INTERCHANGE OPERATIONAL ANALYSIS REPORT (IOAR)

I-10 at S.R. 281 (AVALON BOULEVARD)

Santa Rosa County, Florida

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

March 2021

INTERCHANGE
OPERATIONAL ANALYSIS REPORT (IOAR)

I-10 at S.R. 281 (AVALON BOULEVARD)

Santa Rosa County, Florida

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

Prepared for:

Florida Department of Transportation - District Three
Chipley, Florida

March 2021

Interchange Operational Analysis Report (IOAR)

For I-10 at S.R. 281 (Avalon Boulevard) 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 engineering and operational 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.

Requestor	DocuSigned by: Iris Waters F7595C693CCA40D...	4/6/2021 | 2:52 PM EDT
	Iris Waters, P.E. *District Three Project Development Manager*	*Date*
Interchange Review Coordinator	DocuSigned by: Starsky Harrell E3F2EA2D0F5440D...	4/6/2021 | 2:54 PM EDT
	Starsky Harrell *District Three Interchange Review Coordinator*	*Date*
Systems Management Administrator	DocuSigned by: Jenna Bowman 4AD03E6A337F4C1...	4/16/2021 | 10:16 AM EDT
	Jenna Bowman, P.E. *Systems Implementation Office – Central Office*	*Date*
State Chief Engineer	DocuSigned by: 022E6284290B41A...	4/16/2021 | 10:17 AM EDT
	Will Watts, P.E. *Chief Engineer – Central Office*	*Date*
Federal Highway Administration	N/A (Programmatic)	
		Date

SYSTEMS IMPLEMENTATION OFFICE

QUALITY CONTROL CERTIFICATION FOR INTERCHANGE ACCESS REQUEST SUBMITTAL

Submittal Date: March 2021

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

Project Title: I-10 at Avalon Boulevard Interchange Operational Analysis Report (IOAR)

District: District 3

Requestor: Iris Waters, P.E. Phone: (850) 330-1625

District IRC: Starsky Harrell Phone: (850) 330-1540

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: 4/6/2021 | 2:52 PM EDT

Iris Waters, P.E.

IRC DocuSigned by: Starsky Harrell E3F2EA2D0F6440D... Date: 4/6/2021 | 2:54 PM 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. 281 (Avalon Boulevard) Interchange Operational Analysis Report (IOAR)

LOCATION: Santa Rosa County, FL

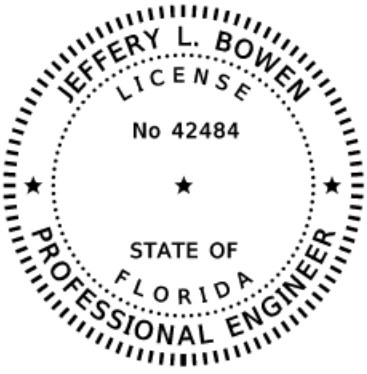
FINANCIAL PROJECT ID: 413062-4-22-01 and 413062-5-22-01

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: 2021.03.31 14:10:47 -04'00'



Date: 3/31/2021

EXECUTIVE SUMMARY

This Interchange Operational Analysis Report (IOAR) has been prepared to evaluate the impacts of widening the Interstate 10 (I-10) Eastbound (EB) off-ramp to S.R. 281 (Avalon Boulevard) from one to two lanes, as well as the signalization of Avalon Boulevard/I-10 Westbound (WB) off-ramp terminal intersection, and the geometric improvements at the I-10 EB ramp terminal intersection. 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 I-10 at Avalon Boulevard interchange is located in Santa Rosa County at Milepost 5.152, Section number 58002000. I-10 at Avalon Boulevard is located between the I-10 at U.S. 90/S.R. 10 interchange to the west and the I-10 at Garcon Point Road interchange to the east. Avalon Boulevard is approximately 2.35 miles east of U.S. 90/S.R 10 and 4.23 miles west of Garcon Point Road.

The purpose of this IOAR is to provide the required documentation for obtaining approval for improvements at the Interstate 10 (I-10) and S.R. 281 (Avalon Boulevard) interchange in Santa Rosa County. The current interchange is a full diamond interchange with stop-controlled operation at the I-10 WB ramp terminal intersection and signal-controlled operation at the I-10 EB ramp terminal intersection. The primary need of the project is to improve future traffic operations at the ramp terminals and the I-10 EB diverge segment, thereby improving safety at the interchange.

The primary basis for traffic projection 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 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 Highway Capacity Software (HCS) and 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.

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 WB ramp terminal intersection, lengthening and widening the diverge segment to provide two deceleration lanes, providing multiple turn-lanes for the left-turn and right-turn movements at the ramp terminal intersections and lengthening the storage lengths for the left-turn movements at I-10 EB and WB ramp terminals.

From an operational perspective in the Design Year 2045 under the No-Build Alternative, operational and safety deficiencies exist. All the individual movements on the WB approach at the I-10 WB ramp terminal intersection will operate at LOS F in both AM and PM peak hours. The I-10 EB diverge segment to Avalon Boulevard will operate at LOS F with v/c of 1.17 in the PM peak hour. At the ramp terminal intersections, queues are longer than the available storage along the I-10 EB and WB off-ramps in 2045 under the No-Build Alternative.

The Build Alternative for this study performs substantially better than the No-Build Alternative for all future years. When compared to the 2045 No-Build Alternative, the 2045 Build Alternative provides a reduction in delay at both study intersections. The queues observed in the 2045 No-Build Alternative are reduced significantly, allowing the available storage to accommodate the queues at the I-10 WB ramp terminal intersection.

As part of this study, an existing crash analysis was performed. The data collected from the FDOT State Safety Office Map-Based Query Tool (SSOGis) shows that rear-end crashes and angle crashes are the most prominent crashes within the project area. The Recommended Build Alternative improves the traffic operations and enhances the safety within the project study area by signalizing the I-10 WB ramp terminal intersection and widening the I-10 EB off-ramp.

A quantitative safety analysis was performed for the study area where improvements were implemented. Based on the safety analysis, it is predicted that a reduction in 0.3 Fatal/Injury crashes and 0.41 Property Damage Only (PDO) crashes will occur at the ramp terminal intersections.

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 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/Avalon Boulevard 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 in-depth operational and safety analysis conducted for this IOAR confirmed that the proposed improvements to the existing interchange will maintain or improve 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 LOS, v/c delays, density, 95th percentile queue lengths, and safety under existing and proposed conditions.

From an operational perspective in the Design Year 2045 under the No-Build Alternative, operational and safety deficiencies exist. All the individual movements on the WB approach at the I-10 WB ramp terminal intersection will operate at LOS F in both AM and PM peak hours. The I-10 EB ramp terminal intersection will operate at LOS E or worse in the AM and PM peak hours and the I-10 EB diverge segment to Avalon Boulevard will operate at LOS F with v/c of 1.17 in the PM peak hour. These operational deficiencies are associated with high arterial volume at the ramp terminal intersection and insufficient capacity of the I-10 EB off-ramp. At the I-10 WB ramp terminal intersection, queues are longer than the available storage in the WB direction in 2045 under the No-Build Alternative. At the EB ramp terminal the queues observed in the 2045 No-Build Alternative are anticipated to be longer than the available storage in the EB direction.

The Build Alternative for this study performs substantially better than the No-Build Alternative for all future years. When compared to the 2045 No-Build Alternative, the 2045 Build Alternative provide a reduction in delay at both study intersections. The most significant reduction in delay and improvement in LOS occurs at the I-10 WB On/Off-ramp and Avalon Boulevard intersection. The delay for the WB left-turn movement at the I-10 WB ramp terminal is reduced by 43,137.9 seconds and 49,900.4 seconds during the AM and PM peak hours, respectively. Also, the LOS at the I-10 EB off-ramp to Avalon Boulevard changes from F to D in the PM peak hour. The queues observed in the 2045 No-Build Alternative are reduced significantly, allowing the available storage to accommodate the queues at the I-10 WB ramp terminal intersection.

The safety analysis performed for this study indicated a total of 68 crashes occurred within the project area during the five study years (2014-2018). And a total of 64 crashes occurred at the I-10 ramp terminal intersections. The predominant crash types that occurred within the study area were rear-end and angle collisions. Crashes of these types are typically attributed to congestion along the arterials and interchange ramps.

The proposed improvements under the Build Alternative are anticipated to enhance safety within the study 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 reduction in 23.52 Fatal/Injury crashes 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 and 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 and Avalon Boulevard interchange in Santa Rosa 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.

Table of Contents

List of Figures

List of Tables

List of Appendices

1. PROJECT OVERVIEW

1.1 Introduction

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 Avalon Boulevard is significant for passenger movements.

This Interchange Operational Analysis Report (IOAR) has been prepared to evaluate the impacts of widening the Interstate 10 (I-10) Eastbound (EB) off-ramp to S.R. 281 (Avalon Boulevard) from one to two lanes, as well as the signalization of Avalon Boulevard/I-10 Westbound (WB) off-ramp terminal intersection, and the geometric improvements at the I-10 EB ramp terminal intersection. The Florida Department of Transportation (FDOT) District 3 is the Requestor seeking approval of this IOAR that presents the necessary documentation for such improvements.

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 done 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 (from west of Avalon Boulevard to west of Log Lake Road). The PTAR is provided in **Appendix A**.

The IOAR is evaluating the proposed improvements to the I-10 EB and WB ramp terminal intersections at Avalon Boulevard 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 Interchange, FDOT Procedure No. 525-030-120: Project Traffic Forecasting, Interchange Access Request 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 widening the I-10 EB off-ramp to Avalon Boulevard and signalizing the I-10 WB at Avalon Boulevard ramp terminal intersection. With the proposed improvements, it is anticipated that the widening of the I-10 EB Off-Ramp from one to two lanes will provide congestion relief and improve safety conditions at the diverge segment. These improvements at the ramp terminals will improve operations and enhance safety along Avalon Boulevard.

As part of this study, the I-10 EB and WB ramp terminal intersections were studied for operational and safety improvements. The existing analysis revealed that the left-turn movement from the I-10 WB off-ramp operates at LOS F in the AM and PM peak hours. By signalizing the I-10 WB ramp terminal intersection, the WB traffic volume will be metered, which will mitigate the simultaneous release of traffic volume onto Avalon Boulevard by creating a platooning effect through the ramp terminal signal control. Signalizing the I-10 WB ramp terminal intersection also requires additional lanes on the southbound (SB), northbound (NB) and WB movements to accommodate the future traffic. The future traffic may produce NB queues along Avalon Boulevard that may affect traffic flow at the upstream I-10 EB ramp terminal intersection.

In addition, the existing operational analysis for the diverge segment at I-10 EB to Avalon Boulevard operates at LOS F in the PM peak period. As a means of increasing the capacity at the diverge segment, converting the single-lane off-ramp to two lanes will provide congestion relief and improve safety conditions on this segment.

The need for this project derives from the PTAR. As part of this study, the existing and future traffic volumes along Avalon Boulevard 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 volume on Avalon Boulevard ranges between 10,200 and 27,200 vehicles per day, with 7.9 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 13,200 to 35,300 vehicles per day. With this increase in traffic along Avalon Boulevard, the operating conditions at the intersections are expected to deteriorate.

