Design Traffic Technical Memorandum

US 301/SR 41 (Gall Blvd.) from SR 39 to South of CR 54

Work Program Item Segment No.: 256422-2

Project Development & Environment Study Update

Florida Department of Transportation
11201 North McKinley Drive
Tampa, Florida 33612

November 2012 (Cover Update)

Florida Department of Transportation

Draft
Design Traffic Technical Memorandum

US 301/SR 41 (Gall Boulevard)

From SR 39 to South of CR 54 (Eiland Boulevard)
Pasco County, Florida

Work Program Item No.: 256422-2

Prepared For:

Florida Department of Transportation
11201 North McKinley Drive
Tampa, Florida 33612

December 2010

Draft
Design Traffic Technical Memorandum

US 301/SR 41 (Gall Boulevard)

From SR 39 to South of CR 54 (Eiland Boulevard)
Pasco County, Florida

Work Program Item No.: 256422-2

Prepared For:

Florida Department of Transportation

Prepared By:

HDR Engineering, Inc.
5426 Bay Center Drive, Suite 400
Tampa, FL 33609

EXECUTIVE SUMMARY

The objective of this Design Traffic Technical Memorandum (DTTM) is to document the traffic analyses conducted to evaluate alternative roadway capacity improvements proposed for the US 301/SR 41 (Gall Boulevard) study corridor from SR 39 to south of CR 54 (Eiland Boulevard) in Pasco County, Florida. This DTTM was prepared in support of the Project Development and Environment (PD&E) Study Update, which documents the environmental and engineering analyses required by the Florida Department of Transportation (FDOT) and the Federal Highway Administration (FHWA) to reach a decision on the type, conceptual design and location of the necessary improvements along the US 301 corridor to accommodate future transportation needs in a safe and efficient manner.

The PD&E Study Update evaluates alternative roadway capacity improvements along US 301 and the one-way pair of 6th and 7th Streets located in the City of Zephyrhills. The limits of the study are from SR 39 to south of CR 54, a distance of 2.6 miles. Existing and future traffic conditions along US 301 were evaluated for a No-Build Alternative and two Build Alternatives: 6th Street and US 301/Gall Boulevard One-Way Pair Alternative and 6th Street and 7th Street One-Way Pair Alternative. These proposed Build Alternatives are described as follows:

- 6th Street and US 301/Gall Boulevard One-Way Pair Alternative: US 301 is converted from a two-lane, two-way, undivided roadway facility to a one-way, three-lane (northbound) roadway from A Avenue to Geiger Road (North Avenue). Sixth Street is widened from a two-lane, one-way (southbound) to a three-lane, one-way (southbound) roadway facility from A Avenue to 16th Avenue. Seventh Street remains as a two-lane, one-way (northbound) roadway facility from A Avenue to Geiger Road. The segment of 7th Street from Geiger Road to Fort King Road would also remain in its existing condition, a two-way, two-lane, undivided roadway facility.

- 6th Street and 7th Street One-Way Pair Alternative: US 301 remains as a two-lane, two-way, undivided roadway facility from A Avenue to Geiger Road. Sixth Street is widened from a two-lane, one way (southbound) to a three-lane, one-way (southbound) roadway facility from A Avenue to 16th Avenue. Seventh Street is widened from a two-lane, one-way (northbound) to a three-lane, one-way (northbound) roadway facility from A Avenue to Fort King Road.

The widening of 6th and 7th Streets would occur when traffic volumes warrant the additional travel lane on these roadways.

In both proposed Build Alternatives, US 301 is assumed to be widened to a four-lane divided roadway facility from SR 39 to Palm Grove Avenue and from Geiger Road to CR 54. From Palm Grove Avenue to A Avenue, US 301 and 6th Street would form a one-way pair, with US 301 having three northbound lanes and 6th Street having three southbound lanes.

EXISTING CONDITIONS

Existing year (2010) Annual Average Daily Traffic (AADT) volumes on US 301 range from a low of 12,700 vehicles per day (vpd) north of South Avenue to a high of 20,900 vpd south of Fort King Road. A highway capacity analysis was conducted to evaluate existing levels of service along the US 301 study corridor and the 6th and 7th Streets one-way pair. The results of the analysis indicate that all 15 study intersections currently operate at an overall Level of Service (LOS) D or better during both the AM and PM peak hours. An analysis of arterial operations reveals that two roadway segments currently do not operate at the adopted LOS standard D in either the AM or PM peak hours. The two roadway segments currently operating at a deficient LOS (LOS E) are listed as follows:

- Northbound 7th Street between Geiger Road and Fort King Road during the PM peak hour;
- Southbound US 301 between 12th Avenue and SR 54 (5th Street) during the AM peak hour.

Crash records were examined for the most recent five-year period (2005-2009) to assess a level of motor vehicle safety along the US 301 study corridor. A total of 500 crashes occurred during this five-year time frame, which resulted in 493 injuries and three fatalities. The US 301 segment from south of CR 54 to Geiger Road is the only roadway segment with a five-year average safety ratio greater than 1.0.

FUTURE CONDITIONS

Design year (2035) traffic projections were developed for the US 301 study corridor using the Tampa Bay Regional Planning Model (TBRPM), Version 7.0. Design year AADT volumes on US 301 are projected to range from a low of 28,400 vpd north of South Avenue to a high of 49,000 vpd north of SR 39. If no improvements are made to US 301 and the 6th and 7th Streets one-way pair, 13 of the 15 study intersections are projected to operate at an unacceptable LOS (LOS E or worse) during the AM

and/or the PM peak hours. Similarly, failing LOS is projected on the US 301 arterial roadway segments under the No-Build Alternative.

Separate traffic forecasts were developed for the proposed Build Alternatives to estimate the reallocation of traffic volumes to 6th Street, US 301 and 7th Street as a result of the different lane configurations associated with the Build Alternatives. **Table ES-1** provides a comparison of the design year (2035) AADT volumes forecasted for each of the alternatives. The volumes shown in this table represent the median and low/high range of AADT projected along the arterial segments of 6th Street, US 301, and 7th Street. As shown in this table, traffic volumes on US 301 are projected to divert to the improved one-way pair of 6th and 7th Streets with the construction of either Build Alternative. The magnitude of traffic diverted off of US 301 and onto 6th and 7th Streets varies among the two Build Alternatives. Approximately 14,400 vpd are projected to be diverted off of US 301 with the 6th Street and 7th Street One-Way Pair Alternative, while it projected that roughly 8,900 vpd would divert under the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative. Moreover, comparing traffic volumes on 6th and 7th Street for the two Build Alternatives reveals that an additional 7,300 vpd will travel on 6th Street with the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative. Likewise, an additional 12,800 vpd will travel on 7th Street with the 6th Street and 7th Street One-Way Pair Alternative.

Table ES-1
Design Year (2035) Annual Average Daily Traffic (AADT) Volumes on US 301, 6th and 7th Streets within the One-Way Pair Section between A Avenue and 15th Street

Roadway	No-Build Alternative	Build Alternatives	
		6th Street and 7th Street One-Way Pair	6th Street and US 301/Gall Boulevard One-Way Pair
6th Street	10,900 vpd (9,600 – 12,200)	18,200 vpd (17,200 - 19,200)	25,500 vpd (24,100 – 26,800)
US 301	29,300 vpd (28,400 – 30,200)	14,900 vpd (14,100 – 15,700)	20,400 vpd (19,300 – 21,400)
7th Street	10,500 vpd (10,100 – 10,800)	16,500 vpd (16,300 – 16,600)	3,700 vpd (2,700 – 4,600)

vpd – vehicles per day
Median AADT
(Low AADT – High AADT)

Highway capacity analyses were performed to evaluate future traffic operations of the Build Alternatives. Initially, the analysis considered only the improvements shown in the conceptual design

plans that were prepared by Pitman Hartenstein and Associates (design consultant for the FDOT). The Build Alternatives primarily included improvements to the mainlines of 6th Street, US 301, and 7th Street as part of the one-way pair alternative. Later, refinements were made to the Build Alternatives to provide side street improvements to improve operations to acceptable LOS. Results of the initial analysis (with no side street improvements) indicate that 9 of the 15 study intersections do not operate at an acceptable level of service in either Build Alternative. **Table ES-2** lists the study intersections that would require additional improvements to achieve an acceptable LOS.

Table ES-2
Summary of Intersections with Deficient Level of Service in the Design Year 2035

Intersection	6th Street and 7th Street One-Way Pair Alternative	6th Street and US 301/Gall Boulevard One-Way Pair Alternative
US 301		
SR 39	✓	✓
SR 54*	✓	
Geiger Road	✓	✓
Fort King Road	✓	✓
6th Street		
South Avenue	✓	
SR 54		✓
7th Street		
South Avenue		✓
SR 54	✓	✓
Geiger Road		✓

*A feasible improvement alternative cannot be identified

Refinements were made to the Build Alternatives in order to achieve acceptable LOS in the design year 2035. The only intersection where an acceptable LOS cannot be achieved is the US 301/SR 54 intersection in the 6th Street and 7th Street One-Way Pair Alternative. A second southbound through lane is needed at the US 301/SR 54 intersection in the 6th Street and 7th Street One-Way Pair Alternative. Construction of this through lane may not be feasible due to right-of-way constraints. The recommended intersection improvements are listed as follows and shown on **Figure ES 1 (A-B)** and **Figure ES 2 (A-B)**:

US 301/SR 39:

- Provide a second southbound-to-eastbound left-turn lane. The Tucker Road median opening would likely need to be closed in order to accommodate the recommended second left-turn lane.

US 301/Geiger Road:

- Provide three through lanes in both the northbound and southbound directions of US 301 for the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative. A third northbound through lane is not needed for the 6th Street and 7th Street One-Way Pair Alternative.
- Provide a second westbound-to-southbound left-turn lane and modify the existing left-turn signal phasing to protected-only;
- Construct an exclusive eastbound-to-southbound right-turn lane; and
- Provide an exclusive westbound-to-northbound right-turn lane.

US 301/Fort King Road:

6th Street and US 301/Gall Boulevard One-Way Pair Alternative:

- Provide three through lanes in the southbound direction of US 301;
- Construct a second northbound-to-westbound left-turn lane and modify the signal phasing for both the northbound-to-westbound and southbound-to-eastbound left-turn movements to protected-only;
- Provide a second eastbound-to-southbound right-turn lane with a protected overlapping green phase operated concurrent with the northbound-to-westbound left-turn movement; and
- To improve safety and efficiency, consider eliminating the eastbound-to-northbound and westbound-to-southbound left-turn movements due to the existing intersection skew angle and projected low traffic demand for these movements.

6th Street and 7th Street One-Way Pair Alternative:

- Provide three southbound through lanes on US 301 and maintain the existing two northbound through lanes between Geiger Road and Fort King Road;

- Form a third northbound through lane on US 301 north of Fort King Road by adding an auxiliary lane from the westbound-to-northbound right-turn movement;
- Provide either a free-flow westbound-to-northbound right-turn lane or dual westbound-to-northbound right-turn lanes operated under signal control;
- Provide a second eastbound-to-southbound right-turn lane with a protected overlapping green phase operated concurrent with the northbound-to-westbound left-turn movement;
- To improve safety and efficiency, consider eliminating the eastbound-to-northbound and westbound-to-southbound left-turn movements due to the existing intersection skew angle and projected low traffic demand for these movements; and
- Construct a second northbound-to-westbound left-turn lane.

6th Street/South Avenue *(6th Street and 7th Street One-Way Pair Alternative Only*):

- Reconstruct the westbound approach to provide an exclusive westbound-to-southbound left-turn lane and a shared left and through lane;
- Provide an exclusive eastbound-to-southbound right-turn lane; and
- Modify the existing signal phasing to provide split phased movements for the eastbound and westbound approaches.

6th Street/SR 54 (*6th Street and US 301/Gall Boulevard One-Way Pair Alternative Only):*

- Provide an exclusive eastbound-to-southbound right-turn lane for the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative only. This improvement is not needed for the 6th Street and 7th Street One-Way Pair Alternative.

7th Street/South Avenue (*6th Street and US 301/Gall Boulevard One-Way Pair Alternative Only):*

- Provide all-way stop control.

7th Street/SR 54:

6th Street and US 301/Gall Boulevard One-Way Pair Alternative:

- Provide an exclusive northbound-to-westbound left-turn lane and maintain the existing all-way stop control.

6th Street and 7th Street One-Way Pair Alternative:

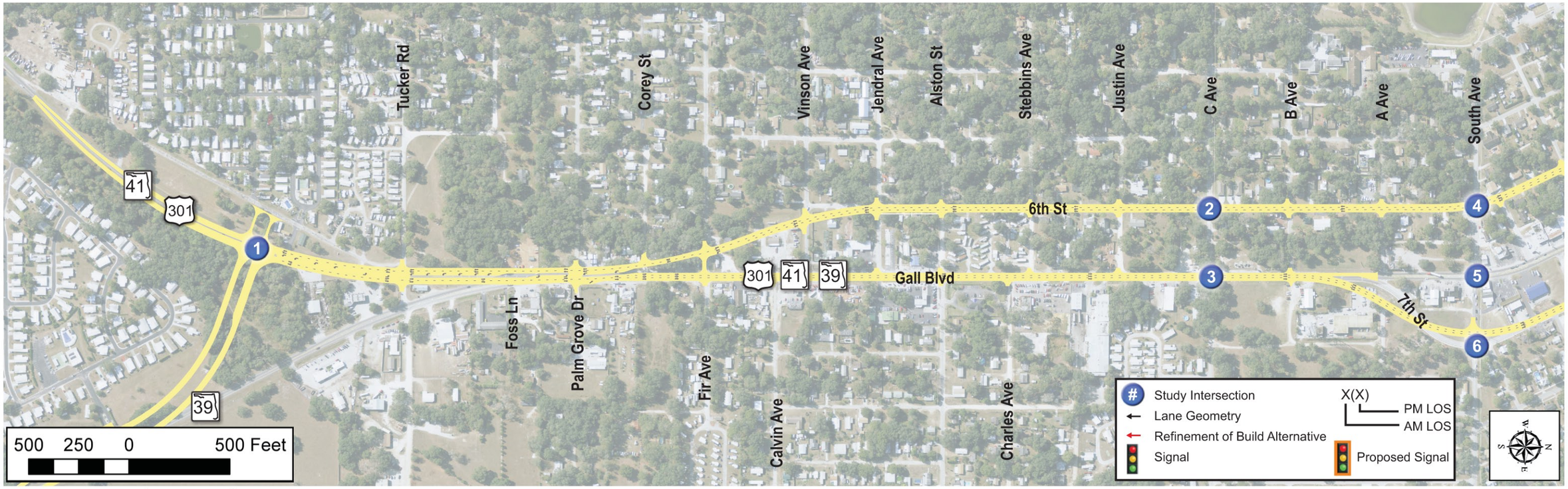
- Provide an exclusive eastbound-to-northbound left-turn lane with protected plus permitted left-turn signal phasing.

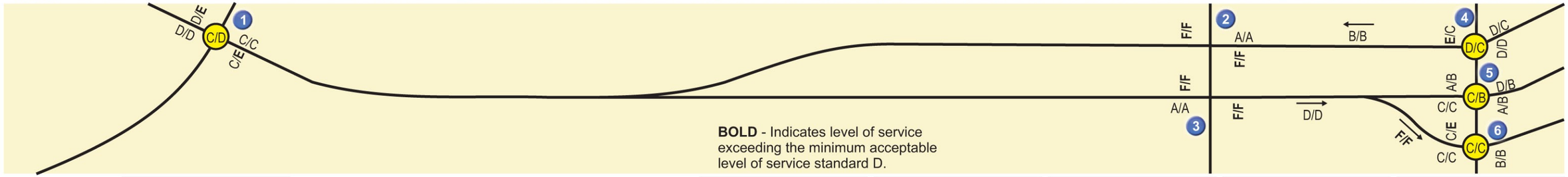
7th Street/Geiger Road (*6th Street and US 301/Gall Boulevard One-Way Pair Alternative Only):*

- Provide a second westbound through lane and maintain the existing all-way stop control.

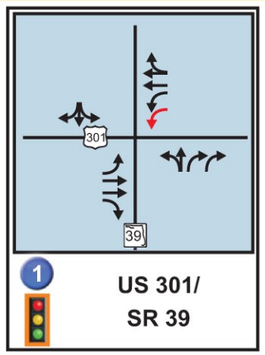
In addition to the refinement of the Build Alternatives, a staging analysis of the proposed roadway capacity improvements was performed to determine the analysis year that three lanes in one direction for the one-way pair alternatives would be required to meet the adopted LOS standard. The analysis revealed that three one-way (southbound) lanes are needed on 6th Street by the year 2030 for the 6th Street and 7th Street One-Way Pair Alternative and seven years earlier (by the year 2023) for the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative. For the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative three lanes on US 301 are needed by 2033. For both Build Alternatives, three one-way (northbound) lanes on 7th Street are not required to meet the LOS standard by the design year 2035.

Lastly, an analysis of opening year (2015) traffic conditions was performed for both Build Alternatives. The results of the analysis indicate that all study intersections are projected to operate at an acceptable LOS.

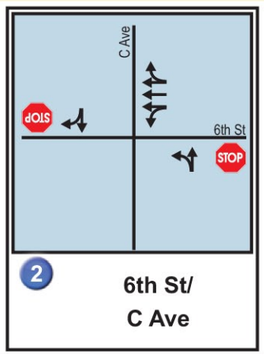




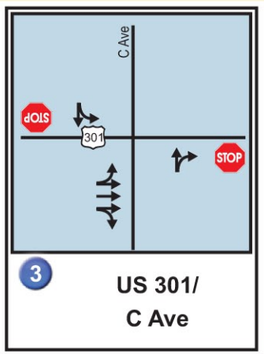
BOLD - Indicates level of service exceeding the minimum acceptable level of service standard D.



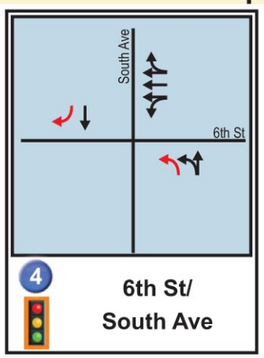
1 **US 301/ SR 39**



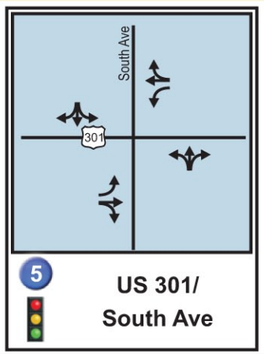
2 **6th St/ C Ave**



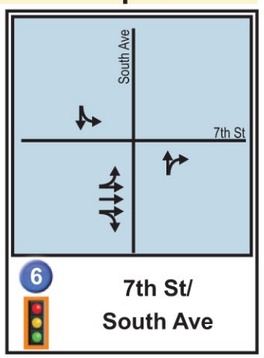
3 **US 301/ C Ave**



4 **6th St/ South Ave**



5 **US 301/ South Ave**

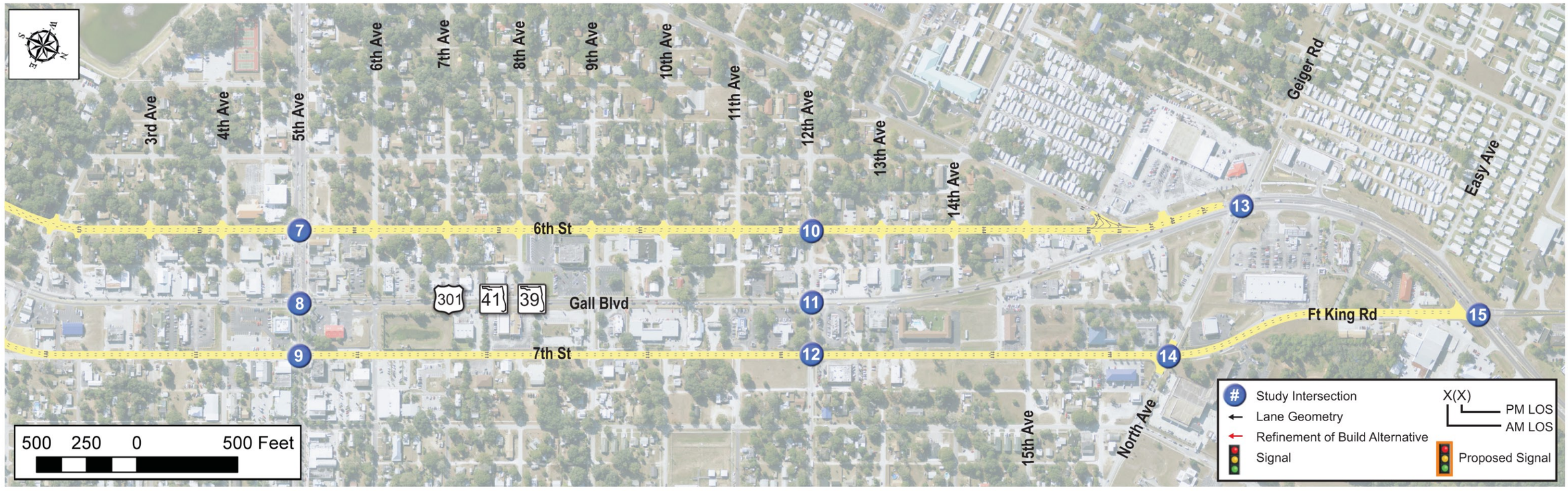


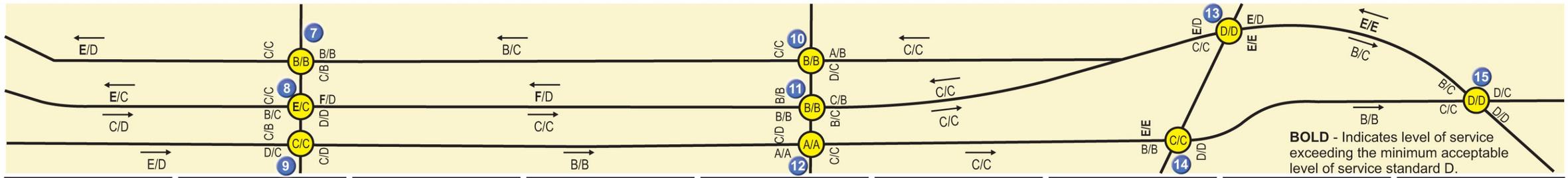
6 **7th St/ South Ave**

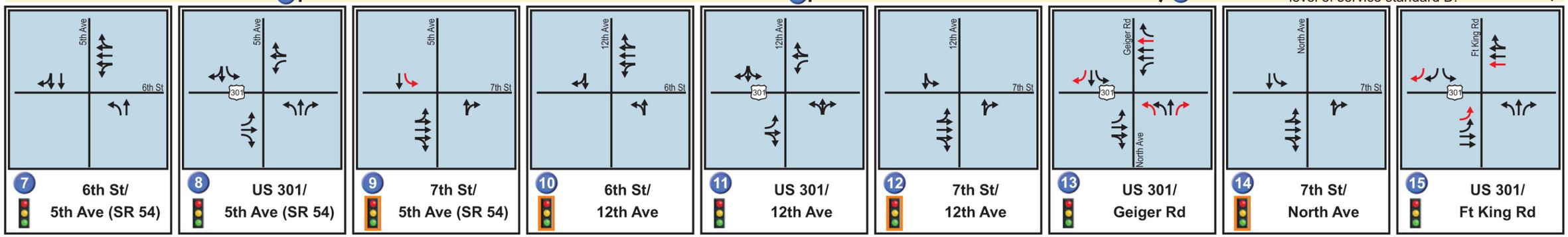
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

DESIGN YEAR (2035) REFINEMENT OF BUILD ALTERNATIVE LANE GEOMETRY AND LEVEL OF SERVICE (LOS)
6TH STREET AND 7TH STREET ONE-WAY PAIR ALTERNATIVE

FIGURE ES 1A



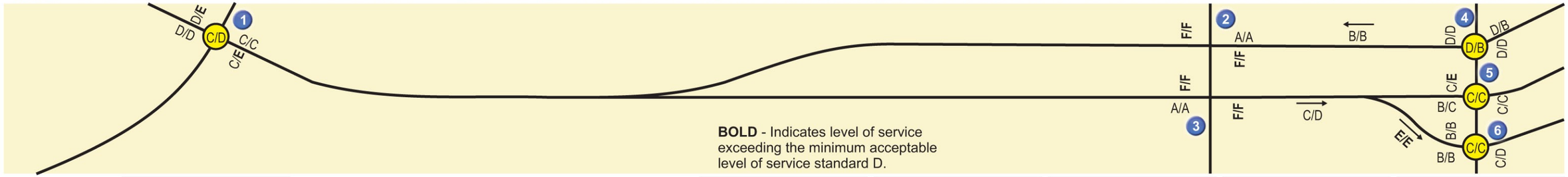




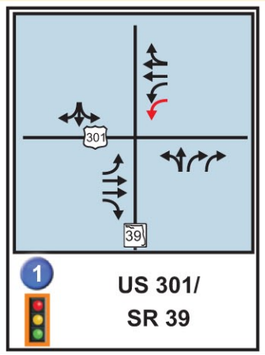
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

DESIGN YEAR (2035) REFINEMENT OF BUILD ALTERNATIVE LANE GEOMETRY AND LEVEL OF SERVICE (LOS)
6TH STREET AND 7TH STREET ONE-WAY PAIR ALTERNATIVE

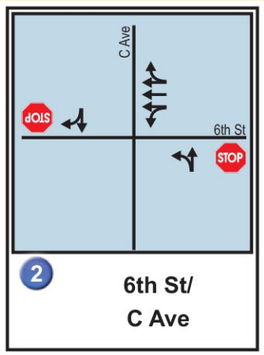
FIGURE ES 1B



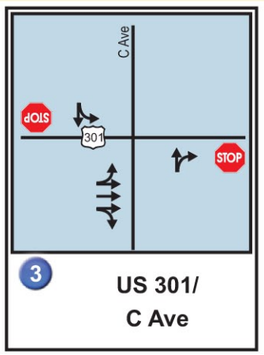
BOLD - Indicates level of service exceeding the minimum acceptable level of service standard D.



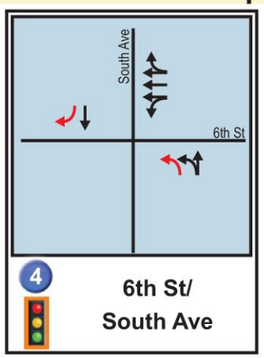
1 **US 301/ SR 39**



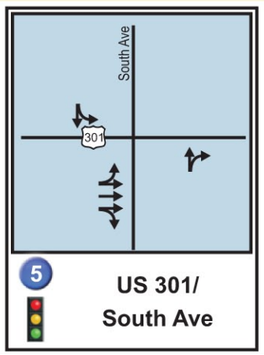
2 **6th St/ C Ave**



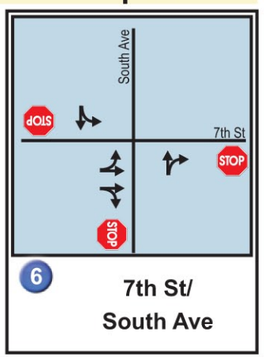
3 **US 301/ C Ave**



4 **6th St/ South Ave**



5 **US 301/ South Ave**

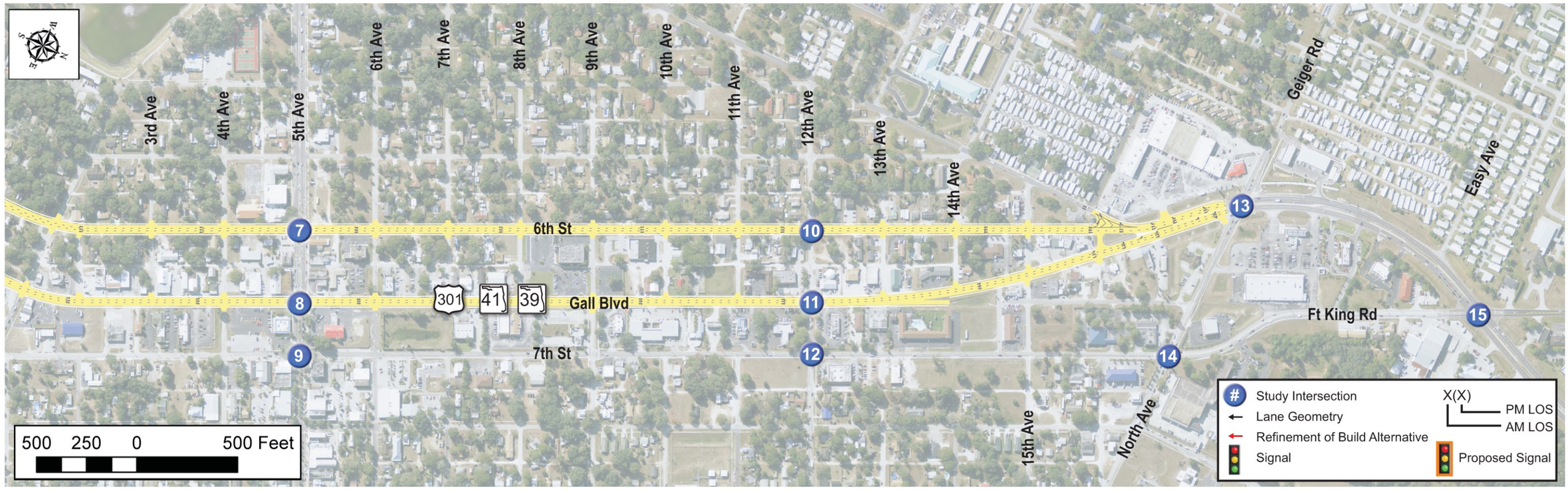


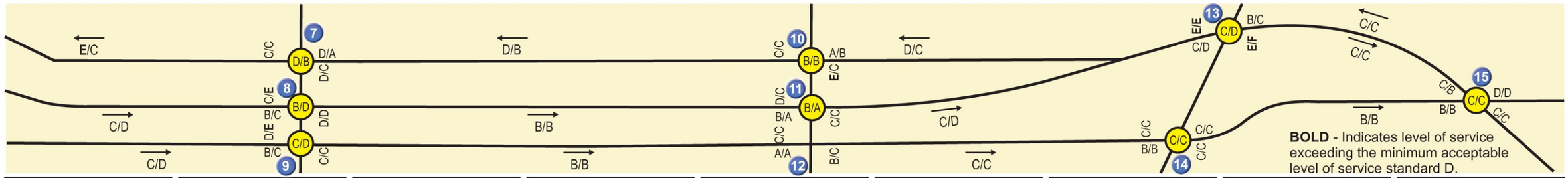
6 **7th St/ South Ave**

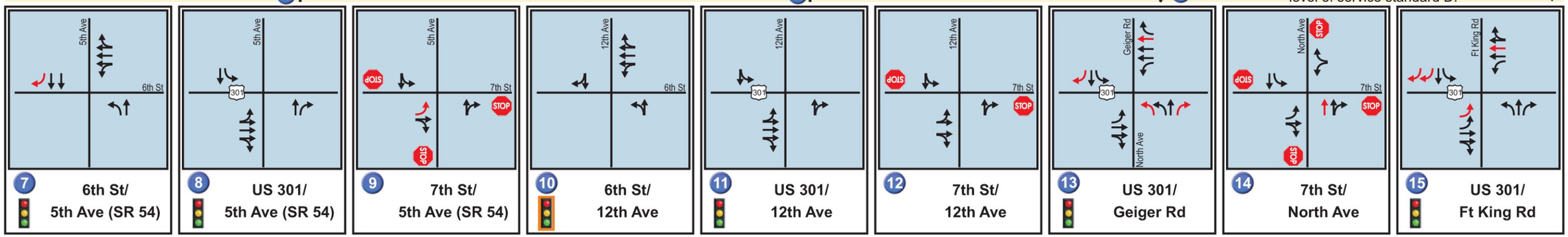
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

DESIGN YEAR (2035) REFINEMENT OF BUILD ALTERNATIVE LANE GEOMETRY AND LEVEL OF SERVICE (LOS)
6TH STREET AND US 301/GALL BLVD ONE-WAY PAIR ALTERNATIVE

FIGURE ES 2A







US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

DESIGN YEAR (2035) REFINEMENT OF BUILD ALTERNATIVE LANE GEOMETRY AND LEVEL OF SERVICE (LOS)
6TH STREET AND US 301/GALL BLVD ONE-WAY PAIR ALTERNATIVE

FIGURE ES 2B

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Appendices
(under separate cover)

GLOSSARY OF TERMS

AADT	Annual Average Daily Traffic
ADT	Average Daily Traffic
AMRC	Access Management Review Committee
CCC	Chairs Coordinating Committee
DDHV	Directional Design Hour Volumes
DHV	Design Hour Volume
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FSUTMS	Florida Standard Urban Transportation Modeling Structure
FTI	Florida Traffic Information
FY	Fiscal Year
HCM	Highway Capacity Manual
LOS	Level of Service
LRTP	Long Range Transportation Plan
MOCF	Model Output Conversion Factor
MPH	Miles per Hour
MPO	Metropolitan Planning Organization
NEPA	National Environmental Policy Act
PD&E	Project Development and Environment
PSWADT	Peak Season Weekday Average Daily Traffic
ROW	Right-of-Way
SHS	State Highway System
TAZ	Traffic Analysis Zones
TBRPM	Tampa Bay Regional Planning Model
TIF	Transportation Impact Fee
TSM	Transportation System Management
TTM	Traffic Technical Memorandum
TWSC	Two-way Stop Controlled
VPD	Vehicles per Day
ZDATA	Socio-Economic Zonal Data

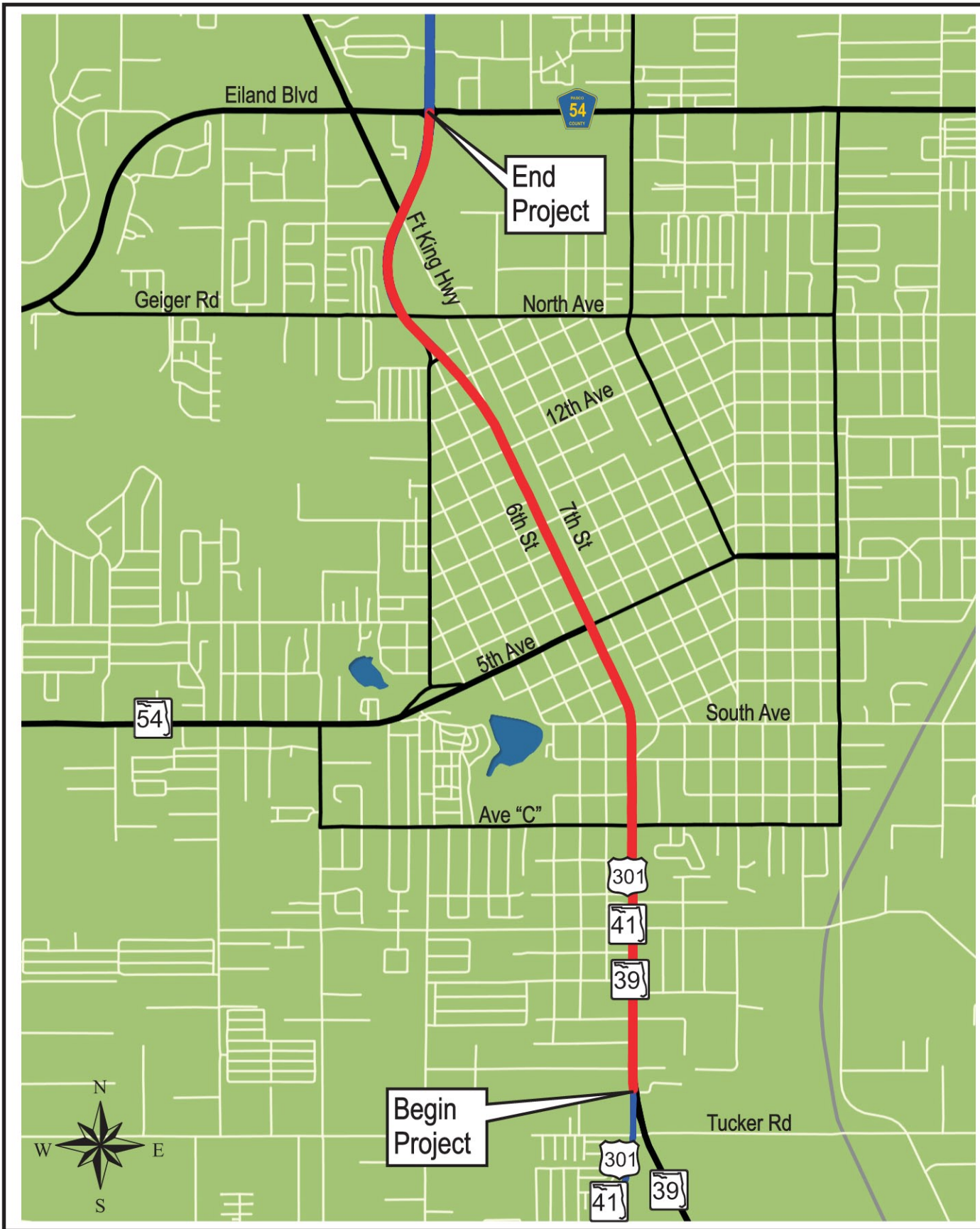
SECTION 1
INTRODUCTION

1.1 INTRODUCTION

The Florida Department of Transportation (FDOT), Pasco County and the City of Zephyrhills are working together to determine alternative roadway improvements to be considered in a Project Development and Environment (PD&E) Study Update for US 301/SR 41 (Gall Boulevard) in southeastern Pasco County. The project location is illustrated on **Figure 1-1**. The limits of the study corridor are from SR 39 to south of CR 54 (Eiland Boulevard), a project distance of 2.6 miles.

The objective of the PD&E Study Update is to provide documented environmental and engineering analyses, which will assist the FDOT and the Federal Highway Administration (FHWA) in reaching a decision on the type, conceptual design and location of the necessary improvements within the US 301 study corridor limits to accommodate future transportation needs in a safe and efficient manner. The PD&E Study Update also satisfies the requirements of the National Environmental Policy Act (NEPA) and other applicable federal requirements, in order for this project to qualify for federal-aid funding of its subsequent phases (design, right-of-way [ROW] acquisition and construction). The PD&E Study Update will compare alternatives based on a variety of parameters using a matrix format. This analytical process identifies the alternative that would have the least impact while providing the necessary improvements. The Design Traffic Technical Memorandum (DTTM) documents the benefits of the proposed geometric improvements contained within each alternative. The impacts and costs associated with these proposed geometric improvements will be determined in the ongoing PD&E Study Update and the subsequent design phase of the project. This DTTM is being prepared as part of the PD&E Study Update.

The DDTM documents the information necessary to confirm the need for this project and develops and evaluates the traffic impacts associated with various improvement alternatives as they relate to the subject transportation facility. The design year of the traffic analysis is Year 2035. The No-Build Alternative is considered a viable alternative throughout this PD&E Study Update.



US 301 PD&E Study Update from SR 39 to CR 54 (Eiland Boulevard)	**PROJECT LOCATION MAP**	**FIGURE 1-1**

1.2 PLAN CONSISTENCY

The Pasco County Metropolitan Planning Organization (MPO) *2035 Long Range Transportation Plan (LRTP)*[1] identifies the conversion of US 301 from an existing two-lane undivided roadway to a one-way pair system with three lanes in one direction as a cost affordable project by the year 2035.

1.3 PURPOSE AND NEED

Motorists in Pasco County are faced with increased traffic congestion and delays as demand from the County's growth continues to place pressure on the existing transportation system. To assess the effects of continued growth along US 301, the FDOT initiated this study to evaluate the impacts of providing alternative roadway capacity improvements to the facility. The purpose of this study is to determine a desirable lane geometry configuration and number of travel lanes in order to aid in addressing existing deficiencies and future traffic demand within the City of Zephyrhills. The need for improvements along US 301 within the study limits was developed based on the evaluation of the following criteria:

- Existing and future quality of traffic operations along US 301 assuming the existing roadway conditions;
- Traffic safety conditions for the time period between the years 2005 and 2009;
- Consistency with local government plans; and
- Projected future socioeconomic growth of Pasco County.

The DTTM documents the following items:

- The development of design hour traffic parameters (i.e., K_{30}, D_{30} and Design Hour Truck [DHT] factors) for the estimation of the existing year (2010), opening year (2015), and design year (2035) design hour volumes (DHV);
- Analysis of existing year (2010) traffic conditions and Levels of Service (LOS);
- A highway safety analysis using historical crash records for a five-year period (2005-2009);
- Access management of the proposed Build Alternatives;
- The development of future traffic projections for the design year (2035) and opening year (2015);

- Highway capacity and LOS analyses of the design year (2035) and opening year (2015) for a No-Build and two Build Alternatives proposed for this project;
- Recommended lane geometry and traffic control features needed to meet adopted LOS standards for the proposed Build Alternatives; and
- A traffic simulation analysis comparing key Measures of Effectiveness (MOEs) (i.e., operating speeds, travel time and vehicle delay) for the proposed Build Alternatives.

1.4 PROJECT DESCRIPTION

US 301 is a north-south arterial that spans the limits of eastern Pasco County and serves as a primary route connecting the Cities of Zephyrhills and Dade City. Unlike Dade City where US 98 serves as a bypass to US 301, US 301 is a transportation "spine" through the downtown of the City of Zephyrhills. The US 301 roadway provides an important connection to the regional and statewide transportation network linking the Tampa Bay region to the remainder of the state and nation. US 301 is identified as a regional roadway by the West Central Florida MPOs' Chairs Coordinating Committee (CCC) and is included in the Regional Roadway Network. US 301 is designated as an emergency evacuation route and currently operates as an existing truck route. The 2035 Cost Affordable Roadway Plan of the *Pasco County MPO Long Range Transportation Plan (LRTP)*[1] identifies the conversion of US 301 from an existing two-lane undivided roadway to a one-way pair system with three lanes in one direction. This PD&E Study Update evaluates the engineering and environmental impacts of providing alternative improvements to US 301 that include, but are not limited to, a No-Build Alternative and two Build Alternatives: 6th Street and 7th Street One-Way Pair Alternative and the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative.

The existing US 301 roadway consists of a two-lane, undivided rural typical section with four-foot (ft) paved shoulders from SR 39 to Geiger Road (North Avenue). North of Geiger Road, US 301 consists of a four-lane, divided rural typical section with four-ft paved shoulders. Although these two US 301 roadway typical sections are considered rural because of their open drainage characteristic (i.e., no curb and gutter), US 301 is functionally classified as an urban other principal arterial since it traverses through the City of Zephyrhills which is part of the Pasco County Urban Service Boundary.

1.5 UPCOMING PROJECTS

Current and scheduled projects within close proximity of the US 301 study corridor that will improve safety and traffic operations include:

- **Proposed Roadways:**
  - US 301 from SR 39 to CR 54
    - Improvement: Widen from 4 lanes to 6 lanes
    - Construction: Fiscal Year (FY) 2016
    - Source: FDOT
- **Studies:**
  - CR 54/US 301; CR 54/Final Engineering Design (50-50% with Pasco County)
    - Completion Date: FY 2010
    - Source: Transportation Impact Fee (TIF)/Pasco County

1.6 REFERENCES

1. *Pasco County Metropolitan Planning Organization (MPO) 2035 Long Range Transportation Plan (LRTP): Document A Draft Report*; Tindale Oliver & Associates, Inc.; December 10, 2009.

