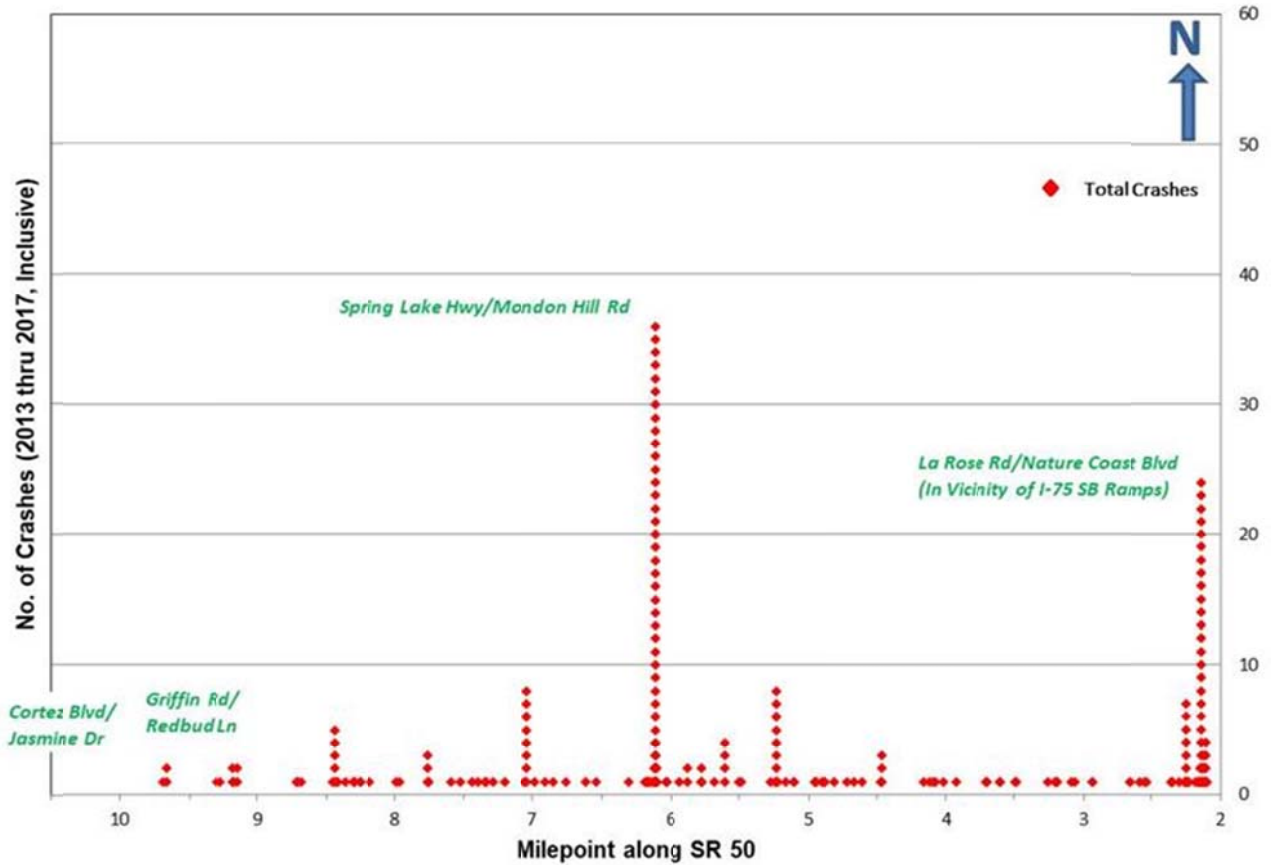
The 5 fatalities along SR 50 occurred at Cammie Street, Winding Woods Way, La Rose Road/Nature Coast Boulevard, Olympia Road and Cedar Lane. It should be noted that the intersection of SR 50 and La Rose Road/ Nature Coast Boulevard intersection is outside the project limit but has been included in the crash summary to document any influence with the adjacent I-75 interchange. One of the fatal crashes involved a bike, 2 were hit fixed object, 1 was a single vehicle and the remaining one was an angle crash. Of these 5 fatalities, 3 occurred under dark – not lighted condition. The potential countermeasure to reduce fatality along the study corridor of SR 50 would be to add lighting along the corridor to better facilitate vehicular traffic and pedestrian/bicycle traffic under dark conditions.

The table above shows that the average crash rate for the study corridor is 0.91 which is lower than the statewide 5-year average crash rate of 1.669 for 4-5 lanes two-way divided raised suburban segments. Approximately 42.5 percent of the total crashes along SR 50 were night-time crashes. As



stated previously, the lighting along the study corridor within the project limits is likely to be reviewed to ensure that they meet FDOT standards.

The distribution of the crashes by mile post is shown in **Figure 5-2**. The plot indicates that the majority of the crashes occurred at Spring Lake Highway/Mondon Hill Road and at or in the vicinity of La Rose Road/Nature Coast Boulevard and I-75 Southbound Ramps.

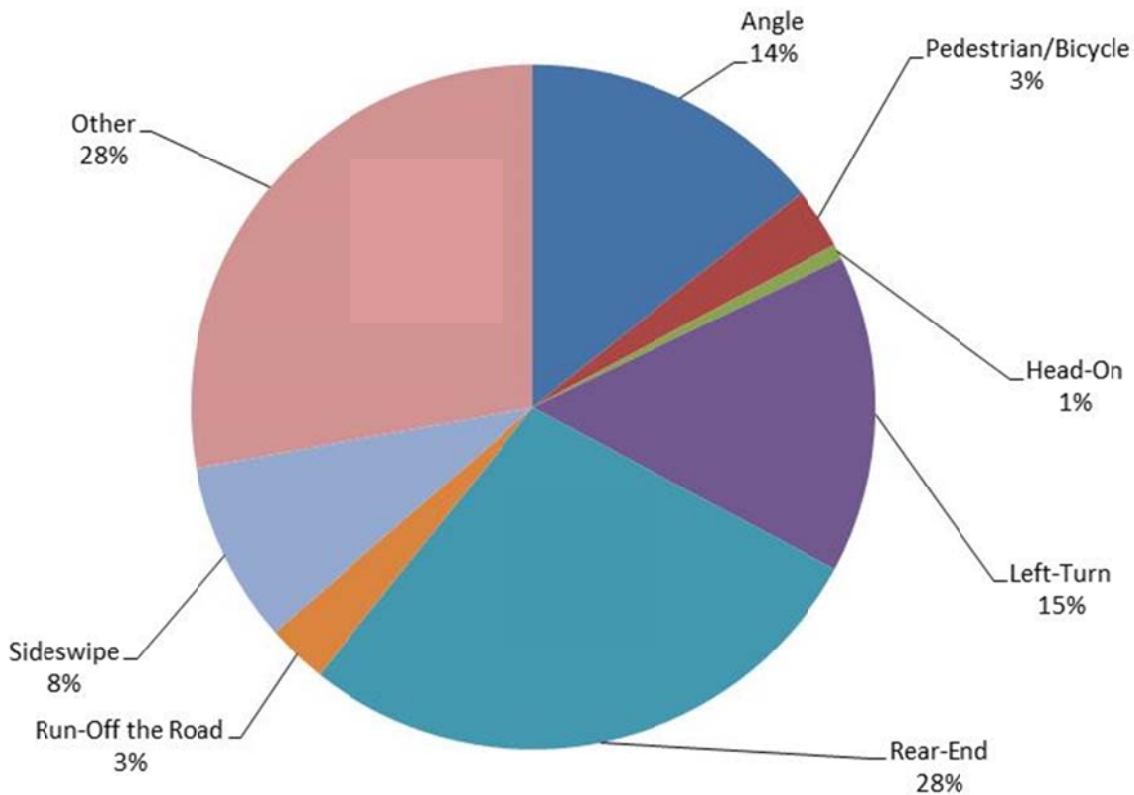


**Figure 5-2 Distribution of Crashes (2009-2013) by Milepost along SR 50 from Brooksville Bypass (SR 50A/East Jefferson Street) to I-75**

The breakdown of the total crashes within the study limits for the last available five years along SR 50 by crash type were also determined and is shown in **Table 5-2** and **Figure 5-3**. Overall, rear-end crashes accounted for 28 percent of the total crashes, angle crashes accounted for 14 percent, left-turn crashes accounted for 15 percent and sideswipe crashes accounted for 9 percent and the remaining 34 percent of the crashes were the other crash types. There were 8 crashes involving a pedestrian or a bicycle.