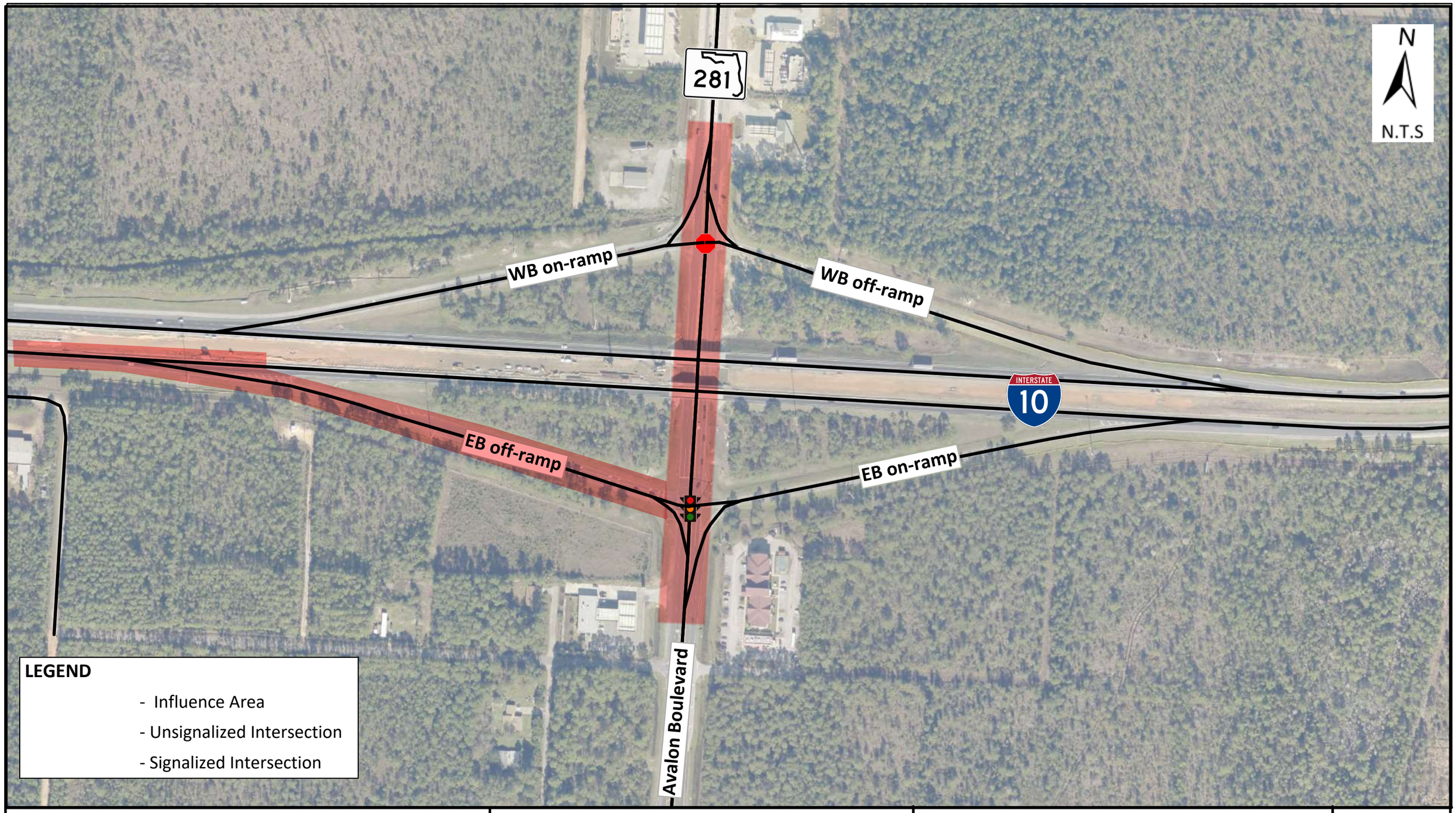
A review of the crash data provided in **Section 3** shows a total of 68 crashes for the five-year period (2014-2018), of which 23 were injury crashes and 2 fatal crashes. The actual crash rate at the I-10 EB ramp terminal intersection is 1.728 crashes per million entering vehicles, which is lower than the average statewide crash rate for similar facilities. Analysis of the crash data revealed the following notable characteristics.

- Rear-End crash (40 %) was the predominant crash type, followed by Angle crash (35%).
- Rear-End crashes were most concentrated at the I-10 EB ramp terminal intersection.
- A combination of high traffic volumes along Avalon Boulevard, speed differentials and drivers' failure to yield to vehicles exiting I-10 appear to be contributing to Rear-End and Angle crashes at the ramp terminal intersections.

If no improvements are made at the ramp terminal intersections and at the I-10 EB diverge segment, traffic operations within the study area will continue to deteriorate as traffic continues to grow.

1.3 Project Location

The I-10 at Avalon Boulevard interchange is located in Santa Rosa County at Milepost 5.152, Section number 58002000. I-10 at Avalon Boulevard is located between the I-10 at U.S. 90/S.R. 10 interchange to the west and the I-10 at Garcon Point Road interchange to the east. Avalon Boulevard is approximately 2.35 miles east of U.S. 90/S.R 10 and 4.23 miles west of Garcon Point Road. The project location and the study area are shown in **Figure 1-1**.



Florida Department of Transportation District Three Chipley, Florida	**I-10 at Avalon Boulevard IOAR** Project Development & Environment Study FPID No.: 413062-4-22-01 and 413062-5-22-01	Title: 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 Avalon Boulevard located in Santa Rosa County. Along Avalon Boulevard, the adjacent intersections of San Pablo Street and San Jose Road are approximately 0.1 miles to the north and south of the ramp terminal intersections. These intersections are not included within the AOI as they are not anticipated to impact the ramp terminals. Similarly, these adjacent intersections carry low traffic volumes that are accounted for in the ramp terminal intersections analysis performed in this IOAR. No signalized intersections are within 0.5 miles of the ramp terminal intersections along Avalon Boulevard. The major study corridor is Avalon Boulevard.

Avalon Boulevard is a north-south highway running from U.S. 98 east of Gulf Breeze to U.S. 90 west of Milton. Within the study area, Avalon Boulevard is a four-lane divided Urban Minor Arterial with a posted speed limit of 45 miles per hour (mph). Avalon Boulevard serves residential communities.

The AOI includes the I-10 EB off-ramp to Avalon Boulevard and the two ramp terminal intersections listed below:

- I-10 WB at Avalon Boulevard Interchange Ramps (Un-signalized)
- I-10 EB at Avalon Boulevard Interchange Ramps (Signalized)

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 29 through October 31, 2019 as part of the PTAR.

The intersection turning movement counts (TMCs) were collected at the I-10 and Avalon Boulevard interchange ramp terminal intersections. This data collection effort was performed on Thursday, October 31, 2019, concurrently with the 72-hour traffic counts. In general, the traffic data for each intersection included 8-hour turning movement counts (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 Avalon Boulevard interchange and on all ramps at the interchange. Also, the 72-hour vehicle classification counts were conducted on Avalon Boulevard 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, T_{Daily} percentage and Design Hour Truck (DHT) percentage. The Standard K factor and D factors were used to develop the Directional Design Hour Volume (DDHV) for this study.

- The T_{Daily} 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 West of Avalon Boulevard	9.0%	54.1%	15.8%	7.9%
I-10 from Avalon Boulevard to Garcon Point Road	9.0%	54.1%	20.7%	10.35%
Avalon Boulevard	9.5%	55.4%	7.9%	3.95%

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 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 FDOT 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 traffic data, 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 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) the most recent five years available (2014-2018). 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. The safety analysis for the Build Alternative was performed by using the Safety Performance Functions (SPFs) from the Highway Safety Manual (HSM).

2.6. Operational Analysis Procedures

Traffic operational analyses were performed for existing conditions and future No-Build and Build alternatives. Intersection analyses have been conducted for the study intersections using Synchro 10. The diverge segment was analyzed using the Highway Capacity Software (HCS) version 7.0.

The delay and LOS for the unsignalized intersection analyses were 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

The diverge analysis performed within the study AOI is based on the criteria and policies detailed in the latest FDOT Interchange Access Request User's Guide (IARUG), 2020 Edition.

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 targets were used for this IOAR. The I-10 at Avalon Boulevard interchange is located in an urban area. The LOS targets for roadways analyzed in this IOAR are summarized below:

- SHS Facilities: LOS D
- Signalized Intersections: LOS D

The LOS D target was determined as the study roadways of this project are in an urban area.

3. EXISTING CONDITIONS

The following section provides a discussion and evaluation of the existing conditions at the subject interchange of I-10 at Avalon Boulevard.

3.1 Geometry

The existing I-10 EB off-ramp is a single lane off-ramp. On I-10, three general-purpose lanes are located upstream and downstream of the I-10 EB off-ramp. The I-10 EB off-ramp is at the right edge line of the general-purpose lanes and with a tapered deceleration lane of approximately 200 feet long.

The existing I-10 WB off-ramp is a single lane off-ramp. On I-10, three general-purpose lanes are located upstream and downstream of the I-10 WB off-ramp. The I-10 WB off-ramp is at the right edge line of the general-purpose lanes and with a tapered deceleration lane of approximately 300 feet long.

The intersection of Avalon Boulevard at I-10 EB On/Off-ramps is a four-leg signalized intersection with the following lane configurations:

- EB off-ramp at Avalon Boulevard: dual left-turn lanes and one right-turn lane
- Avalon Boulevard NB movement: one through lane and one shared through/right turn lane
- Avalon Boulevard SB movement: two through lanes and one left-turn lane

The intersection of Avalon Boulevard at I-10 WB On/Off-ramps is a four-leg unsignalized intersection with the following lane configurations:

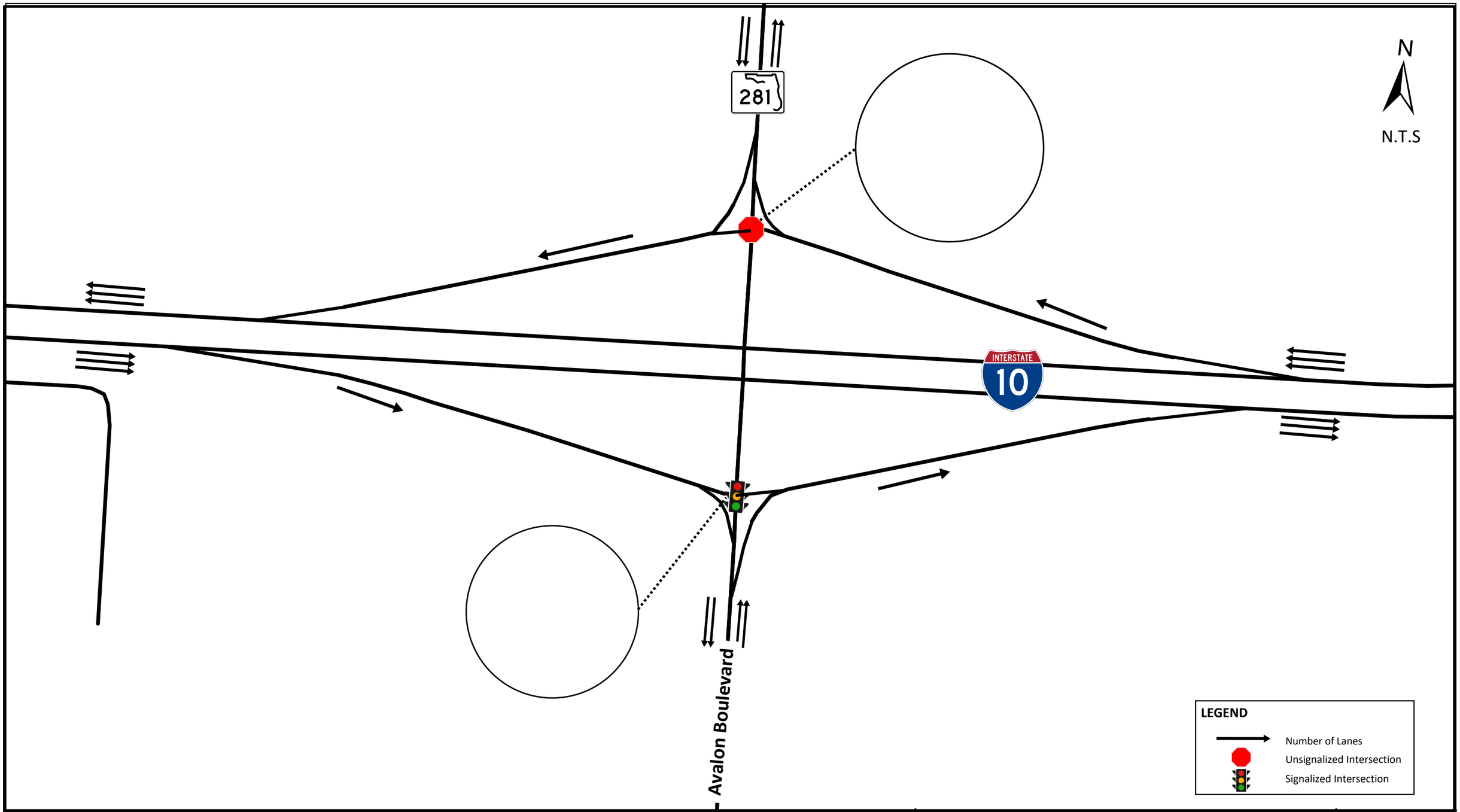
- WB off-ramp at Avalon Boulevard: one left-turn lane and one right-turn lane
- Avalon Boulevard NB movement: two through the lane and left-turn lane
- Avalon Boulevard SB movement: one through lane and one shared through/right-turn lane

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

3.2 Functional Classification

FDOT Functional Classification:

- Avalon Boulevard is classified as Urban Minor Arterial
- I-10 is classified as Urban Principal Arterial - Interstate



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

3.3 Posted Speed Limits

- Avalon Boulevard has a posted speed limit of 45 mph
- I-10 EB Off-ramp has a posted speed limit of 35 mph
- I-10 East and West of Avalon Boulevard has a posted speed limit of 70 mph

3.4 Typical Section

The I-10 typical section at Avalon Boulevard consists of a six-lane divided section providing three general-purpose lanes in each direction. The existing median width for I-10 is 40 feet. I-10 crosses over Avalon Boulevard.

