INTERCHANGE OPERATIONAL ANALYSIS REPORT (IOAR)

I-10 at S.R. 10 (U.S. 90)

Gadsden County, Florida

FPID: 222530-5-22-01 and 222530-6-22-01
FAP No(s): D319158B and D319159B
ETDM No.: 14393

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Prepared for:

Florida Department of Transportation - District Three
Chipley, Florida

November 2020

Interchange Operational Analysis Report (IOAR)

For I-10 at S.R. 10 (U.S. 90) Interchange

FPID: 222530-5-22-01 and 222530-6-22-01

Florida Department of Transportation

Determination of Safety, Operational and Engineering Acceptability

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

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Federal Highway Administration	N/A (Programmatic)	*Date*

SYSTEMS IMPLEMENTATION OFFICE

QUALITY CONTROL CERTIFICATION FOR INTERCHANGE ACCESS REQUEST SUBMITTAL

Submittal Date: November 2020

FM Number: 222530-5-22-01 and 222530-6-22-01

Project Title: I-10 at S.R. 10 (U.S. 90) Interchange Operational Analysis Report (IOAR)

District: District 3

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Document Type: ☐ MLOU ☐ IJR ☐ IMR ☒ IOAR ☐ OTHER_____

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

Quality Control (QC) Statement

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

Requestor DocuSigned by: Iris Waters E7595C693CCA40D... Date: 12/3/2020 | 8:10 AM EST

Iris Waters, P.E.

IRC DocuSigned by: Ray Kirkland F9C93E401A6B416... Date: 12/3/2020 | 8:10 AM EST

Ray Kirkland

PROFESSIONAL ENGINEER CERTIFICATE

I hereby certify that I am a registered professional engineer in the State of Florida practicing with Hanson Professional Services Inc., a Florida corporation authorized under the provisions of Section 471.023, Florida Statutes, to offer engineering services to the public through a Professional Engineer, duly licensed under Chapter 471, Florida Statutes, by the State of Florida Board of Professional Engineers and I have prepared or approved the evaluation, findings, opinions, conclusions or technical advice hereby reported for:

PROJECT: I-10 at S.R. 10 (U.S. 90) Interchange Operational Analysis Report (IOAR)

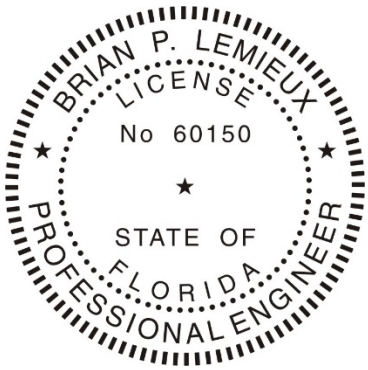
LOCATION: Gadsden County, FL

FINANCIAL PROJECT ID: 222530-5-22-01 and 222530-6-22-01

This report includes a summary of data collection effort, traffic analysis, discussion of preferred alternative and summary of conclusions. I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of transportation engineering and planning as applied through professional judgement and experience.

Name: Brian P. Lemieux, P.E.

Florida P.E. No.: 60150



Signature: Brian P Lemieux Brian P Lemieux 2020.12.02 12:41:00-06'00'

Date: 12/02/2020

EXECUTIVE SUMMARY

The purpose of this IOAR is to provide the required documentation for obtaining approval for improvements at the I-10/U.S. 90 interchange in Gadsden County. The current interchange is a four-quadrant partial cloverleaf with stop-controlled operation at both ramp terminal intersections. The primary need of the project is to improve future traffic operations at the ramp terminals, thereby improving safety at the interchange.

The primary basis for traffic projection in this IOAR is field traffic counts, Florida Traffic Online (FTO) and the latest version of the Capital Region Transportation Planning Agency (CRTPA) Model with the base year 2007 and horizon year 2035. The analysis years for the study include Existing Year 2019, Opening Year 2025, and Design Year 2045. The operation analysis for this study was performed using Synchro 10. Delay and level of services (LOS) for unsignalized intersections analysis was reported based on Highway Capacity Manual (HCM 6th Edition) Methodology.

If no improvements are made, traffic operations and safety within the study area will continue to deteriorate as traffic volumes increase.

Two alternatives were evaluated to address the purpose and needs identified in this IOAR. These include the No-Build Alternative and Build Alternative. The alternatives analyzed include:

- No-Build Alternative – This alternative includes the existing configuration plus all programmed improvements with future traffic.
- Build Alternative – This alternative includes signalizing the I-10/U.S. 90 interchange ramp terminal intersections.

As part of this study, an existing crash analysis was performed. The data provided by FDOT State Safety Office Map-Based Query Tool (SSOGis) shows rear-end crashes and angle crashes are the most prominent crashes within the project area. The Recommended Build Alternative shows improved traffic operations and safety within the project study area when compared to the No-Build Alternative due to the reduction in congestion.

Based on the evaluations of the No-Build and Build Alternatives, the recommended alternative for approval in this study is the Build Alternative.

This IOAR has been developed in accordance with the FDOT Policy No. 000-525-015: Approval of New or Modified Access to Limited Access Highways on the State Highway System (SHS), FDOT Procedure No. 525-030-160: New or Modified Interchanges, FDOT Procedure No. 525-030-120: Project Traffic Forecasting, Interchange Access Request User's Guide (IARUG) and the FDOT Project Traffic Forecasting Handbook (Procedure No. 525-030-120).

E.1 Compliance with FHWA General Requirements

The following requirements serve as the primary decision criteria used in the approval of an IOAR. Responses to each of the two FHWA policy points are provided to show that the proposed improvements at I-10/U.S. 90 interchange are viable based on the conceptual analysis performed to date.

E.1.1 FHWA Policy Point 1

An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis should, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (23 CFR 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, should be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)). Requests for a proposed change in access should include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request should also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d) and 23 CFR 655.603(d)).

An in-depth operational and safety analysis conducted for this IOAR confirmed that the proposed improvement to the existing I-10 eastbound (EB) and westbound (WB) ramp terminal intersections would not have a significant adverse impact on the operation and safety of the project area. Several performance measures were used to compare the operations of the existing system under No-Build and Build

conditions. Key measures included delays, 95th percentile queue lengths and safety under existing and proposed conditions.

From an operational perspective in the Design Year 2045 under No-Build Alternative, operational and safety deficiencies exist. All minor movements at the intersections will operate at LOS F except EB right traffic at the I-10 EB ramp terminal in the PM peak hour. These deficiencies are attributed by the high through traffic volume along U.S. 90 and high left-turn traffic exiting the freeway. The WB approach at the I-10 WB ramp terminal intersection will experience excessive queues, which could possibly affect freeway operations. The U.S. 90 and Fortune Boulevard intersection will operate with queues longer than the available storage in the NB and SB directions affecting the I-10 WB ramp terminal intersection.

The Build Alternative for this study performs substantially better than the No-Build Alternative for all future years. When compared to the No-Build Alternative, the proposed improvements provide a reduction in delay at both study intersections. The most significant reduction in delay and improvement in LOS occurs at U.S. 90 and I-10 WB On/Off-ramp intersection. The delay at the I-10 WB ramp terminal for the left-turn movement is reduced by 512.9 seconds and 2561.0 seconds during the AM and PM peak hours, respectively. Also, the LOS changes from F to D in the AM and PM peak hour. The queues observed in the No-Build Alternative also are reduced significantly, where the available storage can accommodate the queues at the I-10 WB ramp terminal intersection. However, the SB approach queues at the U.S. 90 and Fortune Boulevard intersection will impact the Dupont Road intersection north of Fortune Boulevard intersection in the Build Alternative. A traffic engineering evaluation is recommended to identify the traffic operations and safety trade-offs between the two closely spaced intersections of U.S. 90 with Fortune Boulevard and Dupont Road intersection.

The safety analysis performed for this study indicated a total of 35 crashes occurred within the project area during the five study years (2013-2017). The predominant crash types that occurred within the study area were other crashes that were attributed by careless driving and the failure to comply with traffic laws followed by rear-end and angle crashes. Rear-end and angle crashes were typically attributed to congestion along the arterials and interchange ramps.

With the improved operations under the Build Alternative, it is anticipated to enhance safety within the project area. A predictive safety analysis was performed for the study area, where improvements were implemented. Based on the safety analysis, it is predicted that a total annual crash reduction of 1.190 crashes per year will occur at the ramp terminal intersections.

Overall, the Build Alternative provides significantly better traffic operations and enhanced safety when compared to the No-Build Alternative. All proposed improvements as part of this project will be done within the existing right-of-way.

In conclusion, the comparison of the No-Build and Build alternatives show that the proposed improvements provide enhanced operation and improve safety conditions.

E.1.2 FHWA Policy Point 2

The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access, such as managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)). In rare instances where all basic movements are not provided by the proposed design, the report should include a full-interchange option with a comparison of the operational and safety analyses to the partial-interchange option. The report should also include the mitigation proposed to compensate for the missing movements, including wayfinding signage, impacts on local intersections, mitigation of driver expectation leading to wrong-way movements on ramps, etc. The report should describe whether future provision of a full interchange is precluded by the proposed design.

The proposed improvements apply to the I-10/U.S. 90 ramp terminal intersections in Gadsden County and no new access is requested. The improvements are designed to preserve all the existing connections between public roads and preserve existing traffic movements onto and off I-10. These improvements are designed to meet current standards for federal-aid projects on the interstate system and conform to American Association of State Highway and Transportation Officials (AASHTO) and the FDOT Design Manual.

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1. PROJECT OVERVIEW

1.1 Introduction

This Interchange Operational Analysis Report (IOAR) has been prepared to evaluate the impacts of signalizing the I-10 Eastbound (EB) and Westbound (WB) ramp terminal intersections at S.R. 10 (U.S. 90). The Florida Department of Transportation (FDOT) District 3 is the Requestor seeking approval of this IOAR that presents the necessary documentation for such improvements.

The State of Florida established the Strategic Intermodal System (SIS), which consists of high priority transportation facilities and services of statewide and interregional significance. These SIS facilities are critical to the movement of people and goods in Florida, and their function is vital to Florida's economic competitiveness.

I-10, which is a designated SIS facility, is an east-west roadway that runs east from the border of Alabama through Pensacola, Tallahassee and ends in Jacksonville, Florida. It is a vital thoroughfare that links multi-modal hubs to facilitate the safe and efficient movement of goods and people. The interchange of I-10 at U.S. 90 is significant for passenger movements.

This IOAR stems from a recently completed Project Traffic Analysis Report (PTAR), dated April 2020. The PTAR was part of the Project Development and Environment (PD&E) study done to evaluate the need for widening I-10 from four to six lanes in both Gadsden and Leon Counties. The PD&E study is intended to enhance the efficiency of I-10 and provide the connecting link between numerous widening projects to the east and west of the I-10 study segment (from west of U.S. 90 to west of S.R 263). The PTAR is provided in **Appendix A**.

The IOAR is seeking approval for the proposed improvements to the I-10 EB at U.S. 90 and I-10 WB at U.S. 90 ramp terminal intersections in Gadsden County. This IOAR has been developed in accordance with the FDOT Policy No. 000-525-015: Approval of New or Modified Access to Limited Access Highways on the State Highway System (SHS), FDOT Procedure No. 525-030-160: New or Modified Interchanges, FDOT Procedure No. 525-030-120: Project Traffic Forecasting, Interchange Access Users Guide (IARUG), and the FDOT Project Traffic Forecasting Handbook (Procedure No. 525-030-120).

1.2 Purpose and Need for Project

The main purpose of this IOAR is to document the safety, operational and engineering acceptability of signalizing the I-10 EB at U.S. 90 and I-10 WB at U.S. 90 ramp terminal intersections. These improvements intend to address operational deficiencies within the I-10 at U.S. 90 interchange identified in the existing and future analysis reported in this IOAR.

