

Interchange Justification Report

SR 8 (I-10) at SR 99 (Beulah Road) Interchange

SR 99 (Beulah Road) from US 90A/SR 10 (W. Nine Mile Road) to CR 186 (W. Kingsfield Road)
SR 8 (I-10) from the Florida/Alabama State Line to the Pensacola Weigh Station
Escambia County, Florida

Financial Project Identification (FPID) No's:
433113-1-22-01, 433113-2-22-01, and 433113-3-22-01
Federal Aid Project Number: 0101-211-I

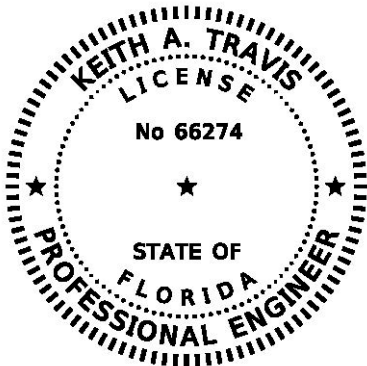
ETDM # 14176

Prepared For:



Florida Department of Transportation
District Three

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



THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY:

Digitally signed by Travis, Keith
Date: 2020.11.17 09:28:48 -05'00'

ON THE DATE ADJACENT TO THE SEAL

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Parsons Transportation Group Inc.
1300 Riverplace Blvd., Suite 200
Jacksonville, Florida 32207
C.A. No. 1838

November 2020

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 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	<div style="border: 1px solid black; border-radius: 10px; padding: 5px; display: inline-block;">DocuSigned by: <i>Iris Waters</i></div> <hr style="border: 0.5px solid black;"/> Iris Waters, P.E. District 3 Project Development Engineer Florida Department of Transportation (FDOT) District Three Office	11/18/2020 10:24 AM <hr style="border: 0.5px solid black;"/> Date
Interchange Review Coordinator	<div style="border: 1px solid black; border-radius: 10px; padding: 5px; display: inline-block;">DocuSigned by: <i>Ray Kirkland</i></div> <hr style="border: 0.5px solid black;"/> Ray Kirkland District Three	11/18/2020 11:05 AM EST <hr style="border: 0.5px solid black;"/> Date
Systems Management Administrator	<div style="border: 1px solid black; border-radius: 10px; padding: 5px; display: inline-block;">DocuSigned by: <i>Jenna Bowman</i></div> <hr style="border: 0.5px solid black;"/> Jenna Bowman, P.E. Systems Implementation Office Central Office	11/30/2020 1:45 PM EST <hr style="border: 0.5px solid black;"/> Date
State Chief Engineer	<div style="border: 1px solid black; border-radius: 10px; padding: 5px; display: inline-block;">DocuSigned by: <i>Will Watts</i></div> <hr style="border: 0.5px solid black;"/> Will Watts, P.E. Central Office	12/1/2020 9:16 AM EST <hr style="border: 0.5px solid black;"/> Date
Assistant Secretary for Strategic Development	<div style="border: 1px solid black; border-radius: 10px; padding: 5px; display: inline-block;">DocuSigned by: <i>Brad Thoburn</i></div> <hr style="border: 0.5px solid black;"/> Brad Thoburn Assistant Secretary for Strategic Development Central Office	12/2/2020 8:31 AM EST <hr style="border: 0.5px solid black;"/> Date

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SYSTEMS IMPLEMENTATION OFFICE

QUALITY CONTROL CERTIFICATION FOR INTERCHANGE ACCESS REQUEST SUBMITTAL

Submittal Date: 10/26/2020

FM Number: 433113-1-22-01, 433113-2-22-01, 433113-3-22-01

Project Title: SR 8 (I-10) at SR 99 (Beulah Road) Interchange

District: Three

Requestor: Iris Waters, P.E.

Phone: (850) 330-1625

District IRC: Ray Kirkland

Phone: (850) 330-1590

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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.

Requester _____
DocuSigned by:
Iris Waters
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Iris Waters, P.E.

Date: 11/18/2020 | 10:24 AM EST

IRC _____
DocuSigned by:
Ray Kirkland
F9C98E481A0B416...
Ray Kirkland

Date: 11/18/2020 | 11:05 AM EST

SR 8 (I-10) / SR 99 (Beulah Road) Interchange
FPID 433113-1-22-01, 433113-2-22-01, & 433113-3-22-01

EXECUTIVE SUMMARY

The purpose of this report is to document the safety, operational and engineering considerations as required for the approval of a new interchange along SR 8 (I-10) in the vicinity of SR 99 (Beulah Road) in Escambia County, located approximately 2 miles east of the Florida/Alabama state line. This report addresses the purpose and need, alternatives and evaluation of Federal Highway Administration's (FHWA) policy points for approval of access to the interstate system.

Environmental considerations are documented separately as part of the concurrent Project Development and Environment (PD&E) Study identified as Efficient Transportation Decision Making (ETDM) Project #14176 in the Environmental Screening Tool (EST), entitled "Beulah Road (SR 99) at I-10 Interchange Project".

The project location and Area of Influence (AOI) is shown in Figure 1.

Purpose and Need

The primary purpose of the proposed project is to improve regional connectivity and mobility within the greater Escambia County area. Secondary purposes include reducing congestion on adjacent roadways, reducing trip lengths for area commuters, and enhancing emergency evacuation by providing an additional connection to I-10.

The project need is driven by the increasing traffic demand resulting from significant development within the project area (both current and planned), as set forth in future development plans such as the Mid-West Escambia County Optional Sector Plan, Detailed Specific Area Plans, and the Escambia County Comprehensive Plan. As a result of this growth, there is a need to provide connectivity from these new areas of development to the surrounding regional transportation system. Additionally, there is a need to provide an alternative route to reduce travel times and congestion, while also providing route choices for hurricane evacuation within the project AOI.

Applicable Policy and Methodology

This IJR has been developed in accordance with current policy, guidelines, and procedures including the following:

- FHWA "Policy on Access to the Interstate System", May 22, 2017
- FHWA guidelines "Interstate System Access Informational Guide", August 31, 2010
- FDOT Policy 000-525-015: "Approval of New or Modified Access to Limited Access Highways on the State Highway System (SHS)", December 16, 2013
- FDOT Topic 525-030-160: "New or Modified Interchanges", January 19, 2018
- FDOT Procedure No. 525-030-120 "Project Traffic Forecasting", March 8, 2019
- FDOT "Interchange Access Request User's Guide", January 2018
- FDOT Topic 625-000-002: "2020 FDOT Design Manual", 201 Design Controls

Since this IJR is for a new service interchange located outside the Transportation Management Area (TMA), the programmatic approval process will be followed in accordance with FDOT Topic 525-030-160.

A Methodology Letter of Understanding (MLOU) for this IJR was prepared and approved on May 6, 2019.

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A Design Traffic Report was approved and signed February 21, 2019 using the latest version of Northwest Florida Regional Planning Model (NWFRPM), Version 2.1 with base year 2010 and horizon year 2040, as modified to include updated roadway network and land use data for the base year of 2016 and a horizon year of 2045.

The analysis years for this study include Existing Year 2018, Opening Year 2025 and Design Year 2045. The operational analysis for this study was performed using the Highway Capacity Software (HCS 7.4) and Synchro 10.1. The operational analysis utilized the methodologies of the Highway Capacity Manual (HCM) 6th Edition and HCM 2000. Since the project is not anticipated to be constructed in phases, a year 2035 analysis was not conducted.

Build Alternative

The recommended Build Alternative includes widening approximately 3.1 miles of I-10 from 4 to 6 lanes from the Florida/Alabama state line to the FDOT Pensacola Weigh Station, a new interchange along I-10 in the vicinity of the existing SR 99 (Beulah Road), widening approximately 1.4 miles of the existing Beulah Road from 2 to 4 lanes from south of W. Nine Mile Road to Isaacs Lane, realigning the existing Beulah Road to create a T-intersection with a new alignment, and constructing a 0.7-mile section on new alignment from Isaacs Lane through the new interchange and terminating at W. Kingsfield Road.

Planning Consistency

The proposed interchange and related roadway improvements are included in the 2045 Needs Plan and 2045 Cost Feasible Plan elements of the Florida-Alabama Transportation Planning Organization (FATPO) 2045 Long Range Transportation Plan (LRTP) as adopted on October 14, 2020. The proposed interchange is identified as a Strategic Intermodal System (SIS) project with right-of-way and construction funded in fiscal year 2026-2045.

Regional Connectivity & Mobility

As discussed in Section 7.3 Alternatives Comparison, the Build Alternative provides improved regional connectivity and mobility that is driven by the current and planned growth within the greater Escambia County area.

The proposed improvement would provide improved connectivity along an approximately 18-mile stretch of I-10 (from CR 64 in Alabama to W. Nine Mile Road) that is without access to the local roadway network. This improvement will reduce circuitous routing (back-tracking, in some cases) and provide more direct connectivity - both regional and local.

Areas such as the township of Cantonment, FL located north of the proposed project (with an estimated population of 26,000 as of the 2010 census) would be provided with improved access to the interstate system. For instance, a trip from I-10 at the state line to Cantonment would be reduced from 13-miles to 7-miles with the new connection and beltway in place. The Mid-West Escambia County Optional Sector Plan is anticipated to result in an increase of up to 23,500 residential units in this area by 2035. This increase in population, along with the associated growth in employment (such as Navy Federal Credit Union), would greatly influence and increase travel demand on the local area roadway network, estimated at 371,000 additional trips per day. The Navy Federal Credit Union is currently the area's largest employer at 8,200 employees and growing. According to a local news journal published November 7, 2019, the company is ahead of schedule in its effort to reach 10,000 employees by 2026. The existing network and future development of the Escambia County Sector Plan will need to be supported by an interconnected transportation

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system that efficiently links housing with employment and retail centers. The proposed hierarchical transportation system would be anchored by the Beulah/I-10 interchange.

From a systemwide perspective, mobility is also enhanced since average travel speeds would be increased with more vehicles being afforded the opportunity to use the interstate system. As presented in Section 7.3.1, an analysis of No-Build and Build Alternative vehicle-miles traveled (VMT), vehicle-hours traveled (VHT), and overall average travel speeds (VMT/VHT) was conducted using outputs from the regional travel demand model.

The analysis shows an increase in overall VMT and reduced VHT and higher average travel speeds under the build scenario. Increased VMT and reduced VHT and higher average travel speeds are observed as a result of routing opportunities along facilities of higher mobility/safety standards and higher travel speeds offered by the Build Alternative. At the regional-level, a shift in travel demand from US 29 to the Beltway and I-10 is observed resulting in longer trips being made at higher speeds and in less time. At the local level, a shift in travel demand is observed from W. Nine Mile Road to SR 99 (Beulah Road) and the I-10 interstate system under the build scenario. This shift in travel demand is a result of the added interchange providing route choice with higher travel speeds and improved roadway standards along the widened Beulah Road and new interchange access to I-10 under the Build Alternative.

The Build Alternative would align relatively longer-distance trips (such as between northern Escambia County and Pensacola) with a facility (I-10) that is designed for this purpose, thereby supporting facilities with higher mobility and safety standards. Without the Build Alternative, there would be increased use of the existing US 29 corridor to satisfy this travel demand. Recognizing US 29 is an interrupted flow facility, mobility (and safety) are enhanced under the build scenario by providing linkage between I-10 and the Beltway to support regional trips on the interstate system rather than the arterial system.

The shift of regional travel demand from US 29 to I-10 and the Beltway is revealed through the “select link plots” as shown in Appendix J which provide a comparison of the 2045 build and no-build scenarios. The VMT, VHT and average travel speed analysis reveals an increase in VMT associated with the build alternative, largely on the freeway. But again, this is a result of trips sacrificing the shortest distance path to gain a mobility edge (as seen by the VHT savings and average speed increases) by re-routing to I-10 at the Beulah Road interchange. In realigning this market with the I-10 route option, not only are mobility benefits realized, but safety benefits are likely as well (reduced long-distance trips on the surface street system). The increased traffic on I-10 resulting from the build alternative would degrade average speed slightly on the interstate system. However, the slight decrease in travel speed on I-10 is not considered significant and it is noted that the volume-delay functions employed in regional travel demand models do not necessarily mirror congestion-deterioration effects.

In summary it is concluded that through an examination of VMT, VHT and average travel speeds, the new interchange and associated roadway improvements further support the purpose and need in terms of providing regional connectivity, mobility, and safety benefits.

Furthermore, as discussed in Section 5.3 Emergency Evacuation and Response Times, the proposed interchange would offer an additional access point to the interstate system providing critically needed improved access and route choices for emergency evacuation.

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E.1.1 FHWA Policy Point 1

An operational and safety analysis was performed comparing the Build Alternative to the No-Build Alternative with the conclusion that the proposed interchange does not have a significant adverse impact on the safety and operation of the Interstate facility (including mainline lanes, existing and new ramps, and ramp intersections with crossroads) or on the local street network based on both the current and the planned future traffic projections.

Operational Analysis

As discussed in further detail in Section 7.3.2 Operational Analysis, and as summarized in Figure 33 and Figure 34, the I-10 mainline and ramp merge/diverge points function similarly for the No-Build and Build alternatives at opening year 2025 and design year 2045 operating at (or better than) target LOS values.

The Build Alternative would function significantly better than the No-Build Alternative along Beulah Road. In the 2045 No-Build Alternative condition, the entire length of Beulah Road would operate at LOS E/F in the peak direction (from south of W. Nine Mile Road to Muscogee Road), and the intersections along Beulah Road would operate at LOS E/F. In the 2045 Build Alternative condition, all of Beulah Road and its intersecting side streets would meet target LOS goals (except for the segment of Beulah Road south of W. Nine Mile Road that operates at LOS E).

Although the proposed I-10/Beulah interchange would reduce traffic demand along W. Nine Mile Road, operational failures are anticipated to occur at the signalized and unsignalized intersections along W. Nine Mile Road from east of Beulah Road to I-10 in design year 2045 no-build and build conditions. In addition, operational failures are anticipated to occur at the signalized and unsignalized intersection along Pine Forest Road within the AOI in design year 2045 no-build and build conditions. As discussed in Section 2.3 Ongoing Adjacent Capacity Improvement Studies, these outlying capacity deficiencies are being evaluated as part of other PD&E studies.

Safety Analysis

As described in further detail in Section 7.3.3 Safety Analysis, the results of the predictive crash analysis indicate that the Build Alternative would provide enhanced safety when compared to No-Build Alternative. Based on the safety analysis, it is predicted that the total number of crashes from opening year to design year would be reduced by 164, of which 47 are fatal/injury type and 117 are Property Damage Only (PDO) crashes.

While crashes for the new interchange ramps and ramp terminals are predicted to increase as a result of the new conflict points, safety benefits are anticipated along Beulah Road, W. Nine Mile Road, and Pine Forest within the AOI.

A Safety Benefit Cost Analysis was performed utilizing “HSM Crash Distribution for Florida” and “KABCO Crash Costs” as presented in the January 2020 FDOT Design Manual. As shown in Table 47: Benefit Cost Analysis, the total safety benefit for the project over the 20-year analysis period is approximately \$95,000,000.

E.1.2 FHWA Policy Point 2

The proposed access connects to a public road only and will provide for all traffic movements. 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)).

Conclusions

The recommended Build Alternative provides the needed regional connectivity, reduced congestion on adjacent roadways, and enhanced emergency evacuation within the AOI as compared to the No-Build Alternative and meets the criteria of the two FHWA policy points. The Recommended Build Alternative will be incorporated into, and further developed in the PD&E study process.

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Appendix B: Design Traffic Report

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Appendix D: Crash Data (FDOT Crash Analysis Reporting System)

Appendix E: Florida-Alabama 2045 Long Range Transportation Plan (Adopted October 14, 2020)

Appendix F: Planned Projects (218605-3, 218605-5, & 218605-7)

Appendix G: No-Build Alternative Opening Year 2025 and Design Year 2045 HCS and Synchro Outputs

Appendix H: Build Alternative Interchange Concept Development

Appendix I: Build Alternative Opening Year 2025 and Design Year 2045 HCS and Synchro Outputs

Appendix J: Purpose & Need Validation Memo

Appendix K: Safety Analysis Output

Appendix L: Build Alternative Concept Plans

Appendix M: Build Alternative Conceptual Signing Plan

Appendix N: Long Range Estimate (LRE)

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ACRONYMS

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
AOI	Area of Influence
APE	Area of Potential Effect
CARS	Crash Analysis Reporting System
CCTV	closed circuit television
CFR	Code of Federal Regulations
DMS	dynamic message sign
DRI	development of regional impact
EB	eastbound
EBM	Empirical Bayes Method
ECAT	Escambia Area Transit Agency
ETDM	efficient transportation decision-making
EST	environmental screening tool
FATPO	Florida-Alabama Transportation Planning Organization
FDEP	Florida Department of Environmental Protection
FDM	FDOT Design Manual
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FPID	Financial Project Identification Number
FTO	Florida Traffic Online
HCM	Highway Capacity Manual
HCS	Highway Capacity Software
HSM	Highway Safety Manual
I-10	Interstate 10
IARUG	Interchange Access Request User's Guide
IJR	Interchange Justification Report
ITS	Intelligent Transportation System
LOS	Level of Service
LRE	long-range estimate
L RTP	Long Range Transportation Plan
MLOU	Methodology Letter of Understanding
MP	milepost
mph	miles per hour
MVDS	microwave vehicle detection stations
NB	northbound
NHS	National Highway System
NRHP	National Register of Historic Places
NWFRPM	Northwest Florida Regional Planning Model
PD&E	Project Development & Environment
PDO	Property Damage Only
PE	Professional Engineer
PHF	peak hour factor
PTMS	Portable Traffic Monitoring Site

ACRONYMS, Cont'd

PTSF	percent time spent following SB southbound
SB	southbound
SHS	State highway system
SIMR	Systems Interchange Modification Report
SIS	Strategic Intermodal System
TMA	Transportation Management Area
TMC	turning movement count
TPAS	truck parking availability system
TSM&O	transportation system management and operations
TTMS	Telemetered Traffic Monitoring Site
v/c	volume to capacity ratio
WB	westbound

SR 8 (I-10) / SR 99 (Beulah Road) Interchange
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1.0 INTRODUCTION

The purpose of this report is to document the safety, operational and engineering considerations as required for the approval of a new interchange along I-10 in the vicinity of SR 99 (Beulah Road) in Escambia County, Florida. This report addresses the purpose and need, alternatives and evaluation of Federal Highway Administration's (FHWA) policy points for approval of access to the interstate system.

Environmental considerations are documented separately as part of the concurrent Project Development and Environment (PD&E) Study identified as Efficient Transportation Decision Making (ETDM) Project #14176 in the Environmental Screening Tool (EST), entitled "Beulah Road (SR 99) at I-10 Interchange Project".

1.1 Project Location

The proposed I-10/Beulah Road interchange is located along I-10 in Escambia County, approximately 2 miles east of the Florida/Alabama state line, and 12 miles northwest of the City of Pensacola. The project is located within a transitioning urbanized area (Area Type 3). The project location is shown in Figure 1.

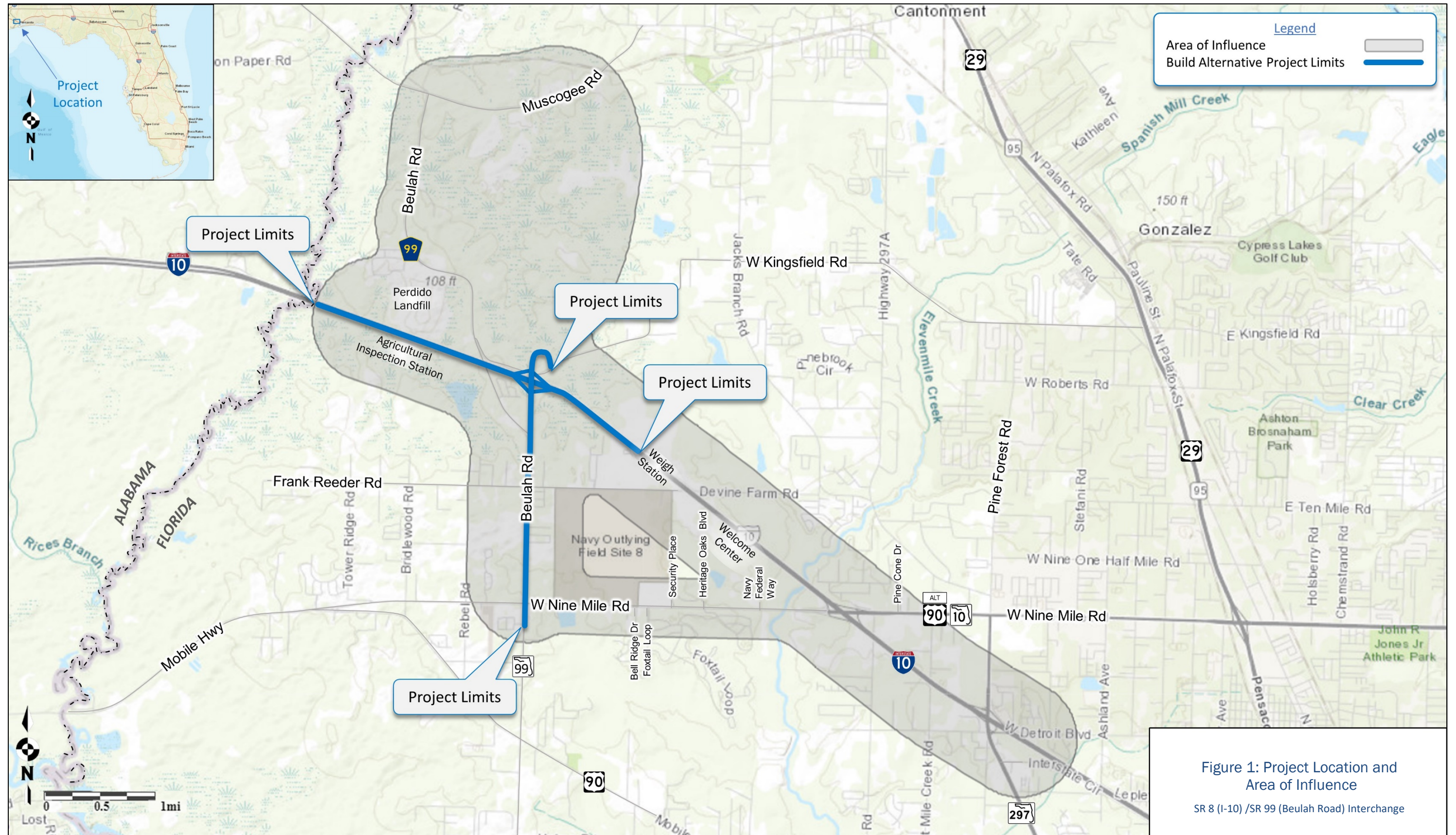
1.2 Purpose and Need

The primary purpose of the proposed project is to improve regional connectivity and mobility within the greater Escambia County area. Secondary purposes include, reducing congestion on adjacent roadways, reducing trip lengths for area commuters, and enhancing emergency evacuation by providing an additional connection to I-10.

The project need is driven by the increasing traffic demand resulting from significant development within the project area (both current and planned), as set forth in development plans such as the Mid-West Escambia County Optional Sector Plan, Detailed Specific Area Plans, and the Escambia County Comprehensive Plan. As a result of this growth, there is a need to provide connectivity from these new areas of development to the surrounding regional transportation system. Additionally, there is a need to provide an alternative route to reduce travel times and congestion, while also providing route choices for hurricane evacuation within the study area.

2.0 METHODOLOGY

The methods used in this report are consistent with the Methodology Letter of Understanding (MLOU) as approved on May 6, 2019 (see Appendix A). Since this IJR is for a new service interchange located outside the urbanized area, the programmatic approval process will be followed in accordance with FDOT Topic 525-030-160.



SR 8 (I-10) / SR 99 (Beulah Road) Interchange

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This IJR was developed in accordance with current policy, guidelines, and procedures including:

- FHWA “Policy on Access to the Interstate System”, May 22, 2017
- FHWA guidelines “Interstate System Access Informational Guide”, August 31, 2010
- FDOT Policy 000-525-015: “Approval of New or Modified Access to Limited Access Highways on the State Highway System (SHS)”, December 16, 2013
- FDOT Topic 525-030-160: “New or Modified Interchanges”, January 19, 2018
- FDOT Procedure No. 525-030-120 “Project Traffic Forecasting”, March 8, 2019
- FDOT “Interchange Access Request User’s Guide”, January 2018
- FDOT Topic 625-000-002: “2020 FDOT Design Manual (FDM)”

2.1 Alternatives

The following alternatives are examined as part of this IJR:

- No-Build Alternative – no action
- Build Alternative – construction of a new full access service interchange and capacity improvements for connecting roadways

2.2 Area of Influence (AOI)

The AOI along I-10 is defined by a 0.5-mile buffer beyond the centerline of I-10 from the Florida/Alabama state line to just east of the SR 297 (Pine Forest Road) interchange. This AOI includes the on- and off-ramps and the merge/diverge areas associated with those ramps. The AOI along Beulah Road consists of a 0.5-mile buffer beyond the centerline of Beulah Road from W. Nine Mile Road to just south of the I-10 overpass, at which point the AOI is expanded to encompass all potential corridors considered as part of the October 2017 ACE developed by Escambia County. The AOI also includes the segment of W. Nine Mile Road from Beulah Road to the I-10 interchange since it serves as a parallel corridor to I-10 within the proximity of the study area. The project AOI is shown in Figure 1.

