INTERCHANGE OPERATIONAL ANALYSIS REPORT (IOAR)

I-10 at S.R. 87

Santa Rosa County, Florida

FPID: 413062-4-22-01 and 413062-5-22-01
FAP No(s): D319157B

June 2021

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Prepared for:

Florida Department of Transportation - District Three
Chipley, Florida

June 2021

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

Interchange Operational Analysis Report (IOAR)

For I-10 at S.R. 87 Interchange

FPID: 413062-4-22-01 and 413062-5-22-01

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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SYSTEMS IMPLEMENTATION OFFICE

QUALITY CONTROL CERTIFICATION FOR INTERCHANGE ACCESS REQUEST SUBMITTAL

Submittal Date: June 2021

FM Number: 413062-4-22-01 and 413062-5-22-01

Project Title: I-10 at S.R. 87 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.

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Iris Waters, P.E.

IRC DocuSigned by: Starsky Harrell E3F2EA2D0F5440D... Date: 7/21/2021 | 10:36 AM EDT

Starsky Harrell

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. 87 Interchange Operational Analysis Report (IOAR)

LOCATION: Santa Rosa County, FL

FINANCIAL PROJECT ID: 413062-4-22-01 and 413062-5-22-01

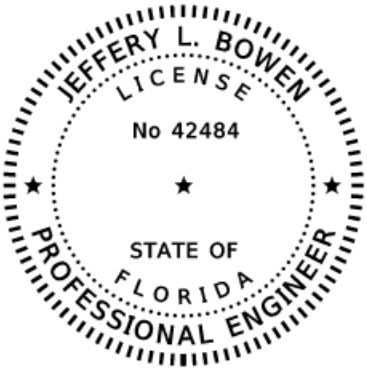
This report includes a summary of data collection effort, traffic analysis, discussion of preferred alternative and summary of conclusions. I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of transportation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

Name: Jeffery L. Bowen, P.E.

Florida P.E. No.: 42484

Signature: Jeffery L Bowen

Digitally signed by Jeffery L Bowen
Date: 2021.06.30 09:16:47 -04'00'



Date: _____

EXECUTIVE SUMMARY

The purpose of this IOAR is to provide the required documentation for obtaining approval for improvements at the Interstate 10 (I-10)/S.R. 87 interchange in Santa Rosa County. The current interchange is a full diamond with stop-controlled operation at both ramp terminal intersections. The primary need of the project is to improve future traffic operations at the ramp terminal intersections, thereby improving safety at the interchange.

The primary basis for traffic projections in this IOAR is consistent with the Project Traffic Analysis Report (PTAR) dated May 2020, which incorporates the field traffic counts, Florida Traffic Online (FTO) and the latest version of the Northwest Florida Regional Planning Model Version 2.1 (NWFRPM v2.1) with base year 2010 and horizon year 2040. The analysis years for the study include Existing Year 2019, Opening Year 2025, and Design Year 2045. The operational analysis for this study was performed using Synchro 10. The delay and level of service (LOS) for the unsignalized intersection analyses were reported based on Highway Capacity Manual (HCM 6th Edition) methodology. The delay and level of service (LOS) for the signalized intersection analyses were reported based on Synchro 10 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.

- 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/S.R. 87 interchange ramp terminal intersections.

As part of this study, an existing crash analysis was performed. The data provided from the FDOT State Safety Office Map-Based Query Tool (SSOGis) shows that angle crashes and rear-end crashes are the most prominent crashes within the project area. The preferred 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 preferred 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.

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 Federal Highway Administration (FHWA) policy points are provided to show that the proposed improvements at the I-10/S.R. 87 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)).

The operational and safety analysis conducted for this IOAR confirmed that the proposed improvements to the existing interchange will not have an adverse impact on the operations 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, crash rate, crash type and crash severity under existing and proposed conditions.

From an operational perspective in the Design Year 2045 under No-Build Alternative, operational and safety deficiencies exist. All the individual movements on the minor approach at the intersections will operate at LOS F in the AM and PM peak hours. These operational deficiencies are attributed to the high through traffic volume along S.R. 87 and high left-turn traffic volume exiting I-10. The eastbound (EB) and westbound (WB) approaches at the ramp terminal intersections will experience excessive queues that are longer than the available storage, which could possibly affect freeway operations.

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 the S.R. 87 and I-10 westbound On/Off-ramp intersection. The delay for the left-turn movement on the westbound approach at the I-10 westbound ramp terminal is reduced by 1,018.8 seconds and 2,223 seconds during the AM and PM peak hours, respectively. Also, the LOS changes from F to C in the AM peak and PM peak hours. The queues observed in the No-Build Alternative are reduced significantly, allowing the available storage to accommodate the queues at both intersections.

The safety analysis performed for this study indicated that a total of 47 crashes occurred within the project area during the five study years (2013-2017). The predominant crash types that occurred within the study area were angle crashes followed by rear-end crashes. Rear-end and angle crashes were typically attributed to congestion along the arterials and interchange ramps.

The Build Alternative operational improvements are anticipated to improve operations and enhance safety within the project area. A quantitative 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 3.666 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 constructed within the existing right-of-way.

In conclusion, the comparison of the No-Build and Build Alternatives show that the proposed improvements provide enhanced operations thereby enhancing safety.

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/S.R. 87 ramp terminal intersections in Santa Rosa County and no new access is requested. The improvements are proposed to preserve all the existing connections between public roads and preserve existing traffic movements onto and off of 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 Interstate 10 (I-10) eastbound and westbound ramp terminal intersections at S.R. 87. 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 begins at the border of Alabama, traverses 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 I-10 interchange at S.R. 87 is significant for passenger movements.

This IOAR stems from a recently completed Project Traffic Analysis Report (PTAR), dated May 2020. The PTAR was part of the Project Development and Environment (PD&E) Study performed to evaluate the need for widening I-10 from four to six lanes in Santa Rosa County. The PD&E study is intended to enhance the efficiency of I-10 and provide the connecting link to the adjacent widening project to the east of the I-10 study segment (West of S.R. 281 (Avalon Boulevard) to Okaloosa County Line). The PTAR is provided in **Appendix A**.

The IOAR is evaluating the proposed improvements to the I-10 eastbound and westbound ramp terminal intersections at S.R. 87 in Santa Rosa 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, IARUG, and the FDOT Project Traffic Forecasting Handbook.

1.2 Purpose and Need for Project

The main purpose of this IOAR is to document the safety, operational and engineering (SO&E) acceptability of signalizing the I-10 eastbound and westbound ramp terminal intersections at S.R. 87. In this report, both ramp terminal intersections have been analyzed to evaluate the traffic operations at the I-10/S.R. 87 interchange.

As part of this study, I-10 eastbound and westbound ramp terminal intersections were studied for operational and safety improvements. The results from the existing analysis at the ramp terminal intersections revealed that the left-turn and right-turn traffic from the I-10 eastbound and westbound off-ramps operates at level of service (LOS) E or worse in the AM and PM peak hours. By signalizing the ramp terminal intersections, the eastbound and westbound exit traffic volumes from the off-ramps will be metered, which will mitigate the simultaneous release of traffic volumes onto S.R. 87 by creating a platooning effect through the ramp terminal signal controls.

The need for this project derives from the PTAR. As part of this study, the existing and future traffic volumes along S.R. 87 were studied and utilized in the analysis of existing and future traffic conditions. Recent traffic projections completed in the region identified increased traffic congestion and potential deficiencies in the vicinity of the interchange. Currently, the daily traffic volumes on S.R. 87 range between 12,800 and 13,000 vehicles per day, with 11.5 percent daily truck traffic in the vicinity of the interchange. By the year 2045, the daily traffic volume is expected to increase to a range between 16,600 to 16,800 vehicles per day. With this increase in traffic along S.R. 87, the operating conditions at the intersections are expected to deteriorate.

A review of the crash data provided in **Section 3.8** shows a total of 47 crashes for the five-year period (2013-2017), of which 36 were injury crashes. No fatal crashes occurred during the five-year period. The crash rates at the ramp terminal intersections were calculated and both were