The analysis of the project traffic conditions reported in this IOAR identify operational deficiencies in the vicinity of the study interchange. I-10 EB and WB ramp terminal intersections were studied for operational and safety improvements. The existing analysis results at the intersections revealed that the left-turn traffic from I-10 WB off-ramp at the ramp terminal would operate at LOS F in the AM and PM peak periods, with the delay of 198.3 seconds in the PM peak hour. The future traffic conditions identified the increase of congestion and operational deficiencies at both ramp terminals, by the design year 2045, the minor movements at the ramp terminals operate at LOS F in the AM and PM peak periods.

As part of this study, the existing and future traffic volumes along U.S. 90 were studied and utilized in the analysis of existing and future traffic conditions. Currently, daily traffic volume on U.S. 90 ranges between 18,100 and 19,500 vehicles per day. By the year 2045, the daily traffic volume is expected to increase by two percent, which is the growth rate estimate within the study area, as indicated in **Section 4** of this IOAR. With this increase in traffic along U.S. 90, the operating conditions at the intersections are expected to deteriorate.

A review of the crash data provided in **Section 3** shows a total of 35 crashes for the five-year period (2013-2017), of which three were fatal crashes and nine were injury crashes. The actual crash rate at the I-10 WB ramp terminal is 1.116 crashes per million entering vehicles, which is higher than the average statewide crash rate for similar facilities. Analysis of the crash data revealed the following notable characteristics.

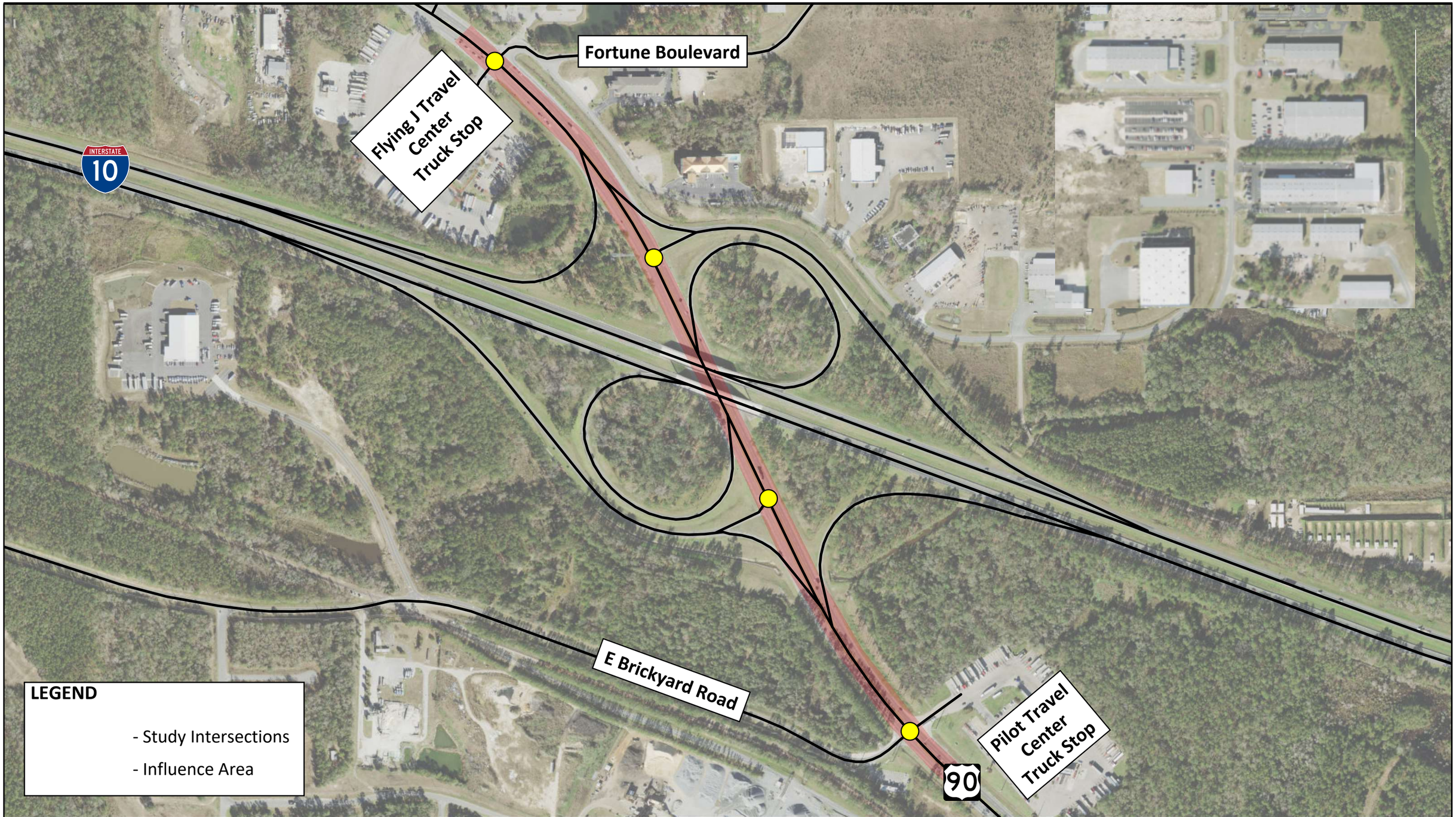
- Other crashes (40%) was the predominant type followed by Rear-end crashes (31%) and by Angle crashes (20%)
- Careless driving and failure to comply with traffic laws attributed to other crashes Rear-end crashes were most concentrated at I-10 WB ramp terminal intersection

- A combination of high traffic volume along U.S. 90, speed differential and failure of yielding for vehicles exiting the freeway appear to be contributing to rear-end and angle crashes at the ramp terminals.
- All fatal crashes occurred at the I-10 WB ramp terminal intersection; two fatal crashes were attributed by drivers that failed to yield right of way.

If no improvements are made at the ramp terminal intersections, traffic operations within the study area will continue to deteriorate as traffic continues to grow.

1.3 Project Location

The subject interchange is located in Gadsden County, along I-10 at Milepost 31.80, Section number 50001000. Along I-10, the nearest interchange of S.R. 267 and S.R. 263 (Capital Circle NW) are 10.9 and 3.8 miles to the west and east, respectively. The project location and the study area are shown in **Figure 1-1**.



Florida Department of Transportation District Three Chipley, Florida	**I-10 at U.S. 90 IOAR** Project Development & Environment Study FPID No.: 222530-5-22-01 and 222530-6-22-01 ETDM No.: 14393	Title: Project Location and Study Area Map	Figure: 1-1

2. METHODOLOGY

2.1. Overview

The Methodology utilized for this IOAR is consistent with that discussed in the PTAR, dated April 2020 (**Appendix A**).

2.2. Area of Influence

The area of influence (AOI) for the IOAR includes the study interchange of I-10 and U.S. 90 located in Gadsden County.

U.S. 90: from E Brickyard Road to Fortune Boulevard

- U.S. 90 is an east-west highway running through Gadsden and Leon Counties. Within the study area, U.S. 90 is a four-lane divided arterial with a posted speed limit of 45 miles per hour (mph). The functional classification from E Brickyard Road to Fortune Boulevard of U.S. 90 is Urban Minor Arterial. Along this segment, U.S. 90 provides access to two truck stops (Pilot Travel Center Truck Stop and Flying J Travel Truck Stop), retail properties and residential communities.

The area of influence includes four intersections.

- E Brickyard Road at U.S. 90
- I-10 EB at U.S. 90 Interchange Ramps
- I-10 WB at U.S. 90 Interchange Ramps
- Fortune Boulevard at U.S. 90

The area of influence is shown in **Figure 1-1**.

2.3. Analysis Years

The analysis years for the project are:

- Existing Year: 2019
- Opening Year: 2025
- Design Year: 2045

2.4. Data Collection and Sources

The primary source of traffic data for this study is the field traffic counts, Florida Traffic Online (FTO) and the Capital Region Transportation Planning Agency (CRTPA) Model with the base year 2007 and horizon year 2035.

The intersection turning movement counts were collected at the I-10 and U.S. 90 interchange ramp terminal intersections. This data collection effort was performed on Tuesday, September 17, 2019, concurrently with the 72-hour traffic counts. In general, the traffic data for each intersection included 8-hour turning movement counts (6:00 – 9:00 AM, 12:00 – 3:00 PM, and 4:00 – 6:00 PM), including the heavy vehicle counts. There were no bicycles or pedestrians observed during the TMCs data collection. At the WB off-ramp, two additional hours were counted, 3:00 – 4:00 PM and 6:00 – 7:00 PM, to reflect the highest ramp volumes for the signal warrant analysis.

Additional turning movement counts for the adjacent intersections (E Brickyard Road at U.S. 90 and Fortune Boulevard at U.S. 90) were collected on July 29th and July 31st, 2020 during a typical weekday. This data collection effort was performed from 6:00 AM to 9:00 AM, 12:00 PM to 3:00 PM and 4:00 PM to 6:00 PM for the morning, mid-day, and evening peak periods, respectively.

72-hour vehicle classification counts were conducted using road tubes and automated traffic counters on the I-10 mainline east and west of the U.S. 90 interchange and on all ramps at the interchange.

72-hour directional volume counts were conducted using road tubes and automated traffic counters on U.S. 90 north and south of the interchange and between the I-10 off-ramps. (Note: the count between the ramps was offset, with the northbound direction counted south of the WB off-ramp, and the southbound direction counted north of the EB off-ramp).

The information from the FTO was used to check reasonableness with the traffic data collected and to confirm the growth rate used to develop future traffic. Adjustments were made if necessary, to ensure that turning movement volumes at ramp terminals sum to the peak hour ramp volumes.

The T_{Daily} factor is the adjusted, annual daily percentage of truck traffic. The DHT factor is the percentage of truck traffic during the peak hour and can be estimated as half of the T_{Daily} factor. The DHT factor was estimated from the 72-hour classification count data, the intersection turning movement counts, and the FTO.

The traffic factors are presented in **Table 2-1**.

Table 2-1: Summary of Traffic Factors

Roadway	K	D	DHT
I-10 from West of S.R. 10 (U.S. 90) to West of S.R. 263 Capital Circle	9.0%	51.4%	13.0%
S.R 10 (U.S. 90) *	9.0%	56.4%	9.0%

*DHT of 9.0% was used at the I-10 EB and WB ramp terminal intersections

Truck percentages were calculated for each turning movement at U.S. 90/E Brickyard Road and U.S. 90 /Fortune Boulevard intersections. These intersections provide direct access to the two truck stops (Pilot Travel Center Truck Stop and Flying J Travel Truck Stop) that contribute to high truck percentages along U.S. 90 corridor. The DHT factor used at the truck stop intersections were based on the turning movements counts collected on July 29th and 31st, 2020.

The Peak Hour Factor (PHF) for existing condition analysis at the study intersections was based on the overall average PHF delivered from the existing traffic counts. In the future analysis, a 0.95 peak hour factor was used at the intersections.

All printouts of the data collected are included in **Appendix B**.

2.5. Travel Demand Forecasting

The development of design traffic for this IOAR followed the procedure outlined in the FDOT Project Traffic Forecasting Handbook. The travel demand forecast methodology utilized was consistent with that employed in the PTAR. A growth rate was developed based on the growth from the latest version of CRTPA Model, historical growth trends and the growth rate from the population projection data for Gadsden County published by the Bureau of Economic and Business Research (BEBR) at the University of Florida. The future traffic volumes were obtained by applying the growth rate to the existing traffic counts collected in the field. Growth rate development and future traffic development are further discussed in **Section 4** of this IOAR.

2.6. Safety Analysis Procedure

Crash data was obtained from FDOT State Safety Office Map-Based Query Tool (SSOGis) for the most recent five years available (2013-2017). The data collected includes the number of crashes, type of crashes and location of crashes, crash severity, weather conditions, road surface conditions and date/time

information. **Section 3.9** documents the crash rates and compares the rates to the statewide averages for similar facilities. **Section 3.9** also provides tables and figures summarizing the crash analysis results. Safety analysis for the Build Alternative was performed by applying the appropriate Crash Modification Factor (CMF) to the existing observed crash frequency.