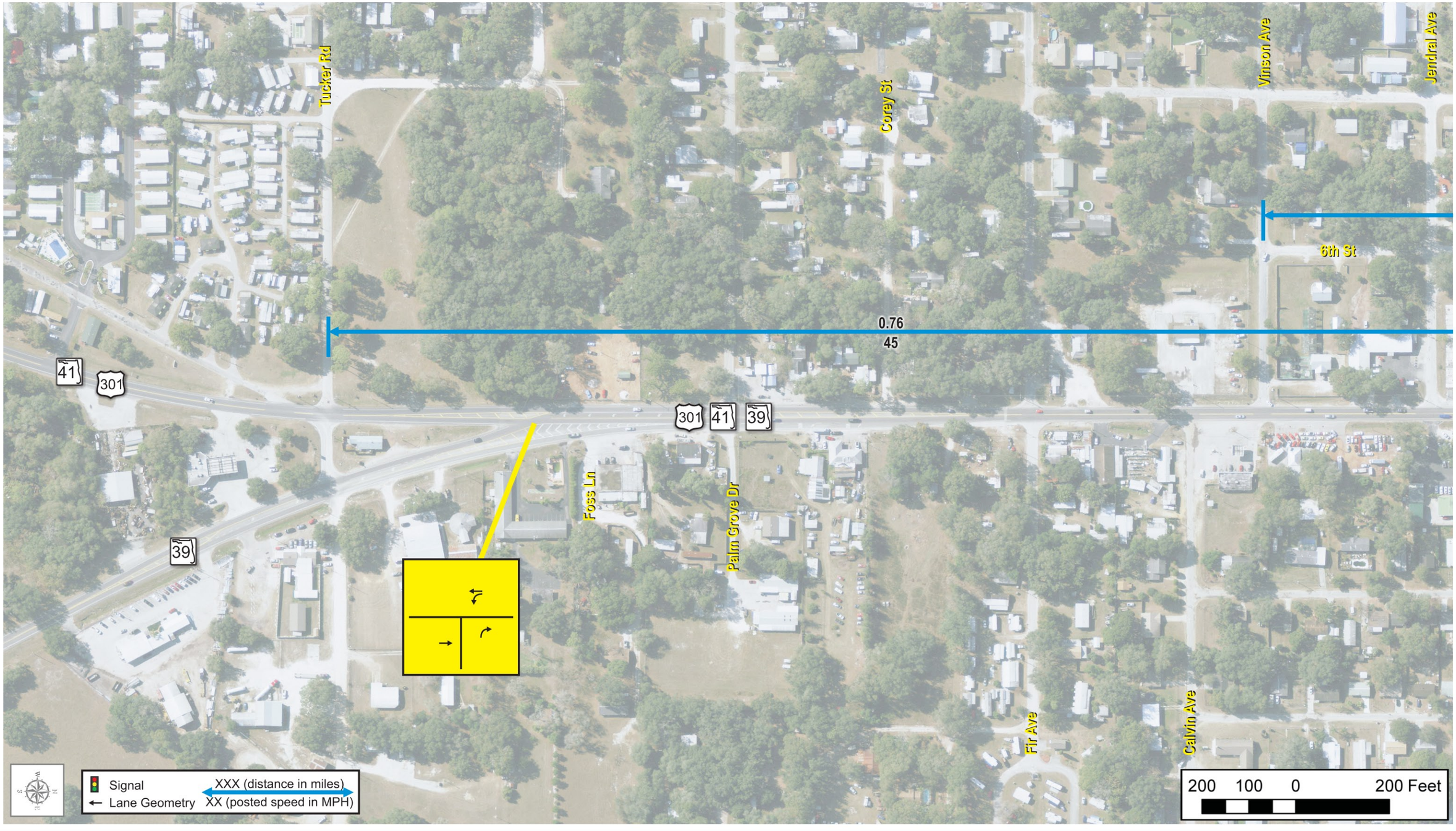
SECTION 2
EXISTING CONDITIONS

2.1 ROADWAY AND INTERSECTION CHARACTERISTICS

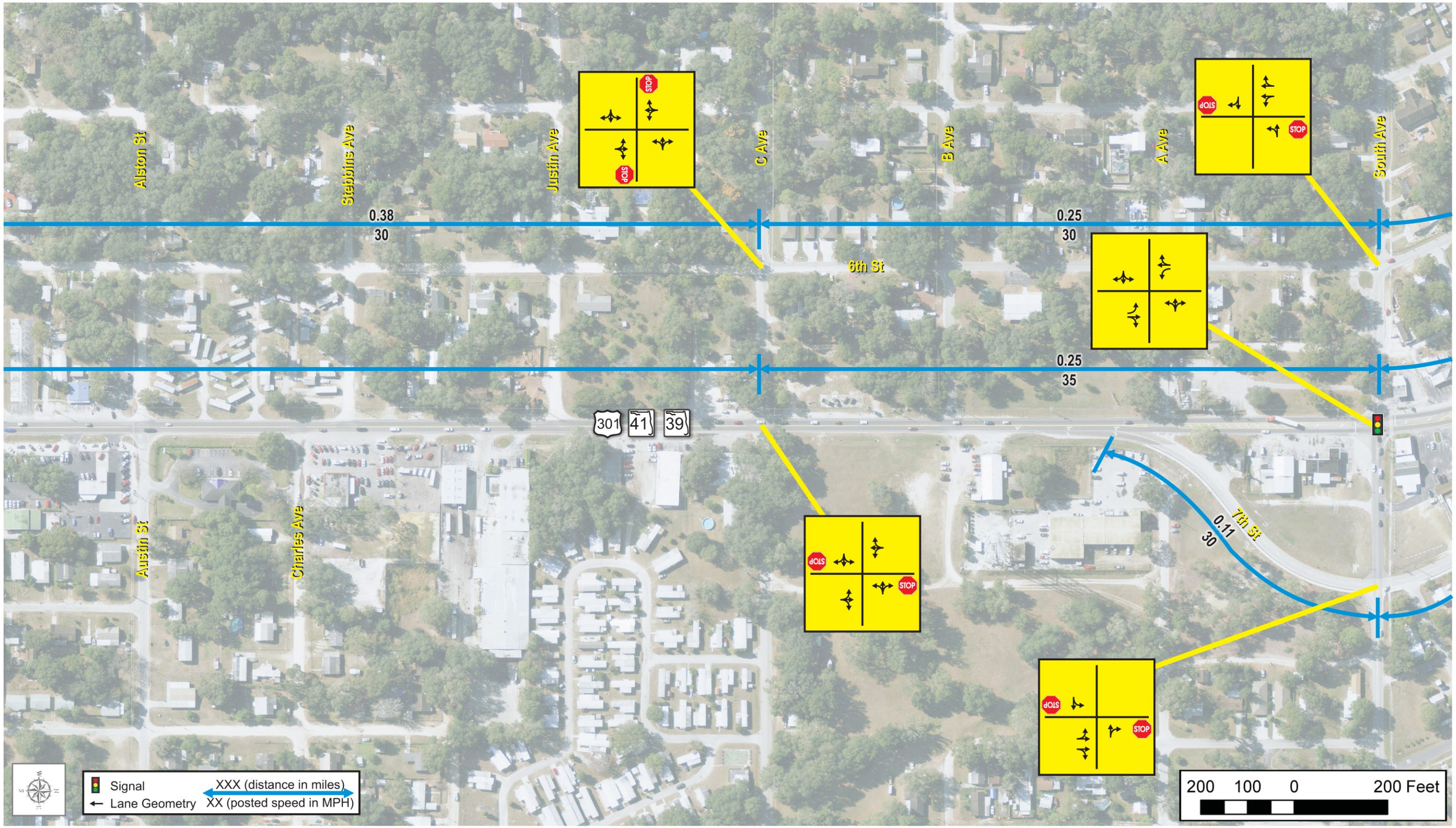
The study area consists of US 301 and the 6th and 7th Streets one-way pair system located in the City of Zephyrhills. The existing US 301 arterial between SR 39 and Geiger Road is a two-lane, undivided Principal Arterial Urban roadway and a four-lane, divided Principal Arterial Urban roadway between Geiger Road and CR 54. The posted speed limits on US 301 are 45 miles per hour (mph) from SR 39 to mile post 4.062 (north of Vinson Avenue), 35 mph from mile post 4.062 to mile post 6.148 (north of Fort King Road), and 45 mph from mile post 6.148 to the northern limit of the project corridor. Sixth Street is a two-lane, one-way (southbound direction only) road that begins at 15th Street to the north and ends north of Palm Grove Avenue to the south. Seventh Street is a two-lane, one-way (northbound direction only) road that begins south of A Avenue and ends at Geiger Road. The posted speed limit along the one-way pair is 30 mph. The location of signalized intersections, arterial segment distances, posted speed limits and intersection lane geometry are shown on **Figures 2-1 A-E**.

2.2 COLLECTION OF TRAFFIC DATA

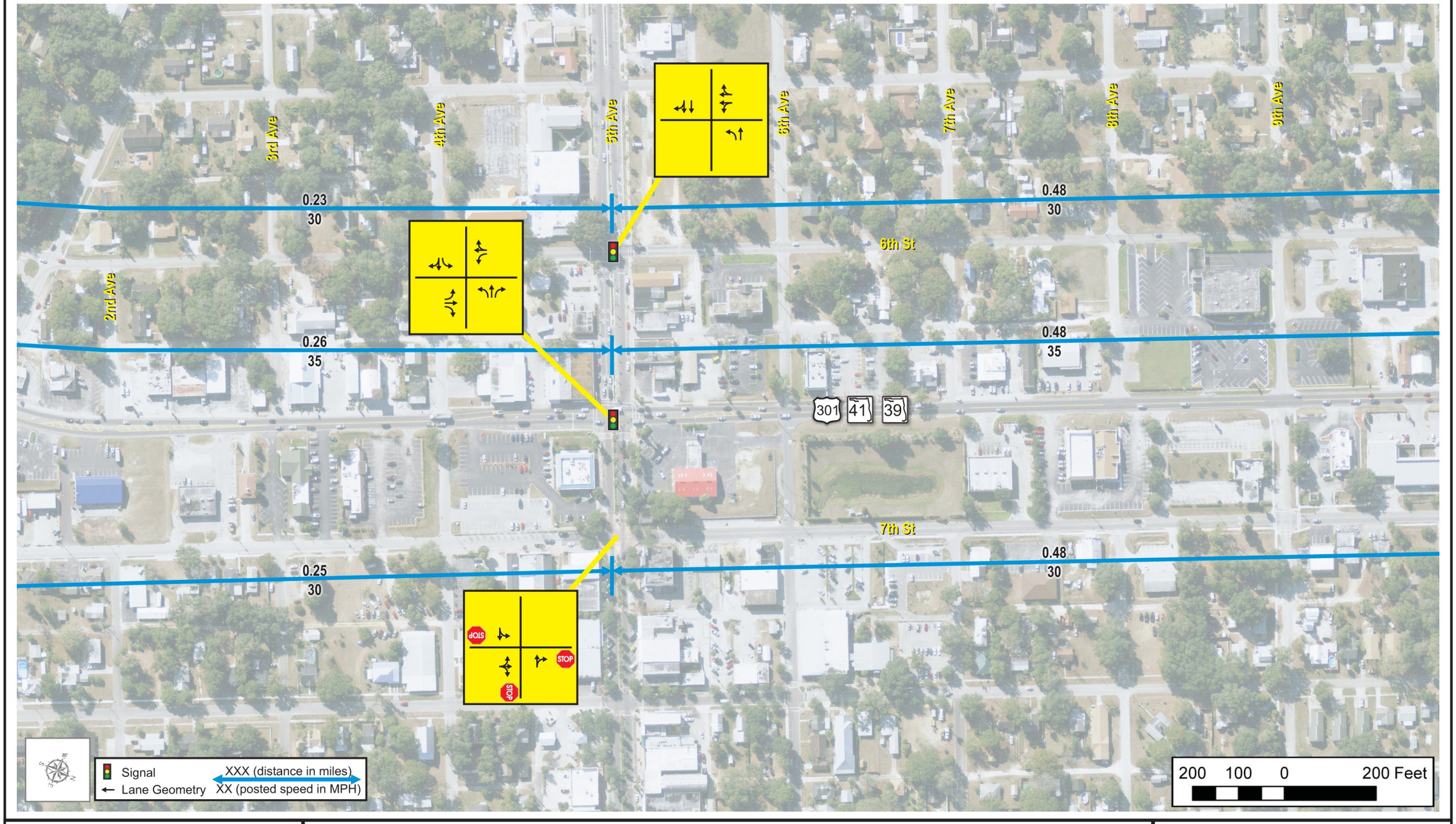
A comprehensive traffic count program was performed for the US 301 PD&E Study Update by Adams Traffic, Inc. during the month of May 2010. The traffic data included 72-hour bi-directional approach counts and 8-hour turning movement counts performed at 15 key intersections within the study area. The data recorded as part of the traffic count program is included in **Appendix A** (under separate cover). **Appendix B** (under separate cover) provides a summary of the existing peak-to-daily ratios (K_{pk}-factor) and directional distributions (D_{pk}-factor) on US 301 and on main cross-streets intersecting US 301. These factors were calculated from the traffic count data and used to assess the general travel characteristics of the study corridor. The corridor average K_{pk}-factor and D_{pk}-factor are calculated to be 7.7% and 56.5%, respectively. The K_{pk}-factor is below the minimum acceptable state and national values for the K_{30}-factor documented in the FDOT's *Traffic Forecasting Handbook*[1]. The study area roadways exhibit atypical traffic conditions due to the type of adjacent land uses and socio-demographic characteristics, which generally constitute a retirement-age population. In addition, instead of the corridor exhibiting clearly defined AM and PM peak hours associated with a typical home-to-work based trip pattern, there is a peak mid-afternoon time period spanning most of the day. This results in a low peak-to-daily ratio.



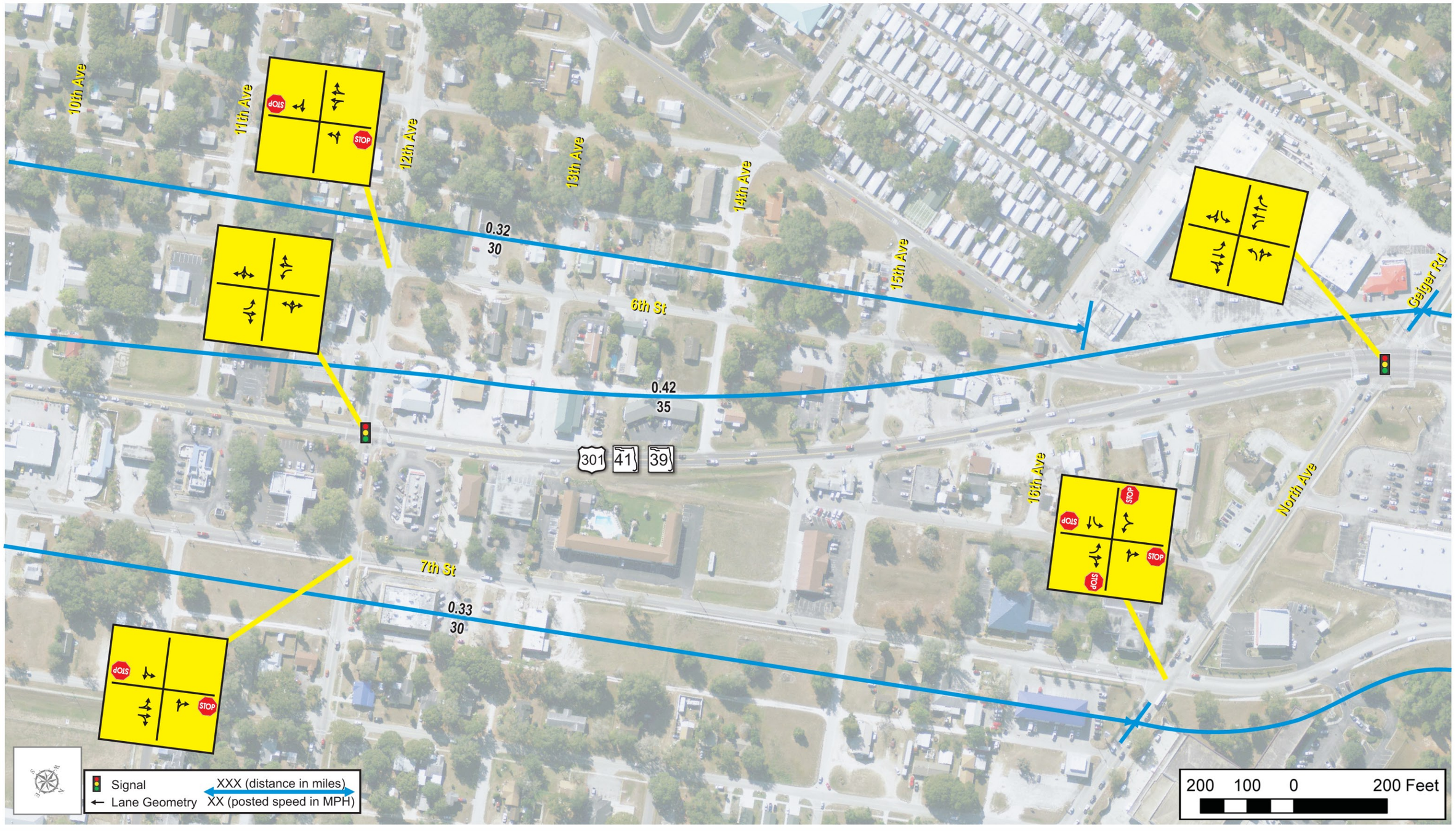
US 301 PD&E Study Update from SR 39 to CR 54 (Eiland Boulevard)	**EXISTING YEAR (2010) CORRIDOR LANE GEOMETRY**	**FIGURE 2-1A**



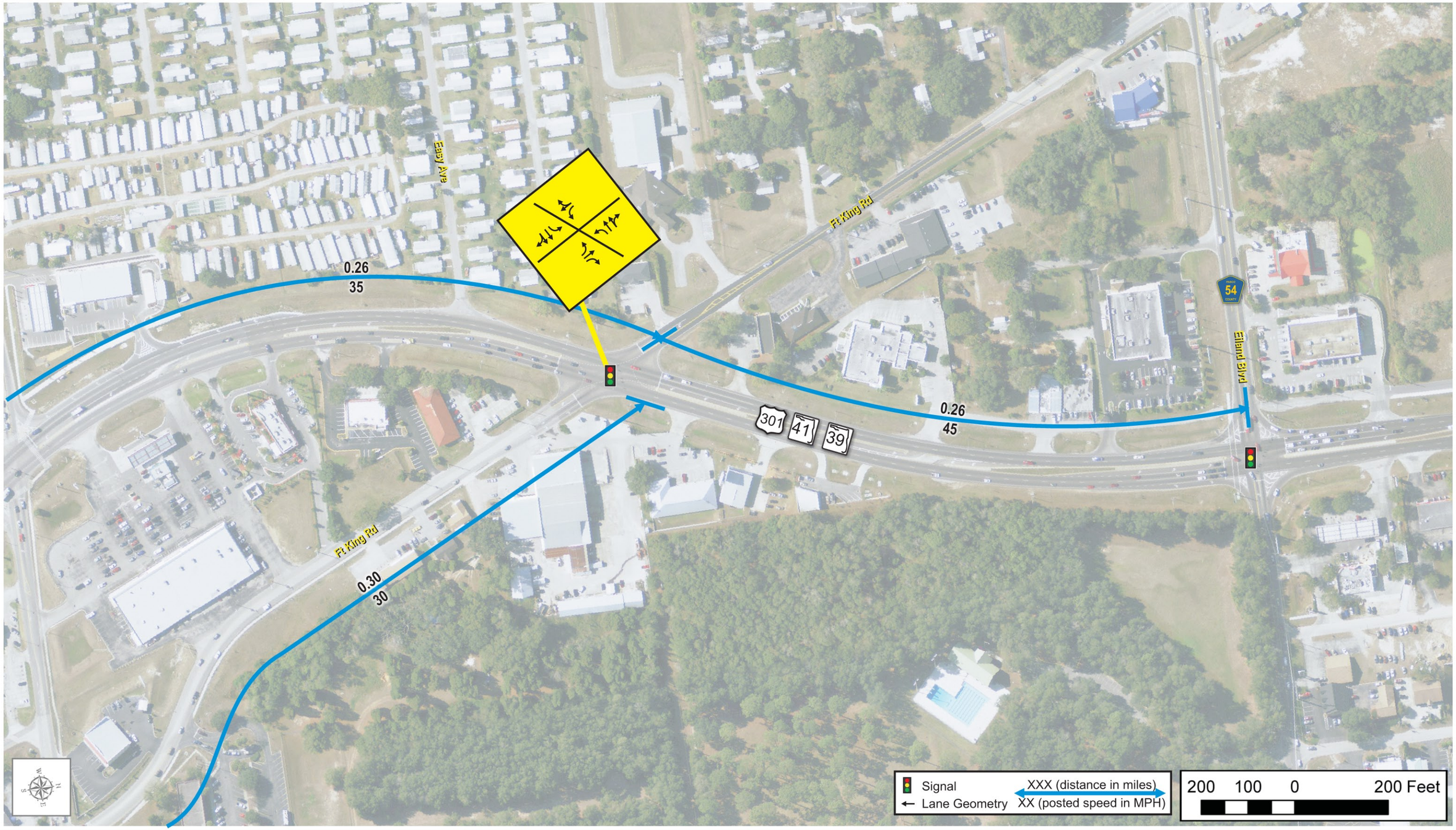
US 301 PD&E Study Update from SR 39 to CR 54 (Eiland Boulevard)	**EXISTING YEAR (2010) CORRIDOR LANE GEOMETRY**	**FIGURE 2-1B**



US 301 PD&E Study Update from SR 39 to CR 54 (Eiland Boulevard)	**EXISTING YEAR (2010) CORRIDOR LANE GEOMETRY**	**FIGURE 2-1C**



US 301 PD&E Study Update from SR 39 to CR 54 (Eiland Boulevard)	**EXISTING YEAR (2010) CORRIDOR LANE GEOMETRY**	**FIGURE 2-1D**



US 301 PD&E Study Update from SR 39 to CR 54 (Eiland Boulevard)	**EXISTING YEAR (2010) CORRIDOR LANE GEOMETRY**	**FIGURE 2-1E**

2.3 DESIGN TRAFFIC FACTORS

The recommended design hour traffic factors were estimated using historical traffic count data obtained from the FDOT 2009 Florida Traffic Information (FTI) DVD. **Tables 2-1 to 2-3** provide a summary of the historical traffic characteristics recorded at several FDOT traffic count stations along US 301 during the five-year period from 2005-2009. Based on five-year averages of the recorded traffic characteristics and comparison of these average values to state and national acceptable ranges obtained from the FDOT *Project Traffic Forecasting Handbook*[1], the design hour traffic factors recommended for the study area are as follows:

K_{30} = 9.4 percent;
D_{30} = 56.0 percent; and
DHT = 3.0 percent - US 301
3.0 percent – SR 54
8.0 percent – SR 39

The intent of selecting appropriate design hour traffic factors is to ensure that the facility under study is designed to accommodate a specific level of future traffic loading. Highlighted in red in the table provided in **Appendix B** (under separate cover) are values that are observed to be greater than the recommended design hour traffic factors. As seen in this table, there are a limited number of occurrences where calculated peak-to-daily ratios or directional distributions on US 301 were greater than the recommended design hour traffic factors. Thus, it can be inferred that the recommended design traffic factors represent a conservative approach to estimating existing (30th highest hour) and future traffic loadings along the US 301 study corridor. The development of design traffic factors included a coordination effort with FDOT. FDOT reviewed and approved the proposed design traffic factors to be used for this study.

Several recent studies performed within the general location of the study area were also referenced to ensure consistency among the various documented design hour traffic factors. These studies include:

- US 98 Dade City Bypass PD&E Study from US 301 South to US 301 North (FPID: 256423 1)[2];
- US 301 PD&E Study from SR 39 to CR 54 (FPN: 256422 1)[3]; and
- US 301 Corridor Study, City of Dade City to City of Zephyrhills[4].

Table 2-1
Summary of Historical Design Hour Traffic Factors (K_{30})

Reference Number	Location of Count	Count Station	Milepost	Count Year					5-Year Average	Recommended K_{30}-Factor
				2005	2006	2007	2008	2009		
US 301										
1	S. of SR 39	140016	3.70	9.40	9.38	9.26	9.52	9.17	9.35	
2	N. of SR 39	140022	3.88	9.40	9.38	9.26	9.52	9.17	9.35	
3	S. of SR 54	145029	4.90	9.40	9.38	9.26	9.52	9.17	9.35	
4	N. of SR 54	145028	5.04	--	9.38	9.26	9.52	9.17	9.33	
5	S. of Geiger Road	145031	5.80	9.40	9.38	9.26	9.52	9.17	9.35	**9.4%**
6	N. of Geiger Road	140019	6.13	9.40	9.38	9.26	9.52	9.17	9.35	
7	N. of CR 54	140014	6.39	9.40	9.38	9.26	9.52	9.17	9.35	
1-7	**US 301 Corridor Average**			**9.40**	**9.38**	**9.26**	**9.52**	**9.17**	**9.35**	
Major Cross-Streets										
1	SR 39, E. of US 301	140023	3.45	9.40	9.38	9.26	9.52	9.17	9.35	
2	SR 54, W. of US 301	145105	20.26	9.40	9.38	9.26	9.52	9.17	9.35	**9.4%**
1-2	**Major Cross-Streets Average**			**9.40**	**9.38**	**9.26**	**9.52**	**9.17**	**9.35**	

Source: Florida Department of Transportation 2009 Florida Traffic Information (FTI) DVD

Table 2-2
Summary of Historical Design Hour Directional Traffic Factors (D_{30})

Reference Number	Location of Count	Count Station	Milepost	Count Year					5-Year Average	Recommended D_{30}-Factor
				2005	2006	2007	2008	2009		
US 301										
1	S. of SR 39	140016	3.70	57.90	55.20	56.87	52.68	58.07	55.96	**56.0%**
2	N. of SR 39	140022	3.88	57.90	55.20	56.87	52.68	58.07	55.96	
3	S. of SR 54	145029	4.90	57.90	55.20	56.87	52.68	58.07	55.96	
4	N. of SR 54	145028	5.04	58.90	55.20	56.87	52.68	58.07	55.96	
5	S. of Geiger Road	145031	5.80	57.90	55.20	56.87	52.68	58.07	55.96	
6	N. of Geiger Road	140019	6.13	57.90	55.20	56.87	52.68	58.07	55.96	
7	N. of CR 54	140014	6.39	57.90	55.20	56.87	52.68	58.07	55.96	
1-7	**US 301 Corridor Average**			**57.90**	**55.20**	**56.87**	**56.97**	**58.07**	**55.96**	
Major Cross-Streets										
1	SR 39, E. of US 301	140023	3.45	57.90	55.20	56.87	52.68	58.07	55.96	**56.0%**
2	SR 54, W. of US 301	145105	20.26	57.90	55.20	56.87	52.67	58.07	55.96	
1-2	**Major Cross-Streets Average**			**57.90**	**55.20**	**56.87**	**52.68**	**58.07**	**55.96**	

Source: Florida Department of Transportation 2009 Florida Traffic Information (FTI) DVD

Table 2-3
Summary of Historical Daily Truck Factors

Reference Number	Location of Count	Count Station	Milepost	Count Year					5-Year Average	Recommended T_{24}-Factor
				2005	2006	2007	2008	2009		
US 301										
1	S. of SR 39	140016	3.70	5.60	5.60	2.10	6.40	5.50	5.04	
2	N. of SR 39	140022	3.88	4.80	6.60	4.10	5.70	7.50	5.74	
3	S. of SR 54	145029	4.90	6.90	~~16.90~~	5.20	5.30	5.60	5.75	
4	N. of SR 54	145028	5.04	--	6.60	4.10	5.70	7.50	5.98	**6.0%**
5	S. of Geiger Road	145031	5.80	4.30	6.60	4.10	5.70	7.50	5.64	
6	N. of Geiger Road	140019	6.13	8.70	6.30	3.90	3.90	3.20	5.20	
7	N. of CR 54	140014	6.39	6.70	8.20	4.00	4.00	4.30	5.44	
1-7	**US 301 Corridor Average**			**6.17**	**6.65**	**3.93**	**5.24**	**5.87**	**5.54**	
Major Cross-Streets										
1	SR 39, E. of US 301	140023	3.45	8.80	18.40	19.40	16.90	1720	16.14	
2	SR 54, W. of US 301	145105	20.26	6.10	6.20	3.80	4.60	4.70	5.08	**16.0%/ 5.0%**
1-2	**Major Cross-Streets Average**			**7.45**	**12.30**	**11.60**	**10.75**	**10.95**	**10.61**	

Source: Florida Department of Transportation 2008 Florida Traffic Information (FTI) DVD
~~16.90~~ is an outlier; therefore, the remaining four values will be averaged to get the 5-year average for that count location. In addition, this value will not be considered in the US 301 Corridor Average for 2006.

2.4 DEVELOPMENT OF EXISTING YEAR (2010) DESIGN HOUR TRAFFIC VOLUMES

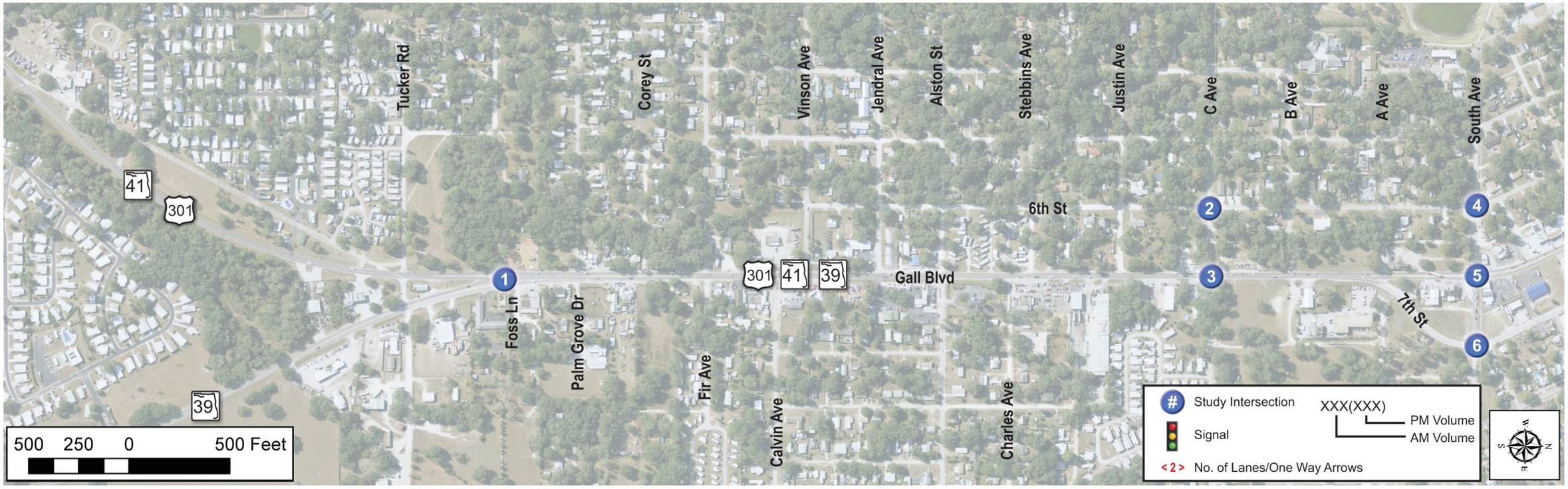
The existing year (2010) Annual Average Daily Traffic (AADT) volumes were estimated from automatic counters, which continuously collected data for a 72-hour period. The average daily traffic (ADT) volumes obtained from the field data were multiplied by a seasonal adjustment factor (SF) of 1.01 and an axle conversion factor (AF) of 0.99 for cross streets, 0.87 for SR 39, 0.98 for SR 54, and 0.96 for US 301 to estimate AADT. These factors were obtained from the 2009 FDOT Florida Traffic Information (FTI) DVD. The estimated existing year (2010) AADT volumes are shown on **Figure 2-2 (A-B)**. The existing year (2010) directional design hour volumes (DDHV) were obtained by multiplying the AADT volumes by the recommended K_{30}- and D_{30}-factors of 9.4% and 56.0% respectively.

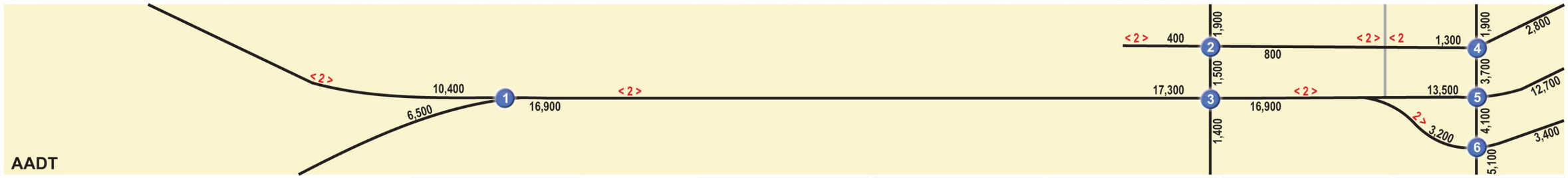
Based on existing traffic count data, southbound on US 301 and 6th Street was assumed to be the peak direction of travel during the AM peak period. Conversely, northbound on US 301 and 7th Street was assumed to be the peak direction of travel during the PM peak period. These assumptions of peak travel directions during the AM and PM peak periods were also used in the development of design year (2035) and opening year (2015) design hour turning movement volumes. Design hour turning movements were developed for the PM peak period by multiplying existing turning percentages with the DDHV. A manual smoothing process was performed in order to satisfy the K_{30}- and D_{30}-factors and balance traffic flows between adjacent intersections. The AM peak period turning movement volumes were developed by reversing the peak direction of travel on 6th Street, US 301 and 7th Street. The existing year (2010) AM and PM design hour turning movement traffic volumes are shown on **Figure 2-2 (A-B)**.

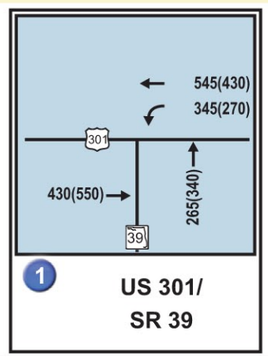
2.5 EXISTING YEAR (2010) INTERSECTION LEVEL OF SERVICE ANALYSIS

Signalized and unsignalized intersection Level of Service (LOS) was estimated using the *Highway Capacity Manual (HCM)*[5] module of the Synchro 7.0 Version (Build 773) software. Existing year (2010) lane geometry, design hour turning movement traffic volumes, and signal timing plans obtained from the Pasco County Traffic Operations Division were used in the analysis. The existing signal timing plans are located in **Appendix C** (under separate cover). The existing year (2010) LOS and control delay results for the 15 study intersections are summarized in **Table 2-4** and shown on

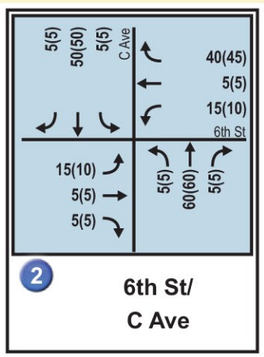
Figures 2-3 (A-E). The existing year (2010) Synchro intersection analysis sheets are included in **Appendix D** (under separate cover).



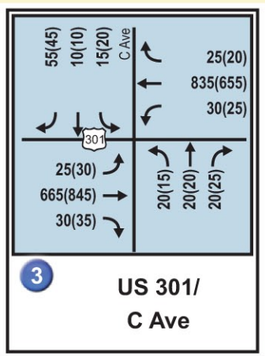




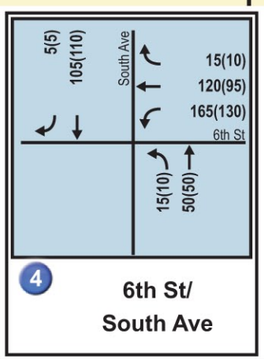
1 US 301/ SR 39



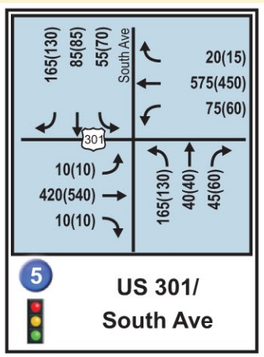
2 6th St/ C Ave



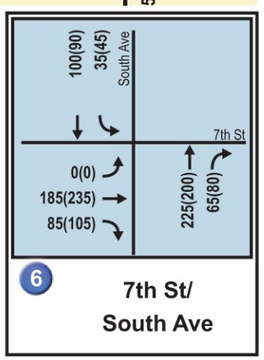
3 US 301/ C Ave



4 6th St/ South Ave



5 US 301/ South Ave

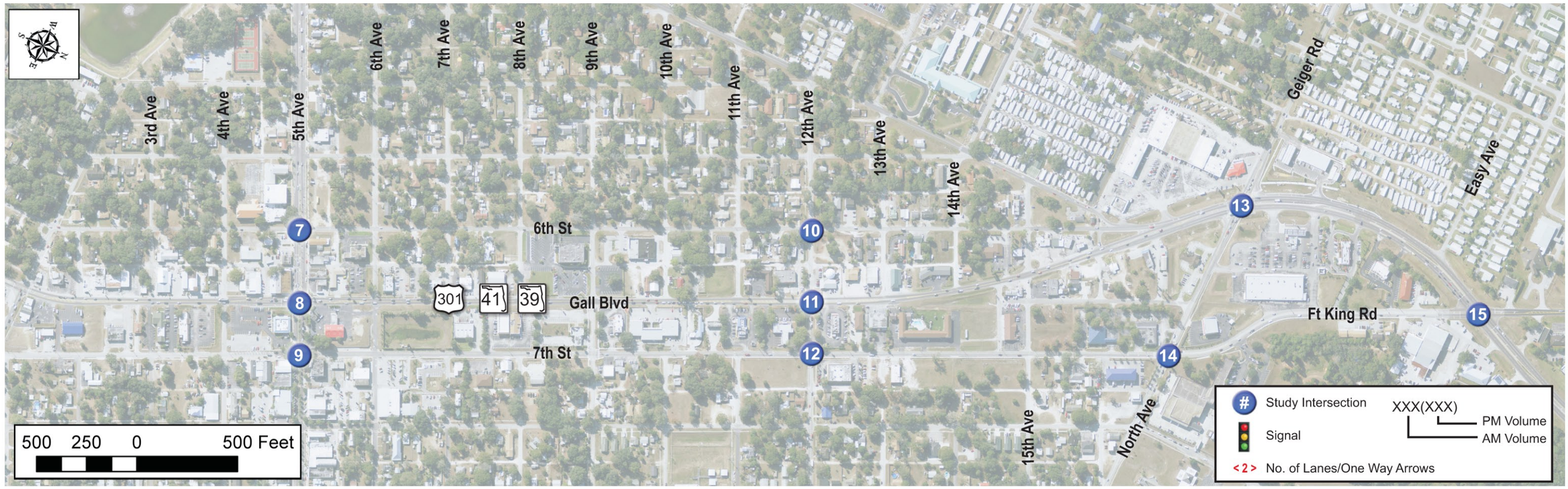


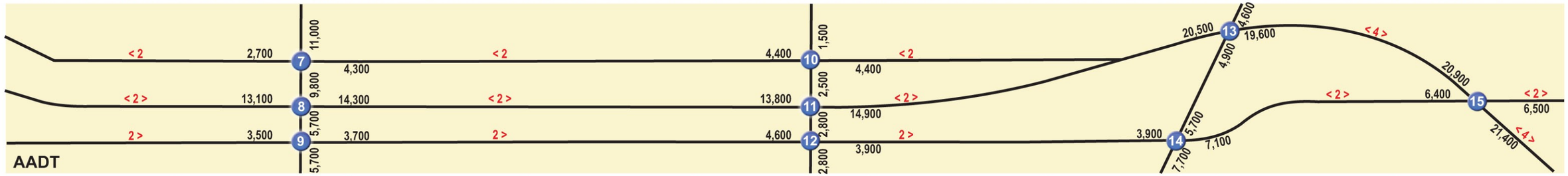
6 7th St/ South Ave

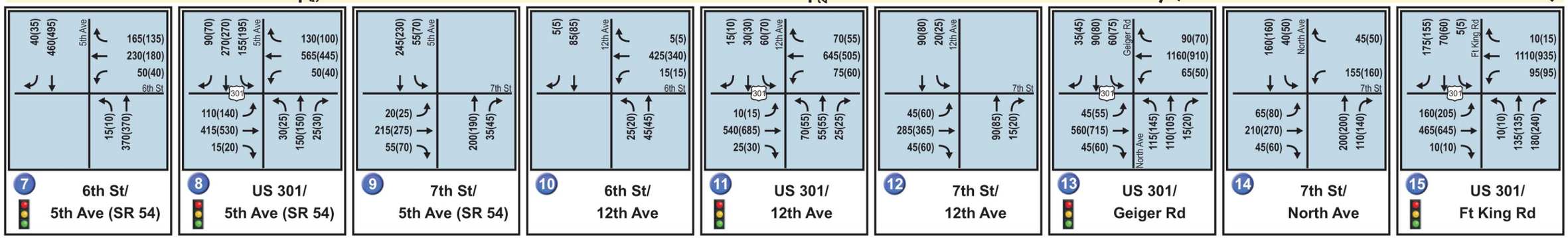
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

EXISTING YEAR (2010) ANNUAL AVERAGE DAILY TRAFFIC (AADT) AND DESIGN HOUR TURNING MOVEMENT VOLUMES

FIGURE 2-2A







US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

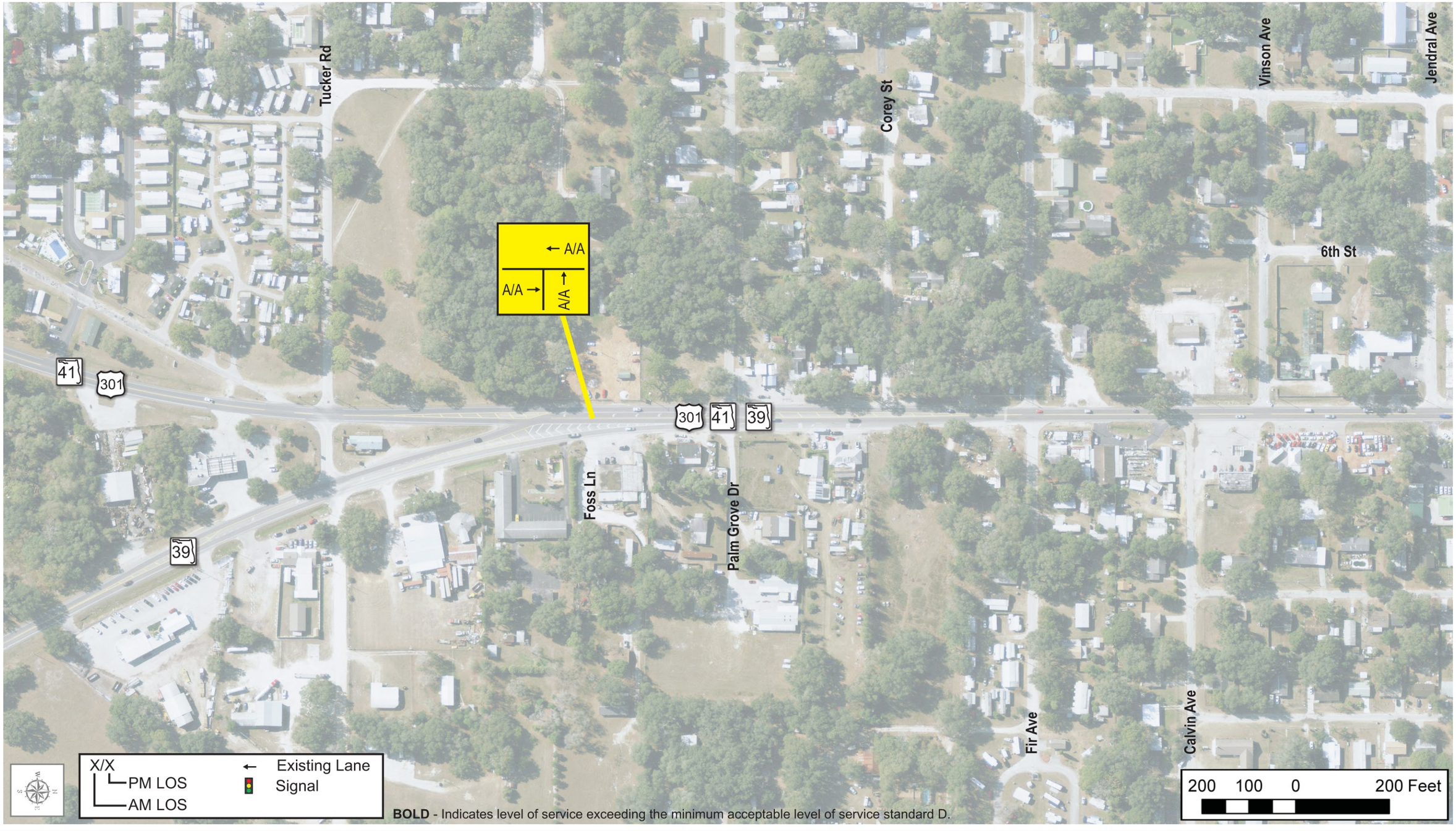
EXISTING YEAR (2010) ANNUAL AVERAGE DAILY TRAFFIC (AADT) AND DESIGN HOUR TURNING MOVEMENT VOLUMES