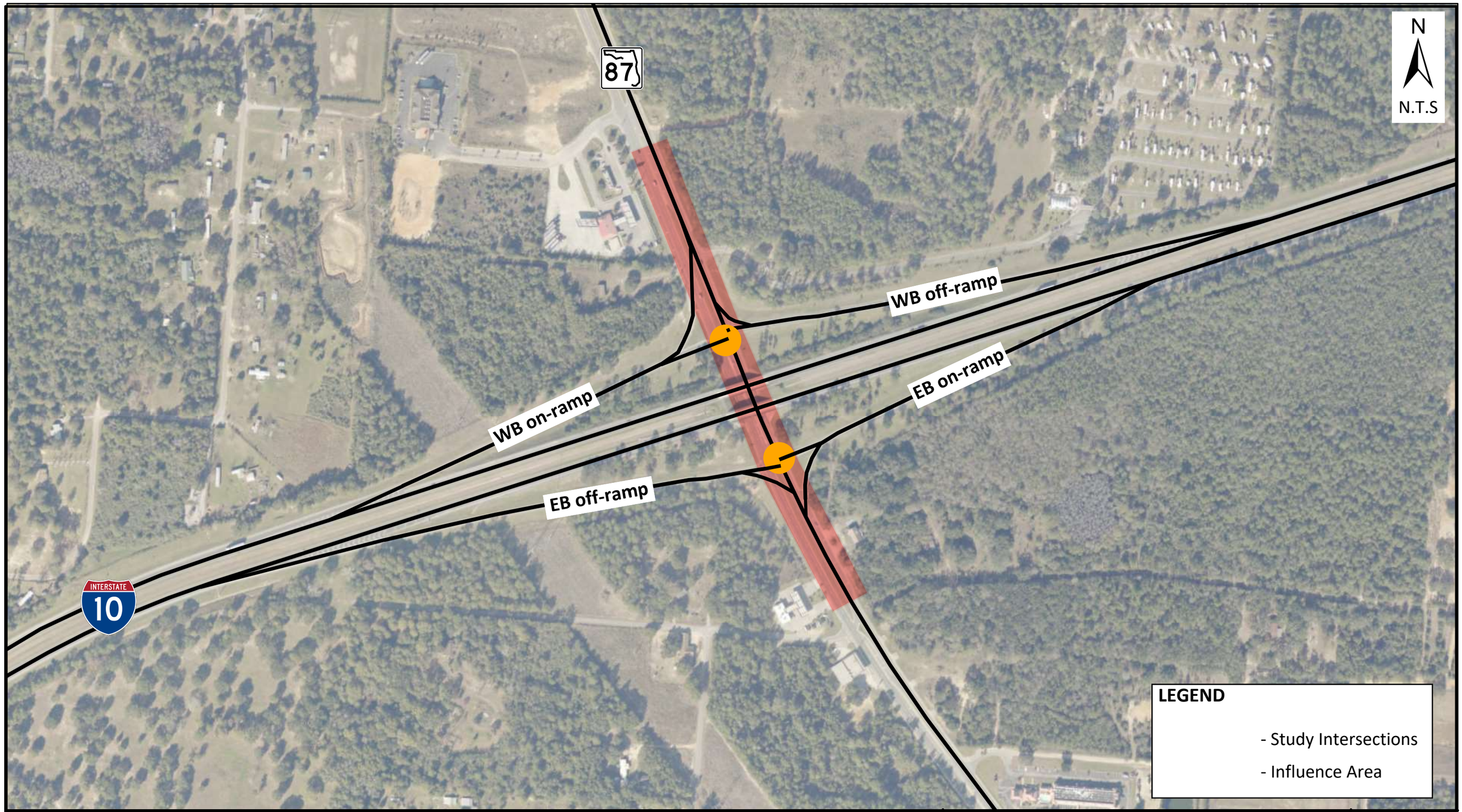
lower than the average statewide crash rate for similar facilities. Analysis of the crash data revealed the following notable characteristics.

- Angle crashes (55%) were the predominant crash type followed by Rear-end crashes (26%).
- Angle crashes were most concentrated at the I-10 westbound ramp terminal intersection.
- A combination of high traffic volume along S.R. 87 and drivers' failure to yield to vehicles exiting the freeway appear to be contributing to angle crashes at the ramp terminal intersections.

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 I-10 at S.R. 87 interchange is located in Santa Rosa County at Milepost 14.700, Section number 58002000. The nearest interchanges along I-10 are the Ward Basin Road interchange located 2.85 miles to the west and the Log Lake Road interchange located 13.80 miles to the east, respectively. Along S.R. 87, the Exxon gas station (truck stop) is 0.22 miles north of the study interchange. The project location and the study area are shown in **Figure 1-1**.



Florida Department of Transportation District Three Chipley, Florida	**I-10 at S.R. 87** Project Development & Environment Study FPID No.: 413062-4-22-01, 413062-5-22-01	Project Location and Study Area Map	Figure 1-1

2. METHODOLOGY

2.1. Area of Influence

The area of influence (AOI) for the IOAR includes the study interchange of I-10 and S.R. 87 located in Santa Rosa County. Along S.R. 87, there are two intersections adjacent to the ramp terminal intersections. Gulf Pines Drive is located 350 feet north of the westbound ramp terminal intersection and Welcome Church Road is approximately 650 feet to the south of the eastbound ramp terminal intersection. These intersections are not included within the AOI as they are not anticipated to impact the ramp terminals. Similarly, these adjacent intersections are unsignalized and carry low traffic volumes that are accounted for in the ramp terminal intersections analysis performed in this IOAR. There are no signalized intersections within one mile of the ramp terminal intersections.

S.R. 87 is a north-south highway in Santa Rosa County that extends from U.S. 98 to U.S. 90. Within the study area, S.R. 87 is a four-lane divided Urban Minor Arterial with a posted speed limit of 45mph. S.R. 87 provides access to the Exxon gas station (truck stop) and residential communities. The Exxon gas station contributes to high truck traffic along S.R. 87 and within the AOI. In addition, the AOI includes the two ramp terminal intersections listed below:

- I-10 westbound at S.R. 87 Interchange Ramps (Unsignalized)
- I-10 eastbound at S.R. 87 Interchange Ramps (Unsignalized)

The AOI is shown in **Figure 1-1**.

2.2. Analysis Years

The analysis years for the project are:

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

2.3. Data Collection and Sources

The primary sources of traffic data for this study are the field traffic counts, Florida Traffic Online (FTO) and the Northwest Florida Regional Planning Model (NWFRPM) with base year 2010 and horizon year 2040. The existing traffic data for this study was collected from October 29th through October 31st, 2019 as part of the PTAR.

The intersection turning movement counts (TMCs) were collected at both the I-10 and S.R. 87 interchange ramp terminal intersections. This data collection effort was performed on Thursday, October 31st, 2019, concurrently with the 72-hour traffic counts. In general, the traffic data for each intersection included 8-hour TMCs (6:00 – 10:00 AM and 2:00 – 6:00 PM), including the heavy vehicle counts. There were no bicycles or pedestrians observed during the TMCs data collection.

72-hour vehicle classification counts were conducted using road tubes and automated traffic counters along the I-10 mainline east and west of the S.R. 87 interchange and on all ramps at the interchange. Also, the 72-hour vehicle classification counts were conducted on S.R. 87 north and south of the interchange.

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 factors used for design traffic analysis include the K factor, D factor, TDaily percentage and Design Hour Truck (DHT) percentage. The Standard K factor and D factors were used to develop the Directional Design Hourly Volume (DDHV) for this study.

- The TDaily factor is the adjusted, annual daily percentage of truck traffic.
- The DHT percentage is calculated as one half of the daily truck percentage.

The traffic factors from the PTAR are recommended for use in this IOAR and are presented in **Table 2-1**. The PTAR is included in **Appendix A**.

Table 2-1: Summary of Traffic Factors

Roadway	K	D	T_{Daily}	DHT
I-10 from Ward Basin Road to S.R. 87	9.0%	54.1%	22.2%	11.10%
I-10 from S.R. 87 to Log Lakes Road	9.5%	54.1%	24.6%	12.30%
S.R. 87	9.5%	55.4%	11.5%	5.75%

Source: FDOT FTO as of August 8, 2019 (reported in the PTAR).

The DHT factor used at the ramp terminal intersections was based on the traffic factors from FTO. The truck stop located north of the I-10 and EB ramp terminal intersection contributes to high truck percentages.

The Peak Hour Factor (PHF) used for the existing condition analysis at the study intersections was 0.92. This is based on the overall average PHF calculated from the existing TMCs. In the future analysis, a 0.95 PHF was used at the intersections.

All printouts of the data collected are included in the PTAR (see **Appendix A**).

2.4. Travel Demand Forecasting

The development of design traffic for this IOAR followed the procedure outlined in the 2019 Project Traffic Forecasting Handbook. The travel demand forecasting methodology utilized was consistent with that provided in the PTAR. A growth rate was developed based on the growth from the latest version of the NWFRPM Model, historical trends analysis, the population projection data for Santa Rosa County published by the Bureau of Economic and Business Research (BEBR) at the University of Florida, Woods & Poole employment forecasts, and the historical trends analysis. 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.

2.5. Safety Analysis Procedure

Crash data was obtained from the 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 3.8** documents the crash rates and compares the rates to the statewide averages for similar facilities. **Section 3.8** also provides tables and figures summarizing the crash analysis results. The safety analysis for the Build Alternative was performed by applying the appropriate Crash Modification Factor (CMF) to the existing observed crash frequency.

2.6. Operational Analysis Procedures

Traffic operational analysis for existing conditions and future No-Build and Build Alternatives was reported using Synchro 10 methodology. Where the Synchro 10 methodology does not support the intersection characteristics, HCM 6th Edition methodology was used.

Intersection analyses have been conducted for the study intersections using Synchro 10. The delay and LOS for the unsignalized intersections analyses were reported based on HCM 6th Edition. 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 Alternatives, AM and PM peak hours.
- Design Year – 2045 conditions for No-Build and Build Alternatives, AM and PM peak hours.

2.7. 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 target was used for this IOAR. The I-10 at S.R. 87 interchange is located in an urbanized area. The LOS target for study intersections analyzed in this IOAR is LOS D.

3. EXISTING CONDITIONS

The following section provides a discussion and evaluation of the existing conditions at the subject interchange of I-10 at S.R. 87.

3.1 Geometry

The following two ramp terminal intersections have been analyzed as part of this IOAR:

The S.R. 87 at I-10 eastbound On/Off ramps is a four-leg unsignalized intersection. This intersection has the following configurations:

- eastbound off-ramp at S.R. 87: one left-turn lane and one channelized right-turn lane
- S.R. 87 northbound movement: two through lanes and one channelized right-turn lane
- S.R. 87 southbound movement: two through lanes and one left-turn lane

The S.R. 87 at I-10 westbound On/Off ramps is a four-leg unsignalized intersection. This intersection has the following configuration:

- Westbound off-ramp at S.R. 87: one left-turn lane and one channelized right-turn lane
- S.R. 87 northbound movement: two through lanes and one left-turn lane
- S.R. 87 southbound movement: two through lanes and one channelized right-turn lane

Figure 3-1 shows the existing layout design of the study area.