Avalon Boulevard's typical section within the project limits consist of a four-lane urban divided roadway with a grassed 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

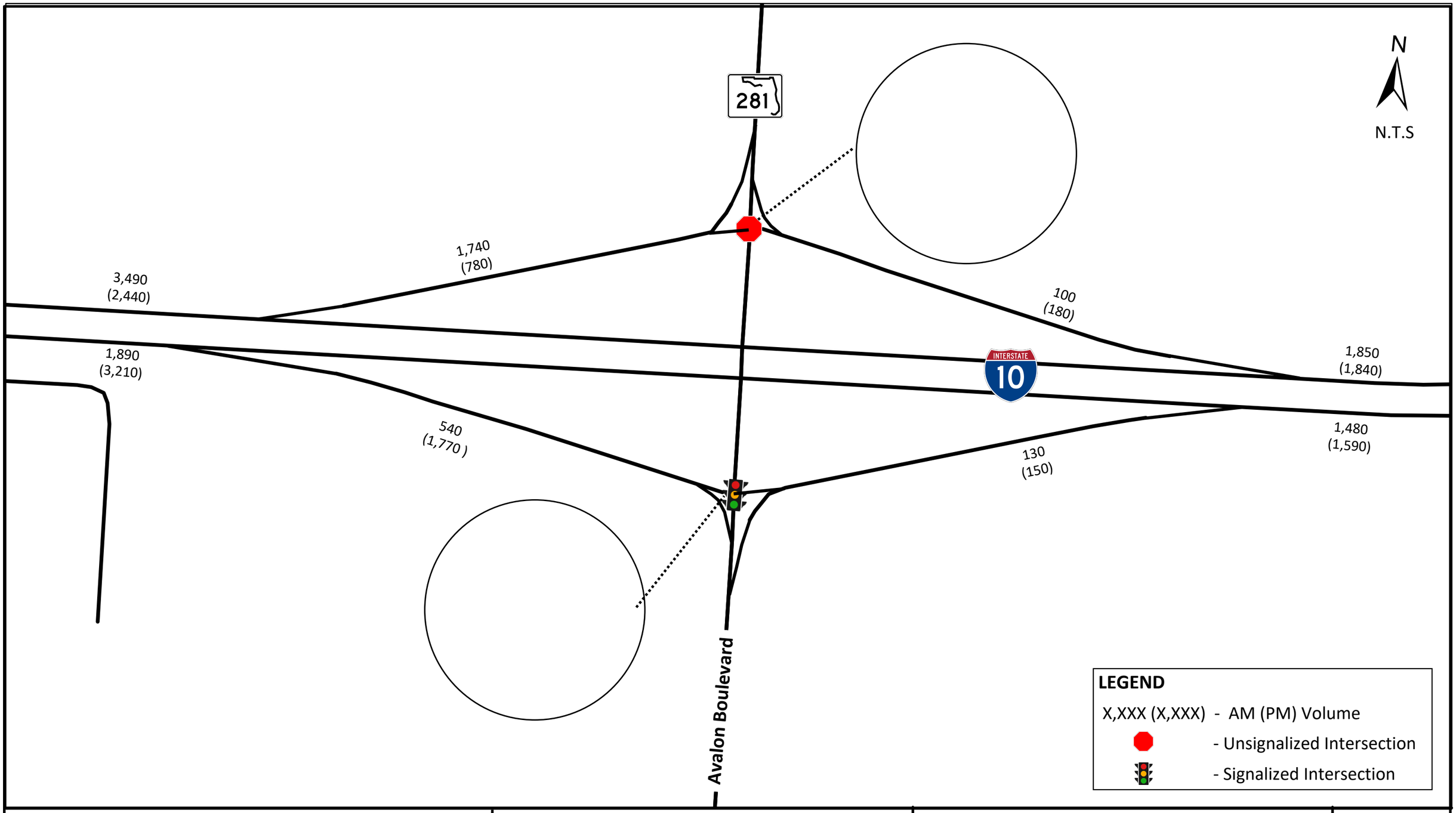
The existing AM and PM peak hour volumes were based on the existing counts collected. The Existing Year 2019 peak hour volumes within the study limits are shown in **Figure 3-2**.

3.7 Existing 2019 Traffic Operational Performance

A detailed operational analysis for Existing Year 2019 was performed at the I-10 EB diverge segment and the ramp terminal intersections. For the ramp terminal intersections, the length of the I-10 EB off-ramp is approximately 1250 feet long and the I-10 WB off-ramp length is approximately 1400 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**. The I-10 EB ramp terminal intersection is signalized and was analyzed using the field signal timing and phasing plans for AM and PM peak hours. No signal optimization was performed when performing analysis for the Existing Year 2019. The I-10 EB ramp terminal intersection operates at LOS C. The I-10 WB ramp terminal intersection is unsignalized and the WB left-turn movement operates at a failing LOS F in the AM and PM peak hours.



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

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)
Avalon Boulevard at I-10 EB On/Off-Ramps	EB	Left	31.9 (28.4)	C (C)	22 (27.5)	C (C)
		Right	5.9 (2.6)	A (A)		
	NB	Thru/Right	23.8 (48.8)	C (D)		
	SB	Left	9.8(29.5)	A (C)		
		Thru	8.0 (22.7)	A (C)		
Avalon Boulevard at I-10 WB On/Off-Ramps*	WB	Left	74.0 (549.1)	F (F)	--	--
		Right	11.6 (34.6)	B (D)		
	NB	Left	8.9 (8.5)	A (A)		

*Delay reported for worst-case approach only

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

A queuing analysis was performed as part of the study to determine the adequacy of the existing turn lane storage lengths for the intersections within the study area. In the Existing Year 2019, the 95th percentile queue length exceeds the storage available for the WB right-turn movement at the I-10 WB ramp terminal intersection in the PM peak hour. **Table 3-2** compares the 95th percentile queues for turning movements with the existing storage lengths and identifies instances where the estimated queue exceeds the storage capacity.

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	Left	Right	Left	Through
Avalon Boulevard at I-10 EB On/Off-Ramps	AM Peak	159	35		195			39	43
	PM Peak	#552	41		#201			92	80
	Existing Storage (feet)	750						100	
Avalon Boulevard at I-10 WB On/Off-Ramps	AM Peak			29	0	42	42		0
	PM Peak			14	0	408	408		0
	Existing Storage (feet)			250			325		

#: 95th percentile volume exceeds capacity, queue may be longer
Storage length noted above is turn pocket length for left/right-turn movements.

HCS Analysis

The Existing Year 2019 HCS analysis results for the I-10 EB diverge segment are summarized in **Table 3-3.** The results of the operational analysis show that the diverge segment at the I-10 EB off-ramp to Avalon Boulevard operates at LOS B during the AM peak hour and LOS F during the PM peak hour. The V/C ratio for the diverge segment is approximately 1.02 during the PM peak hour.

Table 3-3: Existing Year 2019 HCS Analysis Summary

Directions	Segments	Analysis Type	AM Peak Hour				PM Peak Hour			
			Volume	Density	LOS	v/c	Volume	Density	LOS	v/c
I-10 EB	Off-Ramp to Avalon Boulevard	Diverge	540	16.8	**B**	0.31	1770	28.1	**F**	1.02

3.8 Safety Review

Vehicular crash data along Avalon Boulevard 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 (2014-2018). Police reports were obtained from the FDOT and 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 EB diverge segment along Avalon Boulevard 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 IARUG. In this section, the existing crash analysis was performed for the I-10 EB diverge segment, the I-10 EB off-ramp, the I-10 EB ramp terminal intersection and the I-10 WB ramp terminal intersection. The raw crash data is provided in **Appendix C**.

The crash frequency and crash rate was calculated for the study limits. 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 diverge segment and the ramp terminal intersections. The actual crash rate for the study area from the year 2014 to 2018 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 3.4**.

Table 3-4: Existing Crash Summary (2014-2018)

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 Diverge to Avalon Boulevard	3	55,300	0.6	0.487	0.791	0	1
I-10 EB Off Ramp	1	11,500	0.2	0.529	0.791	1	0
Avalon Boulevard at I-10 EB Ramp Terminal	41	13,000	8.2	1.728	1.5	38	1
Avalon Boulevard at I-10 WB Ramp Terminal	23	17,400	4.6	0.724	1.5	9	0

The crash analysis results revealed a total of 68 crashes within the study area during the five study years (2014-2018). Of these 68 crashes, Front to Rear (Rear-End) crash types were the most common type of crashes accounting for 40% (27 crashes) of the total crashes, followed by Angle crash types accounting for 35% (24 crashes) of the total crashes. Based on police reports, Other crashes with 22% (15 crashes) of the total crashes within the study area can be classified as rollover crashes. There were 48 total injuries and 2 fatalities within the study area. Summary of the crash analyses within the study area is provided in **Figure 3-3**, **Table 3-4** and **Table 3-5**.

Figure 3-3: Crash Types (2014-2018)

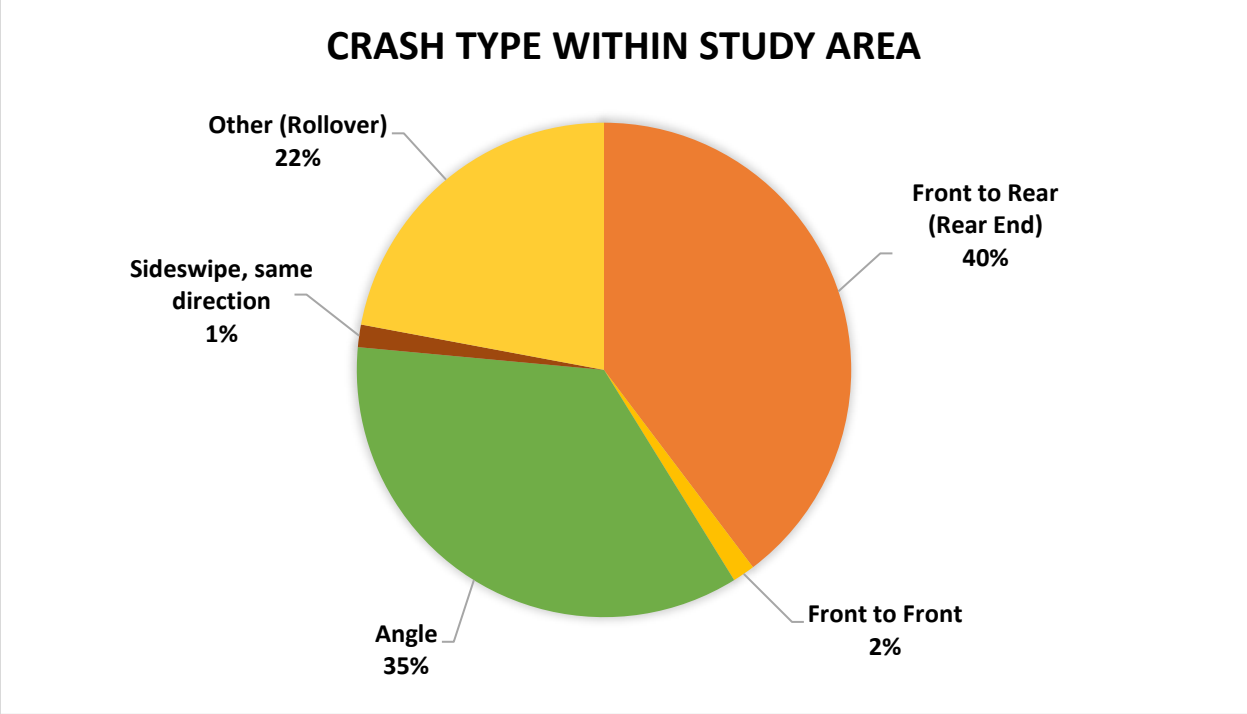


Table 3-5: Severity Summary (2014-2018)

Injury Type	2014	2015	2016	2017	2018	Total	Percent of Total
Number of Property Damage Only Crashes	12	13	9	5	4	43	63%
Number of Crashes with Injuries	5	5	4	3	6	23	34%
Number of Crashes with Fatalities	0	0	0	0	2	2	3%
Total	17	18	13	8	12	68	100%
Number of Injuries	9	15	9	8	7	48	
Number of Fatalities	0	0	0	0	2	2	

I-10 EB Ramp Terminal Intersection

The crash analysis results revealed that there was a total of 41 crashes at the intersection during the five study years (2014-2018). Of these 41 crashes, Front to Rear (Rear-End) crash types were the most common type of crashes accounting for 49% (20 crashes) of the total crashes followed by Angle crash types accounting for 27% (11 crashes) of the total crashes. There were 38 total injuries and 1 fatality. The average crash rate for the intersection is 1.728 crashes per million entering vehicles, which is higher than

the average statewide crash rate for similar facilities. Summary of the crash analyses is provided in **Figure 3-4**, **Table 3-4** and **Table 3-6**.

