# INTERCHANGE OPERATIONAL ANALYSIS REPORT (IOAR)


## I-10 at Ward Basin Road (C.R. 89)

## 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 Ward Basin Road (C.R. 89)

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

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

# Interchange Operational Analysis Report (IOAR)

## For I-10 at Ward Basin Road Interchange

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

## Florida Department of Transportation

Determination of Safety, Operational and Engineering Acceptability

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

| | | |
|---|---|---|
| Requestor | DocuSigned by: Iris Waters F7595C693CCA40D... | 3/24/2021 \| 10:48 AM EDT |
| | Iris Waters, P.E<br>District Three Project Development Manager | Date |
| Interchange Review Coordinator | DocuSigned by: Starsky Harrell E3F2EA2D0F5440D... | 3/25/2021 \| 7:22 AM EDT |
| | Starsky Harrell<br>District Three Interchange Review Coordinator | Date |
| Systems Management Administrator | DocuSigned by: Jenna Bowman 4AD03E6A337F4C1... | 4/16/2021 \| 10:16 AM EDT |
| | Jenna Bowman, PE<br>Systems Implementation Office – Central Office | Date |
| State Chief Engineer | DocuSigned by: 022E6284290B41A... | 4/16/2021 \| 10:17 AM EDT |
| | Will Watts, P.E.<br>Central Office | 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 Ward Basin Road (C.R. 89) 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 F7595C693CCA40D... Date: 3/24/2021 | 10:48 AM EDT

Iris Waters, P.E.

IRC DocuSigned by: Starsky Harrell E3F2EA2D0F5440D... Date: 3/25/2021 | 7:22 AM EDT

Starsky Harrell

**PROFESSIONAL ENGINEER CERTIFICATE**

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

**PROJECT:** I-10 at Ward Basin Road (C.R. 89) Interchange Operational Analysis Report (IOAR)

**LOCATION**: Santa Rosa County, FL

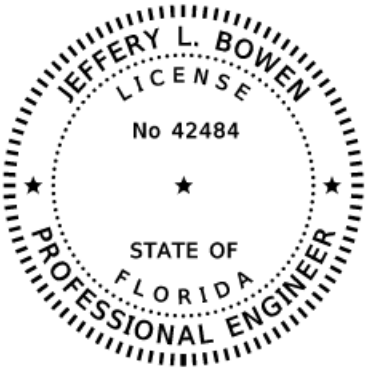
**FINANCIAL PROJECT ID:** 413062-4-22-01 and 413062-5-22-01

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: 2021.03.19 10:34:33 -04'00'




Date: _____

# EXECUTIVE SUMMARY

The purpose of this IOAR is to provide the required documentation for obtaining approval for improvements at the Interstate 10 (I-10)/Ward Basin Road (C.R. 89) interchange in Santa Rosa County. The current interchange is a four-quadrant partial cloverleaf with stop-controlled operation at both ramp terminal intersections. The primary need of the project is to improve future traffic operations at the ramp terminal intersections, 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 latest version of the Northwest Florida Regional Planning Model (NWFRPM) with base year 2010 and horizon year 2040. The analysis years for the study include Existing Year 2019, Opening Year 2025 and Design Year 2045. The operational analysis for this study was performed using Synchro 10. The delay and level of service (LOS) for the unsignalized intersection analyses were reported based on Highway Capacity Manual (HCM 6th Edition) methodology. The delay and LOS for the signalized intersection analyses were reported based on Synchro 10 methodology.

If no improvements are made, traffic operations 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. 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/Ward Basin Road interchange ramp terminal intersections.

As part of this study, an existing crash analysis was performed. The data obtained from the Signal 4 analytics and FDOT State Safety Office Map-Based Query Tool (SSOGis) shows 4 crashes which

resulted in 6 injuries for the five-year period (2013-2017). No fatal crashes occurred during the five-year period. The crash rate at the I-10 WB ramp terminal is 0.401 crashes per million entering vehicles, which is higher than the average statewide crash rate for similar facilities. Analysis of the crashes revealed the following notable characteristics:

- Rollover type crashes were the predominant crash type (3 crashes), followed by sideswipe type crashes (1 crash).
- Rollover crashes were concentrated at the I-10 WB ramp terminal intersection.
- High speed vehicles along the curved ramp is a contributing factor of rollover crashes at the I-10 WB on-ramp.

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

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

## E.1 Compliance with FHWA General Requirements

The following requirements serve as the primary decision criteria used in the approval of interchange operational analysis projects. Responses to each of the two FHWA policy points are provided to show that the proposed improvements at the I-10/Ward Basin Road 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 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 delays, 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 deficiencies exist. The left-turn movement on the minor approach at WB ramp terminal intersections will operate at LOS E and F in the AM and PM peak hours, respectively. For the EB ramp terminal intersection the left-turn movement on the EB approach will operate at LOS D in the AM and PM peak hours. These deficiencies are attributed to the high through traffic volume along Ward Basin Road and high left-turn traffic volume exiting the I-10 mainline. The EB right-turn movements at both the ramp terminals will experience queues that are longer than the available storage.

The Build Alternative for this study performs substantially better than the No-Build Alternative for all future years. When compared to the No-Build Alternative, the proposed improvements provide a reduction in delay at both study intersections. The most significant reduction in delay and improvement in LOS occurs at the I-10 WB On/Off-ramp intersection. The delay for the left-turn movement at the I-10 WB ramp terminal intersection is reduced by 1.4 seconds and 31.0 seconds during the AM and PM peak hours, respectively. Also, the LOS for the left-turn movement at the I-10 WB ramp terminal intersection changes from F to D in the PM peak hour.

The safety analysis performed for this study indicated that a total of four crashes occurred within the project area during the five study years (2013-2017). Three of those crashes that occurred at the I-10 WB on-ramp are rollover crashes. Crashes of these types are typically attributed to reckless driving, where the car is at high speed and the driver fails to control the vehicle.

The proposed improvements under the Build Alternative are anticipated to enhance safety within the project 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 total annual crash reduction of 0.227 crashes per year will occur at the ramp terminal intersections.

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

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

### E.1.2 FHWA Policy Point 2

*The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access, such as managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)). In rare instances where all basic movements are not provided by the*

*proposed design, the report should include a full-interchange option with a comparison of the operational and safety analyses to the partial-interchange option. The report should also include the mitigation proposed to compensate for the missing movements, including wayfinding signage, impacts on local intersections, mitigation of driver expectation leading to wrong-way movements on ramps, etc. The report should describe whether future provision of a full interchange is precluded by the proposed design.*

The proposed improvements will be applied to the I-10 and Ward Basin Road 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 of I-10. These improvements are designed to meet current standards for federal-aid projects on the interstate system and conform to American Association of State Highway and Transportation Officials (AASHTO) and the FDOT Design Manual.

# Table of Contents

# List of Tables

## List of Figures

# List of Appendices

# 1. PROJECT OVERVIEW

## 1.1 Introduction

This Interchange Operational Analysis Report (IOAR) has been prepared to evaluate the impacts of signalizing the Interstate 10 (I-10) Eastbound (EB) and Westbound (WB) ramp terminal intersections at Ward Basin Road (C.R. 89). The Florida Department of Transportation (FDOT) District 3 is the Requestor seeking approval of this IOAR that presents the necessary documentation for such improvements.

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

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

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

The IOAR is evaluating the proposed improvements to the I-10 EB and WB ramp terminal intersections at Ward Basin Road in Santa Rosa County. This IOAR has been developed in accordance with 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.

## 1.2 Purpose and Need for Project

The main purpose of this IOAR is to document the safety, operational and engineering acceptability of signalizing the I-10 EB and WB ramp terminal intersections at Ward Basin Road. In this report, both ramp terminal intersections will be analyzed to evaluate the traffic operations at the I-10/Ward Basin Road interchange.

As part of this study, the I-10 EB and WB ramp terminal intersections were studied for operational and safety improvements. The results from the existing operational analysis at the ramp terminal intersections revealed no operational deficiencies at either of the ramp terminal intersections. However, as traffic increases within the vicinity of the interchange, operational deficiencies are expected at the minor movements of the ramp terminal intersections. If no improvement is made by 2045, the future analysis results revealed that the left turn traffic at the I-10 WB ramp terminal intersection will operate at level of service (LOS) F in the PM peak hour. Signalizing the ramp terminal intersections will meter the EB and WB traffic volumes, mitigate the simultaneous release of traffic volume onto Ward Basin Road, and create a platooning effect through the ramp terminals signal controls.