FIGURE 2-2B

Table 2-4
Existing Year (2010) US 301 Intersection LOS and Control Delay Summary

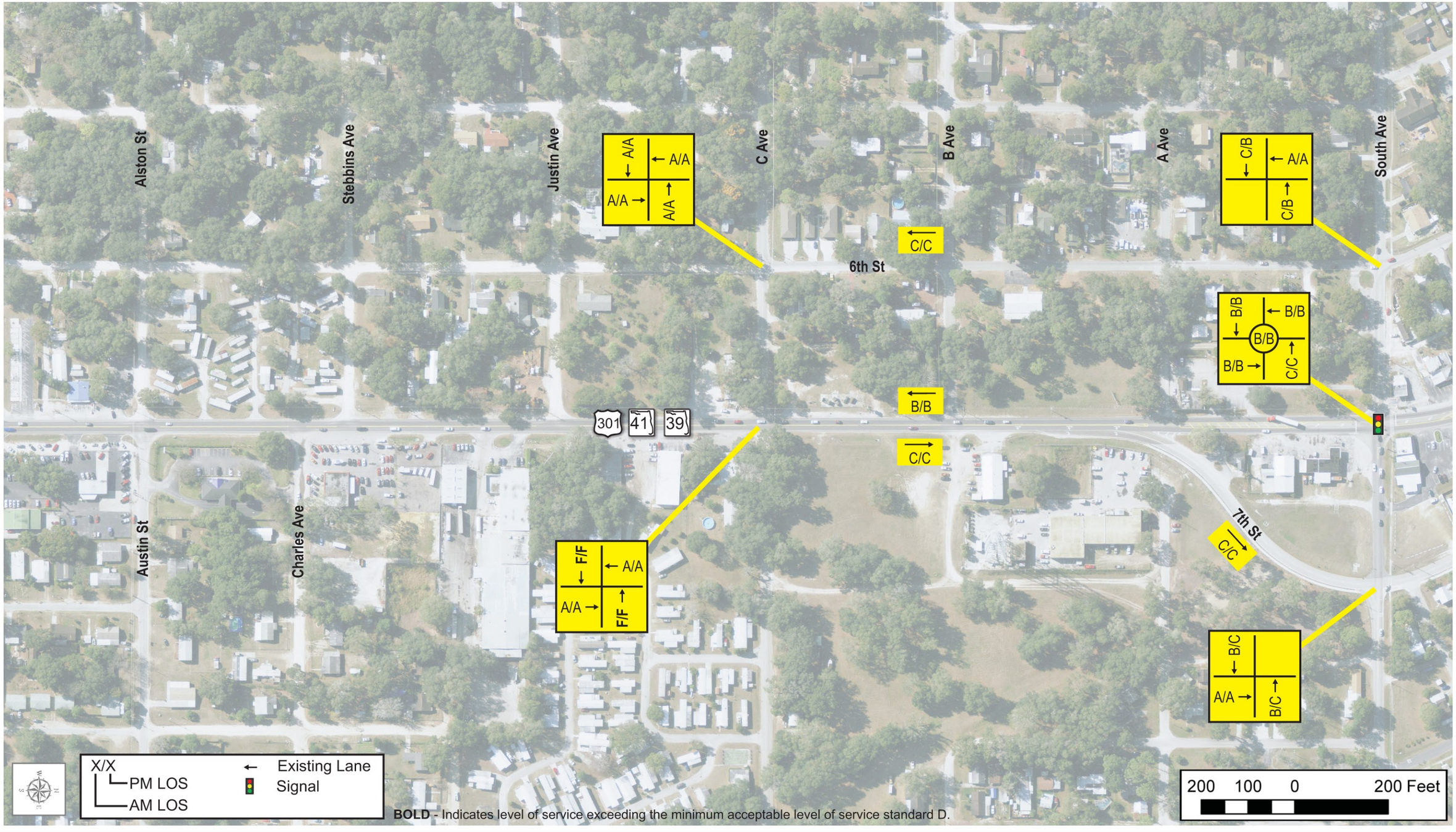
Intersection	Intersection Approach Control Delay and LOS								Overall Intersection	
	Eastbound		Westbound		Northbound		Southbound			
	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS
US 301										
SR 39			0.0 / 0.0	A / A	0.0 / 0.0	A / A	4.0 / 4.1	A / A	2.7 / 2.3	A / A
C Avenue[1]	>50 sec / >50 sec	**F** / **F**	>50 sec / >50 sec	**F** / **F**	1.0 / 1.1	A / A	1.1 / 1.0	A / A		
South Avenue	17.8 / 18.1	B / B	29.0 / 21.7	C / C	12.7 / 14.3	B / B	16.9 / 11.9	B / B	17.7 / 15.2	B / B
SR 54	33.3 / 27.7	C / C	49.3 / 43.4	D / D	16.9 / 21.3	B / C	63.1 / 49.3	**E** / D	41.6 / 33.4	D / C
12th Avenue	19.5 / 19.9	B / B	20.4 / 20.1	C / C	14.5 / 20.1	B / C	19.8 / 14.4	B / B	18.0 / 17.8	B / B
Geiger Road	43.0 / 55.0	D / D	28.7 / 36.6	C / D	8.9 / 9.6	A / A	10.6 / 13.2	B / B	14.4 / 18.2	B / B
Fort King Road	46.5 / 56.1	D / **E**	35.6 / 49.0	D / D	10.3 / 11.8	B / B	9.0 / 6.3	A / A	16.3 / 18.7	B / B
6th Street										
C Avenue[1]	0.6 / 0.6	A / A	0.6 / 0.6	A / A	9.9 / 9.8	A / A	9.3 / 9.2	A / A		
South Avenue[1]	16.6 / 14.5	C / B	16.2 / 13.8	C / B			4.3 / 4.2	A / A		
SR 54	5.3 / 4.7	A / A	5.4 / 5.4	A / A			21.5 / 21.8	C / C	10.8 / 9.7	B / A
12th Avenue[1]	14.5 / 13.2	B / B	13.9 / 12.7	B / B			0.3 / 0.4	A / A		
7th Street										
South Avenue[1]	14.0 / 15.6	B / C	14.5 / 15.3	B / C	0.0 / 0.0	A / A				
SR 54[2]	13.1 / 14.3	B / B	11.4 / 12.2	B / B	13.0 / 16.6	B / C			12.6 / 14.7	B / B
12th Avenue[1]	14.9 / 17.4	B / C	13.7 / 15.5	B / C	1.0 / 1.1	A / A				
Geiger Road [2]	12.3 / 13.7	B / B	20.5 / 28.2	C / D	14.8 / 22.7	B / C	15.8 / 18.4	C / C	16.2 / 21.9	C / C

[1] Indicates two-way stop controlled (TWSC) intersection; overall delay is not calculated
[2] Indicates all-way stop controlled (AWSC) intersection
Bold – Indicates level of service exceeding the minimum acceptable level of service standard D



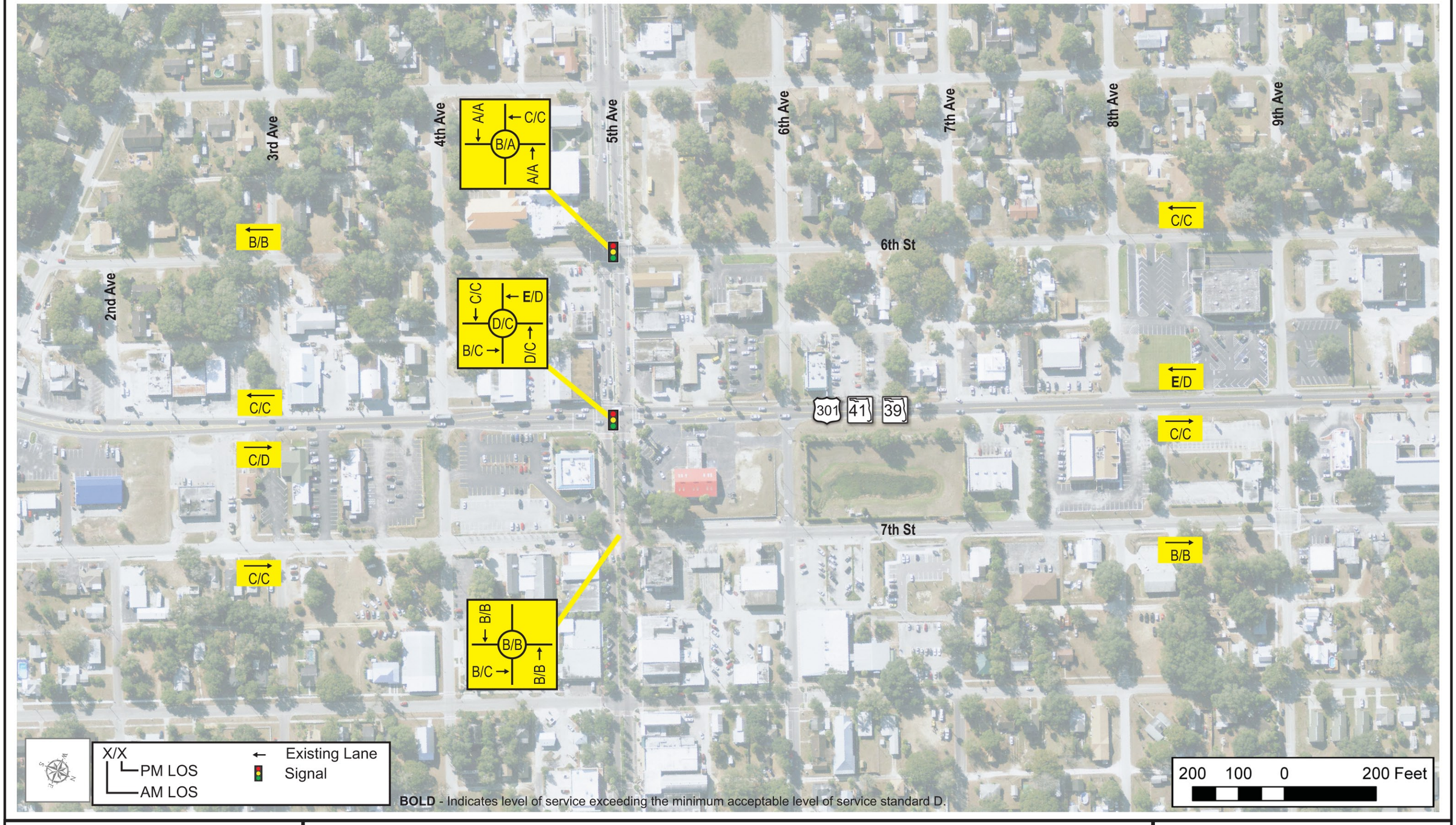
BOLD - Indicates level of service exceeding the minimum acceptable level of service standard D.

US 301 PD&E Study Update from SR 39 to CR 54 (Eiland Boulevard)	**EXISTING YEAR (2010) LEVEL OF SERVICE (LOS)**	**FIGURE 2-3A**

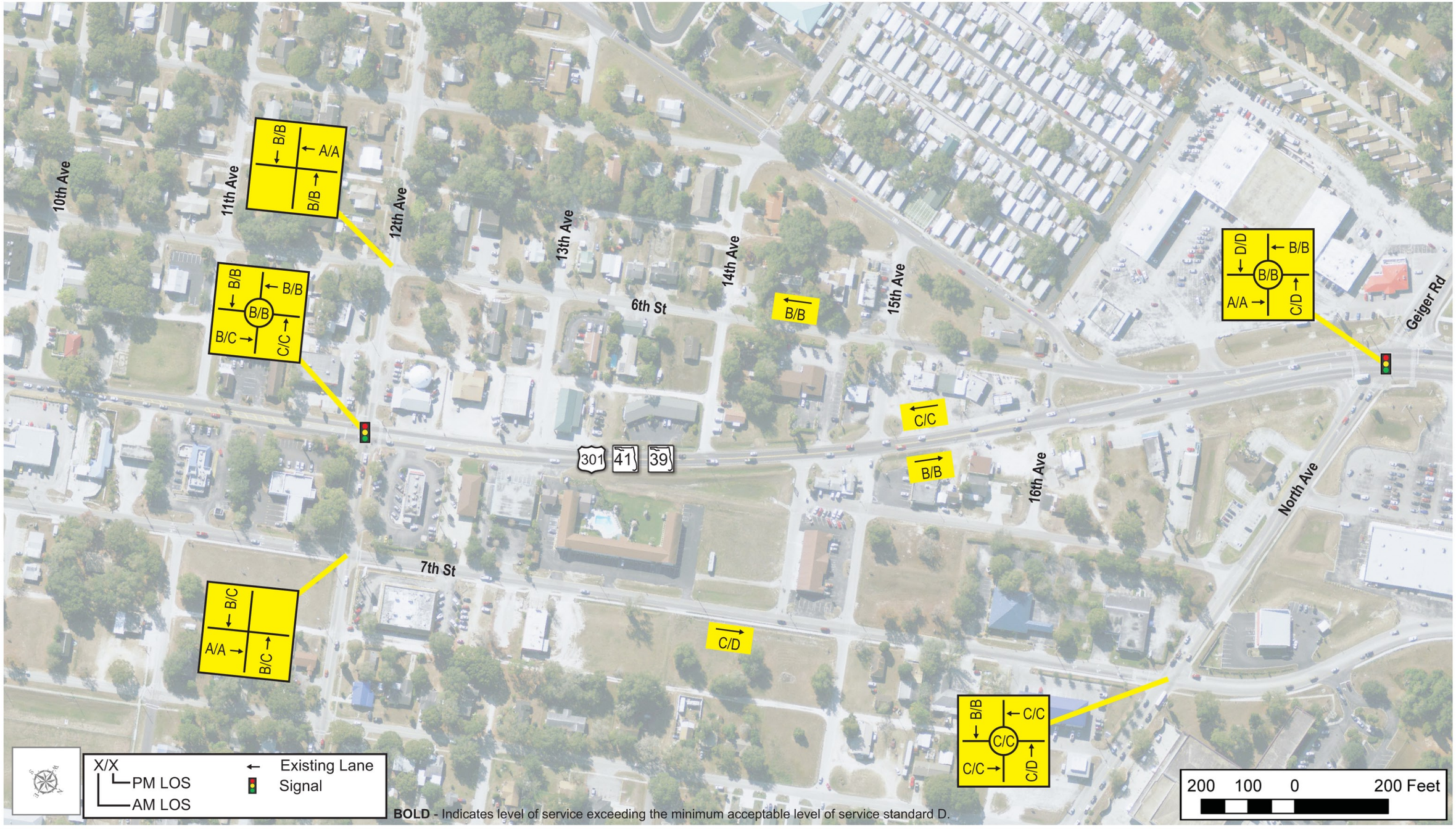


BOLD - Indicates level of service exceeding the minimum acceptable level of service standard D.

US 301 PD&E Study Update from SR 39 to CR 54 (Eiland Boulevard)	**EXISTING YEAR (2010) LEVEL OF SERVICE (LOS)**	**FIGURE 2-3B**

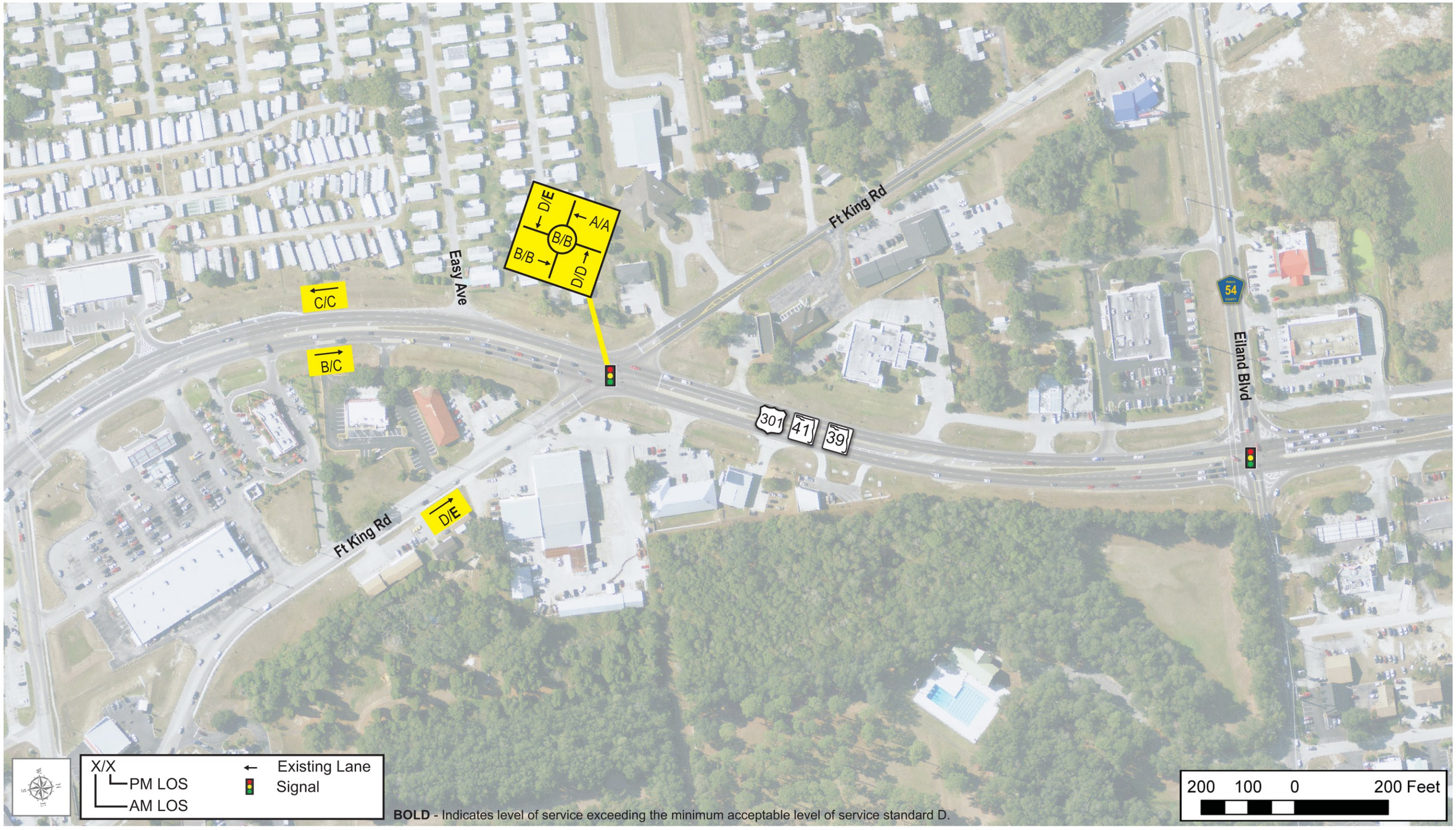


US 301 PD&E Study Update from SR 39 to CR 54 (Eiland Boulevard)	**EXISTING YEAR (2010) LEVEL OF SERVICE (LOS)**	**FIGURE 2-3C**



BOLD - Indicates level of service exceeding the minimum acceptable level of service standard D.

US 301 PD&E Study Update from SR 39 to CR 54 (Eiland Boulevard)	**EXISTING YEAR (2010) LEVEL OF SERVICE (LOS)**	**FIGURE 2-3D**



BOLD - Indicates level of service exceeding the minimum acceptable level of service standard D.

US 301 PD&E Study Update from SR 39 to CR 54 (Eiland Boulevard)	**EXISTING YEAR (2010) LEVEL OF SERVICE (LOS)**	**FIGURE 2-3E**

2.6 EXISTING YEAR (2010) ARTERIAL ANALYSIS

Arterial segment LOS analyses were conducted using the estimated existing year (2010) design hour volumes. The arterial segment LOS analysis was conducted using Exhibit 15-3 of the *HCM*[5]. Free flow speed was assumed to be the posted speed limit in the arterial analysis. The US 301 arterial functional and design categories were determined to be Principal Arterial and Urban (posted speed limit 30-40 mph), respectively, based on Exhibit 10-4 of the *HCM*[5]. The study corridor transitions to a Principal Arterial High-Speed at both the north and south termini of the study corridor. The urban street class for US 301 6th Street and 7th Street was established as Class III using Exhibit 10-3 of the HCM 2000. The existing arterial LOS results for the northbound and southbound directions of US 301 are summarized in **Table 2-5** and **Table 2-6,** respectively and shown on **Figures 2-3 (A-E)**. In addition, the spreadsheets used in the arterial analysis are included in **Appendix E** (under separate cover).

Table 2-5
Existing Year (2010) US 301 Arterial Northbound Level of Service Summary

Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
US 301						
C Avenue to South Avenue	0.25	35	21.0	20.3	C	C
South Avenue to SR 54	0.26	35	20.3	17.9	C	D
SR 54 to 12th Avenue	0.48	35	23.9	22.2	C	C
12th Avenue to Geiger Road	0.42	35	25.6	25.2	B	B
Geiger Road to Fort King Road	0.26	35	27.3	23.9	B	C
C Avenue to Fort King Road	1.67		23.6	22.0	C	C
7th Street						
C Avenue to South Avenue	0.11	30	23.2	23.2	C	C
South Avenue to SR 54	0.25	30	20.1	18.6	C	C
SR 54 to 12th Avenue	0.48	30	27.9	27.9	B	B
12th Avenue to Geiger Road	0.33	30	20.0	17.7	C	D
Geiger Road to Fort King Road	0.30	30	14.9	12.5	D	**E**
C Avenue to Fort King Road	1.47		20.7	18.8	C	C

Bold – Indicates level of service exceeding the minimum acceptable level of service standard D.

Table 2-6
Existing Year (2010) US 301 Arterial Southbound Level of Service Summary

Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
US 301						
Fort King Road to Geiger Road	0.26	35	22.3	21.2	C	C
Geiger Road to 12th Avenue	0.42	35	21.2	23.3	C	C
12th Avenue to SR 54	0.48	35	14.0	15.9	**E**	D
SR 54 to South Avenue	0.26	35	19.1	21.6	C	C
South Avenue to C Avenue	0.25	35	28.9	29.0	B	B
Fort King Road to C Avenue	1.67		19.0	20.6	C	C
6th Street						
Geiger Road to 12th Avenue	0.32	30	28.1	28.1	B	B
12th Avenue to SR 54	0.48	30	21.0	20.9	C	C
SR 54 to South Avenue	0.23	30	24.7	24.7	B	B
South Avenue to C Avenue	0.25	30	21.9	22.0	C	C
Geiger Road to C Avenue	1.28	30	23.3	23.3	C	C
Geiger Road to 12th Avenue	0.32		28.1	28.1	B	B

Bold – Indicates level of service exceeding the minimum acceptable level of service standard D.

2.7 CRASH ANALYSIS

Crash data for the US 301 study corridor was obtained from FDOT District Seven for the five most recent years (2005 to 2009). The FDOT data includes crash location, number and type of crashes and crash severity. The crash data was analyzed on both a segment and intersection basis. The roadway segments along US 301 are classified as suburban for the crash analysis. Intersection crashes were identified to be crashes occurring within 250-feet of intersection midpoint.

As shown in **Table 2-7**, 500 crashes occurred along the US 301 mainline (an average of 100 crashes per year) during the five-year study period. There were three fatalities and 493 injuries during this five year period. Crash rates, critical crash rates, and safety ratios were calculated to determine if any of the roadway segments or intersections along the study corridor are exhibiting an abnormally high number of crashes. The crash rate is calculated accordingly:

- Crash Rate = (Total Crashes * 10^6) / (365 * segment length * AADT), the units are displayed as the number of crashes per million vehicle miles.

The critical crash rate uses the following formula:

- Critical Crash Rate = Statewide Crash Rate + [K * (Statewide Crash Rate / V) $^{1/2}$] – [1 / (2 * V)]; where V = (AADT * 365) / 10^6 and K = 1.645.

The safety ratio is then determined by dividing the crash rate by the critical crash rate. Safety ratios greater than 1.0 indicate that the incidence of vehicle collisions is above average; therefore, traffic safety at these locations may need to be improved. The average crash rate for the entire US 301 corridor was 4.195 crashes per million vehicle miles traveled; however, for the US 301 segment between C Avenue and SR 54 the average crash rate was 5.694. The US 301 segment from south of CR 54 to Geiger Road is the only roadway segment with a five-year average safety ratio greater than 1.0.

Table 2-7
US 301 Crash History Overview

US 301 Segment	Year					Total	Five-Year Average
	2005	2006	2007	2008	2009		
South of SR 39							
Fatal Crashes (Fatalities)	0	0	0	0	0	0	0
Injury Crashes (Injuries)	4	9	1	1	2	17	3
Property Damage Only	2	1	1	2	0	6	1
Total Crashes	4	4	2	3	1	14	3
AADT	18,000	15,800	15,700	13,900	14,500		15,600
Distance (miles)	0.169	0.169	0.169	0.169	0.169		0.169
Crash Rate	3.603	4.104	2.065	3.499	1.118		2.910
Statewide Avg. Crash Rate	3.578	3.541	3.507	2.788	3.452		3.373
Critical Crash Rate	6.081	6.164	6.121	5.171	6.125		5.933
Safety Ratio	**0.592**	**0.666**	**0.337**	**0.677**	**0.183**		**0.490**
SR 39 to C Avenue							
Fatal Crashes (Fatalities)	1	0	1	1	0	3	1
Injury Crashes (Injuries)	23	14	44	26	37	144	29
Property Damage Only	10	10	12	16	7	55	11
Total Crashes	23	19	32	30	24	128	26
AADT	36,500	25,500	22,000	26,500	22,500		26,600
Distance (miles)	0.690	0.690	0.690	0.690	0.690		0.690
Crash Rate	2.502	2.958	5.775	4.495	4.235		3.821
Statewide Avg. Crash Rate	3.578	3.541	3.507	2.788	3.452		3.373
Critical Crash Rate	4.550	4.685	4.725	3.776	4.648		4.466
Safety Ratio	**0.550**	**0.632**	**1.222**	**1.190**	**0.911**		**0.856**

Table 2-7 (Cont.)
US 301 Crash History Overview

US 301 Segment	Year					Total	Five-Year Average
	2005	2006	2007	2008	2009		
C Avenue to SR 54							
Fatal Crashes (Fatalities)	0	0	0	0	0	0	0
Injury Crashes (Injuries)	11	17	6	19	3	56	11
Property Damage Only	7	11	4	8	5	35	7
Total Crashes	14	25	9	21	8	77	15
AADT	13,000	15,600	13,500	14,600	15,700		14,500
Distance (miles)	0.511	0.511	0.511	0.511	0.511		0.511
Crash Rate	5.774	8.592	3.574	7.712	2.732		5.694
Statewide Avg. Crash Rate	4.396	4.346	4.097	4.028	4.229		4.219
Critical Crash Rate	6.405	6.185	5.997	5.845	6.035		6.089
Safety Ratio	**0.902**	**1.389**	**0.596**	**1.319**	**0.453**		**0.935**
SR 54 to Geiger Road							
Fatal Crashes (Fatalities)	0	0	0	0	0	0	0
Injury Crashes (Injuries)	36	38	25	35	22	156	31
Property Damage Only	15	17	12	13	10	67	13
Total Crashes	41	37	29	36	25	168	34
AADT	24,000	19,800	20,200	24,500	29,500		23,600
Distance (miles)	0.898	0.898	0.898	0.898	0.898		0.898
Crash Rate	5.212	5.701	4.380	4.483	2.586		4.344
Statewide Avg. Crash Rate	4.396	4.346	4.097	4.028	4.229		4.219
Critical Crash Rate	5.562	5.615	5.315	5.131	5.265		5.369
Safety Ratio	**0.937**	**1.015**	**0.824**	**0.874**	**0.491**		**0.809**
Geiger Road to South of CR 54							
Fatal Crashes (Fatalities)	0	0	0	0	0	0	0
Injury Crashes (Injuries)	19	17	33	21	30	120	24
Property Damage Only	9	7	14	15	4	49	9
Total Crashes	22	17	32	26	16	113	23
AADT	23,500	30,500	30,500	27,500	29,500		28,300
Distance (miles)	0.520	0.520	0.520	0.520	0.520		0.520
Crash Rate	4.932	2.937	5.528	4.981	2.858		4.208
Statewide Avg. Crash Rate	2.692	2.547	2.429	2.308	2.542		2.504
Critical Crash Rate	3.858	3.552	3.408	3.306	3.561		3.534
Safety Ratio	**1.279**	**0.827**	**1.622**	**1.507**	**0.802**		**1.191**

Table 2-7 (Cont.)
US 301 Crash History Overview

US 301 Segment	Year					Total	Five-Year Average
	2005	2006	2007	2008	2009		
South of SR 39 to South of CR 54 (Total Corridor)							
Fatal Crashes (Fatalities)	1	0	1	1	0	3	1
Injury Crashes (Injuries)	93	95	109	102	94	493	99
Property Damage Only	43	46	43	54	26	212	42
Total Crashes	104	102	104	116	74	500	100
AADT	24,600	22,200	21,100	23,100	24,300		23,100
Distance (miles)	2.788	2.788	2.788	2.788	2.788		2.788
Crash Rate	4.405	4.859	4.265	5.034	2.706		4.195
Statewide Avg. Crash Rate	3.826	3.762	3.604	3.325	3.675		3.639
Critical Crash Rate	5.038	5.022	4.865	4.483	4.868		4.854
Safety Ratio	**0.874**	**0.967**	**0.877**	**1.123**	**0.556**		**0.864**

Source: FDOT District Seven, 2005–2009 Crash Data

Notes:

1. The AADT values and Statewide Average Crash Rates for the Total Corridor reflect weighted averages based on length of segment.
2. The 2009 Statewide Avg. Crash Rates were not available at the time during the preparation of this study. Therefore, the five year avg. (2004-2008) Statewide Avg. Crash Rates were used for 2009 conditions.
3. The AADT values come from the FDOT 2009 FTI DVD

The types of US 301 crashes are summarized in **Table 2-8**. The analysis indicates that rear-end and angle crashes occurred with the highest frequency. **Table 2-9** shows the US 301 crashes that occur in close proximity (within 250-feet) of the midpoint of intersections along the US 301 mainline. The data collected was organized according to the node assigned to a given location. Based on the last five-year crash average, Geiger Road had the highest crash rate (crashes per million entering vehicles) along the US 301 mainline.

Table 2-8
US 301 Crash Type

Crash Type	Year					Total	Percent
	2005	2006	2007	2008	2009		
Rear-end	47	35	45	50	30	207	41.4
Angle	24	39	28	20	16	127	25.4
Left-turn	13	13	14	14	10	64	12.8
Other	4	2	4	10	6	26	5.2
Sideswipe	4	2	4	8	4	22	4.4
Fixed Object	3	3	2	7	2	17	3.4

Table 2-8 (Cont.)
US 301 Crash Type

Crash Type	Year					Total	Percent
	2005	2006	2007	2008	2009		
Pedestrian/Bicycle	3	4	3	3	1	14	2.8
Head-on	1	0	1	2	2	6	1.2
Back-up	1	2	2	1	0	6	1.2
Motor Vehicle	1	1	0	1	1	4	0.8
Run-off/Overturn	2	1	0	0	1	4	0.8
Right-turn	1	0	1	0	1	3	0.6
Total	**104**	**102**	**104**	**116**	**74**	**500**	**100.0**

Table 2-9
US 301 Intersection Crashes

Intersection	Mile Post	2005	2006	2007	2008	2009	Total	2010 AADT	Crash Rate	Statewide Avg. Crash Rate	Critical Crash Rate	Safety Ratio
SR 39	3.735	1	2	5	1	1	10	16,900	0.324	0.379	0.705	0.460
C Avenue	4.425	4	4	6	10	5	29	18,500	0.854	0.379	0.693	1.232
South Avenue	4.673	7	7	2	3	2	21	17,000	0.677	0.385	0.714	0.949
SR 54	4.936	2	7	7	9	3	28	21,500	0.715	0.385	0.685	1.044
12th Avenue	5.416	3	2	2	4	2	13	17,000	0.419	0.385	0.714	0.587
Geiger Road	5.834	12	14	8	10	6	50	24,800	1.105	0.423	0.724	1.526
Fort King Road	6.090	8	4	17	9	7	45	27,600	0.893	0.423	0.711	1.257

Note: Intersection related crashes are assumed to occur 250-ft from intersection midpoint; side street crashes were not considered.

2.8 TRANSIT OPERATIONS

As a part of the PD&E Study Update, coordination with transit and local government officials occurred in order to determine what multi-modal accommodations would be studied and evaluated as part of the project alternatives. These accommodations would include only existing and planned multi-modal facilities. Transit services are currently available on US 301 between the City of Zephyrhills and the City of Dade City, with limited transit service to the eastern limits of CR 54 (Eiland Boulevard). Route 30 is an established fixed route that provides a north/south link between the two cities via US 301. This route, which has one-hour headways, begins at 6 AM and ends at 7 PM,

Monday through Friday. In addition, there are two established fixed routes that service the City of Zephyrhills. Route 31 primarily provides north-south service links with one-hour headways from 7 AM to 7 PM Monday through Friday. Route 33 primarily provides east-west links for the City with one-hour headways that begin at 7 AM and end at 8 PM, Monday through Friday.

The only transit improvement proposed within the study corridor is the installation of bus shelters at needed locations. Other transit enhancements that are expected over the next decade include expanded hours/days of service, and increased connectivity with additional local and express service routes.

2.9 REFERENCES

1. *Florida Department of Transportation Traffic Forecasting Handbook*, 2002
2. *US 98 Dade City Bypass PD&E Study from US 301 South to US 301 North [FPN: 256423 1]*, 2002
3. *US 301 (SR 39) PD&E Study from SR 39 to CR 54 [FPN: 256422 1]*, 2000
4. *US 301 Corridor Study, City of Dade City to City of Zephyrhills*, 2002
5. *Highway Capacity Manual (HCM) 2000; Transportation Research Board National Research Council Washington D.C., 2000*

SECTION 3
ACCESS MANAGEMENT

3.1 ACCESS MANAGEMENT

Access management provides for the orderly movement of traffic to and from adjacent land uses along a roadway and helps a roadway facility to operate in a more efficient, safe and accessible manner by reducing potential vehicle and pedestrian conflict points. The FDOT has developed minimum driveway spacing standards for connections, median openings, and signalized intersections on the State Highway System (SHS). The minimum spacing standards are summarized in **Table 3-1**. US 301 in Pasco County is designated as Access Class 7 from SR 39 to CR 54.

Table 3-1
Access Classification and Standards for Controlled Access Facilities

Access Class	Facility Design Features (Median Treatment and Access Roads)	Minimum Connection Spacing (ft) (>45mph / ≤45mph)	Minimum Median Opening Spacing (ft) (>45mph / ≤45mph)		Minimum Signal Spacing (mi) (>45mph / ≤45mph)
			Bi-Directional	Full	
2	Restrictive w/ Service Roads	1,320 / 660	1,320	2,640	0.5
3	Restrictive	660 / 440	1,320	2,640	0.5
4	Non-Restrictive	660 / 440	N/A	N/A	0.5
5	Restrictive	440 / 245	660	2,640 / 1,320	0.5 / 0.25
6	Non-Restrictive	440 / 245	N/A	N/A	0.25
7	**Both**	**125**	**330**	**660**	**0.25**

Source: State Highway System Access Management Classification System and Standards, Florida Administrative Chapter 14-97.

3.2 MEDIAN OPENINGS

Median openings consist of full and directional median openings. Full median openings allow all turning movements to occur, but directional median openings allow some turning movements and restrict others. Typically, through and left-out movements from cross-streets are restricted at directional median openings. A full median opening can be a signalized or an unsignalized

intersection. The location and type of the proposed median openings along the US 301 study corridor for both the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative and the 6th Street and 7th Street One-Way Pair Alternative are summarized in **Table 3-2**. In addition, the proposed median openings are shown on **Figure 3-1 (A-B)**. In **Table 3-2**, the median spacing takes into account the spacing to the north and south of the median and records the lower of the two values. This method was used in order to be more conservative when evaluating percent compliance with FDOT access class standards. In **Table 3-2** the median spacing for median openings with full access is calculated the same way; however, instead of using the first median opening north and south of the desired median opening, the spacing is measured from the nearest full median opening to the north and south. The smaller of the two values is then recorded in the appropriate table.

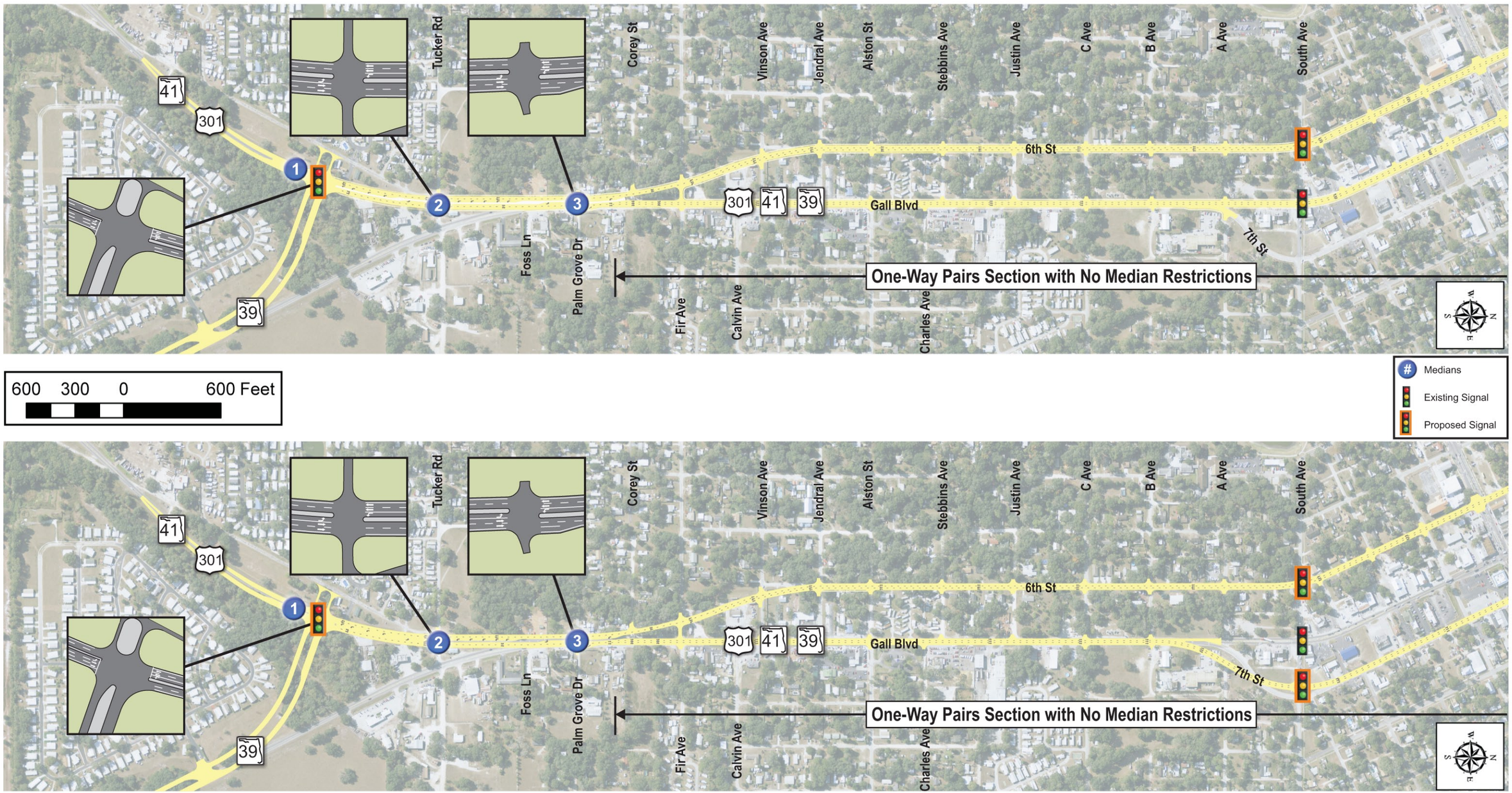
Table 3-2
US 301 Corridor Proposed Median Openings for
6th Street and US 301/Gall Boulevard One-Way Pair Alternative and 6th Street and 7th Street One-Way Pair Alternative

Cross-Street	Mile Post	Type of Access	Type of Traffic Control	FDOT Access Classification	Maximum Posted Speed (mph)	Proposed Spacing (ft)		Percent Compliant with FDOT Access Class	
						Signal	Median	Signal	Median
SR 39	**3.524**	**Full**	**Signalized**	**7**	**45**	**2,413**	**771**	**100**	**100**
Tucker Road	3.670	Full	Unsignalized	7	45	--	771	--	100
Palm Grove Drive	3.830	Full	Unsignalized	7	45	--	660	--	100
Fir Avenue	3.955	Full	Unsignalized	7	45	--	449	--	68
Vinson Avenue	4.040	Full	Unsignalized	7	45	--	385	--	58
Jendral Avenue	4.113	Full	Unsignalized	7	45	--	317	--	48
Alston Avenue	4.173	Full	Unsignalized	7	45	--	317	--	48
Stebbins Avenue	4.256	Full	Unsignalized	7	45	--	438	--	66
Justin Avenue	4.340	Full	Unsignalized	7	45	--	444	--	67
C Avenue	4.425	Full	Unsignalized	7	45	--	380	--	58
B Avenue	4.497	Full	Unsignalized	7	45	--	380	--	58
A Avenue	4.583	Full	Unsignalized	7	45	--	454	--	69
South Avenue	**4.673**	**Full**	**Signalized**	**7**	**45**	**1,389**	**301**	**100**	**46**
2nd Avenue	4.730	Full	Unsignalized	7	45	--	301	--	46
3rd Avenue	4.798	Full	Unsignalized	7	45	--	348	--	53
4th Avenue	4.864	Full	Unsignalized	7	45	--	348	--	53
SR 54	**4.936**	**Full**	**Signalized**	**7**	**35**	**1,389**	**370**	**100**	**56**
6th Avenue	5.006	Full	Unsignalized	7	35	--	359	--	54

Table 3-2 (Cont.)
US 301 Corridor Proposed Median Openings for
6th Street and US 301/Gall Boulevard One-Way Pair Alternative and 6th Street and 7th Street One-Way Pair Alternative

Cross-Street	Mile Post	Type of Access	Type of Traffic Control	FDOT Access Classification	Maximum Posted Speed (mph)	Existing Spacing (ft)		Percent Compliant with FDOT Access Class	
						Signal	Median	Signal	Median
7th Avenue	5.074	Full	Unsignalized	7	35	--	359	--	54
8th Avenue	5.142	Full	Unsignalized	7	35	--	327	--	50
9th Avenue	5.204	Full	Unsignalized	7	35	--	327	--	50
10th Avenue	5.273	Full	Unsignalized	7	35	--	364	--	55
11th Avenue	5.351	Full	Unsignalized	7	35	--	343	--	52
12th Avenue	**5.416**	**Full**	**Signalized**	**7**	**35**	**2,207**	**343**	**100**	**52**
13th Avenue	5.487	Full	Unsignalized	7	35	--	370	--	56
14th Avenue	5.557	Full	Unsignalized	7	35	--	354	--	54
15th Avenue	5.624	Full	Unsignalized	7	35	--	354	--	54
16th Avenue	5.691	Full	Unsignalized	7	35	--	354	--	54
Geiger Road	**5.834**	**Full**	**Signalized**	**7**	**35**	**1,352**	**755**	**100**	**100**
Fort King Road	**6.090**	**Full**	**Signalized**	**7**	**35**	**1,352**	**1,352**	**100**	**100**
CR 54	**6.354**	**Full**	**Signalized**	**7**	**45**	**1,394**	**1,394**	**100**	**100**

Bold – indicates signalized intersection



US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

PROPOSED MEDIAN OPENINGS
FOR 6TH STREET AND US 301/GALL BLVD ONE-WAY PAIR ALTERNATIVE AND
6TH STREET AND 7TH STREET ONE-WAY PAIR ALTERNATIVE

FIGURE 3-1A

US 301 PD&E Study Update from SR 39 to CR 54 (Eiland Boulevard)	**PROPOSED MEDIAN OPENINGS FOR 6TH STREET AND US 301/GALL BLVD ONE-WAY PAIR ALTERNATIVE AND 6TH STREET AND 7TH STREET ONE-WAY PAIR ALTERNATIVE**	**FIGURE 3-1B**

SECTION 4
FUTURE CONDITIONS

4.1 ALTERNATIVES

There were three alternatives evaluated as part of this study. The alternatives consisted of the No-Build Alternative and two Build Alternatives (6th Street and 7th Street One-Way Pair Alternative and 6th Street and US 301/Gall Boulevard One-Way Pair Alternative). A brief description of each of these alternatives is as follows:

- No-Build Alternative: Assumes the existing lane geometry and traffic control features on 6th Street, US 301 and 7th Street;
- 6th Street and 7th Street One-Way Pair Alternative: US 301 remains as a two-lane undivided roadway; 6th Street is widened to three lanes one-way (southbound) from south of Geiger Road to north of Palm Grove Avenue; and 7th Street is widened to three lanes one-way (northbound) from south of A Avenue to the US 301/Fort King Road intersection; and
- 6th Street and US 301/Gall Boulevard One-Way Pair Alternative: US 301 is converted to a three-lane one-way (northbound) roadway, 6th Street is widened to three lanes one-way (southbound) from south of Geiger Road to north of Palm Grove Avenue, and 7th Street remains a two-lane one-way (northbound) from south of A Avenue to the Geiger Road.