**Table 5-2 Summary of Crash Analysis along SR 50 by Crash Types**

Crash Type	Year					Total	Percentage	Average Per Year
	2013	2014	2015	2016	2017			
Rear-end	16	18	16	18	10	78	27.9	15.6
Angle	8	6	8	8	10	40	14.3	8.0
Sideswipe	4	4	6	5	5	24	8.6	4.8
Left-Turn	7	8	9	7	11	42	15.0	8.4
Head-On	0	0	0	2	0	2	0.7	0.4
Pedestrian/Bicycle	0	3	0	2	3	8	2.8	1.6
Run-Off the Road	1	2	1	3	1	8	2.8	1.6
Other	19	14	12	17	16	78	27.9	15.6
<b>Total</b>	<b>55</b>	<b>55</b>	<b>52</b>	<b>62</b>	<b>56</b>	<b>280</b>	<b>100.0</b>	



**Figure 5-3 Crashes Types along SR 50 from Brooksville Bypass/SR 50A/East Jefferson Street to I-75**

There were 8 crashes involving a pedestrian or a bicycle. Pedestrian and bicycle safety will be enhanced by providing sidewalks and bike lanes along the entire project corridor. Pedestrian crosswalks, pedestrian ramps, pedestrian signals will be provided per FDOT standards as a part of the design for the widening project. Also, crosswalks will be provided at all un-signalized intersections per FDOT standards. These are intended to help to reduce pedestrian/bicycle crashes as well as facilitate their mobility along the study corridor.

### **5.3 EXISTING TRAFFIC VOLUMES**

#### **5.3.1 Daily Traffic**

Field traffic counts were conducted during the months of August and September of 2014 for this study area. As stated previously, the traffic count data included 72-hour classification counts performed at two locations, 72-hour approach machine counts performed at approaches of the study intersections, and 8-hour turning movement counts performed at four key study intersections along the study corridor. The existing AADT volumes are obtained by applying seasonal factor and axle factor adjustment to the raw Average Daily Traffic (ADTs) from the 72-hour approach counts. The adjustment factors were obtained from 2013 Florida Transportation Information (FTI) DVD. These seasonally and axle adjusted existing AADT volumes in the study area are shown in **Figure 5-4**. All the information related to the AADTs along with the adjustment factors is included in **Appendix D**.

#### **5.3.2 Turning Movement Counts**

Eight-hour turning movement counts were conducted at the study intersections covering AM and PM peak periods (7:00-9:00 AM, 11:00 AM – 1:00 PM and 2:00-6:00 PM). These counts were conducted during months of August and September of 2014.

The raw turning movement counts have been provided in **Appendix A**.

### **5.4 DEVELOPMENT OF EXISTING TRAFFIC**

The existing design hour volumes for the AM and the PM peak periods were developed based on the seasonally adjusted annual average daily traffic (AADT) using the recommended K and the D factors along with the proportion of the existing turning movement counts.

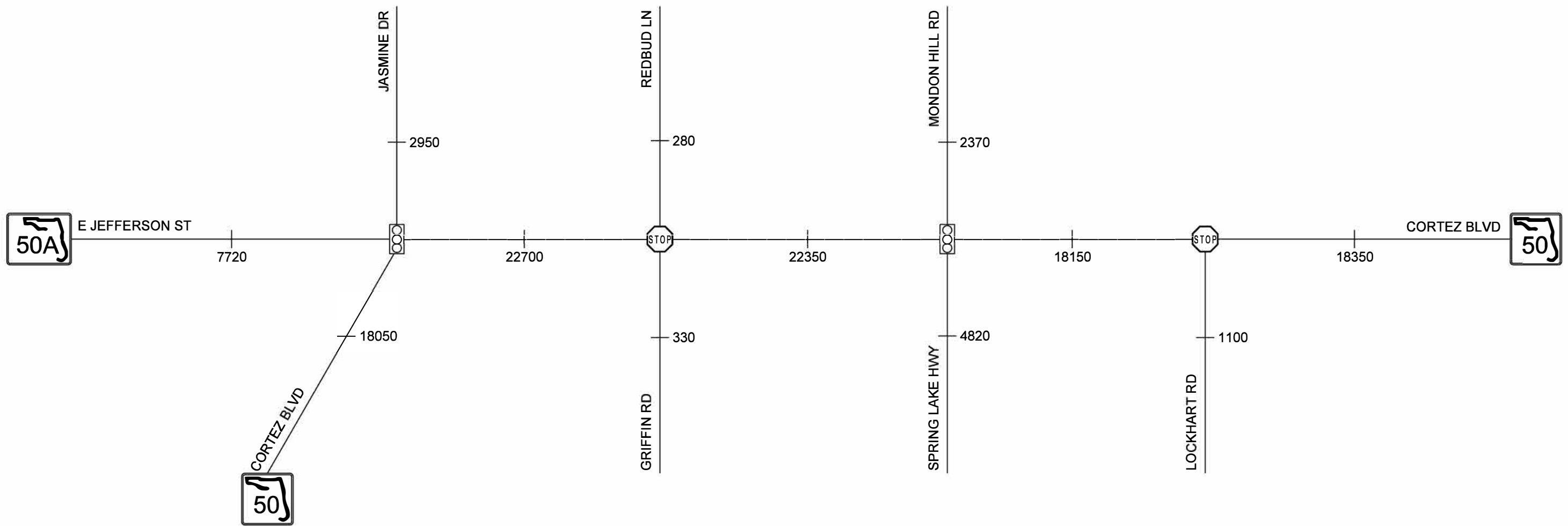
The existing year (2014) AM and PM peak hour directional traffic volumes (DDHV) were obtained by multiplying the existing AADT volumes by the recommended K and D factors of 9.0% and 52.35%, respectively as shown on **Table 4-1**.

The AM and PM peak hour turning movement volumes were developed by multiplying the existing turning percentages with the DDHV estimated from AADTs. The existing turning percentages are obtained from the AM (proposed peak: 7:30am – 8:30am) and the PM (proposed peak: 4:00pm – 5:00pm) peak hour raw turning movement counts. Westbound is considered to be the peak direction along SR 50 within the project limits during the AM peak period in the development of

the peak hour turning volumes. For the PM peak, eastbound for SR 50 (reverse of the AM peak) was used to be the peak direction. Peak direction for every side-street was obtained from the existing traffic counts and has been included as a part of **Appendix B**. The existing year (2014) AM and PM peak hour volumes are shown in **Figure 5-5**. Calculation of the adjusted AADTs, DDHV and AM and PM peak hour turning movement volumes are included as a part of **Appendix D**. The spreadsheets illustrating the development of the existing traffic AM and PM peak hour volumes are also included in **Appendix D**.