2.3 Ongoing Adjacent Capacity Improvement Studies

As shown in Figure 2, and consistent with the current Florida-Alabama Transportation Planning Organization (FATPO) Long Range Transportation Plan (LRTP), there are 4 ongoing PD&E studies within the AOI:

- FPID 433113-1, 433113-2, & 433113-3: SR 8 (I-10) at SR 99 (Beulah Road) Interchange - Subject project to evaluate widening Beulah Road, extension of SR 99 along new alignment to W. Kingsfield Road, addition of a new interchange, and widening of I-10.
- FPID 437905-1, 437905-2: SR 8 (I-10) E. of Alabama State Line to W. of SR 295 (US 29) – This project is evaluating I-10 mainline widening as well as interchange improvements at W. Nine Mile Road and Pine Forest Road as part of an ongoing PD&E study and Systems Interchange Modification Report (SIMR).
- FPID 218605-4: SR 10 (US 90A) W. Nine Mile Road from SR 10A (US 90) to SR 297 Pine Forest Road – This project is evaluating intersection and mainline capacity improvements along W. Nine Mile Road as part of an ongoing PD&E study.



Figure 2: Ongoing Adjacent Capacity Improvement Studies
SR 8 (I-10) / SR 99 (Beulah Road) Interchange

SR 8 (I-10) / SR 99 (Beulah Road) Interchange
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- Beulah Beltway Extension: This project is evaluating extending the Beulah Beltway from north of I-10 to CR 184 (Muscogee Road) and the realignment of W. Kingsfield Road as part of an on-going PD&E study.

2.4 Analysis Years

Although the TIP shows construction funds in the 2026-2030 timeframe, the project is being positioned for advanced production with construction of the project beginning in 2022, with a planned opening year of 2025. As such, the following study years are established for this report:

- Existing Year: 2018
- Opening Year: 2025
- Design Year: 2045

2.5 Sources of Information

Data sources used in the development of this IJR are shown in Table 1.

Data Source	General description of relevant data used
FDOT Florida Traffic Online (FTO)	Annual Average Daily Traffic (AADT), hourly counts, vehicle classification, directional factor, truck factor
Field Traffic Data	Machine counts, peak hour turning movement counts, travel times, and vehicle classification counts
FDOT Crash Analysis Reporting System (CARS) and Signal Four Analytics	Historic crash data and crash rates
FDOT ETDM EST	Existing environmental features
FDOT Straight Line Diagrams & Field Observations	Roadway classification, mile marker reference points, intersection/interchange features, structures features, intersecting railroad features, and physical roadway features
Escambia County	Existing and future land use data, census data, proposed developments of regional impact (DRI's), and master plans
Florida Coast Regional Council / FATPO	L RTP and 2045 Cost Feasible Plan

2.6 Base Traffic Data

Traffic information (AADT, trends, truck factors, and directional factors) were obtained from FDOT continuous Telemetered Traffic Monitoring Site (TTMS) and short-term Portable Traffic Monitoring Site (PTMS) data available from FTO. Additional 48-hour and 24-hour bi-directional machine counts, peak period turning movement counts (TMCs), and peak period travel time runs were also conducted on mid-weekdays during the weeks of March 5th and 12th in 2018. Peak periods for the study were selected based on observed and historic peak travel times for the study area:

- Machine counts were used to collect roadway segment directional hourly volumes for a minimum of 24-hour durations at each location.

- Peak period TMCs were collected from 6:00 AM to 9:00 AM and from 4:00 PM to 7:00 PM.
- Travel speed studies were conducted during peak travel periods from the Alabama state line to US 29 with intermediate waypoints at the ramp terminal for W. Nine Mile Road and Pine Forest Road. Four runs were conducted in each direction along I-10 between 6:00 AM and 8:00 AM and between 4:00 PM and 6:00 PM.

The base traffic data and factors used in the analysis are further detailed in Appendix B: Design Traffic Report as approved on February 21, 2019.

2.7 Traffic Factors

Traffic factors for the analysis were developed from the 2017 FDOT FTO database and 2018 TMC peak hour data. The K factor is the proportion of the AADT occurring in the peak hour. The D factor is the percentage of the total, 2-way design hour traffic traveling in the peak direction. The T_{Daily} factor is the adjusted, annual daily percentage of truck traffic. The design hour truck (DHT) factor is the percentage of truck traffic during the peak hour and can be estimated as half of the T_{Daily} factor. The peak hour factor (PHF) is applied to convert hourly flow to peak 15-minute flow rate for capacity analysis. Actual PHFs were used for existing conditions analysis, and a PHF value of 0.95 were used for analysis of future No-Build and Build conditions. The traffic factors from the approved MLOU are shown in Table 2.

Facility	Site ID	Standard K ¹	D	T _{Daily}
SR 8 (I-10)	480156 ²	9.0%	53.5	14.8%
SR 10 (W. Nine Mile Rd.)	484062	9.0%	58.6	7.9%
SR 99 (Beulah Rd.)	480106	9.0%	54.6	11.4%
CR 184 (Muscogee Rd.)	480501	9.5% ³	56.0	6.3%
SR 297 (Pine Forest Rd.)	484063	9.0%	58.6	6.5%

1. Standard K factors from Figure 2.4 of the Project Traffic Forecasting Handbook for "Transitioning to Urbanized Areas"

2. Telemetered site

3. As reported in Attachment 2 of the approved MLOU.

2.8 Traffic Forecasting

Future year traffic volumes for this study were developed using the Northwest Florida Regional Planning Model (NWFRPM), Version 2.1 as modified for the project. The model produced AADT output for the following analysis years:

- Base Year: 2016
- Opening Year: 2025
- Horizon Year: 2045

Since the project is not anticipated to be constructed in phases, a year 2035 analysis was not conducted.

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Future year traffic volumes were developed in three general steps as follows:

- Generated balanced AADT for each year/scenario based on NWFRPM outputs;
- Used NWFRPM output to calculate future year AM and PM peak hour directional volumes by applying the Standard K factor and D factor based on existing 2018 peak hour TMCs; and
- Refined the traffic directionality to reflect anticipated future travel pattern changes due to the proposed improvements and balanced the resulting volumes using trip distribution tables.

Each of these steps are described in detail in Appendix B: Design Traffic Report, as approved on February 21, 2019.

2.9 Traffic Operational Analysis

The operational analysis was conducted for AM and PM peak periods for each of the analysis years. The following roadway features within the AOI were included in the operational analysis for existing conditions, and future No-Build and Build Alternatives:

- Mainline segments
- Ramps (ramp merge and diverge areas)
- Queuing analysis for ramps at cross-streets
- Signalized intersections
- Unsignalized intersections

2.10 Operational Analysis Software

The operational analysis of the mainline segments and ramp junctions were completed using Highway Capacity Software (HCS 7.8).

The operational analysis for signalized and unsignalized intersections was completed using Trafficware Synchro -10, based on Highway Capacity Manual (HCM) 6th edition methodologies.

A queue analysis was also performed for interchange off-ramps along I-10 to determine if queues would extend onto the interstate system (spillover). The queue analysis was performed for the design year conditions using HCM 6th edition methodologies (95% back of queue).

HCM 6th edition methodologies were used for the operational analysis of individual signalized intersections to the extent practical. Since the HCM 6th edition does not support some conditions, HCM 2000 methodologies were used for the operational analysis of the following situations:

- Turning movements with shared and exclusive lanes
- Free right turn mode
- Unsignalized intersections (delays for exclusive right turn lanes are excluded from calculations of the approach delay and intersection delay in HCM 6th edition)

In accordance with the MLOU, VISSIM analysis will also be conducted if the HCM based analysis indicates that saturated conditions are anticipated to occur. As indicated in Section 4.5.6 (2045 No-Build) and 6.7.2.1 (2045 Build), the I-10 mainline segments operate at level of service (LOS) C or better in design year 2045. Since the HCM-based analysis indicates saturated conditions are not anticipated to occur in the design year, the VISSIM analysis was not conducted.

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2.11 LOS Targets

FDOT LOS targets are defined in Department Policy 000-525-006 and are detailed in the current FDOT Quality Level of Service Handbook. The targeted LOS values defined in the FDOT Quality Level of Service Handbook for the State Highway System are “D” in urbanized areas and “C” outside urbanized areas. Since the project area is outside the urbanized area west of the I-10 weigh station, and within the urbanized area east of the I-10 weigh station, both LOS targets will be applied as appropriate. These minimum LOS targets will be considered for the mainline travel lanes, ramps and intersections within the AOI. The urbanized area boundary is shown for reference in Figure 3 and is referenced in the LOS figures.

2.12 Safety Analysis

The safety analysis performed follows the guidelines presented in the 2018 Interchange Access Request User's Guide (IARUG) and the methodologies outlined in the Highway Safety Manual (HSM), published by American Association of State Highway and Transportation Officials (AASHTO).

The existing conditions analysis utilized the latest five years of validated crash data (2013-2017) from the FDOT CARS was supplemented by additional analysis using Signal Four Analytics data to perform a cluster analysis analyzed by crash type and location to identify potential high crash areas.

The predictive analysis used data obtained from Signal Four Analytics for the five-year period from 2014-2018. The safety analysis was conducted for the I-10 freeway sections, new interchange and ramps, Beulah Road, W. Nine Mile Road and associated signalized/unsignalized intersections within the AOI. The safety analysis evaluated the safety performance, applied crash reduction factors, and concludes with a Benefit Cost Analysis in accordance with the Highway Safety Manual.

Refer to Section 3.11.1 for additional information on crash data sources and utilization.

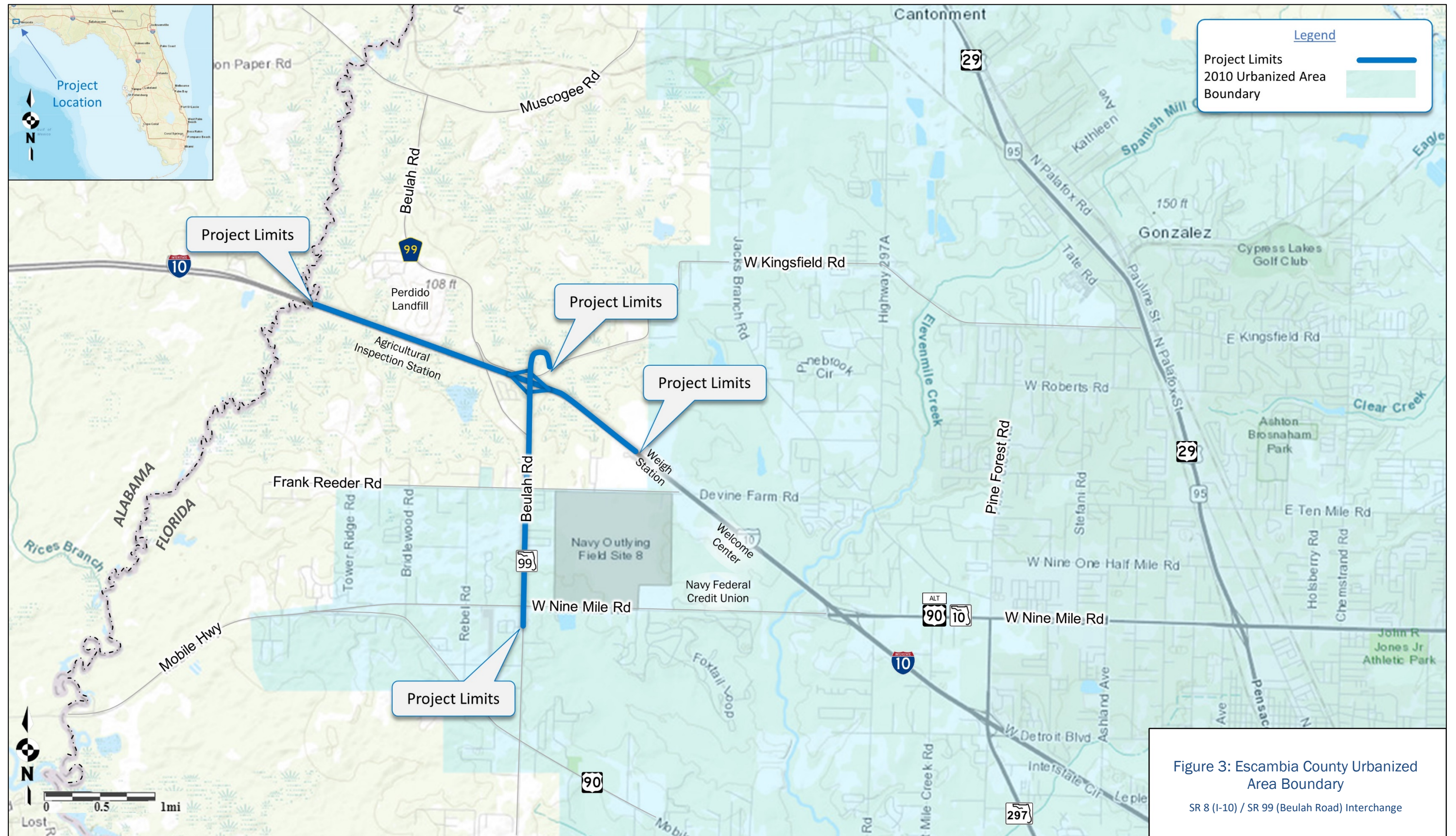


Figure 3: Escambia County Urbanized Area Boundary
SR 8 (I-10) / SR 99 (Beulah Road) Interchange

3.0 EXISTING CONDITIONS

3.1 Demographics

The three-county area has grown by just under 159,000 persons, representing a 29 percent growth since year 2000. The population of Baldwin County, which is a source for increased traffic using I-10 through the study area (going to and from Pensacola), has grown by over 55 percent over the same time period. Nearly half of the population growth in the three-county area (78,000 of the 159,000 growth in population) occurred in Baldwin County.

Table 3: Population Growth							
County	1960	1970	1980	1990	2000	2010	2018
Escambia County (FL)	173,829	205,334	233,794	262,798	294,410	297,619	318,560
Santa Rosa County (FL)	29,547	37,741	55,988	81,608	117,743	151,372	174,887
Baldwin County (AL)	49,088	59,382	78,556	98,280	140,415	182,265	218,022
Totals	252,464	302,457	368,338	442,686	552,568	631,256	711,469

Source: United States Census Bureau

3.2 Existing Land Use

The existing land uses within the project area is primarily residential, agricultural, and open land.

Along I-10, land uses are predominantly public land (owned by Escambia County), rural residential, and low density residential. The Escambia County Solid Waste facility, also referred to as the Perdido Landfill is located just north of I-10 near the Alabama state line.

Beulah Road is characterized predominantly by low-density residential, as well as industrial, rural mixed use, medium density residential, and commercial land uses.

The area is experiencing rapid growth with residential developments and retail (both planned and under construction) along the Beulah Road and W. Nine Mile Road corridors. The existing land use as reported by FDOT Environmental Screening Tool is shown in Figure 4.

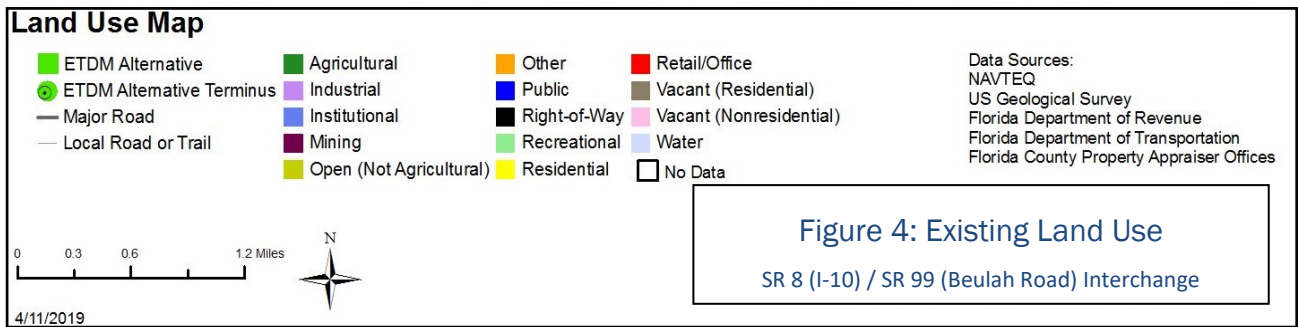
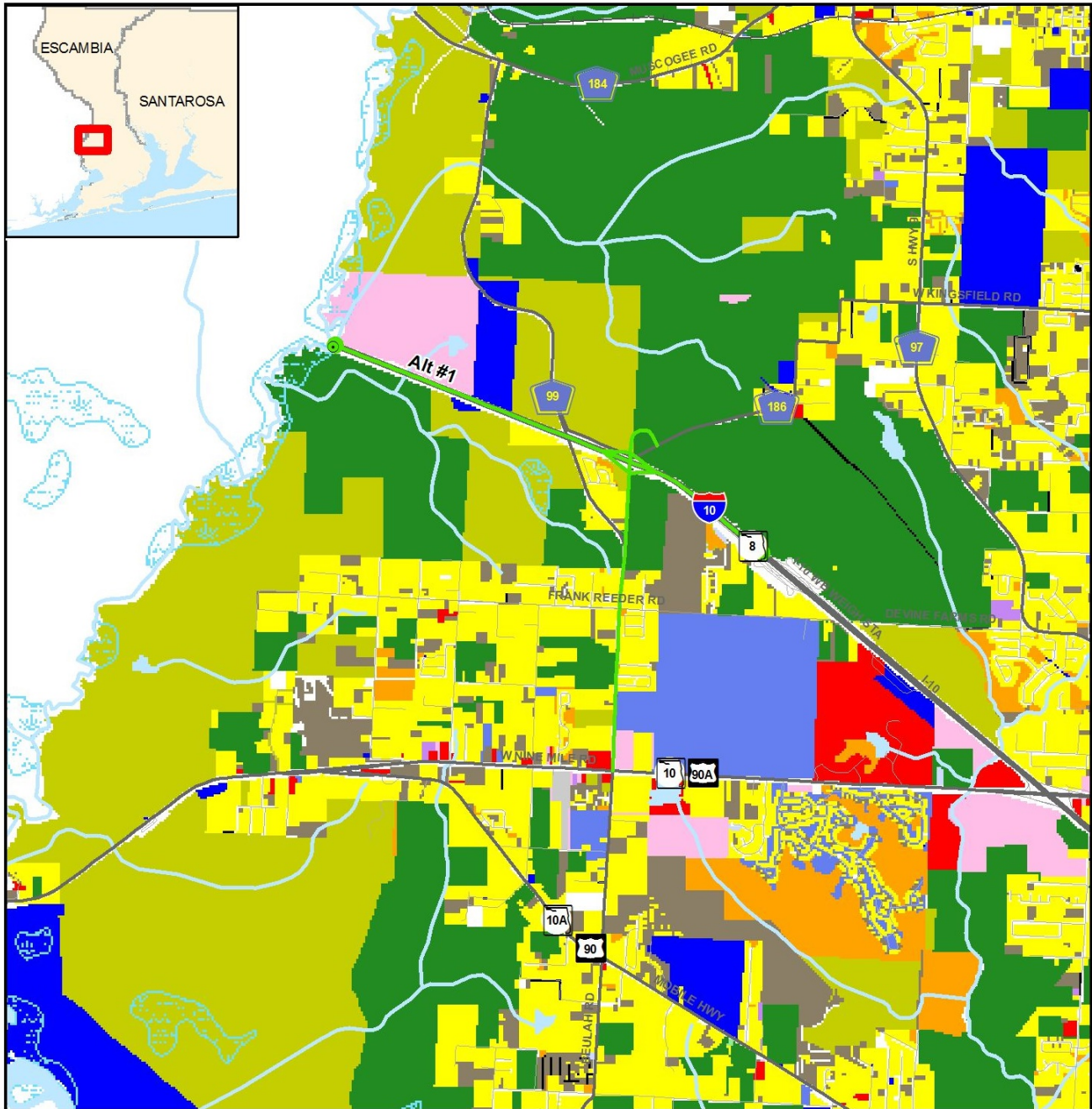


Figure 4: Existing Land Use
 SR 8 (I-10) / SR 99 (Beulah Road) Interchange

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3.3 Existing Transportation Network

SR 8 (I-10), Section: 48260000

As shown in Figure 5, I-10 is a 4-lane divided east-west, limited-access facility (Access Class 1), designated hurricane evacuation route, and is part of Florida's Strategic Intermodal System (SIS). The functional classification of I-10 is Rural Principal Arterial Interstate from MP 0.0 to MP 3.4, and Urban Principal Arterial Interstate from MP 3.4 to the easterly limits of the AOI. There are two 12-ft. travel lanes in each direction with 12-ft. outside shoulders (10-ft. paved) and 8-ft. inside shoulders (4-ft. paved) and a 64-ft. median (8-ft. paved, 56-ft. grassed). The segment of I-10 through the AOI has a right-of-way width of generally 300-ft. The posted speed limit is 70 mph.

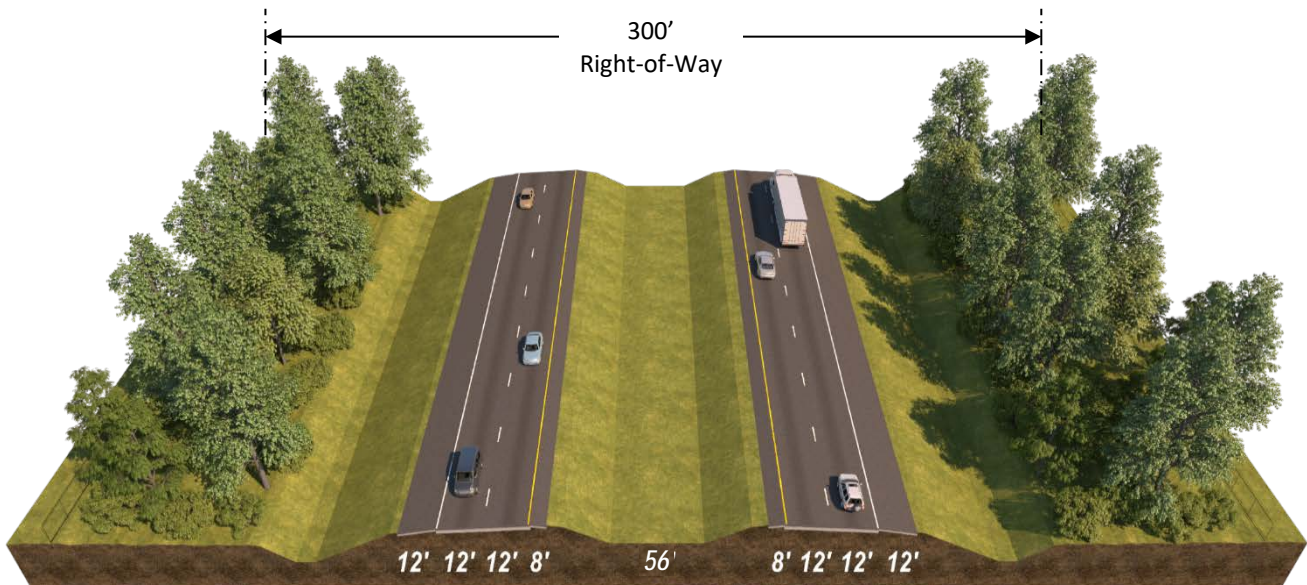


Figure 5: Existing I-10 Typical Section

Features along I-10 consist of an eastbound agricultural inspection station at MP 1.1, an eastbound weigh station at MP 3.2, a westbound weigh station at MP 3.6, and an eastbound Florida Welcome Center at MP 4.3. Two interchanges are located along I-10 within the AOI; the W. Nine Mile Road interchange, at MP 5.5, and the Pine Forest Road interchange at MP 7.1.

County Road 186 (W. Kingsfield Road)

W. Kingsfield Road is east-west rural minor collector. The existing typical section is comprised of two 10-ft. lanes (2-way undivided) with no paved shoulders. The roadway has a posted speed limit of 35 mph and mainly serves as a route for vehicles traveling to/from the landfill located off Beulah Road and local residential traffic.

SR 10/US 90A (W. Nine Mile Road), Section: 48010000

W. Nine Mile Road is a 2-lane, east-west urban minor arterial, and designated hurricane evacuation route. W. Nine Mile Road has 12-ft. travel lanes and 10-ft. shoulders (4-ft. paved) and separate turn lanes at major intersections. W. Nine Mile Road has a right-of-way width of 200-ft. within the study area. The facility's posted speed limit within the AOI is generally 55 mph, which is reduced to 45 mph in the vicinity of I-10. W. Nine Mile Road is currently under construction to be widened from 2

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to 4 lanes divided from Beulah Road to I-10 (FDOT FM 218605-6, 2021 completion) and from I-10 to Pine Forest Road (FDOT FM 218605-7, 2020 completion).

SR 99 (Beulah Road), Section: 48509000

As shown in Figure 6, Beulah Road is a 2-lane, north-south rural minor collector that passes over I-10 west of the proposed interchange at MP 1.8. Beulah Road has 11-ft. travel lanes and 2-ft. paved shoulders. Beulah Road has a right-of-way width of generally 100-ft. within the AOI. The posted speed limit along Beulah Road is 45 mph which is reduced to 30 mph near W. Nine Mile Road. FDOT and Escambia County executed a road-swap agreement to make this section of Beulah Road part of the state highway system (SHS) on November 6, 2019.