2.7. Operational Analysis Procedures

Traffic operational analyses were performed for existing conditions and future No-Build and Build alternatives. Intersection analysis has been conducted for the study intersections using Synchro 10. The delay and level of service (LOS) for unsignalized intersections analysis was reported based on Highway Capacity Manual (HCM 6th Edition) Methodology. The delay and LOS for the signalized intersection analyses were reported based on Synchro 10 methodology. The 95th percentile queues were reported based on Synchro 10 methodology for both signalized and unsignalized intersections. The analyses were performed for the following conditions:

- Existing Year – 2019 conditions, AM and PM peak hours
- Opening Year – 2025 conditions for No-Build and Build Alternative, AM and PM peak hours
- Design Year – 2045 conditions for No-Build and Build Alternative, AM and PM peak hours

2.8. LOS Target

FDOT Topic No. 000-525-006 provides LOS targets for the State Highway System (SHS). The term LOS is defined as the system of six designated ranges from “A” (best) to “F” (worst) used to evaluate roadway facility performance. The FDOT minimum acceptable operating LOS targets were used for this IOAR. The LOS target for study intersections analyzed in this IOAR are summarized below:

- Signalized Intersections: LOS D

The LOS C target was determined as the study roadways of this project are outside the urbanized area.

3. EXISTING CONDITIONS

The following section provides a discussion and evaluation of the existing conditions at the subject interchange of I-10 at U.S. 90.

3.1 Geometry

The following two ramp terminal intersections will be analyzed as part of this IOAR:

The U.S. 90 at I-10 EB On/Off ramps is a three-leg unsignalized intersection. The intersection has the following configuration.

- EB off-ramp at U.S. 90: one left turn lane and one channelized right-turn lane
- U.S. 90 NB movement: two through lanes
- U.S. 90 SB movement: two through lanes

The U.S. 90 at I-10 WB On/off ramps is a three-leg unsignalized intersection. The intersection has the following configuration.

- WB off-ramp at U.S. 90: one left turn lane and one channelized right-turn lane
- U.S. 90 NB movement: two through lanes
- U.S. 90 SB movement: two through lanes

Figure 3-1 shows the existing layout design of the study corridor, including the I-10 EB and WB ramp terminal intersections.

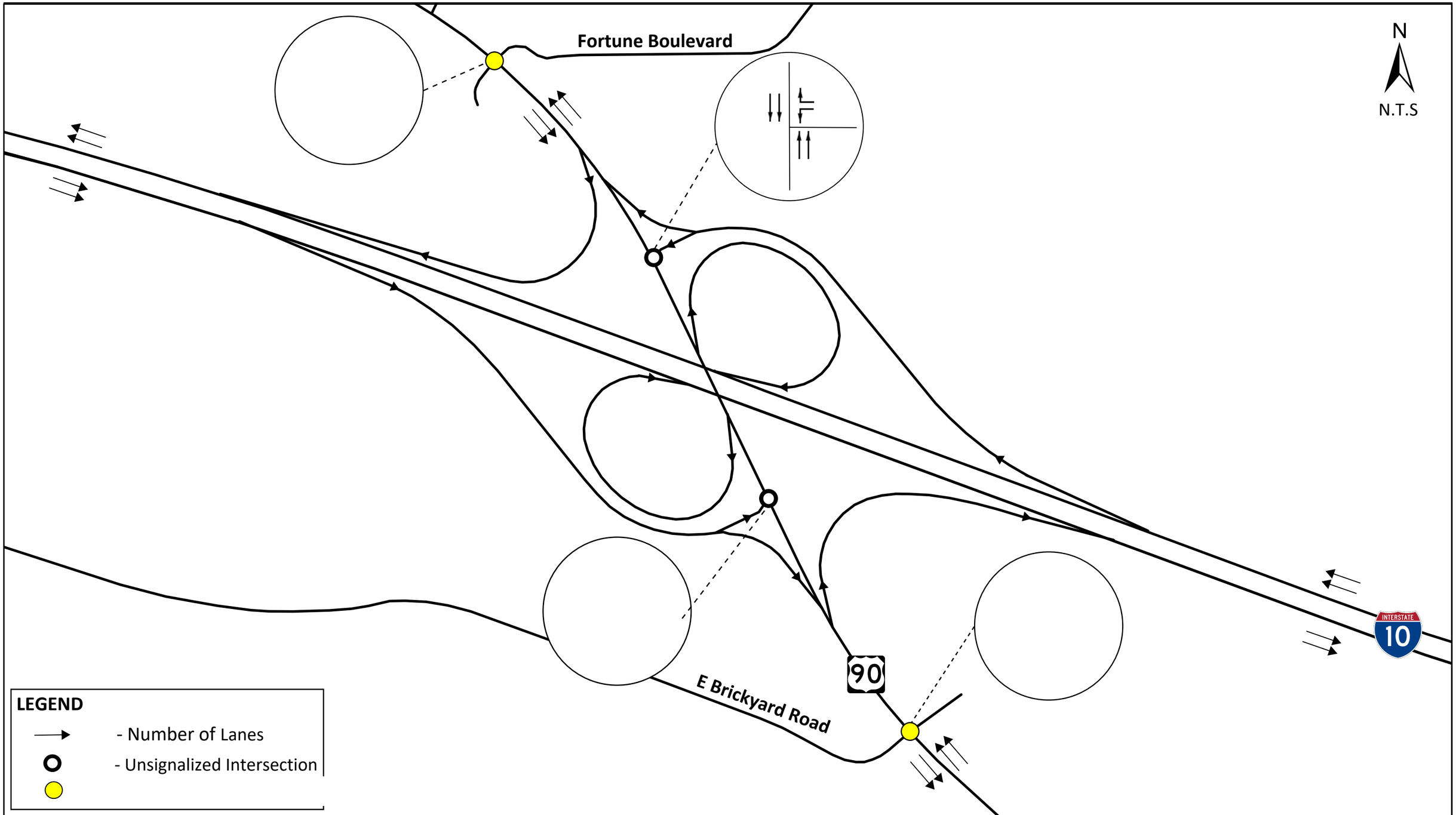
3.2 Functional Classification

FDOT Functional Classification:

- U.S. 90 is classified as Urban Minor Arterial
- I-10 is classified as Urban Principal Arterial Interstate

3.3 Posted Speed Limits

- U.S. 90 has a posted speed limit of 45 mph
- I-10 EB and WB Off/On-ramps have a posted speed limit of 25 mph
- I-10 East and West of U.S. 90 has a posted speed limit of 70 mph



Florida Department of Transportation District Three Chipley, Florida	**I-10 at U.S. 90 IOAR** Project Development & Environment Study FPID No.: 222530-5-22-01 and 222530-6-22-01 ETDM No.: 14393	Title: Existing Year 2019 Lane Configuration	Figure: 3-1

3.4 Typical Section

The I-10 typical section at U.S. 90 consists of a four-lane divided facility providing two general use lanes in each direction. The existing median width for I-10 is 64 feet with guardrail barrier. I-10 crosses over U.S. 90.

The U.S. 90 typical section within the study limits is a four-lane urban divided roadway with a grassed raised median dividing the roadway.

3.5 Interchange Layout

The study interchange is a four-quadrant partial cloverleaf with two inner free-flow loop ramps and both loop ramps serve as entrances to I-10 mainline. All six ramps at the interchange are single lane ramps. On each side of the freeway, there is an exit ramp, followed by the loop ramp and directional ramp entering the freeway. Right turn movements from U.S. 90 are isolated and the only crossing maneuvers at the ramp terminals are due to the through traffic along U.S. 90 and left-turn traffic from the off-ramps. Both ramp terminals are currently unsignalized. An aerial photograph of the existing interchange layout is shown in **Figure 1-1**.

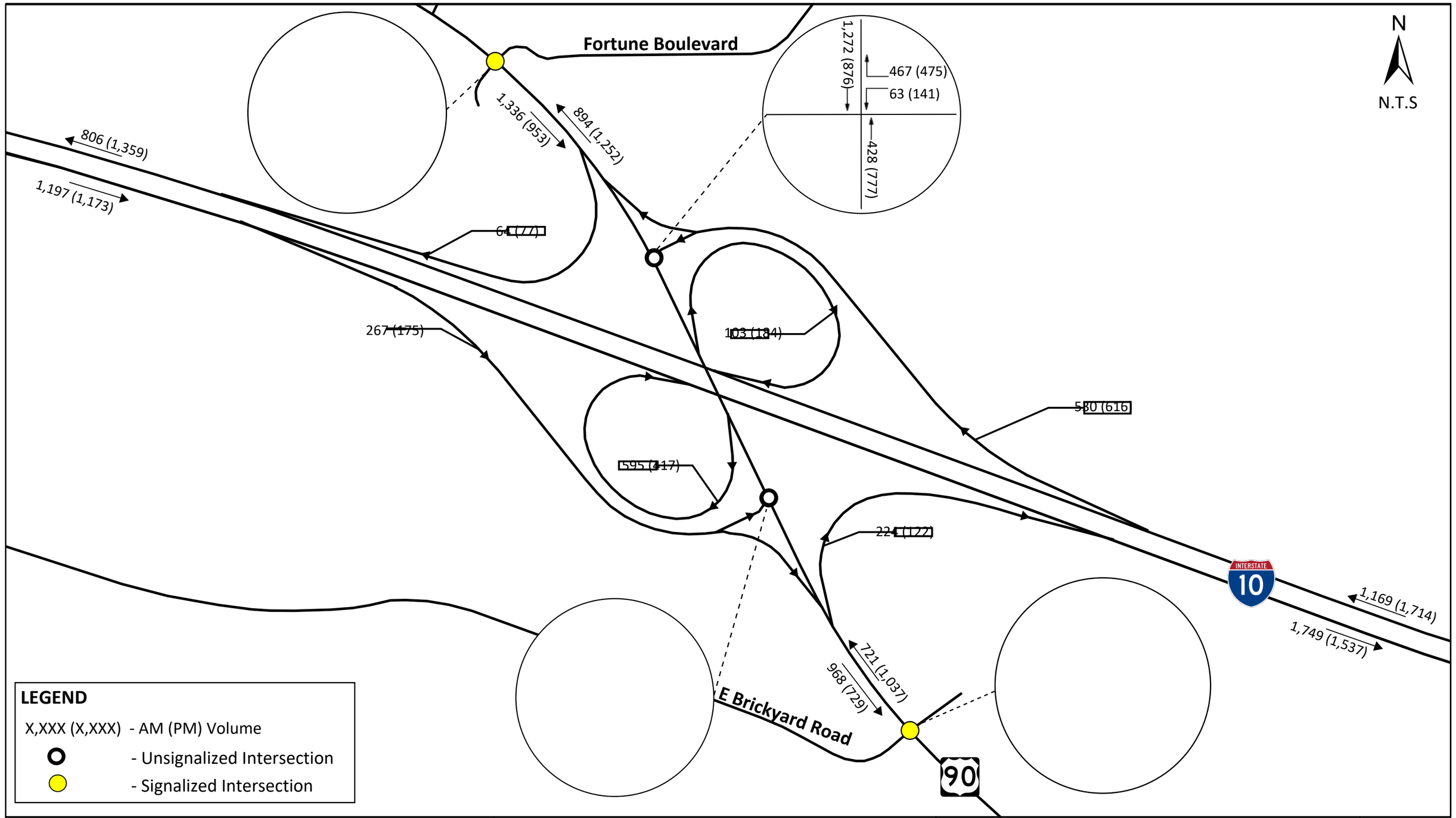
3.6 Existing Traffic Volume

The existing AM and PM peak hour volumes were based on the existing counts collected. The Existing Year 2019 peak hour volumes within the study limits are shown in **Figure 3-2**.

3.7 Truck Traffic

Trucks were counted as part of the study effort using the 8-hour turning movement counts at the intersections (see **Appendix B**). These counts showed that most of the truck traffic entering and exiting the study limits use U.S. 90. The peak hour truck percentages along U.S. 90 was compared against the DHT percentage (9.0%) from FTO mentioned in **Section 2.4**.