Drawing Not To Scale



Legend	
	TRAFFIC SIGNAL
	STOP SIGN (SIDE STREET ONLY)
1234	AADTS



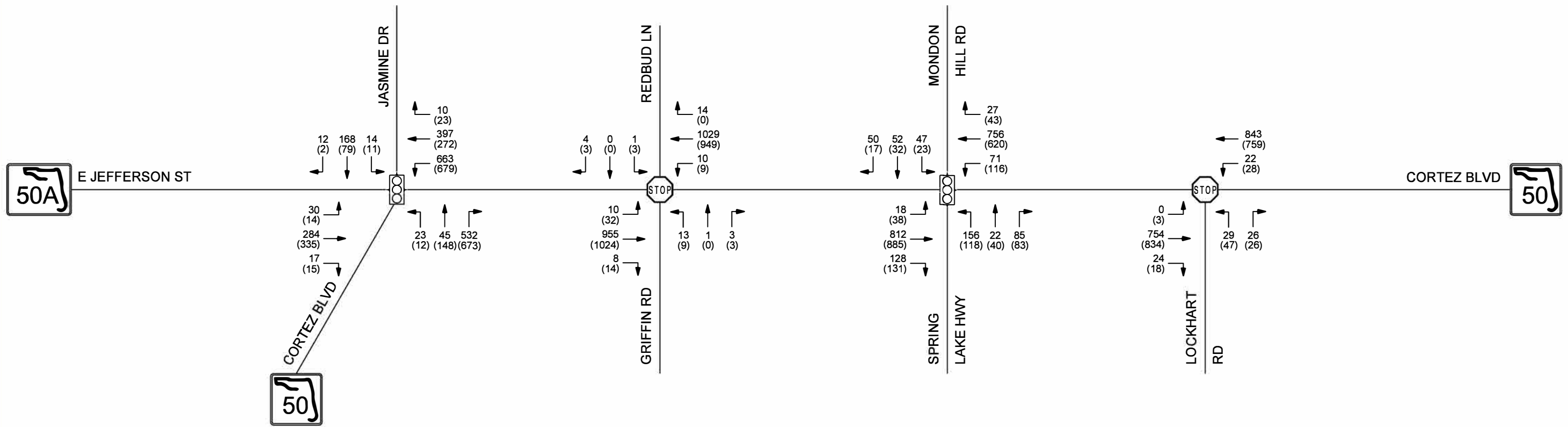
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*From Brooksville Bypass/SR 50A/East  
 Jefferson Street to Interstate 75*  
 WPI Number: 430051-1  
 Hernando County

**Existing (2014) Annual Average Daily Traffic (AADT)**

**Figure 5-4**



Drawing Not To Scale



Legend	
	TRAFFIC SIGNAL
	STOP SIGN (SIDE STREET ONLY)
1234	AM PEAK HOUR VOLUME
(1234)	PM PEAK HOUR VOLUME



**SR 50 PD&E Study**  
*From Brooksville Bypass/SR 50A/East Jefferson Street to Interstate 75*  
 WPI Number: 430051-1  
 Hernando County

**Year 2014 AM and PM Peak Hour Traffic Volumes**

**Figure 5-5**

## 5.5 EXISTING OPERATING CONDITIONS

The existing year (2014) lane geometry and approved existing AM and PM peak hour traffic volumes, along with signal timing plans obtained from Hernando County with phasings verified from the field were used for the existing analysis. The existing signal timing plans have been included in **Appendix E**.

SYNCHRO Version 8.0 (Build 805) was used as the analysis tool within the study limits. Signalized intersection LOS was estimated from SYNCHRO Version 8.0 (Build 805) software. The Highway Capacity Software (HCS+) Version 5.6 was used for the un-signalized intersections.

In this context of operational analysis, it should be noted that the acceptable LOS standard for the existing condition in the study corridor of SR 50 in the urbanized area from Brooksville Bypass/SR 50A/East Jefferson Street to Singer Lane is 'LOS D' and along SR 50 in the transitioning area between Singer Lane and I-75 is 'LOS C' based on the Planning Boundaries for LOS standards for Hernando County and Page 123 of the 2013 FDOT Quality/Level of Service Handbook.

### 5.5.1 Intersection Analysis

The existing year (2014) LOS and control delay results for all the study intersections are summarized in **Table 5-3**. The existing LOS analysis details (HCS output worksheets from SYNCHRO) are provided in **Appendix F**.

Based on the existing analysis, all the study intersections operate at an acceptable level of service during both peak periods.

**Table 5-3 Existing Year (2014) AM/PM Intersection Delay and Level of Service Summary**

Intersection	Overall Average Delay (seconds/vehicle)	Overall Intersection LOS
SR 50A/SR 50 at Cortez Boulevard/Jasmine Drive (signalized)	24.4/23.2	C/C
SR 50 at Griffin Road/Redbud Lane <sup>(1)</sup> (un-signalized)	25.6/25.6	D/D
SR 50 at Spring Lake Highway/Mondon Hill Road (signalized)	20.9/23.1	C/C
SR 50 at Lockhart Road (un-signalized)	15.6/18.5	C/C

(2) Un-signalized Intersection – Delay/LOS along worst minor approach.

### 5.5.2 Arterial Analysis

For the roadway segment analysis for SR 50 between Brooksville Bypass (SR 50A/East Jefferson Street) and I-75, the 2013 FDOT Generalized Quality/Level Of Service Handbook tables (for uninterrupted flow highways) were used. The existing year (2014) roadway segment LOS analyses were conducted for SR 50 using the existing year (2014) AADT volumes as shown in **Figure 5-4**. The existing roadway segment LOS results for SR 50 are summarized in **Table 5-4**.

Based on these results, the existing analysis shows that SR 50 within the study limits operate at an acceptable level of service.

**Table 5-4 Existing Year (2014) Roadway Segment Level of Service Summary**

Roadway Segment along SR 50	Annual Average Daily Traffic (AADT)	Existing (4-Lanes) LOS	Reference Tables from 2013 FDOT Quality/LOS Handbook
Cortez Boulevard/Jasmine Drive to Griffin Road/Redbud Lane	22,700	B	Table 1
Griffin Road/Redbud Lane to Spring Lake Highway/Mondon Hill Road	22,350	B	Table 2
Spring Lake Highway/Mondon Hill Road to Lockhart Road	18,150	B	Table 2
East of Lockhart Road	18,350	B	Table 2



## SECTION 6 DEVELOPMENT OF FUTURE YEAR TRAFFIC FORECAST

Traffic forecasts were developed based on the procedures outlined in the FDOT Project Traffic Forecasting Handbook. As a part of the PD&E process, future design traffic must be analyzed to determine any capacity shortfalls.

Future year traffic volumes were developed using the Tampa Bay Regional Planning Model (TBRPM) Version 7.2. The plan was adopted in December 2009 and last amended in November 2013; and has a base year of 2006 and a horizon year of 2035.

### 6.1 ALTERNATIVES DEVELOPMENT

As indicated in the traffic methodology, already approved by FDOT – District Seven in September 2014, only one set of future traffic volumes were developed that will be used for both the no-build and the build conditions. The approved traffic methodology is included in **Appendix C**.