3.2 Functional Classification

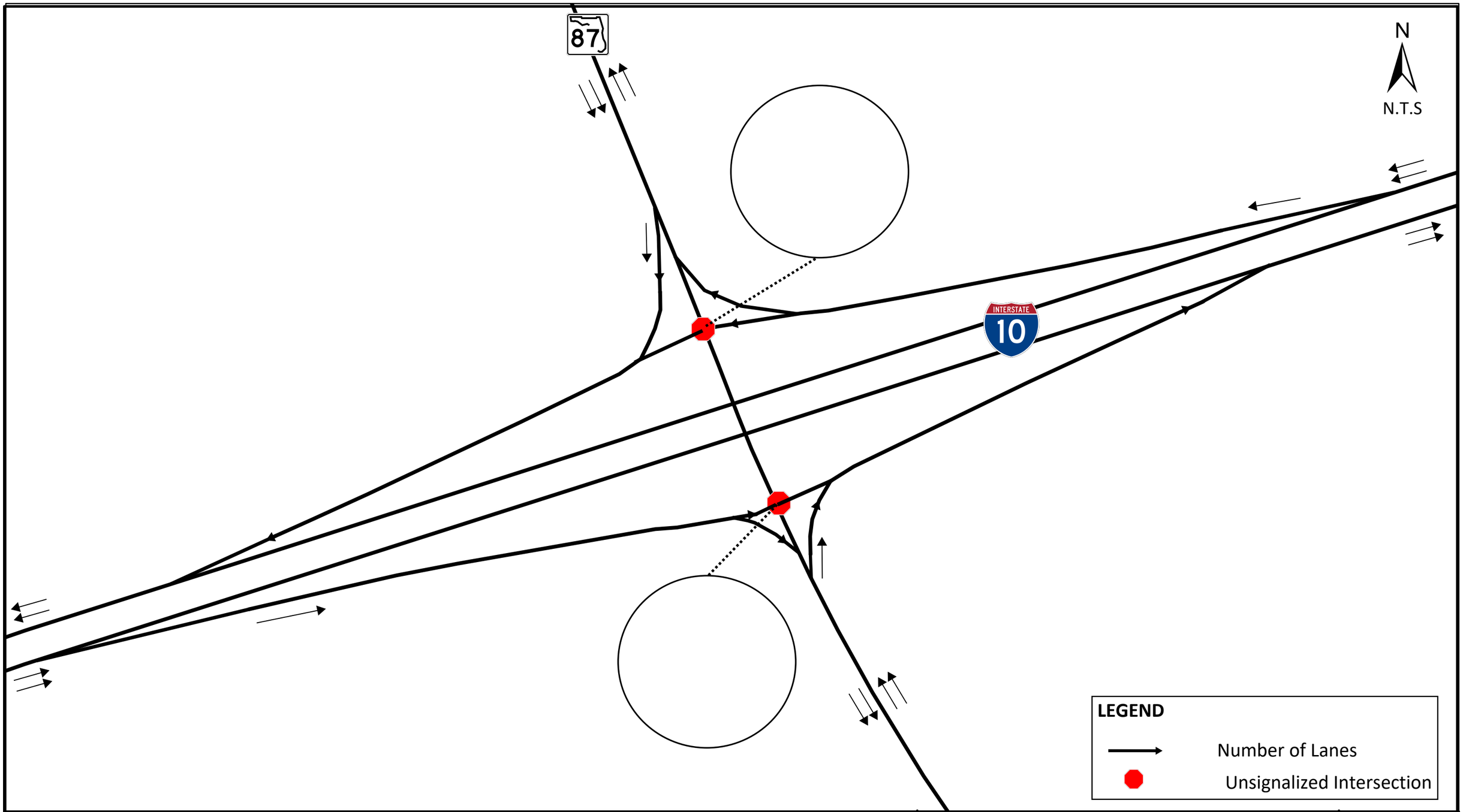
FDOT Functional Classification:

- S.R. 87 is classified as Urban Minor Arterial
- I-10 is classified as Urban Principal Arterial-Interstate

The Santa Rosa County functional classification is provided in **Appendix A**.

3.3 Posted Speed Limits

- S.R. 87 has a posted speed limit of 45 mph
- I-10 eastbound Off/On-ramps have a posted speed limit of 35 mph
- I-10 East and West of S.R. 87 has a posted speed limit of 70 mph



Florida Department of Transportation District Three Chipley, Florida	**I-10 at S.R. 87** Project Development & Environment Study FPID No.: 413062-4-22-01, 413062-5-22-01	Title: Existing Year 2019 Lane Configuration	Figure 3-1

3.4 Typical Section

The I-10 typical section at S.R. 87 consists of a four-lane divided facility providing two general-purpose lanes in each direction. The median within the section is approximately 65 feet with guardrail barrier almost throughout. The I-10 mainline crosses S.R. 87 above grade. The S.R. 87 typical section within the study limits is a four-lane urban divided roadway with a raised median dividing the roadway.

3.5 Interchange Layout

The study interchange is a full diamond interchange, and the existing lane configuration is provided in **Figure 3-1**.

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 Existing 2019 Traffic Operational Performance

A detailed operational analysis for Existing Year 2019 was performed at the ramp terminal intersections. For the ramp terminal intersections, the length of the off-ramps are approximately 1300 feet long. Documentation of the existing year analysis is provided in **Appendix B**.

Intersection Analysis

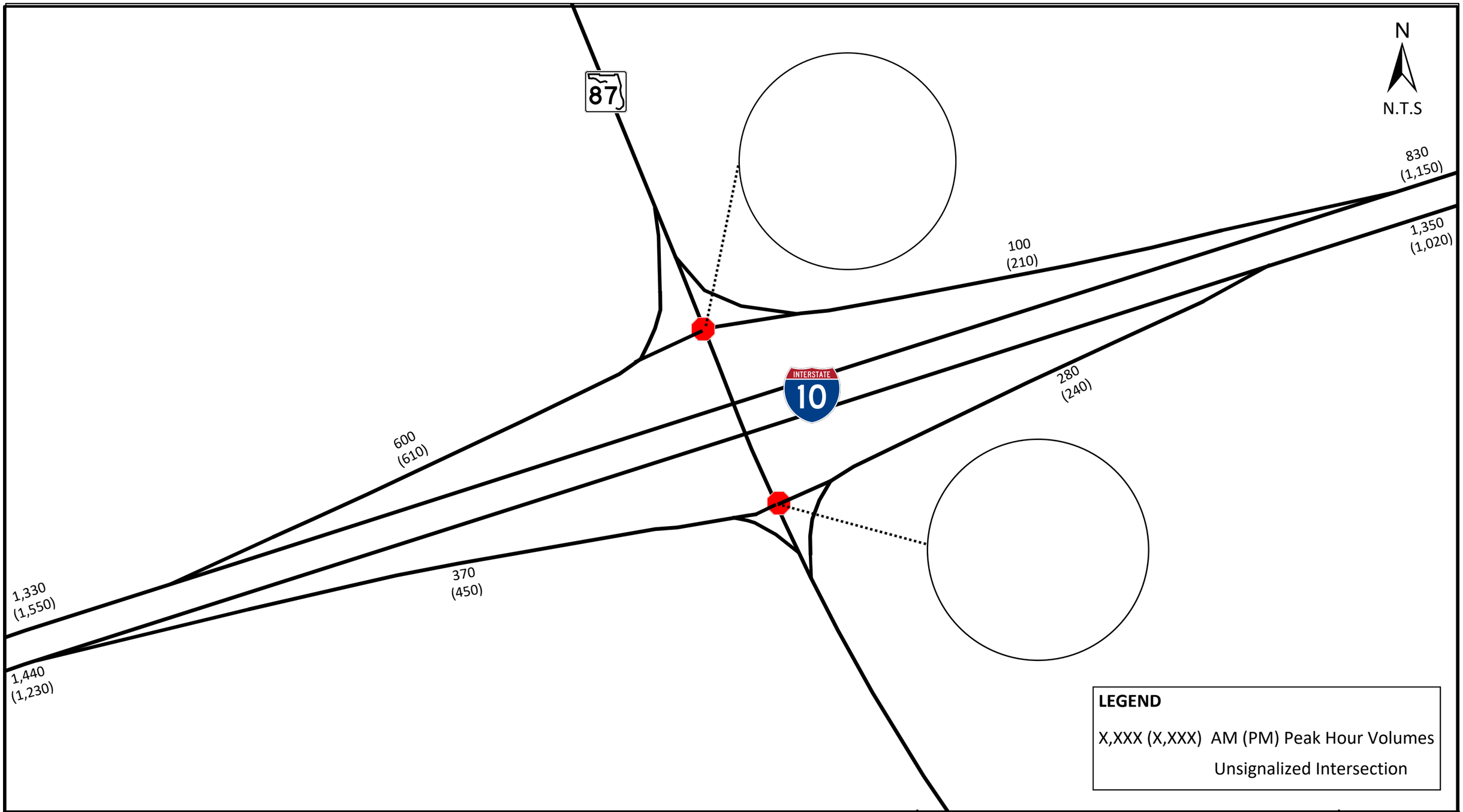
The Existing Year 2019 intersection analysis results are summarized in **Table 3-1**. In the Existing Year 2019, the eastbound left-turn movement at the I-10 eastbound ramp terminal intersection operates at LOS F in the AM and PM peak hours. For the I-10 westbound ramp terminal intersection, the westbound left-turn movement operates at LOS F in the AM and PM peak hours.

Table 3-1: Existing Year 2019 Intersection Analysis Summary

Intersection	Intersection Approach			
	Approach	Movement	Delay*	LOS
			AM (PM)	AM (PM)
S.R. 87 at I-10 EB On/Off-Ramps	EB	Left	95.6 (92.0)	F (F)
		Right	10.4 (13.8)	B (B)
	SB	Left	9.8 (9.8)	A (A)
S.R. 87 at I-10 WB On/Off-Ramps	WB	Left	75.3 (397.0)	F (F)
		Right	10.4 (10.7)	B (B)
	NB	Left	9.7 (10.4)	A (B)

*Delay reported for worst-case approach only

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



Florida Department of Transportation District Three Chipley, Florida	**I-10 at S.R. 87** Project Development & Environment Study FPID No.: 413062-4-22-01, 413062-5-22-01	Title: Existing Year 2019 Peak Hour Volumes	Figure 3-2

In the Existing Year 2019, the 95th percentile queue lengths exceed the available storage lengths at the following locations:

- I-10 eastbound right-turn at S.R. 87 and I-10 eastbound On/Off ramps (AM and PM peak hours)
- I-10 westbound right-turn at S.R. 87 and I-10 eastbound On/Off ramps (PM peak hour)

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	Right	Left	Through	Right	Left	Right	Left	Through	Right
S.R. 87 at I-10 EB On/Off-Ramps	AM Peak	349*	349		0	0			17	0	
	PM Peak	365*	365		0	0			13	0	
	Existing Storage (feet)		250			500			200		
S.R. 87 at I-10 WB On/Off-Ramps	AM Peak			36	0		59*	59		0	0
	PM Peak			42	0		451*	451		0	0
	Existing Storage (feet)			200				300			700

* The queues are less than the total off-ramp length of approximately 1300 feet.