4.2 DEVELOPMENT OF FUTURE TRAFFIC PROJECTIONS

The purpose of this section is to summarize the travel demand forecasting conducted for the US 301 PD&E Study Update from SR 39 to south of CR 54. This section provides an overview of both the process that was used to develop the future year traffic projections for the study area, and the specific values resulting from this process.

The design year for this study is 2035 and the opening year is 2015. The travel demand forecasting model that was used to derive the future year traffic projections for the US 301 PD&E Study Update is the Tampa Bay Regional Planning Model (TBRPM) Version 7.0. The TBRPM is based on the Florida Standard Urban Transportation Modeling Structure (FSUTMS) and is recognized by the FDOT, as well as the five MPOs located within FDOT District 7, as the accepted travel demand forecasting model for the

Tampa Bay Region. The TBRPM includes Hillsborough, Pinellas, Pasco, Hernando, and Citrus Counties and the Port Manatee area, located in Manatee County.

4.3 BASE YEAR (2006) MODEL REVIEW

The primary purpose of this effort was to assess the model performance in the US 301 study area. The TBRPM was validated for the base year 2006 by the FDOT and met the required regional model validation criteria. The base year 2006 model traffic estimates were adjusted from peak season weekday average daily traffic (PSWADT) to annual average daily traffic (AADT), by using the base model year 2006 Pasco Countywide model output conversion factor (MOCF) of 0.95. The 2006 model AADT estimates were compared with the observed year 2006 traffic counts, as shown in **Table 4-1**. The acceptable ranges for percent deviation of model projected traffic volumes from observed traffic counts are based on the National Cooperative Highway Research Program (NCHRP), Report 255 and vary based on the magnitude of traffic volumes. The review of the TBRPM base year 2006 model shows that the base year 2006 traffic estimation differs more than 15 percent with observed traffic counts at some count locations as shown in **Table 4-1**.

Table 4-1
Base Year Model Volume Comparison with Base Year Traffic Counts

Traffic Count Location	2006 No. of Lanes	2006 Count (AADT)	2006 Model Volume (AADT)	Volume/ Count	Percent Deviation	*Within NCHRP Range?
US 301						
South of SR 39	2	15,800	12,800	0.81	(19)	Yes
North of SR 39	2	25,500	21,800	0.85	(15)	Yes
North of SR 54	2	19,200	15,300	0.80	(20)	Yes
South of 6th Street	2	19,800	17,200	0.87	(13)	Yes
North of Fort King Road	4	30,500	27,900	0.91	(9)	Yes
SR 39						
South of Chancy Road	2	13,800	14,100	1.02	2	Yes
South of SR 41	2	7,800	9,500	1.22	22	Yes
SR 54						
East of CR 579	2	15,100	7,900	0.52	(48)	No

*Source: National Cooperative Highway Research Program (NCHRP), Report 255

In addition to the comparison of base year model projected volumes to actual 2006 traffic counts within the study area, base year model estimated traffic split percentages between 6th Street, US 301 and 7th

Street was also compared to the traffic split percentages obtained from the 2010 traffic counts at cutline locations. As shown in **Table 4-2,** the base year model estimated traffic split percentages between 6th Street, US 301 and 7th Street significantly differ from the traffic split percentages obtained from the field traffic counts.

Table 4-2
Base Year Model Traffic Split Comparison with Actual Traffic Split

Cutline Location	2010 Counts				2006 Model			
	6th St. SB	US 301 SB	US 301 NB	7th St. NB	6th St. SB	US 301 SB	US 301 NB	7th St. NB
US 301								
South of South Avenue	13 %	87 %	64 %	36 %	48 %	52 %	55 %	45 %
South of SR 54	31 %	69 %	65 %	35 %	46 %	54 %	51 %	49 %
North of SR 54	39 %	61 %	62 %	38 %	49 %	51 %	56 %	44 %
South of Geiger Road	38 %	62 %	67 %	33 %	49 %	51 %	56 %	44 %

Note: Northbound (NB); Southbound (SB)

The following adjustments were made to the base year 2006 TBRPM model network to better match existing traffic conditions:

1. SR 54 facility type was changed from 32 (undivided arterial class Ia with bays) to 31 (undivided arterial unsignalized with bays) between CR 577 to CR 579.
2. SR 54 facility type was changed from 33 (undivided arterial class Ib with bays) to 32 (undivided arterial class Ia with bays) between CR 579 and 2nd Street.
3. SR 54 facility type was changed from 33 (undivided arterial class Ib with bays) to 23 (divided arterial class Ia) between 2nd Street and US 301.
4. Fifth Avenue was added to the model network between 7th Street and 20th Street as a collector roadway.
5. South Avenue/Airport Road/ 6th Avenue was added to the model network between 20th Street and Chancey Road as a collector roadway.
6. South Avenue facility type was changed from 47 (low speed collector) to 43 (major local undivided collector without bays) between US 301 and 20th Street and extended to 6th Street.
7. SR 39 facility type was changed from 31 (undivided arterial unsignalized with bays) to 32 (undivided arterial class Ia with bays) between County Line Road and Chancey Road.

8. Chancey Road facility type was changed from 42 (major local undivided collector with bays) to 41 (major local divided collector with bays) between US 301 and SR 39.
9. Geiger Road facility type was changed from 42 (major local undivided collector with bays) to 45 (other local undivided collector with bays) between CR 54 (Eiland Boulevard) and 7th Street.
10. North Avenue facility type was changed from 46 (other local undivided collector without bays) to 45 (other local undivided collector with bays) between 7th Street and 20th Street.
11. The centroid connectors from zones 2328, 2358, 2359, 2356, 2357, 2352 and 2336 were revised to appropriately represent the zonal traffic loadings to the adjacent roads.
12. 15 second and 30 second time penalties were applied to 6th Street and 7th Street, respectively, between South Avenue and North Avenue to represent traffic constraints (stop controlled intersections) located along the roadways.

As a result of making these network changes, the revised base year 2006 TBRPM model AADT projections and the traffic split percentages between 6th Street, US 301 and 7th Street are more reasonably matched with existing traffic conditions. The revised based year model volumes and traffic splits are shown in **Tables 4-3 and 4-4**, respectively.

Table 4-3
Revised Base Year Model Volume Comparison with Base Year Traffic Counts

Traffic Count Location	2006 No. of Lanes	2006 Count (AADT)	2006 Model Volume (AADT)	Volume/ Count	Percent Deviation	*Within NCHRP Range?
US 301						
South of SR 39	2	15,800	15,700	0.99	(1)	Yes
North of SR 39	2	25,500	24,500	0.96	(4)	Yes
North of SR 54	2	19,200	17,800	0.93	(7)	Yes
South of 6th Street	2	19,800	18,500	0.93	(7)	Yes
North of Fort King Road	4	30,500	27,300	0.90	(10)	Yes
SR 39						
South of Chancy Road	2	13,800	14,000	1.01	1	Yes
South of SR 41	2	7,800	8,800	1.13	13	Yes
SR 54						
East of CR 579	2	15,100	13,000	0.86	(14)	Yes

*Source: National Cooperative Highway Research Program (NCHRP), Report 255

Table 4-4
Revised Base Year Model Traffic Split Comparison with Actual Traffic Splits

Cutline Location	2010 Counts				2006 Model			
	6th St. SB	US 301 SB	US 301 NB	7th St. NB	6th St. SB	US 301 SB	US 301 NB	7th St. NB
US 301								
South of South Avenue	13 %	87 %	64 %	36 %	14 %	86 %	65 %	35 %
South of SR 54	31 %	69 %	65 %	35 %	30 %	70 %	64 %	36 %
North of SR 54	39 %	61 %	62 %	38 %	40 %	60 %	63 %	37 %
South of Geiger Road	38 %	62 %	67 %	33 %	43 %	57 %	69 %	31 %

Note: Northbound (NB); Southbound (SB)

4.4 FUTURE YEAR (2035) MODEL DEVELOPMENT

Prior to obtaining future traffic volumes from the TBRPM, the 2035 model was reviewed and the following adjustments were made for each of the design alternatives:

Common Changes:

1. SR 54 facility type was changed from 33 (undivided arterial class Ib with bays) to 32 (undivided arterial class Ia with bays) between CR 579 and 2nd Street.
2. SR 54 facility type was changed from 33 (undivided arterial class Ib with bays) to 23 (divided arterial class Ia) between 2nd Street and US 301.
3. Fifth Avenue was added to the model network between 7th Street and 20th Street as a collector roadway.
4. South Avenue/Airport Road/6th Avenue was added to the model network between 20th Street and Chancey Road as a collector roadway.
5. South Avenue facility type was changed from 47 (low speed collector) to 43 (major local undivided collector without bays) between US 301 and 20th Street and extended to 6th Street.
6. SR 39 facility type was changed from 31 (undivided arterial unsignalized with bays) to 32 (undivided arterial class Ia with bays) between County line Road and Chancey Road.
7. Chancey Road facility type was changed from 42 (major local undivided collector with bays) to 41 (major local divided collector with bays) between US 301 and SR 39.
8. Geiger Road facility type was changed from 42 (major local undivided collector with bays) to 45 (other local undivided collector with bays) between CR 54 and 7th Street.

9. North Avenue facility type was changed from 46 (other local undivided collector without bays) to 45 (other local undivided collector with bays) between 7th Street and 20th Street.
10. The centroid connectors from zones 2328, 2326, 2360, 2358, 2359, 2356, 2357, 2352 and 2336 were revised to appropriately represent the zonal traffic loadings to the adjacent roads.

No-Build Alternative:

1. 15 seconds and 30 seconds time penalties were applied to 6th Street and 7th Street, respectively, between South Avenue and North Avenue to represent traffic constraints (stop controlled intersections) located along the roadways.

6th Street and US 301/Gall Boulevard One-Way Pair Alternative:

1. US 301 was coded as a 3-lane northbound one-way roadway between north of CR 39 and south of North Avenue.
2. Sixth Street was coded as a 3-lane southbound one-way roadway between south of North Avenue and north of CR 39.
3. 30 seconds time penalty was applied to 7th Street between South Avenue and North Avenue to represent traffic constraints (stop controlled intersections) located along the roadways.

6th Street and 7th Street One-Way Pair Alternative:

1. US 301 was coded as a 3-lane northbound one-way roadway between north of CR 39 and 7th Street.
2. Seventh Street was coded as 3-lane northbound one-way roadway between US 301 and North Avenue.
3. Fort King Road was coded as a 3-lane northbound one-way roadway between North Avenue and US 301.
4. Sixth Street is coded as a 3-lane southbound one-way roadway between south of North Avenue and north of CR 39.

4.5 DESIGN YEAR (2035) DAILY TRAFFIC PROJECTIONS

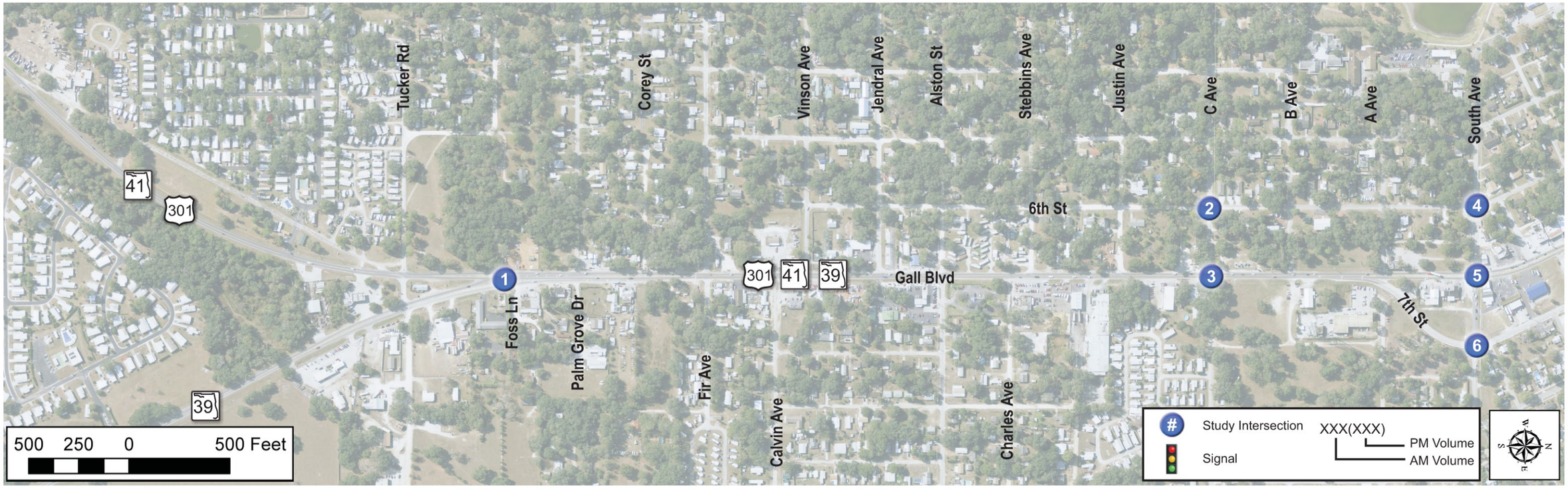
The design year (2035) Directional Annual Average Daily Traffic (DAADT) volumes for the US 301 corridor were estimated by using the year 2035 revised Pre-Design alternative model (cost feasible plan model). The term revised refers to the fact that the 2035 model network was modified as discussed in

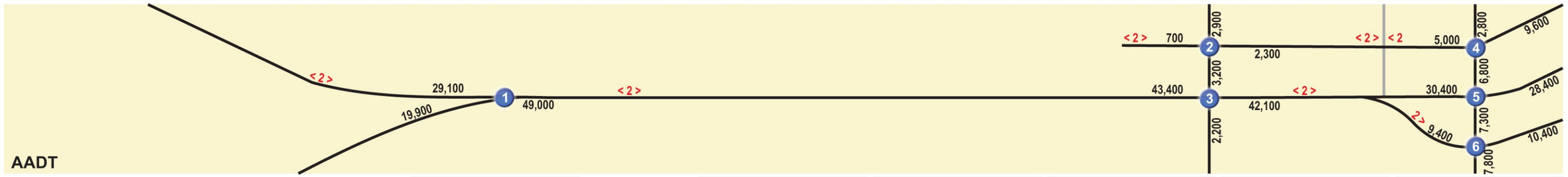
Section 4.3 of this memorandum. For the 6th Street and 7th Street One-Way Pair Alternative and No-Build alternative, the cost feasible plan model projected US 301 corridor traffic volumes were redistributed by using the traffic split variation, as shown in **Table 4-5**, estimated by the respective alternative models. For the cross streets the future year 2035 daily traffic volumes were estimated by applying a liner annual growth rate (AGR) of two percent to the year 2010 daily traffic counts. The two percent AGR was derived from the base year 2006 model to future year 2035 model growth rates observed for the cross streets (including centroid traffic volumes). The estimated design year (2035) DAADT volumes for the three alternatives are shown in **Figures 4-1 (A-B)** through **Figures 4-3 (A-B)**. The opening year 2015 daily traffic volumes were developed by interpolating between the year 2010 daily traffic volumes and the year 2035 daily traffic volumes. The estimated opening year (2015) DAADT volumes are further discussed in Section 4.13. These traffic volumes were submitted previously to FDOT for their review and subsequently approved prior to conducting the traffic analyses.

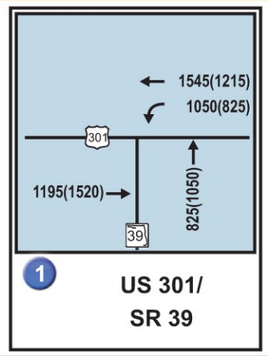
Table 4-5
Future Year Model Traffic Split Comparison

Cutline Location	No-Build Alternative				6th Street and US 301/Gall Boulevard One-Way Pair Alternative				6th Street and 7th Street One-Way Pair Alternative			
	6th St. SB	US 301 SB	US 301 NB	7th St. NB	6th St. SB	US 301 SB	US 301 NB	7th St. NB	6th St. SB	US 301 SB	US 301 NB	7th St. NB
US 301												
South of South Avenue	21%	79%	57%	43%	100%	-	80%	20%	84%	16%	33%	66%
South of SR 54	39%	61%	57%	43%	100%	-	80%	20%	75%	25%	33%	66%
North of SR 54	50%	50%	57%	43%	100%	-	85%	15%	75%	25%	33%	66%
South of Geiger Road	50%	50%	57%	43%	100%	-	85%	15%	75%	25%	33%	66%

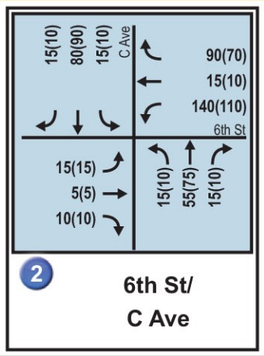
Note: Northbound (NB); Southbound (SB)



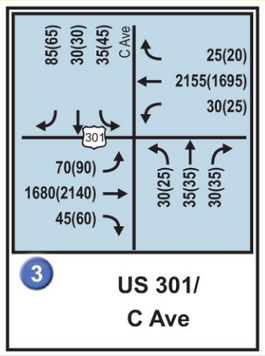




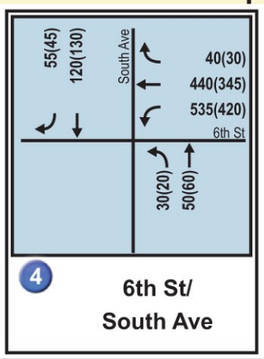
1 US 301/ SR 39



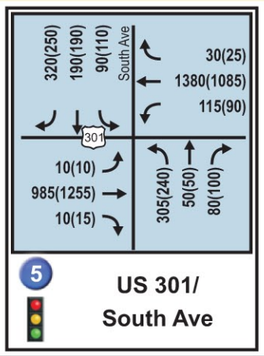
2 6th St/ C Ave



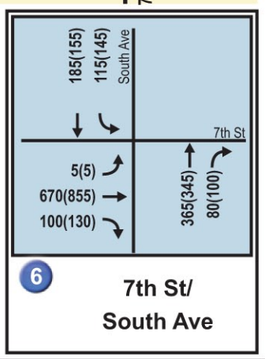
3 US 301/ C Ave



4 6th St/ South Ave

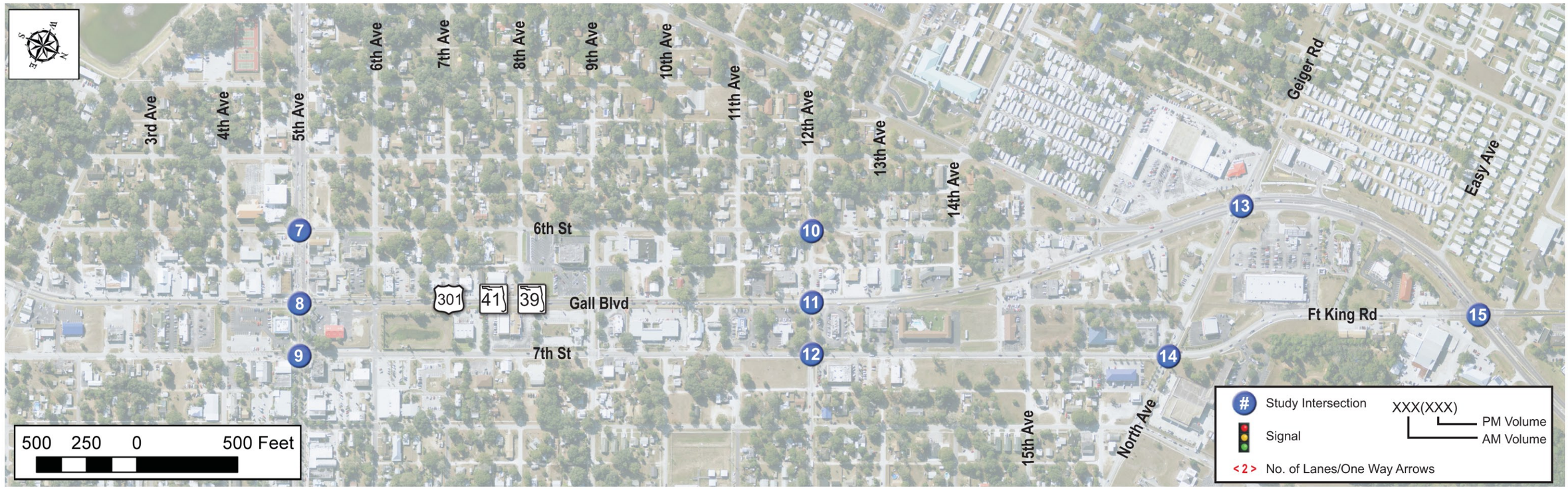


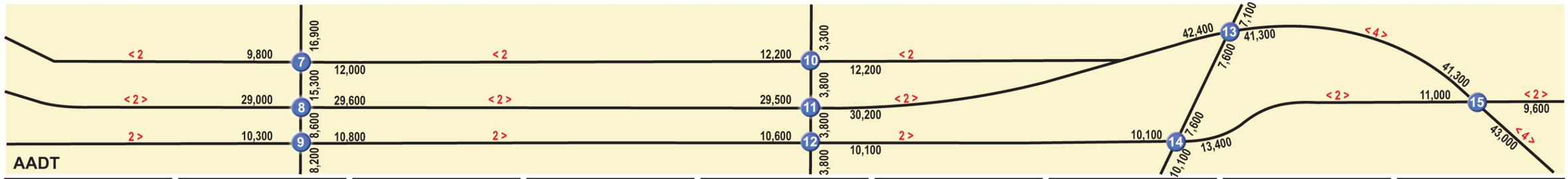
5 US 301/ South Ave

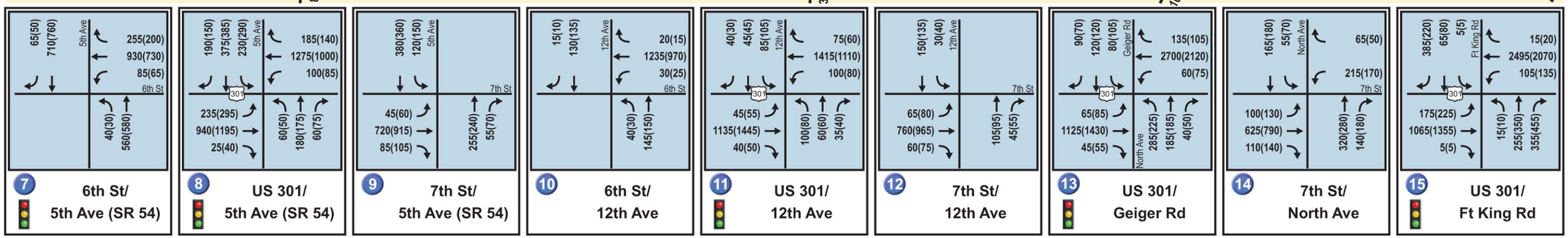


6 7th St/ South Ave

US 301 PD&E Study Update from SR 39 to CR 54 (Eiland Boulevard)	**DESIGN YEAR (2035) NO-BUILD ANNUAL AVERAGE DAILY TRAFFIC (AADT) AND DESIGN HOUR TURNING MOVEMENT VOLUMES**	**FIGURE 4-1A**



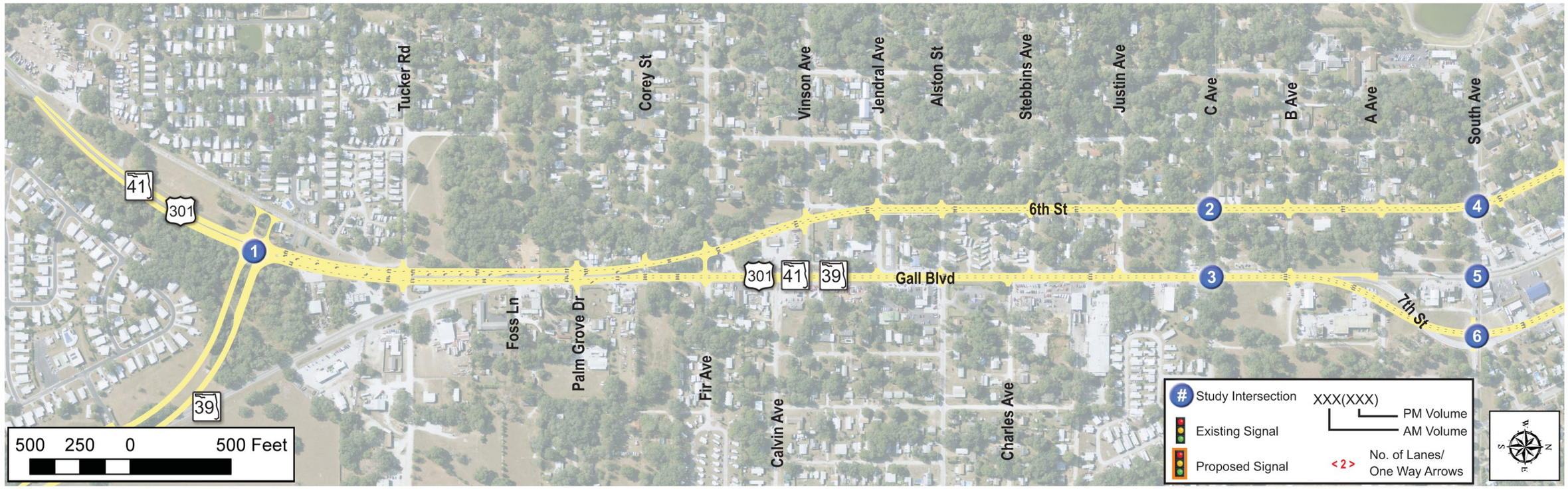


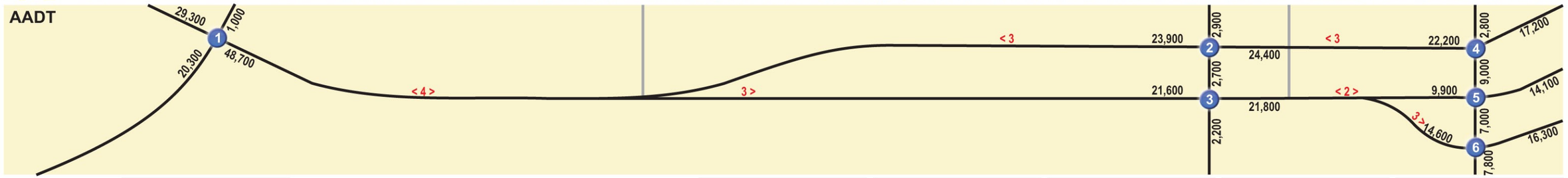


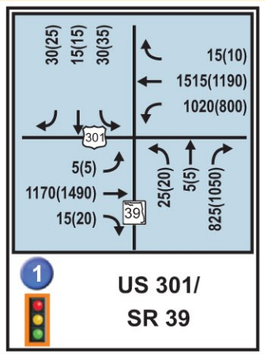
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

DESIGN YEAR (2035) NO-BUILD ANNUAL AVERAGE DAILY TRAFFIC (AADT) AND DESIGN HOUR TURNING MOVEMENT VOLUMES

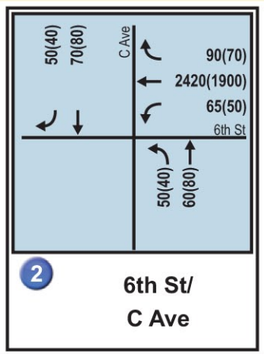
FIGURE 4-1B



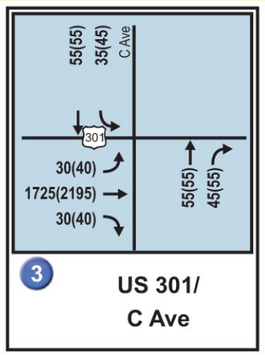




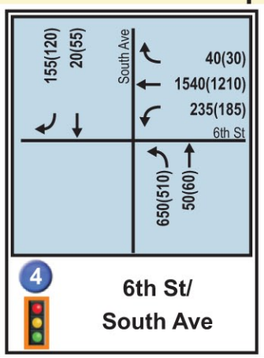
1 US 301/ SR 39



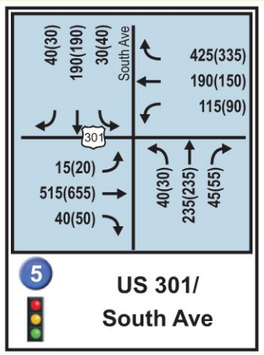
2 6th St/ C Ave



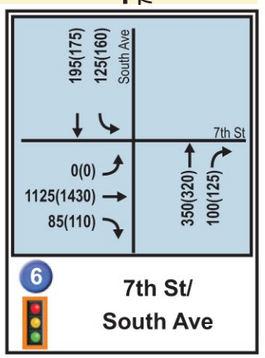
3 US 301/ C Ave



4 6th St/ South Ave



5 US 301/ South Ave

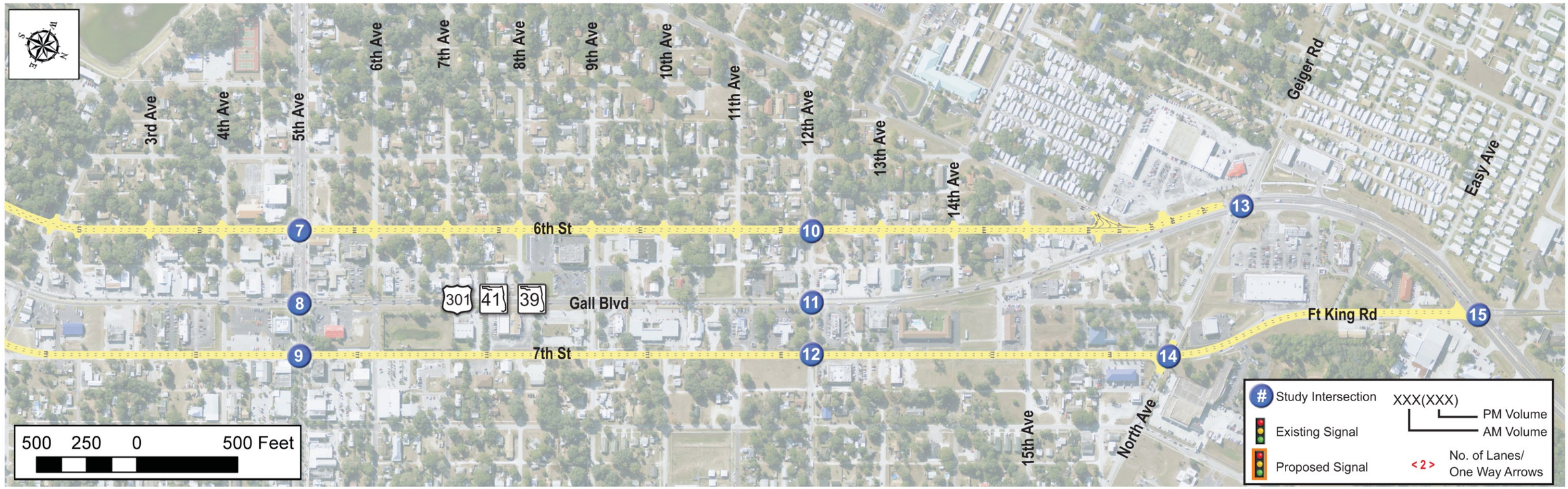


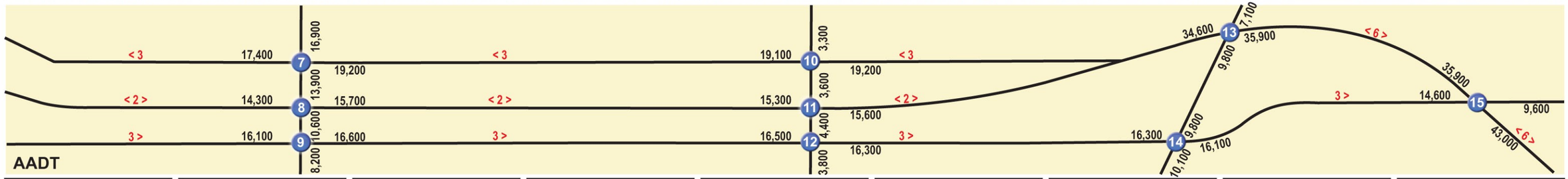
6 7th St/ South Ave

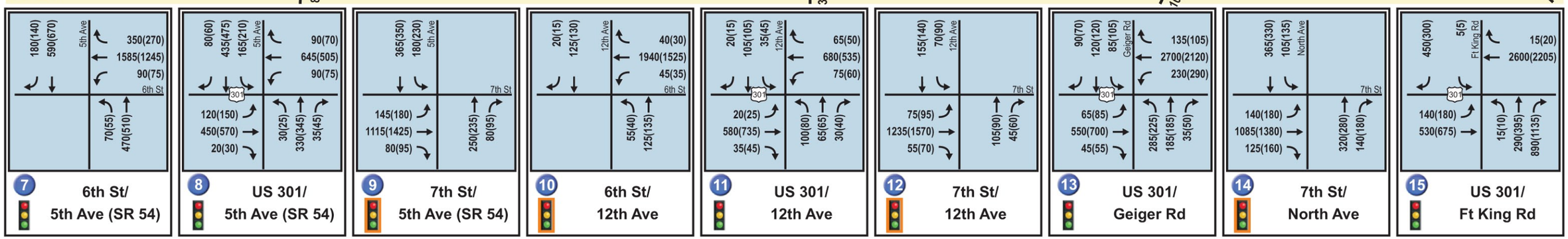
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

DESIGN YEAR (2035) BUILD ANNUAL AVERAGE DAILY TRAFFIC (AADT) AND DESIGN HOUR TURNING MOVEMENT VOLUMES 6TH STREET AND 7TH STREET ONE-WAY PAIR ALTERNATIVE

FIGURE 4-2A



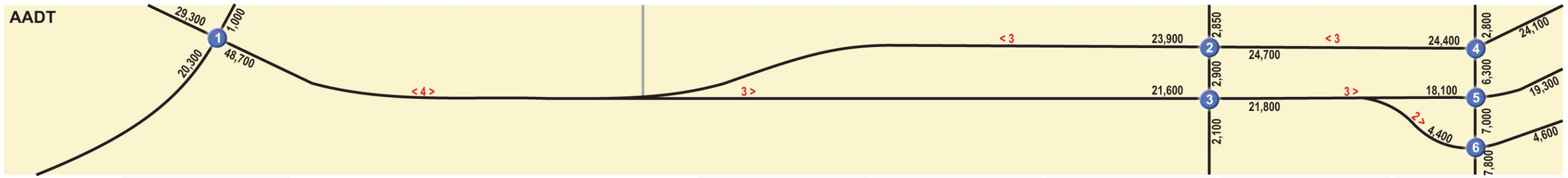


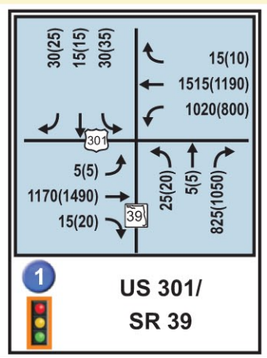


US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

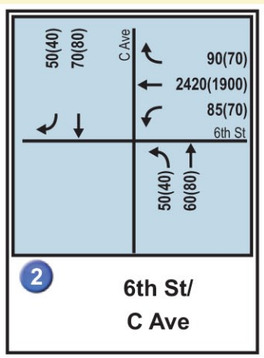
DESIGN YEAR (2035) BUILD ANNUAL AVERAGE DAILY TRAFFIC (AADT) AND DESIGN HOUR TURNING MOVEMENT VOLUMES 6TH STREET AND 7TH STREET ONE-WAY PAIR ALTERNATIVE

FIGURE 4-2B

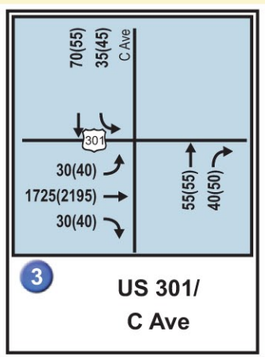




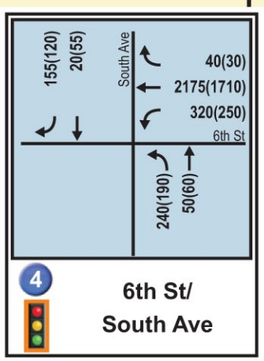
1 US 301/ SR 39



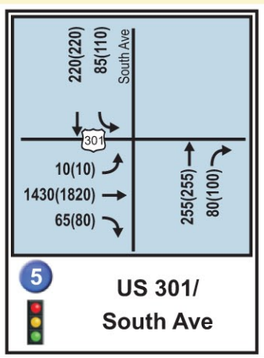
2 6th St/ C Ave



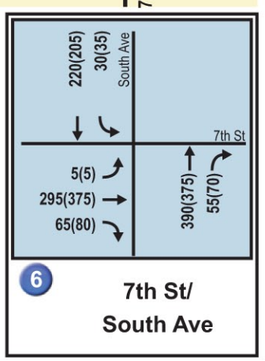
3 US 301/ C Ave



4 6th St/ South Ave



5 US 301/ South Ave

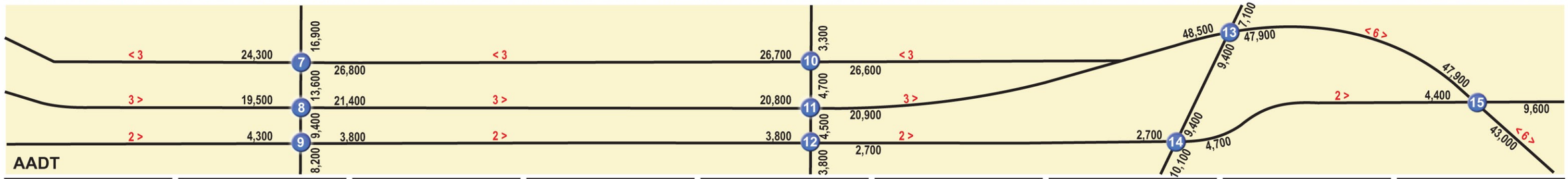


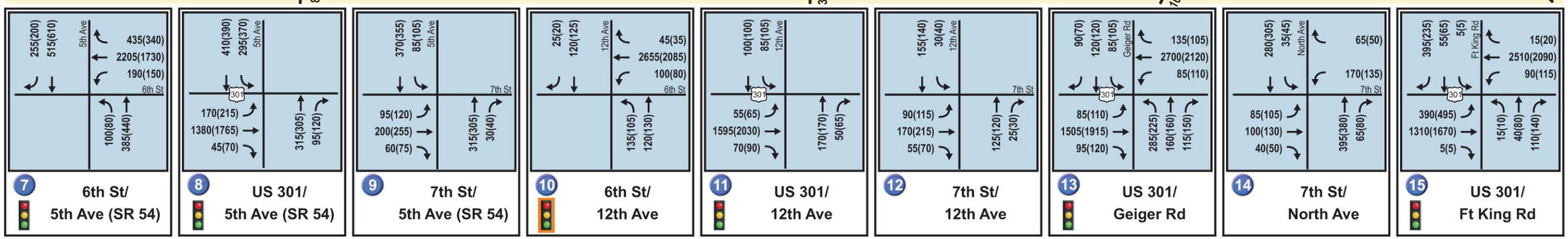
6 7th St/ South Ave

US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

DESIGN YEAR (2035) BUILD ANNUAL AVERAGE DAILY TRAFFIC (AADT) AND DESIGN HOUR TURNING MOVEMENT VOLUMES 6TH STREET AND US 301/GALL BLVD ONE-WAY PAIR ALTERNATIVE

FIGURE 4-3A





US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

DESIGN YEAR (2035) BUILD ANNUAL AVERAGE DAILY TRAFFIC (AADT) AND DESIGN HOUR TURNING MOVEMENT VOLUMES 6TH STREET AND US 301/GALL BLVD ONE-WAY PAIR ALTERNATIVE

FIGURE 4-3B

4.6 DEVELOPMENT OF DESIGN YEAR (2035) DESIGN HOUR TRAFFIC VOLUMES

The design year (2035) DDHV were obtained by multiplying the 2035 AADT volumes by the K_{30}-factor of 9.4 percent and the D_{30}-factor of 56.0 percent. Design hour turning movements were developed for the PM peak period by multiplying existing year (2010) manually smoothed turning movement percentages with the 2035 DDHV. A manual smoothing process was performed in order to satisfy the K_{30}- and D_{30}-factors and to balance traffic flows between adjacent intersections. The AM peak period turning movement volumes were developed by reversing the peak direction of travel on 6th Street, US 301 and 7th Street. The design year (2035) AM and PM design hour turning movement traffic volumes developed for the No-Build, 6th Street and 7th Street One-Way Pair and 6th Street and US 301/Gall Boulevard One-Way Pair Alternatives are shown on **Figure 4-1 (A-B)**, **Figure 4-2 (A-B)**, and **Figure 4-3 (A-B)**, respectively.

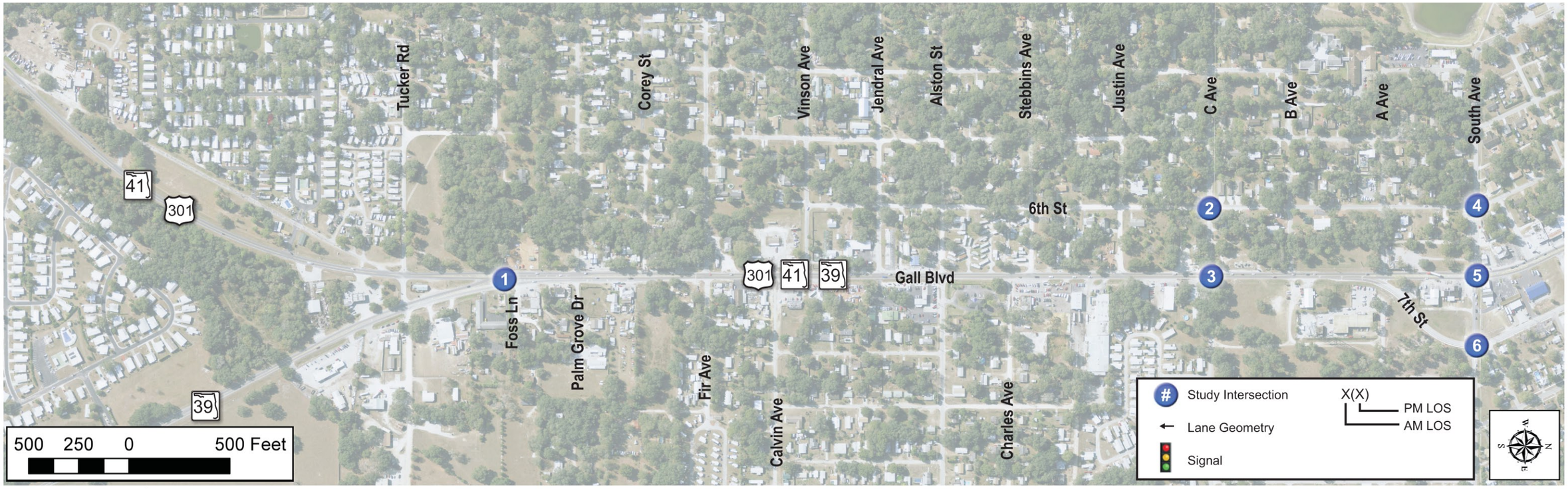
4.7 DESIGN YEAR (2035) NO-BUILD INTERSECTION LEVEL OF SERVICE ANALYSIS

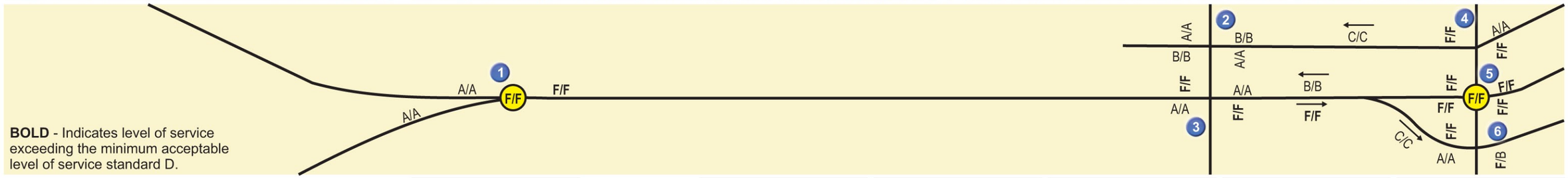
Signalized intersection level of service (LOS) was estimated using the Highway Capacity Manual (HCM) methodology module of the Synchro 7.0 Version (Build 773) software. In the No-Build intersection LOS analysis, existing year (2010) geometric conditions and design year (2035) peak hour traffic volumes were assumed for the analysis. In anticipation of increased traffic volumes, signal timing was optimized to reflect the higher traffic volumes that can be expected in the future. The analysis results for the 15 study intersections are summarized in **Table 4-6.** The design year (2035) No-Build alternative lane geometry and LOS are shown on **Figures 4-4 (A-B)**. The design year (2035) Synchro intersection analysis sheets for No-Build conditions are included in **Appendix F** (under separate cover).