### 6.2 MODEL DEVELOPMENT

A base year (2006) model validation (reasonableness check) was performed for the study area along SR 50 from Brooksville Bypass/SR 50A/East Jefferson Street to west of I-75 (Lockhart Road). Adjustments were made to the base year model to improve the accuracy levels of the model volumes. Details on subarea validation have been included as a part of **Appendix H**. The process and results of subarea validation were coordinated and agreed upon by FDOT - District Seven on October 14, 2014.

These subarea refinements including modifications to centroid connectors, facility types and area types were applied (as appropriate) to the future year 2035 model along SR 50 within project limits.

Based on the results of the subarea validation, NCHRP 255 adjustment techniques (Ratio and Difference Method) were applied to the future year 2035 model volumes along SR 50 and major side-streets – Cortez Boulevard/Jasmine Drive, Spring Lake Highway/Mondon Hill Road, and Lockhart Road, where desired level of accuracy was not attained. This was discussed with FDOT - District Seven. The minor side-streets of Griffin Road/Redbud Lane were not identified in the TBRPM network that represents Hernando County's 2035 Cost Affordable LRTP. Thus, an alternative travel demand forecasting methodology was employed to estimate future traffic volumes for the subject streets by using the growth rate (5.42%) in the socioeconomic data between the base year (2006) and future year (2035) for the traffic analysis zones adjacent to this road. The adjusted 2035 model volumes along SR 50 and major side-streets within the project limits along with the NCHRP 255 adjusted volumes (where necessary) along with the existing AADT were used in forecasting. The NCHRP 255 adjustment and the model plots for the base year (2006) and future year (2035) are provided as a part of **Appendix H**. Also, the calculations of the minor

side-street growth rate based on comparison of socioeconomic data and the historical data within the project limits have been included in **Appendix H**.

### **6.3 FUTURE TRAFFIC FORECASTS**

Projected design traffic volumes (annual average daily traffic (AADTs) and directional design hour volumes) were developed for the opening year 2020, interim year 2030, and design year 2040, for the No-Build and the Build scenarios. The opening year (2020), interim year (2030) and design year (2040) AADT were obtained by interpolation and extrapolation between the existing (2014) AADT and the established 2035 future model volumes as the TBRPM based on 2040 LRTP was not released during the course of this DTTM to determine for the SR 50 volumes and the major side-streets volumes within the project limits. For the minor side-street, future year AADTs were calculated by applying an annual growth rate of 5.42% on the existing (2014) AADT. The future year no-build and build AADT are shown in **Figure 6-1**. These future AADTs were approved by FDOT – District 7 on October 20, 2014. These have also been provided in **Appendix H**.

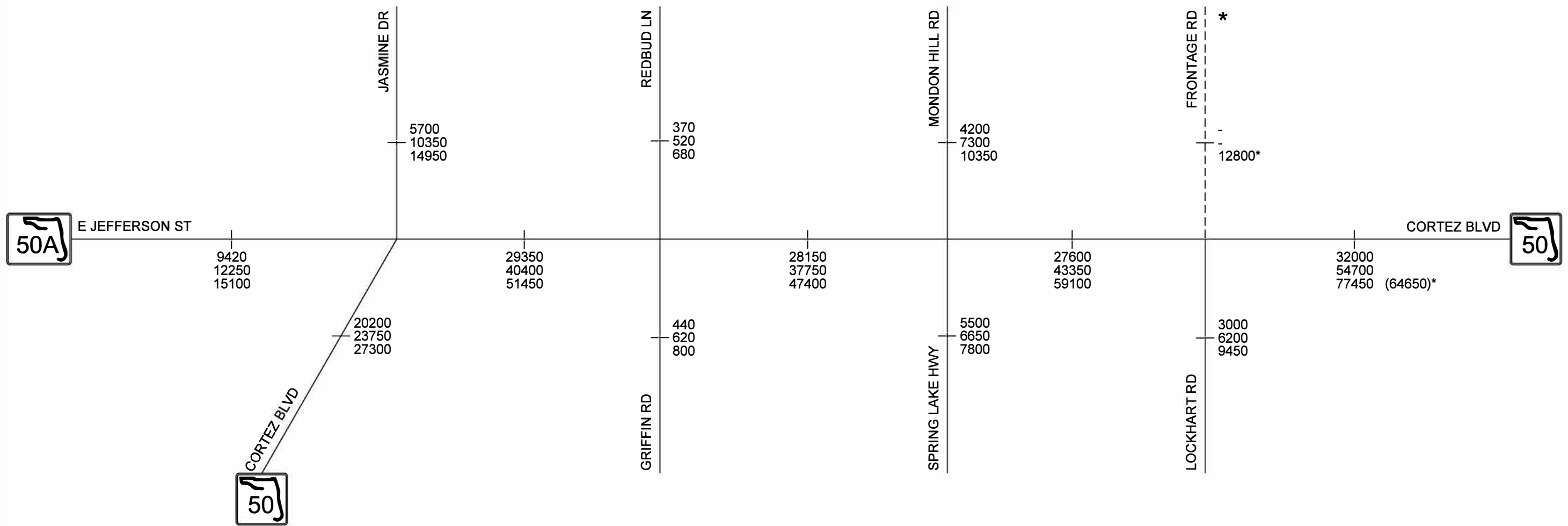
### **6.4 DEVELOPMENT OF DESIGN TRAFFIC**

The future year AM and PM peak hour directional traffic volumes (DDHV) were obtained by multiplying the future year AADT volumes by the recommended K and D factors, respectively. These estimated DDHVs were then distributed at the study intersections by applying the existing turning percentages from the existing traffic counts. As in the existing year (2014), westbound is considered to be the peak direction along SR 50 within the project limits during the AM peak period and eastbound is considered to be the peak direction during the PM peak period in the development of the peak hour turning volumes. Peak direction for each side-street was obtained from the existing traffic counts and has been included in **Appendix B**.

Calculation of the DDHV and the future AM and PM peak hour turning movements are provided as a part of **Appendix I**. The spreadsheets illustrating the development of the AM and PM peak hour traffic volumes for the opening year, interim year and design year are also included in **Appendix I**. The future no-build and build AM and PM peak hour volumes for the opening year (2020), interim year (2030) and design year (2040) are shown in **Figures 6-2, 6-3 and 6-4**, respectively.



Drawing Not To Scale



Legend	
1234	2020 AADTS
1234	2030 AADTS
1234	2040 AADTS

\* ONLY FOR 2040 BUILD SCENARIO.  
 FRONTAGE ROAD FOR 2040 BUILD SCENARIO ONLY  
 PER SR 50 PD&E STUDY FROM LOCKHART ROAD  
 TO US 301 / SR 35 (WPID: 416732-2).