3.8 Safety Review

Vehicular crash data along S.R. 87 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). Crash data obtained from FDOT were reviewed to identify a more descriptive crash type for the "Other crashes" within the study area. All crashes were analyzed to assess safety conditions at the I-10 eastbound and westbound ramp terminal intersections within the project limits. The existing crash analysis performed for the IOAR is consistent with the methods outlined in the IARUG. In this section, the existing crash analysis was broken down between the I-10

eastbound ramp terminal intersection, the segment between the I-10 eastbound and westbound ramp terminal intersections, and I-10 westbound ramp terminal intersection. The crash rate for the segment between the ramp terminal intersections was determined to be zero since no crashes occurred within the segment over the five years. The raw crash data is provided in **Appendix C**.

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 Annual Average Daily Traffic (AADT) and number of crashes occurring, was used for calculating the crash rate for the intersection. The 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. Summary of the existing crash data, including the crash frequency and crash rates within the study area, are provided in **Table 3-3**.

Table 3-3: 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 S.R. 87	27	7,374	5.4	2.006	3.297	30	0
I-10 WB at S.R. 87	20	9,195	4	1.192	3.297	38	0

I-10 EB Ramp Terminal Intersection

The crash analysis results revealed that there was a total of 27 crashes at the intersection during the five study years (2013-2017). Of these 27 crashes, angle crashes were the most common type of crashes accounting for 56% (15 crashes) of the total crashes followed by front to rear (rear-end) crashes accounting for 33% (9 crashes) of the total crashes. There were 30 total injuries and no fatalities. The average crash rate for the intersection is 2.006 crashes per million entering vehicles which is lower than the average statewide crash rate (3.297) for similar facilities. Summaries of the crash analysis are provided in **Figure 3-3**, **Table 3-4** and **Table 3-3**.

Figure 3-3: I-10 EB Ramp Terminal Intersection Crash Types (2013-2017)

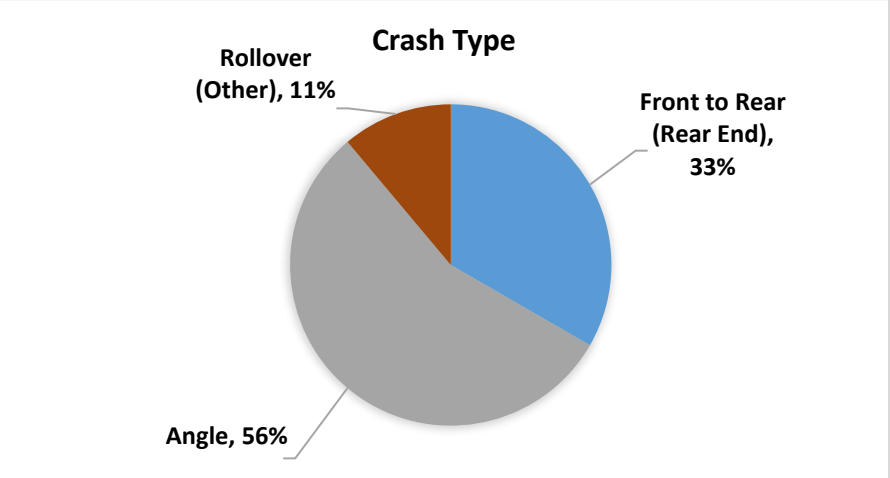


Table 3-4: I-10 EB Ramp Terminal Intersection Severity Summary (2013-2017)

Injury Type	2013	2014	2015	2016	2017	Total	Percent of Total
Number of Property Damage Only Crashes	1	3	1	3	1	9	33%
Number of Crashes with Injuries	3	2	4	1	8	18	67%
Number of Crashes with Fatalities	0	0	0	0	0	0	0%
Total	4	5	5	4	9	27	100%
Number of Injuries	4	5	7	2	12	30	
Number of Fatalities	0	0	0	0	0	0	

I-10 WB Ramp Terminal Intersection

The crash analysis results revealed that there was a total of 20 crashes at the intersection during the five study years (2013-2017). Of these 20 crashes, angle crashes were the most common type of crash accounting for 55% (11 crashes) of the total crashes followed by rollover crashes accounting for 25% (5 crashes) of the total crashes. There were 38 injuries and no fatalities. The crash rate at the intersection is 1.192 crashes per million entering vehicles which is lower than the average statewide crash rate (3.297) for similar facilities. Summaries of the crash analysis are provided in **Figure 3-4**, **Table 3-5** and **Table 3-3**.

Figure 3-4: I-10 WB Ramp Terminal Intersection Crash Types (2013-2017)

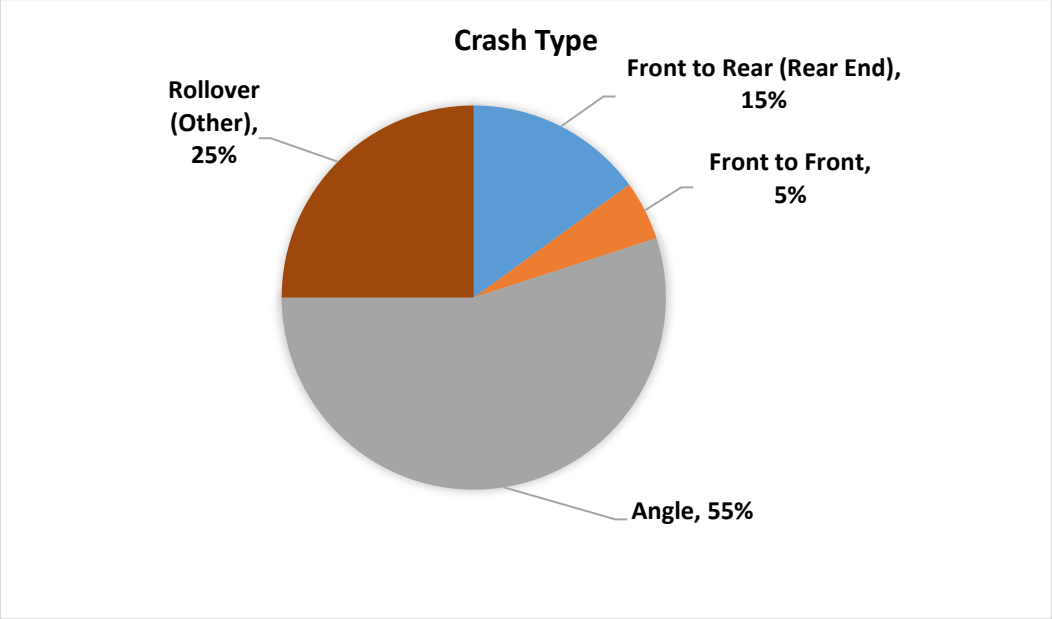


Table 3-5: I-10 WB Ramp Terminal Intersection Severity Summary (2013-2017)

Injury Type	2013	2014	2015	2016	2017	Total	Percent of Total
Number of Property Damage Only Crashes	0	0	0	1	1	2	10%
Number of Crashes with Injuries	1	3	5	3	6	18	90%
Number of Crashes with Fatalities	0	0	0	0	0	0	0%
Total	1	3	5	4	7	20	100%
Number of Injuries	3	13	7	4	11	38	
Number of Fatalities	0	0	0	0	0	0	