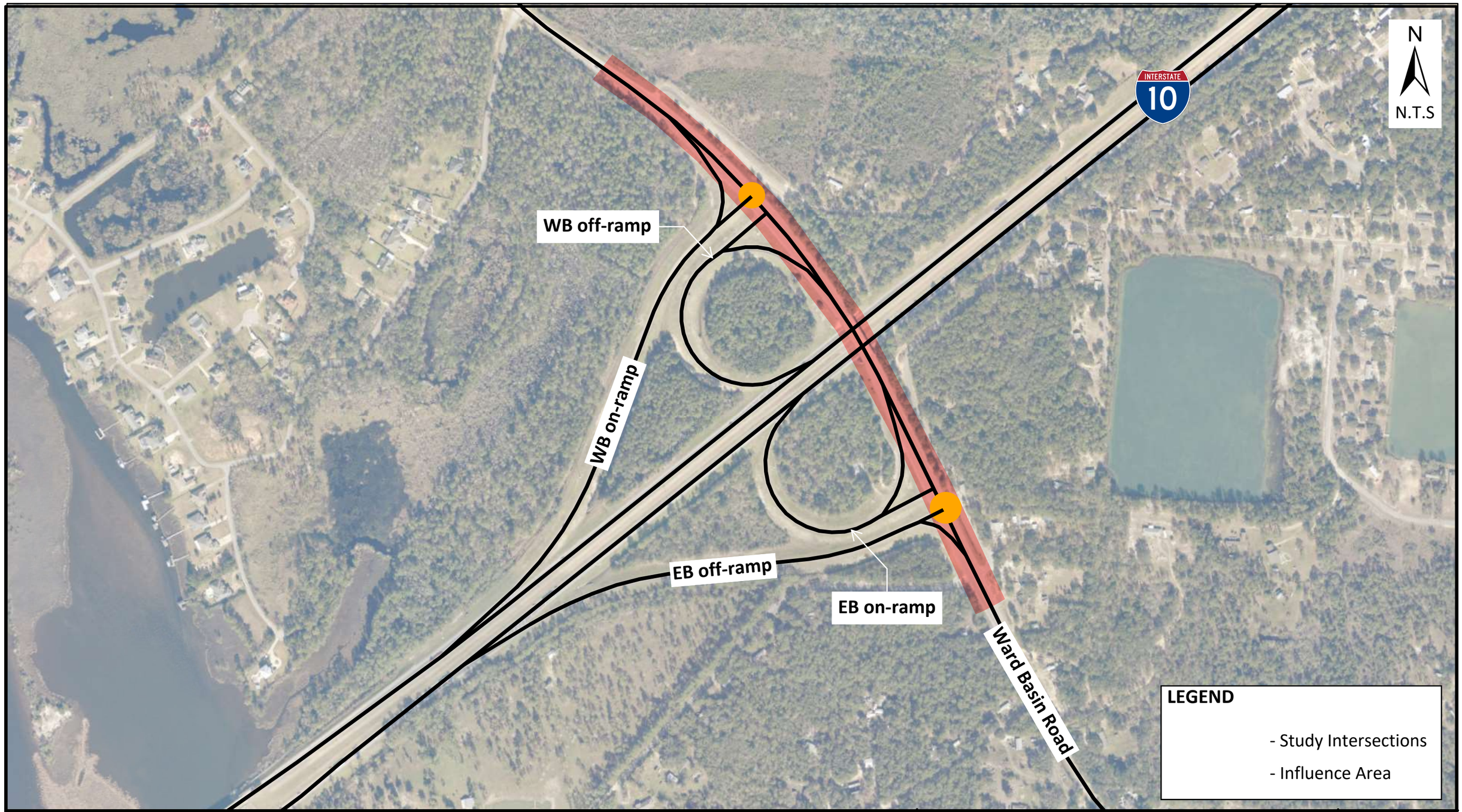
The need for this project derives from the PTAR. As part of this study, the existing and future traffic volumes along Ward Basin Road were studied and utilized in the analysis of existing and future traffic conditions. Recent traffic projections completed in the region identified increased traffic congestion and potential deficiencies in the vicinity of the interchange. Currently, the daily traffic volumes on Ward Basin Road range between 3,800 and 4,300 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 4,900 to 5,600 vehicles per day. With this increase in traffic along Ward Basin Road, the operating conditions at the intersections are expected to deteriorate.

A review of the crash data provided in **Section 3.8** shows a total of 4 crashes for the five-year period (2013-2017), of which 3 were injury crashes. No fatal crashes occurred during the five-year period. The crash rate at the I-10 WB ramp terminal intersection is 0.401 crashes per million entering vehicles, which is higher than the average statewide crash rate for similar facilities. Analysis of the crashes revealed the following notable characteristics:

- Rollover type crashes were the predominant crash type (3 crashes), followed by sideswipe crash types (1 crash).
- Rollover crashes were concentrated at the I-10 WB ramp terminal intersection.
- High speed vehicles along the curved ramp is a contributing factor of rollover crashes at I-10 WB on-ramp.

## 1.3 Project Location

The I-10 at Ward Basin Road interchange is located in Santa Rosa County at Milepost 11.86, Section number 58002000. The nearest interchanges along I-10 are the Garcon Point Road interchange located 2.47 miles to the west and the S.R. 87 interchange located 2.86 miles to the east. The project location and the study area are shown in **Figure 1-1**.




| | | | |
|---|---|---|---|
| **Florida Department of Transportation**<br>District Three<br>Chipley, Florida | **I-10 at Ward Basin Road**<br>Project Development & Environment Study<br>FPID No.: 413062-4-22-01, 413062-5-22-01 | Project Location and Study Area Map | Figure<br>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 Ward Basin Road located in Santa Rosa County. Along Ward Basin Road, the adjacent intersections of Overpass Road and Peterson Point Road are approximately 650 feet to the north and 350 feet south of the ramp terminal intersections, respectively. 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.

Ward Basin Road is a north-south highway running from Fish Camp Road to U.S. 90. Within the study area, Ward Basin Road is a four-lane divided Major Collector Urban facility with a posted speed limit of 45 miles per hour (mph). Ward Basin Road serves residential communities.

The AOI includes the two ramp terminal intersections listed below.

- I-10 WB at Ward Basin Road Interchange Ramps (Unsignalized)
- I-10 EB at Ward Basin Road Interchange Ramps (Unsignalized)

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

## 2.2. Analysis Years

The analysis years for the project are:

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

## 2.3. Data Collection and Sources

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

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

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

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

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

- The $T_{Daily}$ 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**.

Table 2-1: Summary of Traffic Factors

| Roadway | K | D | $T_{Daily}$ | DHT |
|---|---|---|---|---|
| **I-10 from Garcon Point Road to Ward Basin Road** | 9.0% | 54.1% | 21.1% | 10.55% |
| **I-10 from Ward Basin Road to S.R. 87** | 9.0% | 54.1% | 22.2% | 11.10% |
| **Ward Basin Road** | 9.0% | 55.4% | 7.9% | 3.95% |

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

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

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

## 2.4. Travel Demand Forecasting

The development of design traffic for this IOAR followed the procedure outlined in the 2019 Project Traffic Forecasting Handbook. The travel demand forecasting methodology utilized was consistent with that provided in the PTAR. A growth rate was developed based on the growth from the latest version of the NWFRPM Model, historical trends analysis, the population projection data for Santa Rosa County published by the Bureau of Economic and Business Research (BEBR) at the University of Florida, Woods & Poole employment forecasts, and the historical trends analysis. The future traffic volumes were obtained by applying the growth rate to the existing traffic counts collected in the field. Growth rate development and future traffic development are further discussed in **Section 4** of this IOAR.

## 2.5. Safety Analysis Procedure

Crash data was obtained from Signal Four Analytics and FDOT State Safety Office Map-Based Query Tool (SSOGis) for the most recent five years available (2013-2017). The data collected includes the number of crashes, type of crashes and location of crashes, crash severity, weather conditions, road surface conditions and date/time information. **Section 3.8** documents the crash rates and compares the rates to the statewide averages for similar facilities. **Section 3.8** also provides tables and figures summarizing the crash analysis results. The safety analysis for the Build Alternative was performed by applying the appropriate Crash Modification Factor (CMF) to the existing observed crash frequency.

## 2.6. Operational Analysis Procedures

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

Intersection analyses have been conducted for the study intersections using Synchro 10. The delay and LOS for the unsignalized intersection analyses were reported based on 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 the signalized and unsignalized intersections. The analyses were performed for the following conditions:

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

## 2.7. LOS Target

FDOT Topic No. 000-525-006 provides LOS targets for the State Highway System (SHS). The term LOS is defined as the system of six designated ranges from “A” (best) to “F” (worst) used to evaluate roadway facility performance. The FDOT minimum acceptable operating LOS target was used for this IOAR. The I-10 at Ward Basin Road interchange is located in an urbanized area. The LOS target for the study intersections analyzed in this IOAR is LOS D.

# 3. EXISTING CONDITIONS

The following section provides a discussion and evaluation of the existing conditions at the subject interchange of I-10 at Ward Basin Road.

## 3.1 Geometry

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

The Ward Basin Road at I-10 EB On/Off ramps is a three-leg unsignalized intersection. The intersection has the following configuration.

- EB off-ramp at Ward Basin Road: one left turn lane and one channelized right-turn lane
- Ward Basin Road NB movement: two through lanes and one left-turn lane
- Ward Basin Road SB movement: two through lanes and one channelized right-turn lane

The Ward Basin Road at I-10 WB On/Off ramps is a three-leg unsignalized intersection. The intersection has the following configuration.