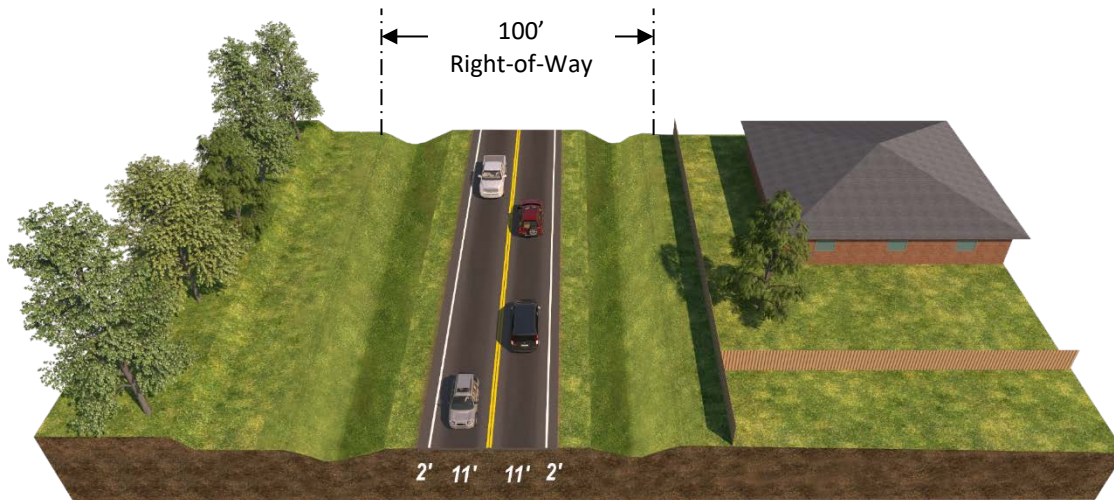


Figure 6: Existing Beulah Road Typical Section

SR 297 (Pine Forest Road), Section: 48190000

Pine Forest Road is a north-south 4-lane divided urban minor arterial, SIS military access facility, and designated hurricane evacuation route south of I-10. The roadway consists of 12-ft. travel lanes and 12-ft. shoulders (4-ft. paved) and separate turn lanes at major intersections. North of I-10, Pine Forest Road is an undivided urban minor arterial with two 12-ft. lanes in the southbound direction, one 12-ft. lane in the northbound direction, 12-ft. shoulders (8-ft. paved), and separate turn lanes at major intersections. The posted speed limit within the AOI is 45 mph which is reduced to 35 mph in the vicinity of the I-10.

The existing lane configuration within the AOI is shown in Figure 7.

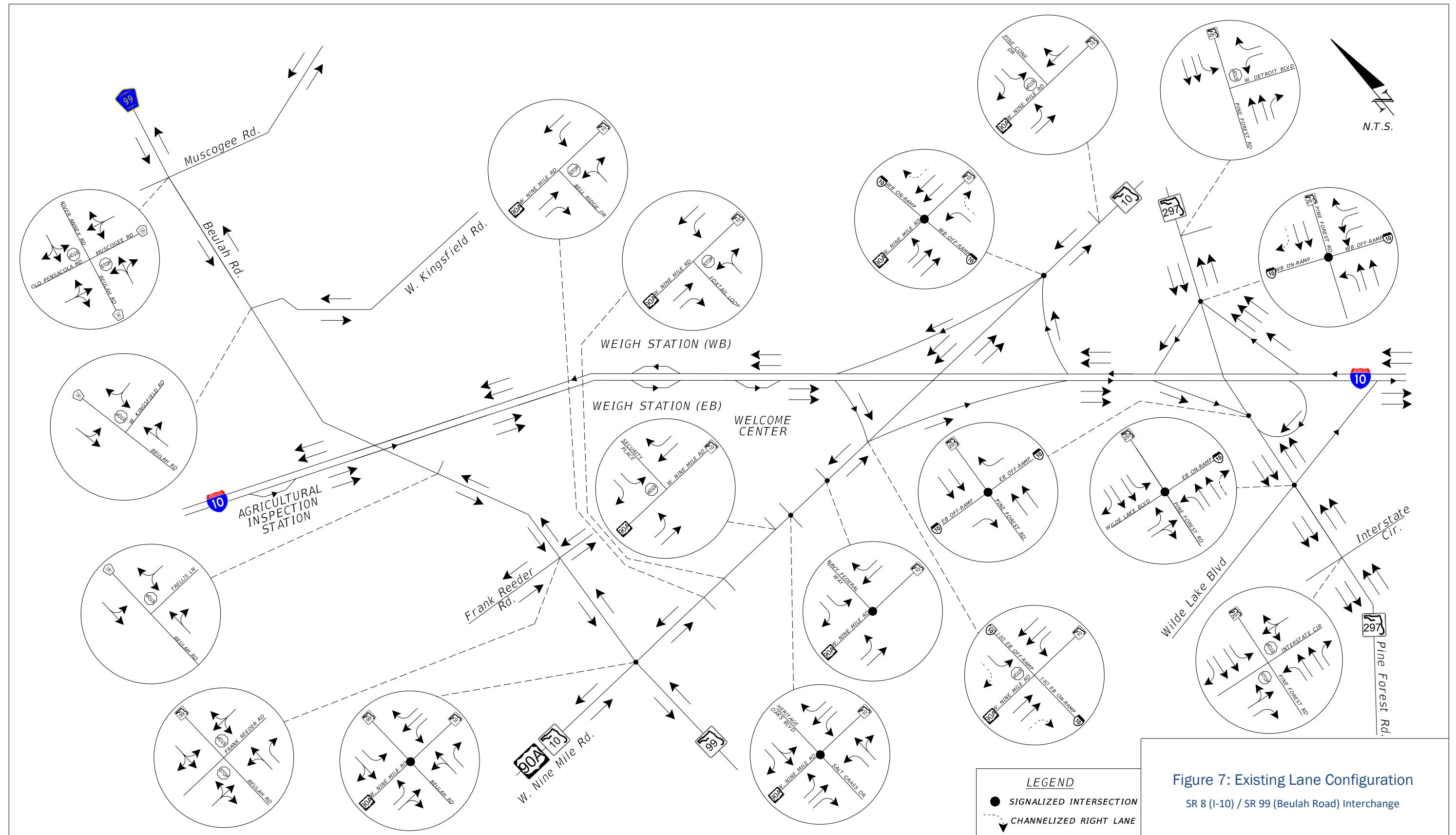


Figure 7: Existing Lane Configuration
SR 8 (I-10) / SR 99 (Beulah Road) Interchange

SR 8 (I-10) / SR 99 (Beulah Road) Interchange
 FPID 433113-1-22-01, 433113-2-22-01, & 433113-3-22-01

3.4 Existing Interchange/Connecting Feature Spacing

Table 4 shows the spacing from the proposed I-10 Beulah Interchange to each adjacent feature. The I-10/CR 64 interchange in Alabama is shown in Table 4, but is not included in the AOI because it is 15.2 miles west of the proposed interchange area. Based on this separation distance, the two interchanges operate independently.

Table 4: Interchange/Connecting Feature Spacing		
Location along I-10	Connecting Feature	Spacing (miles) from Proposed Interchange
CR 64 - Alabama	Diamond Interchange	15.2
I-10/State of Alabama Welcome Center	On- Off-Ramps (westbound)	2.7
I-10/State of Florida Agricultural Inspection Station	On- Off-Ramps (eastbound)	1.1
I-10/State of Florida Weigh Station	On- Off-Ramps	1.2
I-10/State of Florida Welcome Center	On- Off-Ramps (eastbound)	2.1
I-10/US 90A (W. Nine Mile Road)	Diamond Interchange	3.3
I-10/SR 297 (Pine Forest Road)	2-Quadrant Clover Leaf	4.9

As shown in Table 4, the location of the proposed interchange meets the minimum interchange spacing criteria of 3-miles for Area Type 3 (Transitioning Urbanized Areas) as outlined in Florida Rule Chapter 14-97, Florida Administrative Code.

3.5 Existing Traffic Volumes

The Design Traffic Report (Appendix B), as approved February 21, 2019, provides details on the traffic data collection and existing conditions. The existing 2018 AADT and peak hour traffic volumes are shown in Figure 8 and Figure 9, respectively.

AADT, hourly volumes, vehicle classification, daily truck percentages, and directional split factors were obtained from PTMS and TTMS as available from FTO.

The machine count, peak hour TMCs, travel speed, and vehicle classification data was collected on mid-weekdays from 6:00 AM to 9:00 AM and from 4:00 PM to 7:00 PM during the weeks of March 5th and 12th 2018. Machine counts were conducted to collect roadway segment directional hourly volumes for a minimum of 24-hour durations at each location.

Additional TMC and machine counts were taken on September 18, 2018 for Muscogee Road since it was under construction during the initial count period in March of 2018.

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3.6 Existing Signalized Intersections

The following signalized intersections are located within the AOI:

- W. Nine Mile Road at Beulah Road
- W. Nine Mile Road at Heritage Oaks Boulevard
- W. Nine Mile Road at Navy Federal Way
- W. Nine Mile Road at I-10 westbound off-ramp terminus
- Pine Forest Road at Wide Lake Boulevard
- Pine Forest Road at I-10 eastbound off-ramp terminus
- Pine Forest Road at I-10 westbound off-ramp terminus

3.7 Existing Intelligent Transportation Systems (ITS)

Within the AOI, there are ITS devices along I-10 including closed circuit television cameras (CCTV), microwave vehicle detection stations (MVDS), dynamic message signs (DMS), a Truck Parking Availability System (TPAS) sign, and related fiber optic communications and electrical service. The fiber optic communications system runs along I-10, south of the eastbound travel lanes. The following is a listing of existing ITS roadside features within the AOI:

- CCTV (6) at approximately 1 mile spacing
- MVDS (14) at approximately ½ mile spacing
- TPAS (1) along I-10 eastbound upstream of the weigh station
- DMS (1) along I-10 eastbound upstream of the W. Nine Mile Road interchange

3.8 Alternative Transportation Modes

Escambia County Area Transit (ECAT) serves the greater Pensacola area. There is one route (route 47) within the AOI, servicing Pine Forest Road from the downtown Pensacola area to Chellie Road. There are no other alternative transportation modes within the AOI.

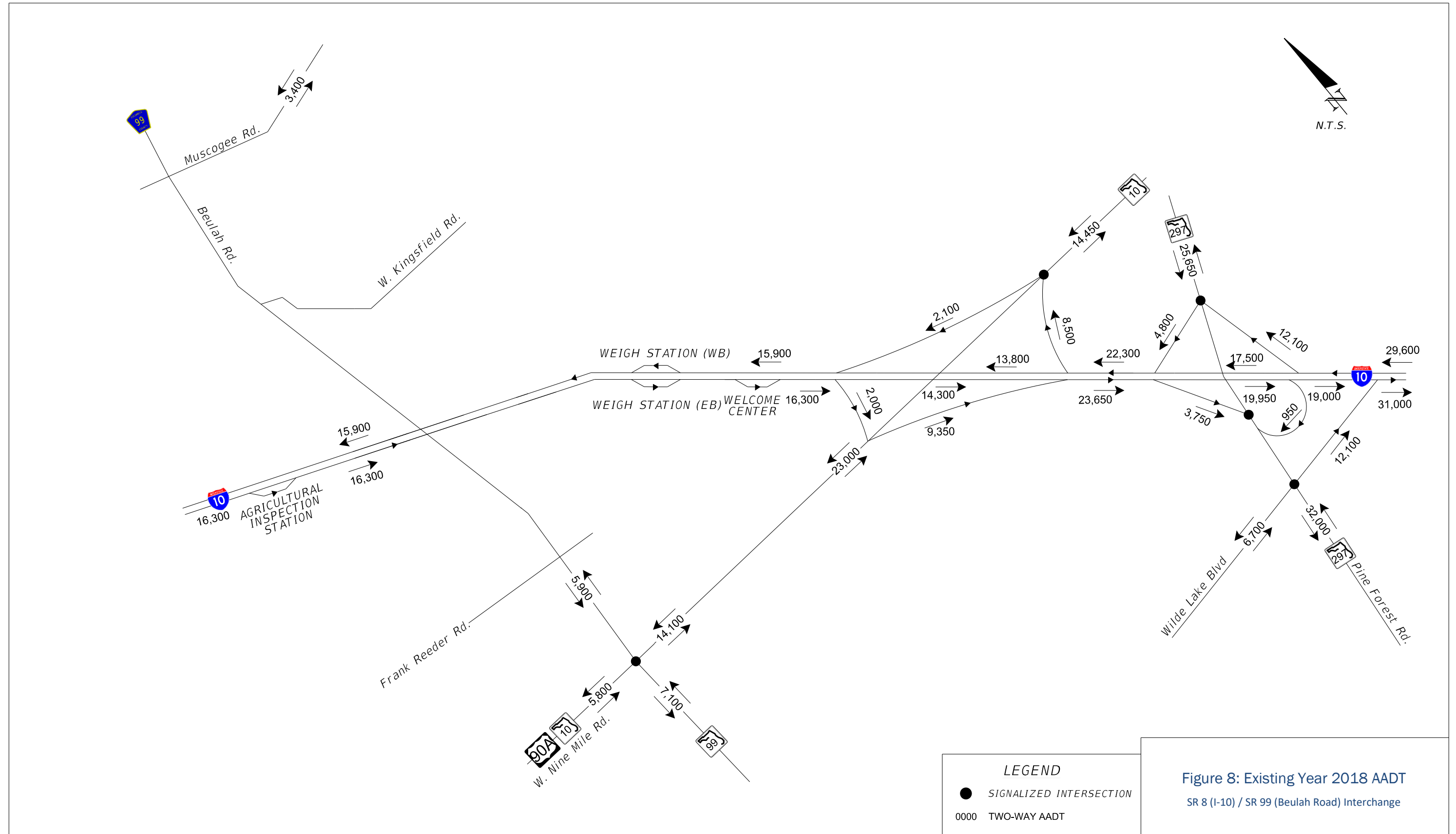
3.9 Consideration of Other Interchange Proposals

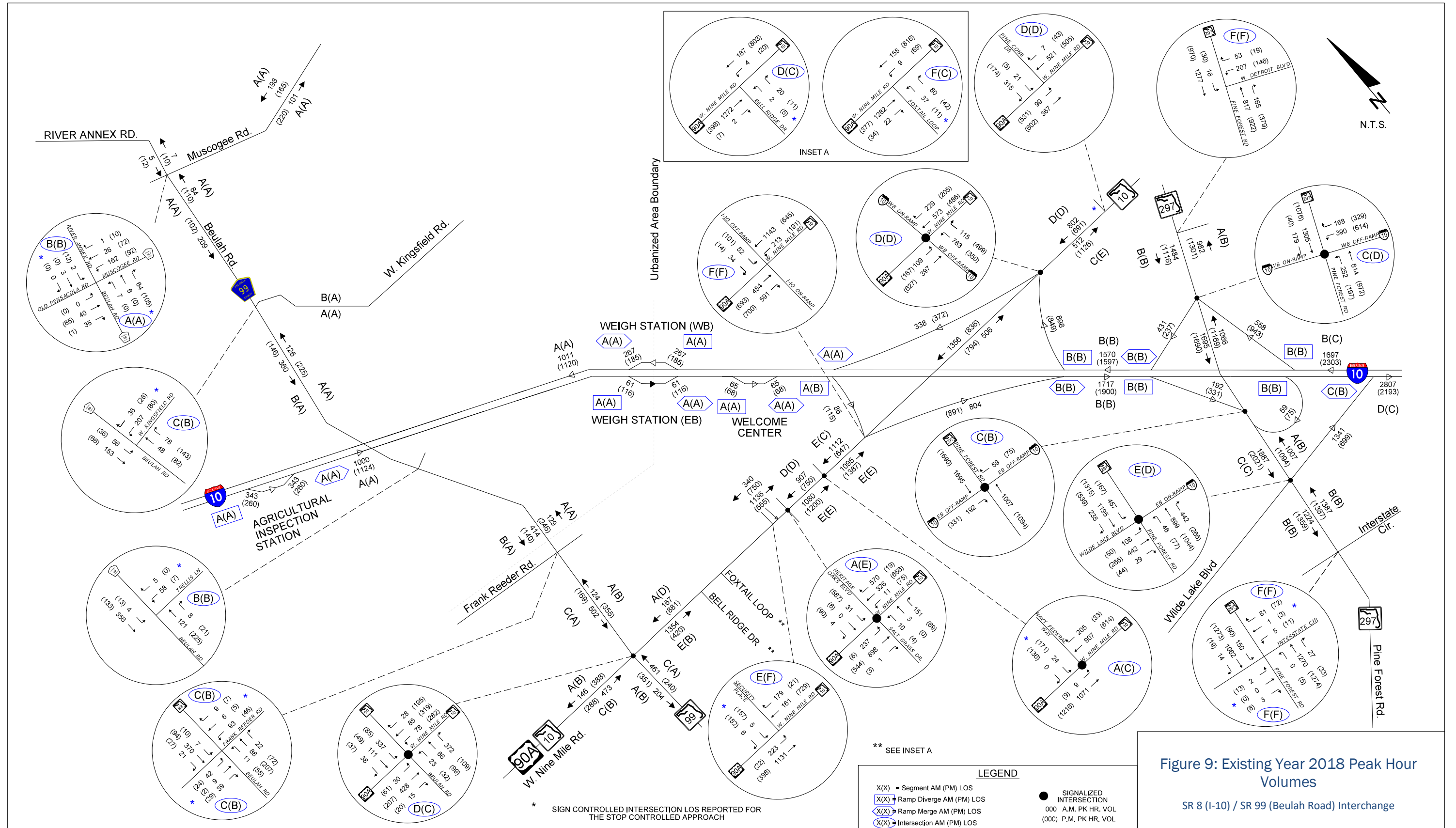
FPID 437905-1: SR 8 (I-10) from the Pensacola Weigh Station to US 29 is examining widening of I-10 and interchange modifications at I-10/W. Nine Mile Road and I-10/Pine Forest Road.

3.10 Existing Operational Performance

An operational analysis for existing conditions was performed for each individual roadway element: basic freeway segments, ramp junctions (merge and diverge areas), arterials, and signalized intersections. Figure 7 shows the existing lane configuration of the I-10 mainline, ramps, and study intersections used in the operational analysis. Figure 9 shows the existing 2018 peak hour volumes and resulting LOS.

The output files for the existing 2018 HCM-based operational analysis are provided in Appendix C: Existing Year 2018 HCS and Synchro Outputs.





3.10.1 Freeway Segment Analysis (2018)

As shown in Table 5, the results of the HCS freeway segments LOS analysis indicate target LOS goals are met for the I-10 mainline for existing year 2018 peak hour conditions.

Table 5: I-10 Freeway Segment LOS (Existing Year 2018)					
Direction	Location	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
I-10 Eastbound	From State Line to Ag. Station	8.2	A	8.6	A
	Between Ramps at Ag. Station	5.3	A	6.6	A
	From Ag. Station to Weigh Station	8.9	A	9.4	A
	Between Ramps at Weigh Station	8.3	A	6.5	A
	From Weigh Station to Welcome Center	5.7	A	6.2	A
	Between Ramps at Welcome Center	8.0	A	8.7	A
	From Welcome Ctr. to W. Nine Mile Rd.	8.9	A	9.9	A
	Between Ramps at W. Nine Mile Rd.	8.1	A	8.8	A
	From W. Nine Mile Rd. to Pine Forest Rd.	15.5	B	16.0	B
	Between Off-Ramps at Pine Forest Rd.	13.8	B	13.2	B
	Between Off-Ramp & On-Ramp at Pine Forest Rd.	13.3	B	12.6	B
From Pine Forest Rd. to US 29	27.6	D	19.0	C	
I-10 Westbound	From US 29 to Pine Forest Rd.	14.2	B	20.6	C
	Between Ramps at Pine Forest Rd.	8.8	A	13.1	B
	From Pine Forest Rd. to W. Nine Mile Rd.	12.3	B	13.9	B
	Between Ramps at W. Nine Mile Rd.	5.3	A	6.5	A
	W. Nine Mile Rd. to Weigh Station	8.4	A	8.8	A
	Between Ramps at Weigh Station	6.2	A	7.4	A
	From Weigh Station to State Line	8.2	A	8.9	A

3.10.2 I-10 Ramp Merge/Diverge LOS (2018)

As shown in Table 6, the results of the HCS I-10 merge/diverge LOS analysis indicate target LOS goals are met for existing year 2018 peak hour conditions.

Table 6: I-10 Ramp Merge/Diverge LOS (Existing Year 2018)					
Direction	Location	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
I-10 Eastbound	to Ag. Station	2.2	A	2.8	A
	from Ag. Station	9.7	A	9.4	A
	to Weigh Station	9.2	A	9.8	A
	from Weigh Station	6.4	A	7.3	A
	to Welcome Center	7.6	A	8.1	A
	from Welcome Center	5.9	A	6.4	A
	to W. Nine Mile Rd.	7.6	A	11.3	B
	from W. Nine Mile Rd.	14.8	B	15.1	B
	to Pine Forest Rd. SB	14.6	B	15.0	B
	to Pine Forest Rd. NB	13.3	B	12.5	B
I-10 Westbound	from Pine Forest Rd.	26.0	C	18.7	B
	to Pine Forest Rd.	10.8	B	18.4	B
	from Pine Forest Rd.	11.9	B	12.9	B
	to W. Nine Mile Rd.	10.3	B	11.8	B
	from W. Nine Mile Rd.	7.8	A	8.4	A
	to Weigh Station	7.2	A	7.8	A
	from Weigh Station	7.4	A	7.4	A

3.10.3 Arterial Segment LOS (2018)

As shown in Table 7, the results of the HCS northbound-southbound arterial LOS analysis indicate target LOS goals are met for existing year 2018 peak hour conditions.

Table 7: Arterial Segment LOS Northbound-Southbound (Existing Year 2018)					
Location	Direction	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Beulah Rd.					
South of W. Nine Mile Rd.	NB	53.8*	C	38.7*	A
	SB	35.8*	A	47.0*	B
W. Nine Mile Rd. to Frank Reeder Rd.	NB	23.9*	A	43.3*	B
	SB	51.1*	C	28.7*	A
Frank Reeder Rd. to Trellis La.	NB	25.4*	A	33.7*	A
	SB	46.1*	B	23.5*	A
Trellis La. to W. Kingsfield Rd.	NB	23.6*	A	32.7*	A
	SB	44.3*	B	26.0*	A
W. Kingsfield Rd. to Muscogee Rd.	NB	18.3*	A	20.9*	A
	SB	31.5*	A	20.0*	A
Pine Forest Rd.					
Interstate Circle to Wilde Lake Blvd.	NB	14.9	B	14.9	B
	SB	13.2	B	14.6	B
Wilde Lake Blvd. to I-10	NB	10.8	A	11.8	B
	SB	20.3	C	21.7	C
I-10 to W. Detroit Blvd.	NB	10.6	A	14.0	B
	SB	16.0	B	12.0	B

* For a 2-lane undivided road, the mid-block section performance is measured in percent time spent following (PTSF).

As shown in Table 8, the results of the HCS eastbound-westbound arterial LOS analysis indicate that several segments of W. Nine Mile Road east of Beulah Road do not meet target LOS goals during existing year 2018 peak hour conditions.

Table 8: Arterial Segment LOS Eastbound-Westbound (Existing Year 2018)					
Location	Direction	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Muscogee Rd.					
East of Beulah Rd.	EB	20.7*	A	31.5*	A
	WB	29.4*	A	28.9*	A
W. Kingsfield Rd.					
East of Beulah Rd.	EB	30.5*	A	35.9*	A
	WB	42.1*	B	27.0*	A
W. Nine Mile Rd.					
West of Beulah Rd.	EB	56.6*	C	44.3*	B
	WB	30.2*	A	51.6*	B
Beulah to Heritage Oaks Blvd.	EB	79.4*	E	49.4*	B
	WB	29.3*	A	68.8*	D
Heritage Oaks Blvd. to Navy Federal Way	EB	76.7*	E	79.3*	E
	WB	72.1*	D	66.9*	D
Navy Federal Way to I-10	EB	76.6*	E	82.3*	E
	WB	77.0*	E	62.2*	C
I-10 to Pinecone Dr.	EB	56.8*	C	77.9*	E
	WB	68.3*	D	65.7*	D

* For a 2-lane undivided road, the mid-block section performance is measured in percent time spent following (PTSF).

3.10.4 Signalized Intersection Operational Analysis (2018)

As shown in Table 9 (2 pages), the results of the HCS signalized intersection LOS analysis indicate that several signalized intersections do not meet target LOS goals during 2018 peak hour conditions. Most of the deficiencies occur at the minor street approaches from Navy Federal Credit Union along W. Nine Mile Road as well as the I-10 interchange areas at W. Nine Mile Road and Pine Forest Road.

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Table 9: Signalized Intersection Operational Analysis (Existing Year 2018)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
W. Nine Mile Rd. at Beulah Rd.	EB	LT	15.6	B	38.7	D	14.2	B	21.2	C
		TH	41.8	D			37.5	D		
		RT	41.8	D			37.5	D		
	WB	LT	16.5	B			15.2	B		
		TH	22.2	C			24.3	C		
		RT	0.1	A			4.1	A		
	NB	LT	51.6	D			43.2	D		
		TH	51.6	D			43.2	D		
		RT	32.6	C			1.7	A		
	SB	LT	57.5	E			25.7	C		
		TH	27.4	C			17.8	B		
		RT	27.4	C			17.8	B		
W. Nine Mile Rd. at Heritage Oaks Blvd.	EB	LT	3.6	A	8.6	A	23.4	C	66.2	E
		TH	10.2	B			46.4	D		
		RT	0.0	A			0.0	A		
	WB	LT	3.2	A			28.3	C		
		TH	7.1	A			46.8	D		
		RT	2.1	A			0.1	A		
	NB	LT	52.3	D			30.5	C		
		TH	16.5	B			0.2	A		
		RT	16.5	B			0.2	A		
	SB	LT	84.2	F			130.6	F		
		TH	84.2	F			130.6	F		
		RT	0.2	A			7.7	A		
W. Nine Mile Rd. at Navy Federal Way	EB	LT	2.0	A	7.1	A	5.6	A	24.2	C
		TH	6.1	A			25.9	C		
	WB	TH	7.6	A			10.4	B		
		RT	2.8	A			5.3	A		
	SB	LT	73.5	E			76.4	E		
		RT	0.0	A			11.4	B		

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Table 9: Signalized Intersection Operational Analysis (Existing Year 2018)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
W. Nine Mile Rd. at I-10 EB Ramps	EB	TH	N/A							
	WB	LT								
		TH								
	SB	LT								
RT										
W. Nine Mile Rd. at I-10 WB Ramps	EB	LT	37.9	D	48.5	D	38.8	D	42.6	D
		TH	32.7	C			33.8	C		
	WB	TH	60.0	E			53.6	D		
	NB	LT	49.4	D			43.5	D		
		RT	49.4	D			43.5	D		
Pine Forest Rd. at I-10 WB Ramps	WB	LT	80.9	F	28.1	C	85.3	F	44.9	D
		RT	11.5	B			54.4	D		
	NB	LT	39.8	D			21.7	C		
		TH	6.8	A			13.2	B		
	SB	TH	28.4	C			53.4	D		
		RT	8.6	A			4.7	A		
Pine Forest Rd. at I-10 EB Ramps	EB	RT	90.8	F	20.3	C	80.6	F	10.1	B
	NB	TH	0.2	A			0.3	A		
		TH	25.0	C			3.1	A		
Pine Forest Rd. at Wilde Lake Blvd.	EB	LT	56.6	E	59.3	E	60.0	E	35.2	D
		TH	113.2	F			94.1	F		
		RT	113.2	F			94.1	F		
	NB	LT	49.5	D			13.4	B		
		TH	56.1	E			23.3	C		
		RT	40.9	D			7.8	A		
	SB	LT	64.0	E			13.0	B		
		TH	55.1	E			46.8	D		
		RT	12.7	B			17.1	B		

¹. Delay measured in seconds per vehicle.