Table 4-6
Design Year (2035) No-Build Alternative Intersection LOS and Control Delay Summary

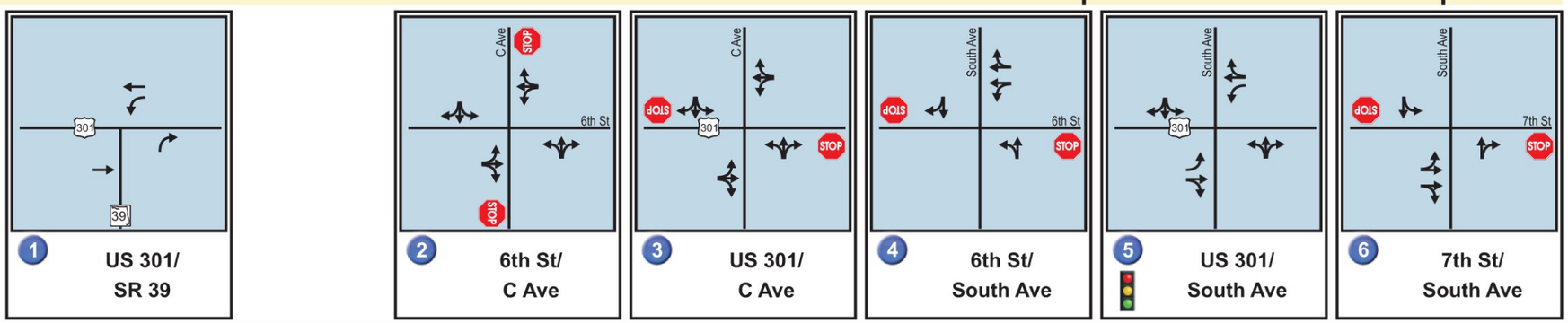
Intersection	Intersection Approach Control Delay and LOS								Overall Intersection	
	Eastbound		Westbound		Northbound		Southbound			
	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS
US 301										
SR 39			0.0 / 0.0	A / A	0.0 / 0.0	A / A	232.3 / 266.0	**F** / **F**	159.0 / 152.4	**F** / **F**
C Avenue[1]	>50 sec / >50 sec	**F** / **F**	>50 sec / >50 sec	**F** / **F**	1.3 / 0.8	A / A	0.2 / 0.4	A / A		
South Avenue	94.0 / 118.6	**F** / **F**	458.1 / 363.4	**F** / **F**	112.8 / 190.4	**F** / **F**	357.2 / 152.8	**F** / **F**	256.3 / 185.4	**F** / **F**
SR 54	100.0 / 102.8	**F** / **F**	85.0 / 67.1	**F** / **E**	78.6 / 133.5	**E** / **F**	366.7 / 247.3	**F** / **F**	200.1 / 157.7	**F** / **F**
12th Avenue	90.1 / 129.2	**F** / **F**	123.4 / 85.6	**F** / **F**	30.4 / 102.8	C / **F**	111.7 / 52.1	**F** / D	80.1 / 83.3	**F** / **F**
Geiger Road	67.4 / 72.6	**E** / **E**	77.8 / 37.8	**F** / D	26.9 / 26.4	C / C	160.6 / 49.1	**F** / D	113.1 / 41.8	**F** / D
Fort King Road	269.7 / 67.9	**F** / **E**	66.6 / 162.3	**E** / **F**	166.2 / 163.6	**F** / **F**	85.1 / 39.2	**F** / D	120.2 / 101.3	**F** / **F**
6th Street										
C Avenue[1]	1.1 / 0.7	A / A	1.4 / 0.8	A / A	10.8 / 10.6	B / B	12.1 / 11.4	B / B		
South Avenue[1]	>50 sec / >50 sec	**F** / **F**	>50 sec / >50 sec	**F** / **F**			5.2 / 4.8	A / A		
SR 54	25.0 / 17.6	C / B	24.9 / 16.7	C / B			24.6 / 42.0	C / D	24.8 / 27.4	C / C
12th Avenue[1]	>50 sec / >50 sec	**F** / **F**	>50 sec / >50 sec	**F** / **F**			0.3 / 0.3	A / A		
7th Street										
South Avenue[1]	>50 sec / >50 sec	**F** / **F**	>50 sec / >50 sec	**F** / **F**	0.0 / 0.0	A / A				
SR 54[2]	>50 sec / >50 sec	**F** / **F**	21.8 / 21.6	C / C	>50 sec / >50 sec	**F** / **F**			>50 sec / >50 sec	**F** / **F**
12th Avenue[1]	>50 sec / >50 sec	**F** / **F**	34.6 / >50 sec	D / **F**	0.7 / 0.8	A / A				
Geiger Road[2]	17.2 / 17.2	C / C	>50 sec / >50 sec	**F** / **F**	>50 sec / >50 sec	**F** / **F**	34.9 / 24.7	D / C	>50 sec / >50 sec	**F** / **F**

[1] Indicates two-way stop controlled (TWSC) intersection; overall delay is not calculated
[2] Indicates all-way stop controlled (AWSC) intersection
Bold – Indicates level of service exceeding the minimum acceptable level of service standard D





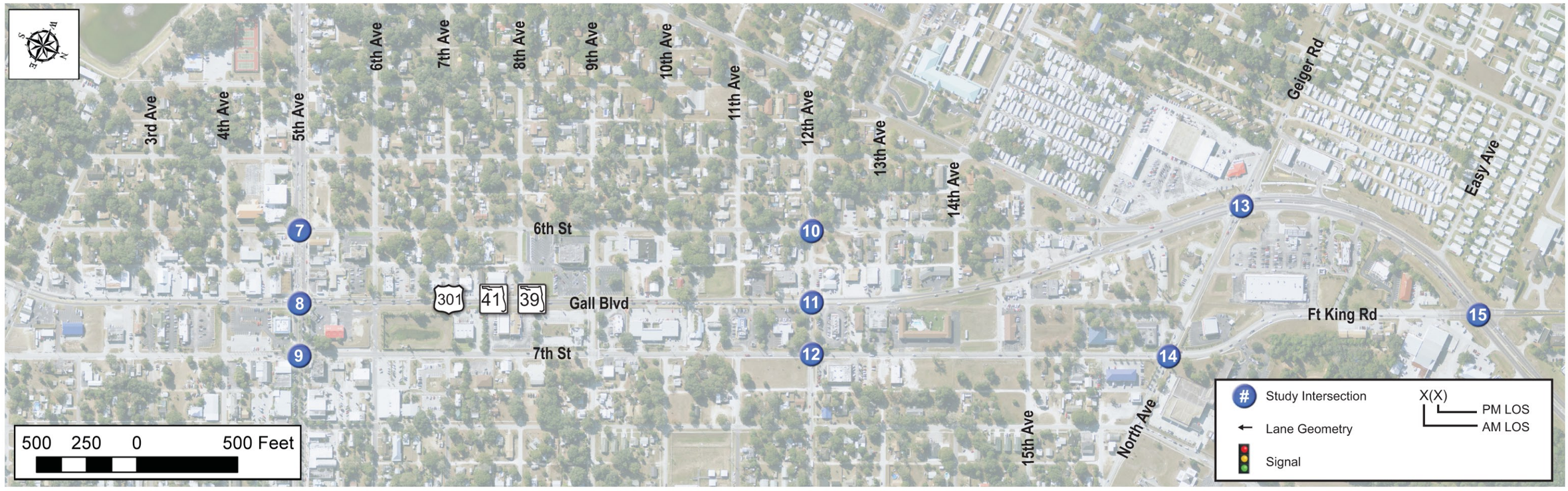
BOLD - Indicates level of service exceeding the minimum acceptable level of service standard D.

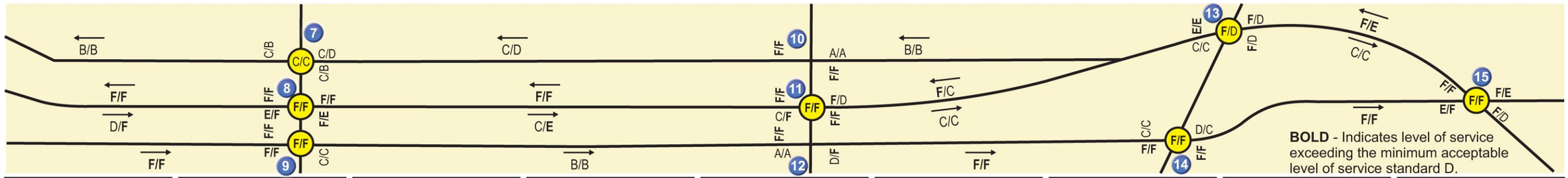


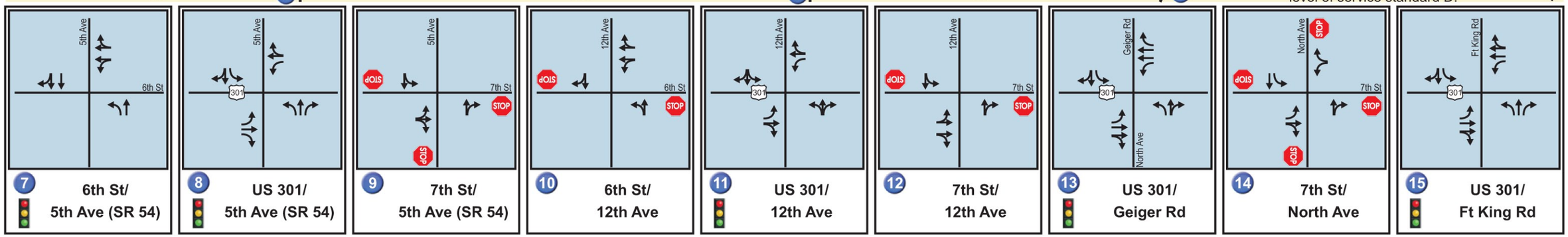
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

DESIGN YEAR (2035) NO-BUILD LANE GEOMETRY AND LEVEL OF SERVICE (LOS)

FIGURE 4-4A







US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

DESIGN YEAR (2035) NO-BUILD LANE GEOMETRY AND LEVEL OF SERVICE (LOS)

FIGURE 4-4B

4.8 DESIGN YEAR (2035) NO-BUILD ALTERNATIVE ARTERIAL ANALYSIS

The design year (2035) No-Build arterial LOS analyses for the US 301 roadway segments within the study area were conducted using the estimated design year (2035) DDHV. For the arterial analysis, the free flow speed was assumed to be the posted speed limit. The US 301 arterial functional and design categories were determined to be Principal Arterial and Urban (posted speed limit 30-40 mph), respectively, based on Exhibit 10-4 of the HCM 2000. The study corridor transitions to a Principal Arterial High-Speed at both the north and south termini of the study corridor. The urban street class for US 301 6th Street and 7th Street was established as Class III using Exhibit 10-3 of the HCM 2000. The northbound and southbound arterial segment LOS results for the design year (2035) conditions are summarized in **Table 4-7** and **Table 4-8,** respectively and shown on **Figures 4-4 (A-B).** In addition, the spreadsheets used in the arterial analysis for the design year (2035) No-Build Alternative are included in **Appendix G** (under separate cover).

Table 4-7
Design Year (2035) No-Build Alternative US 301 Arterial
Northbound Level of Service Summary

Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
US 301						
C Avenue to South Avenue	0.25	35	6.3	4.1	**F**	**F**
South Avenue to SR 54	0.26	35	14.4	6.8	D	**F**
SR 54 to 12th Avenue	0.48	35	20.7	10.6	C	**E**
12th Avenue to Geiger Road	0.42	35	22.9	22.6	C	C
Geiger Road to Fort King Road	0.26	35	22.6	21.9	C	C
C Avenue to Fort King Road	1.67		15.1	9.5	D	**F**
7th Street						
C Avenue to South Avenue	0.11	30	23.1	23.1	C	C
South Avenue to SR 54	0.25	30	2.5	1.6	**F**	**F**
SR 54 to 12th Avenue	0.48	30	28.0	28.0	B	B
12th Avenue to Geiger Road	0.33	30	2.7	1.9	**F**	**F**
Geiger Road to Fort King Road	0.30	30	9.5	4.1	**F**	**F**
C Avenue to Fort King Road	1.47		5.3	3.4	**F**	**F**

Table 4-8
Design Year (2035) No-Build Alternative US 301
Arterial Southbound Level of Service Summary

Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
US 301						
Fort King Road to Geiger Road	0.26	35	4.7	11.4	**F**	**E**
Geiger Road to 12th Avenue	0.42	35	9.8	19.9	**F**	C
12th Avenue to SR 54	0.48	35	4.0	5.8	**F**	**F**
SR 54 to South Avenue	0.26	35	2.7	6.2	**F**	**F**
South Avenue to C Avenue	0.25	35	29.8	29.6	B	B
Fort King Road to C Avenue	1.67		5.2	9.4	**F**	**F**
6th Street						
Geiger Road to 12th Avenue	0.32	30	28.1	28.1	B	B
12th Avenue to SR 54	0.48	30	20.3	16.8	C	D
SR 54 to South Avenue	0.23	30	24.1	24.4	B	B
South Avenue to C Avenue	0.25	30	20.5	20.9	C	C
Geiger Road to C Avenue	1.28		22.6	20.9	C	C

4.9 DESIGN YEAR (2035) BUILD INTERSECTION LEVEL OF SERVICE ANALYSIS

There were two Build Alternatives considered for this study. The assumptions used for each of the alternatives are described Section 4.1. Highway capacity analyses were employed to determine the lane geometry along US 301 required to meet adopted LOS standards. Initially the analysis considered only the improvements shown in the conceptual design plans that were prepared by Pitman Hartenstein and Associates. Signalized intersection LOS was estimated using the HCM methodology module of Synchro software and the geometry required to achieve acceptable LOS. Signal timing was optimized to reflect the addition of the recommended lane geometry in the future. The analysis results for the 15 study intersections are summarized in **Table 4-9** for the 6th Street and 7th Street One-Way Pair Alternative and **Table 4-10** for the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative. The design year (2035) lane geometry and LOS is also shown on **Figures 4-5 (A-B)** for the 6th Street and 7th Street One-Way Pair Alternative and **Figure 4-6 (A-B)** for the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative. The design year (2035) Synchro intersection analysis sheets for the Build conditions are included in **Appendix H** (under separate cover).

Table 4-9
Design Year (2035) 6th Street and 7th Street One-Way Pair Alternative US 301 Intersection Control Delay Summary

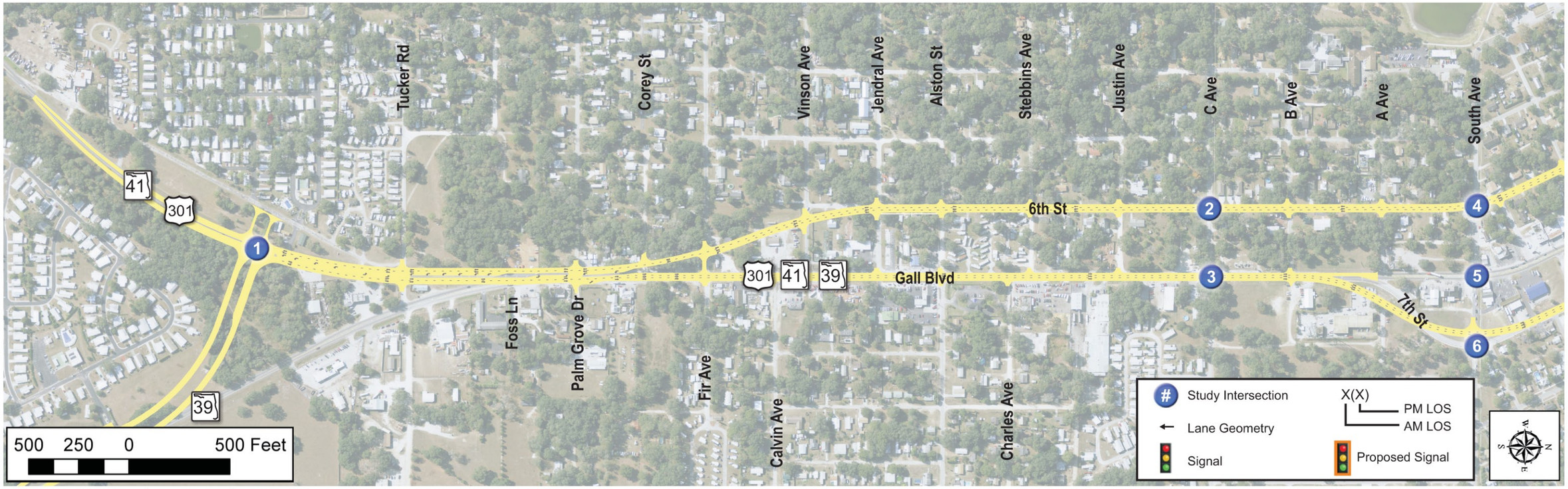
Intersection	Intersection Approach Control Delay and LOS								Overall Intersection	
	Eastbound		Westbound		Northbound		Southbound			
	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS
US 301										
SR 39	72.0 / 73.8	**E** / **E**	23.7 / 41.1	C / D	125.2 / 122.3	**F** / **F**	94.3 / 87.1	**F** / **F**	88.9 / 87.7	**F** / **F**
C Avenue[1]	>50 sec / >50 sec	**F** / **F**	>50 sec / >50 sec	**F** / **F**	0.2 / 0.2	A / A				
South Avenue	8.1 / 12.6	A / B	7.1 / 11.3	A / B	25.8 / 24.0	C / C	37.9 / 16.3	D / B	24.9 / 17.9	C / B
SR 54	21.1 /30.9	C / C	47.3 / 44.3	D / D	12.9 / 27.1	B / C	138.4 / 38.3	**F** / D	62.2 / 33.8	**E** / C
12th Avenue	11.8 / 17.1	B / B	20.0 / 25.4	B / C	12.6 / 15.1	B / B	22.1 / 16.1	C / B	17.6 / 16.7	B / B
Geiger Road	68.2 / 145.2	**E** / **F**	202.0 / 74.6	**F** / **E**	11.9 / 13.6	B / B	159.5 / 34.4	**F** / C	136.7 / 42.6	**F** / D
Fort King Road	153.8 / 37.8	**F** / D	306.5 / 402.2	**F** / **F**	177.9 / 260.2	**F** / **F**	156.4 / 145.1	**F** / **F**	195.4 / 238.8	**F** / **F**
6th Street										
C Avenue[1]	>50 sec / >50 sec	**F** / **F**	>50 sec / >50 sec	**F** / **F**			0.3 / 0.3	A / A		
South Avenue	10.7 / 9.4	B / A	126.8 / 44.7	**F** / D			145.6 /71.3	**F** / **E**	131.9 / 59.4	**F** / **E**
SR 54	25.4 / 20.8	C / C	29.5 / 16.4	C / B			13.9 / 17.7	B / B	19.1 / 18.3	B / B
12th Avenue	34.9 / 31.8	C / C	37.9 / 30.3	D / C			9.7 / 12.6	A / B	13.5 / 15.7	B / B
7th Street										
South Avenue	32.7 / 65.6	C / **E**	19.6 / 19.6	B / B	24.2 / 26.3	C / C			24.5 / 30.7	C / C
SR 54	31.1 / 70.6	C / **E**	12.1 / 14.2	B / B	27.4 / 94.7	C / **F**			26.0 / 79.2	C / **E**
12th Avenue	24.8 / 39.4	C / D	22.2 / 32.3	C / C	6.0 / 3.6	A / A			9.9 / 9.5	A / A
Geiger Road	72.1 / 77.8	**E** / **E**	48.6 / 46.8	D / D	15.6 / 19.1	B / B			33.9 / 34.2	C / C

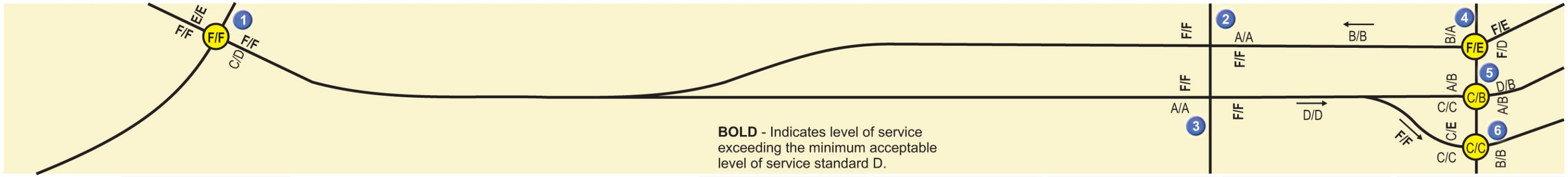
[1] Indicates two-way stop controlled (TWSC) intersection; overall delay is not calculated
Bold – Indicates level of service exceeding the minimum acceptable level of service standard D

Table 4-10
Design Year (2035) 6th Street and US 301/Gall Boulevard One-Way Pair Alternative US 301 Intersection Control Delay Summary

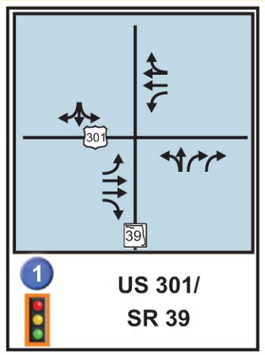
Intersection	Intersection Approach Control Delay and LOS								Overall Intersection	
	Eastbound		Westbound		Northbound		Southbound			
	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS
US 301										
SR 39	72.0 / 73.8	**E** / **E**	23.7 / 41.1	C / D	125.2 / 122.3	**F** / **F**	94.3 / 87.1	**F** / **F**	88.9 / 87.7	**F** / **F**
C Avenue[1]	>50 sec / >50 sec	**F** / **F**	198.7 / >50 sec	**F** / **F**	0.2 / 0.2	A / A				
South Avenue	29.0 / 58.3	C / **E**	26.2 / 26.6	C / C	17.4 / 22.6	B / C			20.5 / 27.7	C / C
SR 54	24.2 / 59.4	C / **E**	37.7 / 46.9	D / D	12.9 / 29.8	B / C			19.6 / 39.0	B / D
12th Avenue	42.1 / 32.8	D / C	34.1 / 30.3	C / C	12.7 / 5.4	B / A			17.5 / 9.8	B / A
Geiger Road	46.1 / 51.0	D / D	130.2 / 25.8	**F** / C	9.6 / 91.6	A / **F**	239.6 / 216.5	**F** / **F**	147.0 / 137.6	**F** / **F**
Fort King Road	255.0 / 76.0	**F** / **E**	33.0 / 28.2	C / C	514.8 / 501.4	**F** / **F**	111.3 / 57.5	**F** / **E**	261.2 / 252.6	**F** / **F**
6th Street										
C Avenue[1]	>50 sec / >50 sec	**F** / **F**	>50 sec / >50 sec	**F** / **F**			0.4 / 0.4	A / A		
South Avenue	26.4 / 27.5	C / C	81.5 / 58.2	**F** / **E**			11.5 / 7.5	B / A	19.1 / 14.2	B / B
SR 54	33.2 / 30.8	C / C	51.4 / 35.9	D / D			69.6 / 9.6	**E** / A	60.6 / 18.3	**E** / B
12th Avenue	32.9 / 29.9	C / C	76.3 / 26.5	**E** / C			4.7 / 14.2	A / B	11.7 / 16.2	B / B
7th Street										
South Avenue[1]	27.4 / 46.1	D / **E**	35.1 / >50 sec	**E** / **F**	0.1 / 0.1	A / A				
SR 54[2]	32.0 / 46.2	D / **E**	19.6 / 24.1	C / C	22.1 / 42.7	C / **E**			25.3 / 38.9	D / **E**
12th Avenue[1]	18.7 / 23.9	C / C	14.6 / 16.7	B / C	2.2 / 2.3	A / A				
Geiger Road[2]	21.2 / 23.9	C / C	>50 sec / >50 sec	**F** / **F**	13.6 / 15.0	B / B	21.7 / 18.8	C / C	39.6 / 40.2	**E** / **E**

[1] Indicates two-way stop controlled (TWSC) intersection; overall delay is not calculated
[2] Indicates all-way stop controlled (AWSC) intersection
Bold – Indicates level of service exceeding the minimum acceptable level of service standard D

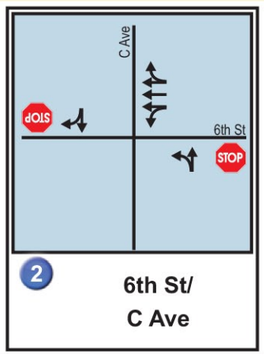




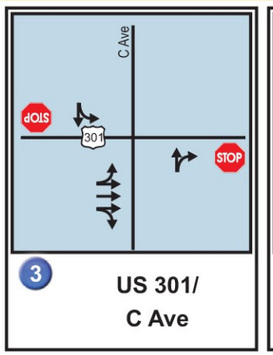
BOLD - Indicates level of service exceeding the minimum acceptable level of service standard D.



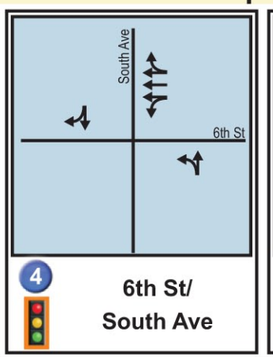
1 **US 301/ SR 39**



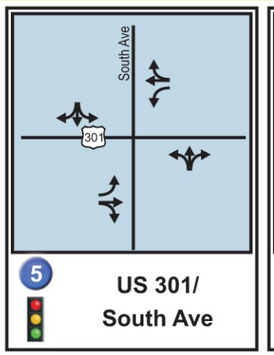
2 **6th St/ C Ave**



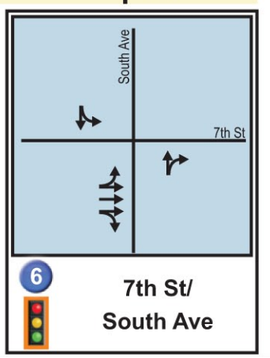
3 **US 301/ C Ave**



4 **6th St/ South Ave**



5 **US 301/ South Ave**

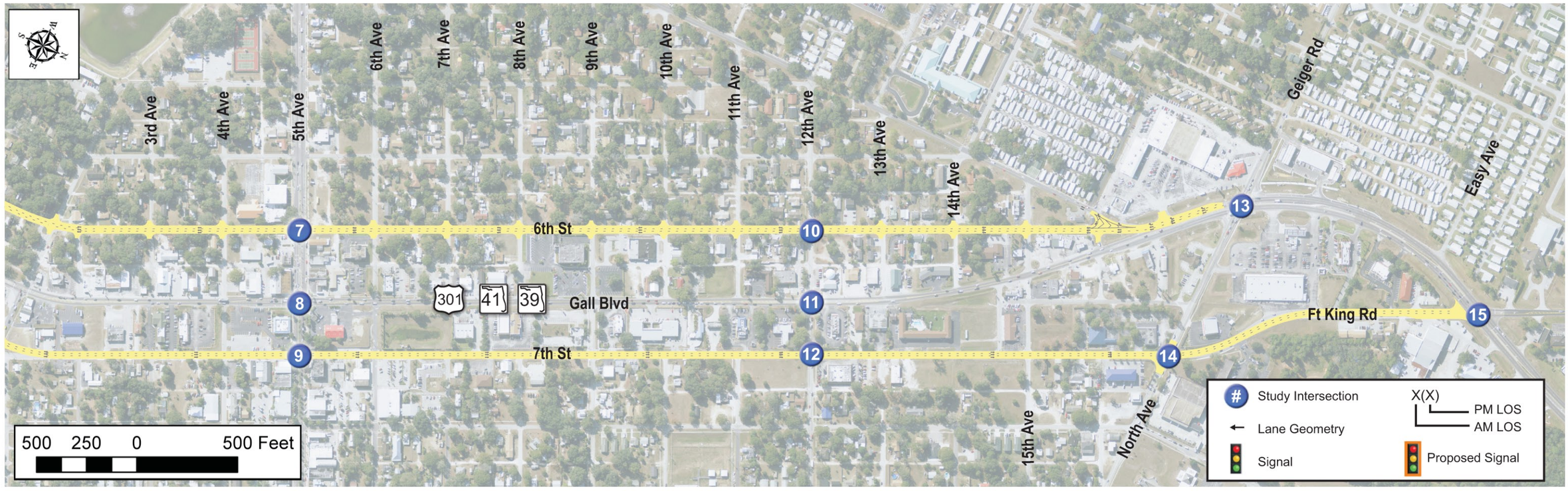


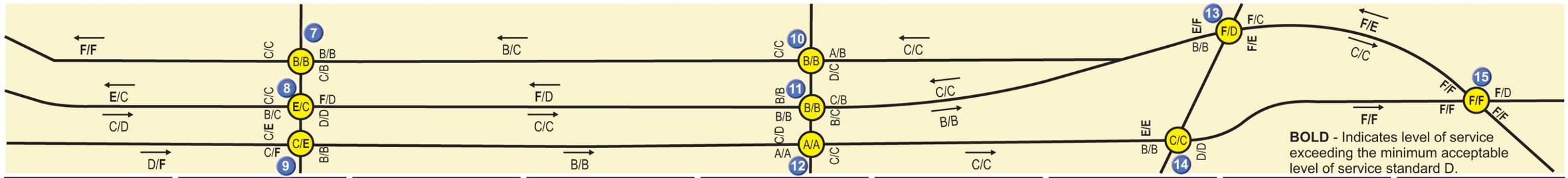
6 **7th St/ South Ave**

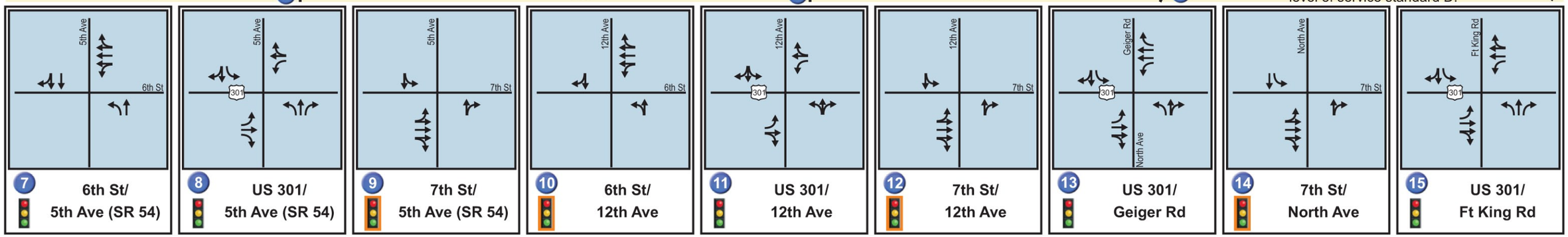
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

DESIGN YEAR (2035) BUILD LANE GEOMETRY AND LEVEL OF SERVICE (LOS)
6TH STREET AND 7TH STREET ONE-WAY PAIR ALTERNATIVE

FIGURE 4-5A



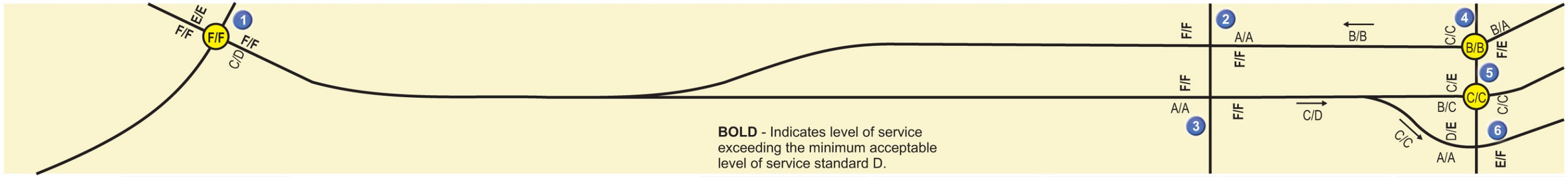




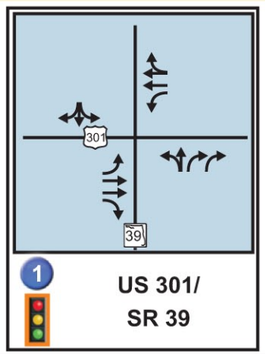
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

DESIGN YEAR (2035) BUILD LANE GEOMETRY AND LEVEL OF SERVICE (LOS)
6TH STREET AND 7TH STREET ONE-WAY PAIR ALTERNATIVE

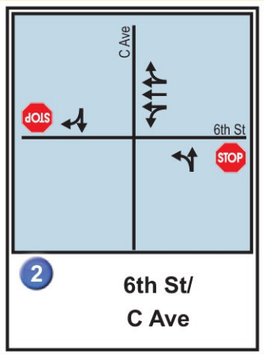
FIGURE 4-5B



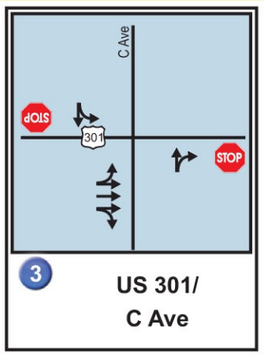
BOLD - Indicates level of service exceeding the minimum acceptable level of service standard D.



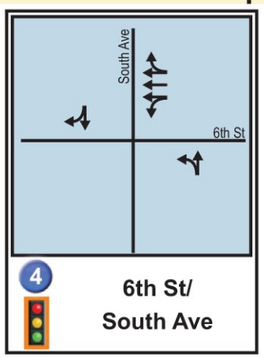
1 **US 301/ SR 39**



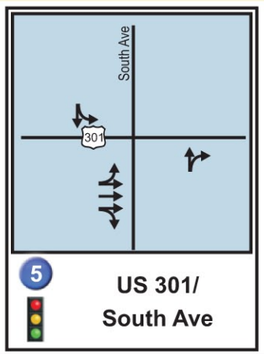
2 **6th St/ C Ave**



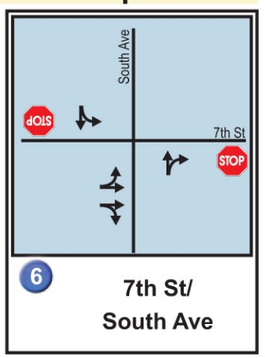
3 **US 301/ C Ave**



4 **6th St/ South Ave**



5 **US 301/ South Ave**

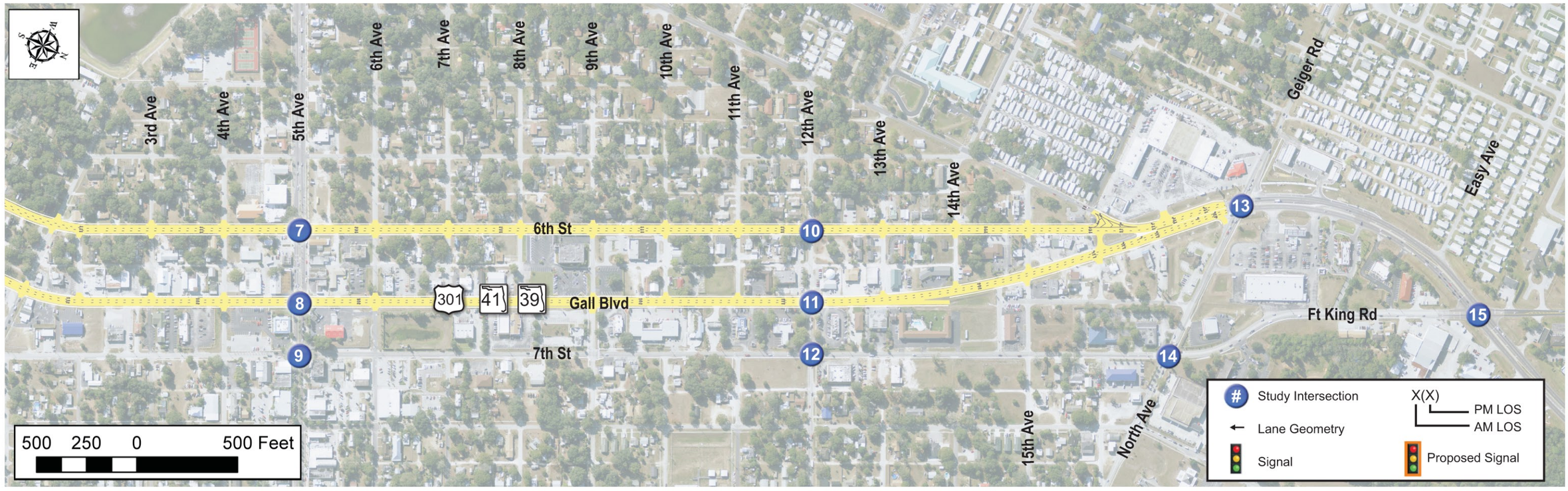


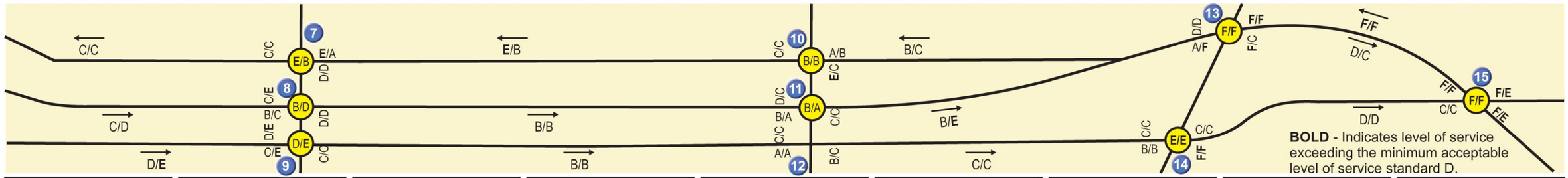
6 **7th St/ South Ave**

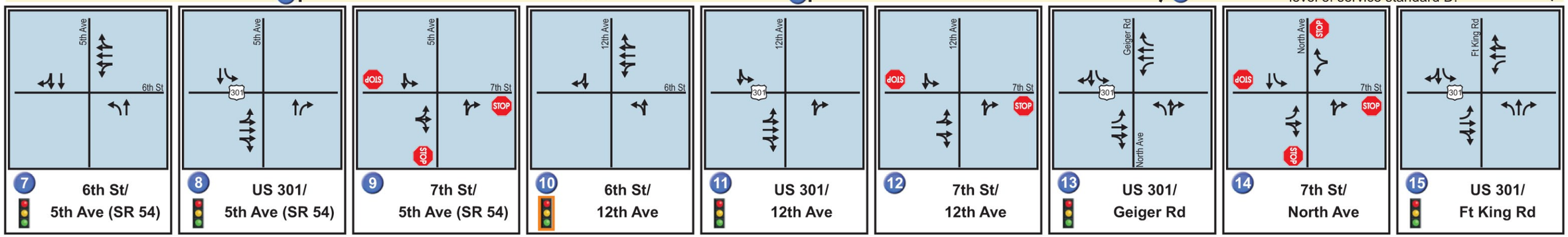
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

DESIGN YEAR (2035) BUILD LANE GEOMETRY AND LEVEL OF SERVICE (LOS)
6TH STREET AND US 301/GALL BLVD ONE-WAY PAIR ALTERNATIVE

FIGURE 4-6A







US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

DESIGN YEAR (2035) BUILD LANE GEOMETRY AND LEVEL OF SERVICE (LOS)
6TH STREET AND US 301/GALL BLVD ONE-WAY PAIR ALTERNATIVE

FIGURE 4-6B

4.10 DESIGN YEAR (2035) BUILD ARTERIAL ANALYSIS

The design year (2035) Build arterial LOS analyses for the US 301 roadway segments within the study area were conducted using the estimated design year (2035) DDHV. The arterial segment LOS analysis was conducted using the Synchro 7.0 Version (Build 773) software. The US 301 arterial functional and design categories were determined to be Principal Arterial and Urban (posted speed limit 30-40 mph), respectively, based on Exhibit 10-4 of the HCM 2000. The study corridor transitions to a Principal Arterial High-Speed at both the north and south termini of the study corridor. The urban street class of the US 301 was established as Class III using Exhibit 10-3 of the HCM 2000. The arterial functional class and design criteria for 6th and 7th Street were established as minor arterial and Class IV. The US 301 northbound and southbound arterial segment LOS results for the 6th Street and 7th Street One-Way Pair Alternative are summarized in **Tables 4-11** and **4-12**. **Tables 4-13** and **4-14** display the northbound and southbound arterial LOS results for the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative. **Figures 4-5 (A-B)** and **Figures 4-6 (A-B)** display the LOS and lane geometry for the respective alternatives. In addition, the spreadsheets used in the arterial analysis for the design year (2035) Build Alternatives are included in **Appendix I** (under separate cover).