- WB off-ramp at Ward Basin Road: one left turn lane and one channelized right-turn lane
- Ward Basin Road NB movement: two through lanes and one left-turn lane
- Ward Basin Road SB movement: two through lanes and one channelized right-turn lane

**Figure 3-1** shows the existing lane configuration of the study area.

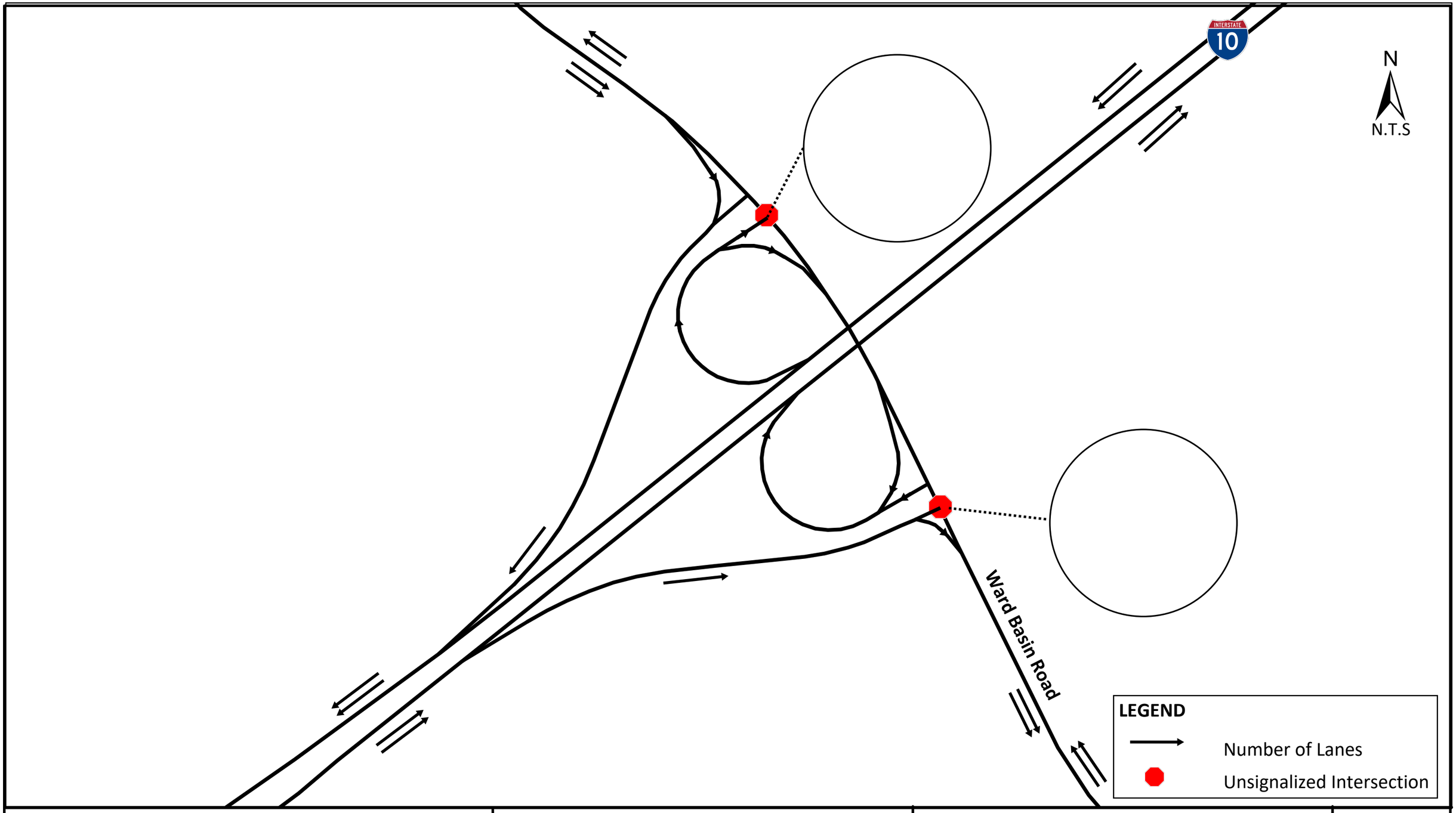
## 3.2 Functional Classification

FDOT Functional Classification:

- Ward Basin Road is classified as Urban Major Collector
- I-10 is classified as Urban Principal Arterial-Interstate

## 3.3 Posted Speed Limits

- Ward Basin Road has a posted speed limit of 45 mph
- I-10 East and West of U.S. 90 has a posted speed limit of 70 mph




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

## 3.4 Typical Section

The I-10 typical section at Ward Basin Road consists of a four-lane divided facility providing two general use lanes in each direction. The median within the section is approximately 65 feet. Ward Basin Road crosses over I-10. The Ward Basin Road typical section within the interchange study limits is a four-lane divided roadway with a raised concrete separator dividing the northbound and southbound travel lanes.

## 3.5 Interchange Layout

The study interchange is a two-quadrant partial cloverleaf with all ramps developed on one side of the crossroad (Ward Basin Road). All four ramps at the interchange are single lane ramps. Both ramp terminals at the study interchange are currently unsignalized. An aerial photograph of the existing interchange layout is shown in **Figure 1-1**.

## 3.6 Existing Traffic Volume

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

## 3.7 Existing 2019 Traffic Operational Performance

A detailed operational analysis for Existing Year 2019 was performed at the ramp terminal intersections. Documentation of the existing year analysis is provided in **Appendix B**.

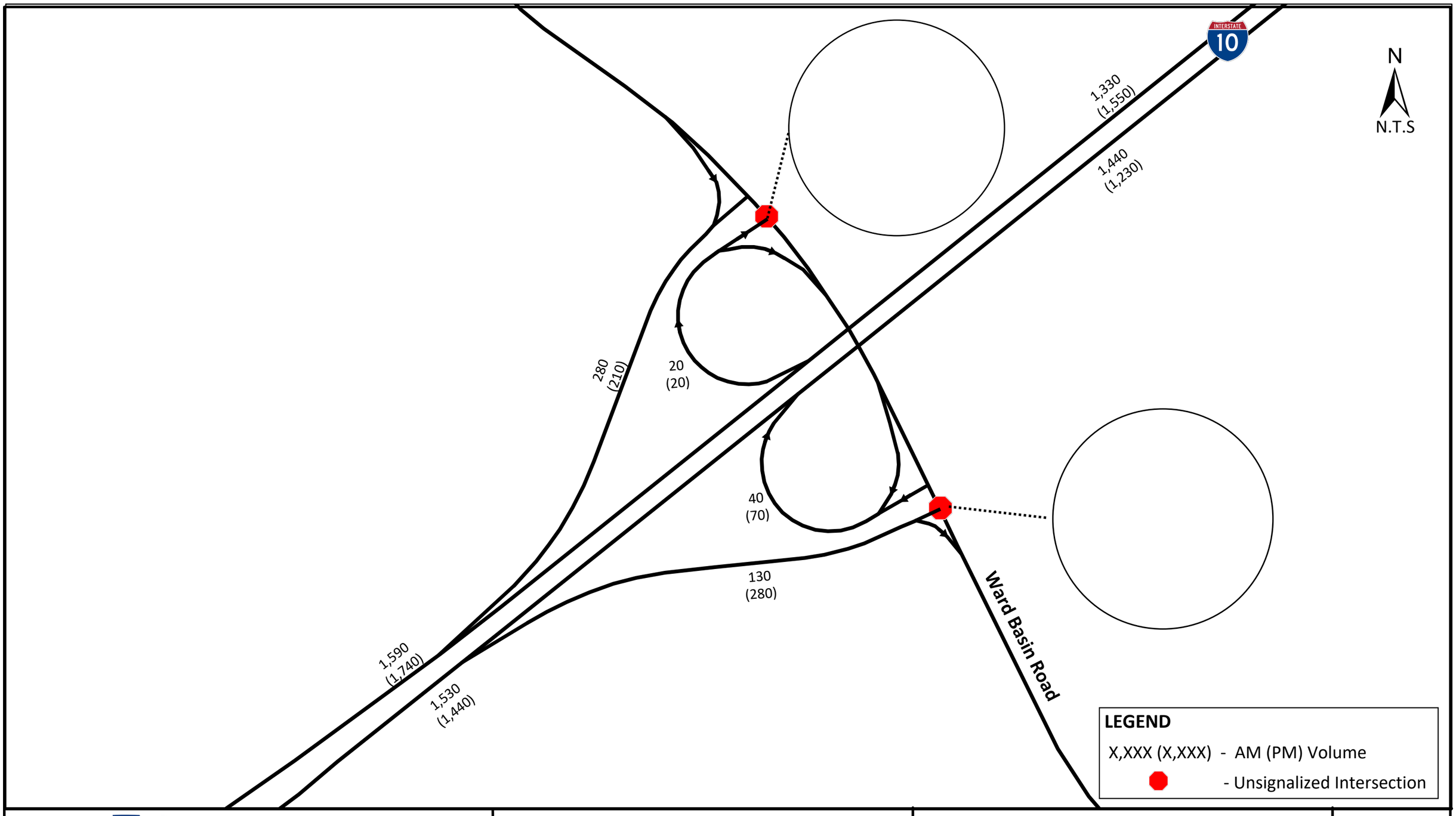
**Intersection Analysis**

The Existing Year 2019 intersection analysis results are summarized in Table 3-1. In Existing Year 2019, all the individual movements on the minor approaches at the ramp terminal intersections operate at LOS B or better in the AM and PM peak hours.