3.10.5 Unsignalized Intersection Operational Analysis (2018)

The results of the HCS unsignalized intersection LOS analysis indicate that several unsignalized intersections do not meet target LOS goals for 2018 peak hour conditions.

As shown in Table 10 (3 pages), the minor street sign-controlled approaches from Foxtail Loop, Security Place, I-10 eastbound ramps, and Pinecone Drive along W. Nine Mile Road; and from W. Detroit Boulevard and Interstate Circle along Pine Forest Road operate at LOS F.

Table 10: Unsignalized Intersection Operational Analysis (Existing Year 2018)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
Beulah Rd. at Muscogee Rd.	EB	LT	0.0	A	0.0	A	0.0	A	0.0	A
		TH	0.0	A			0.0	A		
		RT	0.0	A			0.0	A		
	WB	LT	7.7	A	6.6	A	7.6	A	4.0	A
		TH	0.0	A			0.0	A		
		RT	0.0	A			0.0	A		
	NB	LT	9.8	A	9.8	A	9.3	A	9.3	A
		TH	9.8	A			9.3	A		
		RT	9.8	A			9.3	A		
	SB	LT	13.6	B	13.6	B	13.5	B	13.5	B
		TH	13.6	B			13.5	B		
		RT	13.6	B			13.5	B		
Beulah Rd. at W. Kingsfield Rd.	WB	LT	19.6	C	19.6	C	11.4	B	11.4	B
		RT	19.6	C			11.4	B		
	NB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	7.7	A	2.1	A	7.9	A	2.8	A
		TH	0.0	A			0.0	A		
Beulah Rd. at Trellis Ln.	WB	LT	12.9	B	12.9	B	12.8	B	12.8	B
		RT	12.9	B			12.8	B		
	NB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	7.5	A	0.1	A	8.1	A	0.7	A
		TH	0.0	A			0.0	A		

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Table 10: Unsignalized Intersection Operational Analysis (Existing Year 2018)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
Beulah Rd. at Frank Reeder Rd.	EB	LT	15.9	C	15.9	C	11.7	B	11.7	B
		TH	15.9	C			11.7	B		
		RT	15.9	C			11.7	B		
	WB	LT	21.0	C	21.0	C	14.0	B	14.0	B
		TH	21.0	C			14.0	B		
		RT	21.0	C			14.0	B		
	NB	LT	8.4	A	0.8	A	7.6	A	1.3	A
		TH	0.0	A			0.0	A		
		RT	0.0	A			0.0	A		
	SB	LT	7.5	A	0.1	A	7.9	A	0.6	A
		TH	0.0	A			0.0	A		
		RT	0.0	A			0.0	A		
W. Nine Mile Rd. at Bell Ridge Dr.	EB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	WB	LT	12.4	B	0.3	A	8.3	A	0.2	A
		TH	0.0	A			0.0	A		
	NB	LT	30.0	D	30.0	D	17.1	C	17.1	C
		RT	30.0	D			17.1	C		
W. Nine Mile Rd. at Foxtail Loop	EB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	WB	LT	13.0	B	0.7	A	8.5	A	0.7	A
		TH	0.0	A			0.0	A		
	NB	LT	117.4	F	117.4	F	18.1	C	18.1	C
		RT	117.4	F			18.1	C		
W. Nine Mile Rd. at Security Place	EB	LT	8.8	A	1.5	A	9.8	A	0.5	A
		TH	0.0	A			0.0	A		
	WB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	69.7	F	36.7	E	161.5	F	93.6	F
		RT	9.2	A			23.5	C		

Table 10: Unsignalized Intersection Operational Analysis (Existing Year 2018)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
W. Nine Mile Rd. at I-10 EB Ramps	EB	TH	0.0	A	0.0	A	0.0	A	0.0	A
	WB	LT	9.3	A	1.5	A	10.2	B	2.3	A
		TH	0.0	A			0.0	A		
	SB	LT	335.1	F	208.2	F	174.2	F	154.3	F
		RT	14.1	B			10.6	B		
W. Nine Mile Rd. at Pinecone Dr.	EB	LT	9.1	A	1.9	A	13.3	B	6.2	A
		TH	0.0	A			0.0	A		
	WB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	44.1	E	27.0	D	505.2	F	29.0	D
		RT	25.9	D			15.3	C		
Pine Forest Rd. at W. Detroit Blvd.	WB	LT	631.3	F	505.1	F	333.5	F	296.5	F
		RT	12.0	B			12.0	B		
	NB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	9.8	A	0.1	A	10.3	B	0.3	A
		TH	0.0	A			0.0	A		
Pine Forest Rd. at Interstate Circle	EB	LT	304.7	F	129.6	F	740.4	F	463.8	F
		TH	304.7	F			740.4	F		
		RT	12.9	B			14.4	B		
	WB	LT	75.7	F	75.7	F	235.7	F	235.7	F
		TH	75.7	F			235.7	F		
		RT	75.7	F			235.7	F		
	NB	LT	0.0	A	0.0	A	12.5	B	0.0	A
		TH	0.0	A			0.0	A		
		RT	0.0	A			0.0	A		
	SB	LT	16.5	C	2.0	A	14.5	B	0.9	A
		TH	0.0	A			0.0	A		
		RT	0.0	A			0.0	A		

1. Delay measured in seconds per vehicle.

3.11 Existing Safety Performance

3.11.1 Crash Data Sources

Historic crash data was collected for a five-year period from 2013-2017. The data was collected from two sources: 1) FDOT Crash Analysis Reporting System (CARS), and 2) Signal Four Analytics.

CARS is the official FDOT crash record database. The CARS database includes validated crashes on all public roads that have been reported using a long-form report. Due to the extensive amount of data, there is typically a lag in producing validated reports. For instance, the 2013-2017 data has been fully validated, and validation of 2018 data is only 45% complete. In addition, CARS datasets include location data for state roads only. The CARS crash data reports are included in Appendix D: Crash Data (FDOT Crash Analysis Reporting System).

Signal Four Analytics is an interactive web-based geospatial crash analytical tool, developed by and hosted at University of Florida, Geoplan Center. The tool provides up-to-date crash data as it is reported by law enforcement to the Department of Highway Safety and Motor Vehicles. The tool has various crash analysis functions to evaluate the data spatially and provides the same type of information as CARS on various characteristics associated with each crash including crash type, severity, weather conditions, and contributing factors, but location data has not been checked to the same level of detail as CARS. Signal Four also provides location data for off-system roads such as Beulah Road and Muscogee Road.

A comparison of the CARS and Signal Four Analytics datasets was conducted to validate the 2013-2017 Signal Four Analytics data as a reliable tool to provide high-level graphic representations of crash statistics including cluster analysis, and analysis of crash types by location.

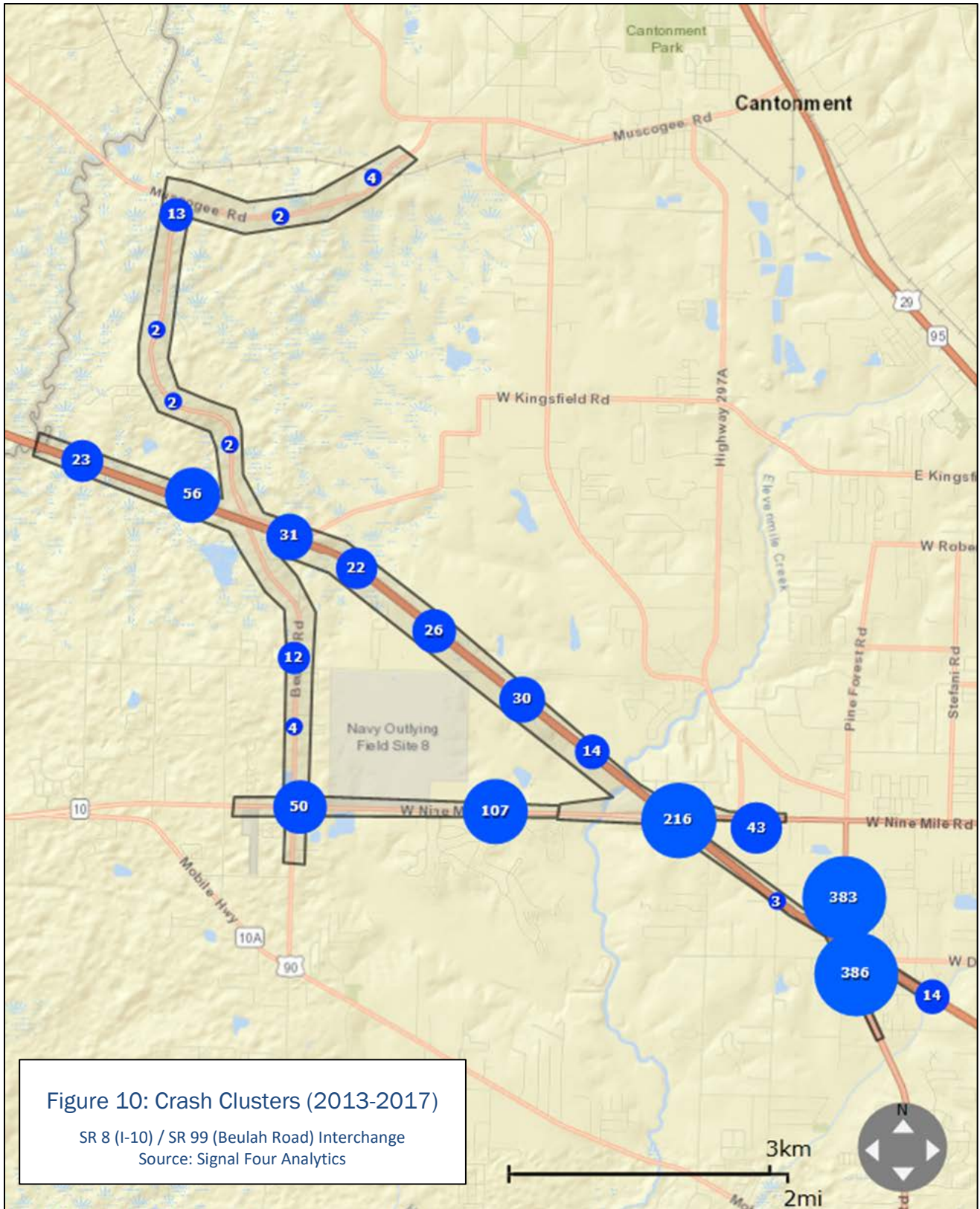
3.11.2 Crash Data Analysis

The Signal Four Analytics crash cluster analysis shown in Figure 10 indicates the majority of crashes occur at the I-10/W. Nine Mile Road and I-10/Pine Forest Road interchange areas. The three clusters shown at the interchanges account for approximately 68% of the crashes within the AOI. Two additional less severe crash clusters are shown at the W. Nine Mile Road/Beulah Road and W. Nine Mile Road/Heritage Oaks Boulevard intersections.

Figure 11 shows the crash types by severity for the study area. Most of the accidents reported were rear end, off-road, and same direction side swipes. Rear end and sideswipe crashes typically reflect congested traffic flow conditions, motorists following too closely, frequently accelerating and/or decelerating, and unsafe lane changes. Off-road crashes typically reflect non-standard shoulder width, roadway alignment with curve, and roadways with fewer lanes.

Most of the high-severity and fatal crashes consisted of rear end, off road, right angle, and left entering/leaving type crashes. Right angle crashes are prone to be severe at signalized intersections. Left entering/leaving type crashes typically occur where there is a high density of access points and congested or high-speed conditions.

There were nine pedestrian/bicycle related crashes within the project limits during the 5-year analysis period including two along Beulah Road (one fatality), one along W. Nine Mile Road, one along I-10, and five along Pine Forest Road in the vicinity of the I-10 interchange.



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	No Injury	Non-Traffic Fatality	Possible Injury	Non-Incapacitating Injury	Incapacitating Injury	Fatal (within 30 days)
Animal	13		3	1		
Backed Into	18		2			
Bicycle			1	1		
Head On			5	2		
Left Entering	26		15	19	2	
Left Leaving	21		3	4		1
Left Rear	13		4	2	1	
Off Road	164		34	24	2	2
Opposing Sideswipe	9		2	2		
Other	35		11	5	1	
Parked Vehicle	39		2	1	2	
Pedestrian	1		2	1	2	1
Rear End	423		132	61	19	1
Right Angle	40		10	15	5	1
Right/Left	1					
Right/Through	8		5	1	1	
Right/U-Turn	1					
Rollover	12		9	11	1	
Same Direction Sideswipe	97		7	5	1	
Single Vehicle	41		6	5	5	
Unknown	11		5	3	3	

Figure 11: Crash Type/Severity (2013-2017)
 SR 8 (I-10) / SR 99 (Beulah Road) Interchange
 Source: Signal Four Analytics

The following sections provide a summary of crashes by roadway.

SR 8 (I-10):

Most crashes along I-10 occur at ramp merge/diverge areas including the Agricultural Inspection Station, Weigh Station, W. Nine Mile Road interchange and Pine Forest Road interchange. The most common crash types are rear end and off-road type crashes.

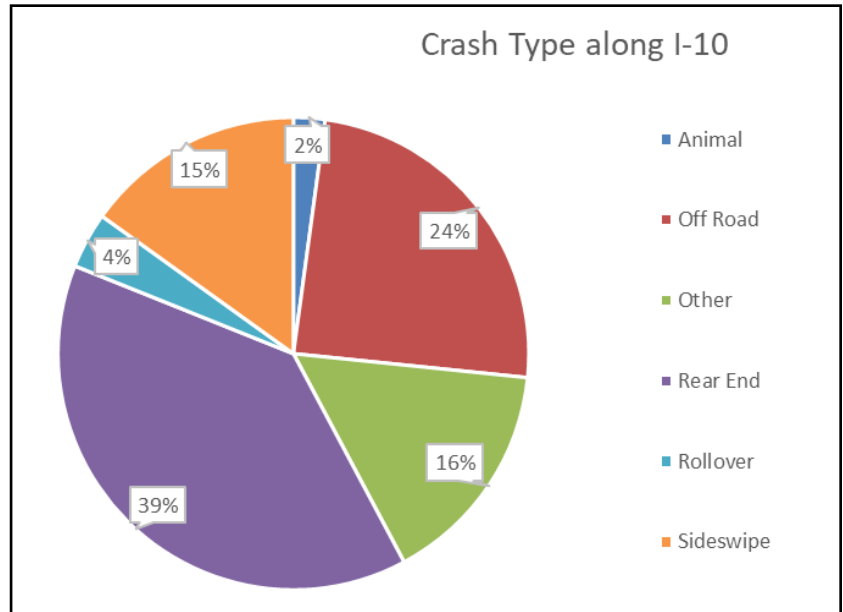


Figure 12: Crash Types along I-10

SR 99 (Beulah Road):

The majority of crashes along Beulah Road occurred at the W. Nine Mile Road and Frank Reeder Road intersections. The most common crash types are rear end and off-road type crashes.

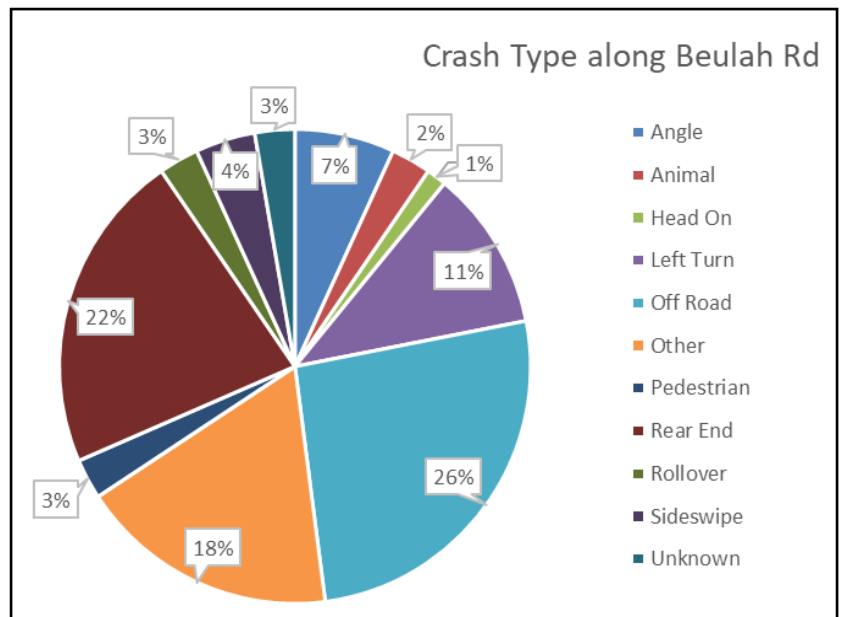


Figure 13: Crash Types along Beulah Road

SR 10/US 90A (W. Nine Mile Road):

Most crashes along W. Nine Mile Road occurred at the Beulah Road and Heritage Oaks Boulevard intersections and at the I-10 interchange. The most common crash types are rear end and left turn type crashes.

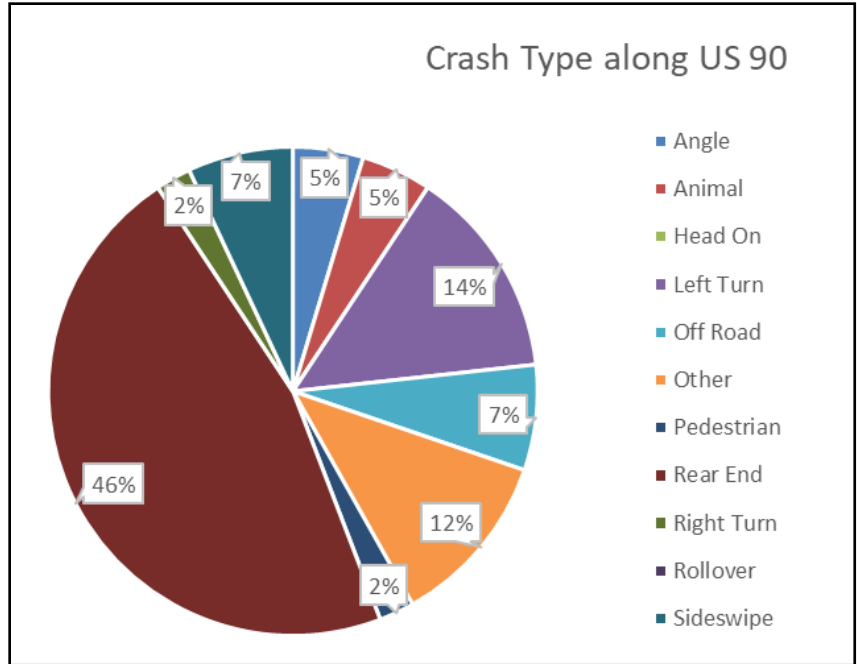


Figure 14: Crash Types along US 90

SR 297 (Pine Forest Road):

Most crashes along Pine Forest Road occurred at the I-10 interchange. The most common crash types are rear end and left turn type crashes.

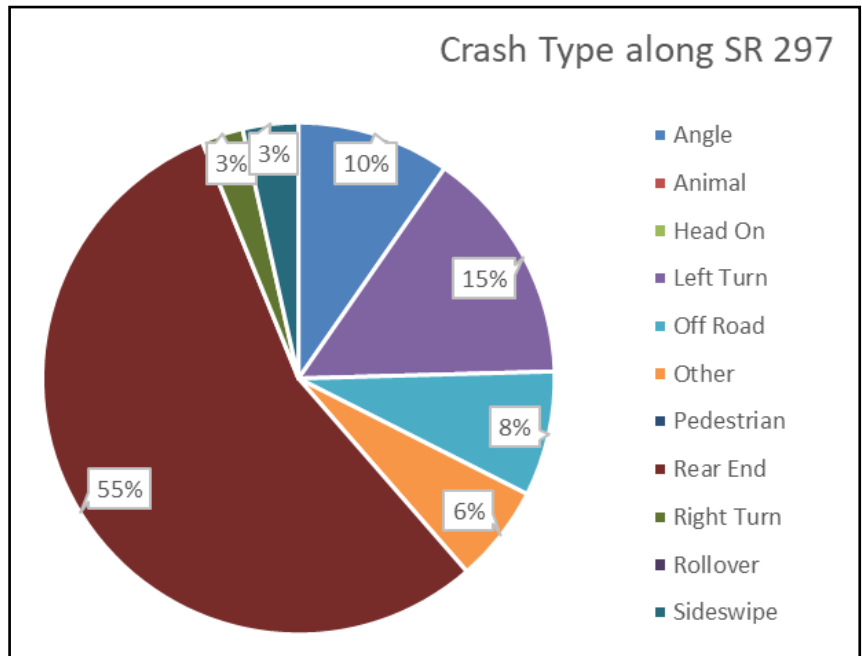


Figure 15: Crash Types Along SR 297

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4.0 FUTURE NO-BUILD CONDITIONS

4.1 Future Land Use

The future land use primarily consists of public owned land and rural communities on the west end of the AOI. Further north, toward Muscogee Road, the land use is mostly agricultural. The area surrounding Beulah Road and along I-10 east of Beulah Road is primarily mixed use-suburban which transitions to mixed use-urban east of the Pensacola Weigh Station.

The Escambia County future 2030 land use map is shown in Figure 16.

4.2 Future Transportation Demand

A significant traffic generator located along W. Nine Mile Road is the Navy Federal Credit Union (see Figure 17). The Navy Federal Credit Union is currently the area's largest employer at 8,200 employees and growing. According to a local news journal published November 7, 2019, the company is ahead of schedule in its effort to reach 10,000 employees by 2026.

The area is also experiencing significant residential and retail growth. To plan for this growth consistent with Escambia County's growth management policies, the Escambia County Sector Plan was adopted by the County and is anticipated to result in an increase of up to 23,500 residential units in the area by 2035. This increase in population, along with associated growth in employment (such as Navy Federal Credit Union), would greatly influence and increase travel demand on area roads, estimated at 371,000 additional trips per day. The future development of the Escambia County Sector Plan will need to be supported by an interconnected, multi-modal transportation system that efficiently links housing with employment and retail centers. The proposed hierarchical transportation system would be anchored by the Beulah Road at I-10 interchange. I-10 is a designated SIS facility and is a vital component of the larger statewide transportation network needed to efficiently move passengers and freight.

In addition, there are several residential developments under construction within the AOI including Deer Run (379 lots) south of I-10 along Beulah Road, Sonoma Ridge (78 lots) south of Frank Reeder Road along Beulah Road, and Jennings Place (237 lots) and Stonebrook Estates (69 lots) east of Beulah Road along Frank Reeder Road. There are also numerous other planned developments including Kaheeley Ridge, Daniels Grove, Beulah Gardens Estates, and Mills Lake along Beulah Road within the AOI as shown in Figure 18.

4.3 Future Transportation Network

The future transportation network assumptions are based on the FATPO 2045 LRTP Cost Feasible Plan (see Appendix E). The No-Build roadway network includes all programmed projects listed in the FATPO's 2045 Cost Feasible Plan, except for the proposed I-10/Beulah interchange project.