4. FUTURE NO-BUILD CONDITIONS

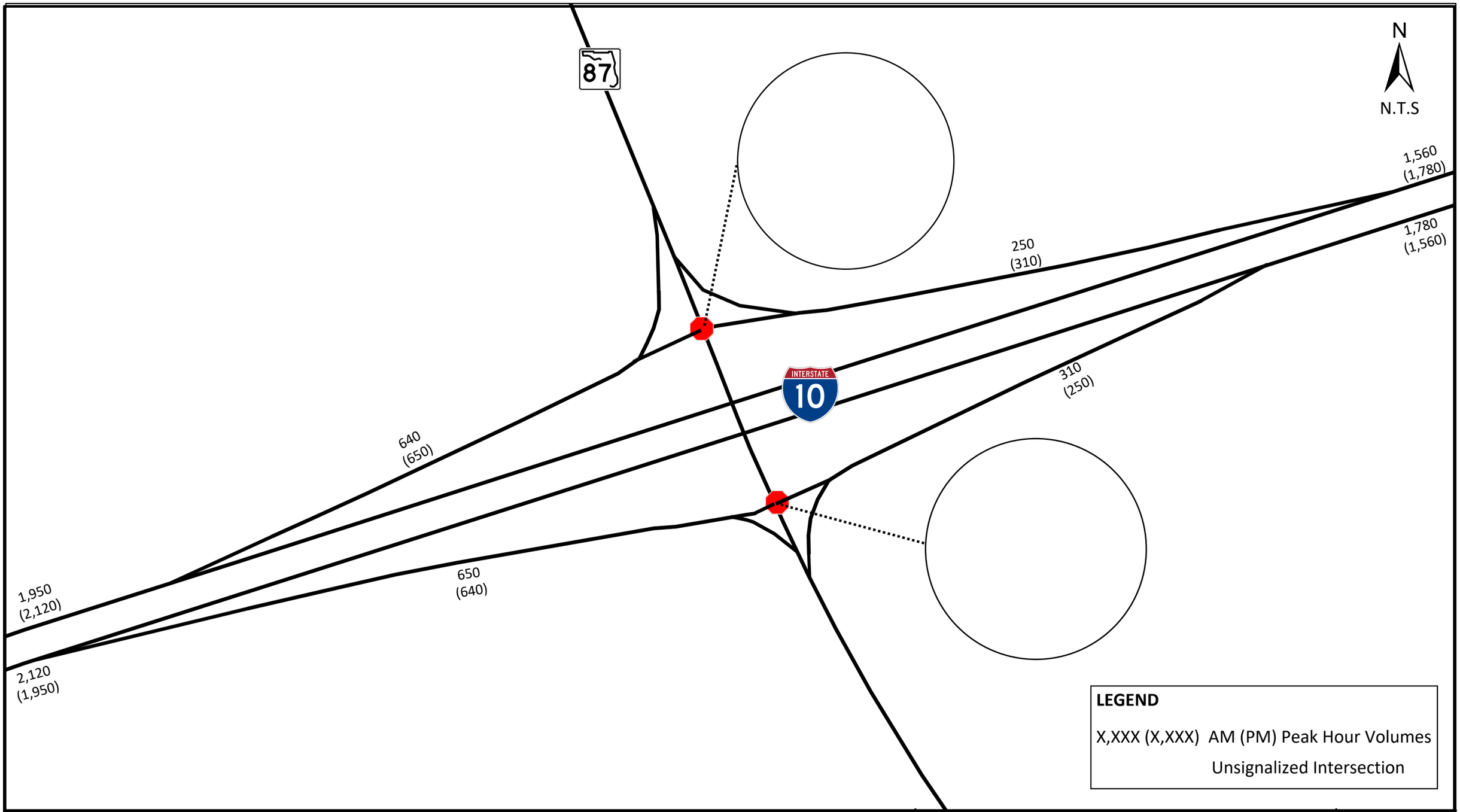
This section documents the future conditions within the I-10 at S.R. 87 interchange AOI for the No-Build Alternative. The No-Build Alternative represents existing physical and operational conditions within the study area, including all planned and programmed roadway improvements over the course of the analysis years. At this time, the No-Build Alternative considers the existing configuration. 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 AOI. The primary objective of this analysis was to establish the No-Build operational conditions at the study intersections.

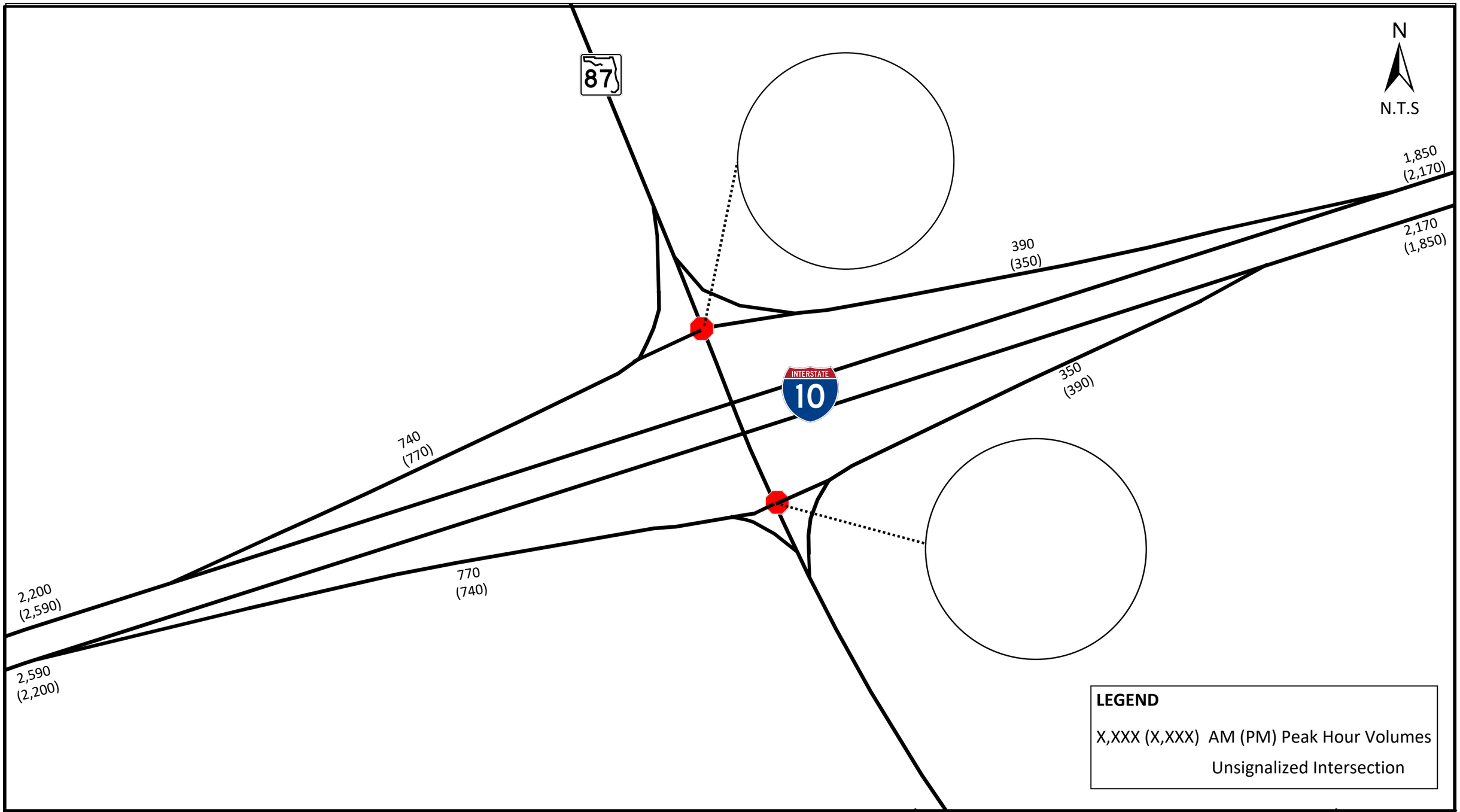
4.1 Future Traffic Development

Future traffic projections were based on previously approved growth rates prepared in the PTAR as part of the I-10 PD&E Study from west of Avalon Boulevard to west of Log Lake Road. In order to develop 2025 and 2045 traffic volumes, a growth rate was developed for the study area based on the comparison of the NWFRPM model volumes, historical traffic data, BEBR population estimates, Woods & Poole employment forecasts, and the Trends analysis. Based on the comparison of the sources, a 1% compound growth rate was applied to forecast the baseline 2025 and 2045 No-Build traffic volumes. To develop the 2025 and 2045 Build volumes, a 5% growth rate was applied to the 2025 and 2045 No-Build volumes along the I-10 mainline and ramps. The Build volumes along S.R. 87 remained the same as the No-Build volumes. These growth rates were estimated by averaging the growth rates calculated from the above sources and an understanding of the project study area.

The Opening Year 2025 and Design Year 2045 No-Build traffic volumes are shown in **Figures 4-1** and **4-2**, respectively.



Florida Department of Transportation District Three Chipley, Florida	**I-10 at S.R. 87** Project Development & Environment Study FPID No.: 413062-4-22-01, 413062-5-22-01	Title: Opening Year 2025 No-Build Peak Hour Volumes	Figure 4-1



Florida Department of Transportation District Three Chipley, Florida	**I-10 at S.R. 87** Project Development & Environment Study FPID No.: 413062-4-22-01, 413062-5-22-01	Title: Design Year 2045 No-Build Peak Hour Volumes	Figure 4-2

4.2 Future No-Build Operational Analysis

This section discusses the future No-Build operational analysis within the study area. The future traffic conditions for unsignalized intersections were analyzed using HCM 6th methodology. Synchro 10 was used to perform the analysis. **Figure 4-1** and **Figure 4-2** illustrate the peak hour volumes utilized for the Opening Year 2025 and Design Year 2045 No-Build operational analysis. The study intersections were analyzed as stop controlled under the No-Build condition. For the ramp terminal intersections, the length of the off-ramps are approximately 1300 feet long. Documentation of the No-Build Alternative analyses is provided in **Appendix D**.

4.2.1 Opening Year 2025 No-Build Analysis

Intersection Analysis

The Opening Year 2025 No-Build intersection analysis results are summarized in **Table 4-1.** In the Opening Year 2025, the results indicate operational deficiencies at the ramp terminal intersections. The eastbound and westbound approaches at the ramp terminal intersections will operate at LOS F in the AM and PM peak hours. The left-turn movements for the minor approach at both ramp terminal intersections will operate at LOS F in the AM and PM peak hours.

Table 4-1: Opening Year 2025 No-Build Intersection Analysis Summary

Intersection	Intersection Approach			
	Approach	Movement	Delay*	LOS
			AM (PM)	AM (PM)
S.R. 87 at I-10 EB On/Off-Ramps	EB	Left	558.5 (478.1)	F (F)
		Right	12.9 (13.8)	B (B)
	SB	Left	10.0 (10.0)	A (A)
S.R. 87 at I-10 WB On/Off-Ramps	WB	Left	384.0 (587.4)	F (F)
		Right	12.5 (12.4)	B (B)
	NB	Left	10.4 (9.9)	B (A)

*Delay reported for worst-case approach only

Table 4-2 summarizes the queue analysis for the Opening Year 2025 No-Build Alternative.