Table 3-1: Existing Year 2019 Intersection Analysis Summary

| Intersection | Intersection Approach | | | | Overall Intersection | |
|---|---|---|---|---|---|---|
| | Approach | Movement | Delay | LOS | Delay | LOS |
| | | | AM (PM) | AM (PM) | AM (PM) | AM (PM) |
| **Ward Basin Road at I-10 EB On/Off Ramps** | Eastbound | Left | 10.3 (12.3) | B (B) | 3.1 (4.3) | A (A) |
| | | Right | 8.9 (9.7) | A (A) | | |
| | Northbound | Left | 7.4 (7.6) | A (A) | | |
| **Ward Basin Road at I-10 WB On/Off Ramps** | Eastbound | Left | 13.0 (15.1) | B (C) | 2.6 (2.3) | A (A) |
| | | Right | 8.7 (9.0) | A (A) | | |
| | Northbound | Left | 7.7 (7.9) | A (A) | | |

*Delay reported for worst-case approach only.




| | | | |
|---|---|---|---|
| **Florida Department of Transportation**<br>District Three<br>Chipley, Florida | **I-10 at Ward Basin Road**<br>Project Development & Environment Study<br>FPID No.: 413062-4-22-01, 413062-5-22-01 | Title:<br>Existing Year 2019 Peak Hour Volumes | Figure<br>3-2 |

**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 lengths are shorter than the existing available storage lengths for all individual movements at both intersections. **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 Percentile Queue Length Summary – Existing Year 2019

| Intersection | Time Period | 95th Percentile Queue Length (feet) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Eastbound | | Northbound | | Southbound | |
| | | Left | Right | Left | Through | Through | Right |
| Ward Basin Road at I-10 EB On/Off-Ramps | AM Peak | 7 | 7 | 1 | 0 | 0 | 0 |
| | PM Peak | 18 | 18 | 1 | 0 | 0 | 0 |
| | Existing Storage (feet) | -- | 100 | 300 | | | 250 |
| Ward Basin Road at I-10 WB On/Off-Ramps | AM Peak | 2 | 2 | 8 | 0 | 0 | 0 |
| | PM Peak | 2 | 2 | 9 | 0 | 0 | 0 |
| | Existing Storage (feet) | -- | 200 | 100 | | | 500 |

Storage length noted above is turn pocket length for left/right turn movements.

## 3.8 Safety Review

Vehicular crash data along Ward Basin Road and at the ramp terminal intersections were obtained from the Signal Four Analytics and FDOT SSOGis. SSOGis is a database maintained by FDOT for crashes reported along state highway facilities. The Signal Four Analytics is a database maintained by the GeoPlan Center at UF (University of Florida) for crashes reported along streets and local roads. The databases provide information on various characteristics associated with each crash, including collision type, severity, weather conditions, road surface conditions and date/time information. The crash data was collected for the most recent five years available (2013-2017). The crashes were analyzed to assess safety conditions along Ward Basin Road and at the I-10 EB and WB ramp terminal intersections within the project limits. The existing crash analysis performed for the IOAR is consistent with the methods outlined in the Highway Safety Manual 1st Edition (HSM). In this section, the existing crash analysis was broken down between

the I-10 EB ramp terminal intersection, the segment between the I-10 EB and I-10 WB ramp terminal intersections, and the I-10 WB ramp terminal intersection. At the I-10 EB ramp terminal intersection, the actual crash rate was not calculated since no crashes occurred at the intersection over the five years. The raw crash data is provided in **Appendix C**.

The existing crashes were first segmented based on arterial and ramp segmentation outlined in Chapter 12 and 19 of the HSM. After segmenting the study area, the crash frequency and crash rate were calculated. The 'Average Crash Rate Method' of crash analysis, based on AADT and number of crashes occurring, was used for calculating the crash rate for the intersections. The crash rate for the study intersections from the year 2013 to 2017 was compared with the statewide average crash rate for the same type of facility.

**I-10 WB Ramp Terminal Intersection**

The crash analysis results revealed that there was a total of three crashes at the intersection during the five study years (2013-2017). Of these three crashes, rollover crashes were the most common types of crashes accounting for 75% (3 crashes) of the total crashes followed by front to rear crashes accounting for 25% (1 crash) of the total crashes. There were six injuries and no fatalities. One rollover crash occurred at the I-10 WB on-ramp. The vehicle traveling southbound on Ward Basin Road failed to negotiate the WB on-ramp curve to I-10 on a wet surface.

The actual crash rate at the I-10 WB ramp terminal intersection is 0.401 crashes per million entering vehicles, which is higher than the average statewide crash rate for similar facilities. However, this location is not among the high crash locations classified in the most recent FDOT High-Crash List (2009-2013).

**Ward Basin Road Segment Between Ramp Terminals**

The crash analysis results revealed that there was only one crash along the segment during the five study years (2013-2017). The crash was one side swipe type crash. The average crash rate for the segment is 2.174 crashes per million vehicles-miles travelled which is higher than the average statewide crash rate for similar facilities. However, this location is not among the high

crash locations classified in the most recent FDOT High-Crash List (2009-2013). Summaries of the crash analysis are provided in **Table 3-3**.

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

| Study Locations | Number of Crashes | Daily Entering (AADT) | Annual Crash Frequency (crashes/year) | Calculated Cash Rate | Statewide Average Crash Rate | Total # of Injuries | Total # of Fatalities |
|---|---|---|---|---|---|---|---|
| **Ward Basin Road Segment Between Ramp Terminals** | 1 | 2,100 | 0.2 | 2.174 | 0.297 | 0 | 0 |
| **I-10 WB at Ward Basin Road** | 3 | 4,100 | 0.6 | 0.401 | 1.5 | 6 | 0 |
| **I-10 EB at Ward Basin Road** | 0 | 4,226 | - | - | - | - | - |

# 4. FUTURE NO-BUILD CONDITIONS

This section documents the future conditions within the I-10 at Ward Basin Road 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 Ward Basin Road respectively. An annual growth rate is rate has been calculated for the I-10 segments and Ward Basin Road 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 Ward Basin | 30,562 | 40,302 | 0.9% |
| | EB Off-Ramp at Ward Basin | 3,018 | 5,043 | 1.7% |
| | WB On-Ramp at Ward Basin | 3,060 | 5,040 | 1.7% |
| | Between Ward Basin Ramps | 24,796 | 30,740 | 0.7% |
| | EB On-Ramp at Ward Basin | 225 | 428 | 2.2% |
| | WB Off-Ramp at Ward Basin | 224 | 448 | 2.3% |
| | E of Ward Basin | 25,223 | 31,570 | 0.8% |
| Ward Basin Road | Ward Basin (S. of Peterson Point) | 4,756 | 6,830 | 1.2% |
| | Ward Basin (Between I-10 EB Ramps and Peterson | 4,756 | 6,830 | 1.2% |
| | Ward Basin (Between I-10 EB and WB Ramps) | 4,735 | 8,050 | 1.8% |
| | Ward Basin (Between I-10 WB Ramps and San Ramon) | 4,758 | 9,289 | 2.3% |
| | Ward Basin (N. of San Ramon) | 3,301 | 6,759 | 2.4% |

### 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 Ward Basin Road. According to the results for the I-10 and Ward Basin Road 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 Ward Basin | 582008 | 45,000 | 50.05% | 1.40% |
| EB Off-Ramp at Ward Basin | 582636 | 5,500 | 98.70% | 8.57% |
| WB On-Ramp at Ward Basin | 582635 | 5,500 | 96.37% | 7.14% |
| EB On-Ramp at Ward Basin | 582638 | 400 | 39.03% | 7.14% |
| WB Off-Ramp at Ward Basin | 582637 | 500 | 46.61% | 0.00% |
| E of Ward Basin | 582005 | 35,300 | 22.54% | 0.79% |
| **Ward Basin** | | | | |
| Ward Basin (S. of Peterson Point) | 580282 | 7,100 | 91.08% | 3.31% |
| Ward Basin (N. of San Ramon) | 580281 | 7,100 | 88.88% | 2.24% |

### 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 | 0.2% |
| | | Medium | 214,700 | 226,900 | 237,500 | 247,000 | 1.2% |
| | | High | 241,200 | 263,800 | 284,900 | 305,900 | 2.1% |