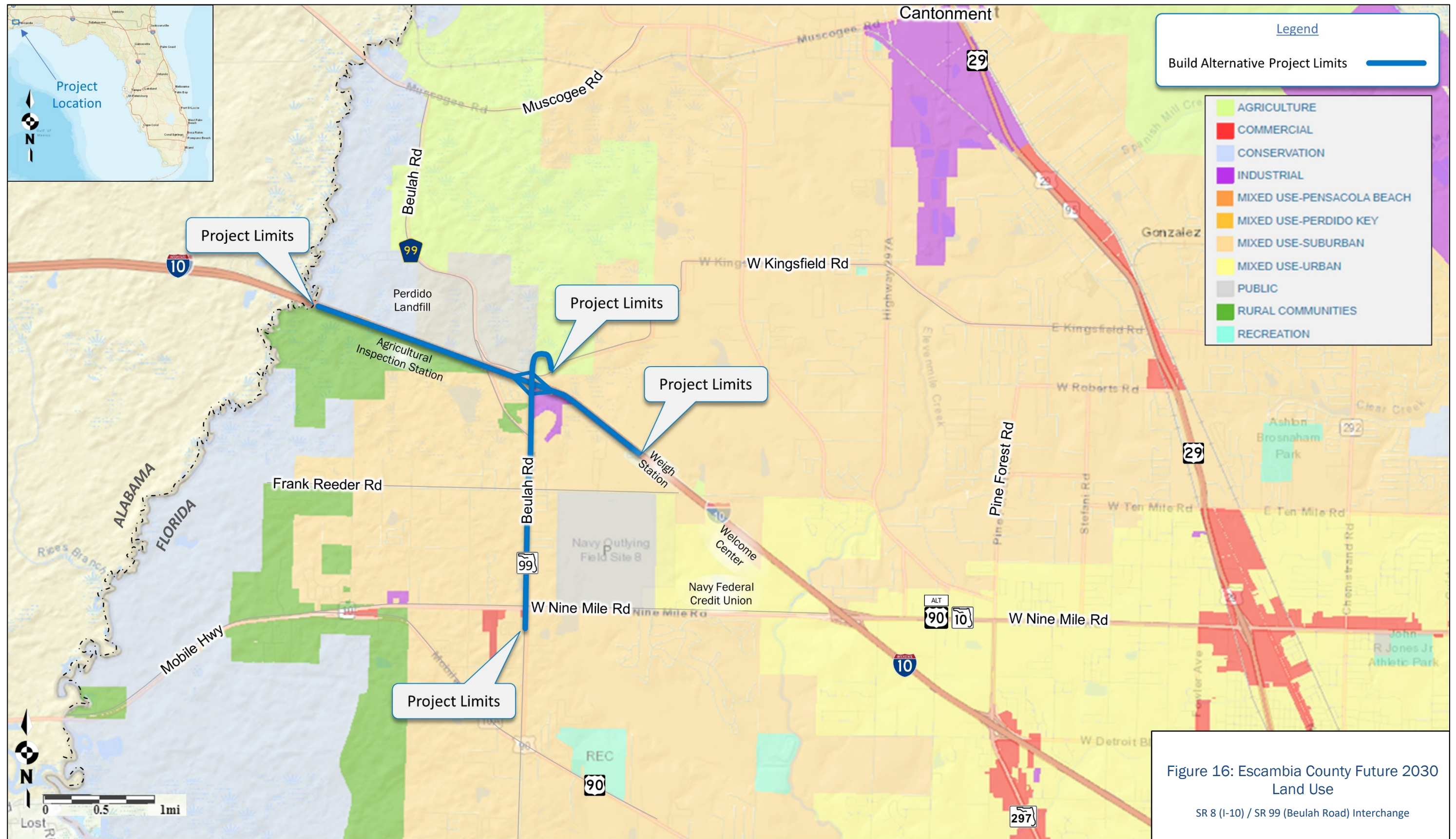
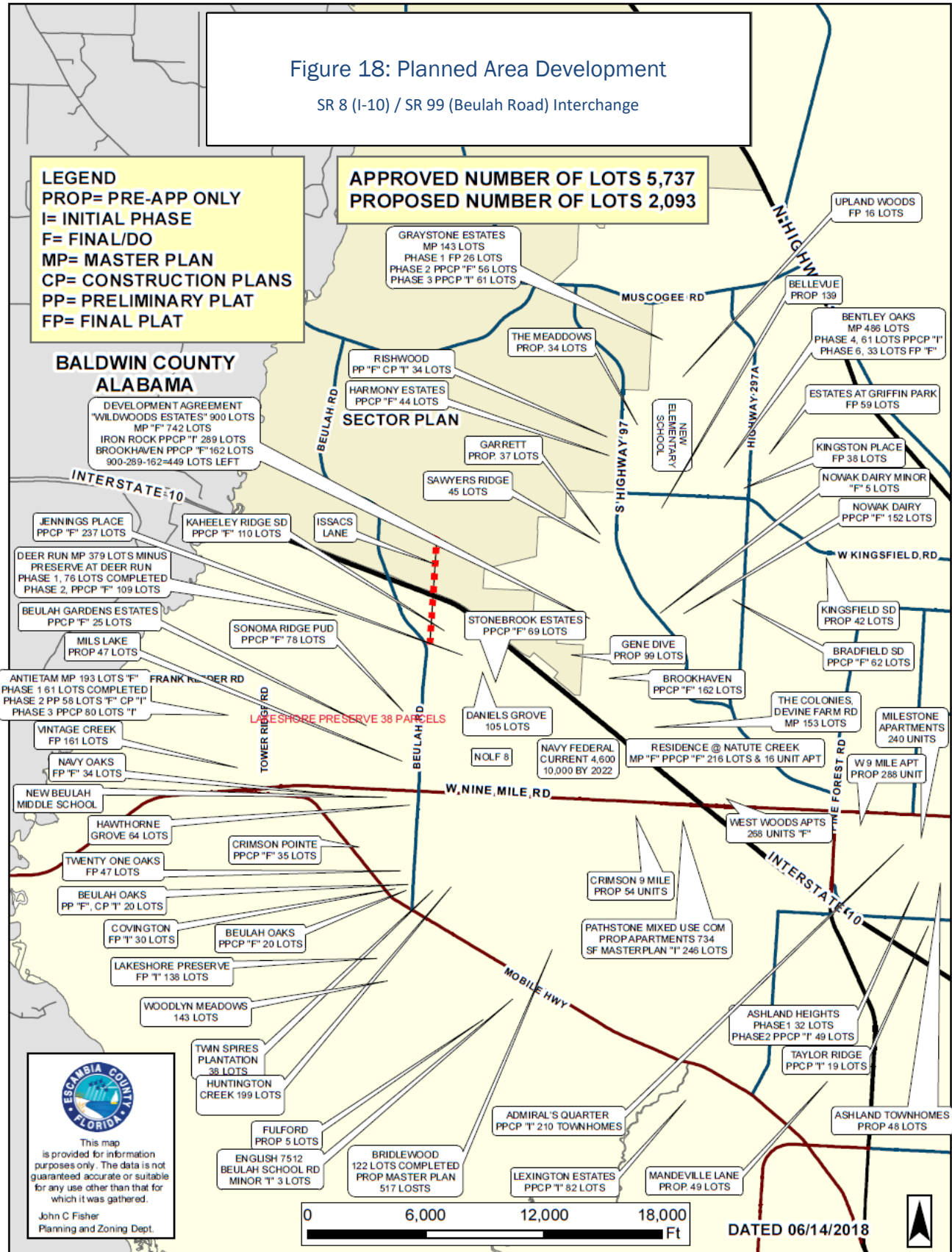




Figure 17: Navy Federal Credit Union
SR 8 (I-10) / SR 99 (Beulah Road) Interchange



SR 8 (I-10) / SR 99 (Beulah Road) Interchange
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4.3.1 2045 Cost Feasible Plan Capacity Improvements

For purposes of traffic forecasting and operational analysis, all capacity improvement projects included in the FATPO's Cost Feasible Plan are assumed to be constructed by the Opening Year as summarized in Table 11, and shown in Figure 19.

Project ID	Roadway	Improvement	Alternative	Opening Year
A	I-10/Beulah Interchange	Widen I-10 to 6 Lanes and New Interchange at SR 99	Build	2025
B	SR 99 (Beulah Road)	Widen to 4 lanes from SR 10 to New I-10/SR 99 Interchange	Build	2025
C ¹	SR 10 (W. Nine Mile Road)	Widen from 2 to 4 Lanes from Beulah Road to US 29	No-Build & Build	2025
D	I-10/US 90A Interchange	Widen I-10 to 6 Lanes and Reconstruct US 90 Interchange	No-Build & Build	2045
E	I-10/SR 297 Interchange	Widen I-10 to 6 Lanes and Reconstruct US 90 Interchange	No-Build & Build	2045
F	Beulah Beltway/ US 29 Connector	New 4-Lane Facility from North of I-10 to Muscogee Road	No-Build & Build	2045
G ²	Beulah Beltway/ US 29 Connector	New 4-Lane facility from North of I-10 to US 29	No-Build & Build	2045
H ³	SR 10 (W. Nine Mile Road)	Widen to 6 Lanes from Mobile Highway to Pine Forest Road	No-Build & Build	2045
I	SR 297 (Pine Forest Road)	Widen from 3 to 4 lanes from I-10 to CR 297A	No-Build & Build	2045

1. The W. Nine Mile Road widening to 4 lanes project (Project C in the table above) is currently under construction. The geometry used in the year 2025 analysis is based on the exhibits shown in Appendix F.
2. Included in the Cost Feasible element of the previously adopted LRTP dated August 2, 2019 and current 2045 Needs Plan as US 29 Connector.
3. Capacity analysis assumes widening to 4 lanes in 2035 based on August 2, 2019 adopted Cost Feasible Plan as shown in Appendix F.



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For projects with ongoing PD&E studies within the AOI (Projects D, E and F as shown in Table 11) the operational analysis accounts for mainline widening only. Specific intersection and interchange improvements for these projects have not been determined and are being studied separately as discussed in Section 2.3.

The resulting future No-Build Alternative lane configurations are shown in Figure 20 and Figure 21 for years 2025 and 2045, respectively.

4.4 Future No-Build Alternative Traffic Volumes

Future year traffic volumes for this study were developed using the Northwest Florida Regional Planning Model (NWFRPM), Version 2.1 as modified for this project. The model produced AADT output for the following analysis years:

- Opening Year: 2025
- Horizon Year: 2045

Future year traffic volumes were developed in three general steps as follows:

- Generated balanced AADT for each year/scenario based on NWFRPM outputs;
- Used NWFRPM output to calculate future year AM and PM peak hour directional volumes by applying the Standard K factor and D factor; and
- Refined the traffic directionality to reflect anticipated future travel pattern changes due to the proposed improvements and balanced the resulting volumes using trip distribution tables.

Additional detail can be found in Appendix B: Design Traffic Report as approved on February 21, 2019.

Future No-Build Alternative opening year 2025 and design year 2045 AADT volumes are shown in Figure 22. Future No-Build Alternative peak hour volumes for opening year 2025 and design year 2045 are shown Figure 23 and Figure 24, respectively.

4.5 Future No-Build Alternative Operational Performance

An operational analysis for the future No-Build Alternative conditions was performed for each individual roadway element: basic freeway segments, ramp junctions (merge and diverge areas), arterials signalized intersections, and unsignalized intersections. Future No-Build Alternative peak hour volumes and resulting LOS for opening year 2025 and design year 2045 are shown in Figure 23 and Figure 24, respectively.

The output files for the future No-Build Alternative HCM-based operational analysis are provided in Appendix G.

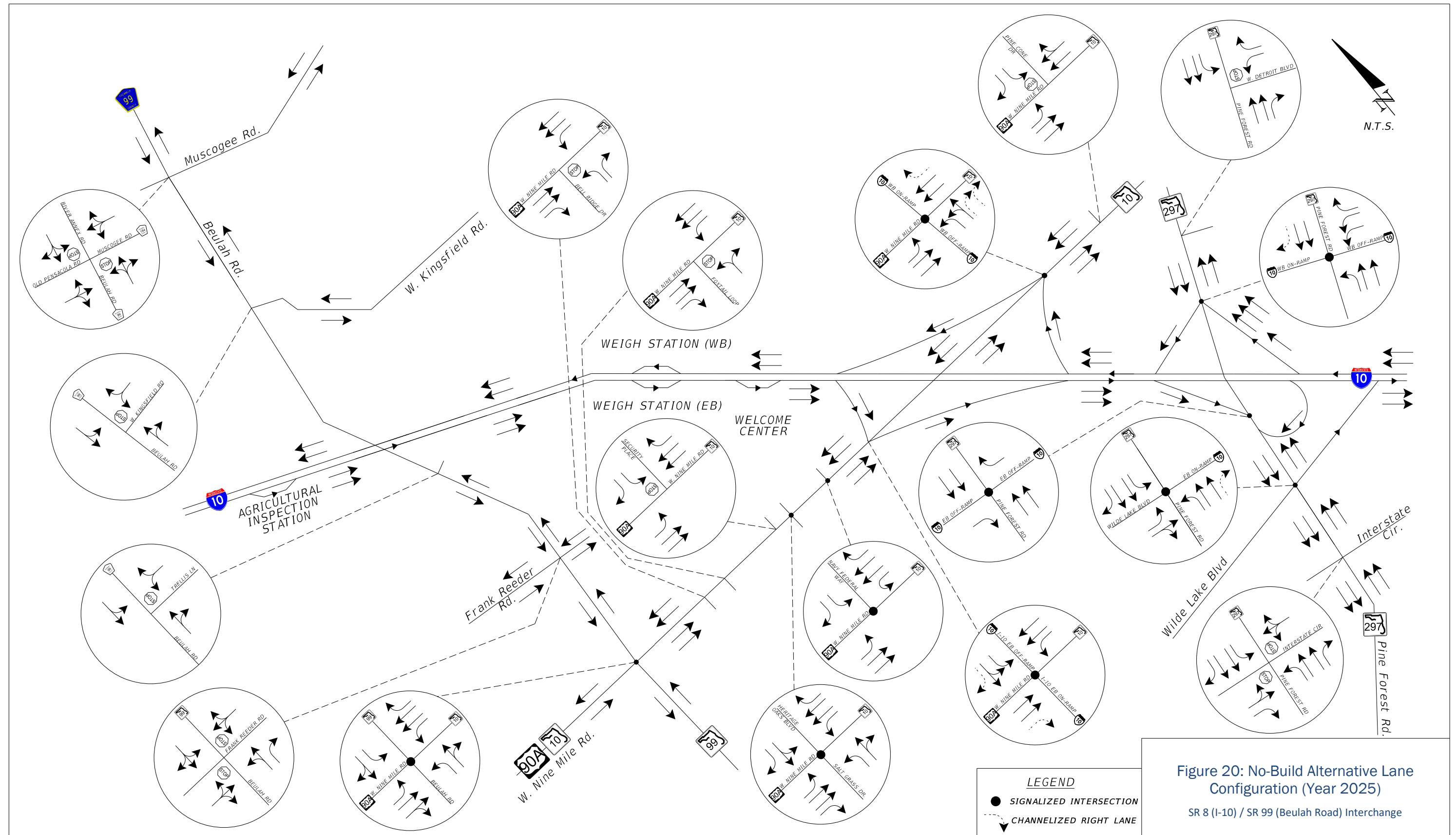


Figure 20: No-Build Alternative Lane Configuration (Year 2025)
SR 8 (I-10) / SR 99 (Beulah Road) Interchange

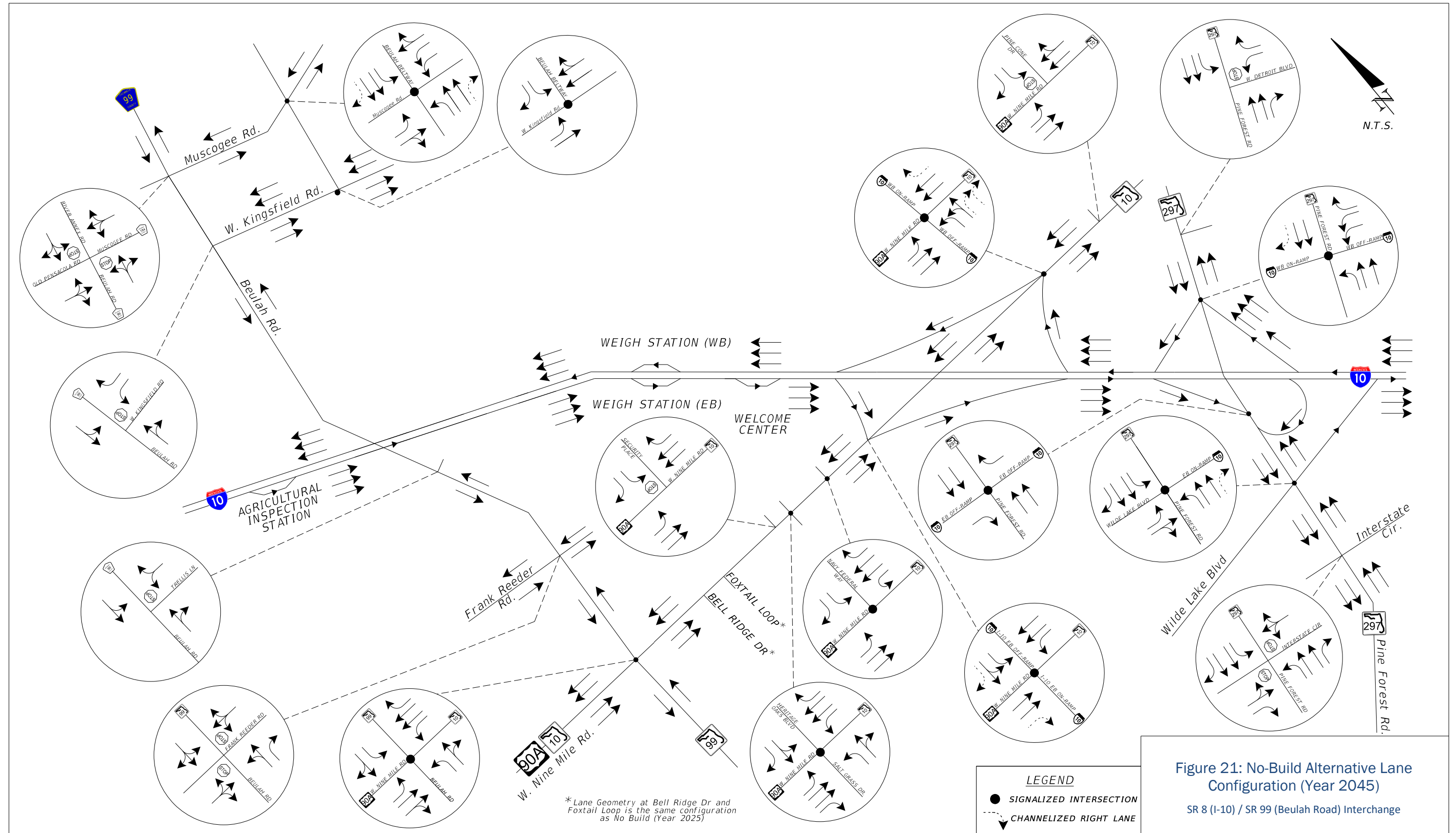
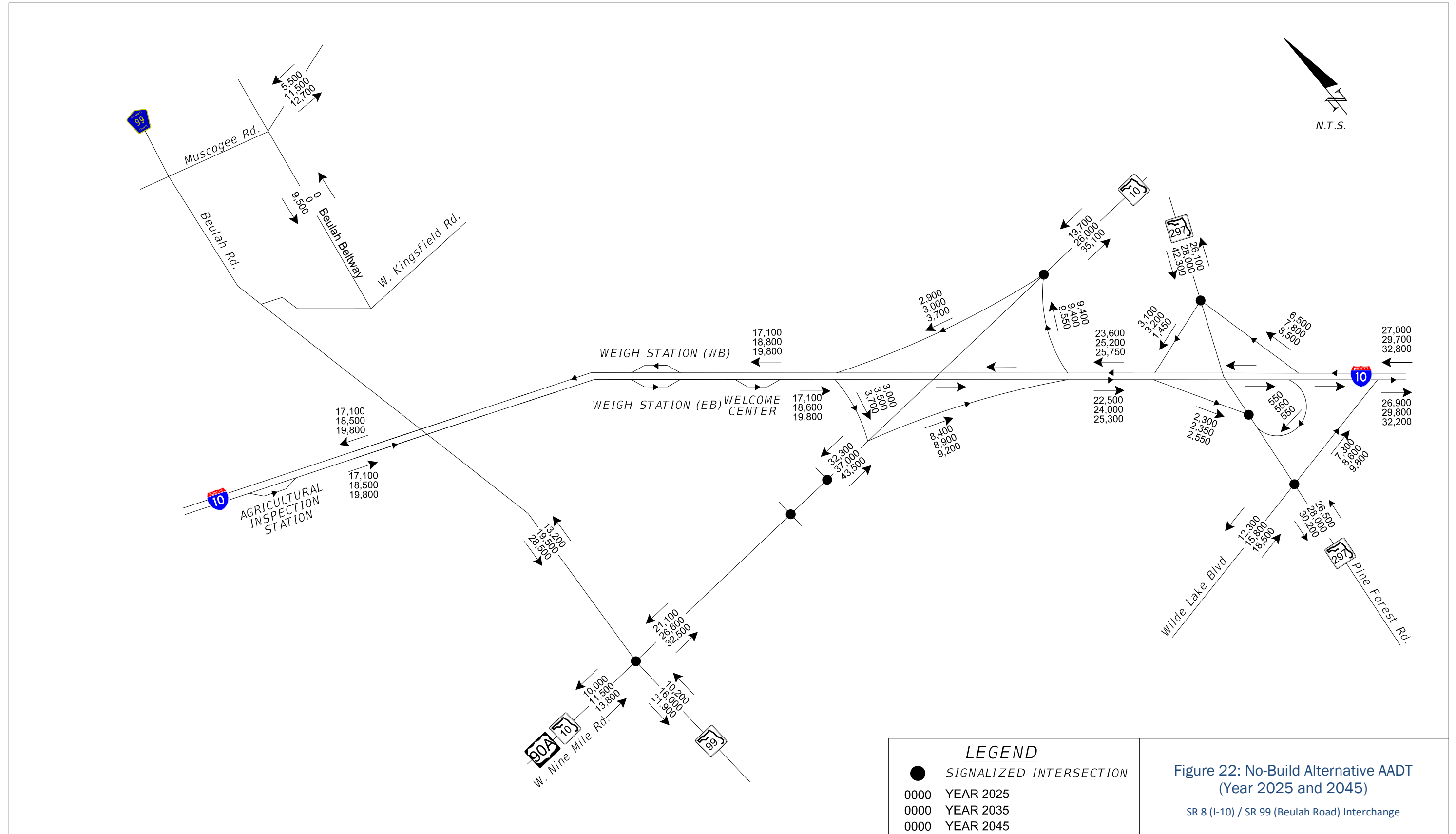
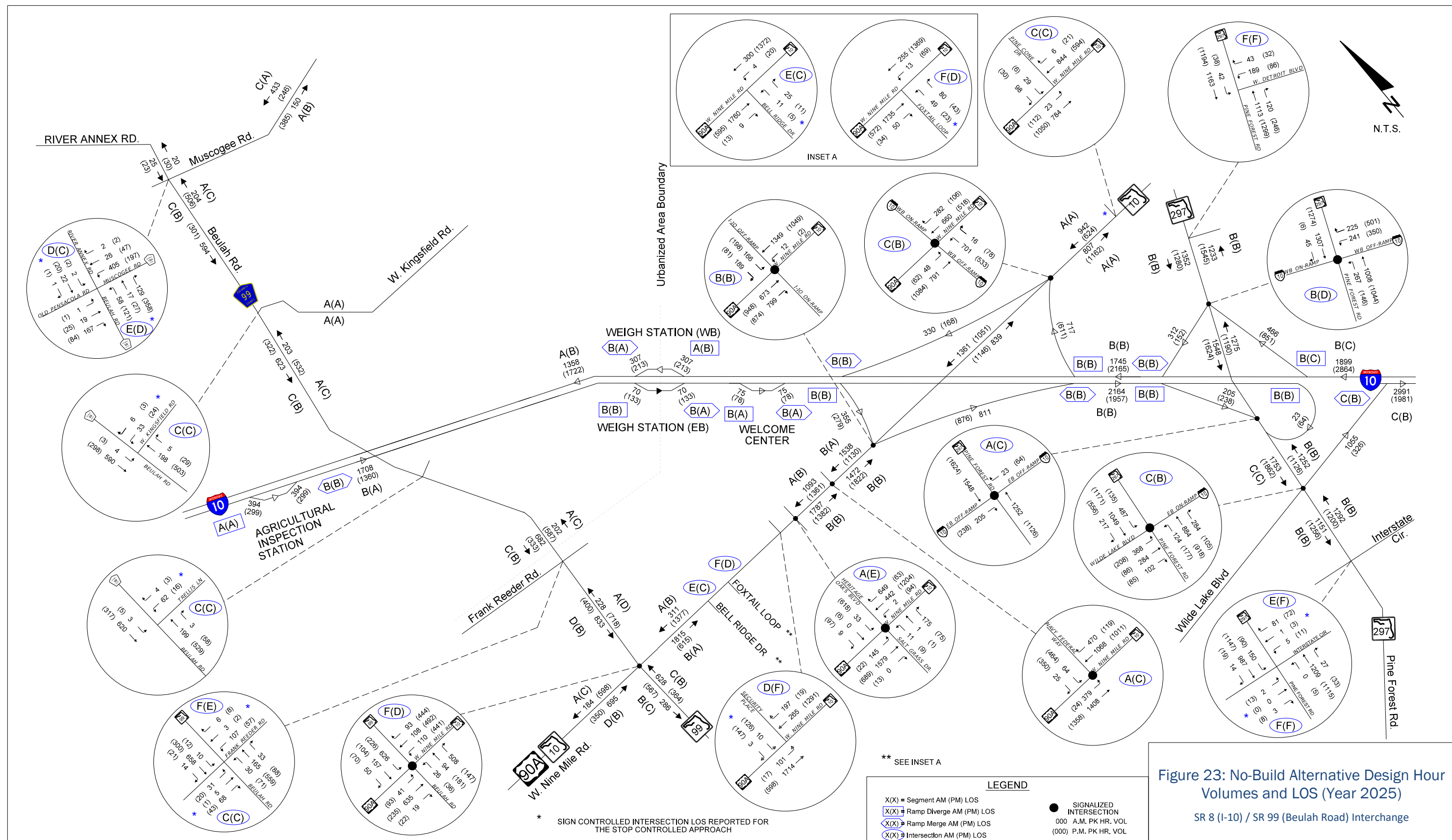
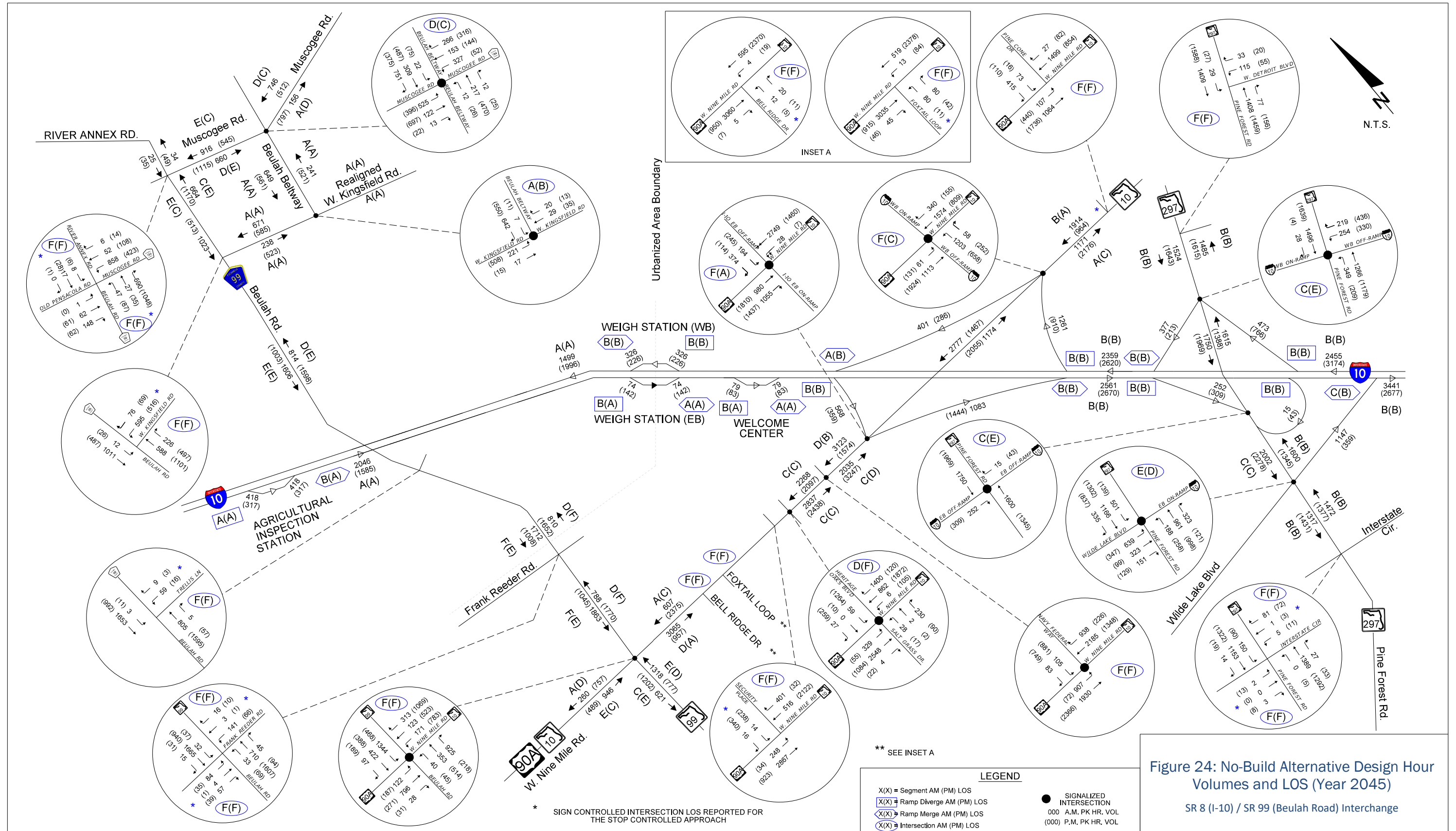


Figure 21: No-Build Alternative Lane Configuration (Year 2045)
SR 8 (I-10) / SR 99 (Beulah Road) Interchange







4.5.1 Freeway Segment Analysis (2025 No-Build)

As shown in Table 12, the results of the HCS freeway segments LOS analysis show target LOS goals would be met for the I-10 mainline segments for opening year 2025 No-Build Alternative peak hour conditions.