Table 4-11
Design Year (2035) 6th Street and 7th Street One-Way Pair Alternative US 301 Arterial Northbound Level of Service Summary

Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
US 301						
C Avenue to South Avenue	0.25	30	15.6	16.0	D	D
South Avenue to SR 54	0.26	30	22.1	16.6	C	D
SR 54 to 12th Avenue	0.48	30	23.5	22.7	C	C
12th Avenue to Geiger Road	0.42	30	24.4	24.3	B	B
Geiger Road to Fort King Road	0.26	35	23.5	21.1	C	C
C Avenue to Fort King Road	1.67		21.8	20.4	C	C
7th Street						
C Avenue to South Avenue	0.11	35	9.9	9.4	**F**	**F**
South Avenue to SR 54	0.25	35	15.7	7.2	D	**F**
SR 54 to 12th Avenue	0.48	35	27.2	28.2	B	B
12th Avenue to Geiger Road	0.33	35	21.5	20.2	C	C
Geiger Road to Fort King Road	0.30	35	2.5	1.9	**F**	**F**
C Avenue to Fort King Road	1.47		8.1	6.2	**F**	**F**

Table 4-12
Design Year (2035) 6th Street and 7th Street One-Way Pair Alternative US 301
Arterial Southbound Level of Service Summary

Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
US 301						
Fort King Road to Geiger Road	0.26	35	4.4	13.2	**F**	**E**
Geiger Road to 12th Avenue	0.42	30	19.8	21.8	C	C
12th Avenue to SR 54	0.48	30	8.1	17.2	**F**	D
SR 54 to South Avenue	0.26	30	13.1	19.8	**E**	C
Fort King Road to South Avenue	1.42		8.9	17.7	**F**	D
6th Street						
Geiger Road to 12th Avenue	0.32	35	24.0	22.6	C	C
12th Avenue to SR 54	0.48	35	24.2	23.0	B	C
SR 54 to South Avenue	0.23	35	4.8	8.4	**F**	**F**
South Avenue to C Avenue	0.25	35	30.0	29.7	B	B
Geiger Road to C Avenue	1.28		14.3	18.0	D	C

Table 4-13
Design Year (2035) 6th Street and US 301/Gall Boulevard One-Way Pair Alternative US 301
Arterial Northbound Level of Service Summary

Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
US 301						
C Avenue to South Avenue	0.25	35	19.0	17.1	C	D
South Avenue to SR 54	0.26	35	21.2	15.3	C	D
SR 54 to 12th Avenue	0.48	35	24.6	27.4	B	B
12th Avenue to Geiger Road	0.42	35	25.8	10.5	B	**E**
Geiger Road to Fort King Road	0.26	35	17.8	23.4	D	C
C Avenue to Fort King Road	1.67		22.0	16.7	C	D
7th Street						
C Avenue to South Avenue	0.11	30	23.1	23.1	C	C
South Avenue to SR 54	0.25	30	16.7	12.1	D	**E**
SR 54 to 12th Avenue	0.48	30	27.4	27.3	B	B
12th Avenue to Geiger Road	0.33	30	21.3	20.6	C	C
Geiger Road to Fort King Road	0.30	30	15.2	16.1	D	D
C Avenue to Fort King Road	1.47		20.3	18.9	C	C

Table 4-14
Design Year (2035) 6th Street and US 301/Gall Boulevard One-Way Pair Alternative US 301
Arterial Southbound Level of Service Summary

Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
US 301						
Geiger Road to Fort King Road	0.26	35	3.3	3.6	**F**	**F**
Geiger Road to Fort King Avenue	0.26		3.3	3.6	**F**	**F**
6th Street						
Geiger Road to 12th Avenue	0.32	35	26.7	21.9	B	C
12th Avenue to SR 54	0.48	35	13.6	25.7	**E**	B
SR 54 to South Avenue	0.23	35	21.2	23.6	C	C
South Avenue to C Avenue	0.25	35	29.6	29.6	B	B
Geiger Road to C Avenue	1.28		19.2	24.9	C	B

4.11 DESIGN YEAR (2035) BUILD ANALYSIS OF US 301/FORT KING ROAD

In order to provide optimal improvement for the US 301/Fort King Road intersection, five alternatives for the 6th Street and 7th Street One-Way Pair Alternative and three alternatives for the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative were analyzed. These alternatives are described in greater detail below and are depicted on **Figure 4-7 (A-B)**.

6th Street and 7th Street One-Way Pair Alternative

Alternative 1:

Northbound – two left turn lanes; two through lanes

Southbound – three through lanes with a shared right turn lane

Eastbound – one left turn lane; two right turn lanes

Westbound – one left turn lane; one through lane; two right turn lanes

The intersection would be signalized.

Alternative 2:

Northbound – two left turn lanes; two through lanes

Southbound – three through lanes with a shared right turn lane

Eastbound – one left turn lane; two right turn lanes

Westbound – one left turn lane; one through lane; one right turn lane that operates as a free-flow movement

The intersection would be signalized.

Alternative 3:

Northbound – two left turn lanes; two through lanes

Southbound – three through lanes with a shared right turn lane

Eastbound – two right turn lanes

Westbound – two through lanes; two right turn lanes

The intersection would be signalized.

To improve safety and efficiency, the eastbound-to-northbound and westbound-to-southbound left-turn movements were eliminated due to the existing intersection skew angle and projected low traffic demand for these movements.

Alternative 4:

Alternative 4 involves the realignment of northbound US 301 to form a new signalized intersection with 7th Street south of Fort King Road. 7th Street would become the mainline and northbound US 301 the sidestreet. Southbound US 301 would remain in existing alignment. See conceptual design displayed in **Figure 4-7A**.

The intersection would be signalized.

Alternative 5:

Northbound – two left turn lanes; two through lanes that operate as a free-flow movement

Southbound – three through lanes with a shared right turn lane

Eastbound – two right turn lanes

Westbound –two right turn lanes that operate as a free-flow movement

The intersection would be signalized.

6th Street and US 301/Gall Boulevard One-Way Pair Alternative

Alternative 1:

Northbound – two left turn lanes; three through lanes with a shared right turn lane

Southbound – one left turn lane; three through lanes with a shared right turn lane

Eastbound – one left turn lane; one through lane; two right turn lanes

Westbound – one left turn lane; one through lane; one right turn lanes

The intersection would be signalized.

Alternative 2:

Northbound – two left turn lanes; two through lanes with a shared right turn lane

Southbound – one left turn lane; three through lanes with a shared right turn lane

Eastbound – one left turn lane; one through lane; two right turn lanes

Westbound – one left turn lane; one through lane; one right turn lane that operates as a free-flow movement

The intersection would be signalized.

Alternative 3:

Northbound – two left turn lanes; three through lanes with a shared right turn lane

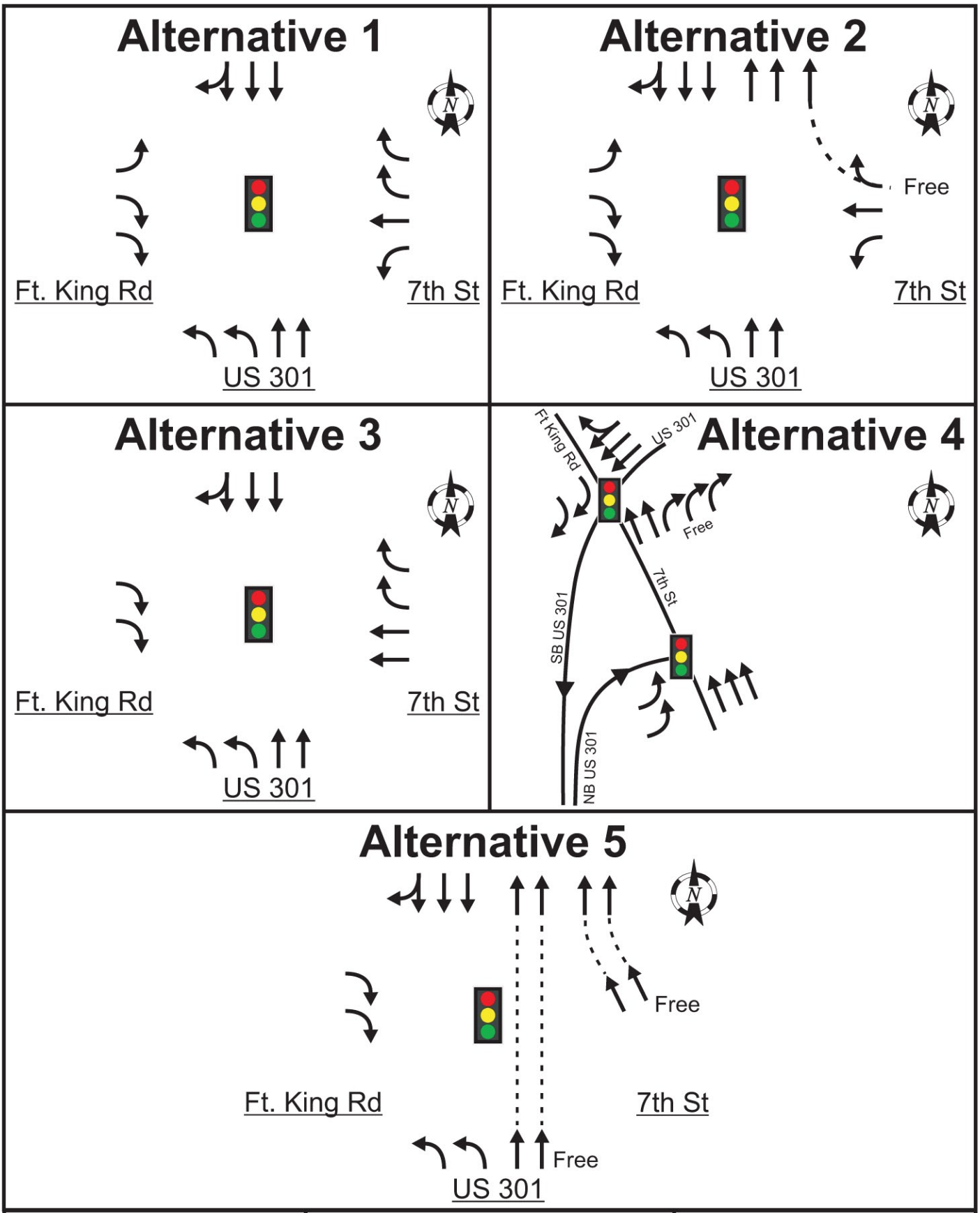
Southbound – one left turn lane; three through lanes with a shared right turn lane

Eastbound – two right turn lanes

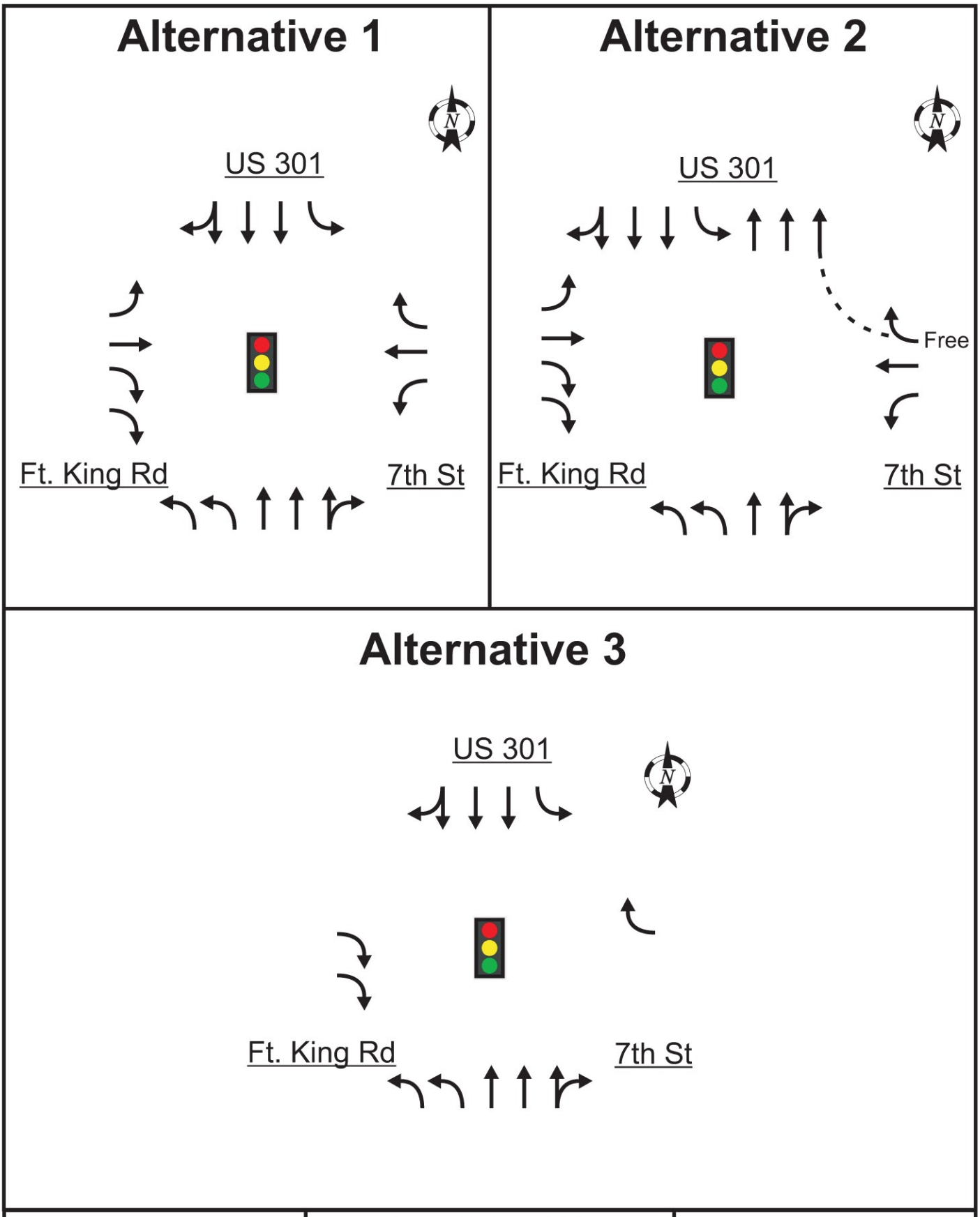
Westbound –one right turn lane

The intersection would be signalized.

To improve safety and efficiency, the eastbound-to-northbound and westbound-to-southbound left-turn movements were eliminated due to the existing intersection skew angle and projected low traffic demand for these movements.



US 301 PD&E Study Update from SR 39 to CR 54 (Eiland Boulevard)	**FORT KING ROAD DESIGN YEAR (2035) BUILD 6TH STREET AND 7TH STREET ONE-WAY PAIR ALTERNATIVE**	**FIGURE 4-7A**



US 301 PD&E Study Update from SR 39 to CR 54 (Eiland Boulevard)

FORT KING ROAD DESIGN YEAR (2035) BUILD 6TH STREET AND US 301/ GALL BLVD ONE-WAY PAIR ALTERNATIVE

FIGURE 4-7B

For each of the Alternatives signalized intersection LOS for the US 301/Fort King Road intersection was estimated using the HCM methodology module of Synchro software. Signal timing was optimized to reflect the lane geometry in the future. The analysis results for the three alternatives are summarized in **Table 4-15** and **Table 4-16.** The design year (2035) Synchro intersection analysis sheets for the Fort King Road Alternatives are included in **Appendix J** (under separate cover).

Table 4-15
Design Year (2035) Build Analysis of US 301/Fort King Road Alternatives
Intersection Level of Service Summary

Alternative	Level of Service (LOS)				
	Eastbound AM / PM	Westbound AM / PM	Northbound AM / PM	Southbound AM / PM	Overall AM / PM
6th Street and 7th Street One-Way Pair Alternative					
1	D / C	D / D	D / D	D / D	D / D
2	D / C	C / C	B / C	D / D	D / D
3	D / D	D / C	C / C	B / B	C / C
4	D / D	A / A		B / B	B / B
5	D / D	A / A	B / C	B / B	B / B
6th Street and US 301/Gall Boulevard One-Way Pair Alternative					
1	D / D	D / D	C / B	D / C	C / C
2	D / D	B / B	C / B	C / C	C / C
3	D / D	**E / E**	B / B	B / C	B / C

Table 4-16
Design Year (2035) Build Analysis of US 301/Fort King Road Alternatives
Intersection Control Delay Summary

Alternative	HCM Average Control Delay (sec/veh)				
	Eastbound AM / PM	Westbound AM / PM	Northbound AM / PM	Southbound AM / PM	Overall AM / PM
6th Street and 7th Street One-Way Pair Alternative					
1	47.8 / 32.3	46.2 / 42.0	47.7 / 45.3	48.2 / 50.4	47.6 / 45.8
2	37.7 / 29.5	24.5 / 23.8	18.7 / 21.6	48.2 / 50.4	37.5 / 35.8
3	44.9 / 41.5	39.1 / 28.5	23.3 / 33.2	19.4 / 18.7	27.0 / 25.7
4	43.2 / 38.0	8.1 / 9.7		19.1 / 14.8	17.2 / 13.7
5	51.2 / 41.1	0.3 / 0.4	19.6 / 21.5	14.2 / 11.8	16.1 / 13.4
6th Street and US 301/Gall Boulevard One-Way Pair Alternative					
1	48.5 / 40.0	45.9 / 47.4	25.6 / 14.0	35.4 / 29.7	33.6 / 24.3
2	49.2 / 40.3	16.3 / 19.8	32.5 / 16.6	34.4 / 29.1	34.5 / 23.8
3	51.7 / 44.3	59.8 / 59.3	11.9 / 17.5	16.5 / 25.7	19.1 / 24.0

As shown in **Table 4-15 and Table 4-16** acceptable LOS was achieved for all alternatives. The decision to implement one alternative over all other alternatives can be evaluated in design.

4.12 REFINEMENTS TO BUILD ALTERNATIVES

In addition to the need to improve future operations at Fort King Road, the intersections of US 301/ SR 39, US 301/SR 54, US 301/Geiger Road, 6th Street/South Avenue, 6th Street/SR 54, 7th Street/South Avenue, 7th Street/SR 54, and 7th Street/Geiger Road require additional improvements in order to meet adopted level of service (LOS) standards. The only intersection where an acceptable LOS cannot be achieved is the US 301/SR 54 intersection in the 6th Street and 7th Street One-Way Pair Alternative. A second southbound through lane is needed at the US 301/SR 54 intersection in the 6th Street and 7th Street One-Way Pair Alternative. Construction of this through lane may not be feasible due to right-of-way constraints. The elimination of on-street parking on the north side of SR 54 between 7th Street and 6th Street may allow for the addition of a second westbound travel lane. An additional westbound lane could reduce delay at this intersection, but would not resolve the lack of capacity on the southbound approach. Thus, the subject intersection would still not meet the adopted LOS standard D in the design year. The design year (2035) lane geometry for the recommended improvements is shown on **Figures 4-8 (A-B)** and **Figures 4-9 (A-B)** for the respective alternatives. The following list of improvements are recommended:

US 301/SR 39:

- Provide a second southbound-to-eastbound left-turn lane. The Tucker Road median opening would likely need to be closed in order to accommodate the recommended second left-turn lane.

US 301/Geiger Road:

- Provide three through lanes in both the northbound and southbound directions of US 301 for the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative. A third northbound through lane is not needed for the 6th Street and 7th Street One-Way Pair Alternative.
- Provide a second westbound-to-southbound left-turn lane and modify the existing left-turn signal phasing to protected-only;
- Construct an exclusive eastbound-to-southbound right-turn lane; and
- Provide an exclusive westbound-to-northbound right-turn lane.

US 301/Fort King Road:

6th Street and US 301/Gall Boulevard One-Way Pair Alternative:

- Provide three through lanes in the southbound direction of US 301;
- Construct a second northbound-to-westbound left-turn lane and modify the signal phasing for both the northbound-to-westbound and southbound-to-eastbound left-turn movements to protected-only;
- Provide a second eastbound-to-southbound right-turn lane with a protected overlapping green phase operated concurrent with the northbound-to-westbound left-turn movement; and
- To improve safety and efficiency, consider eliminating the eastbound-to-northbound and westbound-to-southbound left-turn movements due to the existing intersection skew angle and projected low traffic demand for these movements.

6th Street and 7th Street One-Way Pair Alternative:

- Provide three southbound through lanes on US 301 and maintain the existing two northbound through lanes between Geiger Road and Fort King Road;
- Form a third northbound through lane on US 301 north of Fort King Road by adding an auxiliary lane from the westbound-to-northbound right-turn movement;
- Provide either a free-flow westbound-to-northbound right-turn lane or dual westbound-to-northbound right-turn lanes operated under signal control;
- Provide a second eastbound-to-southbound right-turn lane with a protected overlapping green phase operated concurrent with the northbound-to-westbound left-turn movement;
- To improve safety and efficiency, consider eliminating the eastbound-to-northbound and westbound-to-southbound left-turn movements due to the existing intersection skew angle and projected low traffic demand for these movements; and
- Construct a second northbound-to-westbound left-turn lane.

6th Street/South Avenue *(6th Street and 7th Street One-Way Pair Alternative Only)*:

- Reconstruct the westbound approach to provide an exclusive westbound-to-southbound left-turn lane and a shared left and through lane;
- Provide an exclusive eastbound-to-southbound right-turn lane; and

- Modify the existing signal phasing to provide split phased movements for the eastbound and westbound approaches.

6th Street/SR 54 (*6th Street and US 301/Gall Boulevard One-Way Pair Alternative Only):*

- Provide an exclusive eastbound-to-southbound right-turn lane for the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative only. This improvement is not needed for the 6th Street and 7th Street One-Way Pair Alternative.

7th Street/South Avenue (*6th Street and US 301/Gall Boulevard One-Way Pair Alternative Only):*

- Provide all-way stop control.

7th Street/SR 54:

6th Street and US 301/Gall Boulevard One-Way Pair Alternative:

- Provide an exclusive northbound-to-westbound left-turn lane and maintain the existing all-way stop control.

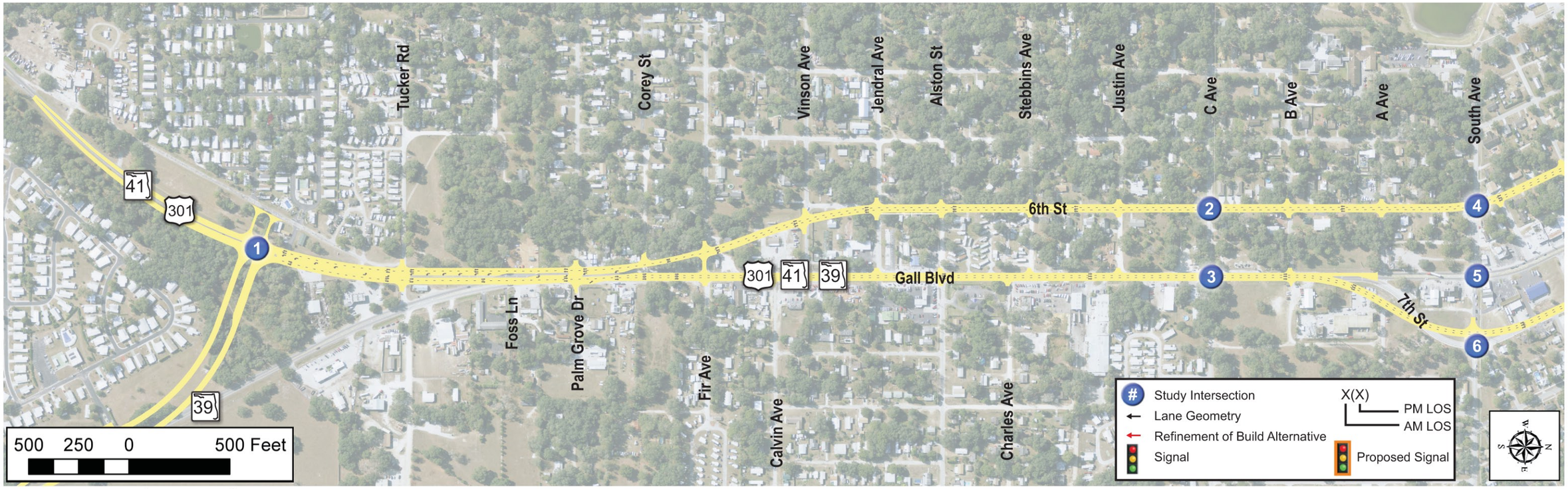
6th Street and 7th Street One-Way Pair Alternative:

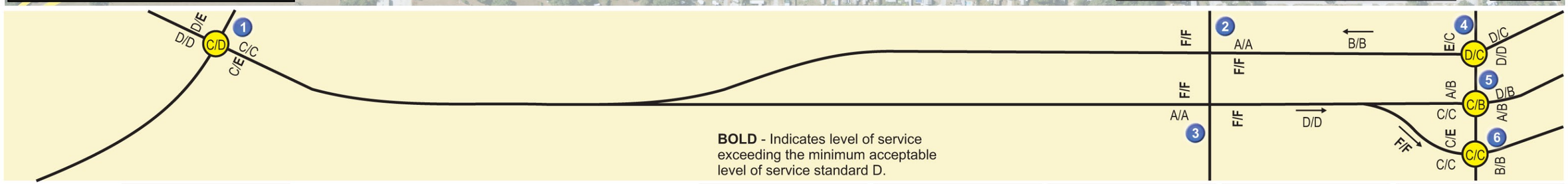
- Provide an exclusive eastbound-to-northbound left-turn lane with protected plus permitted left-turn signal phasing.

7th Street/Geiger Road (*6th Street and US 301/Gall Boulevard One-Way Pair Alternative Only):*

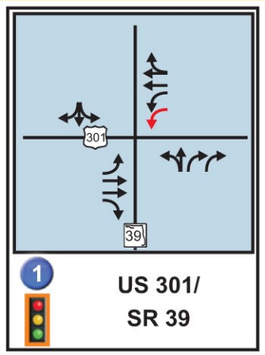
- Provide a second westbound through lane and maintain the existing all-way stop control.

If these above listed improvements were implemented the resulting LOS and delay is shown in **Table 4-17**. In addition, the design year (2035) Synchro intersection analysis sheets for the intersections with the above listed improvements are included in **Appendix K** (under separate cover).

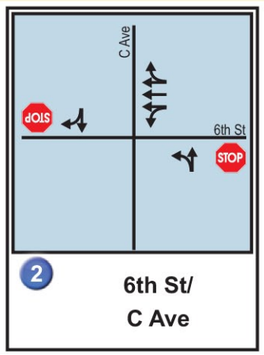




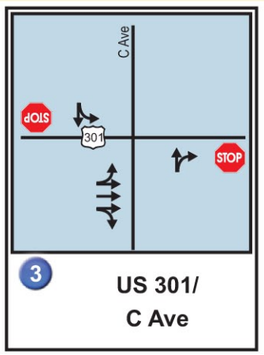
BOLD - Indicates level of service exceeding the minimum acceptable level of service standard D.



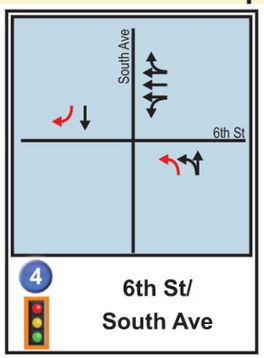
1 **US 301/ SR 39**



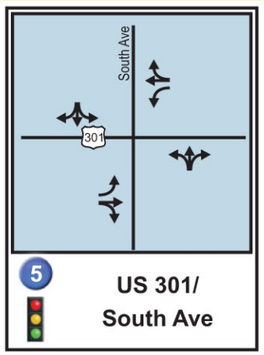
2 **6th St/ C Ave**



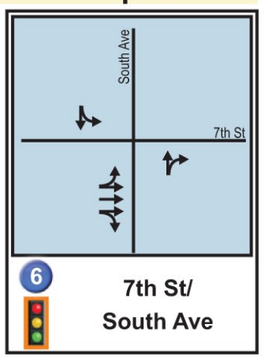
3 **US 301/ C Ave**



4 **6th St/ South Ave**



5 **US 301/ South Ave**

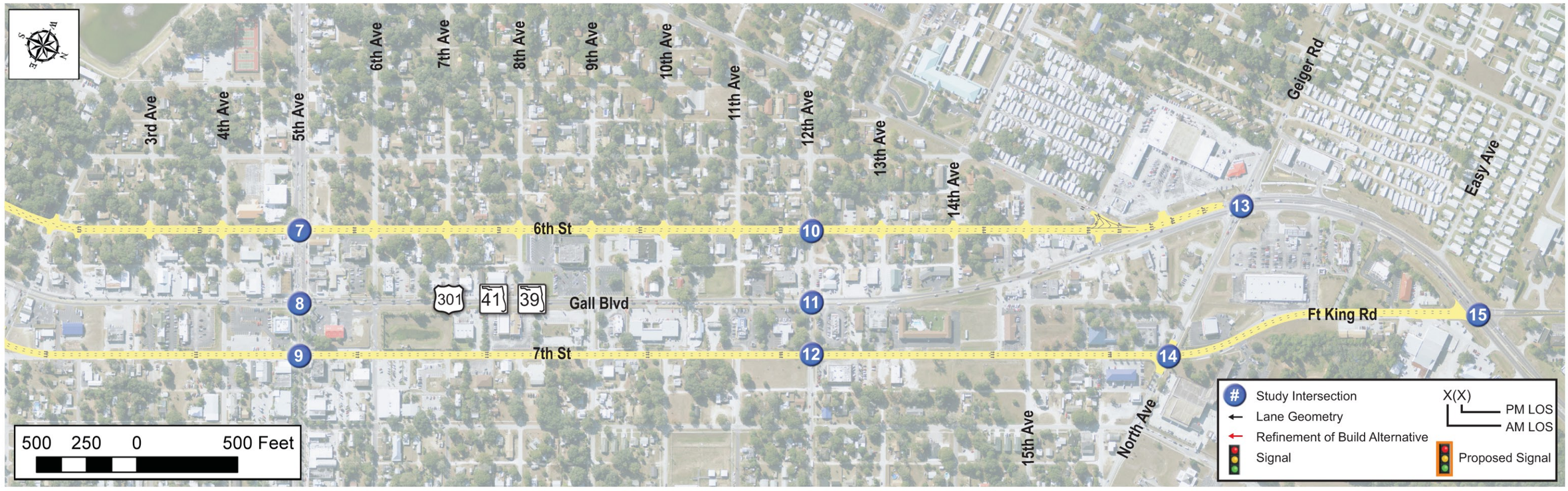


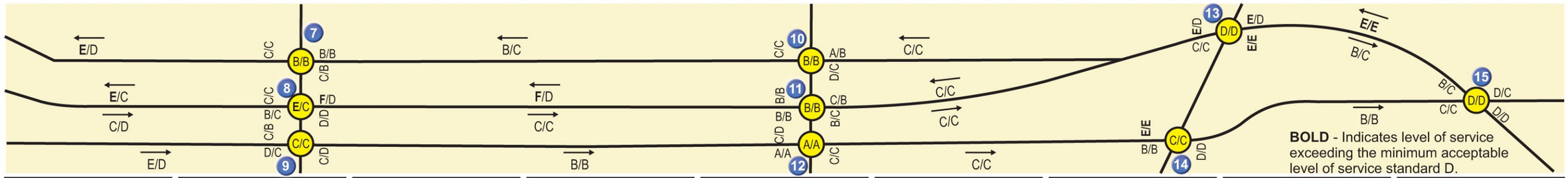
6 **7th St/ South Ave**

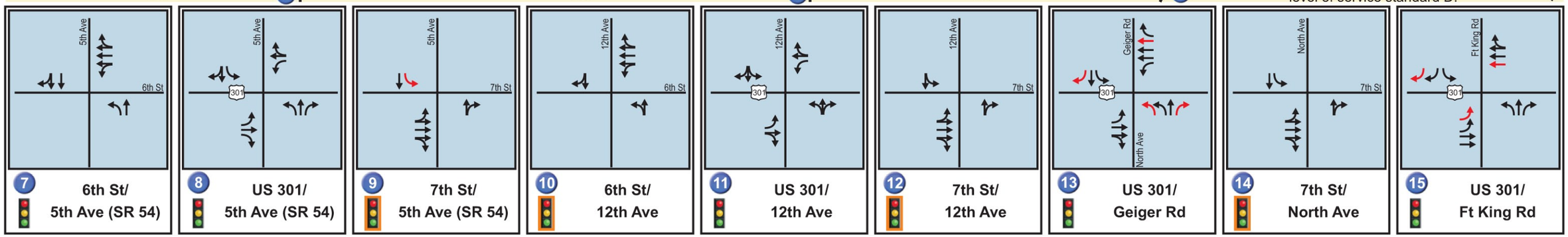
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

DESIGN YEAR (2035) REFINEMENT OF BUILD ALTERNATIVE LANE GEOMETRY AND LEVEL OF SERVICE (LOS)
6TH STREET AND 7TH STREET ONE-WAY PAIR ALTERNATIVE

FIGURE 4-8A



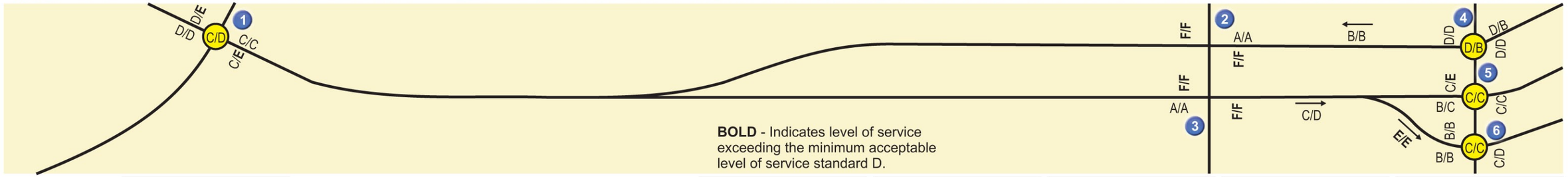




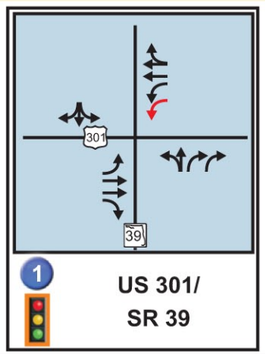
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

DESIGN YEAR (2035) REFINEMENT OF BUILD ALTERNATIVE LANE GEOMETRY AND LEVEL OF SERVICE (LOS)
6TH STREET AND 7TH STREET ONE-WAY PAIR ALTERNATIVE

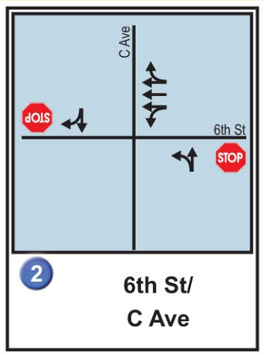
FIGURE 4-8B



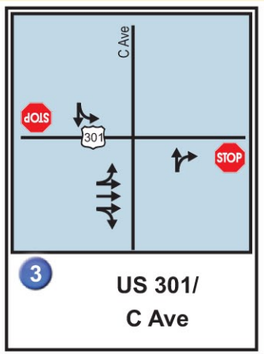
BOLD - Indicates level of service exceeding the minimum acceptable level of service standard D.



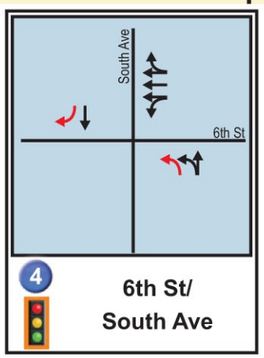
1 **US 301/ SR 39**



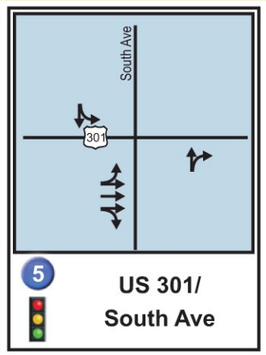
2 **6th St/ C Ave**



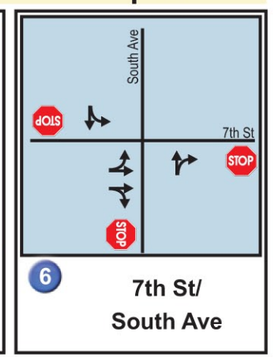
3 **US 301/ C Ave**



4 **6th St/ South Ave**



5 **US 301/ South Ave**

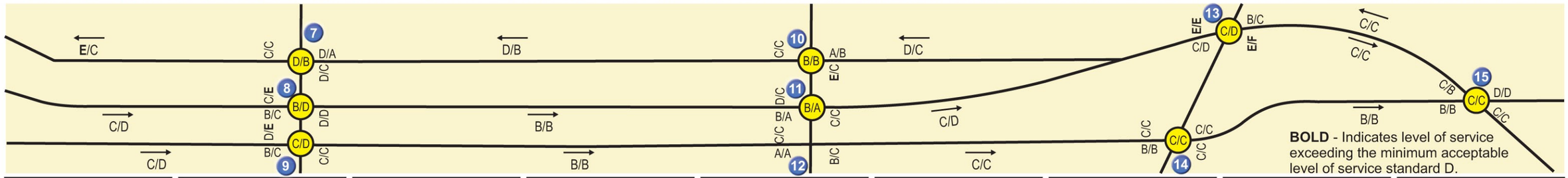


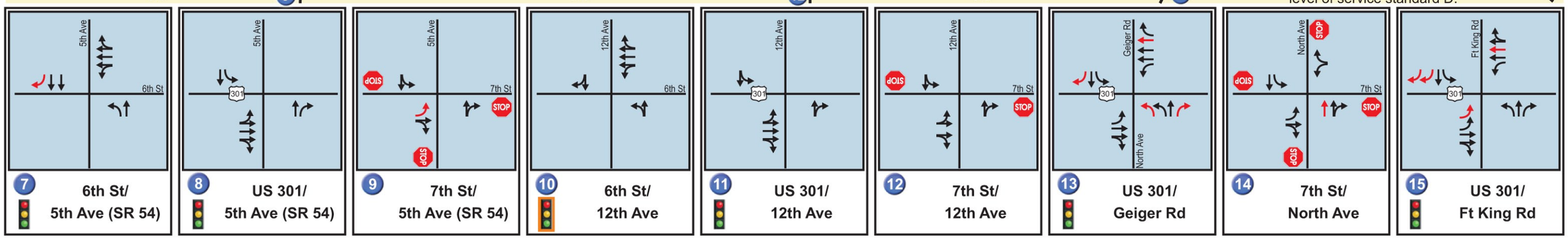
6 **7th St/ South Ave**

US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

DESIGN YEAR (2035) REFINEMENT OF BUILD ALTERNATIVE LANE GEOMETRY AND LEVEL OF SERVICE (LOS)
6TH STREET AND US 301/GALL BLVD ONE-WAY PAIR ALTERNATIVE

FIGURE 4-9A





US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

DESIGN YEAR (2035) REFINEMENT OF BUILD ALTERNATIVE LANE GEOMETRY AND LEVEL OF SERVICE (LOS)
6TH STREET AND US 301/GALL BLVD ONE-WAY PAIR ALTERNATIVE

FIGURE 4-9B

Table 4-17
Design Year (2035) Refinement of Build Alternative Intersection Control Delay Summary

Intersection	Intersection Approach Control Delay and LOS								Overall Intersection	
	Eastbound		Westbound		Northbound		Southbound			
	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS
6th Street and 7th Street One-Way Pair Alternative										
US 301										
SR 39	54.9 / 68.0	D / **E**	28.1 / 76.0	C / **E**	40.8 / 49.4	D / D	24.8 / 27.6	C / C	30.0 / 46.5	C / D
Geiger Road	55.7 / 53.2	**E** / D	65.3 / 58.9	**E** / **E**	28.0 / 30.7	C / C	57.7 / 38.4	**E** / D	54.1 / 40.2	D / D
6th Street										
South Avenue	66.2 / 35.0	**E** / C	45.8 / 35.8	D / D			45.5 / 25.0	D / C	46.9 / 28.7	D / C
7th Street										
SR 54	28.7 / 18.6	C / B	28.9 / 41.5	C / D	37.3 / 28.2	D / C			33.9 / 27.7	C / C
6th Street and US 301/Gall Boulevard One-Way Pair Alternative										
US 301										
SR 39	54.9 / 68.5	D / **E**	28.1 / 78.2	C / **E**	40.8 / 48.3	D / D	24.8 / 28.2	C / C	30.0 / 46.9	C / D
Geiger Road	62.3 / 70.5	**E** / **E**	71.9 / 86.9	**E** / **F**	28.1 / 48.9	C / D	17.0 / 20.1	B / C	28.5 / 41.3	C / D
6th Street										
South Avenue	43.3 / 37.5	D / D	40.9 / 42.7	D / D			48.9 / 12.0	D / B	47.8 / 17.0	D / B
SR 54	30.3 / 25.5	C / C	38.1 / 32.4	D / C			47.3 / 9.6	D / A	43.0 / 16.5	D / B
7th Street										
South Avenue	13.6 / 14.2	B / B	22.3 / 25.1	C / D	12.0 / 14.1	B / B			16.7 / 18.4	C / C
SR 54	29.1 / 38.1	D / **E**	18.5 / 21.4	C / C	14.9 / 20.4	B / C			21.6 / 27.2	C / D
Geiger Road	19.2 / 21.7	C / C	16.0 / 16.0	C / C	12.6 / 13.8	B / B	18.7 / 16.6	C / C	16.7 / 17.2	C / C

4.13 TRAFFIC SIMULATION ANALYSIS

In addition, to the capacity analysis using the Highway Capacity methodology of the Synchro software a traffic simulation analysis was conducted using SimTraffic Version 7 (Build 773). Since downtown Zephyrhills consists of a tightly spaced network of streets and intersections the simulation serves to uncover the interaction of traffic flow within the street network. Five runs were performed for the Design Year (2035) 6th Street and 7th Street One-Way Pair Alternative AM and PM peak periods, as well as the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative AM and PM peak periods. The Synchro/SimTraffic model developed previously for the downtown Zephyrhills study area was used to estimate the simulation results for this study. **Appendix L** and **Appendix M** contain the detailed simulation output for 6th Street and 7th Street One-Way Pair Alternative and 6th Street and US 301/Gall Boulevard One-Way Pair Alternative, respectively. The simulation results for each of the design year (2035) alternatives are provided in **Table 4-18.**

Table 4-18
SimTraffic Micro simulation Overall Measures of Effectiveness

Network Performance Measures of Effectiveness	6th Street and 7th Street One-Way Pair Alternative			6th Street and US 301/Gall Boulevard One-Way Pair Alternative		
	AM	PM	Total	AM	PM	Total
Total Delay (hr)	707.9	450.2	1158.1	513.3	594.7	1108.0
Delay / Vehicle (sec)	329.6	200.0	529.6	220.7	281.4	502.1
Total Stops	28458	28687	57145	27340	25067	52407
Travel Time (hr)	1032.0	798.7	1830.7	836.7	902.5	1739.2
Average Speed (mph)*	14	14	14	15	12	14
Fuel Used (gal)	503.3	469.4	972.7	472.8	470.6	943.4

*Total column represents an average of the AM and PM average speeds

Based on the results of the simulation, the network performance measures of effectiveness for the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative are better than the measures of effectiveness for the 6th Street and 7th Street One-Way Pair Alternative. The percent difference in measures of effectiveness between the two alternatives varies from zero to 39.6 percent and is generally greater in the AM than in the PM.

4.14 INTERSECTION QUEUE LENGTH ANALYSIS

Vehicle queue lengths for signalized intersections were estimated using the *Red Time Formula Method*[1]. The primary formula used in this method is as follows:

$$\text{95th Percentile Queue Length, ft} = \left[\frac{\text{DHV, }{}^{\text{veh}}/_{\text{hr}} \text{ x } (1 + \text{truck \%}) \text{ x Arrival Factor x } \left(1 - \frac{g}{C}\right) \text{ x Cycle Length, sec x } 25\ {}^{\text{ft}}/_{\text{veh}}}{3600 \text{ sec/hour x No. of Lanes}}\right]$$

Vehicle queue lengths for unsignalized two-way stop controlled (TWSC) intersections were estimated using Equation 17-37 from the *Highway Capacity Manual (HCM) 2000*[2]:

$$\text{95th Percentile Queue, veh} = 900T\left[{}^{v_x}/_{c_{m,x}} - 1 + \sqrt{\left({}^{v_x}/_{c_{m,x}} - 1\right)^2 + \frac{\left({}^{3600}/_{c_{m,x}}\right)\left({}^{V_x}/_{c_{m,x}}\right)}{150T}}\right]\left({}^{c_{m,x}}/_{3600}\right)$$

where

v_x = flow rate for movement x (veh/hr),

$c_{m,x}$= capacity of movement x (veh/hr), and

T = analysis time period (h) (T = 0.25 for a 15-min period).

The HCM does not provide a separate equation to estimate vehicle queues for all-way stop controlled (AWSC) intersections. Research has shown that it is reasonable to assume that AWSC intersections possess similar characteristics to TWSC intersections from the point of view of queuing systems, where vehicle arrivals follow a random process, and the service time can be represented by a general distribution[3]. Therefore, the same queue length model for TWSC intersections has been employed in this study to analyze AWSC intersections.

Spreadsheets used to calculate the projected intersection vehicle queues are provided in **Appendix N** (under separate cover). The design year (2035) queue lengths are summarized by individual movements in **Table 4-19** for both the 6th Street and 7th Street One-Way Pair Alternative and the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative. Queue lengths were also estimated for through movements since queuing in a through lane can sometimes block access to left or right turn lanes. The required length of turn lanes should be designed to account for the queue of the adjacent through movement and include the appropriate deceleration and taper distance from Index 301 of the FDOT Design Standards (Topic No. 625-010-003).