### 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% |

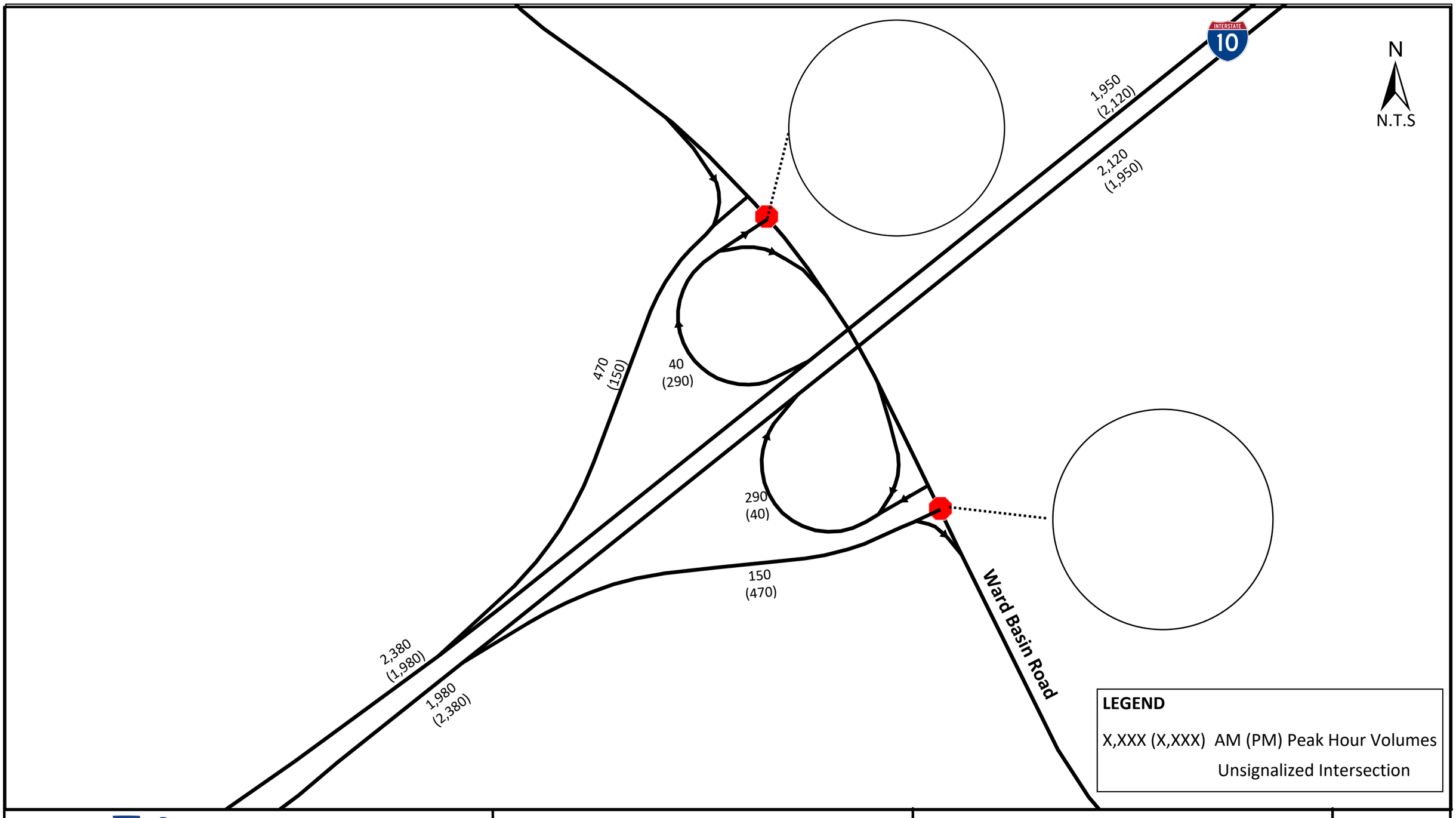
### 4.1.6 Travel Demand Model

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.

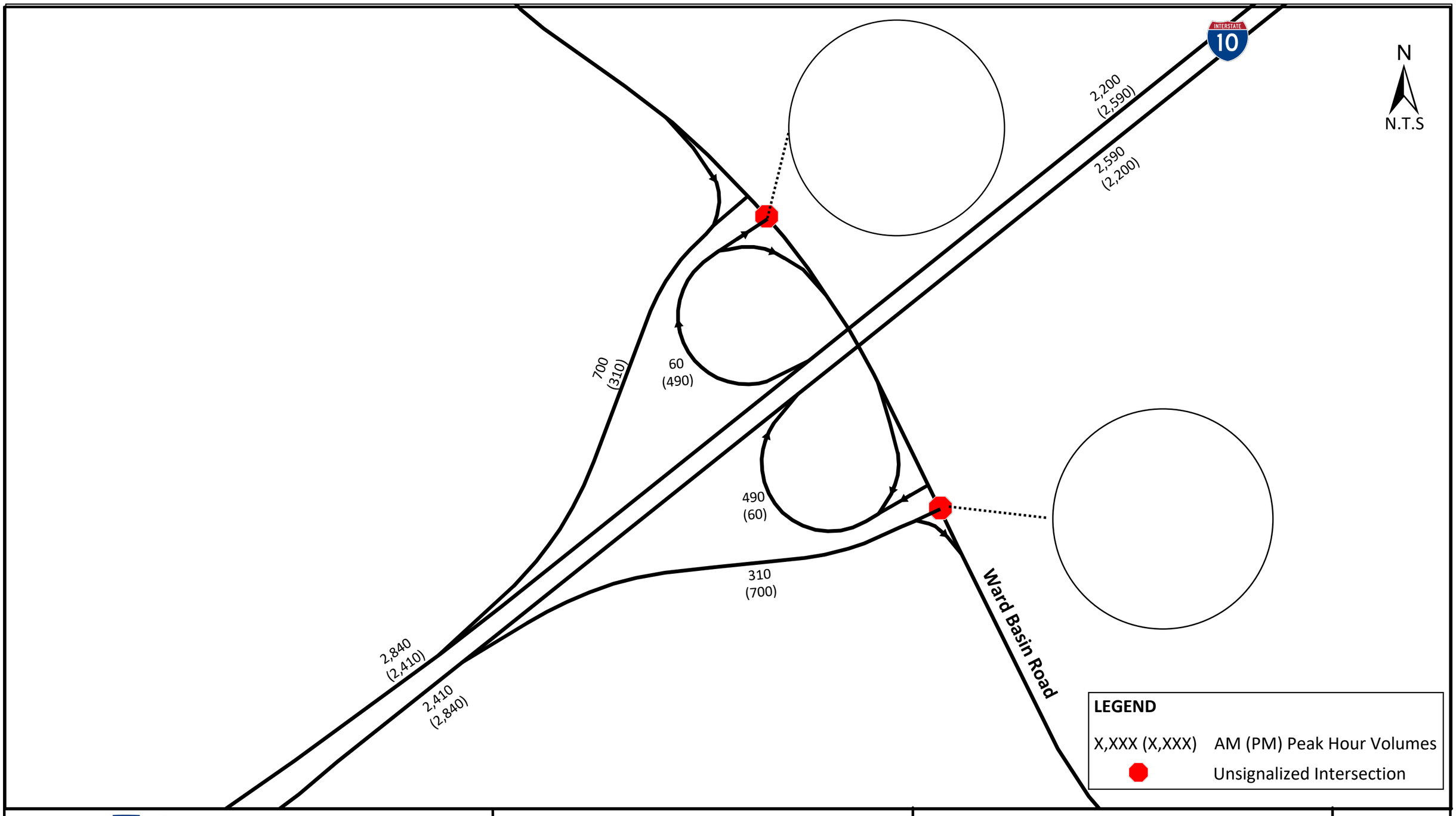
## 4.2 Future Traffic Development

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 one 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**<br>District Three<br>Chipley, Florida | **I-10 at Ward Basin Road**<br>Project Development & Environment Study<br>FPID No.: 413062-4-22-01, 413062-5-22-01 | Title:<br>Opening Year 2025 No-Build Peak Hour Volumes | Figure<br>4-1 |




| | | | |
|---|---|---|---|
| **Florida Department of Transportation**<br>District Three<br>Chipley, Florida | **I-10 at Ward Basin Road**<br>Project Development & Environment Study<br>FPID No.: 413062-4-22-01, 413062-5-22-01 | Title:<br>Design Year 2045 No-Build Peak Hour Volumes | Figure<br>4-2 |

## 4.3 Future No-Build Operational Analysis

This section discusses the future No-Build operational analysis within the study area. SYNCHRO 10 software was used to perform the intersection analysis. The analysis was performed for the AM and PM peak hours. **Figure 4-1** and **Figure 4-2** illustrate the peak hour volumes utilized for the Opening Year 2025 and Design Year 2045 No-Build Alternative operational analysis. The study intersections were analyzed as stop controlled under the No-Build condition. Documentation of the No-Build Alternative analyses is provided in **Appendix D**.

### 4.3.1 Opening Year 2025 No-Build Analysis

**Intersection Analysis**

The Opening Year 2025 No-Build intersection analysis results are summarized in **Table 4-5**. In the Opening Year 2025, all the individual movements on the minor approaches at the ramp terminal intersections will operate at LOS C or better in the AM and PM peak hours.

Table 4-5: Opening Year 2025 No-Build Intersection Analysis Summary

| Intersection | Intersection Approach | | | |
|---|---|---|---|---|
| | Approach | Movement | Delay* | LOS |
| | | | AM (PM) | AM (PM) |
| **Ward Basin Road at I-10 EB On/Off Ramps** | Eastbound | Left | 16.2 (15.1) | C (C) |
| | | Right | 9.2 (10.3) | A (B) |
| | Northbound | Left | 7.8 (7.7) | A (A) |
| **Ward Basin Road at I-10 WB On/Off Ramps** | Eastbound | Left | 21.8 (15.7) | C (C) |
| | | Right | 9.3 (9.2) | A (A) |
| | Northbound | Left | 8.5 (7.5) | 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 lengths are shorter than the existing available storage lengths for all movements at both intersections. **Table 4-6** 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 4-6: 95th Percentile Queue Length Summary Opening Year 2025 No-Build Alternative

| Intersection | Time Period | 95th Percentile Queue Length (feet) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Eastbound | | Northbound | | Southbound | |
| | | Left | Right | Left | Through | Through | Right |
| Ward Basin Road at I-10 EB On/Off-Ramps | AM Peak | 17 | 17 | 8 | 0 | 0 | 0 |
| | PM Peak | 53 | 53 | 1 | 0 | 0 | 0 |
| | Existing Storage (feet) | -- | 100 | 300 | | | 250 |
| Ward Basin Road at I-10 WB On/Off-Ramps | AM Peak | 7 | 7 | 18 | 0 | 0 | 0 |
| | PM Peak | 37 | 37 | 4 | 0 | 0 | 0 |
| | Existing Storage (feet) | -- | 200 | 100 | | | 500 |

Storage length noted above is turn pocket length for left/right turn movements.