Higher percentages of truck traffic are observed during the mid-day peak hour (1:30 to 2:30). The NB and SB movements along U.S. 90 have over 12% truck traffic (for the ramp terminal study intersections within the project limits). The two truck stop intersections at East Brickyard Road (Pilot Travel Center Truck Stop) and Fortune Boulevard (Flying J Travel Truck Stop) contribute to high truck traffic turning left and right onto/from U.S. 90.



Florida Department of Transportation District Three Chipley, Florida	**I-10/SR 8 at U.S. 90 IOAR** Project Development & Environment Study FPID No.: 222530-5-22-01 and 222530-6-22-01 ETDM No.: 14393	Title: Existing Year 2019 Peak Hour Volumes Intersections	Figure: 3-2

3.8 Existing 2019 Traffic Operational Performance

A detailed operational analysis for Existing Year 2019 was performed at the study intersections. For the ramp terminal intersections, the length of the I-10 WB off-ramp is approximately 2000 feet long and the I-10 EB off-ramp length is approximately 2500 feet long. Documentation of the existing year analysis is provided in **Appendix C**.

Intersection Analysis

The Existing Year 2019 intersection analysis results are summarized in **Table 3-1**. In the Existing Year 2019, all the intersections within the study area operate at acceptable LOS D or better. However, the left-turn movement at the I-10 WB ramp terminal intersection operates at LOS F in the AM and PM peak hours.

Table 3-1: Existing Year 2019 Intersection Analysis Summary

Intersection	Intersection Approach				Overall Intersection	
	Approach	Movement	Delay	LOS	Delay (sec)	LOS
			AM (PM)	AM (PM)	AM (PM)	AM (PM)
U.S. 90 at Fortune Boulevard	Eastbound	Left	38.4 (31.9)	D (C)	17.9 (23.7)	B (C)
		Thru/Right	15.9 (10.1)	B (B)		
	Westbound	Left	65.6 (57.7)	E (E)		
		Thru/Right	18.4 (10.1)	B (B)		
	Northbound	Left	11.9 (12.2)	B (B)		
		Thru	13.6 (23.1)	B (C)		
		Right	2.4 (3.3)	A (A)		
	Southbound	Left	8.3 (13.4)	A (B)		
		Thru	20.5 (20.0)	C (B)		
		Right	0.1 (0.0)	A (A)		
U.S. 90 at I-10 WB On/Off-Ramps*	Westbound	Left	50.6 (197.6)	F (F)	--	
		Right	30.6 (48.5)	D (E)		
U.S. 90 at I-10 EB On/Off-Ramps*	Eastbound	Left	29.4 (34.9)	D (D)	--	
		Right	16.2 (12.5)	C (B)		
U.S. 90 at E Brickyard Road	Eastbound	Left/Thru/Right	26.8 (26.4)	C (C)	11.5 (11.4)	B (B)
	Westbound	Left/Thru	49.4 (48.2)	D (D)		
		Right	4.9 (11.1)	A (B)		
	Northbound	Left	5.3 (4.8)	A (A)		
		Thru	10.1 (10.6)	B (B)		
		Right	0.1 (0.0)	A (A)		
	Southbound	Left	5.3 (5.5)	A (A)		
		Thru/Right	10.6 (9.6)	B (A)		

* For Stop controlled intersections, the delay is reported for the worst-case approach only based on HCM 6th Edition.

Figure 3-2 illustrates the peak hour volumes for the Existing Year 2019 intersections analysis.

In the Existing Year 2019, the 95th percentile queue length exceeds the storage at the following locations:

- WB left at U.S. 90 and Fortune Boulevard (AM and PM peak hours)
- SB through at U.S. 90 and Fortune Boulevard (AM and PM peak hours)

The SB through queues at the U.S. 90 and Fortune Boulevard intersection extend 270 feet. This SB queue could overflow into the adjacent intersection of U.S. 90 and Dupont Road. The SB through segment between the two intersections is approximately 250 feet.

Table 3-2 summarizes the queue analysis for Existing Year 2019.

Table 3-2: 95th Intersection Percentile Queue Length Summary – Existing Year 2019

Intersection	Time Period	95th Percentile Queue Length (feet)											
		Eastbound			Northbound			Westbound			Southbound		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
U.S. 90 at Fortune Boulevard	AM Peak	23	44		38	187	35	164	43		45	537	0
	PM Peak	28	35		45	558	17	234	40		16	283	0
	Existing Storage (feet)	100	100		450	1000	850	100	100		220	250	250
U.S. 90 at I-10 WB On/Off-Ramps	AM Peak	--			0			20	--	232	0		
	PM Peak				0			176		289	0		
	Existing Storage (feet)				--			2000		2000	--		
U.S. 90 at I-10 EB On/Off-Ramps	AM Peak	18	--	57	0			--			0		
	PM Peak	21		23	0						0		
	Existing Storage (feet)	2500		2500	--						--		
U.S. 90 at E Brickyard Road	AM Peak	67			16	160	0	53		8	27	251	
	PM Peak	57			29	254	0	44		26	21	174	
	Existing Storage (feet)	1000			300	--	235	200		100	250	800	

3.9 Safety Review

Vehicular crash data along U.S. 90 and at the ramp terminal intersections were obtained from the FDOT SSOGis. SSOGis is a database maintained by FDOT for crashes reported along state highway facilities. The database provides information on various characteristics associated with each crash, including collision type, severity, weather conditions, road surface conditions and date/time information. The crash data was collected for the most recent five years available (2013- 2017). The crashes were analyzed to assess safety conditions along U.S. 90 and at the I-10 EB and WB ramp terminal intersections within the project limits. The existing crash analysis performed for the IOAR is consistent with the methods outlined in the Highway Safety Manual 1st Edition (HSM). In this section, the existing crash analysis will be broken down between I-10 EB ramp terminal intersection, the segment between I-10 EB and I-10 WB ramp terminals and I-10 WB ramp terminal intersection. The raw crash data is provided in **Appendix D**.

After the break down of the study area, the crash frequency and crash rate were calculated. The 'Average Crash Rate Method' of crash analysis, based on AADT and number of crashes occurred, was used for calculating the actual crash rate for the intersections. The actual crash rate for the study intersections from the year 2013 to 2017 was compared with the statewide average crash rate for the same type of facility. The actual crash rate for the segment between the ramp terminals was not calculated since no crashes occurred within the segment over the five years.

I-10 EB Ramp Terminal Intersection

The crash analysis results revealed that there was a total of 6 crashes at the I-10 EB ramp terminal intersection during the five study years (2013-2017). Of these 6 crashes, other crashes were the most common type of crashes accounting 67% (4 crashes) of total crashes followed by front to rear (rear-end) crashes accounting 33% (2 crashes). There were 2 total injuries and no fatalities.

The actual crash rate of 0.416 is lower than the average statewide crash rate for similar interstate facilities.

I-10 WB Ramp Terminal Intersection

The crash analysis results revealed that there was a total of 29 crashes at the I-10 WB ramp terminal intersection during the five study years (2013-2017). Of these 29 crashes, other crashes were the most common type of crash accounting 34% (10 crashes) of total crashes followed by front to rear (rear-end) crashes accounting 31% (9 crashes). There were 22 total injuries and 3 fatalities. The average crash rate of 1.116 is lower than the average statewide crash rate for similar interstate facilities.

Segment along U.S. 90 between I-10 EB and I-10 WB ramp terminals

The crash analysis results revealed that there were no crashes at the segment during the five study years (2013-2017), and the actual crash rate for the segment between the ramp terminals was not calculated.

Summaries of the crash analysis are provided in **Figure 3-4**, **Table 3-3** and **Table 3-4**.

Figure 3-3: Crash Types (2013-2017)

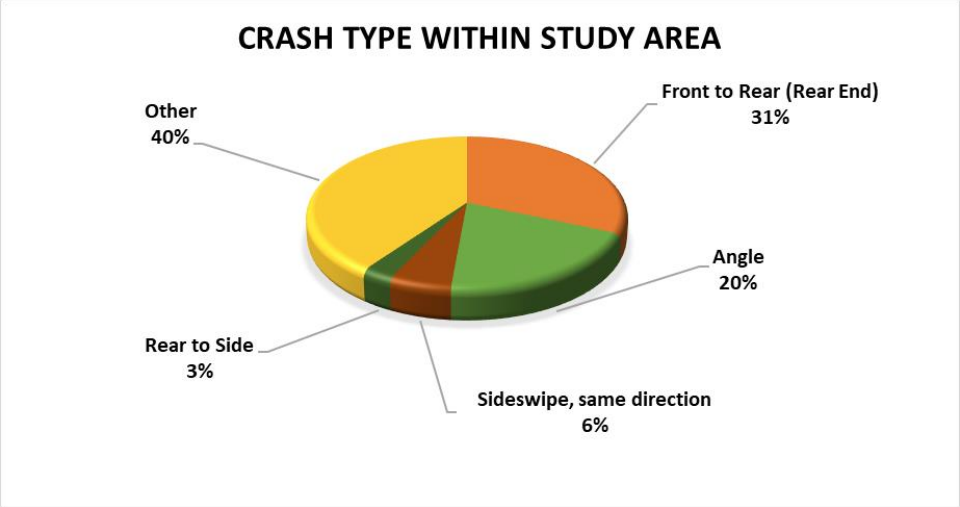


Table 3-3: Severity Summary (2013-2017)

Injury Type	2013	2014	2015	2016	2017	Total	Percent of Total
Number of Property Damage Only Crashes	2	8	2	4	7	23	62%
Number of Crashes with Injuries	0	2	2	4	1	9	30%
Number of Crashes with Fatalities	1	0	1	0	1	3	8%
Total	3	10	5	8	9	35	100%
Number of Injuries	0	3	3	18	1	25	
Number of Fatalities	1	0	1	0	1	3	

Table 3-4: Existing Crash Summary (2013-2017)

Study Locations	Number of Crashes	Daily Entering (AADT)	Annual Crash Frequency (crashes/year)	Cash Rate (crashes/million entering)	Statewide Average Crash Rate	Total # of Injuries	Total # of Fatalities
I-10 EB at U.S. 90	6	7,900	1.2	0.416	1.187	2	0
I-10 WB at U.S. 90	29	14,238	5.8	1.116	1.187	22	3

4. FUTURE NO-BUILD CONDITIONS

This section documents the future conditions within the I-10 at U.S. 90 interchange area of influence for the No-Build Alternative. The No-Build Alternative represents existing physical and operational conditions within the study area, including all planned and programmed roadway improvements over the course of the analysis years. At this time, the No-Build alternative considers the existing configuration and the widening of I-10 from four lanes to six lanes. The No-Build Alternative does not satisfy the purpose and need of this project.

The analysis years considered under the No-Build Alternative are Opening Year 2025 and Design Year 2045. The operational analysis includes the future year peak hour traffic forecasts for the area of influence. The primary objective of this analysis was to establish the No-Build operational conditions at the study intersections.

4.1 Future Traffic Development

The development of future traffic projections for the project is based on 2007 and 2035 CRTPA volumes, historical growth trends, population projections published by the Bureau of Economic and Business Research (BEBR) at the University of Florida, and planned development information within the project study area.

4.1.1 Travel Demand Forecasting

The CRTPA with the base year 2007 provided the basis for travel demand forecasting for the project. CRTPA is an activity-based model, built on Florida Standard Urban Transportation Modeling System (FSUTMS). It is the adopted travel demand forecasting tool for FDOT and the regional Metropolitan Planning Organizations (MPOs).

Table 4-1 shows the 2007 and 2035 CRTPA model volumes in the vicinity of the project. The linear growth rate was calculated using the base year 2007 and horizon year 2035.