Table 12: I-10 Freeway Segments LOS (2025 No-Build)

Direction	Location	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
I-10 Eastbound	From State Line to Ag. Station	12.9	B	10.2	A
	Between Ramps at Ag. Station	9.9	A	8.0	A
	From Ag. Station to Weigh Station	12.9	B	10.2	A
	Between Ramps at Weigh Station	12.3	B	9.2	A
	From Weigh Station to Welcome Center	8.6	A	6.8	A
	Between Ramps at Welcome Center	12.3	B	9.7	A
	From Welcome Ctr to W. Nine Mile Rd.	12.9	B	10.2	A
	Between Ramps at W. Nine Mile Rd.	10.2	A	8.1	A
	From W. Nine Mile Rd. to Pine Forest Rd.	16.4	B	14.8	B
	Between Off-Ramps at Pine Forest Rd.	14.8	B	12.9	B
	Btw Off-Ramp & On-Ramp at Pine Forest Rd.	14.6	B	12.5	B
From Pine Forest Rd. to US 29	24.2	C	14.9	B	
I-10 Westbound	From US 29 to Pine Forest Rd.	14.3	B	22.9	C
	Between Ramps at Pine Forest Rd.	10.8	A	15.2	B
	From Pine Forest Rd. to W. Nine Mile Rd.	13.1	B	16.4	B
	Between Ramps at W. Nine Mile Rd.	7.7	A	11.7	B
	W. Nine Mile Rd. to Weigh Station	10.2	A	13.0	B
	Between Ramps at Weigh Station	7.9	A	11.4	B
	From Weigh Station to State Line	10.2	A	13.0	B

4.5.2 I-10 Ramp Merge/Diverge LOS (2025 No-Build)

As shown in Table 13, the results of the HCS I-10 merge/diverge LOS analysis indicate target LOS goals would be met for opening year 2025 No-Build Alternative peak hour conditions.

Table 13: I-10 Ramp Merge/Diverge LOS (2025 No-Build)					
Direction	Location	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
I-10 Eastbound	to Ag. Station	2.3	A	4.6	A
	from Ag. Station	15.0	B	11.3	B
	to Weigh Station	15.0	B	11.6	B
	from Weigh Station	11.7	B	9.0	A
	to Welcome Center	13.3	B	9.9	A
	from Welcome Center	11.1	B	8.1	A
	to W. Nine Mile Rd.	13.4	B	13.2	B
	from W. Nine Mile Rd.	17.0	B	15.1	B
	to Pine Forest Rd. SB	17.0	B	15.0	B
	to Pine Forest Rd. NB	15.8	B	13.5	B
I-10 Westbound	from Pine Forest Rd.	24.9	C	16.4	B
	to Pine Forest Rd.	12.9	B	22.3	C
	from Pine Forest Rd.	13.6	B	17.4	B
	to W. Nine Mile Rd.	12.2	B	16.3	B
	from W. Nine Mile Rd.	10.4	B	13.7	B
	to Weigh Station	10.0	A	13.5	B
from Weigh Station	10.1	B	9.5	A	

4.5.3 Arterial Segment LOS (2025 No-Build)

As shown in Table 14, the results of the HCS northbound-southbound arterial LOS analysis indicate target LOS goals would be met for opening year 2025 No-Build Alternative peak hour conditions.

Table 14: Arterial Segment LOS Northbound-Southbound (2025 No-Build)					
Location	Direction	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Beulah Rd.					
South of W. Nine Mile Rd.	NB	63.2*	C	50.2*	B
	SB	44.5*	B	60.9*	C
W. Nine Mile Rd. to Frank Reeder Rd.	NB	36.8*	A	64.6*	D
	SB	67.7*	D	49.9*	B
Frank Reeder Rd. to Trellis La.	NB	33.8*	A	58.7*	C
	SB	62.0*	C	44.9*	B
Trellis La. to W. Kingsfield Rd.	NB	33.7*	A	56.9*	C
	SB	60.4*	C	44.8*	B
W. Kingsfield Rd. to Muscogee Rd.	NB	34.9*	A	55.0*	C
	SB	58.6*	C	43.1*	B
Pine Forest Rd.					
Interstate Circle to Wilde Lake Blvd.	NB	14.0	B	13.0	B
	SB	12.5	B	13.6	B
Wilde Lake Blvd. to I-10	NB	13.6	B	12.2	B
	SB	19.0	C	20.2	C
I-10 to W. Detroit Blvd.	NB	13.4	B	16.8	B
	SB	14.7	B	13.9	B

* For a 2-lane undivided road, the mid-block section performance is measured in percent time spent following (PTSF).

As shown in Table 15, the results of the HCS eastbound-westbound arterial LOS analysis indicate that target LOS goals would be met for opening year 2025 No-Build Alternative peak hour conditions.

Table 15: Arterial Segment LOS Eastbound-Westbound (2025 No-Build)					
Location	Direction	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Muscogee Rd.					
East of Beulah Rd.	EB	27.9*	A	47.2*	B
	WB	49.2*	C	37.5*	A
W. Kingsfield Rd.					
East of Beulah Rd.	EB	5.7*	A	12.9*	A
	WB	14.6*	A	11.6*	A
W. Nine Mile Rd.					
West of Beulah Rd.	EB	67.0*	D	49.3 *	B
	WB	34.8*	A	63.1 *	C
Beulah to Heritage Oaks Blvd.	EB	16.6	B	5.6	A
	WB	2.4	A	13.1	B
Heritage Oaks Blvd. to Navy Federal Way	EB	16.3	B	12.6	B
	WB	10.0	A	12.4	B
Navy Federal Way to I-10	EB	13.4	B	16.6	B
	WB	14.0	B	10.3	A
I-10 to Pinecone Dr.	EB	7.4	A	10.6	A
	WB	8.6	A	5.7	A

* For a 2-lane undivided road, the mid-block section performance is measured in percent time spent following (PTSF).

4.5.4 Signalized Intersection Operational Analysis (2025 No-Build)

As shown in Table 16 (2 pages), the results of the HCS signalized intersection LOS analysis indicate that target LOS goals would be met for the majority of signalized intersections in opening year 2025 No-Build Alternative peak hour conditions. The W. Nine Mile Road at Beulah Road intersection would fail in the AM condition. Other specific movements at the minor street approaches from Navy Federal Credit Union along W. Nine Mile Road as well as the I-10 interchange areas at W. Nine Mile Road and Pine Forest Road would not meet target LOS goals.

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Table 16: Signalized Intersection Operational Analysis (2025 No-Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
W. Nine Mile Rd. at Beulah Rd.	EB	LT	38.2	D	113.6	F	24.1	C	38.9	D
		TH	96.5	F			46.9	D		
		RT	96.5	F			46.9	D		
	WB	LT	71.9	E			27.8	C		
		TH	49.3	D			28.1	C		
		RT	4.0	A			5.1	A		
	NB	LT	48.4	D			43.4	D		
		TH	222.5	F			113.0	F		
		RT	222.5	F			113.0	F		
	SB	LT	102.3	F			52.5	D		
		TH	13.4	B			21.4	C		
		RT	13.4	B			21.4	C		
W. Nine Mile Rd. at Heritage Oaks Blvd.	EB	LT	5.2	A	8.0	A	37.1	D	56.8	E
		TH	8.0	A			48.0	D		
		RT	N/A	N/A			0.1	A		
	WB	LT	0.5	A			31.5	C		
		TH	2.8	A			39.8	D		
		RT	8.0	A			0.9	A		
	NB	LT	36.2	D			17.7	B		
		TH	15.2	B			4.1	A		
		RT	15.2	B			4.1	A		
	SB	LT	47.5	D			126.1	F		
		TH	47.5	D			126.1	F		
		RT	0.2	A			3.0	A		
W. Nine Mile Rd. at Navy Federal Way	EB	LT	25.1	C	9.1	A	8.2	A	31.5	C
		TH	3.5	A			13.1	B		
	WB	TH	10.9	B			44.4	D		
		RT	2.8	A			17.8	B		
	SB	LT	52.6	D			62.4	E		
		RT	18.5	B			30.7	C		

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Table 16: Signalized Intersection Operational Analysis (2025 No-Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
W. Nine Mile Rd. at I-10 EB Ramps	EB	TH	8.5	A	13.4	B	7.2	A	13.1	B
	WB	LT	51.2	D			59.0	E		
		TH	11.5	B			11.9	B		
	SB	LT	32.0	C			48.6	D		
		RT	25.7	C			10.1	B		
W. Nine Mile Rd. at I-10 WB Ramps	EB	LT	9.9	A	25.2	C	9.1	A	18.0	B
		TH	13.3	B			12.6	B		
	WB	TH	22.2	C			17.0	B		
	NB	LT	46.6	D			36.0	D		
		RT	0.1	A			0.4	A		
Pine Forest Rd. at I-10 WB Ramps	WB	LT	55.8	E	17.8	B	46.0	D	42.0	D
		RT	28.0	C			115.8	F		
	NB	LT	24.3	C			34.5	C		
		TH	0.7	A			7.4	A		
	SB	TH	21.4	C			41.3	D		
		RT	0.1	A			0.0	A		
Pine Forest Rd. at I-10 EB Ramps	EB	RT	58.2	E	9.8	A	142.2	F	34.8	C
	NB	TH	0.3	A			0.3	A		
	SB	TH	11.1	B			44.2	D		
Pine Forest Rd. at Wilde Lake Blvd.	EB	LT	51.4	D	33.9	C	73.1	E	14.6	B
		TH	38.2	D			38.2	D		
		RT	96.5	F			96.5	F		
	NB	LT	96.5	F			96.5	F		
		TH	71.9	E			71.9	E		
		RT	49.3	D			49.3	D		
	SB	LT	4.0	A			4.0	A		
		TH	48.4	D			48.4	D		
		RT	222.5	F			222.5	F		

1. Delay measured in seconds per vehicle.

4.5.5 Unsignalized Intersection Operational Analysis (2025 No-Build)

The results of the HCS unsignalized intersection LOS analysis indicate that several unsignalized intersections would not meet target LOS goals for opening year 2025 No-Build Alternative peak hour conditions. As shown in Table 17 (3 pages), the minor street sign-controlled approaches from Muscogee Road and Frank Reeder Road along Beulah Road; from Bell Ridge Drive, Foxtail Loop, Security Place, and Pinecone Drive along W. Nine Mile Road; and from W. Detroit Boulevard and Interstate Circle along Pine Forest Road would not meet target LOS goals.

Table 17: Unsignalized Intersection Operational Analysis (2025 No-Build)										
Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
Beulah Rd. at Muscogee Rd.	EB	LT	7.3	A	0.0	A	7.3	A	0.1	A
		TH	0.0	A			0.0	A		
		RT	0.0	A			0.0	A		
	WB	LT	8.8	A	8.2	A	7.9	A	6.3	A
		TH	0.0	A			0.0	A		
		RT	0.0	A			0.0	A		
	NB	LT	37.0	E	37.0	E	28.3	D	28.3	D
		TH	37.0	E			28.3	D		
		RT	37.0	E			28.3	D		
	SB	LT	34.3	D	34.3	D	16.5	C	16.5	C
		TH	34.3	D			16.5	C		
		RT	34.3	D			16.5	C		
Beulah Rd. at W. Kingsfield Rd.	WB	LT	16.0	C	16.0	C	16.6	C	16.6	C
		RT	16.0	C			16.6	C		
	NB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	7.7	A	0.1	A	8.6	A	0.1	A
		TH	0.0	A			0.0	A		
Beulah Rd. at Trellis Ln.	WB	LT	18.6	C	18.6	C	17.2	C	17.2	C
		RT	18.6	C			17.2	C		
	NB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	7.7	A	0.0	A	8.8	A	0.1	A
		TH	0.0	A			0.0	A		

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Table 17: Unsignalized Intersection Operational Analysis (2025 No-Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
Beulah Rd. at Frank Reeder Rd.	EB	LT	21.7	C	21.7	C	18.6	C	18.6	C
		TH	21.7	C			18.6	C		
		RT	21.7	C			18.6	C		
	WB	LT	56.4	F	56.4	F	39.8	E	39.8	E
		TH	56.4	F			39.8	E		
		RT	56.4	F			39.8	E		
	NB	LT	9.3	A	1.2	A	8.2	A	0.8	A
		TH	0.0	A			0.0	A		
		RT	0.0	A			0.0	A		
SB	LT	7.7	A	0.1	A	9.1	A	0.3	A	
	TH	0.0	A			0.0	A			
	RT	0.0	A			0.0	A			
W. Nine Mile Rd. at Bell Ridge Dr.	EB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	WB	LT	16.7	C	0.2	A	9.0	A	0.1	A
		TH	0.0	A			0.0	A		
	NB	LT	97.5	F	43.5	E	33.9	D	17.7	C
RT		19.8	C	10.4			B			
W. Nine Mile Rd. at Foxtail Loop	EB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	WB	LT	17.2	C	0.8	A	9.2	A	0.4	A
		TH	0.0	A			0.0	A		
	NB	LT	272.4	F	272.4	F	25.8	D	25.8	D
RT		272.4	F	25.8			D			
W. Nine Mile Rd. at Security Place	EB	LT	8.8	A	0.5	A	12.7	B	0.4	A
		TH	0.0	A			0.0	A		
	WB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	37.9	E	31.3	D	443.7	F	215.6	F
RT		9.1	A	20.0			C			
W. Nine Mile Rd. at I-10 EB Ramps	EB	TH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		LT								
	WB	TH								
		RT								
SB	LT									
	RT									
W. Nine Mile Rd. at	EB	LT	10.0	B	0.3	A	9.5	A	0.9	A

Table 17: Unsignalized Intersection Operational Analysis (2025 No-Build)

Intersection	Approach	Movement	AM Peak				PM Peak				
			Approach		Overall		Approach		Overall		
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	
Pinecone Dr.	TH	TH	0.0	A			0.0	A			
		WB	TH	0.0	A	0.0	A	0.0	A	0.0	A
			RT	0.0	A			0.0	A		
	SB	LT	23.4	C	23.4	C	16.1	C	16.1	C	
		RT	23.4	C			16.1	C			
	Pine Forest Rd. at W. Detroit Blvd.	WB	LT	1214.1	F	991.6	F	738.9	F	542.6	F
RT			13.8	B	15.1			C			
NB		TH	0.0	A	0.0	A	0.0	A	0.0	A	
		RT	0.0	A			0.0	A			
SB		LT	11.6	B	0.4	A	12.9	B	0.4	A	
		TH	0.0	A			0.0	A			
Pine Forest Rd. at Interstate Circle	EB	LT	194.7	F	85.2	F	294.5	F	187.4	F	
		TH	194.7	F			294.5	F			
		RT	12.2	B			13.3	B			
	WB	LT	44.1	E	44.1	E	79.9	F	79.9	F	
		TH	44.1	E			79.9	F			
		RT	44.1	E			79.9	F			
	NB	LT	0.0	A	0.0	A	11.5	B	0.0	A	
		TH	0.0	A			0.0	A			
		RT	0.0	A			0.0	A			
	SB	LT	14.8	B	1.9	A	12.6	B	0.9	A	
		TH	7.3	A			7.3	A			
		RT	0.0	A			0.0	A			

1. Delay measured in seconds per vehicle.

4.5.6 Freeway Segment Analysis (2045 No-Build)

As shown in Table 18, target LOS goals would be met for the I-10 mainline segments for design year 2045 No-Build Alternative conditions.

Table 18: I-10 Freeway Segment LOS (2045 No-Build)					
Direction	Location	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
I-10 Eastbound	From State Line to Ag. Station	10.3	A	8.0	A
	Between Ramps at Ag. Station	8.2	A	6.4	A
	From Ag. Station to Weigh Station	10.3	A	8.0	A
	Between Ramps at Weigh Station	9.9	A	7.2	A
	From Weigh Station to Welcome Center	10.3	A	8.0	A
	Between Ramps at Welcome Center	9.9	A	7.5	A
	From Welcome Ctr to W. Nine Mile Rd.	10.3	A	8.0	A
	Between Ramps at W. Nine Mile Rd.	7.4	A	6.2	A
	From W. Nine Mile Rd. to Pine Forest Rd.	12.9	B	13.4	B
	Between Off-Ramps at Pine Forest Rd.	11.6	B	11.9	B
	Btw Off-Ramp & On-Ramp at Pine Forest Rd.	11.5	B	11.6	B
From Pine Forest Rd. to US 29	17.5	B	13.4	B	
I-10 Westbound	From US 29 to Pine Forest Rd.	12.3	B	16.0	B
	Between Ramps at Pine Forest Rd.	9.9	A	12.1	B
	From Pine Forest Rd. to W. Nine Mile Rd.	11.8	B	13.1	B
	Between Ramps at W. Nine Mile Rd.	5.5	A	8.6	A
	W. Nine Mile Rd. to Weigh Station	7.5	A	10.0	A
	Between Ramps at Weigh Station	5.9	A	8.9	A
	From Weigh Station to State Line	7.5	A	10.0	A

4.5.7 I-10 Ramp Merge/Diverge LOS (2045 No-Build)

As shown in Table 19, the results of the HCS I-10 merge/diverge LOS analysis indicate target LOS goals would be met for design year 2045 No-Build Alternative peak hour conditions.

Table 19: I-10 Ramp Merge/Diverge LOS (2045 No-Build)					
Direction	Location	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
I-10 Eastbound	to Ag. Station	7.1	A	3.7	A
	from Ag. Station	12.6	B	9.1	A
	to Weigh Station	12.7	B	10.0	A
	from Weigh Station	7.2	A	5.6	A
	to Welcome Center	10.8	B	8.1	A
	from Welcome Center	7.5	A	5.0	A
	to W. Nine Mile Rd.	12.0	B	11.7	B
	from W. Nine Mile Rd.	15.2	B	17.0	B
	to Pine Forest Rd. SB	13.6	B	14.3	B
	to Pine Forest Rd. NB	12.4	B	12.8	B
I-10 Westbound	from Pine Forest Rd.	20.9	C	14.5	B
	to Pine Forest Rd.	11.9	B	16.7	B
	from Pine Forest Rd.	12.2	B	13.1	B
	to W. Nine Mile Rd.	14.5	B	14.7	B
	from W. Nine Mile Rd.	7.8	A	10.1	B
	to Weigh Station	13.4	B	16.2	B
from Weigh Station	11.5	B	15.2	B	

4.5.8 Arterial Segment LOS (2045 No-Build)

As shown in Table 20, the results of the HCS northbound-southbound arterial LOS analysis indicate target LOS goals would not be met for design year 2045 No-Build Alternative peak hour conditions along Beulah Road.

Table 20: Arterial Segment LOS Northbound-Southbound (2045 No-Build)					
Location	Direction	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Beulah Beltway					
Realigned W. Kingsfield Rd. to Muscogee Rd.	NB	2.7	A	5.8	A
	SB	7.2	A	6.2	A
Beulah Rd.					
South of W. Nine Mile Rd.	NB	83.6*	E	71.9*	D
	SB	66.2*	C	81.8*	E
W. Nine Mile Rd. to Frank Reeder Rd.	NB	69.9*	D	0**	F
	SB	0**	F	77.0*	E
Frank Reeder Rd. to Trellis La.	NB	70.7*	D	0**	F
	SB	0**	F	76.3*	E
Trellis La. to W. Kingsfield Rd.	NB	70.8*	D	87.0*	E
	SB	86.9*	E	77.0*	E
W. Kingsfield Rd. to Muscogee Rd.	NB	65.0*	C	78.4*	E
	SB	75.5*	E	58.6*	C
Pine Forest Rd.					
Interstate Circle to Wilde Lake Blvd.	NB	16.0	B	15.0	B
	SB	14.3	B	15.6	B
Wilde Lake Blvd. to I-10	NB	17.4	B	14.6	B
	SB	21.8	C	24.8	C
I-10 to W. Detroit Blvd.	NB	16.1	B	17.5	B
	SB	16.6	B	17.8	B

* For a 2-lane undivided road, the mid-block section performance is measured in percent time spent following (PTSF).

** Density cannot be calculated v/c >1.

As shown in Table 21, the results of the HCS eastbound-westbound arterial LOS analysis indicate target LOS goals would not be met for design year 2045 No-Build Alternative peak hour conditions along Muscogee Road and W. Nine Mile Road west of Beulah Road.

Table 21: Arterial Segment LOS Eastbound-Westbound (2045 No-Build)					
Location	Direction	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Muscogee Rd.					
Beulah Rd. to Beulah Beltway	EB	64.8*	D	77.5*	E
	WB	72.8*	E	60.2*	C
East of Beulah Beltway	EB	29.9*	A	68.3*	D
	WB	64.1*	D	57.4*	C
W. Kingsfield Rd.					
Beulah Rd. to Beulah Beltway	EB	2.6	A	5.6	A
	WB	7.2	A	6.3	A
East of Beulah Beltway	EB	0.3	A	0.3	A
	WB	0.5	A	0.5	A
W. Nine Mile Rd.					
West of Beulah Rd.	EB	70.6*	E	54.3 *	C
	WB	37.7*	A	65.1	D
Beulah to Heritage Oaks Blvd.	EB	28.6	D	8.7	A
	WB	5.5	A	21.7	C
Heritage Oaks Blvd. to Navy Federal Way	EB	26.0	C	22.2	C
	WB	20.7	C	19.1	C
Navy Federal Way to I-10	EB	18.6	C	30.9	D
	WB	29.2	D	14.4	B
I-10 to Pinecone Dr.	EB	10.7	A	19.8	C
	WB	17.4	B	8.8	A

* For a 2-lane undivided road, the mid-block section performance is measured in percent time spent following (PTSF).

4.5.9 Signalized Intersection Operational Analysis (2045 No-Build)

As shown in Table 22 (3 pages), the results of the HCS signalized intersection LOS analysis indicate that nearly all of the signalized intersections within the AOI would fail to meet target LOS goals, with many intersections operating at LOS F in design year 2045 No-Build Alternative peak hour conditions. All signalized intersections along Beulah Road, W. Nine Mile Road, and Pine Forest Road would operate at LOS E or F during peak hour conditions.