Figure 3-4: I-10 EB Ramp Terminal Intersection Crash Types (2014-2018)

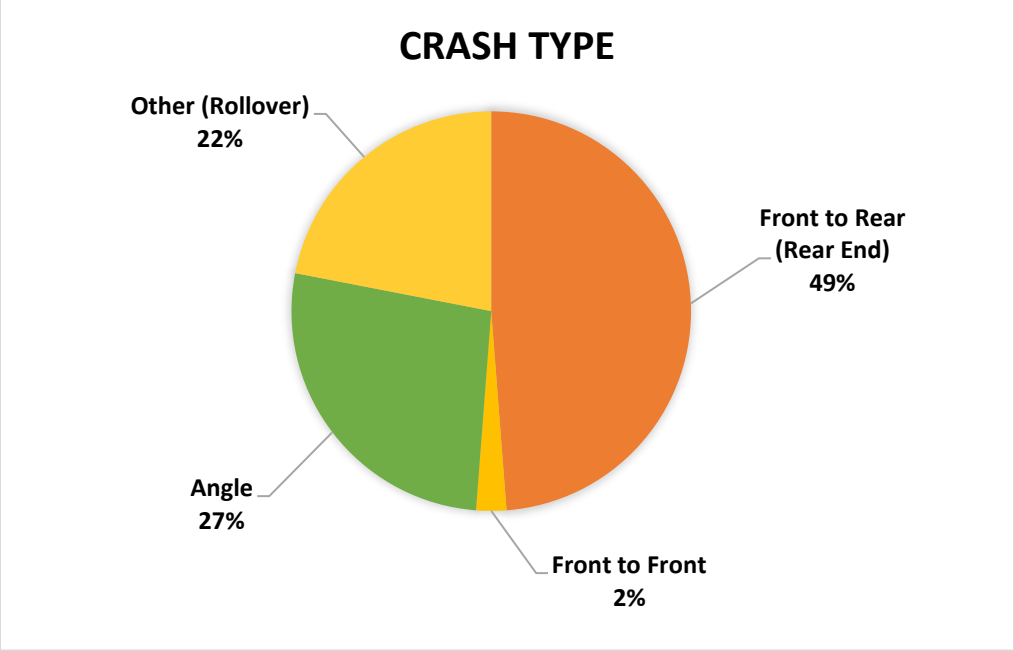


Table 3-6: I-10 EB Ramp Terminal Intersection Severity Summary (2014-2018)

Injury Type	2014	2015	2016	2017	2018	Total	Percent of Total
Number of Property Damage Only Crashes	3	12	5	3	1	24	59%
Number of Crashes with Injuries	4	5	3	2	2	16	39%
Number of Crashes with Fatalities	0	0	0	0	1	1	2%
Total	7	17	8	5	4	41	100%
Number of Injuries	7	15	8	5	3	38	
Number of Fatalities	0	0	0	0	1	1	

I-10 WB Ramp Terminal Intersection

The crash analysis results revealed that there was a total of 23 crashes at the intersection during the five study years (2014-2018). Of these 23 crashes, Angle crashes were the most common type of crash accounting for 57% (13 crashes) of the total crashes followed by Front to Rear (Rear-End) crashes accounting for 22% (5 crashes) of the total crashes. There were 9 injuries and no fatalities. The actual crash rate at the intersection is 0.724 crashes per million entering vehicles, which is lower than the

average statewide crash rate for similar facilities. Summary of the crash analyses is provided in **Figure 3-5**, **Table 3-4** and **Table 3-7.**

Figure 3-5: I-10 WB Ramp Terminal Intersection Crash Types (2014-2018)

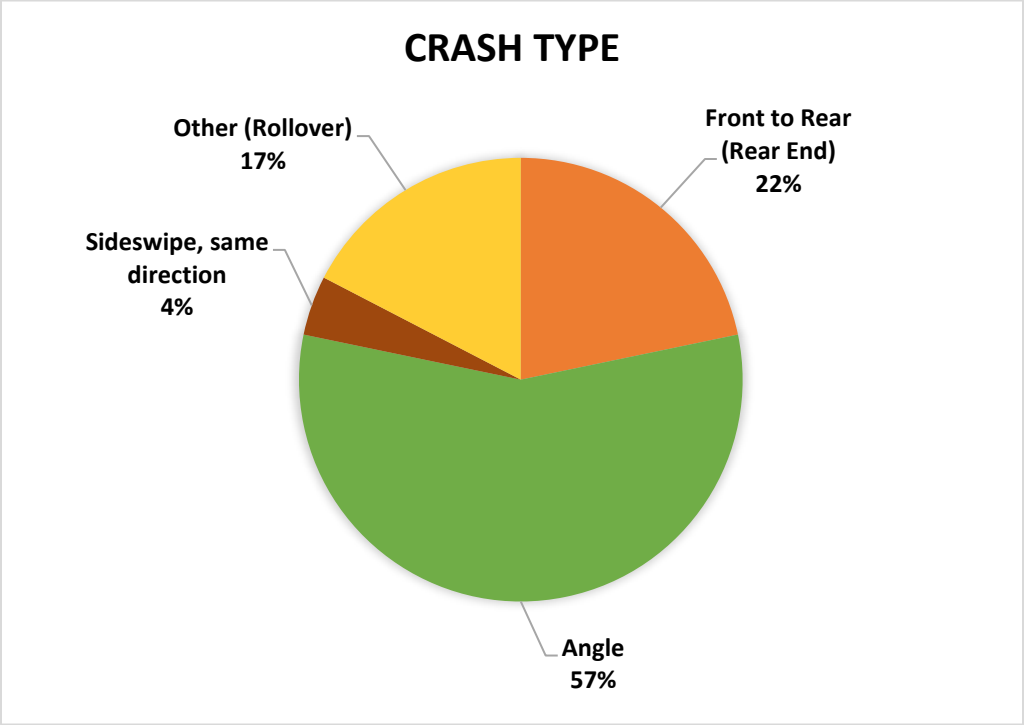


Table 3-7: I-10 WB Ramp Terminal Intersection Severity Summary (2014-2018)

Injury Type	2014	2015	2016	2017	2018	Total	Percent of Total
Number of Property Damage Only Crashes	9	1	2	2	3	17	74%
Number of Crashes with Injuries	1	0	1	1	3	6	26%
Number of Crashes with Fatalities	0	0	0	0	0	0	0%
Total	10	1	3	3	6	23	100%
Number of Injuries	2	0	1	3	3	9	
Number of Fatalities	0	0	0	0	0	0	

I-10 EB Diverge to Avalon Boulevard

The crash analysis results revealed that there was a total of 3 crashes along the diverge segment during the five study years (2014-2018). Of these 3 crashes, Other crashes were the most common type of crash accounting for 67% (2 crashes) of the total crashes followed by Front to Rear (Rear-End) crashes accounting for 33% (1 crash) of the total crashes. Based on the police reports, Other crashes are influenced

by a driver losing control and causing the vehicle to rollover. There were no injuries and 1 fatality. The actual crash rate at the segment is 0.487 crashes per 100 million vehicle miles of travel, which is lower than the average statewide crash rate for similar facilities. Summary of the crash analyses within the study area is provided in **Figure 3-6**, **Table 3-4** and **Table 3-8**.

Figure 3-6: I-10 EB Diverge Segment Crash Types (2014-2018)

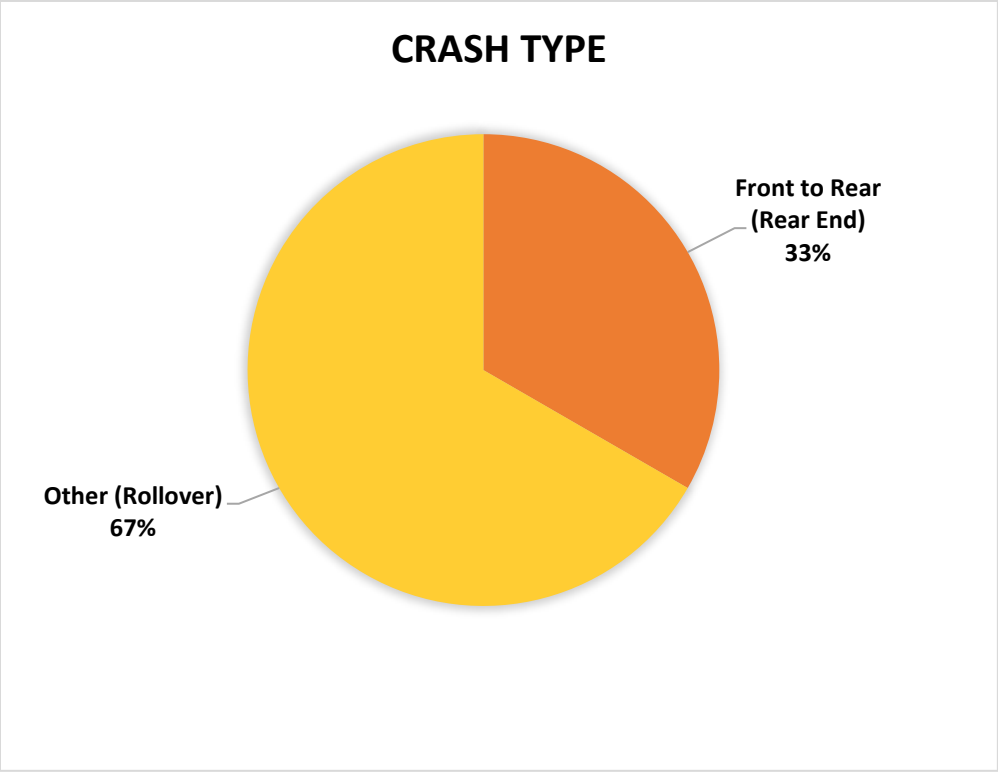


Table 3-8: I-10 EB Diverge Segment Severity Summary (2014-2018)

Injury Type	2014	2015	2016	2017	2018	Total	Percent of Total
Number of Property Damage Only Crashes	0	0	2	0	0	2	67%
Number of Crashes with Injuries	0	0	0	0	0	0	0%
Number of Crashes with Fatalities	0	0	0	0	1	1	33%
Total	0	0	2	0	1	3	100%
Number of Injuries	0	0	0	0	0	0	
Number of Fatalities	0	0	0	0	1	1	

I-10 EB Off-Ramp

The crash analysis results revealed that there was 1 crash along the off-ramp segment during the five study years (2014-2018). The crash was a Front to Rear (Rear-End) crash with one injury and no fatalities. The actual crash rate at the segment is 0.529 crashes per 100 million vehicle miles of travel, which is lower than the average statewide crash rate for similar facilities. Summary of the crash analyses within the study area is provided in **Figure 3-7**, **Table 3-4** and **Table 3-9**.

Figure 3-7: I-10 EB Off-Ramp Segment Crash Types (2014-2018)

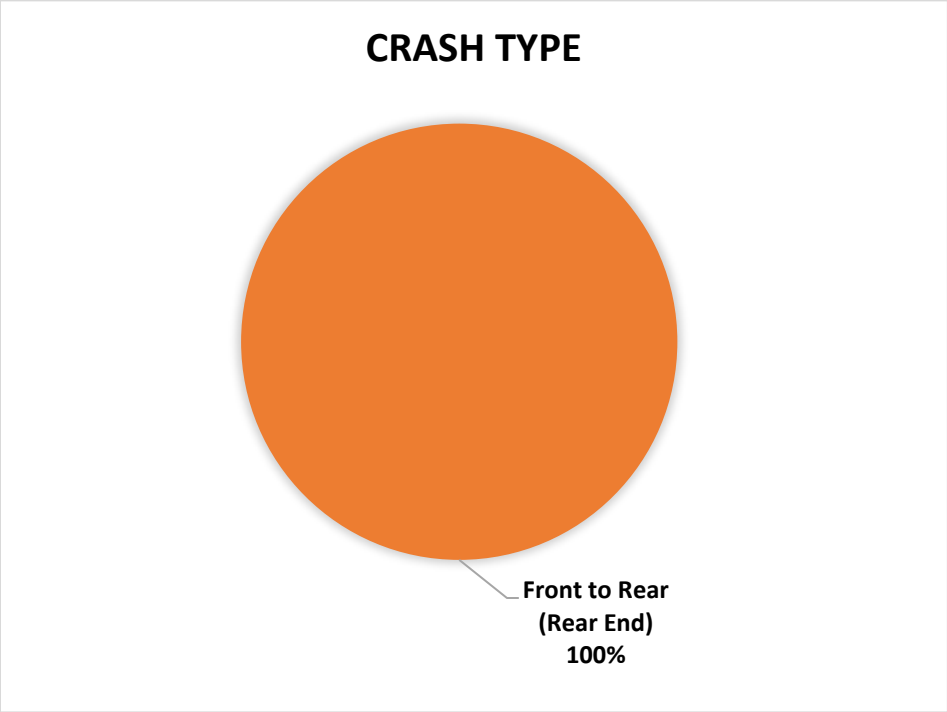


Table 3-9: I-10 EB Off-Ramp Segment Severity Summary (2014-2018)

Injury Type	2014	2015	2016	2017	2018	Total	Percent of Total
Number of Property Damage Only Crashes	0	0	2	0	0	0	0%
Number of Crashes with Injuries	0	0	0	0	1	1	100%
Number of Crashes with Fatalities	0	0	0	0	0	0	0%
Total	0	0	2	0	1	1	100%
Number of Injuries	0	0	0	0	1	1	
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 Avalon Boulevard 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 Traffic Forecasting Methodology

The methodologies used in this IOAR to estimate future traffic projections are consistent with those outlined in the PTAR as part of the I-10 Project Development and Environment (PD&E) Study from west of Avalon Boulevard to west of Log Lake Road.