Table 4-1: CRTPA Model Volumes

Roadways	Segments	2007	2035	Linear Growth Rate	Average Linear Growth Rate
U.S. 90	South of I-10	33,755	32,648	-0.1%	0.28%
	North of I-10	17,580	20,904	0.7%	
I-10	EB E of U.S. 90 Interchange	20,486	29,997	1.7%	1.27%
	EB W of U.S. 90 Interchange	21,515	27,629	1.0%	
	WB W of U.S. 90 Interchange	23,225	28,434	0.8%	
	WB E of U.S. 90 Interchange	20,310	29,365	1.6%	
I-10 Ramps	EB OFF Ramp to U.S. 90	8,395	6,675	-0.7%	0.84%
	EB ON Ramp from EB U.S. 90	2,756	3,999	1.6%	
	EB ON Ramp from WB U.S. 90	2,724	3,606	1.2%	
	WB OFF Ramp to US 90	5,176	6,874	1.2%	
	WB ON Ramp from WB U.S. 90	88	158	2.8%	
	WB ON Ramp from EB U.S. 90	6,117	4,348	-1.0%	

As shown in **Table 4-1**, the calculated linear growth rates show a small increase in traffic along U.S. 90 from 2007 to 2035 volumes. The other corridors within the study area show an increase in traffic from 2007 to 2035 volumes compared to U.S. 90.

4.1.2 Historical Traffic Growth

The historical AADT volumes used to study the growth trend were obtained from FTO for the past five years (2014-2018) for the I-10 mainline, ramps and U.S. 90. The historical growth rates were estimated based on regression analysis from ten FDOT count stations. The trend analysis was performed using FDOT's TRENDS tool. The trend analysis spreadsheets for all the locations are included in **Appendix B**.

The annual historical growth rates are shown in **Table 4-2** with their R square values. FDOT defines acceptable Historic Trend Growth Rate as that which has an R square of 75% and greater.

Table 4-2: Annual Historical Growth Rates

Roadway	FDOT Count Stations	Annual Historical Growth Rate	R Square	Average Annual Historical Growth Rate
S.R. 10/U.S. 90	500038	4.84%	91.43%	4.72%
	500321	4.59%	81.21%	
I-10	552001	2.28%	72.73%	3.66%
	500220	5.04%	96.68%	
I-10 EB OFF Ramp to U.S. 90	502610	4.69%	35.77%	6.30%
I-10 EB ON Ramp from EB U.S. 90	502613	4.00%	29.24%	
I-10 EB ON Ramp from WB U.S. 90	502614	2.50%	10.96%	
I-10 WB OFF Ramp to U.S. 90	502612	4.29%	68.93%	
I-10 WB ON Ramp from WB U.S. 90	502611	1.47%	12.50%	
I-10 WB ON Ramp from EB U.S. 90	502609	20.83%	48.81%	

Based on the trend analysis, the historical growth trend along U.S. 90 and I-10 shows a significant increase in traffic over the last five years.

4.1.3 Population Projections

In addition to the historical trend analysis and 2010 to 2018, medium 2045 population projection data from BEBR was used for comparison and to determine the reasonableness of the growth rate estimate. **Table 4-3**, shows 2010, 2018 and 2045 population for Gadsden County.

Table 4-3: 2010, 2018 and 2045 Census Populations

Year	Gadsden County
Population	
2010	46,389
2018	47,828
2045	48,800
Linear Growth Rate	
2010-2018	0.39%
2018-2045	0.08%
2010-2045	0.15%

Based on the Census population counts, Gadsden County shows a slight increase in population from the periods 2010 to 2018, 2018 to 2045 and 2010 to 2045.

In order to develop 2025 and 2045 traffic volumes, a growth rate was developed for the study area based on the comparison of historical growth trends, CRTPA volumes, and population projections. Based on the comparison of the sources, a 2% linear growth rate was estimated for the study area. This growth rate was estimated by averaging the growth rates calculated from the above sources and an understanding of the project study area.

4.1.4 Development of Turning Movement Counts

The Design Year 2045 traffic volumes were developed by applying the recommended linear annual growth rate to the Existing Year 2019 turning movement counts collected. The Opening Year 2025 traffic volumes were developed by interpolating between the existing year and design year volumes.

The Opening Year 2025 and Design Year 2045 traffic volumes are shown in **Figures 4-1 and 4-2,** respectively.

4.2 Future No-Build Operational Analysis

Intersection analysis was performed for the Opening Year 2025 and Design Year 2045 using Synchro 10. **Figure 4-1** and **Figure 4-2** illustrate the peak hour volumes utilized for the Opening Year 2025 and Design Year 2045 No-Build Alternative Synchro analysis. The study intersections were analyzed as stop control under the No-Build condition. Documentation of the No-Build Alternative analyses is provided in **Appendix E**.

4.2.1 Opening Year 2025 No-Build Analysis

Intersection Analysis

The Opening Year 2025 No-Build intersection analysis results are summarized in **Table 4-4**. In Opening Year 2025, the results indicate several operational deficiencies in the AM or PM peak hours. There are some movements at the intersections operating at LOS E and worse. These movements are listed below:

U.S. 90 at Fortune Boulevard intersection

- WB Left (AM peak hour) – operates at LOS E

U.S. 90 at I-10 WB On/Off-Ramps

- WB Left (AM and PM peak hours) – operates at LOS E or worse
- WB Right (PM peak hour) - operates at LOS F

U.S. 90 at I-10 EB On/Off-Ramps

- EB Left (PM peak hour) – operates at LOS E

Table 4-4: Opening Year 2025 No-Build Intersection Analysis Summary

Intersection	Intersection Approach				Overall Intersection	
	Approach	Movement	Delay	LOS	Delay (sec)	LOS
			AM (PM)	AM (PM)	AM (PM)	AM (PM)
U.S. 90 at Fortune Boulevard	Eastbound	Left	36.0 (31.2)	D (C)	18.2 (23.4)	B (C)
		Thru/Right	15.2 (10.5)	B (B)		
	Westbound	Left	62.5 (57.7)	E (E)		
		Thru/Right	20.6 (9.5)	C (A)		
	Northbound	Left	11.8 (12.3)	B (B)		
		Thru	15.7 (22.8)	B (C)		
		Right	2.7 (4.3)	A (A)		
	Southbound	Left	9.3 (13.4)	A (B)		
		Thru	21.2 (20.4)	C (C)		
		Right	1.0 (0.1)	A (A)		
U.S. 90 at I-10 WB On/Off-Ramps*	Westbound	Left	45.3 (298.2)	E (F)	--	
		Right	30.1 (104.7)	D (F)		
U.S. 90 at I-10 EB On/Off-Ramps*	Eastbound	Left	28.2 (37.3)	D (E)	--	
		Right	17.0 (12.7)	C (B)		
U.S. 90 at E Brickyard Road	Eastbound	Left/Thru/Right	44.4 (25.4)	D (C)	12.1 (11.3)	B (B)
	Westbound	Left/Thru	75.9 (49.1)	E (D)		
		Right	12.4 (10.5)	B (B)		
	Northbound	Left	4.7 (4.8)	A (A)		
		Thru	8.8 (10.5)	B (B)		
		Right	0.1 (0.0)	A (A)		
	Southbound	Left	4.9 (5.4)	A (A)		
		Thru/Right	9.2 (10.1)	A (B)		

* For Stop controlled intersections, the delay is reported for the worst-case approach only based on HCM 6th Edition.

In the Opening Year 2025, the 95th percentile queue length exceeds the storage at the following locations:

- WB left at U.S. 90 and Fortune Boulevard (AM and PM peak hours)
- SB through at U.S. 90 and Fortune Boulevard (AM and PM peak hours)

Table 4-5 summarizes the queue analysis for Opening Year 2025 No-Build Alternative.

Table 4-5: 95th Percentile Queue Length Summary Opening Year 2025 No-Build Alternative

Intersection	Time Period	95th Percentile Queue Length (feet)											
		Eastbound			Northbound			Westbound			Southbound		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
U.S. 90 at Fortune Boulevard	AM Peak	22	53		37	230	49	153	52		70	559	8
	PM Peak	36	39		43	587	33	274	49		19	290	0
	Existing Storage (feet)	100	100		450	1000	850	100	100		220	250	250
U.S. 90 at I-10 WB On/Off-Ramps	AM Peak	-			0			19		240	0		
	PM Peak				0			235		501	0		
	Existing Storage (feet)				-			2000		2000	-		
U.S. 90 at I-10 EB On/Off-Ramps	AM Peak	19		67	0			-			0		
	PM Peak	26		29	0						0		
	Existing Storage (feet)	2500		2500	-						-		
U.S. 90 at E Brickyard Road	AM Peak	105			19	197	0	74		38	30	275	
	PM Peak	73			35	266	0	52		34	21	179	
	Existing Storage (feet)	1000			300		235	200		100	250	800	

4.2.2 Design Year 2045 No-Build Analysis

Intersection Analysis

The Design Year 2045 No-Build intersection analysis results are summarized in **Table 4-6**. In the Design Year 2045, the results indicate several operational deficiencies along U.S. 90 within the study area. U.S. 90 at Fortune Boulevard will operate at LOS E in the PM peak hour. There are several individual movements at study intersections that will operate at LOS E or worse. These movements are listed below:

U.S. 90 at Fortune Boulevard intersection

- WB Left (AM and PM peak hours) - operates at LOS F
- NB Left (AM peak hour) - operates at LOS F
- NB Through (PM peak hour) - operates at LOS E

U.S. 90 at I-10 WB On/Off-Ramps

- WB Left (AM and PM peak hours) - operates at LOS F
- WB Right (AM and PM peak hours) - operates at LOS F

U.S. 90 at I-10 EB On/Off-Ramps

- EB Left (AM and PM peak hours) - operates at LOS F
- EB Right (AM peak hour) - operates at LOS F

Table 4-6: Opening Year 2045 No-Build Intersection Analysis Summary

Intersection	Intersection Approach				Overall Intersection	
	Approach	Movement	Delay	LOS	Delay (sec)	LOS
			AM (PM)	AM (PM)	AM (PM)	AM (PM)
U.S. 90 at Fortune Boulevard	Eastbound	Left	44.0 (43.5)	D (D)	49.1 (53.9)	D (D)
		Thru/Right	16.4 (12.3)	B (B)		
	Westbound	Left	93.8 (149.0)	F (F)		
		Thru/Right	29.1 (25.3)	C (C)		
	Northbound	Left	81.0 (18.5)	F (B)		
		Thru	25.6 (61.9)	C (E)		
		Right	4.8 (8.2)	A (A)		
	Southbound	Left	21.9 (29.0)	C (C)		
		Thru	76.9 (28.2)	E (C)		
		Right	4.3 (1.7)	A (A)		
U.S. 90 at I-10 WB On/Off-Ramps*	Westbound	Left	552.1 (2600.1)	F (F)		
		Right	332.2 (687.4)	F (F)		
U.S. 90 at I-10 EB On/Off-Ramps*	Eastbound	Left	157.8 (321.6)	F (F)		
		Right	96.4 (22.3)	F (C)		
U.S. 90 at E Brickyard Road	Eastbound	Left/Thru/Right	44.1 (33.8)	D (C)	18.6 (17.5)	B (B)
	Westbound	Left/Thru	70.5 (52.9)	E (D)		
		Right	11.6 (16.8)	B (B)		
	Northbound	Left	11.2 (9.9)	B (A)		
		Thru	15.3 (17.2)	B (B)		
		Right	0.2 (0.0)	A (A)		
	Southbound	Left	11.4 (19.6)	B (B)		
		Thru/Right	17.9 (15.0)	B (B)		

* For Stop controlled intersections, the delay is reported for the worst-case approach only based on HCM 6th Edition.