Table 22: Signalized Intersection Operational Analysis (2045 No-Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
W. Nine Mile Rd. at Beulah Rd.	EB	LT	25.1	C	657.2	F	43.6	D	302.4	F
		TH	121.0	F			31.3	C		
		RT	121.0	F			31.3	C		
	WB	LT	94.5	F			529.7	F		
		TH	29.1	C			32.6	C		
		RT	7.4	A			390.5	F		
	NB	LT	62.4	E			68.9	E		
		TH	853.0	F			328.6	F		
		RT	853.0	F			328.6	F		
	SB	LT	1399.7	F			617.6	F		
		TH	21.4	C			30.1	C		
		RT	21.4	C			30.1	C		
W. Nine Mile Rd. at Heritage Oaks Blvd.	EB	LT	29.3	C	55.0	D	44.3	D	293.2	F
		TH	43.2	D			43.9	D		
		RT	0.0	A			0.1	A		
	WB	LT	0.2	A			21.3	C		
		TH	0.4	A			203.3	F		
		RT	115.4	F			0.6	A		
	NB	LT	42.1	D			21.1	C		
		TH	45.4	D			3.7	A		
		RT	45.4	D			3.7	A		
	SB	LT	144.9	F			784.9	F		
		TH	144.9	F			784.9	F		
		RT	0.6	A			11.6	B		

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Table 22: Signalized Intersection Operational Analysis (2045 No-Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
Beltway at Muscogee Rd.	EB	LT	97.6	F	48.5	D	46.9	D	31.4	C
		TH	15.3	B			26.2	C		
		RT	15.3	B			26.2	C		
	WB	LT	111.3	F			58.8	E		
		TH	8.0	A			9.0	A		
		RT	8.0	A			9.0	A		
	NB	LT	38.4	D			29.2	C		
		TH	47.8	D			44.2	D		
		RT	0.1	A			1.5	A		
	SB	LT	39.1	D			34.7	C		
		TH	56.2	E			50.3	D		
		RT	14.6	B			9.1	A		
Beltway at W. Kingsfield Rd.	EB	LT	17.9	B	7.4	A	29.9	C	16.5	B
		TH	8.9	A			7.5	A		
	WB	TH	6.5	A			6.0	A		
		RT	6.5	A			6.0	A		
	SB	LT	7.4	A			13.3	B		
		RT	3.8	A			5.3	A		
W. Nine Mile Rd. at Navy Federal Way	EB	LT	359.6	F	164.7	F	11.9	B	154.3	F
		TH	2.7	A			194.8	F		
	WB	TH	249.3	F			53.3	D		
		RT	132.5	F			8.3	A		
	SB	LT	101.7	F			270.2	F		
		RT	18.1	B			129.4	F		
W. Nine Mile Rd. at I-10 EB Ramps	EB	TH	12.7	B	82.4	F	7.0	A	8.8	A
		LT	5.1	A			3.3	A		
	WB	TH	102.0	F			3.2	A		
		LT	42.7	D			49.1	D		
	SB	RT	147.3	F			22.4	C		

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Table 22: Signalized Intersection Operational Analysis (2045 No-Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
W. Nine Mile Rd. at I-10 WB Ramps	EB	LT	53.0	D	85.3	F	10.4	B	33.6	C
		TH	38.3	D			23.7	C		
	WB	123.5	F	37.6			D			
	NB	LT	103.5	F			75.9	E		
		RT	0.8	A			21.5	C		
Pine Forest Rd. at I-10 WB Ramps	WB	LT	72.4	E	27.1	C	48.4	D	68.5	E
		RT	65.4	E			197.9	F		
	NB	LT	54.6	D			43.2	D		
		TH	1.1	A			7.9	A		
	SB	TH	29.9	C			85.1	F		
		RT	0.1	A			0.0	A		
Pine Forest Rd. at I-10 EB Ramps	EB	RT	60.2	E	21.2	C	178.0	F	66.8	E
	NB	TH	0.7	A			0.4	A		
	SB	TH	34.5	C			96.1	F		
Pine Forest Rd. at Wilde Lake Blvd.	EB	LT	122.1	F	66.2	E	65.7	E	48.3	D
		TH	45.5	D			33.6	C		
		RT	45.5	D			33.6	C		
	NB	LT	115.9	F			99.1	F		
		TH	63.5	E			22.4	C		
		RT	14.2	B			3.2	A		
	SB	LT	175.9	F			22.1	C		
		TH	23.7	C			64.3	E		
		RT	3.3	A			46.4	D		

1. Delay measured in seconds per vehicle.

4.5.10 Unsignalized Intersection Operational Analysis (2045 No-Build)

The results of the HCS unsignalized intersection LOS analysis indicate that all of the minor street sign-controlled approaches would not meet target LOS goals for design year 2045 No-Build Alternative peak hour conditions. As shown in Table 23 (3 pages), all of the minor street sign-controlled approaches along Beulah Road, W. Nine Mile Road, and Pine Forest Road would operate at LOS F.

Table 23: Unsignalized Intersection Operational Analysis (2045 No-Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
Beulah Rd. at Muscogee Rd.	EB	LT	7.3	A	0.0	A	0.0	A	0.0	A
		TH	0.0	A			0.0	A		
		RT	0.0	A			0.0	A		
	WB	LT	13.0	B	12.2	B	8.6	A	6.7	A
		TH	0.0	A			0.0	A		
		RT	0.0	A			0.0	A		
	NB	LT	N/A	F	N/A	F	590.1	F	590.1	F
		TH	N/A	F			590.1	F		
		RT	N/A	F			590.1	F		
	SB	LT	N/A	F	N/A	F	N/A	F	N/A	F
		TH	N/A	F			N/A	F		
		RT	N/A	F			N/A	F		
Beulah Rd. at W. Kingsfield Rd.	WB	LT	3129.2	F	2776.5	F	3754.9	F	3317.0	F
		RT	15.6	C			42.2	E		
	NB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	9.8	A	0.1	A	15.5	C	0.8	A
		TH	0.0	A			0.0	A		
Beulah Rd. at Trellis Ln.	WB	LT	956.5	F	956.5	F	407.7	F	407.7	F
		RT	956.5	F			407.7	F		
	NB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	9.7	A	0.0	A	15.6	C	0.2	A
		TH	0.0	A			0.0	A		

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Table 23: Unsignalized Intersection Operational Analysis (2045 No-Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
Beulah Rd. at Frank Reeder Rd.	EB	LT	N/A	F	N/A	F	3129.9	F	3129.9	F
		TH	N/A	F			3129.9	F		
		RT	N/A	F			3129.9	F		
	WB	LT	N/A	F	N/A	F	5788.4	F	5788.4	F
		TH	N/A	F			5788.4	F		
		RT	N/A	F			5788.4	F		
	NB	LT	16.7	C	0.7	A	11.1	B	0.4	A
		TH	0.0	A			0.0	A		
		RT	0.0	A			0.0	A		
	SB	LT	9.6	A	0.2	A	17.2	C	0.6	A
		TH	0.0	A			0.0	A		
		RT	0.0	A			0.0	A		
W. Nine Mile Rd. at Bell Ridge Dr.	EB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	WB	LT	48.0	E	0.3	A	10.5	B	0.1	A
		TH	0.0	A			0.0	A		
	NB	LT	2621.3	F	1017.2	F	138.5	F	51.6	F
		RT	54.7	F			12.1	B		
W. Nine Mile Rd. at Foxtail Loop	EB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	WB	LT	54.0	F	1.3	A	11.2	B	0.4	A
		TH	0.0	A			0.0	A		
	NB	LT	9928.7	F	9928.7	F	80.5	F	80.5	F
		RT	9928.7	F			80.5	F		
W. Nine Mile Rd. at Security Place	EB	LT	13.2	B	1.1	A	25.1	D	0.9	A
		TH	0.0	A			0.0	A		
	WB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	689.0	F	326.9	F	9554.4	F	4173.6	F
		RT	10.1	B			407.1	F		

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Table 23: Unsignalized Intersection Operational Analysis (2045 No-Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
W. Nine Mile Rd. at I-10 EB Ramps	EB	TH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	WB	LT								
		TH								
	SB	LT								
RT										
W. Nine Mile Rd. at Pinecone Dr.	EB	LT	17.8	C	1.6	A	20.5	C	4.1	A
		TH	0.0	A			0.0	A		
	WB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	1876.9	F	1876.9	F	1387.5	F	1387.5	F
		RT	1876.9	F			1387.5	F		
Pine Forest Rd. at W. Detroit Blvd.	WB	LT	1569.3	F	1223.0	F	932.6	F	688.2	F
		RT	16.1	C			16.1	C		
	NB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	13.7	B	0.3	A	14.1	B	0.2	A
		TH	0.0	A			0.0	A		
Pine Forest Rd. at Interstate Circle	EB	LT	397.9	F	167.1	F	730.2	F	457.6	F
		TH	397.9	F			730.2	F		
		RT	13.3	B			14.6	B		
	WB	LT	98.1	F	98.1	F	227.7	F	227.7	F
		TH	98.1	F			227.7	F		
		RT	98.1	F			227.7	F		
	NB	LT	0.0	A	0.0	A	12.7	B	0.0	A
		TH	0.0	A			0.0	A		
		RT	0.0	A			0.0	A		
	SB	LT	17.6	C	2.0	A	14.3	B	0.9	A
		TH	7.3	A			7.3	A		
		RT	0.0	A			0.0	A		

¹. Delay measured in seconds per vehicle.

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5.0 PROJECT NEED

5.1 Regional Connectivity

The project need is driven by the increasing traffic demand resulting from significant development within the project area (both current and planned), as set forth in development plans such as the Mid-West Escambia County Optional Sector Plan, Detailed Specific Area Plans, and the Escambia County Comprehensive Plan. As a result of this growth, there is a need to provide connectivity from these new areas of development to the surrounding regional transportation system. Additionally, there is a need to provide an alternative route to reduce travel times and congestion, while also providing route choices for emergency evacuation within the study area.

5.2 Traffic Congestion

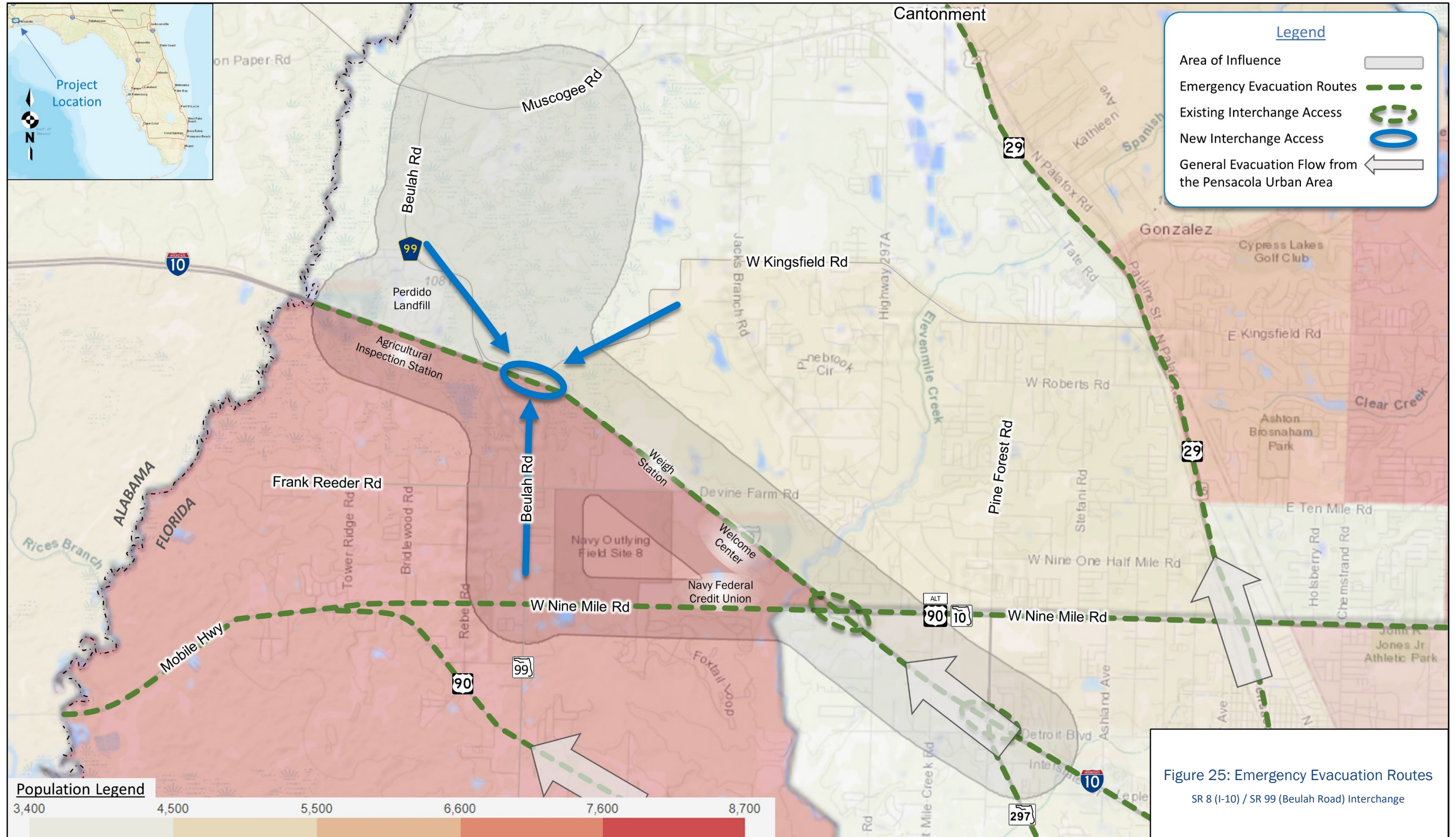
As indicated in Section 4.5, the 2045 No-Build travel demand exceeds the capacity of the local roadway network within the AOI. For instance, Beulah Road is projected to operate at LOS F from W. Nine Mile Road to I-10 in the peak direction by year 2045.

5.3 Emergency Evacuation and Response Times

Within the AOI, I-10, W. Nine Mile Road, and Pine Forest Road serve as part of the emergency evacuation network designated by the Florida Division of Emergency Management and Escambia County. This evacuation network serves the Pensacola urban area and western portions of the state of Florida.

The AOI is within the Escambia County Cantonment census county division with a population of 54,000 and approximately 19,000 homes as reported by the US Census Bureau. As shown in Figure 25, the most densely populated Census Tract (tract ID 003603) within the AOI is located southwest of the project and has a population of nearly 7,000. Lesser densely populated census tracts north of I-10 and west of US 29 have a cumulative population of over 18,000. As shown in Figure 25, this area has limited evacuation route choices and is primarily supported by the I-10/W. Nine Mile Road interchange for access to the interstate system.

The proposed interchange would offer an additional access point to the interstate system providing critically needed improved access and route choices during emergency evacuation periods.



6.0 ALTERNATIVES

6.1 No-Build Alternative

As discussed in Section 4.3, the No-Build Alternative roadway network includes all programmed projects listed in the FATPO's 2045 Cost Feasible Plan, except for the proposed I-10/Beulah interchange project.

6.2 Improvements to Adjacent Interchanges

As explained in further detail in Section 2.3, interchange improvements are being evaluated at the I-10/W. Nine Mile Road and I-10/Pine Forest Road interchanges as part of the ongoing SIMR and PD&E study for SR 8 (I-10) E. of Alabama State Line to W. of SR 95 (US 29), (FPID's 437905-1 and 437905-2).

While improvements to adjacent interchanges are warranted and beneficial to the system within the AOI, they do not provide the needed regional connectivity as discussed in Section 5.1.

6.3 Transportation System Management and Operations Alternatives

Transportation System Management and Operations (TSM&O) improvements such as traffic incident management, corridor management, travel demand management, and public transportation management all have benefits, but do not provide the access improvements provided by the proposed interchange. The need for the proposed interchange is primarily to provide regional connectivity through the additional access to I-10.

TSM&O alternatives and consideration are examined on a regional level with cost feasible alternatives incorporated into the FATPO 2045 LRTP.

6.4 Build Alternative Considerations

6.4.1 Interchange Concept Development & Recommendations

As part of the interchange concept development, 12 alternatives were initially developed and evaluated based on geometric constraints and environmental considerations as shown in Appendix H. The physical location of the interchange was highly influenced by the following constraints:

- AASHTO requires a minimum of 2,000 feet from like points, such as gore areas, with a minimum of 300 feet from acceleration lane end taper to deceleration lane begin taper. Since the agricultural inspection station and weigh station are only 5,900 feet apart (from end taper to begin taper), and due to other existing conditions and controlling design standards, the options are limited with respect to the location and type of interchange that will fit within these constraints.
- Even though an interchange can be placed such that all design criteria are met, the proximity of the ramps between the proposed interchange, agricultural station and weigh station will require weaving conditions to be closely evaluated.
- Other constraints include the landfill north of I-10, Arbor Ridge development and planned Kaheeley Ridge development south of I-10 and W. Kingsfield Road north of I-10.

Based on the evaluation of the interchange concepts and above constraints, the following recommendations were made:

- Interchange Type: Simplified diamond interchange with an option to expand in the future. A design speed of 50 mph for ramps.
- Interchange Location: Based on design constraints and interchange geometry, an alternative east of the Arbor Ridge development is the most feasible and consistent with the ACER.
- Interchange Opening: The interchange overpass should accommodate a future widening of I-10 from 4 to 6 lanes.
- Preferred Alternative: Diamond configuration east of Arbor Ridge with braided ramp to eliminate the weaves from eastbound on-ramp and weigh station off-ramp.
- SR 99 (Beulah Road): Principal Arterial, Access Class 5, 45-mph design speed. Alternatives that have median opening spacing less than 2640-ft but not less than 1320-ft will be considered to avoid/minimize impacts.
- Landscaping Opportunities: Existing mature trees will be preserved, specifically within the infield areas of the proposed interchange where practical/feasible.

6.4.2 Future Beulah Beltway Extension

As described in Section 4.3.1, 2045 Cost Feasible Plan Capacity Improvements, both Build and No-Build alternatives account for the planned extension of the Beulah Beltway from north of I-10 to US 29 in accordance with the 2045 Cost Feasible Plan. The Build Alternative concept shows the Beltway terminating in the form of a “fishhook” at a “T” intersection with W. Kingsfield Road north of I-10. It is anticipated that the fishhook would be replaced in the 2045 scenario with the beltway extended north and a new tie-in to a 4-way intersection at a realigned W. Kingsfield Road as depicted in the Build Alternative Lane Configuration figures (Figure 26 and Figure 27).

6.4.3 I-10 Mainline Considerations

As part of the evaluation of adding a new interchange along I-10, widening of I-10 from 4 to 6-lanes was considered. Part of the consideration is to verify that the addition of the proposed interchange ramp merges and potential increased volumes along I-10 east of the interchange (as a result of the introduction of a new interchange) do not adversely affect operations of the I-10 mainline. In addition, the cost savings associated with widening of I-10 concurrent with the addition of the interchange was considered as well as simplified maintenance of traffic during construction.

As shown in Table 24, target LOS is not met for the segment of I-10 between the new interchange and the weigh station under the 4-lane condition. As shown in Table 25, there is considerable benefit to widening of I-10 from the existing 4-lane section to 6-lanes from an operational standpoint. As a result, it is recommended to carry 6-lanes along I-10 through the new interchange to the weigh station.

Table 24: I-10 Freeway Segment 4-Lane LOS (Year 2045 Build Volumes)

Direction	Location	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
EB	From State Line to Ag. Station	16.8	B	12.9	B
	Between Ramps at Ag. Station	13.5	B	10.5	A
	From Ag. Station to Beltway Off-Ramp	16.8	B	12.9	B
	Between Ramps at Beltway	13.9	B	11.1	B
	From Beltway to Weigh Station	28.8	D	20.3	C
WB	From Weigh Station to Beltway	17.3	B	25.7	C
	Between Ramps at Beltway	10.4	A	14.7	B
	From Beltway to State Line	13.3	B	16.6	B

Table 25: I-10 Freeway Segment 6-Lane LOS (Year 2045 Build Volumes)

Direction	Location	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
EB	From State Line to Ag. Station	11.1	B	8.6	A
	Between Ramps at Ag. Station	9.0	A	7.0	A
	From Ag. Station to Beltway Off-Ramp	11.1	B	8.6	A
	Between Ramps at Beltway	9.2	A	7.4	A
	From Beltway to Weigh Station	17.1	B	13.1	B
WB	From Weigh Station to Beltway	11.4	B	15.7	B
	Between Ramps at Beltway	6.9	A	9.8	A
	From Beltway to State Line	8.9	A	11.0	A

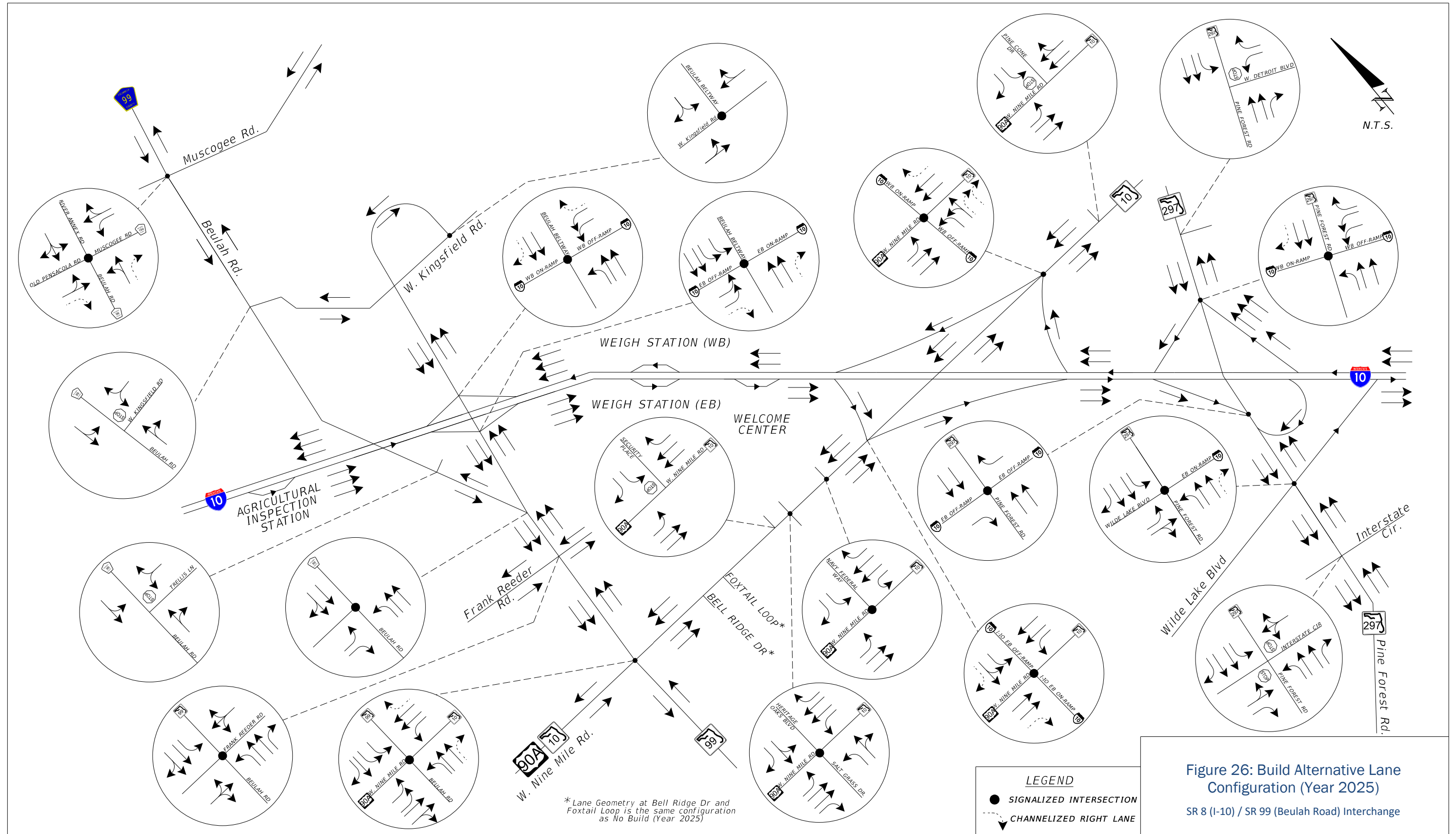
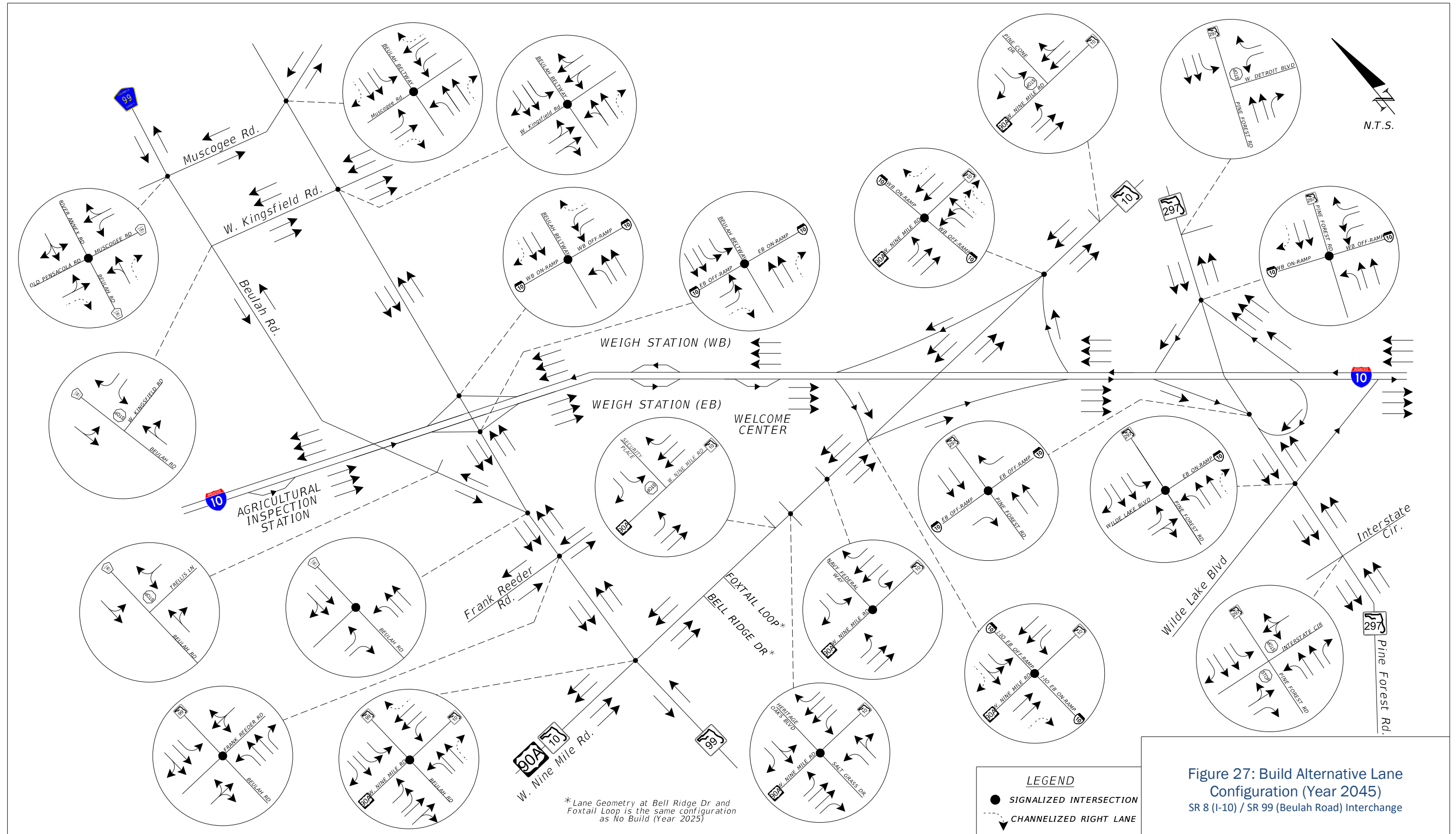


Figure 26: Build Alternative Lane Configuration (Year 2025)
SR 8 (I-10) / SR 99 (Beulah Road) Interchange



6.5 Recommended Build Alternative

The Build roadway network includes the same roadway network as the No-Build, plus the proposed improvements of the Build Alternative as shown in Figure 26 and as summarized in Table 11. The Build alternative includes the following primary roadway improvements:

- Widen 3.1 miles of I-10 from 4 to 6 lanes from the Alabama state line to the Pensacola Weigh Station;
- Add a new interchange along I-10 in the vicinity of the existing Beulah Road overpass;
- Widen 1.4 miles of Beulah Road from 2 to 4 lanes from W. Nine Mile Road to Isaacs Lane including bicycle and pedestrian accommodations;
- Add a 0.7-mile section of new alignment from Isaacs Lane, through the new interchange, and terminating at W. Kingsfield Road (including bicycle and pedestrian accommodations);
- Realign W. Kingsfield Road to avoid conflicts with the proposed interchange;
- Provide intersection improvements along Beulah Road including the addition of turn lanes, traffic signals, and pedestrian accommodations at W. Nine Mile Road and Frank Reeder Road.