4.1.1 Model Growth Rates

Tables 4-1 provide the 2010 and 2040 No-Build segment AADTs for I-10 and the Avalon Boulevard respectively. An annual growth rate is rate has been calculated for the I-10 segments and Avalon Boulevard using the NWFRPM 2010 and 2040 volumes.

Table 4-1: Model Growth Rates

Road	Intersection	No-Build		
		2010 AADT	2040 AADT	Annual Growth Rate
I-10	W of Avalon	54,648	73,371	1.00%
	EB Off-Ramp at Avalon	10,341	12,980	0.80%
	WB On-Ramp at Avalon	10,078	12,739	0.80%
	Between Avalon Ramps	35,280	48,977	1.10%
	EB On-Ramp at Avalon	1,018	997	-0.10%
	WB Off-Ramp at Avalon	1,033	1,000	-0.10%
	E of Avalon	37,225	50,872	1.00%
Avalon Boulevard	Avalon (S. of San Jose)	7,896	13,005	1.70%
	Avalon (Between I-10 EB Ramps and San Jose)	7,896	13,005	1.70%
	Avalon (Between I-10 EB and WB Ramps)	14,722	21,565	1.30%
	Avalon (Between I-10 WB Ramps and San Pablo)	21,431	29,762	1.10%
	Avalon (N. of San Pablo)	21,431	29,762	1.10%

4.1.2 Historical Trend Analysis

Based on data collected from the 2018 FTO, trends analyses were performed for the FDOT count stations located within the study area using historical AADTs. **Tables 4-2** provide the summary of the historical trend analysis for I-10 and the Avalon Boulevard. According to the results for the I-10 and Avalon Boulevard counts, about half of the segments show a good R-squared value (greater than 75%). R-squared values denote the goodness-of-fit of a model to the existing data points, which in turn demonstrates the faith in future model forecasts. Therefore, due to a lack of significant number of stations and inconsistent R-square values between stations, the trends analysis results are not reliable for use in this study.

Table 4-2: Historical Trend Analysis Summary

Intersection	Count Site	Trend Analysis		
		Design Year 2045 Trend	Trend R-Squared	Trend Annual Historic Growth Rate
I-10				
W. of Avalon	**582001**	79,700	86.09%	2.08%
EB Off-Ramp at Avalon	**582605**	14,100	73.44%	1.52%
WB On-Ramp at Avalon	**582603**	13,700	66.78%	1.37%
EB On-Ramp at Avalon	**582606**	1,000	55.13%	-1.50%
WB Off-Ramp at Avalon	**582604**	1,000	46.61%	-0.84%
E of Avalon	**582003**	56,900	76.99%	2.17%
Avalon Boulevard				
Avalon (S. of San Jose)	**580280**	14,300	97.23%	4.81%
Avalon (N. of San Pablo)	**580270**	31,500	83.71%	1.81%

4.1.3 Historical Population Growth

Historical population growth was also analyzed and is included in **Table 4-3**. Population data from the 2010 U.S. Census was obtained for Santa Rosa County. This data was then compared against the 2018 estimate from the U.S. Census QuickFacts. An annual growth rate was calculated to show the population change from 2010 to 2018.

Table 4-3: Historical Population Growth

Intersection	Population		
	2010 Population	2018 Estimate	Annual Growth Rate
Santa Rosa County	151,372	179,349	2.10%

4.1.4 BEBR Population Projections

The University of Florida's Bureau of Economic and Business Research (BEBR) publishes population projections for all counties in the state of Florida. The projections include a low estimate, medium estimate, and high estimate. The Santa Rosa County population growth estimates from BEBR are shown in **Table 4-4**.

Table 4-4: BEBR Population Projections

County	2019 Population	Projection	Population				2019 to 2045 Growth Rate
			2030	2035	2040	2045	
Santa Rosa County	179,054	Low	185,600	188,800	190,100	189,900	0.20%
		Medium	214,700	226,900	237,500	247,000	1.20%
		High	241,200	263,800	284,900	305,900	2.10%

4.1.5 Woods & Poole Employment Data

Woods & Poole employment data was obtained and analyzed to understand how employment in Santa Rosa county is projected to change from 2019 to 2045. **Table 4-5** includes the 2019 existing employment along with the projected 2045 employment by county. An annual growth rate was also calculated for each county.

Table 4-5: Existing and Projected Employment

County	Employment		
	2019	2045	Annual Growth Rate
Santa Rosa County	64,204	102,642	1.80%

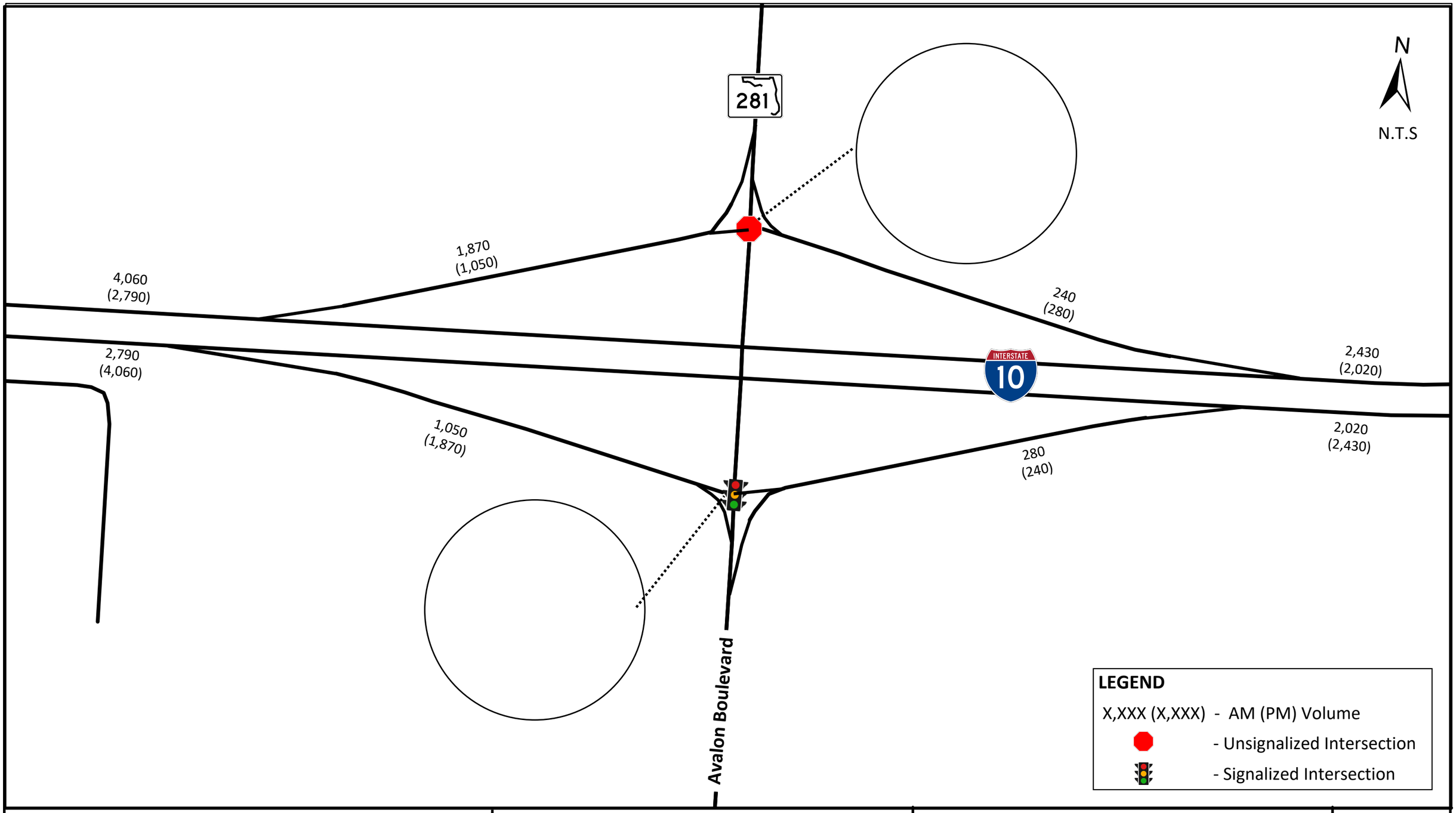
4.1.6 Travel Demand Model

The Northwest Florida Regional Planning Model (NWFRPM) version 2.1 is the adopted travel demand model with a base year of 2010 and a horizon year of 2040. The NWFRPM is based on the Florida Standard Urban Transportation Modeling Structure (FSUTMS) and is recognized by FDOT District Three as an acceptable travel demand forecasting tool, which has been used to develop design traffic for several recent improvement projects. The NWFRPM was used as a reference to estimate future years daily and peak hour traffic forecasts.

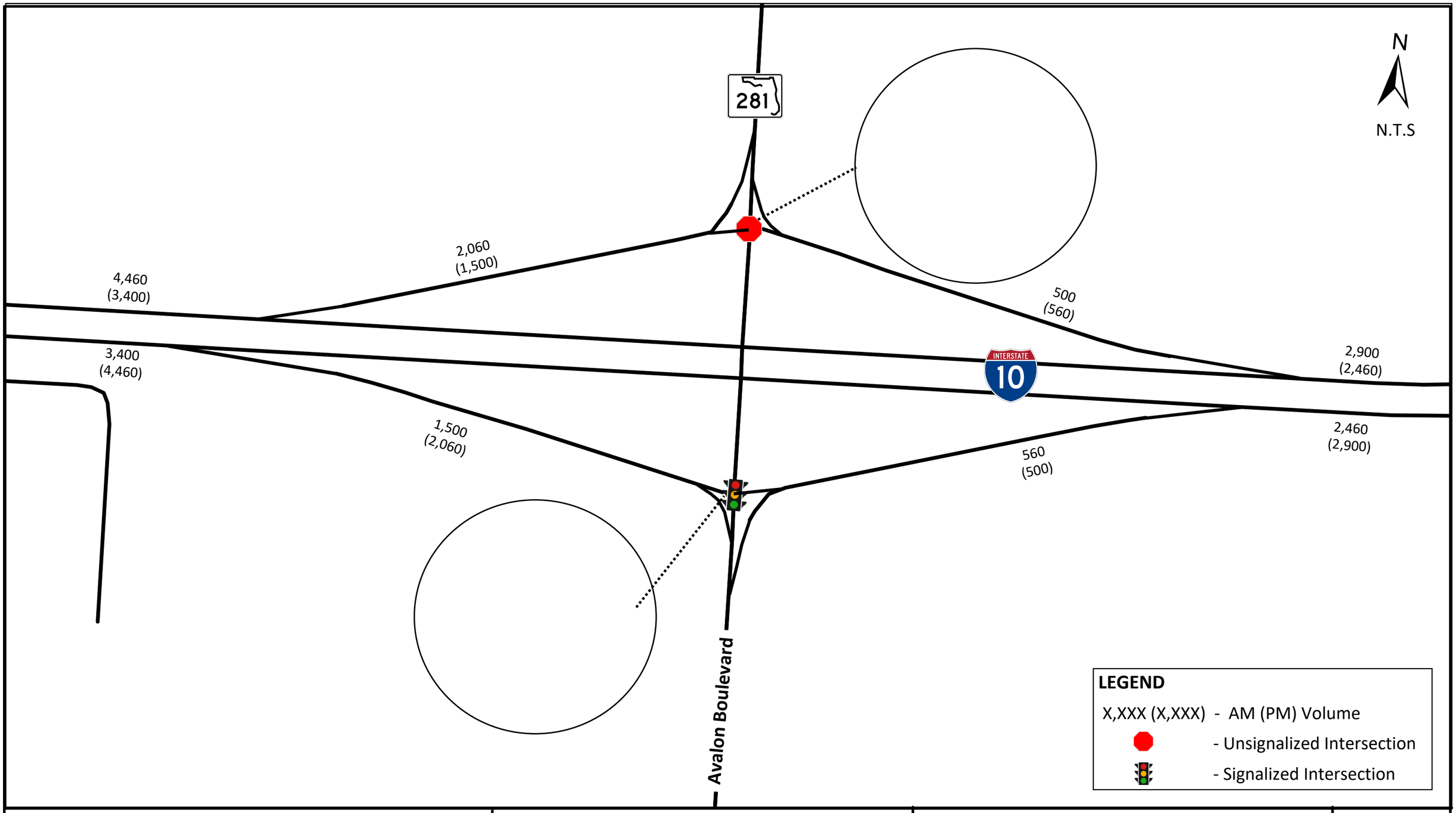
4.2 Future Traffic Development

The future conditions analysis is conducted by examining the traffic operations for both the daily and peak hour conditions for the Opening Year 2025 and Design Year 2045. Based on the growth rates from the NWFRPM, historical trend analysis, BEBR population estimates, Woods & Poole employment forecasts, and Trends analysis, a growth rate of five percent was selected for the study area. This growth rate was applied in order to forecast the baseline 2025 and 2045 No-Build traffic volumes. To develop the 2025 and 2045 Build volumes, a five percent volume increase was applied to the 2025 and 2045 No-Build volumes along the I-10 mainline and ramps. The other Build volumes within the study area remained the same as the No-Build. The five percent figure was obtained by calculating the average growth in NWFRPM volumes between the 2040 No-Build and Build scenarios for the I-10 mainline and ramps.