Table 4-2: 95th Percentile Queue Length Summary Opening Year 2025 No-Build Alternative

Intersection	Time Period	95th Percentile Queue Length (feet)									
		Eastbound		Northbound			Westbound		Southbound		
		Left	Right	Left	Through	Right	Left	Right	Left	Through	Right
S.R. 87 at I-10 EB On/Off-Ramps	AM Peak	1,481	1,481		0	0			19	0	
	PM Peak	1,403	1,403		0	0			19	0	
	Existing Storage (feet)		250			500			200		
S.R. 87 at I-10 WB On/Off-Ramps	AM Peak			42	0		448	448		0	0
	PM Peak			35	0		726	726		0	0
	Existing Storage (feet)			200				300			700

In the Opening Year 2025, the 95th percentile queue lengths exceed the total ramp length (1300 feet) for the eastbound off-ramp and also the available storage lengths at the following intersection approaches in the AM and PM peak hours:

- I-10 eastbound right-turn at S.R. 87 and I-10 eastbound On/Off ramps
- I-10 westbound right-turn at S.R. 87 at I-10 eastbound ramp terminal intersection

The queue lengths for the eastbound off-ramp right-turn lane and left-turn lane are anticipated to back up to the mainline.

4.2.2 Design Year 2045 No-Build Analysis

Intersection Analysis

The Design Year 2045 No-Build intersection analysis results are summarized in **Table 4-3**. In the Design Year 2045, the results indicate operational deficiencies at both of the ramp terminal intersections. The eastbound and westbound approach at the ramp terminal intersections will operate at LOS F in the AM and PM peak hours. The left-turn movements for the minor approach at both ramp terminal intersections will operate at LOS F in the AM and PM peak hours.

Table 4-3: Design Year 2045 No-Build Intersection Analysis Summary

Intersection	Intersection Approach			
	Approach	Movement	Delay*	LOS
			AM (PM)	AM (PM)
S.R. 87 at I-10 EB On/Off-Ramps	EB	Left	1,267.6 (2,576.5)	F (F)
		Right	15.5 (16.4)	C (C)
	SB	Left	11.0 (12.2)	B (B)
S.R. 87 at I-10 WB On/Off-Ramps	WB	Left	1,055.3 (2,271.2)	F (F)
		Right	18.3 (14.2)	C (B)
	NB	Left	11.3 (12.6)	B (B)

*Delay reported for worst-case approach only

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

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

Intersection	Time Period	95th Percentile Queue Length (feet)									
		Eastbound		Northbound			Westbound		Southbound		
		Left	Right	Left	Through	Right	Left	Right	Left	Through	Right
S.R. 87 at I-10 EB On/Off-Ramps	AM Peak	Error*	Error*		0	0			26	0	
	PM Peak	Error*	Error*		0	0			46	0	
	Existing Storage (feet)		250			500			200		
S.R. 87 at I-10 WB On/Off-Ramps	AM Peak			51	0		Error*	Error*		0	0
	PM Peak			63	0		Error*	Error*		0	0
	Existing Storage (feet)			200				300			700

*Synchro reports Error which indicates significantly long queues for the approach.

In the Design Year 2045, the 95th percentile queue lengths for the following approaches are reported as errors, which indicates the queues are expected to be significantly longer than the available storage.

- I-10 eastbound left-turn at S.R. 87 and I-10 eastbound On/Off ramps (AM and PM peak hours)
- I-10 eastbound right-turn at S.R. 87 and I-10 eastbound On/Off ramps (AM and PM peak hours)
- I-10 westbound left-turn at S.R. 87 and I-10 eastbound On/Off ramps (AM and PM peak hours)
- I-10 westbound right-turn at S.R. 87 and I-10 eastbound On/Off ramps (AM and PM peak hours)

5. BUILD CONDITIONS

5.1 Build Alternative

The Build Alternative incorporates the roadway conditions described under **Section 4** for the No-Build Alternative plus the following improvements:

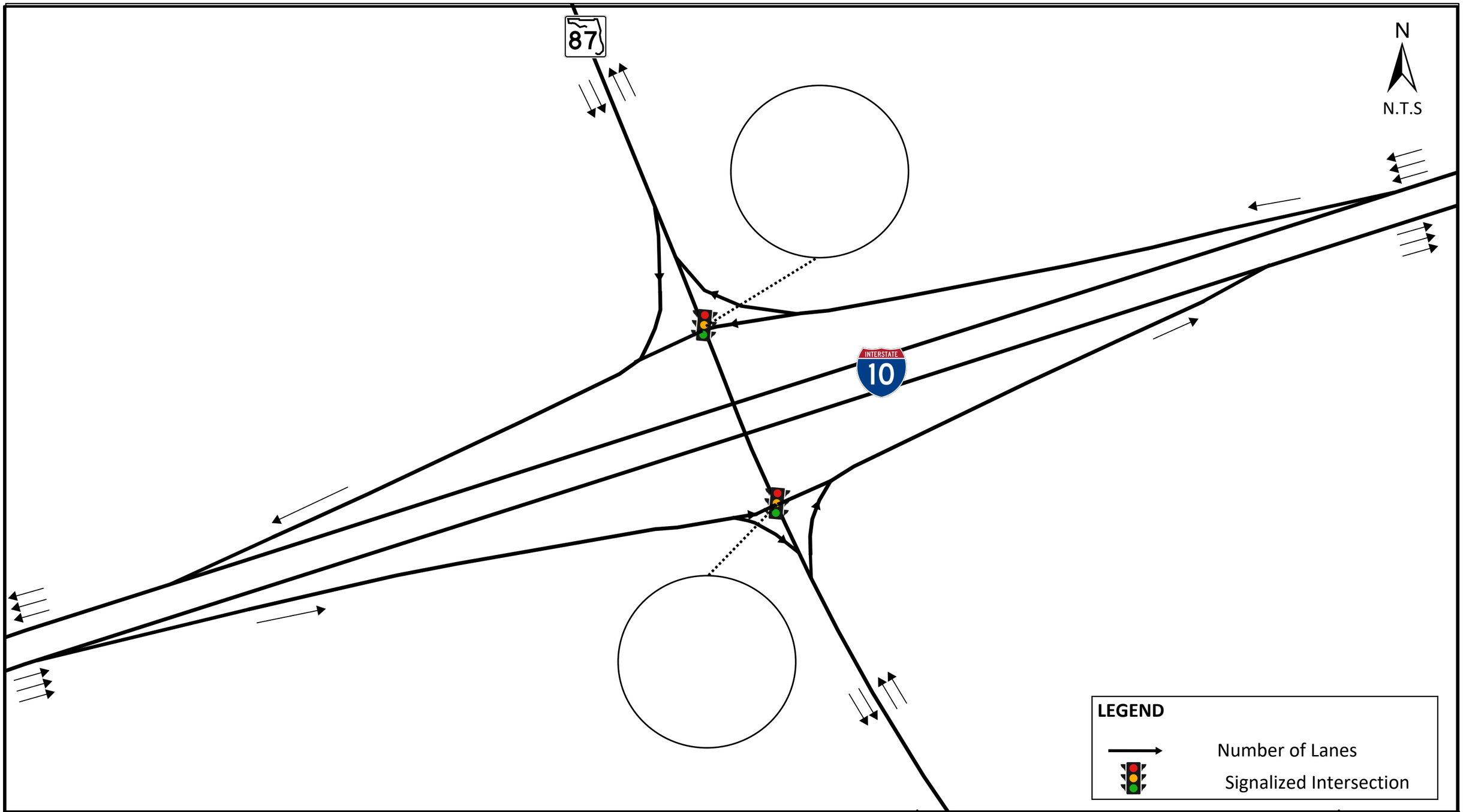
- Converting ramp terminals from stop-controlled intersections to signal-controlled intersections.

The Build Alternative lane configuration is shown in **Figure 5-1**. The travel demand forecast for the project assumes that the above improvements will not impact the overall future traffic patterns within the study. However, the forecast traffic volume for the Build Alternative is discussed in **Section 4.1** of this report and presented in **Figure 5-2** and **Figure 5-3**.

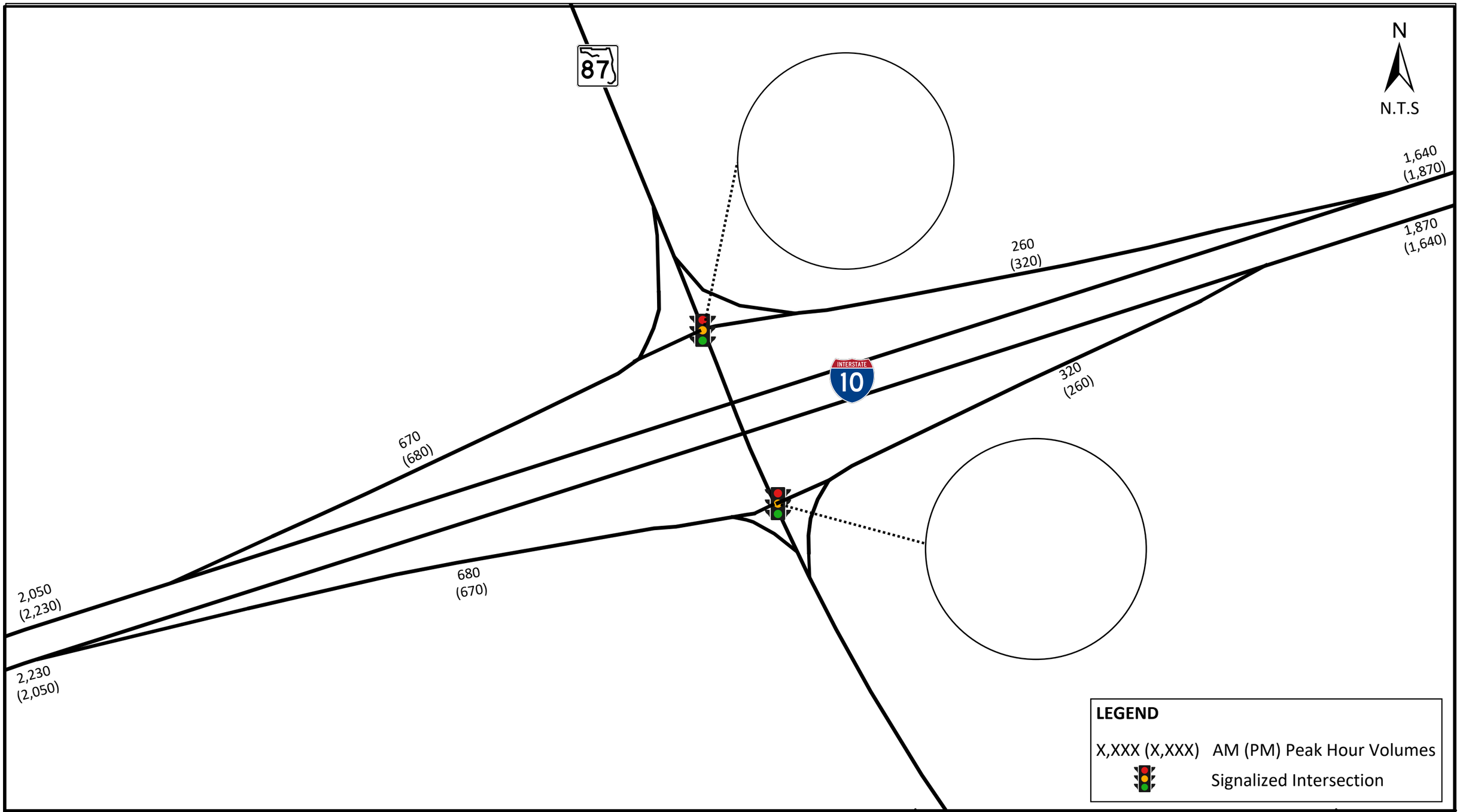
5.2 Build Alternative Operational Analysis