In the Design Year 2045, the 95th percentile queue length exceeds the storage at the following locations:

- NB through at U.S. 90 and Fortune Boulevard (PM peak hour)
- WB left at U.S. 90 and Fortune Boulevard (AM and PM peak hours)
- SB through at U.S. 90 and Fortune Boulevard (AM and PM peak hours)
- WB left at U.S. 90 and I-10 WB Off ramps (PM peak hour)

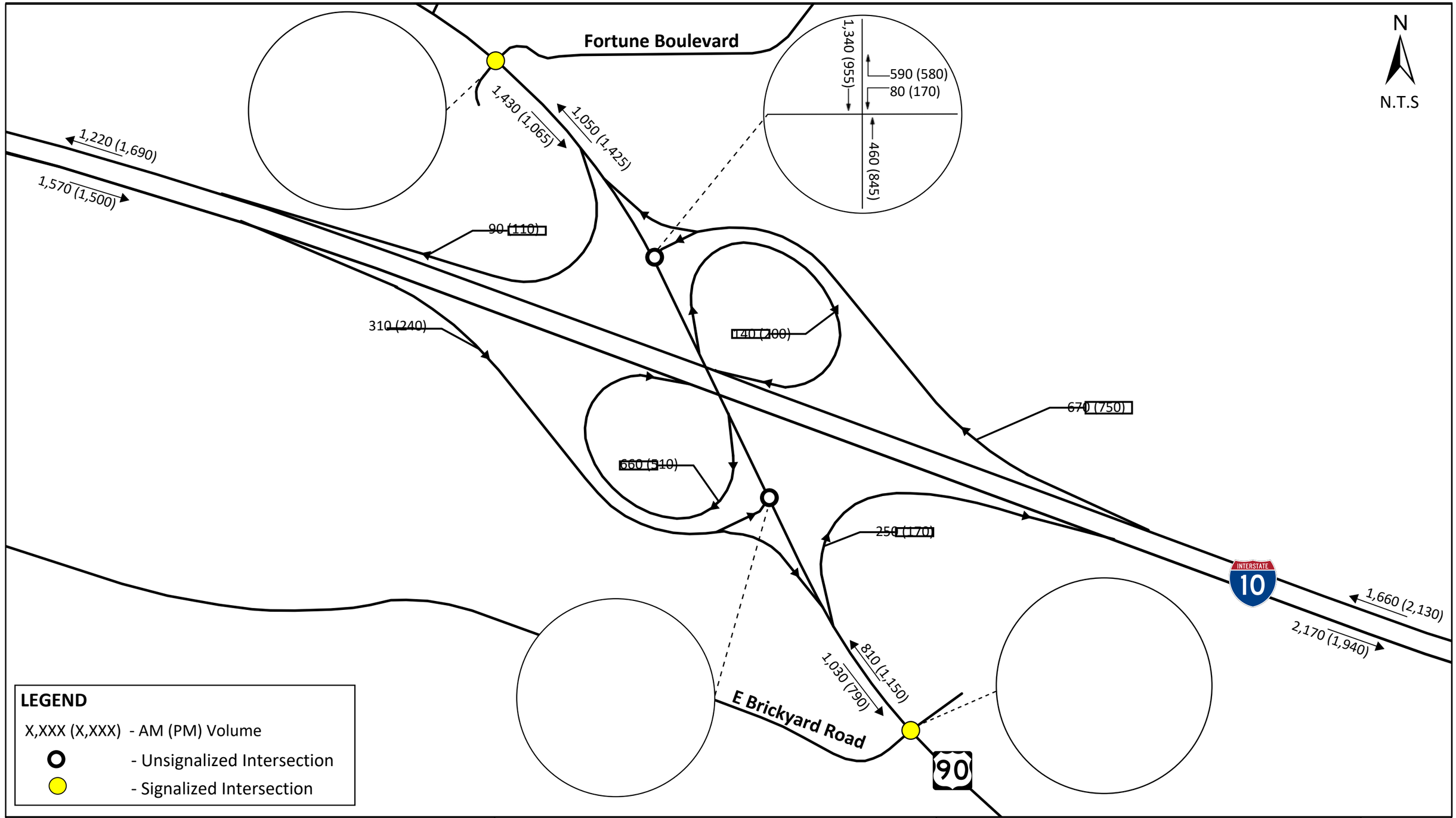
Table 4-7 summarizes the queue analysis for Design Year 2045 No-Build Alternative.

Table 4-7: 95th Percentile Queue Length Summary Design Year 2045 No-Build Alternative

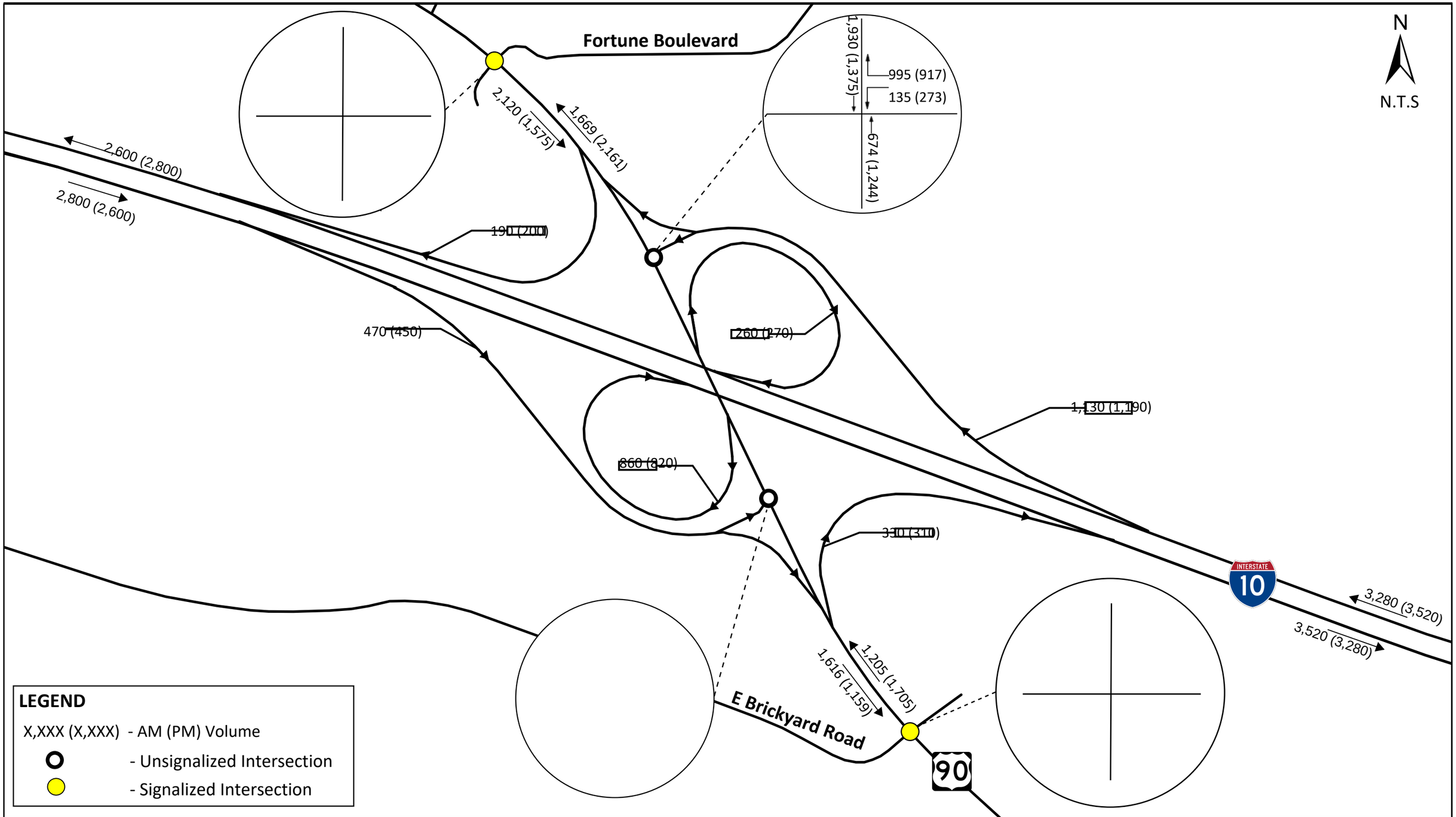
Intersection	Time Period	95th Percentile Queue Length (feet)											
		Eastbound			Northbound			Westbound			Southbound		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
U.S. 90 at Fortune Boulevard	AM Peak	40	81		#201	504	111	#318	96		112	#1266	33
	PM Peak	67	60		62	#1302	75	#676	132		30	523	12
	Existing Storage (feet)	100	100		450	1000	850	100	100		220	250	250
U.S. 90 at I-10 WB On/Off-Ramps	AM Peak	-			0			45		1493	0		
	PM Peak				0			Error*		1907	0		
	Existing Storage (feet)				-			2000		2000	-		
U.S. 90 at I-10 EB On/Off-Ramps	AM Peak	89		365	0			-			0		
	PM Peak	125		110	0						0		
	Existing Storage (feet)	2500		2500	-						-		
U.S. 90 at E Brickyard Road	AM Peak	136			31	380	0	89		49	53	640	
	PM Peak	114			57	527	0	72		67	52	341	
	Existing Storage (feet)	1000			300	--	235	200		100	250	800	

*Synchro reports “Error (Err)” which indicates significantly long queues for the approach

#: 95th percentile volume exceeds capacity and queue may be longer.



Florida Department of Transportation District Three Chipley, Florida	**I-10/SR 8 at U.S. 90 IOAR** Project Development & Environment Study FPID No.: 222530-5-22-01 and 222530-6-22-01 ETDM No.: 14393	Title: Opening Year 2025 No-Build and Build Peak Hour Volumes	Figure: 4-1



Florida Department of Transportation District Three Chipley, Florida	**I-10/SR 8 at U.S. 90 IOAR** Project Development & Environment Study FPID No.: 222530-5-22-01 and 222530-6-22-01 ETDM No.: 14393	Title: Design Year 2045 No-Build and Build Peak Hour Volumes	Figure: 4-2

5. BUILD CONDITIONS

5.1 Build Alternative

The Build Alternative looks at improving operation along U.S 90. The following are the major improvements for the Build Alternative:

- Changing ramp terminals from stop control intersections to signal control intersections.

The Build Alternative lane configuration is shown in **Figure 5-1**. The travel demand forecast for the project assumes that the above improvements would not impact overall future traffic patterns within the study. Therefore, the future year peak hour turning movement volume forecasts for the No-Build Alternative are also evaluated for the Build Alternative.

5.2 Build Alternative Operational Analysis

The No-Build Alternative Operational analysis presented in **Section 4.2** of this report demonstrated that failing conditions are expected at the ramp terminals by Design Year 2045 if no improvements are considered. A signal warrant analysis was performed to check if signalization is justified at both ramp terminal intersections.

Documentation of the Build Alternative analyses is provided in **Appendix F**.

5.2.1 Signal Warrant Analysis

Existing traffic conditions, including traffic volumes and traffic crashes at the EB and WB exit ramp terminals, were reviewed to determine if the T-intersections meet any of the nine Manual on Uniform Traffic Control Devices (MUTCD) Warrants for traffic signals. Right turns are via dedicated lanes, so only left-turning traffic is utilized for the side street traffic volumes.

Traffic turning movement counts were taken on September 17, 2019, and peak hours for off-ramp volumes were found to differ for each direction (as noted in **Section 2.3**). The turning movement summary sheets are shown in **Appendix B**.

The posted speed limit on U.S. 90 is 45 mph, allowing the 70 percent traffic volume threshold to be applied in the Warrant Analysis. **Tables 5-1 and 5-2** list the traffic signal warrants and show which warrants were satisfied, not satisfied, or not applicable for each ramp. The signal warrant worksheets are in **Appendix B.**

Table 5-1: Eastbound Exit Ramp Traffic Signal Warrants

Warrant Number	Description	*Warrant Satisfied*		
		Yes	No	Not Applicable
1A	Eight-hour vehicular volume		X	
1B	Eight-hour vehicular volume		X	
2	Four-hour vehicular volume		X	
3	Peak hour			X
4	Pedestrian volume			X
5	School crossing			X
6	Coordinated signal system			X
7	Crash experience		X	
8	Roadway network			X
9	Intersection near a grade crossing			X

Table 5-2: Westbound Exit Ramp Traffic Signal Warrants

Warrant Number	Description	*Warrant Satisfied*		
		Yes	No	Not Applicable
1A	Eight-hour vehicular volume		X	
1B	Eight-hour vehicular volume	X		
2	Four-hour vehicular volume	X		
3	Peak hour			X
4	Pedestrian volume			X
5	School crossing			X
6	Coordinated signal system			X
7	Crash experience		X	
8	Roadway network			X
9	Intersection near a grade crossing			X

At the EB exit ramp terminus, the I-10 exiting traffic was not sufficient to meet any of the hourly volume warrants, but traffic on U.S. 90 was sufficient to meet warrants. At the WB exit ramp terminus, two traffic signal warrants were met due to heavier exiting traffic. Both Warrant 1B and Warrant 2 were met at the 70% level.