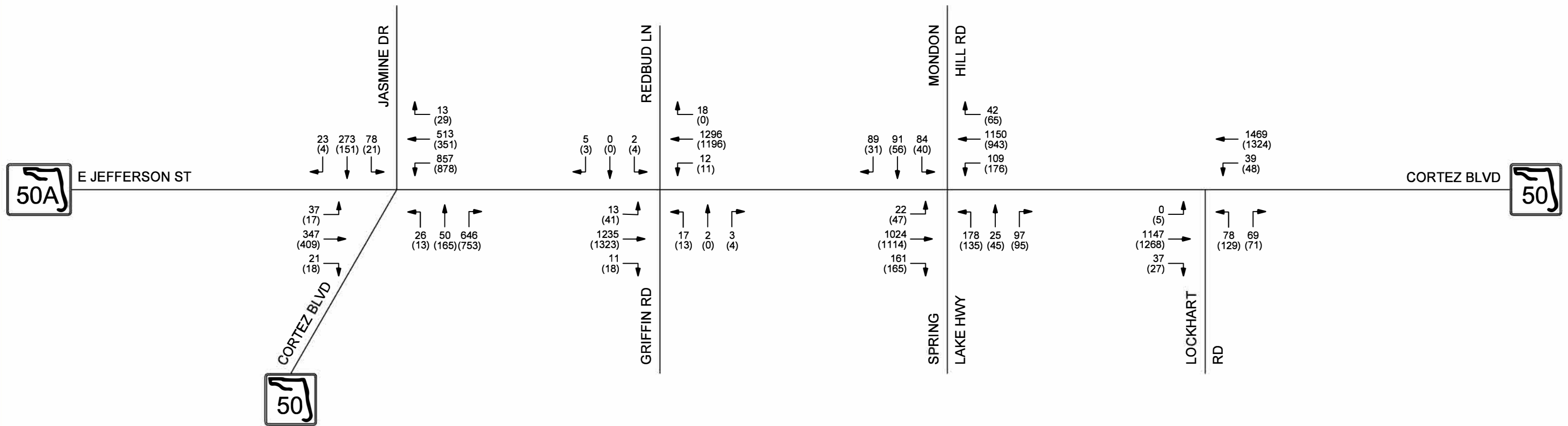
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*From Brooksville Bypass/SR 50A/East  
 Jefferson Street to Interstate 75*  
 WPI Number: 430051-1  
 Hernando County

### Future Year Annual Average Daily Traffic (AADTS)

Figure 6-1



Drawing Not To Scale



Legend	
1234	AM PEAK HOUR VOLUME
(1234)	(PM PEAK HOUR VOLUME)



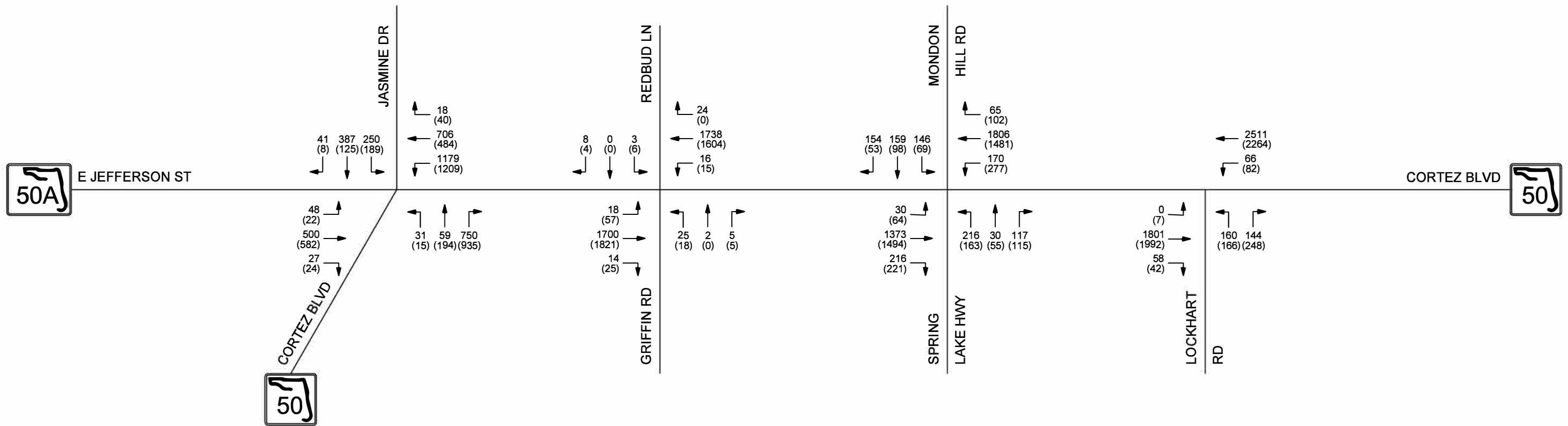
**SR 50 PD&E Study**  
*From Brooksville Bypass/SR 50A/East Jefferson Street to Interstate 75*  
 WPI Number: 430051-1  
 Hernando County

### Opening Year 2020 AM and PM Peak Hour Traffic Volumes

Figure 6-2



Drawing Not To Scale



Legend	
1234	AM PEAK HOUR VOLUME
(1234)	(PM PEAK HOUR VOLUME)



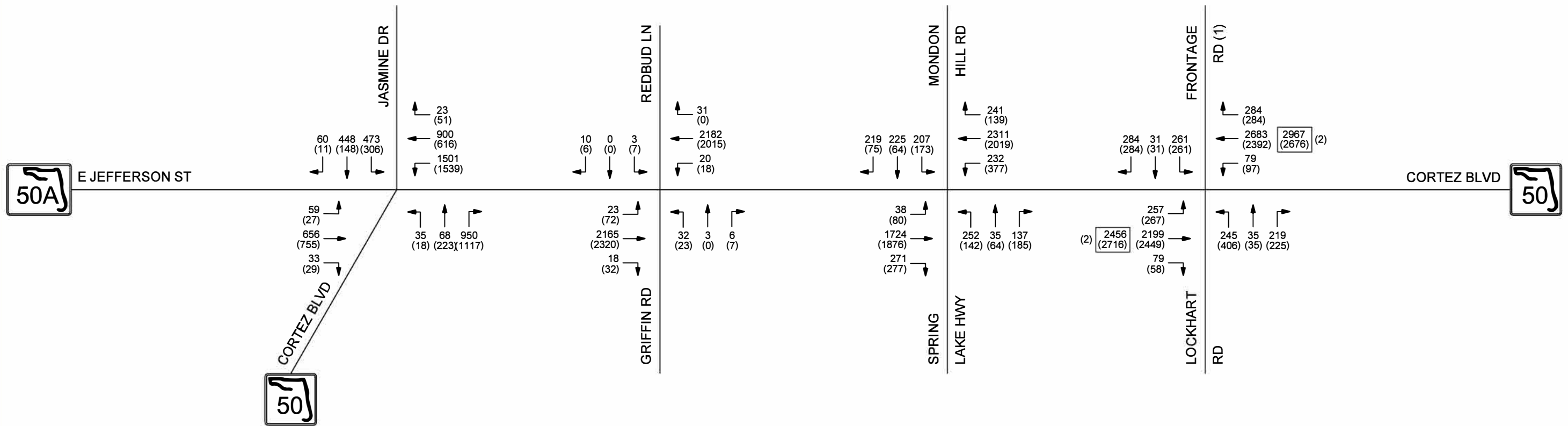
**SR 50 PD&E Study**  
*From Brooksville Bypass/SR 50A/East  
 Jefferson Street to Interstate 75*  
 WPI Number: 430051-1  
 Hernando County

### Interim Year 2030 AM and PM Peak Hour Traffic Volumes

Figure 6-3



Drawing Not To Scale



- (1) FRONTAGE ROAD FOR 2040 BUILD SCENARIO ONLY PER SR 50 PD&E STUDY FROM LOCKHART ROAD TO US 301 / SR 35 (WPID: 416732-2).
- (2) 2040 NO-BUILD VOLUMES.