The Build Alternative includes installing new signals at the ramp terminal intersections. A Synchro operational analysis was performed to determine delay and LOS.

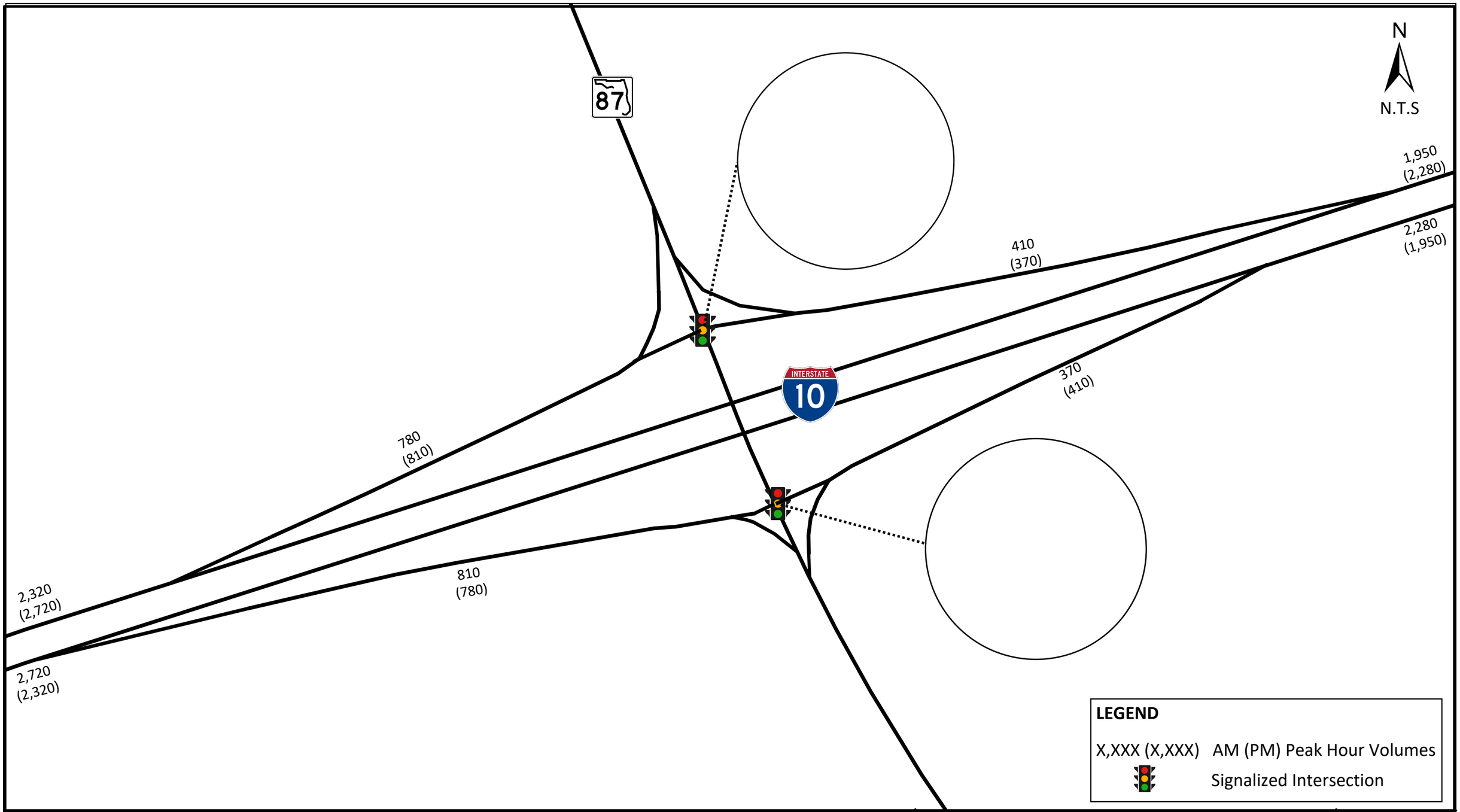
The pavement marking layout for the lanes on the diverge segment and the study intersections is presented in a signing and pavement marking concept plan provided in **Appendix E**.



Florida Department of Transportation District Three Chipley, Florida	**I-10 at S.R. 87** Project Development & Environment Study FPID No.: 413062-4-22-01, 413062-5-22-01	Title: Build Alternative Lane Configuration	Figure 5-1



Florida Department of Transportation District Three Chipley, Florida	**I-10 at S.R. 87** Project Development & Environment Study FPID No.: 413062-4-22-01, 413062-5-22-01	Title: Opening Year 2025 Build Peak Hour Volumes	Figure 5-2



Florida Department of Transportation District Three Chipley, Florida	**I-10 at S.R. 87** Project Development & Environment Study FPID No.: 413062-4-22-01, 413062-5-22-01	Title: Design Year 2045 Build Peak Hour Volumes	Figure 5-3

5.2.1 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 5-1**. All the intersections within the project area operate at acceptable LOS B or better in both AM and PM peak hours. No operational issues are observed at any of these intersections in the Opening Year 2025 Build Alternative. Documentation of the Build Alternative analyses is provided in **Appendix F**.

Table 5-1: 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)
S.R. 87 at I-10 EB On/Off-Ramps	EB	Left	43.5 (45.3)	D (D)	17.7 (19.6)	B (B)
		Right	6.1 (6.9)	A (A)		
	NB	Thru	23.1 (22.2)	C (C)		
		Right	4.9 (2.4)	A (A)		
	SB	Left	10.8 (15.2)	B (B)		
		Thru	4.4 (12.4)	A (B)		
S.R. 87 at I-10 WB On/Off-Ramps	WB	Left	43.6 (45.9)	D (D)	7.8 (10.2)	A (B)
		Right	13.2 (10.4)	B (B)		
	NB	Left	8.6 (7.6)	A (A)		
		Thru	0.2 (4.7)	A (A)		
	SB	Thru	12.1 (14.3)	B (B)		
		Right	2.7 (3.2)	A (A)		

In the Opening Year 2025 Build Alternative, the 95th Percentile queue lengths do not exceed the proposed storage length at either intersection within the study area. **Table 5-2** summarizes the queue analysis for the Opening Year 2025 Build Alternative.

Table 5-2: 95th Percentile Queue Length Summary Opening Year 2025 Build Alternative

Intersection	Time Period	95th Percentile Queue Length (feet)									
		Eastbound		Northbound			Westbound		Southbound		
		Left	Right	Left	Through	Right	Left	Right	Left	Through	Right
S.R. 87 at I-10 EB On/Off-Ramps	AM Peak	256*	58		216	39			66	22	
	PM Peak	243*	64		227	15			131	113	
	Proposed Storage (feet)		250			500			200		
S.R. 87 at I-10 WB On/Off-Ramps	AM Peak			98	0		79*	59		127	45
	PM Peak			102	43		125*	56		128	52
	Proposed Storage (feet)			200				300			700

* The queues are less than the total off-ramp length of approximately 1300 feet.

5.2.2 Design Year 2045 Build Alternative Analysis

Intersection Analysis

The Design Year 2045 Build intersection analysis results are summarized in **Table 5-3**. In the Design Year 2045, all intersections operate at LOS C or better in the AM and PM peak hours. No operational issues are observed at any of these intersections in the Design Year 2045 Build Alternative.

Table 5-3: 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)
S.R. 87 at I-10 EB On/Off-Ramps	EB	Left	46.5 (50.5)	D (D)	21.0 (24.7)	C (C)
		Right	9.5 (11.7)	A (B)		
	NB	Thru	27.7 (28.9)	C (C)		
		Right	4.9 (5.3)	A (A)		
	SB	Left	15.8 (26.1)	B (C)		
		Thru	5.4 (12.0)	A (B)		
S.R. 87 at I-10 WB On/Off-Ramps	WB	Left	36.5 (48.2)	D (D)	12.4 (11.7)	B (B)
		Right	28.3 (9.8)	C (A)		
	NB	Left	15.9 (9.2)	B (A)		
		Thru	0.7 (2.5)	A (A)		
	SB	Thru	18.3 (19.7)	B (B)		
		Right	4.1 (4.1)	A (A)		

In the Design Year 2045 Build Alternative, the 95th Percentile queue lengths do not exceed the proposed storage length at either intersection within the study area. **Table 5-4** summarizes the queue analysis for the Design Year 2045 Build Alternative.