Table 4-19
Design Year (2035) Queue Lengths for 6th Street and 7th Street One-Way Pair Alternative and 6th Street and US 301/Gall Boulevard One-Way Pair Alternative

Intersection	Approach	6th Street and 7th Street One-Way Pair Alternative			6th Street and US 301/Gall Boulevard One-Way Pair Alternative		
		Movement	Queue Length (feet)		Movement	Queue Length (feet)	
			AM	PM		AM	PM
US 301							
SR 39	Eastbound	Left-Thru-Right	150	150	Left-Thru-Right	150	150
	Westbound	Left-Thru	50	50	Left-Thru	50	50
		Right	300	500	Right	300	500
	Northbound	Left	50	50	Left	50	50
		Thru	425	525	Thru	425	525
		Right	50	50	Right	50	50
	Southbound	Left	425	450	Left	425	450
		Thru-Right	225	175	Thru-Right	225	175
C Avenue (unsignalized)	Eastbound	Left-Thru	275	400	Left-Thru	325	400
	Westbound	Thru-Right	175	300	Thru-Right	175	300
South Avenue	Eastbound	Left-Thru-Right	175	200	Left-Thru	225	250
	Westbound	Left-Thru-Right	225	225	Thru-Right	250	250
	Northbound	Left	50	50	Left-Thru-Right	250	325
		Thru-Right	325	325			
	Southbound	Left	100	75			
		Thru-Right	350	250			
SR 54	Eastbound	Left	150	175	Left	200	250
		Thru-Right	325	350	Thru	250	250
	Westbound	Left	50	50	Thru	275	300
		Thru	300	325			
		Right	50	75	Right	125	150
	Northbound	Left	100	125	Left-Thru-Right	300	375
		Thru	250	325			
		Right	50	50			
	Southbound	Left	100	100			
		Thru-Right	475	400			
12th Avenue	Eastbound	Left-Thru-Right	150	175	Left-Thru	200	200
	Westbound	Left-Thru-Right	175	200	Thru-Right	225	225
	Northbound	Left	50	50	Left-Thru-Right	250	300
		Thru-Right	275	350			
	Southbound	Left	75	50			
		Thru-Right	325	275			

Table 4-19 (Cont.)
Design Year (2035) Queue Lengths for 6th and 7th Street One-Way Pair Alternative and 6th Street and US 301/Gall Boulevard One-Way Pair Alternative

Intersection	Approach	6th Street and 7th Street One-Way Pair Alternative			6th Street and US 301/Gall Boulevard One-Way Pair Alternative		
		Movement	Queue Length (feet)		Movement	Queue Length (feet)	
			AM	PM		AM	PM
Geiger Road	Eastbound	Left	150	175	Left	150	175
		Thru	200	200	Thru	200	200
		Right	150	125	Right	150	125
	Westbound	Left	225	200	Left	225	200
		Thru	275	250	Thru	250	250
		Right	50	75	Right	200	225
	Northbound	Left	125	150	Left	150	175
		Thru-Right	250	300	Thru-Right	375	425
	Southbound	Left	300	325	Left	150	200
		Thru	450	375	Thru	400	350
		Right	100	100	Right	100	75
Fort King Road	Eastbound	Left	50	50	Left	50	50
		Right	250	175	Thru	100	125
					Right	250	175
	Westbound	Left	50	50	Left	50	50
		Thru	350	400	Thru	75	150
		Right	50	50	Right	50	50
	Northbound	Left	125	150	Left	275	325
		Thru	150	200	Thru-Right	325	400
	Southbound	Thru-Right	475	475	Left	150	200
					Thru-Right	425	400
6th Street							
C Avenue (unsignalized)	Eastbound	Thru-Right	400	325	Thru-Right	400	325
	Westbound	Left-Thru	425	475	Left-Thru	425	475
South Avenue	Eastbound	Thru	50	100	Thru	50	100
		Right	200	150	Right	200	175
	Westbound	Left	300	250	Left	175	175
		Left-Thru	300	250	Left-Thru	175	175
	Southbound	Left-Thru-Right	350	300	Left-Thru-Right	375	300
SR 54	Eastbound	Thru-Right	275	250	Thru	225	250
					Right	225	175
	Westbound	Left	75	50	Left	125	100
		Thru	300	300	Thru	300	325
	Southbound	Left-Thru-Right	325	325	Left-Thru-Right	350	325

Table 4-19 (Cont.)
Design Year (2035) Queue Lengths for 6th and 7th Street One-Way Pair Alternative and 6th Street and US 301/Gall Boulevard One-Way Pair Alternative

Intersection	Approach	6th Street and 7th Street One-Way Pair Alternative			6th Street and US 301/Gall Boulevard One-Way Pair Alternative		
		Movement	Queue Length (feet)		Movement	Queue Length (feet)	
			AM	PM		AM	PM
12th Avenue	Eastbound	Thru-Right	175	175	Thru-Right	175	150
	Westbound	Left-Thru	200	200	Left-Thru	250	225
	Southbound	Left-Thru-Right	225	225	Left-Thru-Right	350	275
7th Street							
South Avenue[1]	Eastbound	Left-Thru	200	200	Left-Thru	75	75
	Westbound	Thru-Right	250	250	Thru-Right	175	200
	Northbound	Left-Thru-Right	275	300	Left-Thru	50	50
					Thru-Right	50	75
SR 54[1]	Eastbound	Left	125	175	Left-Thru	225	275
		Thru	225	250			
	Westbound	Thru-Right	250	300	Thru-Right	125	125
	Northbound	Left-Thru-Right	300	350	Left	50	50
					Thru-Right	100	150
12th Avenue[2]	Eastbound	Left-Thru	200	250	Left-Thru	50	75
	Westbound	Thru-Right	150	175	Thru-Right	50	50
	Northbound	Left-Thru-Right	250	250			
North Avenue[1]	Eastbound	Left	125	150	absent	50	50
		Thru	325	300	Thru	125	150
	Westbound				Thru	100	100
		Thru-Right	400	400	Thru-Right	50	50
	Northbound	Left-Thru-Right	250	300	Left	50	50
					Thru-Right	50	50
	Southbound				Left-Thru-Right	75	50

[1] The 7th Street intersections of South, SR 54 and North Avenue are assumed to be operated under signal control in the 6th Street and 7th Street One-Way Pair Alternative and all-way stop controlled (AWSC) under the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative.

[2] The 7th Street intersections at South Avenue and 12th Avenue are assumed to be operated under signal control in the 6th Street and 7th Street One-Way Pair Alternative and two-way stop controlled (TWSC) under the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative.

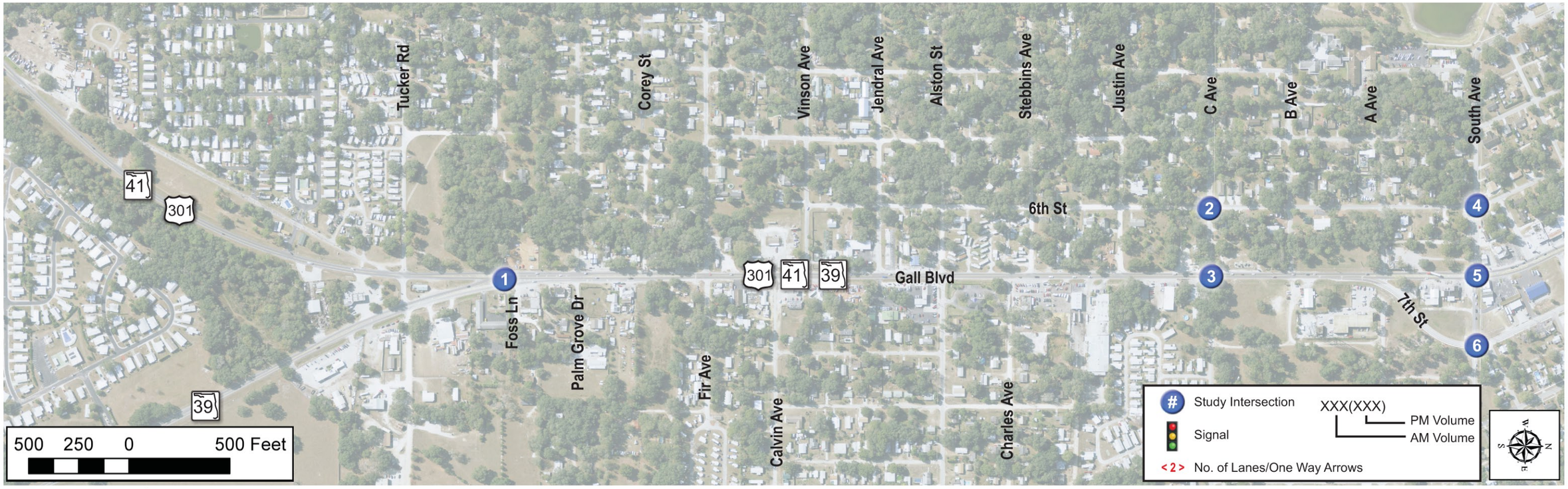
4.15 DEVELOPMENT OF OPENING YEAR (2015) DESIGN HOUR VOLUMES

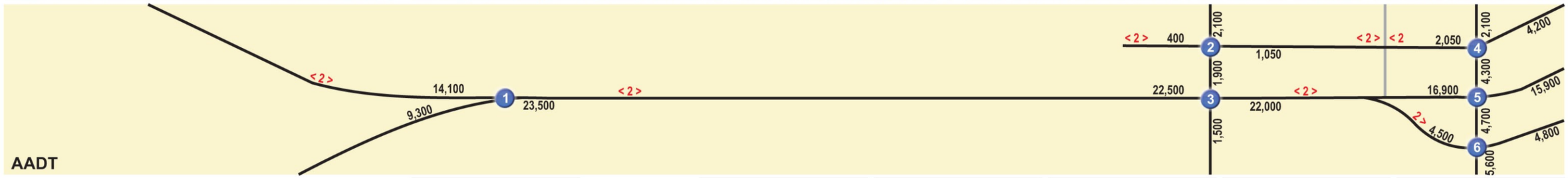
The opening year (2015) AM and PM design peak hour intersection turning movement volumes were estimated by linear interpolating between the existing year (2010) and the design year (2035) turning movement volumes. In order to perform the linear interpolation of turning movement volumes, existing year (2010) turning movement volumes were developed for the 6th Street and 7th Street One-Way Pair and 6th Street and US 301/Gall Boulevard One-Way Pair Alternatives by using the 2035 model traffic

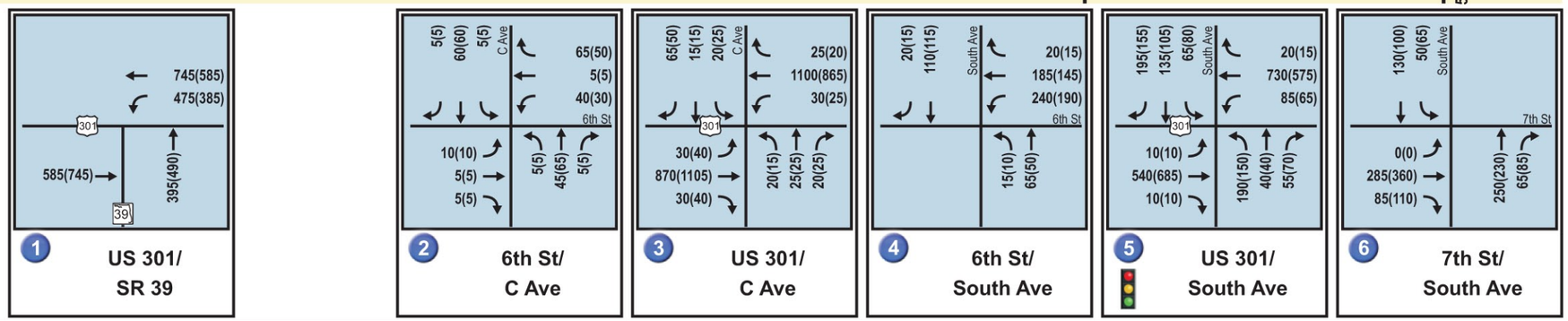
splits. The opening year (2015) daily traffic volumes were developed by dividing approach traffic volumes by the K_{30}-factor of 9.4 percent and the D_{30}-factor of 56.0 percent. The opening year (2015) daily, AM and PM design hour traffic volumes developed for the No-Build, 6th Street and 7th Street One-Way Pair and 6th Street and US 301/Gall Boulevard One-Way Pair Alternatives are shown on **Figures 4-10 (A-B), Figures 4-11 (A-B) and Figures 4-12 (A-B)** for the three alternatives.

4.16 OPENING YEAR (2015) INTERSECTION LEVEL OF SERVICE ANALYSIS

Signalized intersection LOS was estimated using the HCM methodology module of Synchro/SimTraffic software. In anticipation of increased traffic volumes, signal timing was optimized to reflect the higher traffic volumes that can be expected in the future. The analysis results for the 15 study intersections are summarized in **Tables 4-20** for the No-Build Alternative, **Table 4-21** for the 6th Street and 7th Street One-Way Pair Alternative and **Table 4-22** for the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative. The opening year (2015) lane geometry and level of service is also shown on **Figures 4-13 (A-B), Figures 4-14 (A-B)** and **Figures 4-15 (A-B)** for the respective alternatives**.** The opening year (2015) Synchro intersection analysis sheets are included in **Appendix O** (under separate cover).



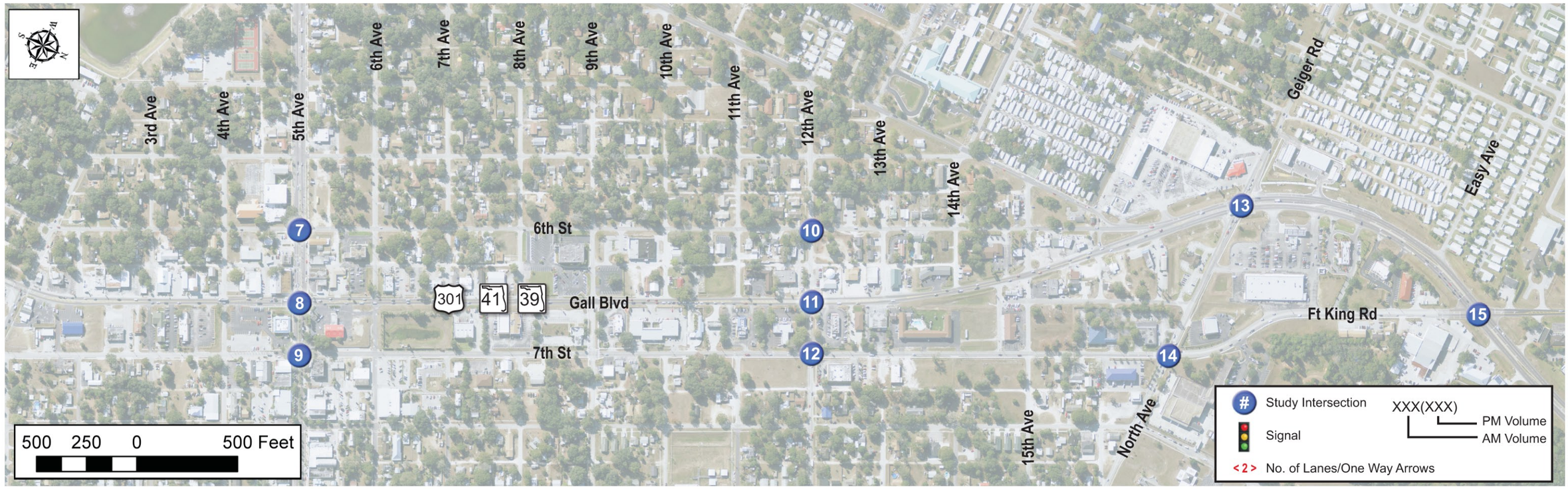


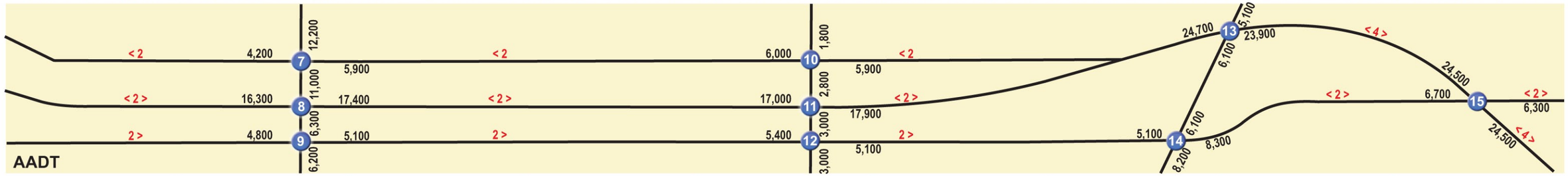


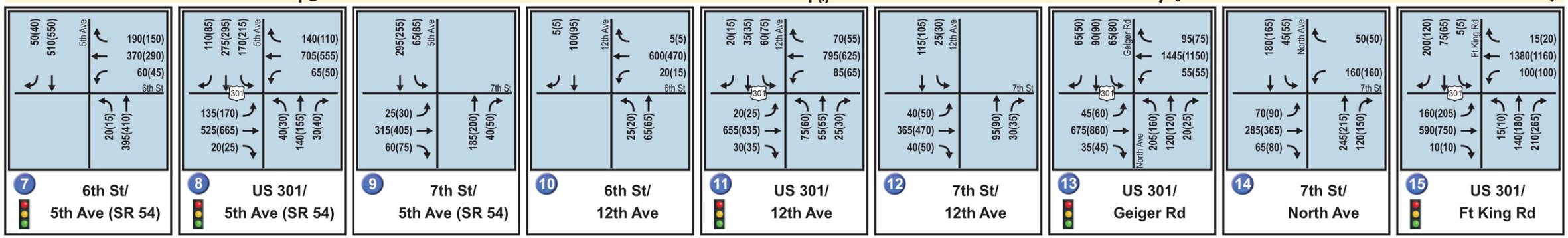
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

OPENING YEAR (2015) NO-BUILD ALTERNATIVE ANNUAL AVERAGE DAILY TRAFFIC (AADT) AND DESIGN HOUR TURNING MOVEMENT VOLUMES

FIGURE 4-10A



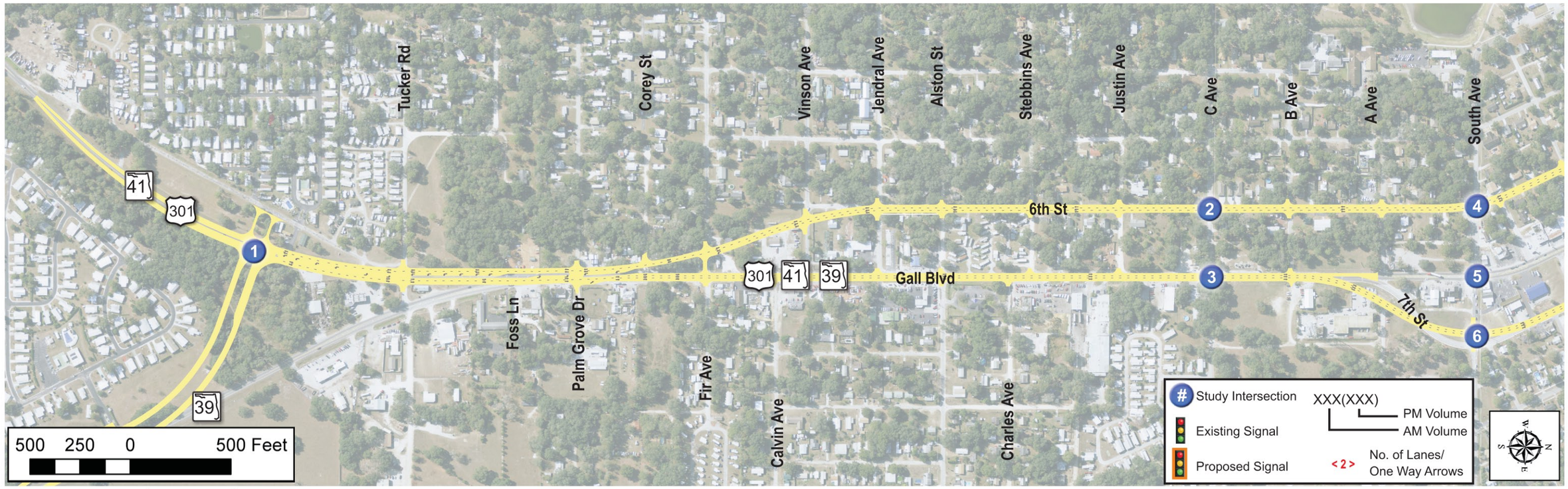


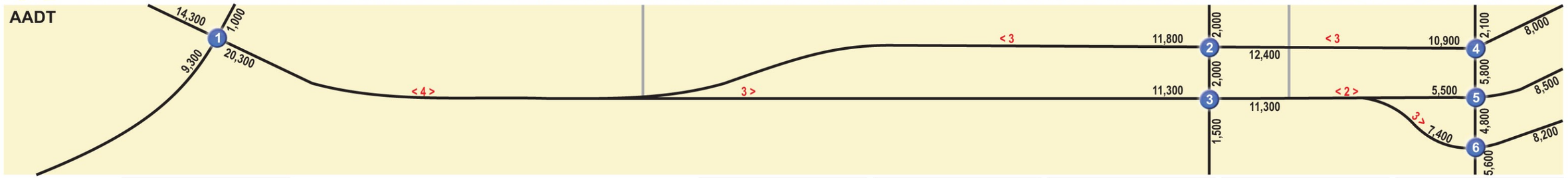


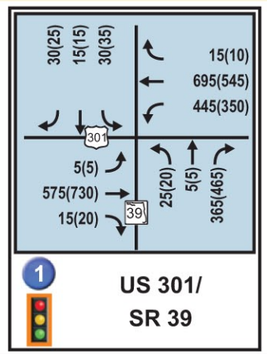
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

OPENING YEAR (2015) NO-BUILD ALTERNATIVE ANNUAL AVERAGE DAILY TRAFFIC (AADT) AND DESIGN HOUR TURNING MOVEMENT VOLUMES

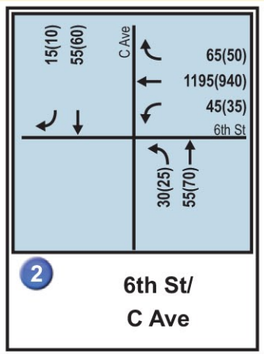
FIGURE 4-10B



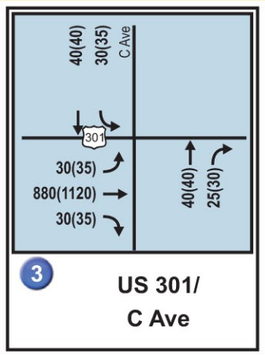




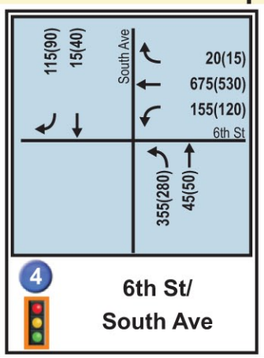
1 US 301/ SR 39



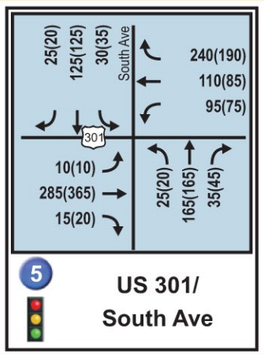
2 6th St/ C Ave



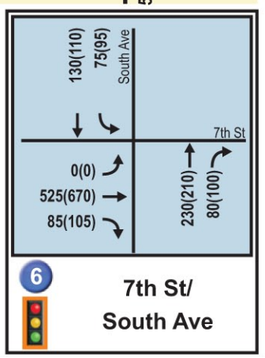
3 US 301/ C Ave



4 6th St/ South Ave



5 US 301/ South Ave

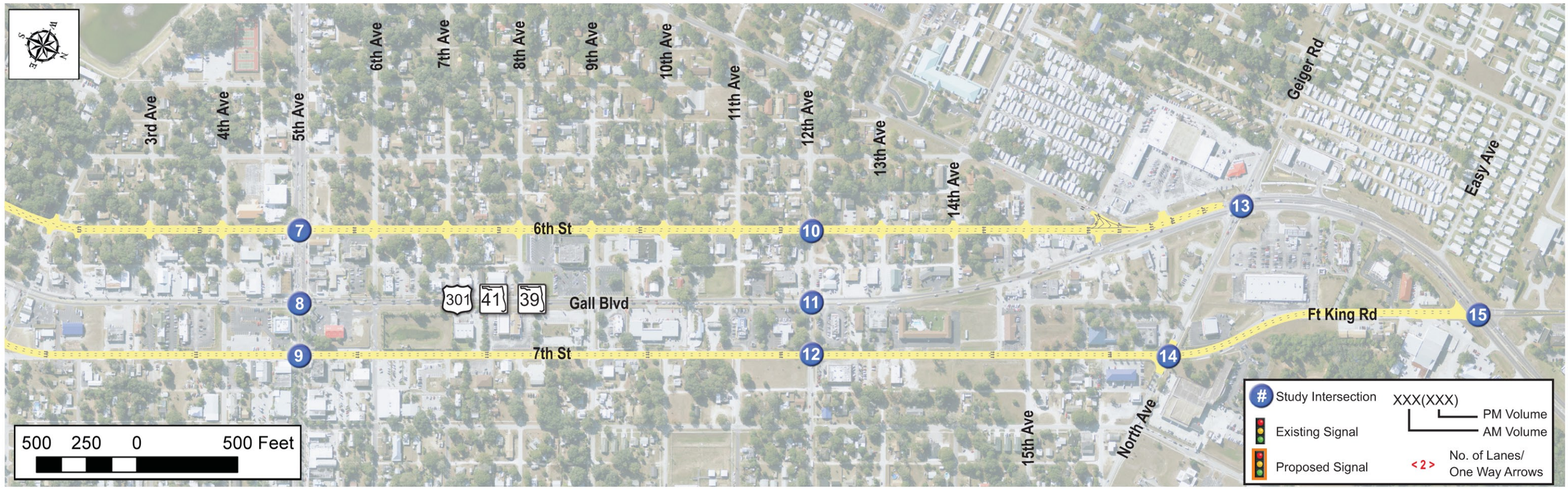


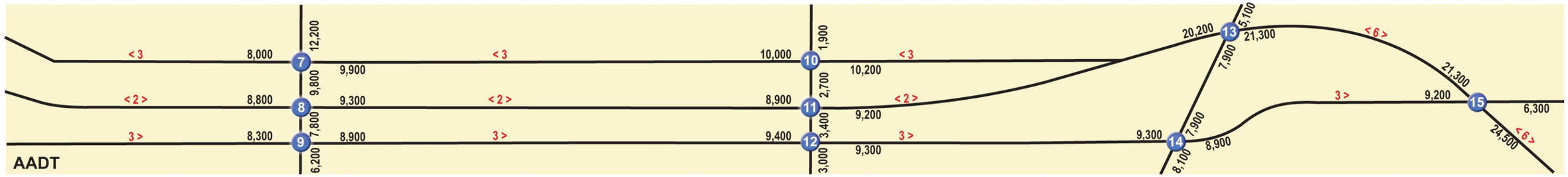
6 7th St/ South Ave

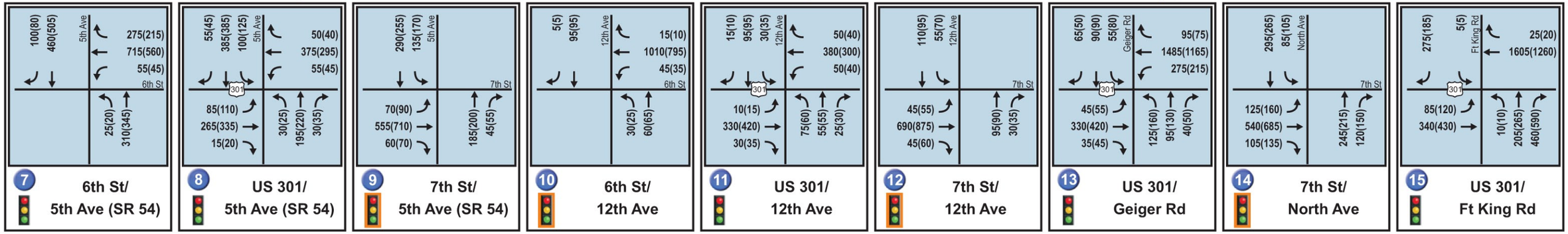
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

OPENING YEAR (2015) BUILD ANNUAL AVERAGE DAILY TRAFFIC (AADT) AND DESIGN HOUR TURNING MOVEMENT VOLUMES 6TH STREET AND 7TH STREET ONE-WAY PAIR ALTERNATIVE

FIGURE 4-11A



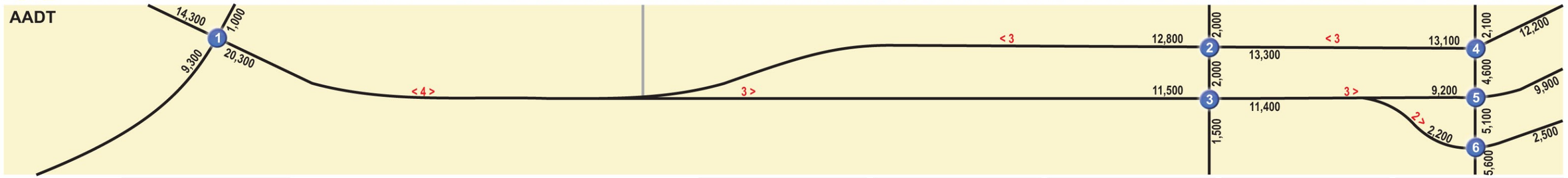


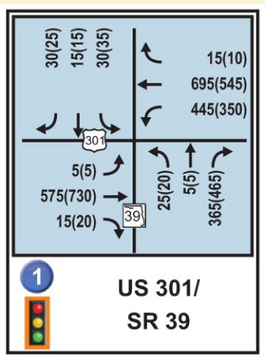


US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

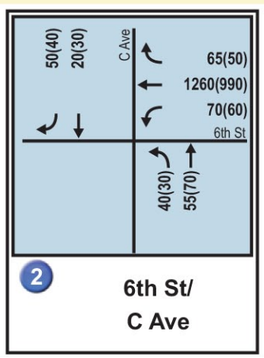
OPENING YEAR (2015) BUILD ANNUAL AVERAGE DAILY TRAFFIC (AADT) AND DESIGN HOUR TURNING MOVEMENT VOLUMES 6TH STREET AND 7TH STREET ONE-WAY PAIR ALTERNATIVE

FIGURE 4-11B

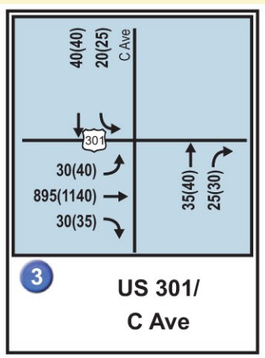




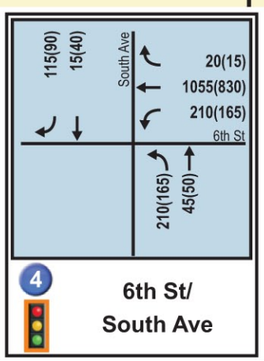
1 US 301/ SR 39



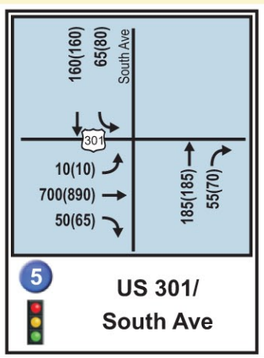
2 6th St/ C Ave



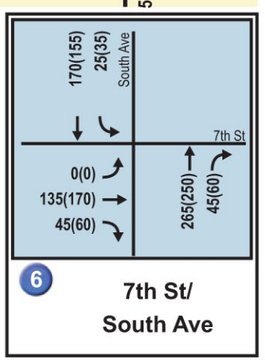
3 US 301/ C Ave



4 6th St/ South Ave



5 US 301/ South Ave

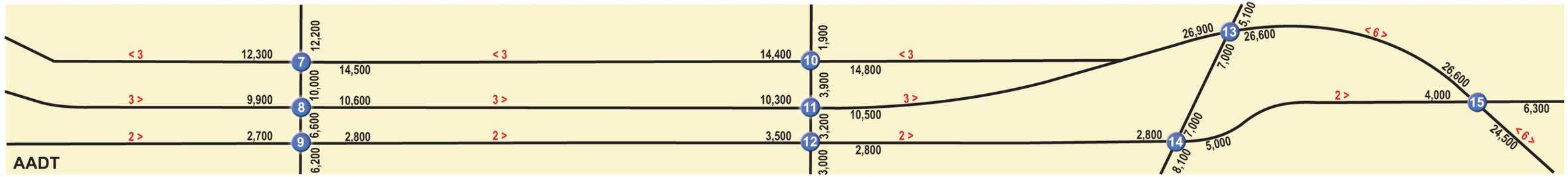


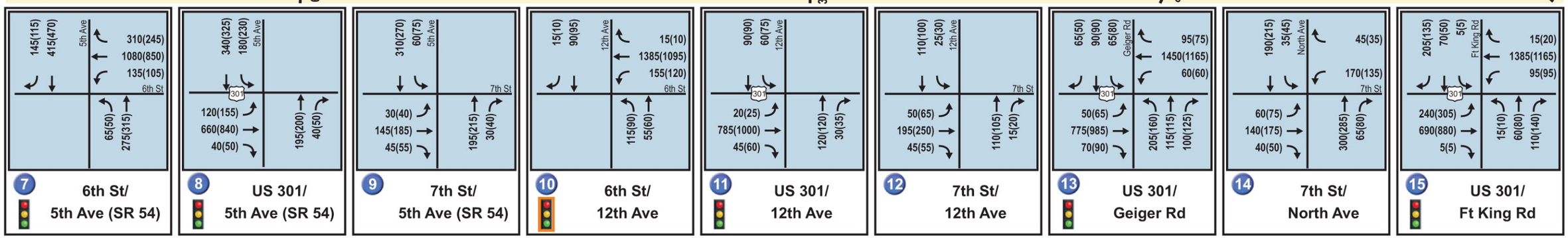
6 7th St/ South Ave

US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

OPENING YEAR (2015) BUILD ANNUAL AVERAGE DAILY TRAFFIC (AADT) AND DESIGN HOUR TURNING MOVEMENT VOLUMES 6TH STREET AND US 301/GALL BLVD ONE-WAY PAIR ALTERNATIVE

FIGURE 4-12A





US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

OPENING YEAR (2015) BUILD ANNUAL AVERAGE DAILY TRAFFIC (AADT) AND DESIGN HOUR TURNING MOVEMENT VOLUMES
6TH STREET AND US 301/GALL BLVD ONE-WAY PAIR ALTERNATIVE

FIGURE 4-12B

Table 4-20
Opening Year (2015) No-Build Alternative US 301 Intersection Control Delay Summary

Intersection	Intersection Approach Control Delay and LOS								Overall Intersection	
	Eastbound		Westbound		Northbound		Southbound			
	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS
US 301										
SR 39			0.0 / 0.0	A / A	0.0 / 0.0	A / A	5.4 / 5.8	A / A	3.6 / 3.3	A / A
C Avenue[1]	>50 sec / >50 sec	**F** / **F**	>50 sec / >50 sec	**F** / **F**	1.9 / 2.6	A / A	1.9 / 1.6	A / A		
South Avenue	23.4 / 21.5	C / C	54.2 / 31.7	D / C	19.2 / 23.4	B / C	36.5 / 16.5	D / B	31.8 / 21.9	C / C
SR 54	39.7 / 35.2	D / D	51.9 / 45.8	D / D	16.1 / 19.2	B / B	77.1 / 51.7	**E** / D	48.4 / 35.4	D / D
12th Avenue	22.0 / 22.5	C / C	23.2 / 22.6	C / C	16.5 / 31.2	B / C	29.7 / 19.3	C / B	23.9 / 25.3	C / C
Geiger Road	43.4 / 42.5	D / D	36.7 / 33.5	D / C	10.2 / 8.5	B / A	9.7 / 6.6	A / A	15.6 / 13.1	B / B
Fort King Road	79.5 / 39.2	**E** / D	37.8 / 41.2	D / D	23.7 / 16.1	C / B	8.9 / 7.3	A / A	23.2 / 17.7	C / B
6th Street										
C Avenue[1]	0.5 / 0.6	A / A	0.7 / 0.5	A / A	9.9 / 9.9	A / A	9.5 / 9.6	A / A		
South Avenue[1]	24.6 / 19.0	C / C	25.7 / 17.9	D / C			4.4 / 4.3	A / A		
SR 54	7.9 / 5.8	A / A	7.9 / 5.9	A / A			42.1 / 43.1	D / D	21.2 / 17.9	C / B
12th Avenue[1]	19.4 / 15.7	C / C	18.6 / 15.3	C / C			0.3 / 0.3	A / A		
7th Street										
South Avenue[1]	19.0 / 24.0	C / C	18.5 / 21.9	C / C	0.0 / 0.0	A / A				
SR 54[2]	18.0 / 20.5	C / C	12.7 / 15.2	B / C	20.1 / 40.0	C / **E**			17.6 / 28.3	C / D
12th Avenue[1]	17.5 / 21.7	C / C	14.8 / 17.2	B / C	0.8 / 0.8	A / A				
Geiger Road[2]	15.6 / 15.5	C / C	38.3 / 41.6	**E** / **E**	29.6 / >50 sec	D / **F**	20.3 / 21.3	C / C	28.0 / 43.6	D / **E**

[1] Indicates two-way stop controlled (TWSC) intersection; overall delay is not calculated
[2] Indicates all-way stop controlled (AWSC) intersection
Bold – Indicates level of service exceeding the minimum acceptable level of service standard D

Table 4-21
Opening Year (2015) 6th Street and 7th Street One-Way Pair Alternative US 301 Intersection Control Delay Summary

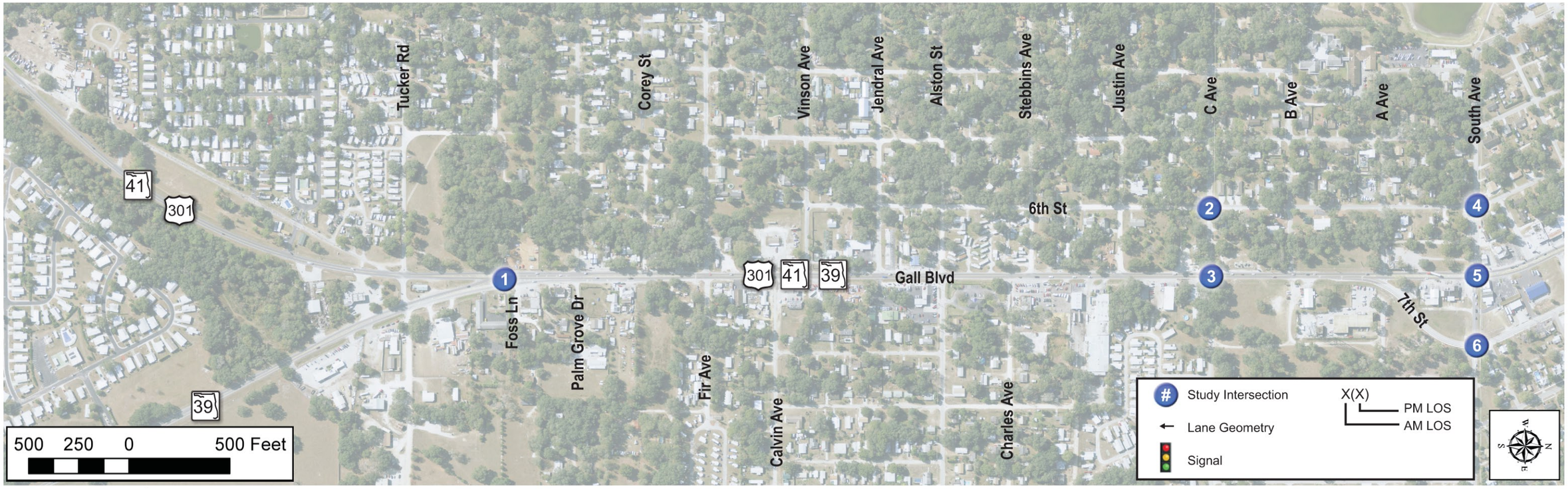
Intersection	Intersection Approach Control Delay and LOS								Overall Intersection	
	Eastbound		Westbound		Northbound		Southbound			
	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS
US 301										
SR 39	32.1 / 29.9	C / C	15.1 / 16.6	B / B	19.8 / 18.1	B / B	19.8 / 18.5	B / B	19.3 / 18.3	B / B
C Avenue[1]	23.3 / 36.0	C / **E**	20.7 / 29.4	C / D	0.3 / 0.3	A / A				
South Avenue	2.1 / 6.3	A / A	1.6 / 3.4	A / A	21.7 / 26.7	C / C	20.7 / 55.1	C / **E**	14.4 / 27.5	B / C
SR 54	15.8 / 12.4	B / B	26.6 / 22.8	C / C	17.3 / 22.0	B / C	38.3 / 28.7	D / C	24.4 / 20.5	C / C
12th Avenue	8.3 / 17.6	A / B	12.2 / 13.6	B / B	20.7 / 18.0	C / B	12.3 / 13.4	B / B	14.5 / 15.9	B / B
Geiger Road	29.8 / 32.5	C / C	17.5 / 20.4	B / C	5.2 / 5.6	A / A	13.4 / 11.5	B / B	13.8 / 13.3	B / B
Fort King Road	50.9 / 27.3	D / C	20.4 / 39.6	C / D	19.0 / 19.1	B / B	15.7 / 12.6	B / B	20.5 / 22.9	C / C
6th Street										
C Avenue[1]	49.9 / 30.0	**E** / D	>50 sec / 36.1	**F** / **E**			0.3 / 0.3	A / A		
South Avenue	9.2 / 8.4	A / A	16.3 / 9.7	B / A			21.5 / 16.8	C / B	18.8 / 13.7	B / B
SR 54	10.5 / 7.6	B / A	7.5 / 13.2	A / B			27.9 / 4.0	C / A	19.3 / 7.1	B / A
12th Avenue	15.6 / 10.6	B / B	15.1 / 11.7	B / B			7.9 / 22.7	A / C	9.0 / 20.6	A / C
7th Street										
South Avenue	7.1 / 7.6	A / A	10.7 / 11.7	B / B	19.9 / 23.0	B / C			15.0 / 17.8	B / B
SR 54	4.8 / 9.1	A / A	6.9 / 9.1	A / A	33.6 / 18.2	C / B			19.9 / 14.2	B / B
12th Avenue	11.9 / 7.7	B / A	10.2 / 13.7	B / B	20.6 / 9.6	C / A			18.1 / 9.7	B / A
Geiger Road	18.5 / 34.5	B / C	29.3 / 32.3	C / C	1.5 / 1.7	A / A			12.5 / 15.3	B / B

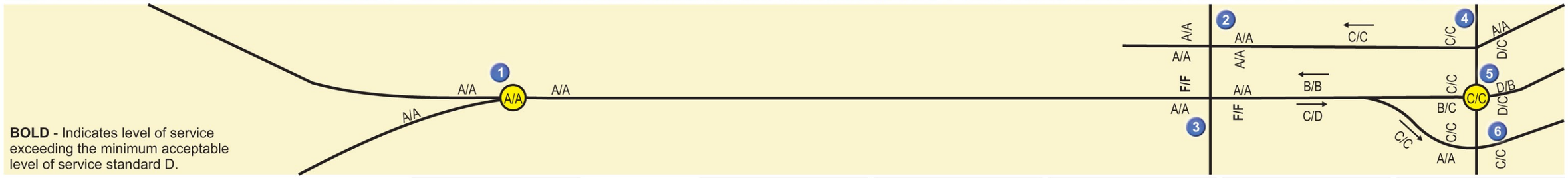
[1] Indicates two-way stop controlled (TWSC) intersection; overall delay is not calculated
Bold – Indicates level of service exceeding the minimum acceptable level of service standard D

Table 4-22
Opening Year (2015) 6th Street and US 301/Gall Boulevard One-Way Pair Alternative US 301 Intersection Control Delay Summary

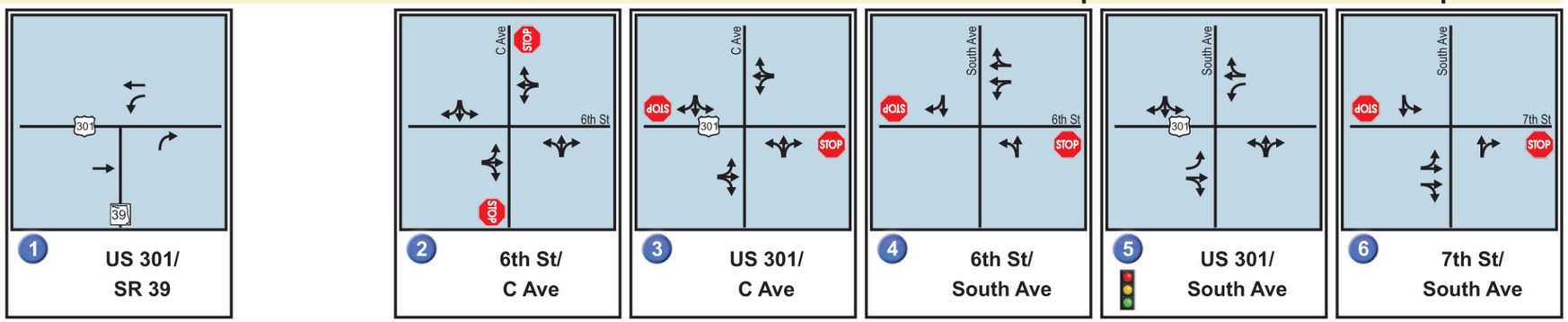
Intersection	Intersection Approach Control Delay and LOS								Overall Intersection	
	Eastbound		Westbound		Northbound		Southbound			
	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS	Control Delay (Sec/Veh)	LOS
US 301										
SR 39	32.1 / 29.9	C / C	15.1 / 16.6	B / B	19.8 / 18.1	B / B	19.8 / 18.5	B / B	19.3 / 18.3	B / B
C Avenue[1]	24.0 / 38.4	C / **E**	20.2 / 31.0	C / D	0.3 / 0.3	A / A				
South Avenue	7.0 / 8.0	A / A	10.3 / 14.5	B / B	27.6 / 23.1	C / C			20.4 / 19.1	C / B
SR 54	6.1 / 6.9	A / A	19.0 / 24.6	B / C	9.8 / 9.9	A / A			10.0 / 11.0	A / B
12th Avenue	9.1 / 16.3	A / B	11.0 / 16.0	B / B	9.1 / 8.6	A / A			9.4 / 10.3	A / B
Geiger Road	51.8 / 37.8	D / D	44.8 / 30.0	D / C	11.3 / 3.7	B / A	16.0 / 13.8	B / B	21.0 / 13.9	C / B
Fort King Road	118.6 / 38.9	**F** / D	43.9 / 34.6	D / C	61.2 / 56.6	**E** / **E**	7.8 / 7.0	A / A	38.0 / 31.7	D / C
6th Street										
C Avenue[1]	26.2 / 22.1	D / C	>50 sec / 47.1	**F** / **E**			0.5 / 0.5	A / A		
South Avenue	18.1 / 13.7	B / B	31.4 / 20.9	C / C			10.2 / 13.4	B / B	14.1 / 14.6	B / B
SR 54	19.7 / 13.4	B / B	17.2 / 15.3	B / B			9.5 / 8.3	A / A	12.9 / 10.9	B / B
12th Avenue	25.8 / 19.0	C / B	28.0 / 12.4	C / B			12.1 / 8.8	B / A	14.4 / 9.9	B / A
7th Street										
South Avenue[1]	13.3 / 14.5	B / B	13.8 / 14.5	B / B	0.0 / 0.0	A / A				
SR 54[2]	14.3 / 14.8	B / B	10.9 / 12.0	B / B	11.6 / 13.4	B / B			12.6 / 13.6	B / B
12th Avenue[1]	14.3 / 16.3	B / C	13.1 / 14.4	B / B	1.4 / 1.4	A / A				
Geiger Road[2]	13.4 / 14.5	B / B	27.0 / 28.2	D / D	12.9 / 14.6	B / B	17.1 / 15.8	C / C	18.8 / 19.3	C / C

[1] Indicates two-way stop controlled (TWSC) intersection; overall delay is not calculated
[2] Indicates all-way stop controlled (AWSC) intersection
Bold – Indicates level of service exceeding the minimum acceptable level of service standard D





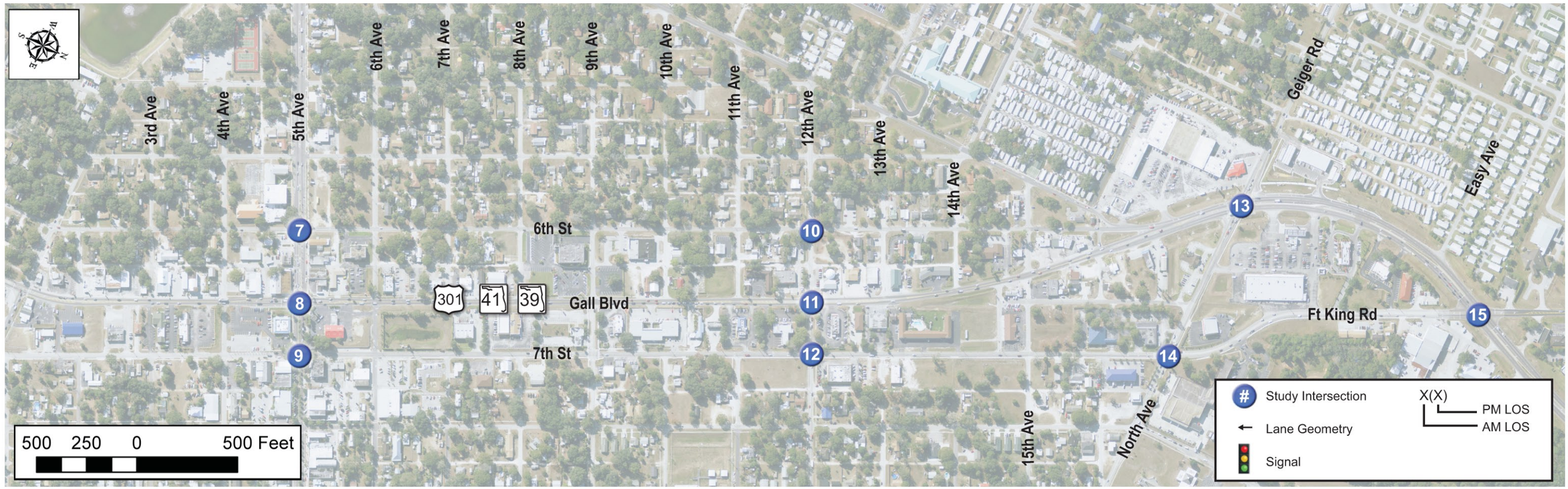
BOLD - Indicates level of service exceeding the minimum acceptable level of service standard D.