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 Avalon Boulevard** 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 Avalon Boulevard** 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. HCS 7 was used to perform the capacity analysis for the I-10 EB diverge segment and Synchro 10 was used for the intersection analysis of the ramp terminals. The I-10 WB ramp terminal intersection was analyzed as stop controlled under the No-Build condition. The analysis results for the EB off-ramp included in this IOAR do not match the analysis results included in the PTAR where analysis was performed for two lanes on the mainline under the existing condition.

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. 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 4-6**. In the Opening Year 2025, the results indicate operational deficiencies at the I-10 WB ramp terminal intersection. The WB left-turn movement at the intersection will operate at LOS F during the AM and PM peak hours.

Table 4-6: 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)
Avalon Boulevard at I-10 EB On/Off-Ramps	EB	Left	38.2 (51.2)	D (D)	27.0 (39.6)	C (D)
		Right	5.2 (4.4)	A (A)		
	NB	Thru/Right	29.9 (45.0)	C (D)		
	SB	Left	15.9 (35.0)	B (C)		
		Thru	10.6 (20.6)	B (C)		
Avalon Boulevard at I-10 WB On/Off-Ramps*	WB	Left	532.4 (4752.5)	F (F)	--	--
		Right	17.4 (29.9)	C (D)		
	NB	Left	9.4 (9.0)	A (A)		

*Delay reported for worst-case approach only

A queuing analysis for the 2025 No-Build Alternative was performed as part of the study to determine the adequacy of the existing storage lengths for the ramp terminal intersections using Synchro 10. The 95th percentile queue length exceeds the storage length at the following intersection approaches:

- SB left -turn at the I-10 EB ramp terminal intersection (PM peak hour)
- WB right-turn at the I-10 WB ramp terminal intersection (AM and PM peak hours)

- WB left-turn at the I-10 WB ramp terminal intersection (AM and PM peak hours)

The queue length at the WB right-turn lane at the I-10 WB ramp terminal intersection extends over 325 feet during the PM peak hour and possibly blocks the left-turn vehicles. **Table 4-7** compares the 95th percentile queues for turning movements with the existing storage lengths and identifies instances where the estimated queue exceeds the storage capacity.

Table 4-7: 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	Left	Right	Left	Through
Avalon Boulevard at I-10 EB On/Off-Ramps	AM Peak	#308	53		#261			62	57
	PM Peak	#625	67		#222			134	102
	Existing Storage (feet)	750						100	
Avalon Boulevard at I-10 WB On/Off-Ramps	AM Peak			35	0	535	535		0
	PM Peak			22	0	Error*	Error*		0
	Existing Storage (feet)			250			325		

#: 95th percentile volume exceeds capacity, queue may be longer
*Synchro reports Error which indicates significantly long queues for the approach.
Storage length noted above is turn pocket length for left/right-turn movements.

HCS Analysis

The Opening Year 2025 No-Build analysis is summarized in **Table 4-8**. The results of the operational analysis show that the diverge segment will operate at LOS C in the AM peak hour. In the PM peak hour, the diverge segment will operate at LOS F with a v/c ratio of 1.06.

Table 4-8: Opening Year 2025 No-Build HCS Analysis Summary

Directions	Segments	Analysis Type	AM Peak Hour				PM Peak Hour			
			Volume	Density	LOS	V/C	Volume	Density	LOS	V/C
I-10 EB	Off-Ramp to Avalon Boulevard	Diverge	1,050	23.3	C	0.6	1,870	32.4	F	1.06

4.2.2 Design Year 2045 No-Build Analysis

Intersection Analysis

The Design Year 2045 No-Build intersection analysis results are summarized in **Table 4-9**. In the Design Year 2045, the results indicate several operational deficiencies along Avalon Boulevard within the study area. The I-10 EB ramp terminal intersection will operate at LOS E or worse by year 2045 in the AM and PM peak hours. All the individual movements for the WB approach at the I-10 WB ramp terminal intersection will operate at LOS F in the AM and PM peak hours. For the I-10 EB ramp terminal intersection, the following individual movements listed below will operate at LOS F.

Avalon Boulevard at I-10 EB On/Off-Ramps

- EB left-turn lane (PM peak hour)
- NB through/right-turn lane (PM peak hour)
- SB left-turn lane (AM and PM peak hours)

Table 4-9: Design 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)
Avalon Boulevard at I-10 EB On/Off-Ramps	EB	Left	67.5 (117.8)	E (F)	56.8 (98.5)	E (F)
		Right	9.3 (16.2)	A (B)		
	NB	Thru/Right	69.8 (110.4)	E (F)		
	SB	Left	87.3 (161.7)	F (F)		
		Thru	19.5 (25.2)	B (C)		
Avalon Boulevard at I-10 WB On/Off-Ramps*	WB	Left	43166.3 (49932.6)	F (F)	--	--
		Right	157 (465.1)	F (F)		
	NB	Left	17.5 (10.7)	C (B)		

*Delay reported for worst-case approach only

A queuing analysis for the 2045 No-Build Alternative was performed as part of the study to determine the adequacy of the existing storage lengths for the ramp terminal intersections using Synchro 10. The 95th percentile queue length will exceed the storage length at the following intersection approaches:

- EB left-turn at the I-10 EB ramp terminal intersection (PM peak hour)
- SB left-turn at the I-10 EB ramp terminal intersection (AM and PM peak hours)
- WB left-turn at the I-10 WB ramp terminal intersection (AM and PM peak hours)
- WB right-turn at the I-10 WB ramp terminal intersection (AM and PM peak hours)

Table 4-10 compares the 95th percentile queues for turning movements with the existing storage lengths and identifies instances where the estimated queue exceeds the storage capacity.

Table 4-10: 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	Left	Right	Left	Through
Avalon Boulevard at I-10 EB On/Off-Ramps	AM Peak	#711	116		#531			#468	191
	PM Peak	#1,137	272		#657			#666	166
	Existing Storage (feet)	750						100	
Avalon Boulevard at I-10 WB On/Off-Ramps	AM Peak			115	0	Error*	Error*		0
	PM Peak			37	0	Error*	Error*		0
	Existing Storage (feet)			250			325		

#: 95th percentile volume exceeds capacity, queue may be longer
*Synchro reports Error which indicates significantly long queues for the approach.
Storage length noted above is turn pocket length for left/right-turn movements.

HCS Analysis

The Design Year 2045 No-Build analysis is summarized in **Table 4-11**. The results of the operational analysis show that the diverge segment will operate at LOS C in the AM peak hour. In the PM peak hour, the segment will operate at LOS F with a v/c ratio of 1.17.

Table 4-11: Design Year 2045 No-Build HCS Analysis Summary

Directions	Segments	Analysis Type	AM Peak Hour				PM Peak Hour			
			Volume	Density	LOS	V/C	Volume	Density	LOS	V/C
I-10 EB	Off-Ramp to Avalon Boulevard	Diverge	1,500	28.0	C	0.85	2,060	34.9	F	1.17