### 4.3.2 Design Year 2045 No-Build Analysis

**Intersection Analysis**

The Design Year 2045 No-Build intersection analysis results are summarized in **Table 4-7**. In Design Year 2045, the left-turn movement at the I-10 EB ramp terminal will operate at LOS D in the AM and PM peak hours. At the I-10 WB ramp terminal intersection, the left-turn movement will operate at LOS E in the AM peak hour and LOS F PM peak hour.

Table 4-7: Design Year 2045 No-Build Intersection Analysis Summary

| Intersection | Intersection Approach | | | |
|---|---|---|---|---|
| | Approach | Movement | Delay* | LOS |
| | | | AM (PM) | AM (PM) |
| Ward Basin Road at I-10 EB On/Off Ramps | Eastbound | Left | 29.3 (34.3) | D (D) |
| | | Right | 9.8 (11.1) | A (B) |
| | Northbound | Left | 8.0 (7.7) | A (A) |
| Ward Basin Road at I-10 WB On/Off Ramps | Eastbound | Left | 43.3 (76.2) | E (F) |
| | | Right | 10.0 (9.3) | B (A) |
| | Northbound | Left | 9.6 (7.6) | A (A) |

*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 lengths in feet exceed the existing available storage lengths at the following locations:

- I-10 EB right-turn at I-10 EB ramp terminal intersection (PM peak hour)
- I-10 EB right-turn at I-10 WB ramp terminal intersection (PM peak hour)

**Table 4-8** 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 4-8: 95th Percentile Queue Length Summary Design Year 2045 No-Build Alternative

| Intersection | Time Period | 95th Percentile Queue Length (feet) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Eastbound | | Northbound | | Southbound | |
| | | Left | Right | Left | Through | Through | Right |
| Ward Basin Road at I-10 EB On/Off-Ramps | AM Peak | 71 | 71 | 13 | 0 | 0 | 0 |
| | PM Peak | 263 | 263 | 2 | 0 | 0 | 0 |
| | Existing Storage (feet) | -- | 100 | 300 | | | 250 |
| Ward Basin Road at I-10 WB On/Off-Ramps | AM Peak | 25 | 25 | 30 | 0 | 0 | 0 |
| | PM Peak | 316 | 316 | 10 | 0 | 0 | 0 |
| | Existing Storage (feet) | -- | 200 | 100 | | | 500 |

Storage length noted above is turn pocket length for left/right turn movements.

# 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:

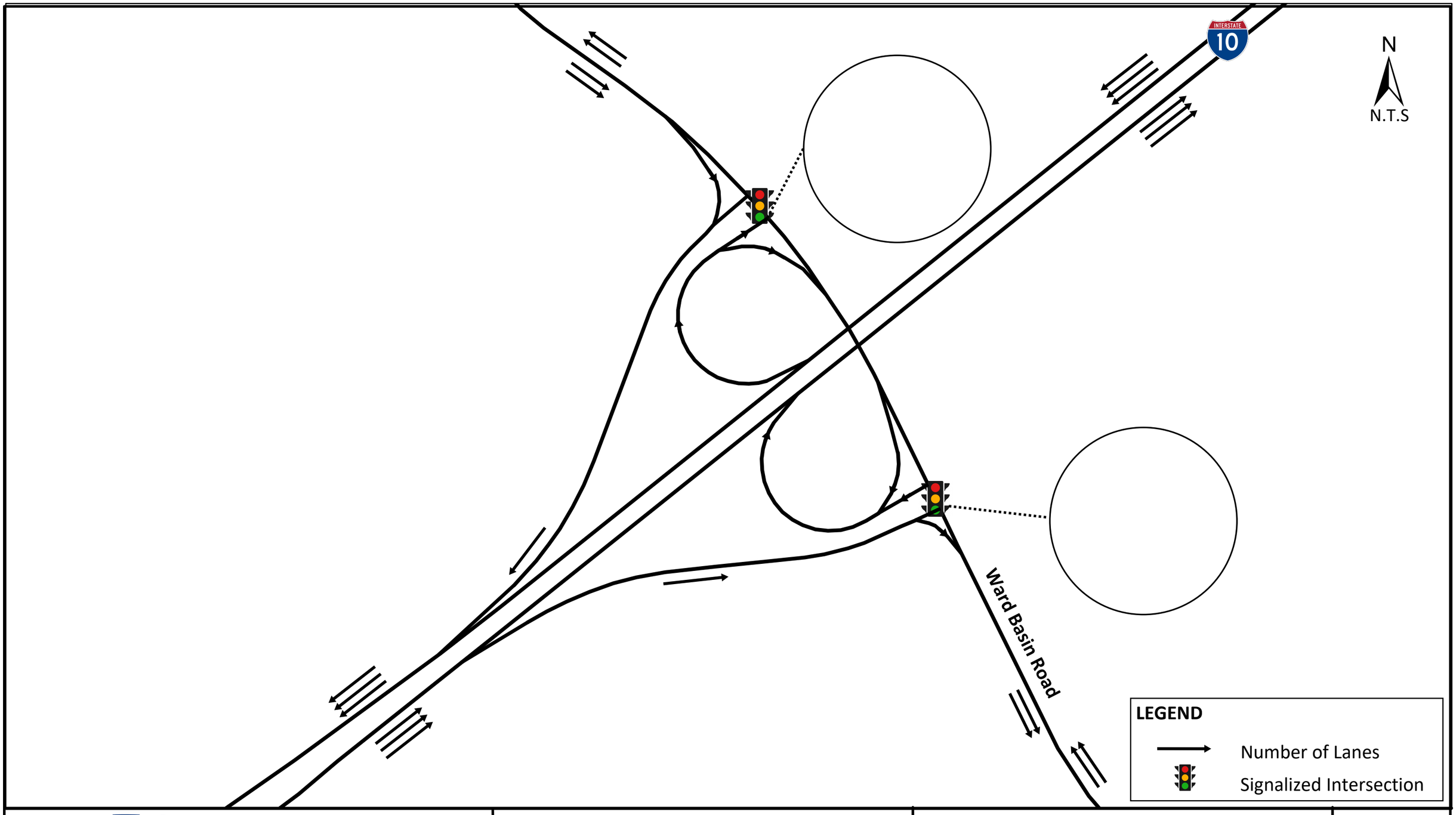
- Changing the ramp terminals from stop-controlled intersections to signal-controlled intersections.

The Build Alternative lane configuration is shown in **Figure 5-1**. The travel demand forecast for the project assumes that the above improvements will not impact the overall future traffic patterns within the study area. The turning movements for the Build Alternative are presented in **Figure 5-2** and **Figure 5-3**.

## 5.2 Build Alternative Operational Analysis

The Build Alternative being considered for the Ward Basin Road interchange along I-10 is described in **Section 5.1**. The Build Alternative includes installing traffic signals at the ramp terminal intersections. A Synchro operational analysis was performed to determine the delay and LOS.