Legend	
1234 (1234)	AM PEAK HOUR VOLUME (PM PEAK HOUR VOLUME)



**SR 50 PD&E Study**  
*From Brooksville Bypass/SR 50A/East Jefferson Street to Interstate 75*  
 WPI Number: 430051-1  
 Hernando County

**Design Year 2040 AM and PM Peak Hour Traffic Volumes**

**Figure 6-4**

## SECTION 7 ALTERNATIVES ANALYSIS

All signalized, un-signalized intersections and roadway segments within the study area were evaluated for all the analysis years for both the no-build and the build scenarios to determine the future levels of service. The acceptable LOS standard is 'LOS D' for the study corridor of SR 50 in the urbanized area between Brooksville Bypass/SR 50A/East Jefferson Street and Singer Lane. For the remaining of the study corridor between Singer Lane and I-75, the area is transitioning and therefore, acceptable LOS will be considered to be 'LOS C' based on the Planning Boundaries for LOS standards for Hernando County. However, in the future year of 2035, the TBRPM Version 7.2 Cost Affordable Plan model indicates the area type along the corridor has been revised to reflect Outlying Business District (OBD) which indicates the study corridor will be urbanized with as the result of very large growth in all the forecasted socioeconomic development within the project limits. Thus, 'LOS D' will be used as an acceptable LOS standard for future years.

SYNCHRO Version 8.0 (Build 805) was used as the analysis tool for the signalized intersections within the study limits from Brooksville Bypass/SR 50A/East Jefferson Street to west of I-75 (Lockhart Road). The Highway Capacity Software (HCS+) Version 5.6 was used for the un-signalized study intersections. The SR 50 roadway segments within the study limits were analyzed using the 2013 FDOT Generalized Quality/Level Of Service Handbook tables.

Peak hour factor (PHF) of 0.95 was used for the future operational analysis as indicated in the approved traffic methodology.

The following are the future analysis scenarios that were evaluated in the future traffic operational analysis:

Opening Year	2020	No-Build and Build
Interim Year	2030	Build
Design Year	2040	No-Build and Build

The future operational analysis was conducted for the No-Build and the Build conditions. The no-build condition considers the existing lane geometry shown in **Figure 5-1**. The build analysis considers SR 50 to be widened to six lanes within the project limits. The proposed build typical section along SR 50 within the study limits comprises of six-lane divided roadway with 50 mph design speed between Brooksville Bypass (SR 50A/East Jefferson Street) and Griffin Road/Redbud Lane, and also, east of Lockhart Road; and 65 mph design speed between Griffin Road/Redbud Lane and Lockhart Road. Therefore, in the build analysis, posted speed limit of 45 mph has been used along SR 50 within the project limits with the exception of the segment between Griffin Road/Redbud Lane and Lockhart Road where a posted speed limit of 60 mph has been used. The build analysis also considers additional improvements required for SR 50 and the study

intersections to operate at an acceptable level of service. The same traffic volumes were used for the no-build and the build analysis.

The un-signalized intersection module of the Highway Capacity Software cannot analyze six lane roadways (three lanes per approach). In these cases, the un-signalized analysis is performed considering two through lanes on each approach and using two-third of the through traffic volume. This approach for the analysis of the un-signalized intersection with six lanes on the major roadway has been used previously for other studies within FDOT District Seven jurisdiction and is an acceptable approach by FDOT – District Seven.

### 7.1 DESIGN YEAR (2040) NO-BUILD INTERSECTION LEVEL OF SERVICE ANALYSIS

The 2040 no-build condition includes the existing geometry shown in **Figure 4-1**. Levels of service (LOS) for the study intersections have been calculated using the design hour volumes (DHVs) shown in **Figure 6-4**. The 2040 no-build calculated LOS for signalized and un-signalized intersections within the project limits are summarized in **Table 7-1**. Signal timings were optimized as a part of the future year analysis. The design year no-build LOS analysis details (SYNCHRO and HCS intersection analysis worksheets) are provided in **Appendix J**.

**Table 7-1 Design Year (2040) No-Build AM/PM Intersection Delay and Level of Service Summary**

Intersection	Overall Average Delay (seconds/vehicle)	Overall Intersection LOS
SR 50A/SR 50 at Cortez Boulevard/Jasmine Drive (signalized)	127.6/143.4	F/F
SR 50 at Griffin Road/Redbud Lane <sup>(1)</sup> (un-signalized)	>50.0/>50.0	F/F
SR 50 at Spring Lake Highway/Mondon Hill Road (signalized)	160.4/97.8	F/F
SR 50 at Lockhart Road (un-signalized)	>50.0/- <sup>(2)</sup>	F/F

(1) Un-signalized Intersection – Delay/LOS along worst minor approach.

(2) Delay exceeds software capacity.

Based on the 2040 no-build intersection analysis, all the study intersections do not operate at an acceptable level of service during both the peak periods.

### 7.2 DESIGN YEAR (2040) BUILD INTERSECTION LEVEL OF SERVICE ANALYSIS

The 2040 build proposed geometry is shown in Figure 6-1. This includes the six laning of SR 50 with additional improvements at the intersections. Based on the SR 50 PD&E Study to the east from Lockhart Road to US 301 (SR 35/Treiman Boulevard), WPI Segment No.: 416732-2, Lockhart Road has been considered to be signalized four-legged intersection with the frontage road as the north leg at this intersection. The proposed build geometry including signalization at the intersection of SR 50 and Lockhart Road is obtained from the SR 50 PD&E Study to the east (WPI Segment No.: 416732-2). Under the build condition, the existing northbound to eastbound single free flow right-turn at the intersection of SR 50A/SR 50 and Cortez Boulevard/Jasmine Drive is recommended to



be improved to dual right-turns operating under signal control. The LOS for the study intersections has been calculated using the DHVs shown in **Figure 6-4**. The 2040 build calculated LOS for signalized and un-signalized intersections within the project limits are summarized in **Table 7-2**. The design year build LOS analysis details (SYNCHRO and HCS intersection analysis worksheets) are also provided in **Appendix J**.

**Table 7-2 Design Year (2040) Build AM/PM Intersection Delay and Level of Service Summary**

Intersection	Overall Average Delay (seconds/vehicle)	Overall Intersection LOS
SR 50A/SR 50 at Cortez Boulevard/Jasmine Drive (signalized)	53.6/52.9	D/D
SR 50 at Griffin Road/Redbud Lane <sup>(1)</sup> (un-signalized)	>50.0/>50.0	F/F
SR 50 at Spring Lake Highway/Mondon Hill Road (signalized)	38.4/38.7	D/D
SR 50 at Lockhart Road (signalized)	51.1/50.3	D/D

(2) *Un-signalized Intersection – Delay/LOS along worst minor approach.*

Based on the results of the 2040 build intersection analysis shown in the table above, all intersections are operating at an acceptable level of service except the minor approaches of the un-signalized intersection at Griffin Road/Redbud Lane which do not operate at an acceptable level of service during AM peak or PM peak or both. The 2040 AM and PM peak hour volumes for the worst failing approach along Griffin Road/Redbud Lane is 41 vehicles per hour and 30 vehicles per hour, respectively which is low compared even with the 70% volume threshold of 70 vehicles per hour for one lane approach from Signal Warrant 3 – Peak Hour Warrant from MUTCD 2009 Edition. The 2040 AM and PM peak hour traffic volumes along Griffin Road/Redbud Lane are quite low in order for a signal to be warranted at this intersection. However, during the design phase, a complete signal warrant analysis may be performed at this location to evaluate if a traffic signal would be warranted at the intersection of SR 50 and Griffin Road/Redbud Lane.