5. BUILD CONDITIONS

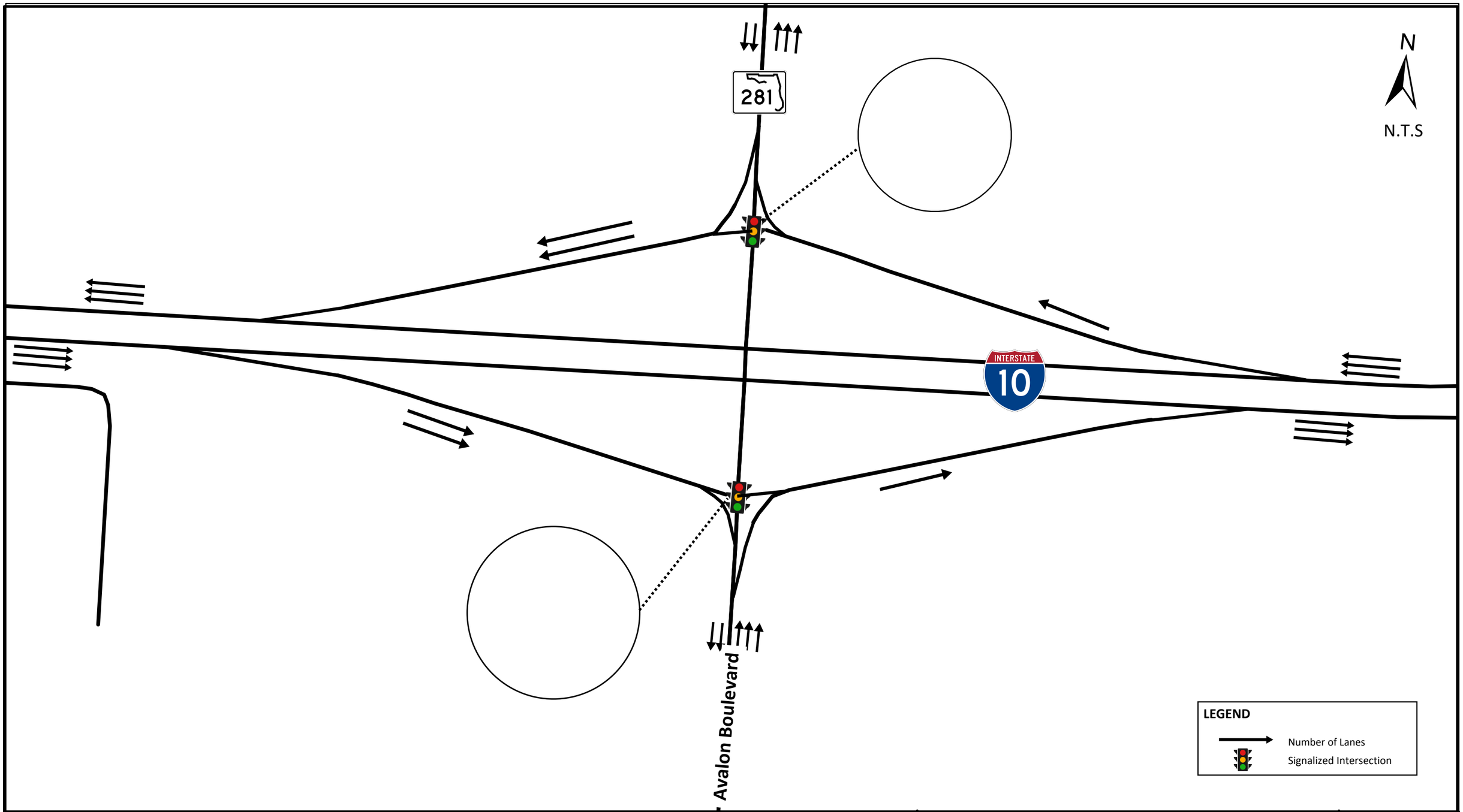
5.1 Build Alternative

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

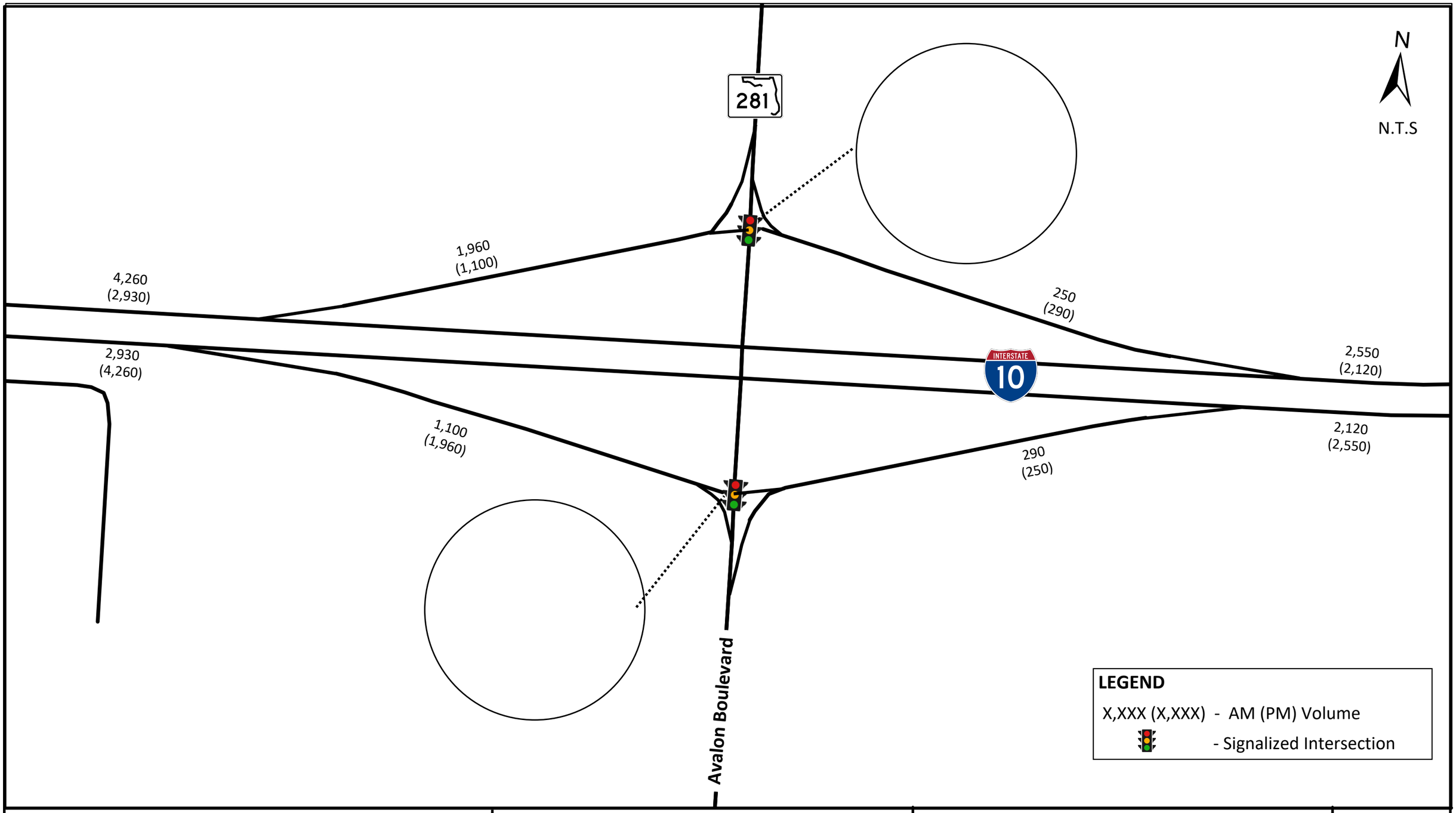
- Widening the I-10 EB off-ramp from one lane to two lanes
- Lengthening and widening the diverge segment to provide two deceleration lanes.
    - The deceleration lane will taper and diverge to Avalon Boulevard at approximately 2000 feet.
    - The choice lane will diverge to Avalon Boulevard at approximately 400 feet.
- Changing the I-10 WB ramp terminal from a stop-controlled intersection to a signal-controlled intersection.
- Provide dual WB right-turn lanes at the I-10 WB ramp terminal intersection.
- Provide dual NB left-turn lanes and three through lanes at the I-10 WB ramp terminal intersection.
- Changing SB shared through/right-turn lane to two through lanes and provide exclusive SB right-turn lane at the I-10 WB ramp terminal intersection.
- Provide dual NB exclusive through lanes at the I-10 EB ramp terminal intersection.
- Provide dual SB left-turn lane at the I-10 EB ramp terminal intersection.
- Provide triple EB left-turn lane at the I-10 EB ramp terminal intersection.
- The storage length at the ramp terminals were improved, the queue length tables (**Table 5-2** and **Table 5-5**) show the improved storage lengths.

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**.

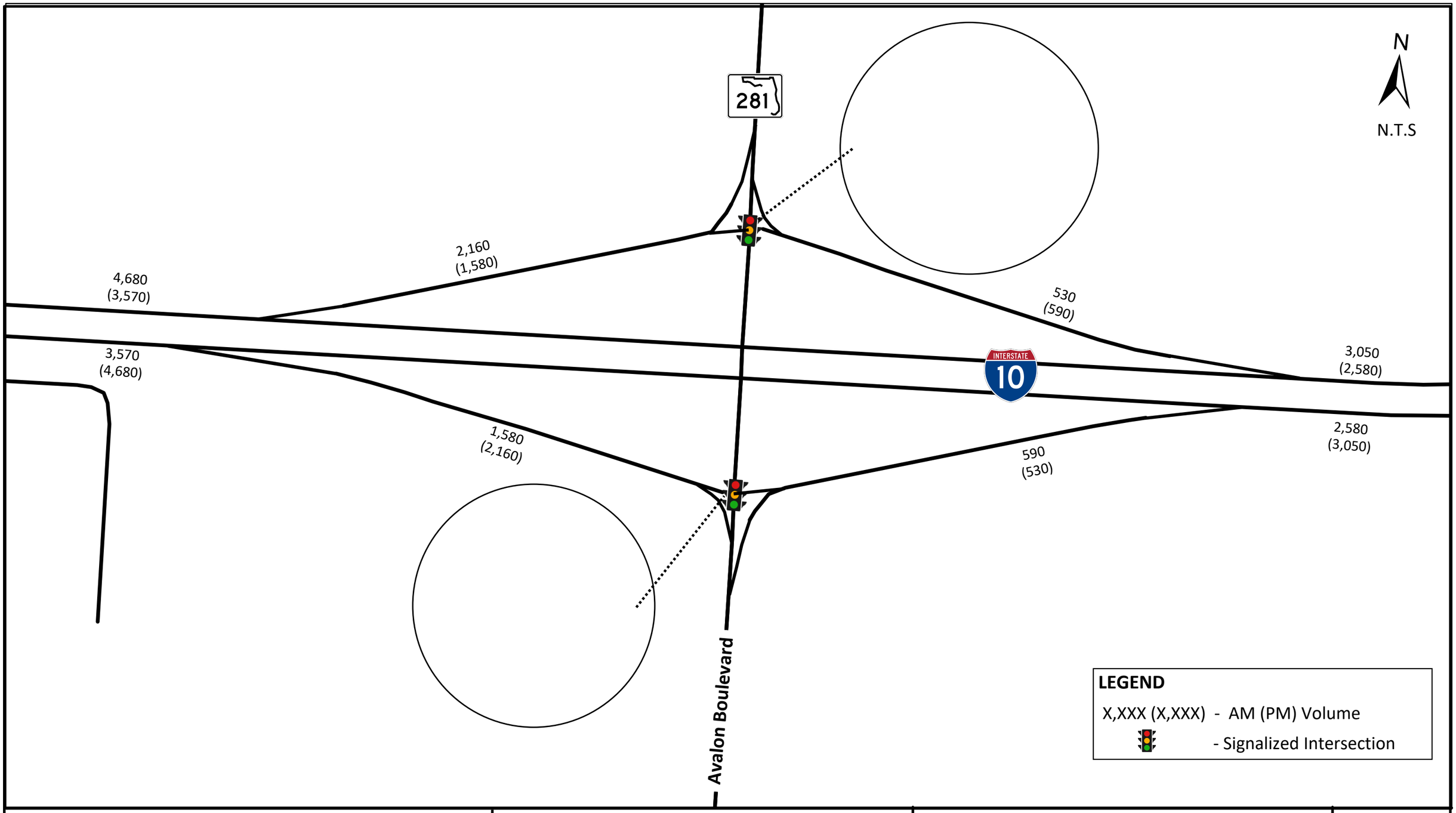
The Build Alternative lane configuration is shown in **Figure 5-1**. The travel demand forecast for the project assumes that the above improvements will not impact overall future traffic patterns within the study. Furthermore, the forecast traffic volume for the Build Alternative is discussed in **Section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



Florida Department of Transportation District Three Chipley, Florida	**I-10 at Avalon Boulevard** 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 Avalon Boulevard** 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/SR 8 at Avalon Boulevard** 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 Build Alternative Operational Analysis

The Build Alternative being considered for the Avalon Boulevard interchange along I-10 is described in **Section 5.1**.

The No-Build Alternative Operational analysis presented in **Section 4.2** of this report demonstrates that failing conditions are expected within the study area by Design Year 2045 if no improvement is considered. To address these operational deficiencies, a design option was developed and evaluated for the interchange.

The Build Alternative includes modification to I-10 EB diverge area. Therefore, HCS operational analysis was performed to determine density, LOS and v/c ratio. The improvements at the ramp terminal intersections were analyzed using Synchro 10 software. Documentation of the Build Alternative analyses is provided in **Appendix F**.

5.2.1 Opening Year 2025 Build Alternative Analysis

Intersection Analysis

The ramp terminal intersections were analyzed as signalized intersections. The Opening Year 2025 Build intersection analysis results are summarized in **Table 5-1**. **Figure 5-2** illustrates the peak hour volumes for the Opening Year 2025 intersection analysis. Both the ramp terminal intersections within the project area will operate at acceptable LOS D or better in both AM and PM peak hours.

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)
Avalon Boulevard at I-10 EB On/Off-Ramps	EB	Left	51.6 (39.0)	D (D)	37.0 (30.6)	D (C)
		Right	6.5 (4.4)	A (A)		
	NB	Thru/Right	35.9 (33.8)	D (C)		
	SB	Left	53.9 (38.3)	D (D)		
		Thru	16.5 (12.1)	B (B)		
Avalon Boulevard at I-10 WB On/Off-Ramps	WB	Left	28.8 (30.9)	C (C)	24.7 (11.7)	C (B)
		Right	34.1 (21.8)	C (C)		
	NB	Left	25.1 (25.5)	C (C)		
		Thru	3.2 (11.0)	A (B)		
	SB	Thru	16.5 (16.3)	B (B)		
		Right	38.4 (1.5)	D (A)		

A queuing analysis for the 2025 Build Alternative was performed as part of the study to determine the adequacy of the available storage lengths for the ramp terminal intersections using Synchro 10. In the Opening Year 2025 Build Alternative, the 95th Percentile queue lengths did not exceed the 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	Left	Right	Left	Through	Right
Avalon Boulevard at I-10 EB On/Off-Ramps	AM Peak	295	67		256			96	85	
	PM Peak	471	63		155			90	94	
	Proposed Storage (feet)	700	--					595		
Avalon Boulevard at I-10 WB On/Off-Ramps	AM Peak			127	56	49	82		90	#308
	PM Peak			m93	341	111	43		81	0
	Proposed Storage (feet)			600		675	675			575

#: 95th percentile volume exceeds capacity, queue may be longer
m: Volume for 95th percentile queue is metered by upstream signal.
Storage length noted above is turn pocket length for left/right-turn movements.

HCS Analysis

The I-10 EB off-ramp was analyzed as a two-lane section. The Opening Year 2025 Build HCS analysis results are summarized in **Table 5-3.** The diverge segment operates at acceptable LOS B or better in both AM and PM peak hours. No operational issues are observed at the diverge segment in the Opening Year 2025 Build Alternative.

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

Directions	Segments	Analysis Type	AM Peak Hour				PM Peak Hour			
			Volume	Density	LOS	V/C	Volume	Density	LOS	V/C
I-10 EB	Off-Ramp to Avalon Boulevard	Diverge	1,100	9.5	A	0.31	1,960	20.0	B	0.56

5.2.2 Design Year 2045 Build Alternative Analysis

Intersection Analysis

The Design Year 2045 Build intersection analysis results are summarized in **Table 5-4**. **Figure 5-3** illustrates the peak hour volumes for the Design Year 2045 Build intersection analysis. In the Design Year 2045, all the intersections within the study area operate at acceptable LOS D or better in both AM and PM peak hours. All individual movements operate acceptably in Design Year 2045 under the Build Alternative versus the No-Build Alternative that had several failing movements.

Table 5-4: 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)
Avalon Boulevard at I-10 EB On/Off-Ramps	EB	Left	49.8 (43.5)	D (D)	43.1 (35.8)	D (D)
		Right	10.8 (10.4)	B (B)		
	NB	Thru/Right	54.6 (38.3)	D (D)		
	SB	Left	54.3 (52.0)	D (D)		
		Thru	22.6 (10.7)	C (B)		
Avalon Boulevard at I-10 WB On/Off-Ramps	WB	Left	28.4 (32.2)	C (C)	34.9 (16.3)	C (B)
		Right	43.7 (32.7)	D (C)		
	NB	Left	27.4 (27.6)	C (C)		
		Thru	6.1 (14.6)	A (B)		
	SB	Thru	26.5 (19.9)	C (C)		
		Right	63.9 (6.7)	E (A)		

A queuing analysis for the 2045 Build Alternative was performed as part of the study to determine the adequacy of the available storage lengths for the ramp terminal intersections using Synchro 10. In the Design Year 2045 Build Alternative, the 95th Percentile queue lengths did not exceed the storage length at either intersection within the study area. **Table 5-5** summarizes the queue analysis for the Design Year 2045 Build Alternative.