After review of the signal warrant analysis results, it was decided to analyze both ramp terminals as signalized intersections in the Build Alternative scenario.

5.2.2 Opening Year 2025 Build Alternative Analysis

Intersection Analysis

The ramp terminals were analyzed as signalized intersections. The Opening Year 2025 Build intersection analysis results are summarized in **Table 5-3**. All the intersections within the project area operate at

acceptable LOS C or better in both AM and PM peak hours. However, the WB Left movement at US 90 and Fortune Boulevard intersection will operate at LOS E in the AM and PM peak hours.

Table 5-3: Opening Year 2025 Build Intersection Analysis Summary

Intersection	Intersection Approach				Overall Intersection	
	Approach	Movement	Delay	LOS	Delay (sec)	LOS
			AM (PM)	AM (PM)	AM (PM)	AM (PM)
U.S. 90 at Fortune Boulevard	Eastbound	Left	29.8 (24.0)	C (C)	16.4 (23.0)	B (C)
		Thru/Right	14.2 (9.6)	B (A)		
	Westbound	Left	58.8 (69.9)	E (E)		
		Thru/Right	18.3 (9.1)	B (A)		
	Northbound	Left	10.1 (7.5)	B (A)		
		Thru	12.3 (19.6)	B (B)		
		Right	2.8 (1.2)	A (A)		
	Southbound	Left	8.1 (11.0)	A (B)		
		Thru	19.9 (21.3)	B (C)		
		Right	0.1 (0.1)	A (A)		
U.S. 90 at I-10 WB On/Off-Ramps	Westbound	Left	37.5 (38.5)	D (D)	11.2 (12.4)	B (B)
		Right	0.9 (0.8)	A (A)		
	Northbound	Through	3.0 (5.3)	A (A)		
	Southbound	Through	17.0 (20.9)	B (C)		
U.S. 90 at I-10 EB On/Off-Ramps	Eastbound	Left	40.8 (41.8)	D (D)	5.5 (7.6)	A (A)
		Right	0.3 (0.2)	A (A)		
	Northbound	Through	3.9 (5.5)	A (A)		
	Southbound	Through	6.6 (9.6)	A (A)		
U.S. 90 at E Brickyard Road	Eastbound	Left/Thru/Right	28.3 (28.8)	C (C)	12.0 (12.9)	B (B)
	Westbound	Left/Thru	50.0 (49.6)	D (D)		
		Right	5.4 (9.3)	A (A)		
	Northbound	Left	5.0 (5.5)	A (A)		
		Thru	10.7 (12.5)	B (B)		
		Right	0.1 (0.0)	A (A)		
	Southbound	Left	5.5 (6.3)	A (A)		
		Thru/Right	11.0 (11.4)	B (B)		

In the Opening Year 2025 Build Alternative, the 95th Percentile queue lengths exceed the storage at the following approaches within the study area:

- WB left at U.S. 90 and Fortune Boulevard (AM and PM peak hours)
- SB through at U.S. 90 and Fortune Boulevard (AM peak hour)

Table 5-4 summarizes the queue analysis for Opening Year 2025 Build Alternative.

Table 5-4: 95th Percentile Queue Length Summary Opening Year 2025 Build Alternative

Intersection	Time Period	95th Percentile Queue Length (feet)											
		Eastbound			Northbound			Westbound			Southbound		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
U.S. 90 at Fortune Boulevard	AM Peak	19	48		16	173	61	#148	46		49	406	0
	PM Peak	30	35		15	#532	8	#291	45		15	243	0
	Proposed Storage (feet)	100	100		450	1000	850	100	100		220	250	250
U.S. 90 at I-10 WB On/Off-Ramps	AM Peak	-			28			82		0	436		
	PM Peak				156			142		0	m356		
	Proposed Storage (feet)				1000			2000		2000	1000		
U.S. 90 at I-10 EB On/Off-Ramps	AM Peak	53		0	68			-			167		
	PM Peak	74		0	152						188		
	Proposed Storage (feet)	2500		2500	1000						1000		
U.S. 90 at E Brickyard Road	AM Peak	76			18	191	0	57		16	28	277	
	PM Peak	74			39	308	0	51		33	23	199	
	Proposed Storage (feet)	1000			300		235	200		100	250	800	

#: 95th percentile volume exceeds capacity and queue may be longer.

5.2.3 Design Year 2045 Build Alternative Analysis

Intersection Analysis

The Design Year 2045 Build intersection analysis results are summarized in **Table 5-5**. In the Design Year 2045, all intersections operate at LOS C or better in the AM and PM peak hours. However, few movements listed below will operate at LOS E or worse:

U.S. 90 and Fortune Boulevard intersection

- WB Left (AM and PM peak hours) - operates at LOS E or worse
- NB Left (AM peak hour) - operates at LOS F

Table 5-5: Design Year 2045 Build Intersection Analysis Summary

Intersection	Intersection Approach				Overall Intersection	
	Approach	Movement	Delay	LOS	Delay (sec)	LOS
			AM (PM)	AM (PM)	AM (PM)	AM (PM)
U.S. 90 at Fortune Boulevard	Eastbound	Left	27.8 (29.4)	C (C)	32.8 (38.4)	C (D)
		Thru/Right	29.0 (10.2)	C (B)		
	Westbound	Left	71.9 (207.6)	E (F)		
		Thru/Right	16.9 (30.7)	B (C)		
	Northbound	Left	327.4 (13.1)	F (B)		
		Thru	8.4 (27.5)	A (C)		
		Right	1.3 (0.5)	A (A)		
	Southbound	Left	53.5 (44.1)	D (D)		
		Thru	36.0 (12.1)	D (B)		
		Right	1.9 (2.2)	A (A)		
U.S. 90 at I-10 WB On/Off-Ramps	Westbound	Left	39.2 (39.1)	D (D)	13.6 (10.5)	B (B)
		Right	2.9 (2.2)	A (A)		
	Northbound	Through	3.6 (9.8)	A (A)		
	Southbound	Through	20.8 (10.9)	C (B)		
U.S. 90 at I-10 EB On/Off-Ramps	Eastbound	Left	43.5 (43.4)	D (D)	7.1 (9.4)	A (A)
		Right	0.5 (0.4)	A (A)		
	Northbound	Through	4.7 (9.1)	A (A)		
	Southbound	Through	9.4 (8.5)	A (A)		
U.S. 90 at E Brickyard Road	Eastbound	Left/Thru/Right	43.9 (33.7)	D (C)	19.1 (17.8)	B (B)
	Westbound	Left/Thru	70.8 (53.2)	E (D)		
		Right	11.5 (16.7)	B (B)		
	Northbound	Left	10.2 (9.5)	B (A)		
		Thru	15.7 (17.6)	B (B)		
		Right	0.2 (0.0)	A (A)		
	Southbound	Left	11.1 (18.3)	B (B)		
		Thru/Right	18.7 (15.4)	B (B)		

In the Design Year 2045 Build Alternative, the 95th Percentile queue lengths exceed the storage at the following approaches within the study area:

U.S. 90 and Fortune Boulevard intersection

- WB left at U.S. 90 and Fortune Boulevard (AM and PM peak hours)
- SB through at U.S. 90 and Fortune Boulevard (AM and PM peak hours)
- SB left at U.S. 90 and Fortune Boulevard (AM peak hour)

Table 5-6 summarizes the queue analysis for Design Year 2045 Build Alternative.

Table 5-6: 95th Percentile Queue Length Summary Design Year 2045 Build Alternative

Intersection	Time Period	95th Percentile Queue Length (feet)											
		Eastbound			Northbound			Westbound			Southbound		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
U.S. 90 at Fortune Boulevard	AM Peak	29	101		m#121	237	0	#227	60		#244	#753	17
	PM Peak	47	47		m17	#771	m0	#476	129		#60	251	14
	Proposed Storage (feet)	100	100		450	1000	850	100	100		220	250	250
U.S. 90 at I-10 WB On/Off-Ramps	AM Peak	-			38			132	-	0	m486		
	PM Peak				319			228		0	m258		
	Proposed Storage (feet)				1000			2000		2000	1000		
U.S. 90 at I-10 EB On/Off-Ramps	AM Peak	72	-	0	110			-			m309		
	PM Peak	118		0	298						212		
	Proposed Storage (feet)	2500		2500	1000						1000		
U.S. 90 at E Brickyard Road	AM Peak	135			31	380	0	89		49	53	640	
	PM Peak	114			57	527	0	72		67	52	341	
	Proposed Storage (feet)	1000			300	--	235	200		100	250	800	

m: Volume for 95th percentile queue is metered by upstream signal.

#: 95th percentile volume exceeds capacity and queue may be longer.

5.3 Build Alternative Safety Analysis

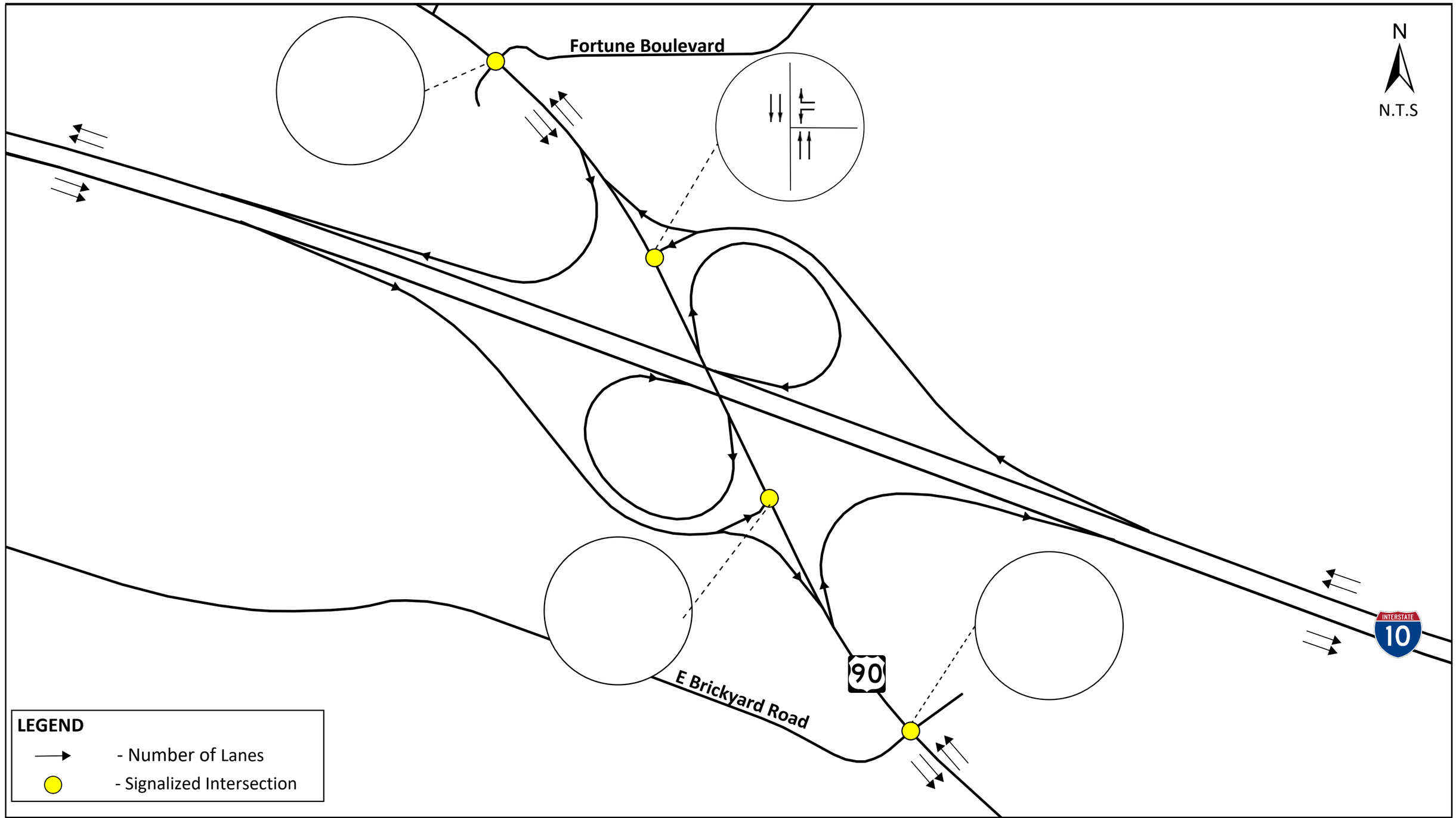
A predicted safety analysis was performed to determine if the proposed improvements addressed the existing safety concerns for this IOAR. The safety analysis performed follows the guidelines in the 2018 IARUG.