### 7.3 INTERIM YEAR (2030) BUILD INTERSECTION LEVEL OF SERVICE ANALYSIS

The levels of service (LOS) for the study intersections for the interim year 2030 have been calculated using the design hour volumes shown in **Figure 6-3** and the proposed build geometry shown in **Figure 7-1**. The proposed build geometry including signalization at the intersection of SR 50 and Lockhart Road is obtained from the FHWA approved SR 50 PD&E Study to the east (WPI Segment No.: 416732-2). The 2030 build calculated LOS for signalized and un-signalized intersections within the project limits are summarized in **Table 7-3**. The interim year build LOS analysis details (SYNCHRO and HCS intersection analysis worksheets) are also provided in **Appendix K**.

**Table 7-3 Interim Year (2030) Build AM/PM Intersection Delay and Level of Service Summary**

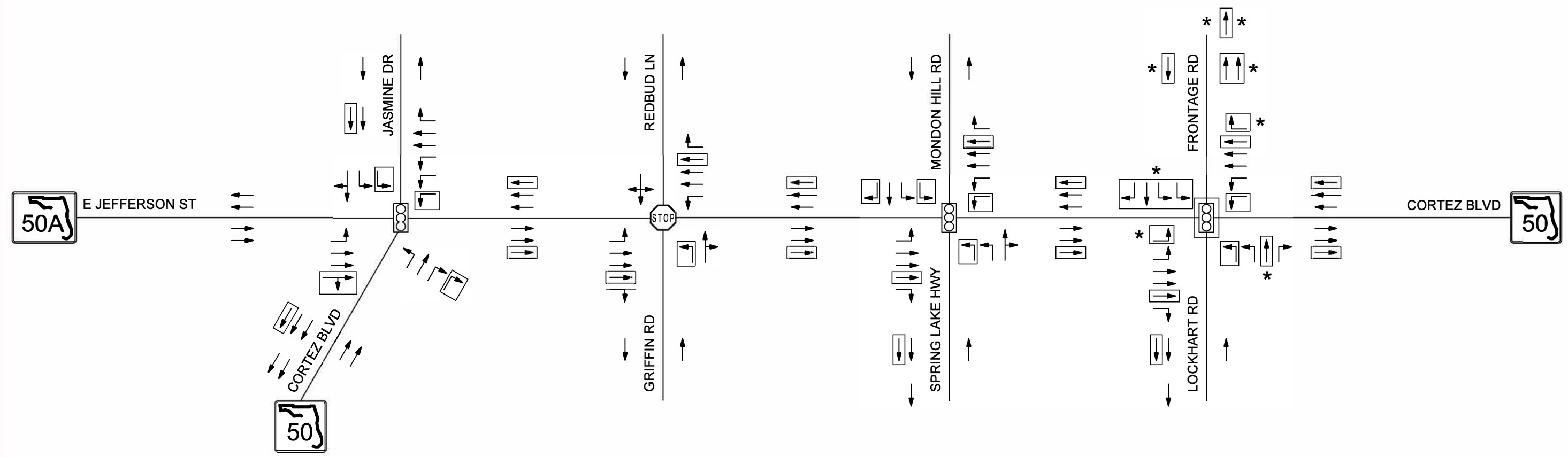
Intersection	Overall Average Delay (seconds/vehicle)	Overall Intersection LOS
SR 50A/SR 50 at Cortez Boulevard/Jasmine Drive (signalized)	33.6/37.4	C/D
SR 50 at Griffin Road/Redbud Lane <sup>(1)</sup> (un-signalized)	42.1/47.2	E/E
SR 50 at Spring Lake Highway/Mondon Hill Road (signalized)	30.6/31.9	C/C
SR 50 at Lockhart Road (signalized)	9.4/13.8	A/B






(1) Un-signalized Intersection – Delay/LOS along worst minor approach.

Based on the results of the 2030 build intersection analysis shown in the table above, all the intersections are operating at an acceptable level of service except the minor approaches of the un-signalized intersections along SR 50 at Griffin Road/Redbud Lane.

### 7.4 OPENING YEAR (2020) NO-BUILD INTERSECTION LEVEL OF SERVICE ANALYSIS

The 2020 no-build condition includes the existing geometry shown in **Figure 4-1**. The LOS for the study intersections has been calculated using the design hour volumes shown in **Figure 5-2**. The 2020 no-build calculated LOS for signalized and un-signalized intersections within the project limits are summarized in **Table 7-4**. Signal timings were optimized as a part of the future year analysis. The opening year no-build LOS analysis details (SYNCHRO and HCS intersection analysis worksheets) are provided in **Appendix L**.



Legend	
	TRAFFIC SIGNAL
	PROPOSED TRAFFIC SIGNAL
	STOP SIGN (SIDE STREET ONLY)
	TRAVEL LANES
	PROPOSED IMPROVEMENTS

\* ONLY 2040 BUILD IMPROVEMENTS. FRONTAGE ROAD FOR 2040 BUILD SCENARIO ONLY PER SR 50 PD&E STUDY FROM LOCKHART ROAD TO US 301 / SR 35 (WPID: 416732-2).



**SR 50 PD&E Study**  
*From Brooksville Bypass/SR 50A/East  
 Jefferson Street to Interstate 75*  
 WPI Number: 430051-1  
 Hernando County

## Proposed Build Lane Geometry

Figure 7-1

**Table 7-4 Opening Year (2020) No-Build AM/PM Intersection Delay and Level of Service Summary**

Intersection	Overall Average Delay (seconds/vehicle)	Overall Intersection LOS
SR 50A/SR 50 at Cortez Boulevard/Jasmine Drive (signalized)	29.5/27.0	C/C
SR 50 at Griffin Road/Redbud Lane <sup>(1)</sup> (un-signalized)	41.6/42.0	E/E
SR 50 at Spring Lake Highway/Mondon Hill Road (signalized)	23.1/25.0	C/C
SR 50 at Lockhart Road (un-signalized)	37.8/>50.0	E/F

(1) Un-signalized Intersection – Delay/LOS along worst minor approach.

(2) Delay exceeds software capacity.

Based on the 2020 no-build intersection analysis, all the signalized study intersections operate at an acceptable level of service during both peak periods. However, the minor approaches of the un-signalized intersections along SR 50 at Griffin Road/Redbud Lane and at Lockhart Road do not operate at an acceptable level of service.

**7.5 OPENING YEAR (2020) BUILD INTERSECTION LEVEL OF SERVICE ANALYSIS**

The LOS for the study intersections for the opening year 2020 have been calculated using the design hour volumes shown in **Figure 6-2** and the design year build geometry shown in **Figure 7-1**. The proposed build geometry including signalization at the intersection of SR 50 and Lockhart Road is obtained from the FHWA approved SR 50 PD&E Study to the east (WPI Segment No.: 416732-2). The 2020 build calculated LOS for signalized and un-signalized intersections within the project limits are summarized in **Table 7-5**. The opening year build LOS analysis details (SYNCHRO and HCS intersection analysis worksheets) are also provided in **Appendix L**.

**Table 7-5 Opening Year (2020) Build AM/PM Intersection Delay and Level of Service Summary**

Intersection	Overall Average Delay (seconds/vehicle)	Overall Intersection LOS
SR 50A/SR 50 at Cortez Boulevard/Jasmine Drive (signalized)	27.2/25.7	C/C
SR 50 at Griffin Road/Redbud Lane <sup>(1)</sup> (un-signalized)	23.9/24.4	C/C
SR 50 at Spring Lake Highway/Mondon Hill Road (signalized)	25.4/26.2	C/C
SR 50 at Lockhart Road (signalized)	5.5/7.6	A/A

(1) Un-signalized Intersection – Delay/LOS along worst minor approach.

Based on the results of the 2020 build intersection analysis shown in the table above, all the study intersections along SR 50 operate at an acceptable level of service during both the peak periods.