Table 5-5: 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	Left	Right	Left	Through	Right
Avalon Boulevard at I-10 EB On/Off-Ramps	AM Peak	468	141		352			256	193	
	PM Peak	#526	187		278			#259	110	
	Proposed Storage (feet)	700	--					595		
Avalon Boulevard at I-10 WB On/Off-Ramps	AM Peak			212	233	91	#189		255	#415
	PM Peak			m103	448	#149	#136		141	#28
	Proposed Storage (feet)			600		675	675			575

#: 95th percentile volume exceeds capacity, queue may be longer
m: Volume for 95th percentile queue is metered by upstream signal.
Storage length noted above is turn pocket length for left/right-turn movements.

HCS Analysis

The Design Year 2045 Build HCS analysis results are summarized in **Table 5-6**. In Design Year 2045, the diverge segment will operate at LOS C or better in the AM and PM peak hours. No operational issues are observed at the diverge segment in the Design Year 2045 Build Alternative.

Table 5-6: Design Year 2045 Build HCS Analysis Summary

Directions	Segments	Analysis Type	AM Peak Hour				PM Peak Hour			
			Volume	Density	LOS	V/C	Volume	Density	LOS	V/C
I-10 EB	Off-Ramp to Avalon Boulevard	Diverge	1,580	14.9	B	0.45	2,160	22.9	C	0.61

5.2.3 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. The crash frequencies were predicted using the SPFs for urban speed change lane and ramp terminal from the HSM. The Empirical Bayes (EB) method was not applicable for this evaluation. The detailed spreadsheets showing the breakdown of crashes are provided in **Appendix G**.

Table 5-7 shows the expected crashes based on the No-Build Alternative compared to the Build Alternative for the ramp terminals and I-10 EB diverge segment to Avalon Boulevard. These crash frequencies were then used to determine the safety impact of the proposed improvements.

The improvements proposed at the I-10 and WB ramp terminal intersection, will improve intersection operations. However, the quantitative safety analysis shows an increase in PDO crashes for the intersection in the Build Alternative. PDO crashes can be caused by the increase in sideswipe crashes that are due to having dual turn lanes. The turn path delineation used at these locations can reduce sideswipe crashes. A search through existing literature suggests that PDO crashes can be avoided if drivers are alert, careful and reasonably cautious.

At the I-10 EB diverge to Avalon Boulevard, FI crashes increase in the Build Alternative. Travelling on a diverge segment can require a need for drivers to process additional information. The change in speed and direction for these complex circumstances can increase the potential for crashes at the diverge segment. The potential for crashes increases more with the increase in length of speed-change lane (deceleration lane).

Table 5-7: Build Alternative Annual Crash Reduction Calculations

Study Locations	No-Build Expected Crash Frequency		Build Expected Crash Frequency		Reduction in Crashes	
	FI	PDO	FI	PDO	FI	PDO
I-10 EB Diverge to Avalon Boulevard	0.15	0.32	0.80	2.10	-0.66	-1.78
I-10 EB Off Ramp	0.07	0.22	0.09	0.27	-0.02	-0.05
EB Ramp Terminal	5.18	8.13	3.60	7.06	1.58	1.07
WB Ramp Terminal	28.32	5.37	5.58	8.37	22.75	-3.00
Total	**33.74**	**14.10**	**10.22**	**17.94**	**23.52**	**-3.84**

By implementing the proposed modification, a total crash reduction of 23.52 fatal/injury crashes a year.

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 and the Build Alternative is 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 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.

2025 No-Build and Build Alternative

Intersection Analysis

In the Opening Year 2025, the results indicate operational deficiencies at the I-10 WB ramp terminal intersection. The WB left-turn movement will operate at LOS F during the AM and PM peak hours. The operational deficiency at this intersection is associated with the high through traffic along Avalon Boulevard and high left-turn traffic from the I-10 WB off-ramp. However, the I-10 WB ramp terminal's condition improves in the Build Alternative where the left-turn traffic operates at acceptable LOS C. A comparison of the Opening Year 2025 No-Build and Build results is provided in **Table 6-1**.

Table 6-1: Opening Year 2025 No-Build and Build Alternatives Intersections Comparison

Intersections	Approach		2025 No-Build				2025 Build			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Avalon Boulevard at I-10 EB On/Off-Ramps	EB	L	38.2	D	51.2	D	51.6	D	39	D
		R	5.2	A	4.4	A	6.5	A	4.4	A
	NB	T/R	29.9	C	45	D	35.9	D	33.8	C
	SB	L	15.9	B	35	C	53.9	D	38.3	D
		T	10.6	B	20.6	C	16.5	B	12.1	B
Avalon Boulevard at I-10 WB On/Off-Ramps	WB	L	532.4	F	4752.5	F	28.8	C	30.9	C
		R	17.4	C	29.9	D	34.1	C	21.8	C
	NB	L	9.4	A	9.0	A	25.1	C	25.5	C
		T	--	--	--	--	3.2	A	11.0	B
	SB	T	--	--	--	--	16.5	B	16.3	B
		R	--	--		--	38.4	D	1.5	A

The 2025 Build Alternative will improve the delay at both ramp terminals. The greatest improvement in delay and LOS occurs at the Avalon Boulevard and I-10 WB On/Off-ramp intersection. The delay for the WB left-turn movement at the I-10 WB ramp terminal is reduced by 503.6 seconds and 4721.6 seconds during the AM and PM peak hours, respectively.

The 2025 No-Build results indicate long queues for the WB approach at the I-10 WB ramp terminal intersection during the PM peak hours. However, these queues are reduced significantly under the 2025 Build Alternative. In the Build Alternative, the 95th percentile queue lengths do not exceed the ramp terminal intersections' storage lengths.

HCS Analysis

The summary of the LOS and v/c for the 2025 No-Build and 2025 Build Alternatives for the I-10 EB diverge segment are shown in **Table 6-2**. The diverge segment will improve from LOS C and F under the No-Build Alternative to LOS A and B under the Build Alternative in the AM and PM peak hours, respectively.

Table 6-2: LOS and v/c Summary for Build and No-Build Alternative

Locations	MOE	2025 No-Build AM (PM)	2025 Build AM (PM)
I-10 EB Off-Ramp to Avalon Boulevard	LOS	C (F)	A (B)
I-10 EB Off-Ramp to Avalon Boulevard	v/c	0.6 (1.06)	0.31 (0.56)

2045 No-Build and Build Alternative

Intersection Analysis

In the Design Year 2045, operational deficiencies exist within the study area under the No-Build Alternative. The results indicate that during both the AM and PM peak hours, the I-10 EB and the WB ramp terminal intersections will operate at LOS E or worse under the No-Build Alternative. These operational deficiencies at the intersections are associated with high arterial through traffic along Avalon Boulevard and high left-turn traffic, particularly at the I-10 WB off-ramp. However, these conditions improve under the Build Alternative to provide an acceptable LOS for the ramp terminal intersections.

A comparison of the Design Year 2045 No-Build and Build results is provided in **Table 6-3**.

Table 6-3: Design Year 2045 No-Build and Build Alternatives Intersections Comparison

Intersections	Approach		2045 No-Build				2045 Build			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Avalon Boulevard at I-10 EB On/Off-Ramps	EB	L	67.5	E	117.8	F	49.8	D	43.5	D
		R	9.3	B	16.2	B	10.8	B	10.4	B
	NB	T/R	69.8	E	110.4	F	54.6	D	38.3	D
	SB	L	87.3	F	161.7	F	54.3	D	52.0	D
		T	19.5	B	25.2	C	22.6	C	10.7	B
Avalon Boulevard at I-10 WB On/Off-Ramps	WB	L	43166.3	F	49932.6	F	28.4	C	32.2	C
		R	157.0	F	465.1	F	43.7	D	32.7	C
	NB	L	17.5	C	10.7	B	27.4	C	27.6	C
		T	--	--	--	--	6.1	A	14.6	B
	SB	T	--	--	--	--	26.5	C	19.9	C
		R	--	--	--	--	63.9	E	6.7	A

The Build Alternative will improve the delay at both ramp terminals. The biggest improvement in delay and LOS occurs at the Avalon Boulevard and I-10 WB On/Off-ramp intersection. The delay for the WB left-turn movement at the I-10 WB ramp terminal is reduced by 43,137.9 seconds and 49,900.4 seconds during the AM and PM peak hours, respectively.

In the Design Year 2045, the Build Alternative provides a significant reduction in queues compared to the No-Build Alternative. The No-Build queue analysis indicates that the left-turn movement at the WB off-ramp approach will experience longer queues than the storage available. However, for the Build Alternative, the queues are reduced and they will not exceed the storage available.

HCS Analysis

The summary of the LOS and v/c for the No-Build and Build Alternatives for the I-10 EB diverge segment are shown in **Table 6-4**. The diverge segment will improve from LOS C and F under the No-Build Alternative to LOS B and C under the Build Alternative in the AM and PM peak hours, respectively.

Table 6-4: LOS and v/c Summary for Build and No-Build Alternative

Locations	MOE	2045 No-Build AM (PM)	2045 Build AM (PM)
I-10 EB Off-Ramp to Avalon Boulevard	LOS	C (F)	B (C)
I-10 EB Off-Ramp to Avalon Boulevard	v/c	0.85 (1.17)	0.45 (0.61)

Safety Analysis

A quantitative safety analysis was performed at the ramp terminals to determine if the Build Alternative addresses the existing safety concerns. Based on the proposed improvements, a reduction in 23.52 Fatal/Injury crashes is expected.

6.3 Preferred Alternative

The proposed improvements at the ramp terminal intersections and the I-10 EB diverge segment at the I-10/Avalon Boulevard interchange will provide traffic relief and enhance safety within the AOI by reducing delay and queueing on the I-10 EB and WB off-ramps.

The No-Build Alternative evaluation shows that it will not accommodate the travel demand at the interchange. In the Design Year 2045, significant operational deficiencies exist. Almost all movements at the ramp terminal intersections operate at unacceptable LOS in the Design Year 2045 No-Build Alternative, and the I-10 EB diverge segment to Avalon Boulevard operates at LOS F with v/c of 1.17 in the PM peak hour. These operational deficiencies are associated with high arterial volumes at the ramp terminal intersections and insufficient capacity at the I-10 EB off-ramp.

The Build Alternative for this study performs substantially better than the No-Build Alternative for all future years. The proposed interchange improvements will provide additional capacity for the I-10 EB diverge segment and the off-ramp volumes at the ramp terminal intersections and improve operations by installing a signal at the I-10 WB ramp terminal intersection.

The Avalon Boulevard arterial segment will operate more efficiently with the additional turn lanes at the ramp terminal intersections and the new signal control resulting in lower intersection delays.

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 expected to be reduced by 0.919 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 was 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 $3,577,815.60.

7. JUSTIFICATION

The proposed improvements at the Avalon Boulevard 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 Avalon Boulevard 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 IOAR. Responses to each of the two FHWA policy points are provided to show that the proposed improvements at the I-10/Avalon Boulevard 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 in-depth operational and safety analysis conducted for this IOAR confirmed that the proposed improvements to the existing interchange will not have a significant 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 LOS, v/c 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 the individual movements on the WB approach at the I-10 WB ramp terminal intersection will operate at LOS F in both AM and PM peak hours. The I-10 EB ramp terminal intersection will operate at LOS E or worse in the AM and PM peak hours, and the I-10 EB diverge segment to Avalon Boulevard will operate at LOS F with v/c of 1.17 in the PM peak hour. These operational deficiencies are associated with high arterial volume at the ramp terminal intersection and insufficient capacity of the I-10 EB off-ramp. At the I-10 WB ramp terminal intersection, queues are anticipated to be longer than the available storage in the WB direction in Design Year 2045 under the No-Build Alternative.

The Build Alternative for this study performs substantially better than the No-Build Alternative for all future years. When compared to the 2045 No-Build Alternative, the 2045 Build Alternative provide a reduction in delay at both study intersections. The most significant reduction in delay and improvement in LOS occurs at the I-10 WB On/Off-ramp and Avalon Boulevard intersection. The delay for the WB left-turn movement at the I-10 WB ramp terminal is reduced by 43,137.9 seconds and 49,900.4 seconds during the AM and PM peak hours, respectively. Also, the LOS at the I-10 EB off-ramp to Avalon Boulevard changes from F to D in the PM peak hour. The queues observed in the 2045 No-Build Alternative are reduced significantly, allowing the available storage to accommodate the queues at the I-10 WB ramp terminal intersection.

The safety analysis performed for this study indicated a total of 68 crashes occurred within the project area during the five study years (2014-2018). And a total of 64 crashes occurred at the I-10 ramp terminal intersections. The predominant crash types that occurred within the study area were rear-end and angle collisions. Crashes of these types are typically attributed to congestion along the arterials and interchange ramps.

The proposed improvements under the Build Alternative are anticipated to enhance safety within the study area. A quantitative safety analysis was performed for the study area where improvements are to be implemented. Based on the safety analysis, it is predicted that a reduction in 23.52 Fatal/Injury crashes 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 improved 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 and Avalon Boulevard interchange 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 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 Avalon Boulevard 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 Avalon Boulevard interchange planned in the five year program.

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	Build Alternative Signing and Pavement Marking Concept Plan
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