Table 5-4: 95th Percentile Queue Length Summary Design Year 2045 Build Alternative

Intersection	Time Period	95th Percentile Queue Length (feet)									
		Eastbound		Northbound			Westbound		Southbound		
		Left	Right	Left	Through	Right	Left	Right	Left	Through	Right
S.R. 87 at I-10 EB On/Off-Ramps	AM Peak	#334*	115		271	43			113	31	
	PM Peak	#351*	134		274	34			#236	143	
	Proposed Storage (feet)		250			500			200		
S.R. 87 at I-10 WB On/Off-Ramps	AM Peak			m118	31		92*	148		195	65
	PM Peak			m80	43		151*	58		227	64
	Proposed Storage (feet)			200				300			700

m: Volume for 95th percentile queue is metered by upstream signal.
#: 95th percentile volume exceeds capacity and queue may be longer.
* The queues are less than the total off-ramp length of approximately 1300 feet.

5.3 Build Alternative Safety Analysis

A quantitative safety analysis was performed to determine if the proposed improvements address the existing safety concerns for this IOAR. The safety analysis performed follows the guidelines in the 2020 IARUG Safety Analysis Guidance.

The proposed improvements include changing the ramp terminal intersections from stop-controlled to signal-controlled intersections. Signalizing the right-turn lanes is anticipated to reduce the number of right-turn related crashes at the intersections. Therefore, crash modification factors (CMF) for “Install a traffic signal” was obtained from the CMF Clearinghouse maintained by FHWA. CMF ID: 322 and CMF ID: 7848 were determined applicable for the proposed improvement. CMF 322 was not selected because the analyst is interested in the number of crashes that are not interchange-related. CMF 7848 was developed to account for all crashes not specifying the location, and as a result, was used for the predictive analysis.

The CMF (ID: 7848) of 0.61 was applied to observed crashes. The complete quantitative crash analysis is summarized in **Table 5-5**. The CMF is provided in **Appendix G**.

Table 5-5: Build Alternative Annual Crash Reduction Calculations

Study Locations	Total Number of Crashes	Annual Crash Frequency (crashes/year)	CMF	Predicted Annual Crash Frequency	Annual Reduction in Crashes (crashes/year)
S.R. 87 at I-10 EB On/Off-Ramps	27	5.4	0.61	3.294	2.106
S.R. 87 at I-10 WB On/Off-Ramps	20	4	0.61	2.440	1.560
Total Reduction					3.666

By implementing the proposed modifications, a total crash reduction of 3.666 crashes a year is expected.

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 was analyzed in **Section 5**. A comparison of the No-Build Alternative and the Build Alternative are provided in this section. The evaluation criteria are 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 A 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. The left-turn movement on the minor approaches at both ramp terminal intersections operate at an unacceptable LOS F in the AM and PM peak hours (see **Table 4-3**). These operational deficiencies at the intersections are associated with high arterial through traffic volumes along S.R. 87 and high left-turn traffic volumes from the I-10 eastbound and westbound off-ramps. A comparison of the left-turn movements for the Design Year 2045 No-Build and Build results is provided in **Table 6-1**.

Table 6-1: Design Year 2045 No-Build and Build Alternatives Intersections Comparison

Intersection	Approach	Movement	2045 No-Build Alternative		2045 Build Alternative	
			Intersection Approach		Intersection Approach	
			Delay	LOS	Delay	LOS
			AM (PM)	AM (PM)	AM (PM)	AM (PM)
S.R. 87 at I-10 EB On/Off-Ramps	EB	Left	1,267.6 (2,576.5)	F (F)	46.5 (50.5)	D (D)
		Right	15.5 (16.4)	C (C)	9.5 (11.7)	A (B)
	NB	Thru	--	--	27.7 (28.9)	C (C)
		Right	--	--	4.9 (5.3)	A (A)
	SB	Left	11.0 (12.2)	B (B)	15.8 (26.1)	B (C)
		Thru	--	--	5.4 (12.0)	A (B)
S.R. 87 at I-10 WB On/Off-Ramps	WB	Left	1,055.3 (2,271.2)	F (F)	36.5 (48.2)	D (D)
		Right	18.3 (14.2)	C (B)	28.3 (9.8)	C (A)
	NB	Left	11.3 (12.6)	B (B)	15.9 (9.2)	B (A)
		Thru	--	--	0.7 (2.5)	A (A)
	SB	Thru	--	--	18.3 (19.7)	B (B)
		Right	--	--	4.1 (4.1)	A (A)

The Build Alternative will improve the delay at both ramp terminals. The biggest improvement in delay and LOS occurs at the S.R. 87 and I-10 westbound On/Off-ramp intersection. The delay for the left-turn movement on the westbound approach at the I-10 westbound ramp terminal is reduced by 1,018.8 seconds and 2,223 seconds during the AM and PM peak hours, respectively.

In the Design Year 2045, the Build Alternative will also improve the queues at the study intersections compared to the No-Build Alternative. A major improvement with the Build Alternative is the queue lengths along the off-ramps at the I-10 eastbound and westbound ramp terminal intersections. In the No-Build results, errors were obtained indicating the queues are longer than the available storage to the point that Synchro cannot calculate the queue lengths. The Build Alternative reduces the queue lengths to where they do not exceed the storage available at both ramp terminal intersections.

A quantitative safety analysis was performed at the ramp terminal intersections to determine if the Build Alternative addresses the existing safety concerns. A CMF (ID: 322) of 0.95 obtained from the CMF Clearinghouse maintained by FHWA was used to quantify the benefits of the proposed improvements. Based on the proposed improvements, a reduction of 3.666 crashes per year is expected.

6.3 Preferred Alternative

The proposed improvements at the ramp terminal intersections at the I-10/S.R. 87 interchange will provide traffic relief and enhance safety within the AOI by reducing delay and queueing on the I-10 eastbound and westbound off-ramps.

The Build Alternative for this study performs substantially better than the No-Build Alternative for all future years. The S.R. 87 arterial segment will benefit from the new signal control at the ramp terminal intersections that will result in lower intersection delays. The minor approaches at both ramp terminal intersections will operate at LOS C in the Design Year 2045 Build condition.

A quantitative safety analysis was also performed to determine if the Build Alternative addressed the existing safety concerns. Based on the proposed improvements, crashes are predicted to be reduced by 3.666 crashes per year.

Considering all the findings described in the IOAR, the Build Alternative is recommended as the preferred alternative for approval in this study. A final comparison of the No-Build and Build Alternatives is provided in **Section 6.2**.

6.4 Project Costs

The anticipated cost of this project based on the FDOT Long Range Estimating (LRE) System is provided in **Appendix H**. The project cost for Build Alternative is estimated to be $4,881,798.31.

6.5 Conceptual Signing Plan

Conceptual signing and marking plans in accordance with Manual on Uniform Traffic Control Devices (MUTCD) guidelines was prepared for the Build Alternative considered at the I-10 and S.R. 87 interchange and are provided in **Appendix E**.

7. JUSTIFICATION

The proposed improvements at the S.R. 87 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 enhancing safety within the AOI. The I-10 at S.R. 87 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 an IOAR. Responses to each of the two FHWA policy points are provided to show that the proposed improvements at the I-10/S.R. 87 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)).

The operational and safety analysis conducted for this IOAR confirmed that the proposed improvement to the existing I-10 eastbound and westbound ramp terminal intersections will not have a adverse impact on the operations 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 approaches at the intersections will operate at LOS F in the AM and PM peak hours. These deficiencies are attributed to the high through traffic volume along S.R. 87 and high left-turn traffic volume exiting I-10. The eastbound and westbound approaches at the ramp terminal intersections will experience excessive queues that are longer than the available storage, which could possibly affect freeway operations.

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 the S.R. 87 and I-10 westbound On/Off-ramp intersection. The delay for the left-turn movement on the westbound approach at the I-10 westbound ramp terminal intersection is reduced by 1,018.8 seconds and 2,223 seconds during the AM and PM peak hours, respectively. Also, the LOS changes from F to C in the AM peak and PM peak hours. The queues observed in the No-Build Alternative are reduced significantly, allowing the available storage to accommodate the queues at both intersections.

The safety analysis performed for this study indicated that a total of 47 crashes occurred within the project area during the five study years (2013-2017). The predominant crash types that

occurred within the study area were angle crashes followed by rear-end crashes. Rear-end and angle crashes were typically attributed to congestion along the arterials and interchange ramps.

The Build Alternative operational improvements are anticipated to improve operations and enhance safety within the project area. A quantitative 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 3.666 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 constructed 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 thereby enhancing safety.

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/S.R. 87 ramp terminal intersections in Santa Rosa County, no new access is requested. The improvements are proposed to preserve all the existing connections between public roads and preserve existing traffic movements onto and off of 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. INTERCHANGE IMPROVEMENT SCHEDULE

The improvements proposed as part of the Build Alternative at the I-10 at S.R. 87 interchange are performed under the Programmatic Agreement with FHWA. Therefore, FDOT Central Office will conduct necessary review and assessment of the justification for the proposed improvements. Currently there are no design or construction improvements to the I-10 at S.R. 87 interchange included in the 2021-2026 FDOT Adopted Five-Year Work Program.

The project is in the Florida-Alabama Transportation Planning Organization (TPO) 2045 Long Range Transportation Plan (LRTP) Cost Feasible Plan. The I-10 segments included in the PD&E Study will be added to the five-year work program as the TPO prioritizes them. District Three is looking to advance the project, but it is dependent on future federal funding.

List of Appendices

Appendix A	Project Traffic Analysis Report
Appendix B	Existing Year 2019 Operational Analysis
Appendix C	Raw Crash Data
Appendix D	No-Build Opening Year 2025 and Design Year 2045 Operational Analysis
Appendix E	S.R. 87 At I-10 2025/2045 Build Alternative
Appendix F	Build Alternative Opening Year 2025 and Design Year 2045 Operational Analysis
Appendix G	Quantitative Safety Analysis
Appendix H	FDOT Long Range Estimating (LRE) System