## 7.6 FUTURE ROADWAY SEGMENT ANALYSIS

The Analysis of the roadway segments for the future years along SR 50 using 2013 FDOT Generalized Quality/Level Of Service Handbook tables is shown in **Table 7-6** to determine the analysis year when proposed widening is needed to meet the adopted LOS standards on a segment-by-segment basis. The future AADT volumes along SR 50 roadway segments as shown in **Figure 5-1** were used in this analysis. The FDOT generalized level of service tables (for uninterrupted flow highways) used has been included in **Appendix N**.

**Table 7-6 Future Roadway Segment Analysis Summary**

Roadway Segment along SR 50	Annual Average Daily Traffic (AADT)	No-Build (4-Lanes) LOS	Build (6-Lanes) LOS	Reference Tables from 2013 FDOT Quality/LOS Handbook	
				No-Build	Build
<b>Year 2020</b>					
Cortez Boulevard/Jasmine Drive to Griffin Road/Redbud Lane	29,350	B	B	Table 1	Table 1
Griffin Road/Redbud Lane to Spring Lake Highway/Mondon Hill Road	28,150	B	B	Table 2	Table 1
Spring Lake Highway/Mondon Hill Road to Lockhart Road	27,600	B	B	Table 2	Table 1
East of Lockhart Road	32,000	B	B	Table 2	Table 1
<b>Year 2030</b>					
Cortez Boulevard/Jasmine Drive to Griffin Road/Redbud Lane	40,400	C	B	Table 1	Table 1
Griffin Road/Redbud Lane to Spring Lake Highway/Mondon Hill Road	37,750	C	B	Table 2	Table 1
Spring Lake Highway/Mondon Hill Road to Lockhart Road	43,350	C	B	Table 2	Table 1
East of Lockhart Road	54,700	D	B	Table 2	Table 1
<b>Year 2040</b>					
Cortez Boulevard/Jasmine Drive to Griffin Road/Redbud Lane	51,450	C	B	Table 1	Table 1
Griffin Road/Redbud Lane to Spring Lake Highway/Mondon Hill Road	47,400	C	B	Table 2	Table 1
Spring Lake Highway/Mondon Hill Road to Lockhart Road	59,100	D	C	Table 2	Table 1
East of Lockhart Road (For 2040 Build Scenario with the Frontage Road per SR 50 PD&E Study WPID: 416732-2)*	77,450 (64,650)	F	C	Table 2	Table 1

The future roadway segment analysis shows that the segment along SR 50 to the east of Lockhart Road will fail to operate at the acceptable level of service by the future design year 2040.

### **7.7 INTERSECTION STORAGE LENGTH CALCULATIONS**

The intersection storage lengths for the signalized intersections have been calculated for the design year 2040 build conditions based on the ITE “red-time” formula. The recommended turn lane lengths have been rounded to the nearest 25 feet increment and are shown in **Table 7-7**. The detailed calculation for the queue lengths and the turn lane lengths are included in **Appendix M**.

Also, the left-turn lane and the right-turn storage lane lengths along SR 50 at the un-signalized intersections have been estimated for the 2040 build conditions based on *Figure 3-16 of the Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (Florida Greenbook), April 2016*. The recommended turn lane lengths have been rounded to the nearest 25 feet increment and are shown in **Table 7-7** and these estimates are also included in **Appendix M**.

**Table 7-7 Design Year (2040) Build Recommended Turn Lane Lengths**

SR 50 Intersections	Approach	Movement	Recommended Turn Lane Length (feet)
Cortez Boulevard/Jasmine Drive	Eastbound	Left	400 <sup>(1)</sup>
		Thru-Right	
	Westbound	Left	900
		Right	500 <sup>(1)</sup>
	Northbound	Left	425
		Right	900
	Southbound	Left	625 <sup>(1)</sup>
		Thru-Right	
Griffin Road/Redbud Lane* (un-signalized)	Eastbound	Left	350
		Right	300
	Westbound	Left	550
		Right	550
	Northbound	Left	200
		Thru-Right	
	Southbound	Left- Thru-Right	
	Spring Lake Highway/Mondon Hill Road	Eastbound	Left
Right			700
Westbound		Left	800
		Right	700 <sup>(1)</sup>
Northbound		Left	425
		Thru-Right	
Southbound		Left	350
		Right	450
Lockhart Road	Eastbound	Left	825 <sup>(1)</sup>
		Right	825 <sup>(1)</sup>
	Westbound	Left	875 <sup>(1)</sup>
		Right	875 <sup>(1)</sup>
	Northbound	Left	650
		Right	650
	Southbound	Left	425
		Right	625

\* For un-signalized intersections, turn lane lengths along SR 50 estimated from Figure 3-16 Florida Greenbook, April 2016.

<sup>(1)</sup> Based on thru lane queue as thru lane queue exceeds storage length for turn lanes.

## SECTION 8 SUMMARY OF ANALYSIS RESULTS

The purpose of this Project Traffic Analysis is to provide the Florida Department of Transportation (FDOT) District Three with the traffic information necessary to assist in making decisions and conducting environmental evaluations related to the of SR 50 Project Development and Environmental (PD&E) process.

The operational analysis for the existing conditions showed that all of the study intersections operate at an acceptable level of service or better during both AM and PM peak periods. The existing roadway segment analysis showed that SR 50 within the study limits operates at an acceptable level of service.

Operational analyses of future conditions for years 2040 and 2020 were conducted for both the no-build and the build conditions and only the build condition was analyzed for the year 2030 as a part of this study. The no-build condition considered the existing lane geometry with the future traffic volumes to be generated by all the socioeconomic growth projected to occur along the study corridor. The analysis showed that the study intersections and the roadway segments deteriorated during the future years under the no-build conditions. The build condition considered widening SR 50 to six lanes within the project limits. Operational analysis for build conditions showed that widening of SR 50 to six lanes from Brooksville Bypass/SR 50A/East Jefferson Street to west of I-75 (Lockhart Road) with additional improvements at the intersections will result in improved traffic operation and reduced delay by 2040 along SR 50 within the project limits and also, at the study intersections with intersection turn lane improvements. The future roadway segment analysis performed along the study corridor of SR 50 using the 2013 FDOT Generalized Quality/Level Of Service Handbook tables showed that the segment along SR 50 to the east of Lockhart Road will fail to operate at the acceptable level of service by the future design year 2040. Pedestrian crosswalks, pedestrian ramps and pedestrian signals will be provided per FDOT standards as a part of the design for the widening project. Also, crosswalks will be provided at all un-signalized intersections per FDOT- District Seven standards. Pedestrian and bicycle safety will be enhanced by providing sidewalks and bike lanes along the entire project corridor.



## APPENDICES

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Appendix A	Existing Traffic Counts
Appendix B	Recommended Design Hour Traffic Factors
Appendix C	Approved Traffic Methodology
Appendix D	Development of Existing Traffic Volumes
Appendix E	Existing Signal Timings
Appendix F	Existing Year 2014 Level of Service
Appendix G	Crash Data
Appendix H	Subarea Validation, NCHRP 255 Adjustments, Model Plots, Historical Data, Development of Future AADTS
Appendix I	Development of Future Traffic Volumes
Appendix J	Design Year 2040 No-Build and Build Level of Service
Appendix K	Interim Year 2030 Build Level of Service
Appendix L	Opening Year 2020 No-Build and Build Level of Service
Appendix M	Intersection Turn Lane Storage Lengths
Appendix N	FDOT Generalized LOS Tables
Appendix O	FDOT Comment-Responses