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

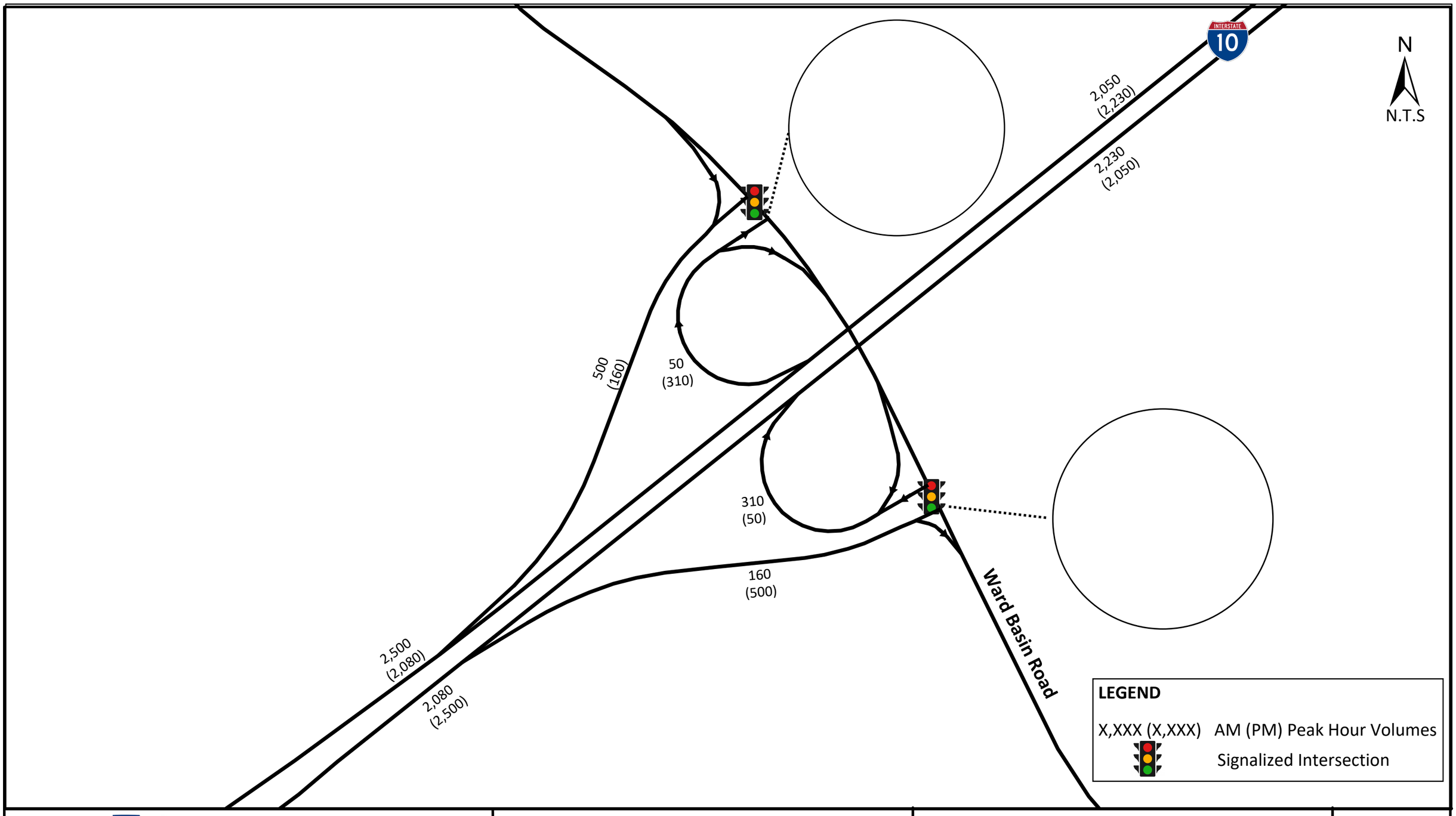



**Florida Department of Transportation**
District Three
Chipley, Florida

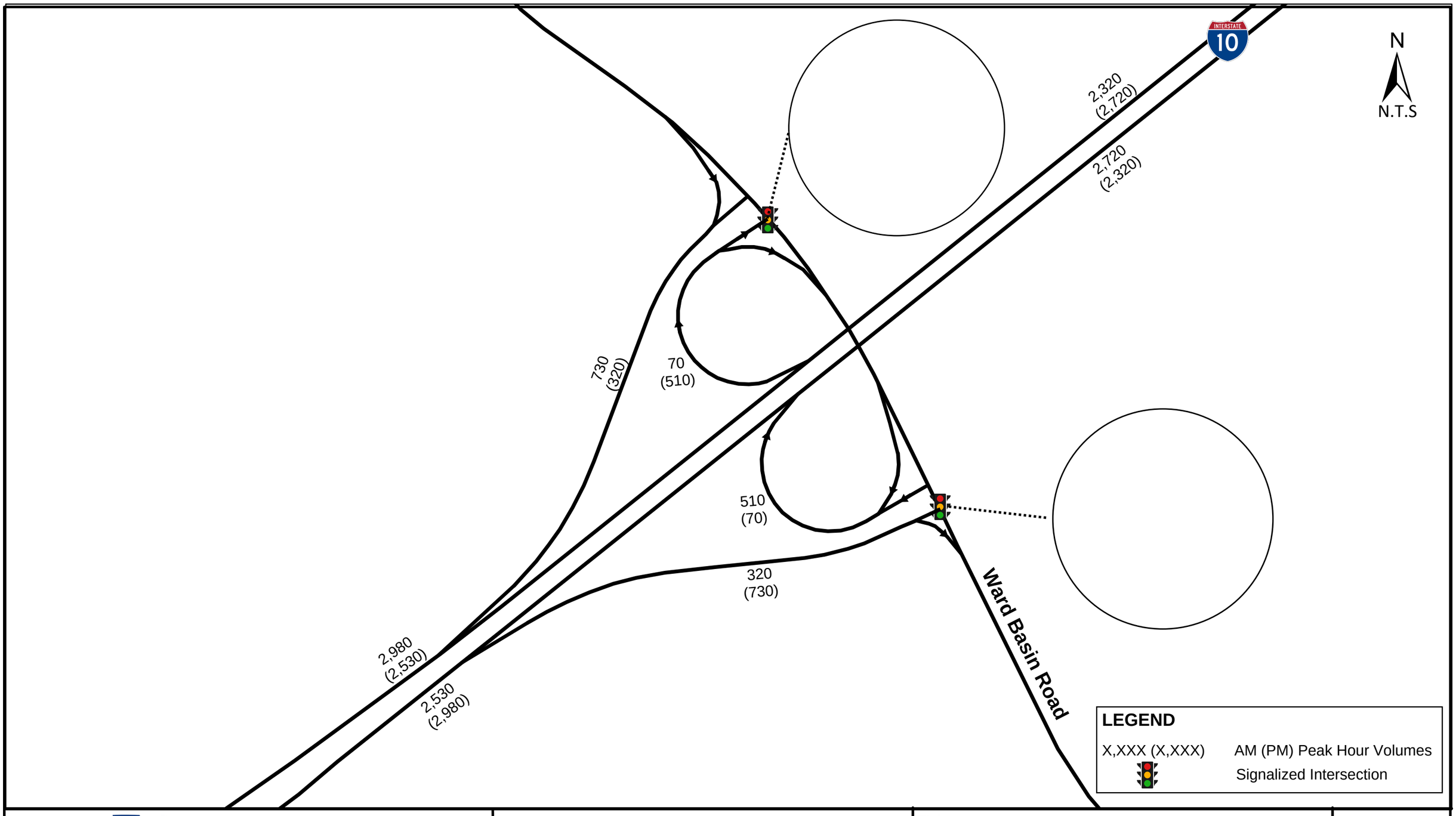
**I-10 at Ward Basin Road**
Project Development & Environment Study
FPID No.: 413062-4-22-01, 413062-5-22-01

Title:
Build Alternative Lane Configuration

Figure
5-1




| | | | |
|---|---|---|---|
| **Florida Department of Transportation**<br>District Three<br>Chipley, Florida | **I-10 at Ward Basin Road**<br>Project Development & Environment Study<br>FPID No.: 413062-4-22-01, 413062-5-22-01 | Title:<br>Opening Year 2025 Build Peak Hour Volumes | Figure<br>5-2 |




| | | | |
|---|---|---|---|
| **Florida Department of Transportation**<br>District Three<br>Chipley, Florida | **I-10 at Ward Basin Road**<br>Project Development & Environment Study<br>FPID No.: 413062-4-22-01, 413062-5-22-01 | Title:<br>Design Year 2045 Build Peak Hour Volumes | Figure<br>5-3 |

### 5.2.1 Opening Year 2025 Build Alternative Analysis

**Intersection Analysis**

In the Opening Year 2025, the ramp terminal intersections were analyzed as signalized intersections. The Opening Year 2025 Build intersection analysis results are summarized in **Table 5-1**. All the intersections operate at acceptable LOS B or better in both AM and PM peak hours. No operational issues are observed at any of these intersections in the Opening Year 2025 Build Alternative. Documentation of the Opening Year 2025 Build Alternative analyses is provided in **Appendix E**.

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) |
| **Ward Basin Road at I-10 EB On/Off-Loop Ramps** | Eastbound | Left | 43.9 (41.6) | D (D) | 7.8 (17.6) | A (B) |
| | | Right | 12.8 (6.3) | B (A) | | |
| | Northbound | Left | 3.6 (8.4) | A (A) | | |
| | | Thru | 3.0 (7.7) | A (A) | | |
| | Southbound | Thru | 5.4 (12.2) | A (B) | | |
| | | Right | 3.9 (6.7) | A (A) | | |
| **Ward Basin Road at I-10 WB On/Off-Loop Ramps** | Eastbound | Left | 41.2 (45.0) | D (D) | 6.0 (15.6) | A (B) |
| | | Right | 17.8 (8.6) | B (A) | | |
| | Northbound | Left | 5.4 (9.9) | A (A) | | |
| | | Thru | 3.9 (9.4) | A (A) | | |
| | Southbound | Thru | 6.8 (11.1) | A (B) | | |
| | | Right | 1.7 (3.6) | A (A) | | |

A queuing analysis for Build Alternative was performed for the Opening Year 2025 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 do not exceed the proposed storage lengths 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 | | Southbound | |
| | | Left | Right | Left | Through | Through | Right |
| Ward Basin Road at I-10 EB On/Off-Ramps | AM Peak | 79 | 42 | 38 | 35 | 33 | 80 |
| | PM Peak | 201 | 51 | 16 | 46 | 56 | 16 |
| | Available Storage (feet) | -- | 350 | 300 | -- | -- | 250 |
| Ward Basin Road at I-10 WB On/Off-Ramps | AM Peak | 45 | 22 | 90 | 24 | 58 | 32 |
| | PM Peak | 151 | 46 | 66 | 107 | 26 | 23 |
| | Available Storage (feet) | -- | 200 | 250 | -- | -- | 500 |

Storage length noted above is turn pocket length for left/right turn movements.

### 5.2.2 Design Year 2045 Build Alternative Analysis

**Intersection Analysis**

In the Design Year 2045, the ramp terminal intersections were analyzed as signalized intersections. The Design Year 2045 Build intersection analysis results are summarized in **Table 5-3**. In the Design Year 2045, both of the study intersections operate at LOS C or better in AM and PM peak hours. No operational issues are observed at either of the study intersections in the Design Year 2045 Build Alternative. Documentation of the Design Year 2045 Build Alternative analyses is provided in **Appendix E**.