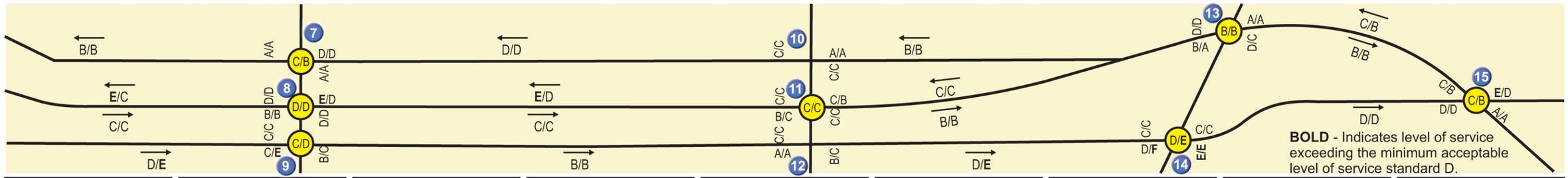


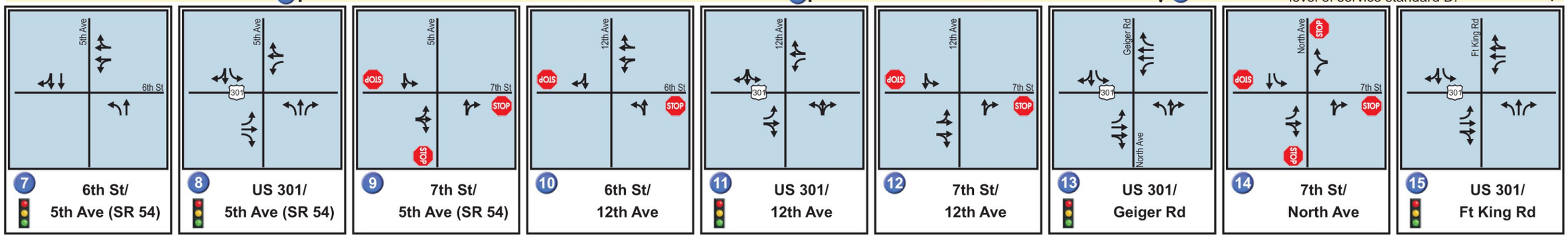
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

OPENING YEAR (2015) NO-BUILD LANE GEOMETRY AND LEVEL OF SERVICE (LOS)

FIGURE 4-13A



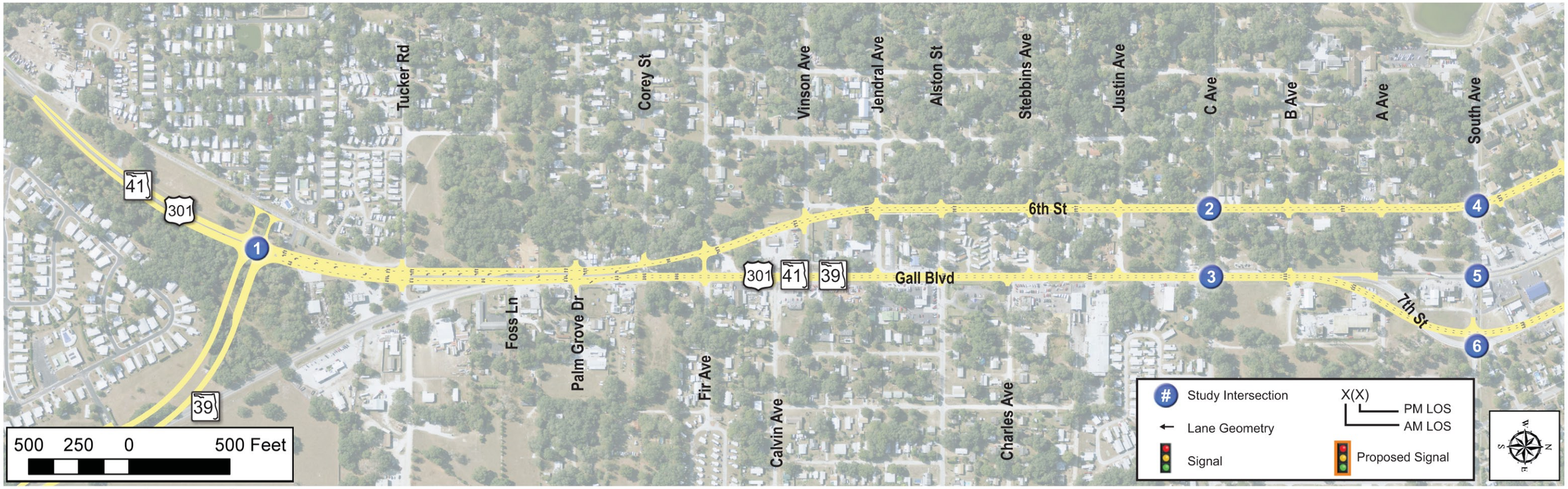




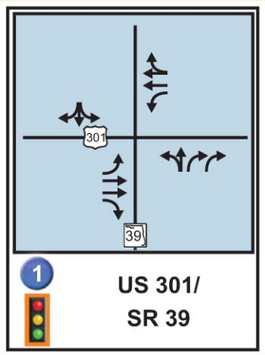
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

OPENING YEAR (2015) NO-BUILD LANE GEOMETRY AND LEVEL OF SERVICE (LOS)

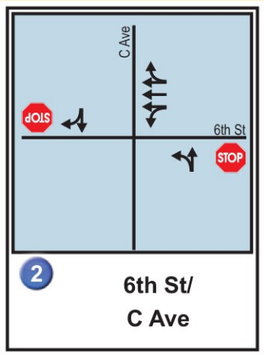
FIGURE 4-13B



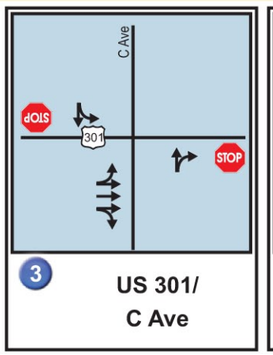
BOLD - Indicates level of service exceeding the minimum acceptable level of service standard D.



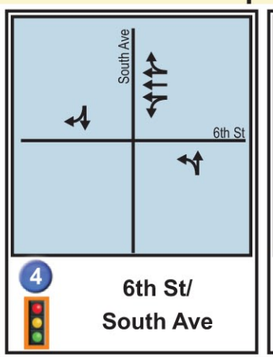
1 **US 301/ SR 39**



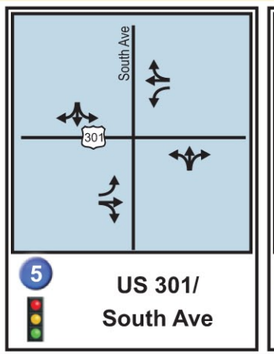
2 **6th St/ C Ave**



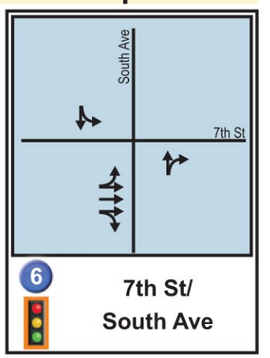
3 **US 301/ C Ave**



4 **6th St/ South Ave**



5 **US 301/ South Ave**

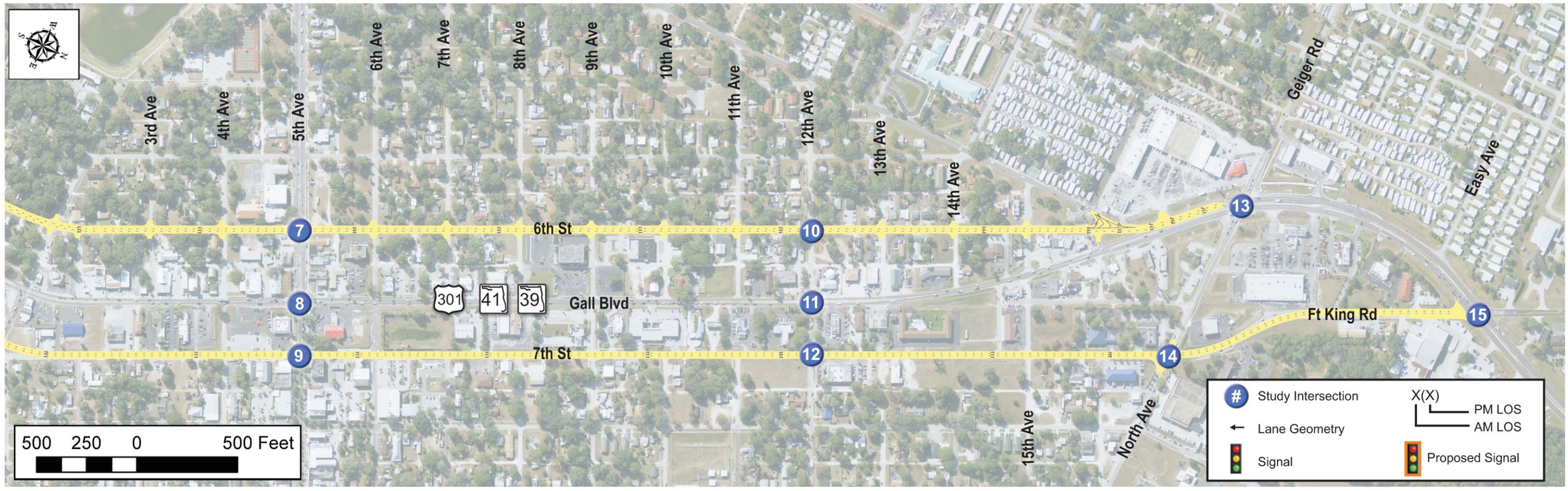


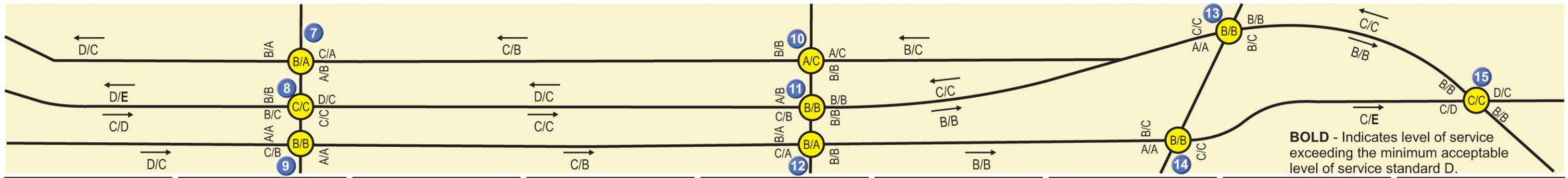
6 **7th St/ South Ave**

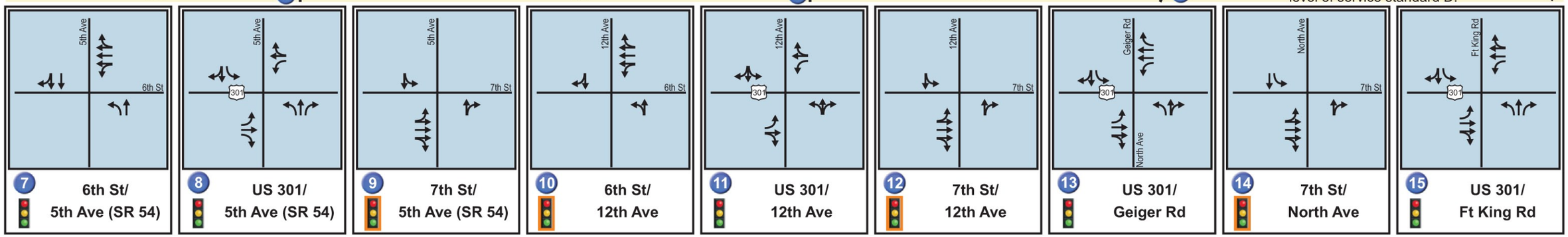
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

OPENING YEAR (2015) BUILD LANE GEOMETRY AND LEVEL OF SERVICE (LOS)
6TH STREET AND 7TH STREET ONE-WAY PAIR ALTERNATIVE

FIGURE 4-14A



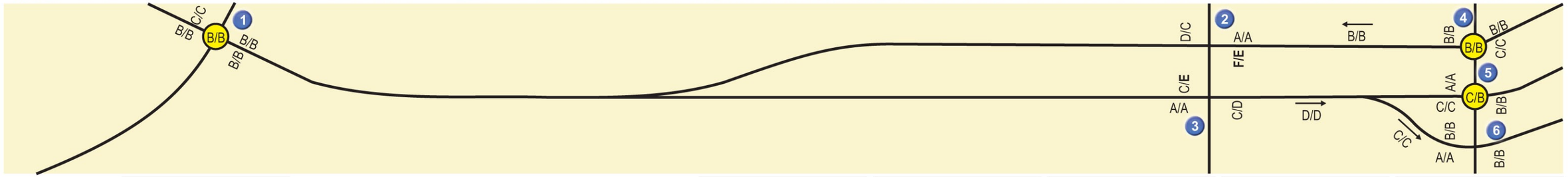


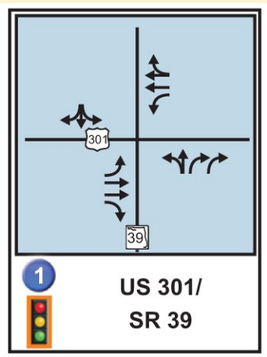


US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

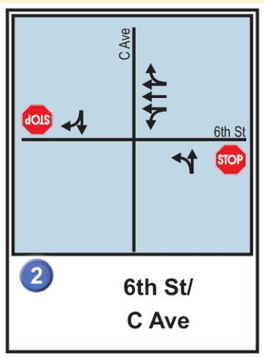
OPENING YEAR (2015) BUILD LANE GEOMETRY AND LEVEL OF SERVICE (LOS)
6TH STREET AND 7TH STREET ONE-WAY PAIR ALTERNATIVE

FIGURE 4-14B

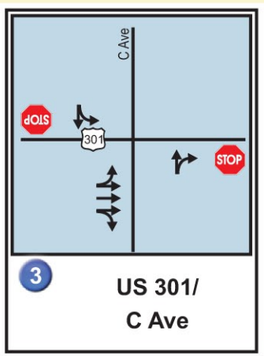




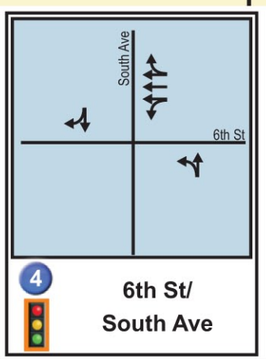
1 US 301/ SR 39



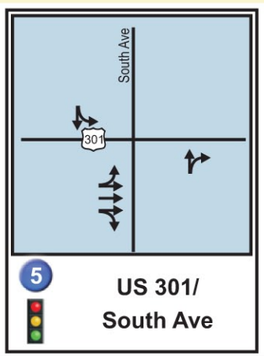
2 6th St/ C Ave



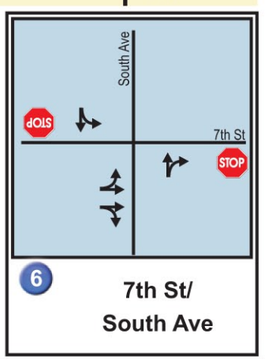
3 US 301/ C Ave



4 6th St/ South Ave



5 US 301/ South Ave

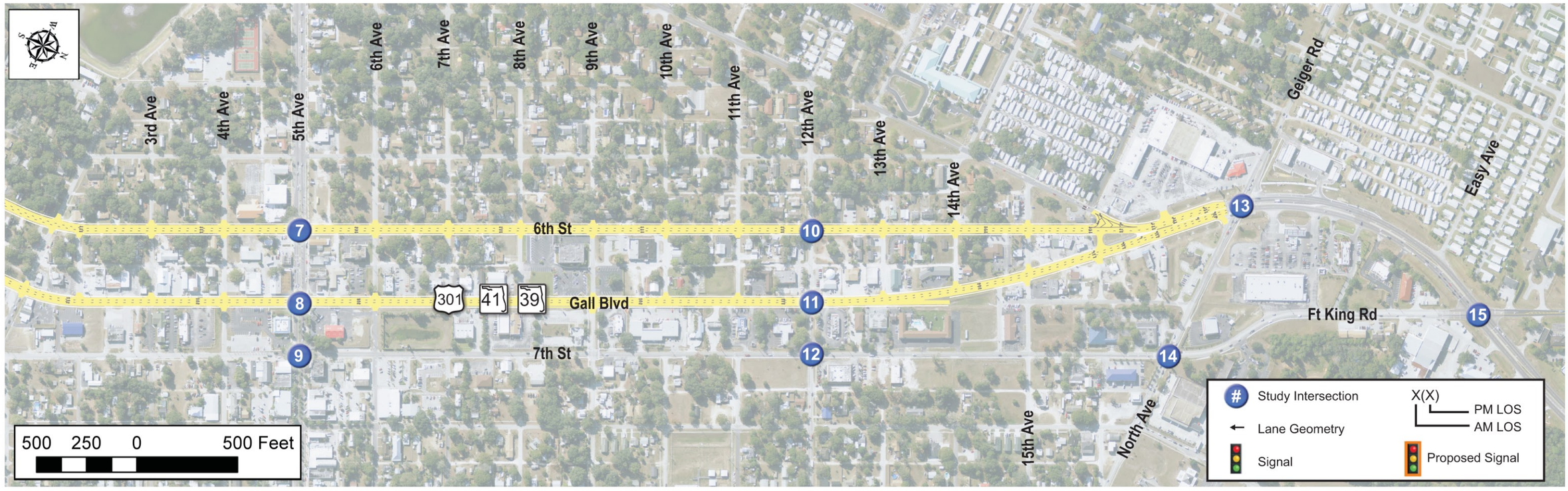


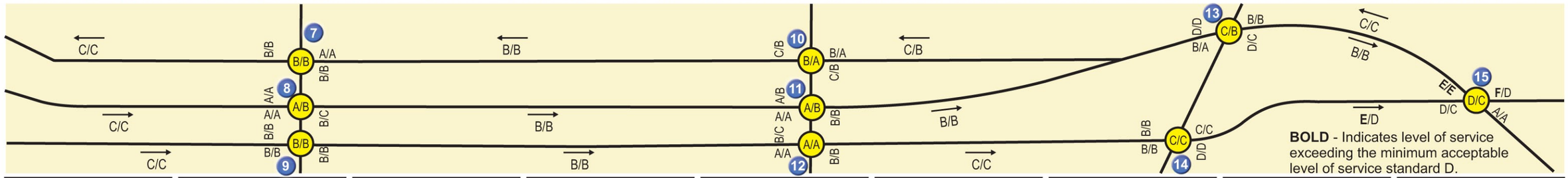
6 7th St/ South Ave

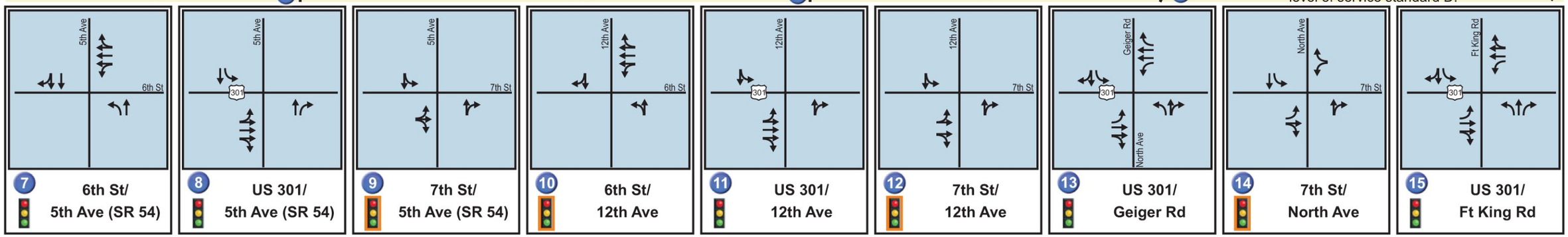
US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

OPENING YEAR (2015) BUILD LANE GEOMETRY AND LEVEL OF SERVICE (LOS)
6TH STREET AND US 301/GALL BLVD ONE-WAY PAIR ALTERNATIVE

FIGURE 4-15A







US 301 PD&E Study Update
from SR 39 to
CR 54 (Eiland Boulevard)

OPENING YEAR (2015) BUILD LANE GEOMETRY AND LEVEL OF SERVICE (LOS)
6TH STREET AND US 301/GALL BLVD ONE-WAY PAIR ALTERNATIVE

FIGURE 4-15B

4.17 OPENING YEAR (2015) ARTERIAL ANALYSIS

The opening year (2015) arterial LOS analyses for the US 301 roadway segments within the study area were conducted using the estimated opening year (2015) DDHV. The arterial segment LOS analysis was conducted using the Synchro/SimTraffic 7.0 Version (Build 773) software. The US 301 arterial functional and design categories were determined to be Principal Arterial and Urban (posted speed limit 30-40 mph), respectively, based on Exhibit 10-4 of the HCM 2000. The study corridor transitions to a Principal Arterial High-Speed at both the north and south termini of the study corridor. The urban street class for US 301 6th Street and 7th Street was established as Class III using Exhibit 10-3 of the HCM 2000. The northbound and southbound arterial segment LOS results for the opening year (2015) conditions are summarized in **Tables 4-23** and **4-24** for the No-Build Alternative**, Tables 4-25 and 4-26** for the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative and **Tables 4-27 and 28** for the 6th Street and 7th Street One-Way Pair Alternative. The opening year (2015) lane geometry and level of service is also shown on **Figures 4-13 (A-B), Figure 4-14 (A-B)** and **Figure 4-15 (A-B)** for the respective alternatives**.** In addition, the spreadsheets used in the arterial analysis for the opening year (2015) are included in **Appendix P** (under separate cover).

Table 4-23
Opening Year (2015) No-Build Alternative US 301 Arterial
Northbound Level of Service Summary

Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
US 301						
C Avenue to South Avenue	0.25	35	18.3	16.8	C	D
South Avenue to SR 54	0.26	35	21.5	19.5	C	C
SR 54 to 12th Avenue	0.48	35	23.3	19.3	C	C
12th Avenue to Geiger Road	0.42	35	25.3	25.7	B	B
Geiger Road to Fort King Road	0.26	35	26.6	26.0	B	B
C Avenue to Fort King Road	1.67		22.9	21.0	C	C
7th Street						
C Avenue to South Avenue	0.11	30	23.2	23.2	C	C
South Avenue to SR 54	0.25	30	17.4	12.5	D	**E**
SR 54 to 12th Avenue	0.48	30	28.0	28.0	B	B
12th Avenue to Geiger Road	0.33	30	15.8	10.1	D	**E**
Geiger Road to Fort King Road	0.30	30	14.5	14.3	D	D
C Avenue to Fort King Road	1.47		18.9	15.4	C	D

Table 4-24
Opening Year (2015) No-Build Alternative US 301
Arterial Southbound Level of Service Summary

Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
US 301						
Fort King Road to Geiger Road	0.26	35	22.7	24.6	C	B
Geiger Road to 12th Avenue	0.42	35	18.5	22.5	C	C
12th Avenue to SR 54	0.48	35	12.4	15.5	**E**	D
SR 54 to South Avenue	0.26	35	13.4	19.6	**E**	C
South Avenue to C Avenue	0.25	35	28.2	28.5	B	B
Fort King Road to C Avenue	1.67		16.5	20.3	D	C
6th Street						
Geiger Road to 12th Avenue	0.32	30	28.1	28.1	B	B
12th Avenue to SR 54	0.48	30	16.8	16.6	D	D
SR 54 to South Avenue	0.23	30	24.6	24.7	B	B
South Avenue to C Avenue	0.25	30	21.8	21.8	C	C
Geiger Road to C Avenue	1.28		21.1	21.0	C	C

Table 4-25
Opening Year (2015) 6th Street and 7th Street One-Way Pair Alternative US 301 Arterial Northbound Level of Service Summary

Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
US 301						
C Avenue to South Avenue	0.25	30	16.8	15.3	D	D
South Avenue to SR 54	0.26	30	18.6	16.9	C	D
SR 54 to 12th Avenue	0.48	30	21.1	21.8	C	C
12th Avenue to Geiger Road	0.42	30	26.3	26.2	B	B
Geiger Road to Fort King Road	0.26	35	27.1	24.9	B	B
C Avenue to Fort King Road	1.67		21.7	20.8	C	C
7th Street						
C Avenue to South Avenue	0.11	35	11.1	10.2	**E**	E
South Avenue to SR 54	0.25	35	14.2	18.7	D	C
SR 54 to 12th Avenue	0.48	35	22.1	25.7	C	B
12th Avenue to Geiger Road	0.33	35	28.9	28.8	B	B
Geiger Road to Fort King Road	0.30	35	18.1	12.6	C	E
C Avenue to Fort King Road	1.47		19.0	18.8	C	C

Table 4-26
Opening Year (2015) 6th Street and 7th Street One-Way Pair Alternative US 301 Arterial Southbound Level of Service Summary

Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
US 301						
Fort King Road to Geiger Road	0.26	35	20.4	21.7	C	C
Geiger Road to 12th Avenue	0.42	30	22.9	22.6	C	C
12th Avenue to SR 54	0.48	30	17.1	19.0	D	C
SR 54 to South Avenue	0.26	30	17.4	10.0	D	**E**
Fort King Road to South Avenue	1.42		19.2	17.4	C	D
6th Street						
Geiger Road to 12th Avenue	0.32	35	24.9	18.9	B	C
12th Avenue to SR 54	0.48	35	20.2	28.1	C	B
SR 54 to South Avenue	0.23	35	16.9	18.7	D	C
South Avenue to C Avenue	0.25	35	29.7	29.7	B	B
Geiger Road to C Avenue	1.28		21.8	23.3	C	C

Table 4-27
Opening Year (2015) 6th Street and US 301/Gall Boulevard One-Way Pair Alternative US 301
Arterial Northbound Level of Service Summary

Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
US 301						
C Avenue to South Avenue	0.25	35	15.6	17.0	D	D
South Avenue to SR 54	0.26	35	22.8	22.8	C	C
SR 54 to 12th Avenue	0.48	35	25.9	26.1	B	B
12th Avenue to Geiger Road	0.42	35	25.0	28.2	B	B
Geiger Road to Fort King Road	0.26	35	26.7	27.1	B	B
C Avenue to Fort King Road	1.67		23.1	24.2	C	B
7th Street						
C Avenue to South Avenue	0.11	30	23.2	23.2	C	C
South Avenue to SR 54	0.25	30	20.8	19.9	C	C
SR 54 to 12th Avenue	0.48	30	27.8	27.7	B	B
12th Avenue to Geiger Road	0.33	30	21.4	20.6	C	C
Geiger Road to Fort King Road	0.30	30	13.3	15.0	**E**	D
C Avenue to Fort King Road	1.47		20.4	20.8	C	C

Table 4-28
Opening Year (2015) 6th Street and US 301/Gall Boulevard One-Way Pair Alternative US 301
Arterial Southbound Level of Service Summary

Segment	Segment Length (miles)	Posted Speed (mph)	Arterial Speed (mph)		Arterial LOS	
			AM	PM	AM	PM
US 301						
Geiger Road to Fort King Road	0.26	35	19.5	20.6	C	C
6th Street						
Geiger Road to 12th Avenue	0.32	35	22.8	24.4	C	B
12th Avenue to SR 54	0.48	35	25.8	26.2	B	B
SR 54 to South Avenue	0.23	35	21.9	20.2	C	C
South Avenue to C Avenue	0.25	35	29.5	29.5	B	B
Geiger Road to C Avenue	1.28		24.8	25.0	B	B

4.18 STAGING ANALYSIS

A staging analysis of the Build alternatives, 6th Street and 7th Street One-Way Pair Alternative and 6th Street and US 301/Gall Boulevard One-Way Pair Alternative, was performed using the FDOT 2009 Generalized Level of Service Tables and traffic forecasts previously developed for the PD&E Study Update.

A numerical summary of the staging analysis is shown in **Appendix Q**. The results of the staging analysis indicate that projected traffic volumes for the 6th Street and 7th Street One-Way Pair Alternative and the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative will exceed the generalized roadway capacity at the adopted LOS D standard by years 2031 and 2024, respectively.

4.19 REFERENCES

1. *FDOT Design Standards for Design, Construction, Maintenance and Utility Operations on the State Highway System,* 2008

2. *Highway Capacity Manual (HCM) 2000; Transportation Research Board National Research Council Washington D.C., 2000*

SECTION 5
SUMMARY AND CONCLUSIONS

5.1 EXISTING YEAR (2010)

Existing year (2010) Annual Average Daily Traffic (AADT) volumes on US 301 range from a low of 12,700 vehicles per day (vpd) north of South Avenue to a high of 20,900 vpd south of Fort King Road. A highway capacity analysis was conducted to evaluate existing levels of service along the US 301 study corridor and the 6th Street and 7th Street one-way pair. The results of the analysis indicate that all 15 study intersections currently operate at an overall Level of Service (LOS) D or better during both the AM and PM peak hours. An analysis of arterial operations reveals that two roadway segments currently do not operate at the adopted LOS standard D in either the AM or PM peak hours. The two roadway segments currently operating at a deficient LOS (LOS E) are listed as follows:

- Northbound 7th Street between Geiger Road and Fort King Road during the PM peak hour;
- Southbound US 301 between 12th Avenue and SR 54 (5th Street) during the AM peak hour.

5.2 CRASH ANALYSIS

Crash records were examined for the most recent five-year period (2005-2009) to assess a level of motor vehicle safety along the US 301 study corridor. A total of 500 crashes occurred during this five-year time frame, which resulted in 493 injuries and three fatalities. The US 301 segment from south of CR 54 to Geiger Road is the only roadway segment with a five-year average safety ratio greater than 1.0.

5.3 ACCESS MANAGEMENT

The FDOT District Seven designates US 301 as an Access Class 7 roadway from SR 39 to CR 54 (Eiland Boulevard). The proposed access management plan detailed in this study would provide safe and efficient access to land uses along the US 301 corridor, while providing mobility to the motorists.

5.4 DESIGN YEAR (2035)

Design year (2035) traffic projections were developed for the US 301 study corridor using the Tampa Bay Regional Planning Model (TBRPM), Version 7.0. Design year AADT volumes on US 301 are projected to range from a low of 28,400 vpd north of South Avenue to a high of 49,000 vpd north of SR 39. If no improvements are made to US 301 and the 6th Street and 7th Street one-way pair, 13 of the 15 study intersections are projected to operate at an unacceptable LOS (LOS E or worse) during the AM and/or the PM peak hours. Similarly, failing LOS is projected on the US 301 arterial roadway segments under the No-Build Alternative.

Separate traffic forecasts were developed for the proposed Build Alternatives to estimate the reallocation of traffic volumes to 6th Street, US 301 and 7th Street as a result of the different lane configurations associated with the Build Alternatives. Highway capacity analyses were performed to evaluate future traffic operations of the Build Alternatives. Initially the analysis considered only the improvements shown in the conceptual design plans that were prepared by Pitman Hartenstein and Associates. Later, refinements were made to the Build Alternative and consideration was given to side street improvements. Results of the initial analysis (with no side street improvements) indicate that 9 of the 15 study intersections do not operate at an acceptable level of service in either Build Alternative. **Table 5-1** lists the study intersections that would require additional improvements to achieve an acceptable LOS.

Table 5-1
Summary of Intersections with Deficient Level of Service in the Design Year 2035

Intersection	6th Street and 7th Street One-Way Pair Alternative	6th Street and US 301/Gall Boulevard One-Way Pair Alternative
US 301		
SR 39	✓	✓
SR 54*	✓	
Geiger Road	✓	✓
Fort King Road	✓	✓
6th Street		
South Avenue	✓	
SR 54		✓
7th Street		
South Avenue		✓

SR 54	✓	✓
Geiger Road		✓

*A feasible improvement alternative cannot be identified

Refinements were made to the Build Alternatives in order to achieve acceptable LOS in the design year 2035. For comparison purposes the overall intersection LOS and control delay for each of the 15 intersections based on the design year (2035) traffic conditions can be seen in **Table 5-2**.

5.5 TRAFFIC SIMULATION ANALYSIS

In addition, to the capacity analysis using the Highway Capacity methodology of the Synchro software a traffic simulation analysis was conducted using SimTraffic Version 7 (Build 773). Five runs were performed for the Design Year (2035) 6th Street and 7th Street One-Way Pair Alternative AM and PM peak periods, as well as the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative AM and PM peak periods. Based on the results of the simulation, the network performance measures of effectiveness for the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative are better than the measures of effectiveness for the 6th Street and 7th Street One-Way Pair Alternative. The percent difference in measures of effectiveness between the two alternatives varies from zero to 39.6 percent and is generally greater in the AM than in the PM.

5.6 OPENING YEAR (2015)

In addition, an analysis of opening year (2015) traffic conditions was performed for both Build Alternatives. The results of the analysis indicate that all study intersections are projected to operate at an acceptable LOS. For comparison purposes the overall intersection LOS and control delay for each of the 15 intersections based on the opening year (2015) traffic conditions are shown **Table 5-3**.

5.7 STAGING ANALYSIS

In addition to the refinement of the Build Alternatives, a staging analysis of the proposed roadway capacity improvements was performed to determine the analysis year that six-lanes would be required to meet the adopted LOS standard. The analysis revealed that three one-way (southbound) lanes are needed on 6th Street by the year 2030 for the 6th Street and 7th Street One-Way Pair Alternative and seven years earlier (by the year 2023) for the 6th Street and US 301/Gall Boulevard One-Way Pair Alternative. For both Build Alternatives, three one-way (northbound) lanes on 7th Street are not required to meet the LOS standard by the design year 2035.

Table 5-2
Design Year Build (2035)
Comparison of Overall Intersection LOS and Overall Control Delay

Cross-Street	Level Of Service (LOS)			HCM Average Control Delay (Sec/Veh)		
	No-Build Alternative AM / PM	6th Street and 7th Street One-Way Pair Alternative AM/ PM	6th Street and US 301/Gall Boulevard One-Way Pair Alternative AM / PM	No-Build Alternative AM / PM	6th Street and 7th Street One-Way Pair Alternative	6th Street and US 301/Gall Boulevard One-Way Pair Alternative AM / PM
US 301						
SR 39	**F** / **F**	C / D	C / D	159.0 / 152.4	30.0 / 46.5	30.0 / 46.9
South Avenue	**F** / **F**	C / B	C / C	256.3 / 185.4	24.9 / 17.9	20.5 / 27.7
SR 54	**F** / **F**	**E** / C	B / D	200.1 / 157.7	62.2 / 33.8	19.6 / 39.0
12th Avenue	**F** / **F**	B / B	B / A	80.1 / 83.3	17.6 / 16.7	17.5 / 9.8
Geiger Road	**F** / D	D / D	C / D	110.6 / 41.8	54.1 / 40.2	28.5 / 41.3
Fort King Road	**F** / **F**	D / D	C / C	120.2 / 101.3	37.5 / 35.8	34.5 / 23.8
6th Street						
South Avenue		D / C	D / B		46.9 / 28.7	47.8 / 17.0
SR 54	C / C	B / B	D / B	24.5 / 27.4	19.1 / 18.3	43.0 / 16.5
12th Avenue		B / B	B / B		13.5 / 15.7	11.7 / 16.2
7th Street						
South Avenue		C / C	C / D		24.5 / 30.7	21.2 / 30.1
SR 54	**F** / **F**	C / C	C / D	194.5 / 193.2	33.9 / 27.7	21.6 / 27.2
12th Avenue		A / A			9.9 / 9.5	
Geiger Road	**F** / **F**	C / C	C / C	161.6 / 170.1	33.9 / 34.2	17.2 / 17.5

Bold – Indicates level of service exceeding the minimum acceptable level of service standard D.
Indicates TWSC intersections; overall delay is not calculated

Table 5-3
Opening Year Build (2015)
Comparison of Overall Intersection LOS and Overall Control Delay

Cross-Street	Level Of Service (LOS)			HCM Average Control Delay (Sec/Veh)		
	No-Build Alternative AM / PM	6th Street and 7th Street One-Way Pair Alternative AM/ PM	6th Street and US 301/Gall Boulevard One-Way Pair Alternative AM / PM	No-Build Alternative AM / PM	6th Street and 7th Street One-Way Pair Alternative	6th Street and US 301/Gall Boulevard One-Way Pair Alternative AM / PM
US 301						
SR 39	A / A	B / B	B / B	3.6 / 3.3	19.3 / 18.3	19.3 / 18.3
South Avenue	C / C	B / C	C / B	31.8 / 21.9	14.4 / 27.5	20.4 / 19.1
SR 54	D / D	C / C	A / B	48.4 / 35.4	24.4 / 20.5	10.0 / 11.0
12th Avenue	C / C	B / B	A / B	23.9 / 25.3	14.5 / 15.9	9.4 / 10.3
Geiger Road	B / B	B / B	C / B	15.6 / 13.1	13.8 / 13.3	21.0 / 13.9
Fort King Road	C / B	C / C	D / C	23.2 / 17.7	20.5 / 22.9	38.0 / 31.7
6th Street						
South Avenue		B / B	B / B		18.8 / 13.7	14.1 / 14.6
SR 54	C / B	B / A	B / B	21.2 / 17.9	19.3 / 7.1	12.9 / 10.9
12th Avenue		A / C	B / A		9.0 / 20.6	14.4 / 9.9
7th Street						
South Avenue		B / B	B / A		15.0 / 17.8	10.0 / 9.9
SR 54	C / D	B / B	B / B	17.6 / 28.3	19.9 / 14.2	12.6 / 13.5
12th Avenue		B / A			18.1 / 9.7	
Geiger Road	D / **E**	B / B	C / C	28.0 / 43.5	12.5 / 15.3	18.8 / 19.3

Bold – Indicates level of service exceeding the minimum acceptable level of service standard D.
Indicates TWSC intersections; overall delay is not calculated

5.8 CONCLUSION

The summary of findings found in this report are intended to assist the Florida Department of Transportation (FDOT) and the Federal Highway Administration (FHWA) in reaching a decision on the optimal improvements along the US 301 study corridor. Traffic analysis is one of several factors that should be considered in selection of a recommended alternative. Other factors to consider include, but are not limited to: social, environmental, historical, cultural factors, and cost factors such as right-of-way acquisition, business damages and construction which will be determined in the ongoing PD&E Study Update and subsequent design phase of the project.