The proposed improvements include changing the ramp terminal intersections from stop-controlled to signal-controlled intersections. Therefore, a crash modification factor (CMF) for "Install a traffic signal" was obtained from the CMF Clearinghouse funded by FHWA. The CMF (ID:1459) of 0.83 was used for the proposed improvement. The complete predictive crash analysis is summarized in **Table 5-7**. The CMF is provided in **Appendix F**.

Table 5-7: Build Alternative Annual Crash Reduction Calculations

Study Locations	Number of Crashes	Annual Crash Frequency (crashes/year)	CMF	Proposed Annual Crash Frequency	Annual Reduction in Crashes
I-10 EB at U.S. 90	6	1.2	0.83	0.996	0.204
I-10 WB at U.S. 90	29	5.8	0.83	4.814	0.986
				Total Reduction	1.190

By implementing the proposed modification, a total crash reduction of 1.190 crashes a year is predicted.



Florida Department of Transportation District Three Chipley, Florida	**I-10 at U.S. 90 IOAR** Project Development & Environment Study FPID No.: 222530-5-22-01 and 222530-6-22-01 ETDM No.: 14393	Title: Build Alternative Lane Configuration	Figure: 5-1

6. EVALUATION OF ALTERNATIVES

This section discusses the analysis of alternatives based on safety, operational and engineering acceptability. The No-Build Alternative was evaluated in **Section 4** and the Build Alternative is analyzed in **Section 5**. A comparison of the No-Build and the Build Alternative is provided in this section. The evaluation criteria is described as follows:

- Compliance with FHWA Requirements
- Traffic Operational Performance

6.1 Compliance with Policies and Engineering Standards

The design criteria for this project is based on design parameters outlined in the FDOT Design Manual, the FDOT Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways and AASHTO's Policy on Geometric Design of Highway and Streets published in 2018.

6.2 Alternative Comparison

This section compares the operational and safety performance of the No-Build and Build Alternatives.

In the Design Year 2045, operational deficiencies exist within the study area for the No-Build Alternative. Almost all minor movements at both ramp terminal intersections operate at unacceptable LOS F, and the U.S. 90 at Fortune Boulevard intersection operates at LOS E in the Design Year 2045 No-Build Alternative. These operational deficiencies at the intersections are associated with high arterial through traffic along U.S. 90 and high left-turn traffic from the I-10 off-ramps. However, these conditions improve under the Build Alternative to provide an acceptable level of service for the study intersections.

A comparison of the queue lengths at the ramp terminal approaches indicate that the Build Alternatives provides significant reduction in queues compared to the No-Build Alternative. The No-Build queue analysis indicates that the left-turn movement at the westbound off-ramp approach will experience longer queues than the storage available in the Design Year 2045. However, for the Build Alternative, the queues at the ramp terminals are reduced, and they will not exceed the storage available.

The results also indicate excess queues at the U.S. 90 and Fortune Boulevard intersection in the Design Year 2045 No-Build Alternative. For this intersection, no improvement is proposed for the Build Alternative and the excess queue on the SB approach remains in the Build Alternative. This queue is associated with high truck percentages generated by the truck stop at the intersection.

The 2045 Build Alternative queue analysis showed a reduction in the NB through movement queue at the intersection of U.S. 90 and Fortune Boulevard when compared to the 2045 No-Build Alternative for the same approach and movement. The queue for the NB through movement under the 2045 Build Alternative is reported in the Synchro 95th percentile queue analysis as 771 feet, which is less than the available proposed storage length of 1,000 feet. The queue reported for the same movement under the 2045 No-Build Alternative is reported in the Synchro 95th percentile queue analysis as 1,302 feet, which exceeds the proposed storage length of 1,000 feet.

The 2045 Build Alternative queue length for the SB through movement showed a reduction in the SB through movement queue at the intersection of U.S. 90 and Fortune Boulevard when compared to the 2045 No Build Alternative for the same approach movement. The queue for the SB through movement under 2045 Build Alternative is reported in Synchro 95th percentile queue analysis as 753 feet (AM peak hour) and 250 feet (PM peak hour). The SB through movement would be reduced compared to the No-Build Alternative during the 2045 AM and PM peak hours. However, the SB approach queues will extend and overflow into the Dupont Road intersection. The two intersections are closely spaced (approximately 250 feet apart). Due to the existing spacing between the Dupont Road intersection and the Fortune Boulevard intersection, further engineering evaluations are recommended to identify traffic operations and safety trade-offs between the two closely spaced intersections and the WB ramp terminal intersection.

A quantitative predictive analysis was performed at the ramp terminals to determine if the Build Alternative addressed the existing safety concerns. A CMF (ID: 1459) of 0.83 obtained from the CMF Clearinghouse funded by FHWA was used for the proposed improvement. Based on the proposed improvement, a reduction of crashes is expected.

6.3 Recommended Alternative

The proposed improvements at the ramp terminal intersections at the I-10/U.S. 90 interchange will provide traffic relief and enhance safety within the area of influence by reducing delay and queueing on the off-ramps.

The No-Build Alternative evaluation shows that it will not accommodate the travel demand at the interchange. In the Design Year 2045, a significant operational deficiency exists. Almost all minor movements at the ramp terminals operate at unacceptable LOS in the Design Year 2045 No-Build Alternative. The Build Alternative for this study is expected to provide improved operations at the I-10 ramp terminal intersections in the Design Year 2045. However, the SB approach queues at U.S. 90 and Fortune Boulevard in the Build Alternative will extend and overflow into the Dupont Road intersection. Due to the existing spacing between the Dupont Road intersection and the Fortune Boulevard intersection, further engineering evaluations are recommended to identify traffic operations and safety trade-offs between the two closely spaced intersections and the WB ramp terminal intersection.

This report supports the conclusion that the improvements associated with the Build Alternative will benefit both interstate and regional transportation systems. Given the signals can be installed within the existing right-of-way, no potential environmental impacts are expected within the study area.

7. JUSTIFICATION

The proposed improvements at the U.S. 90 interchange with I-10 are consistent with the requirements set by the FHWA Access to the Interstate System Policy dated May 22,2017. The roadway improvements in this IOAR will provide traffic relief, thereby enhance safety within the area of influence. The I-10 at U.S. 90 interchange will operate at an acceptable LOS through the Design Year 2045.

7.1 Assessment of FHWA'S Policy on Access to Interstate System

The following requirements serve as the primary decision criteria used in approval of interchange operational analysis projects. Responses to each of the two FHWA policy points are provided to show that the proposed improvements at I-10/U.S. 90 interchange are viable based on the conceptual analysis performed to date.

7.1.1 FHWA Policy Point 1

An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis should, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (23 CFR 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, should be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)). Requests for a proposed change in access should include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect distribute, and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request should also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d) and 23 CFR 655.603(d)).

An in-depth operational and safety analysis conducted for this IOAR confirmed that the proposed improvement to the existing I-10 EB and WB ramp terminal intersections would not have a significant

adverse impact on operation and safety of the project area. Several performance measures were used to compare the operations of the existing system under No-Build and Build conditions. Key measures included delays, 95th percentile queue lengths and safety under existing and proposed conditions.

From an operational perspective in the Design Year 2045 under No-Build Alternative, operational and safety deficiencies exist. All minor movements at the intersections will operate at LOS F except EB right traffic at the I-10 EB ramp terminal in the PM peak hour. These deficiencies are attributed by the high through traffic volume along U.S. 90 and high left-turn traffic exiting the freeway. The WB approach at the I-10 WB ramp terminal intersection will experience excessive queues, which could possibly affect freeway operations. The U.S. 90 and Fortune Boulevard intersection will operate with queues longer than the available storage in the NB and SB directions affecting the I-10 WB ramp terminal intersection.

The Build Alternative for this study performs substantially better than the No-Build Alternative for all future years. When compared to the No-Build Alternative, the proposed improvements provide a reduction in delay at both study intersections. The most significant reduction in delay and improvement in LOS occurs at U.S. 90 and I-10 WB On/Off-ramp intersection. The delay at the I-10 WB ramp terminal for the left-turn movement is reduced by 512.9 seconds and 2561.0 seconds during the AM and PM peak hours, respectively. Also, the LOS changes from F to D in the AM and PM peak hours. The queues observed in the No-Build Alternative also are reduced significantly, where the available storage can accommodate the queues at the I-10 WB ramp terminal intersection. However, the SB approach queues at the U.S. 90 and Fortune Boulevard intersection will impact the Dupont Road intersection north of Fortune Boulevard intersection in the Build Alternative. A traffic engineering evaluation is recommended to identify the traffic operations and safety trade-offs between the two closely spaced intersections of U.S. 90 with Fortune Boulevard and Dupont Road intersection.

The safety analysis performed for this study indicated a total of 35 crashes occurred within the project area during the five study years (2013-2017). The predominant crash types that occurred within the study area were other crashes that were attributed by careless driving and the failure to comply with traffic laws followed by rear-end and angle crashes. Rear-end and angle crashes were typically attributed to congestion along the arterials and interchange ramps.

With the improved operations under the Build Alternative, it is anticipated to enhance safety within the project area. A predictive safety analysis was performed for the study area, where improvements are to

be implemented. Based on the safety analysis, it is predicted that a total annual crash reduction of 1.190 crashes per year will occur at the ramp terminal intersections.

Overall, the Build Alternative provides significantly better traffic operations and enhanced safety when compared to the No-Build Alternative. All proposed improvements as part of this project will be done within the existing right-of-way.

In conclusion, the comparison of the No-Build and Build Alternatives show that the proposed improvements provide enhanced operation and safety conditions.

7.1.2 FHWA Policy Point 2

The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access, such as managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)). In rare instances where all basic movements are not provided by the proposed design, the report should include a full-interchange option with a comparison of the operational and safety analyses to the partial-interchange option. The report should also include the mitigation proposed to compensate for the missing movements, including wayfinding signage, impacts on local intersections, mitigation of driver expectation leading to wrong-way movements on ramps, etc. The report should describe whether future provision of a full interchange is precluded by the proposed design.

The proposed improvements apply to the I-10/U.S. 90 ramp terminal intersections in Gadsden County no new access is requested. The improvements are designed to preserve all the existing connections between public roads and preserve existing traffic movements onto and off I-10. These improvements are designed to meet current standards for federal-aid projects on the interstate system and conform to American Association of State Highway and Transportation Officials (AASHTO) and the FDOT Design Manual.

8. CONCEPTUAL FUNDING PLAN/CONSTRUCTION SCHEDULE

The proposed improvements at the I-10 at U.S. 90 interchange are identified in the FDOT District Three Five-Year Work Program (FDIP: 222530-5) with funding allocated for Highway/PD&E in 2021.

List of Appendices