Table 5-3: Design Year 2045 Build Intersection Analysis Summary

| Intersection | Intersection Approach | | | | Overall Intersection | |
|---|---|---|---|---|---|---|
| | Approach | Movement | Delay | LOS | Delay (sec) | LOS |
| | | | AM (PM) | AM (PM) | AM (PM) | AM (PM) |
| Ward Basin Road at I-10 EB On/Off-Loop Ramps | Eastbound | Left | 45.9 (43.4) | D (D) | 10.5 (20.6) | B (C) |
| | | Right | 9.4 (4.8) | A (A) | | |
| | Northbound | Left | 6.0 (11.7) | A (B) | | |
| | | Thru | 4.8 (11.5) | A (B) | | |
| | Southbound | Thru | 4.8 (15.3) | A (B) | | |
| | | Right | 5.1 (4.8) | A (A) | | |
| Ward Basin Road at I-10 WB On/Off-Loop Ramps | Eastbound | Left | 41.9 (45.2) | D (D) | 7.1 (19.5) | A (B) |
| | | Right | 16.1 (5.9) | B (A) | | |
| | Northbound | Left | 7.1 (15.3) | A (B) | | |
| | | Thru | 3.9 (15.6) | A (B) | | |
| | Southbound | Thru | 9.0 (18.0) | A (B) | | |
| | | Right | 2.2 (4.4) | A (A) | | |

A queuing analysis for Build Alternative was performed for the Design Year 2045 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 do not exceed the proposed storage lengths at either intersection within the study area. **Table 5-4** summarizes the queue analysis for the Design Year 2045 Build Alternative.

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

| Intersection | Time Period | 95th Percentile Queue Length (feet) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Eastbound | | Northbound | | Southbound | |
| | | Left | Right | Left | Through | Through | Right |
| **Ward Basin Road at I-10 EB On/Off-Ramps** | AM Peak | 139 | 52 | 71 | 48 | 24 | 162 |
| | PM Peak | 326 | 53 | 24 | 75 | 52 | 14 |
| | Proposed Storage (feet) | -- | 350 | 300 | | | 250 |
| **Ward Basin Road at I-10 WB On/Off-Ramps** | AM Peak | 53 | 26 | 107 | 25 | 100 | 43 |
| | PM Peak | 247 | 48 | m119 | 182 | 16 | 41 |
| | Proposed Storage (feet) | -- | 200 | 250 | | | 500 |

m: Volume for 95th percentile queue is metered by upstream signal.
Storage length noted above is turn pocket length for left/right turn movements.

## 5.3 Build Alternative Safety Analysis

A quantitative safety analysis was performed to determine if the proposed improvements address the existing safety concerns for this IOAR. The safety analysis performed follows the guidelines in the 2020 IARUG. The safety analysis was performed using Crash Modification Factors (CMFs) from CMF Clearinghouse funded by FHWA.

The proposed improvements include changing the ramp terminal intersections from stop controlled to signal controlled intersections. Therefore, a CMF (ID: 7981) of 0.716 was used for the proposed improvement. The complete quantitative safety analysis is summarized in **Table 5-5**. The CMF Clearinghouse summary report is provided in **Appendix F**.

Table 5-5: Build Alternative Annual Crash Reduction Calculations

| Study Locations | Number of Crashes | Annual Crash Frequency (crashes/year) | CMF | Expected Annual Crash Frequency | Annual Reduction in Crashes (crashes/year) |
|---|---|---|---|---|---|
| **Ward Basin Road between I-10 EB and WB Terminals** | 1 | 0.2 | 0.716 | 0.143 | 0.057 |
| **I-10 EB/Ward Basin Road WB Ramp Terminal** | 3 | 0.6 | 0.716 | 0.430 | 0.17 |
| | | | | **Total Reduction** | 0.227 |

By implementing the proposed modification, a total crash reduction of 0.227 crashes a year is expected.

# 6. EVALUATION OF ALTERNATIVES

This section discusses the analysis of alternatives based on safety, operational and engineering acceptability. The No-Build Alternative was evaluated in **Section 4** and the Build Alternative was analyzed in **Section 5**. A comparison of the No-Build Alternative and the Build Alternative 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 are based on design parameters outlined in the FDOT Design Manual, the FDOT Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways and AASHTO's A Policy on Geometric Design of Highway and Streets published in 2018.

## 6.2 Alternative Comparison

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

**2045 No-Build and Build Alternative**

In the Design Year 2045, operational deficiencies exist within the study area for the No-Build Alternative. The EB approach at the I-10 WB ramp terminal intersection will operate at LOS F in the PM peak hour (see **Table 4-6**). These operational deficiencies at the intersection are associated with high arterial through traffic volumes along Ward Basin Road and high left-turn traffic volumes from the I-10 WB Off-ramp. A comparison of the minor movements for Design Year 2045 No-Build and Build results is provided in **Table 6-1**.

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

| 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 |
| Ward Basin Road at I-10 EB On/Off-Ramps | EB | L | 29.3 | D | 34.3 | D | 45.9 | D | 43.4 | D |
| | | R | 9.8 | A | 11.1 | B | 9.4 | A | 4.8 | A |
| | NB | L | 8 | A | 7.7 | A | 6.0 | A | 11.7 | B |
| | | T | -- | -- | -- | -- | 4.8 | A | 11.5 | B |
| | SB | T | -- | -- | -- | -- | 4.8 | A | 15.3 | B |
| | | R | -- | -- | -- | -- | 5.1 | A | 4.8 | A |
| Ward Basin Road at I-10 WB On/Off-Ramps | EB | L | 43.3 | E | 76.2 | F | 41.9 | D | 45.2 | D |
| | | R | 10 | B | 9.3 | A | 16.1 | B | 5.9 | A |
| | NB | L | 9.6 | A | 7.6 | A | 7.1 | A | 15.3 | B |
| | | T | -- | -- | -- | -- | 3.9 | A | 15.6 | B |
| | SB | T | -- | -- | -- | -- | 9.0 | A | 18.0 | B |
| | | R | -- | -- | -- | -- | 2.2 | A | 4.4 | A |

The Build Alternative will improve the delay at both ramp terminals. The biggest improvement in delay and LOS occurs at the Ward Basin Road and I-10 WB On/Off-ramp intersection. The delay for the left-turn movement at the I-10 WB ramp terminal intersection is reduced by 1.4 seconds and 31.0 seconds during the AM and PM peak hours, respectively.

In the Design Year 2045, the Build Alternative provides a reduction in queues compared to the No-Build Alternative. The No-Build queue analysis indicates that the EB right-turn movement at the two ramp terminal intersections 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.

A quantitative safety analysis was performed at the ramp terminal intersections to determine if the Build Alternative addressed the existing safety concerns. A CMF (ID: 7981) of 0.716 obtained from the CMF Clearinghouse funded by FHWA was used for the proposed improvement. Based on the proposed improvement, a reduction of 0.227 crashes per year is expected.

## 6.3 Preferred Alternative

The proposed improvements at the ramp terminal intersections at the I-10/Ward Basin Road interchange will provide traffic relief and enhance safety within the AOI by reducing delay on the off-ramps.

The Build Alternative for this study performs substantially better than the No-Build Alternative for all future years. The proposed interchange improvements provide better operations by installing a signal control at the ramp terminal intersections.

A quantitative safety analysis was also performed to determine if the Build Alternative addressed the existing safety concerns. Based on the proposed improvements, crashes are predicted to be reduced by 0.227 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**.

A conceptual signing plan was developed for the Preferred Alternative. See **Appendix G** for the attached signing plan.

## 6.4 Project Costs

The anticipated cost of this project based on the FDOT Long Range Estimating (LRE) System is provided in **Appendix H**. The project cost for Build Alternative is estimated to be $4,567,361.81.

# 7. JUSTIFICATION

The proposed improvements at the Ward Basin Road 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 Ward Basin Road 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/Ward Basin Road 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 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 deficiencies exist. The left-turn movement on the minor approach at WB ramp terminal intersections will operate at LOS E and F in the AM and PM peak hours, respectively. For the EB ramp terminal intersection the left-turn movement on the EB approach will operate at LOS D in the AM and PM peak hours. These deficiencies are attributed to the high through traffic volume along Ward Basin Road and high left-turn traffic volume exiting the I-10 mainline. The EB right-turn movements at both the ramp terminals will experience queues that are longer than the available storage.

The Build Alternative for this study performs substantially better than the No-Build Alternative for all future years. When compared to the No-Build Alternative, the proposed improvements provide a reduction in delay at both study intersections. The most significant reduction in delay and improvement in LOS occurs at the I-10 WB On/Off-ramp intersection. The delay for the left-turn movement at the I-10 WB ramp terminal intersection is reduced by 1.4 seconds and 31.0 seconds during the AM and PM peak hours, respectively. Also, the LOS for the left-turn movement at the I-10 WB ramp terminal intersection changes from F to D in the PM peak hour.

The safety analysis performed for this study indicated a total of 4 crashes occurred within the project area during the five study years (2013-2017). Three of those crashes that occur at the I-

10 WB on-ramp are rollover type crashes. Crashes of these types are typically attributed to reckless driving, where the car is at high speed and the driver fail to control the vehicle.

The proposed improvements under the Build Alternative are anticipated to enhance safety within the project 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 total annual crash reduction of 0.227 crashes per year will occur at the ramp terminal intersections.

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

In conclusion, the comparison of the No-Build and Build Alternatives show that the proposed improvements provide enhanced operations and thereby enhance 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/Ward Basin Road ramp terminal intersections in Santa Rosa County and no new access is requested. The improvements are proposed to preserve all the existing connections between public roads and preserve existing traffic movements onto

and off 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 Ward Basin Road 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 Ward Basin Road interchange planned in the five year program.

## List of Appendices