SR 8 (I-10)

The widening of I-10 from 4 to 6 lanes would occur toward the median, adding a 12-ft. lane in each direction with 12-ft. shoulders (10-ft. paved). The existing lanes and outside shoulders would be milled and resurfaced and would remain sloped outwards. (see below).

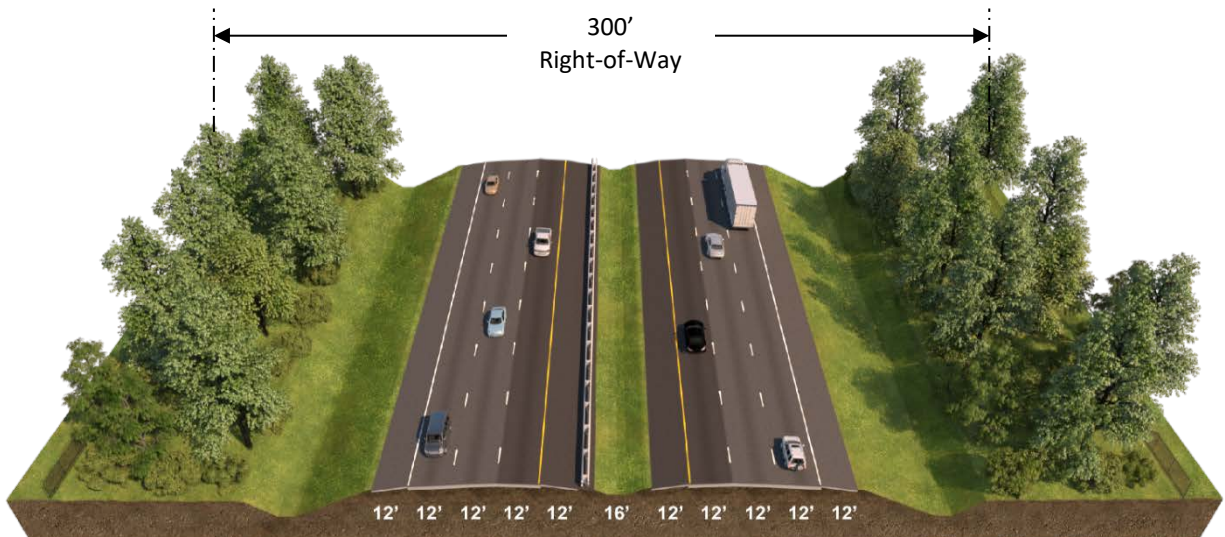


Figure 28: Proposed I-10 Typical Section

SR 99 (Beulah Road)

Beulah Road would be reconstructed and widened from 2 to 4 lanes from W. Nine Mile Road to Isaacs Lane. North of Isaacs Lane the roadway would follow a new alignment parallel to Isaacs Lane to just north of W. Kingsfield Road. The proposed Beulah Road typical section from W. Nine Mile Road to north of W. Kingsfield Road would be a 4-lane divided principal arterial with curb and gutter, a 6-ft. sidewalk along the west side and a 12-ft. shared use path on the east side (see Figure 29). The new alignment would pass over I-10 and tie into W. Kingsfield Road.

It is noted that the Build Alternative conceptual plans show a 12-ft. shared use path along the east side of the widened portion of Beulah Road (and 6-ft. sidewalk along the west side) in lieu of 7-ft. buffered bicycle lanes. Other standard pedestrian features such as crosswalks and pedestrian signal heads would also be provided along Beulah Road in accordance with FDOT standards.

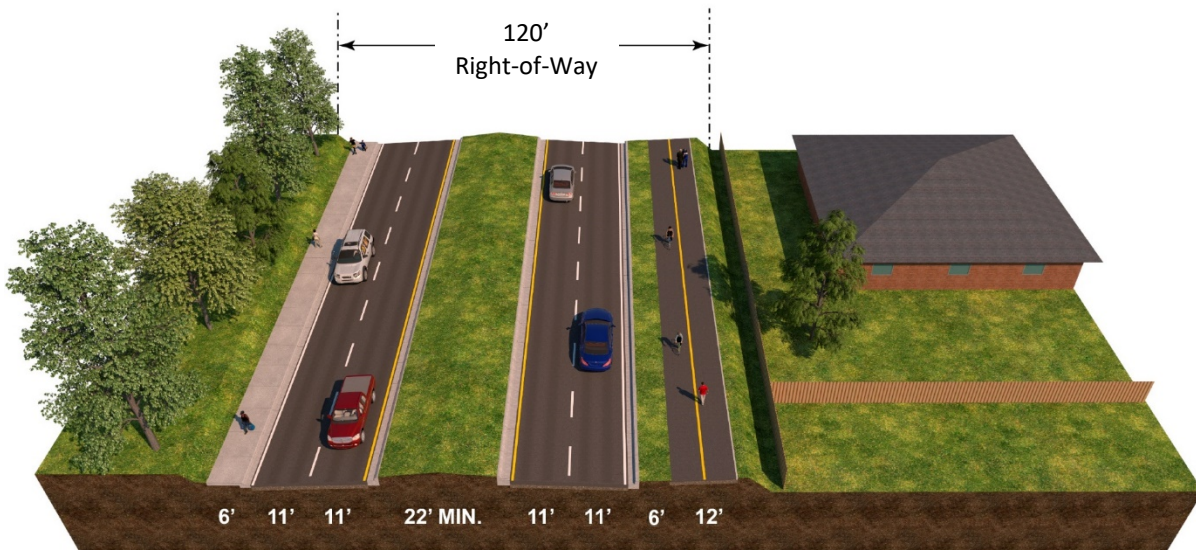


Figure 29: Proposed Beulah Road Typical Section

W. Kingsfield Road

W. Kingsfield Road would be realigned to avoid the proposed Beulah interchange. The typical section would be a 2-lane (11-ft. lane) undivided roadway with 8-ft. shoulders (2-ft. paved). The realignment would pass underneath the new alignment.

Frank Reeder Road

Intersection improvements would be made at the Frank Reeder Road and Beulah Road intersection including the addition of turn lanes to Frank Reeder Road and traffic signals.

SR 10/US 90A (W. Nine Mile Road)

Intersection improvements would be made at the W. Nine Mile Road and Beulah Road intersection including the addition of turn lanes and traffic signal modifications.

The resulting Build Alternative lane configurations are shown in Figure 26 and Figure 27 for years 2025 and 2045, respectively.

SR 8 (I-10) / SR 99 (Beulah Road) Interchange
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6.6 Build Alternative Traffic Volumes

Future year traffic volumes for this study were developed using the Northwest Florida Regional Planning Model (NWFRPM), Version 2.1 as modified for this project. The model produced AADT output for the following analysis years:

- Opening Year: 2025
- Horizon Year: 2045

Future year traffic volumes were developed in three general steps as follows:

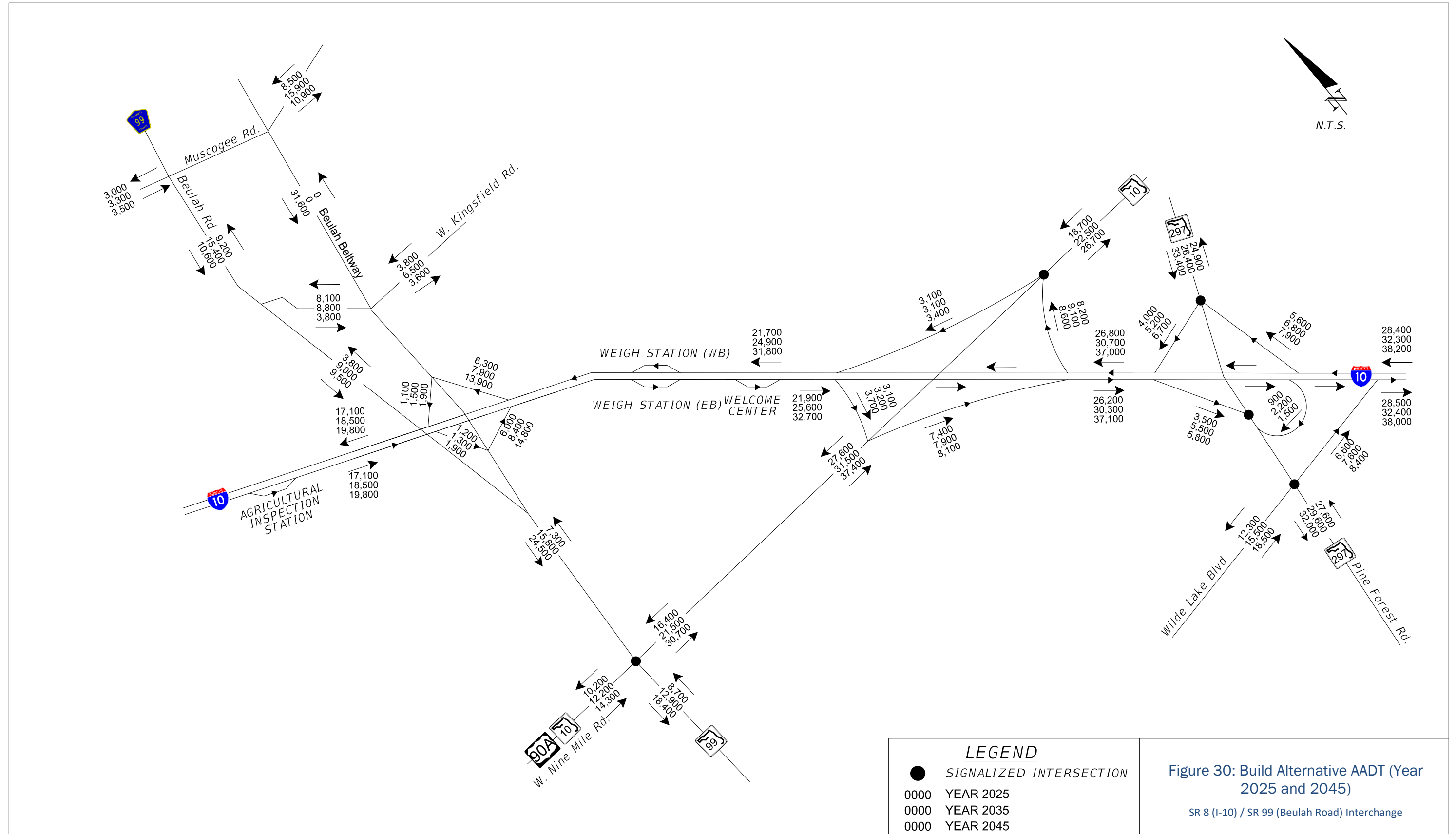
- Generated balanced AADT for each year/scenario based on NWFRPM outputs;
- Used NWFRPM output to calculate future year AM and PM peak hour directional volumes by applying the Standard K factor and D factor; and
- Refined the traffic directionality to reflect anticipated future travel pattern changes due to the proposed improvements and balanced the resulting volumes using trip distribution tables.

The Build Alternative opening year 2025 and design year 2045 AADT volumes are shown in Figure 30. Future Build Alternative peak hour volumes for opening year 2025 and design year 2045 are shown in Figure 31 and Figure 32, respectively. Additional detail can be found in Appendix B: Design Traffic Report as approved on February 21, 2019.

6.7 Build Alternative Operational Performance

An operational analysis for the Build Alternative conditions was performed for each individual roadway element; basic freeway segments, ramp junctions (merge and diverge areas), arterials, signalized intersections, and unsignalized intersections. Future Build Alternative peak hour volumes and resulting LOS for opening year 2025 and design year 2045 are shown in Figure 31 and Figure 32, respectively.

The output files for the Build Alternative HCM-based operational analysis are provided in Appendix I: Build Alternative Opening Year 2025 and Design Year 2045 HCS and Synchro Outputs.



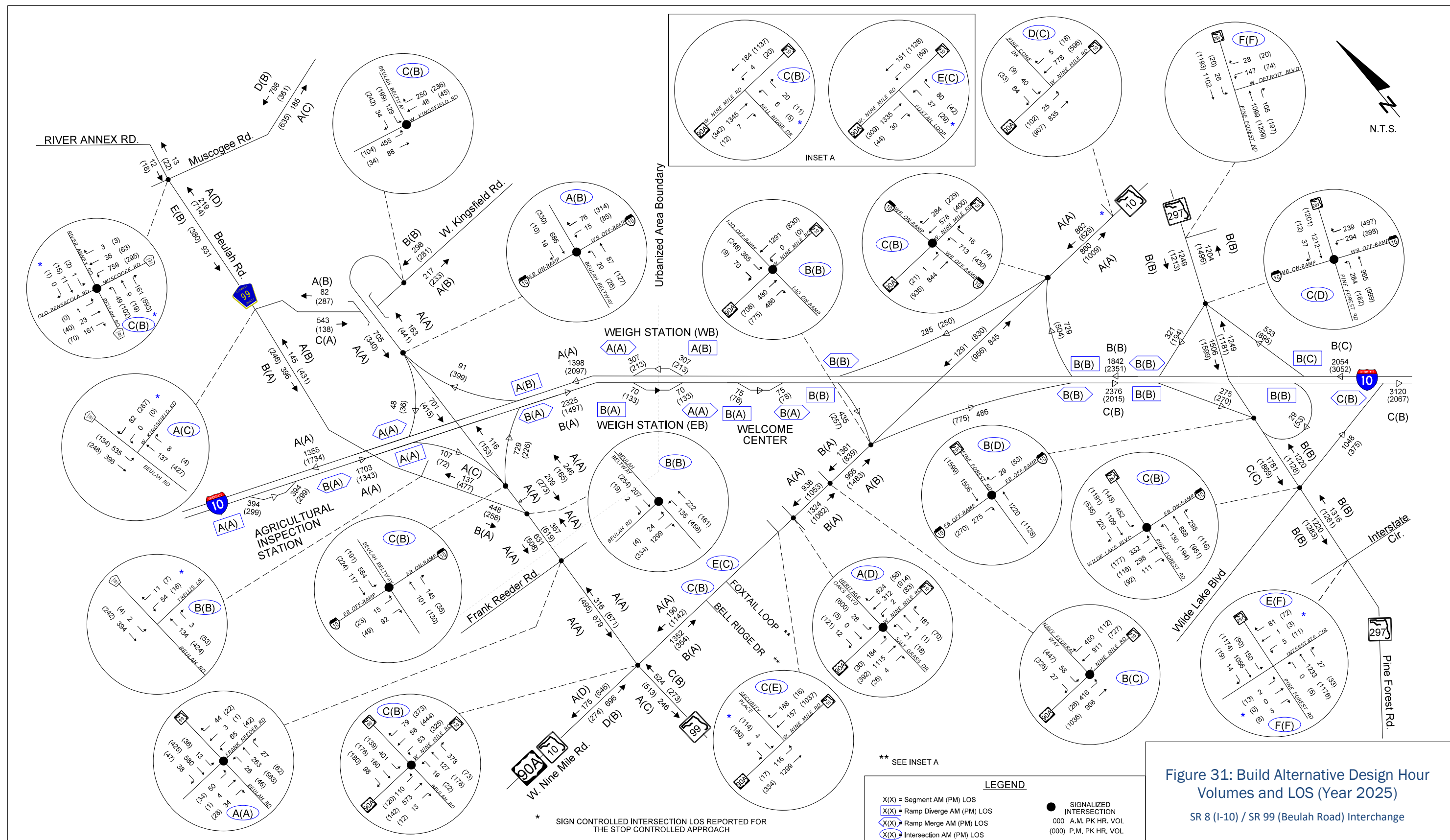


Figure 31: Build Alternative Design Hour Volumes and LOS (Year 2025)
SR 8 (I-10) / SR 99 (Beulah Road) Interchange

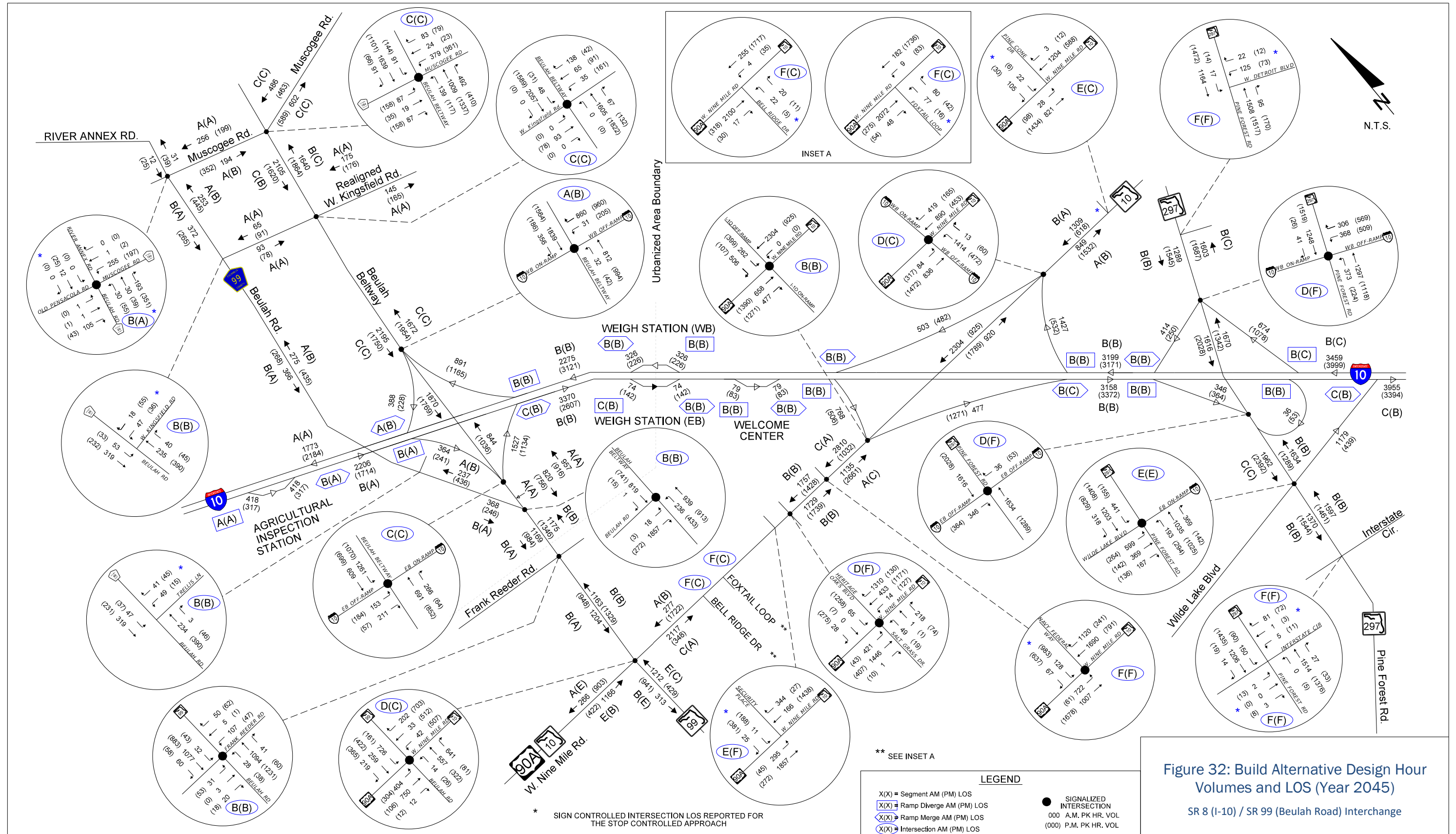


Figure 32: Build Alternative Design Hour Volumes and LOS (Year 2045)
SR 8 (I-10) / SR 99 (Beulah Road) Interchange

6.7.1 Build Alternative Opening Year 2025 Operational Performance

6.7.1.1 Freeway Segment Analysis (2025 Build)

As shown in Table 26, target LOS goals would be met for the I-10 mainline segments for opening year 2025 Build Alternative conditions.

Table 26: I-10 Freeway Segment LOS (2025 Build)					
Direction	Location	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
I-10 Eastbound	From State Line to Ag. Station	8.5	A	6.7	A
	Between Ramps at Ag. Station	6.6	A	5.2	A
	From Ag. Station to Beltway Off-Ramp	8.5	A	6.7	A
	Between Ramps at Beltway	8.0	A	6.4	A
	From Beltway to Weigh Station	11.7	B	7.5	A
	Between Ramps at Weigh Station	11.3	B	6.9	A
	From Weigh Station to Welcome Center	11.7	B	7.5	A
	Between Ramps at Welcome Center	17.1	B	10.7	A
	Between Welcome Ctr & W. Nine Mile Rd.	17.8	B	11.3	B
	Between Ramps at W. Nine Mile Rd.	14.3	B	9.3	A
	From W. Nine Mile Rd. to Pine Forest Rd.	18.2	C	15.2	B
	Between Off-Ramps at Pine Forest Rd.	15.9	B	13.1	B
	Between Off-Ramp & On-Ramp at SR 297	15.7	B	12.7	B
	From Pine Forest Rd. to US 29	25.7	C	15.6	B
I-10 Westbound	From US 29 to Pine Forest Rd.	15.5	B	24.9	C
	Between Ramps at Pine Forest Rd.	11.5	B	16.3	B
	From Pine Forest Rd. to W. Nine Mile Rd.	13.9	B	18.0	B
	Between Ramps at W. Nine Mile Rd.	8.4	A	13.9	B
	From W. Nine Mile Rd. to Weigh Station	10.5	A	15.9	B
	Between Ramps at Weigh Station	6.6	A	10.1	A
	From Weigh Station to Beltway	7.0	A	10.5	A
	Between Ramps at Beltway	6.6	A	8.5	A
From Beltway to State Line	6.8	A	8.7	A	

6.7.1.2 I-10 Ramp Merge/Diverge LOS (2025 Build)

As shown in Table 27, the results of the HCS I-10 merge/diverge LOS analysis indicate target LOS goals would be met for opening year 2025 Build Alternative peak hour conditions.

Table 27: I-10 Ramp Merge/Diverge LOS (2025 Build)					
Direction	Location	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
I-10 Eastbound	to Ag. Station	4.9	A	2.1	A
	from Ag. Station	10.5	B	9.2	A
	To Beulah Beltway	8.8	A	9.5	A
	From Beulah Beltway	12.9	B	7.0	A
	to Weigh Station	14.4	B	9.3	A
	from Weigh Station	8.6	A	5.1	A
	to Welcome Center	12.5	B	7.4	A
	from Welcome Center	16.6	B	9.3	A
	to W. Nine Mile Rd.	19.4	B	14.5	B
	from W. Nine Mile Rd.	19.0	B	15.7	B
	to Pine Forest Rd. SB	19.0	B	15.5	B
	to Pine Forest Rd. NB	17.2	B	13.7	B
from Pine Forest Rd.	26.1	C	17.1	B	
I-10 Westbound	to Pine Forest Rd.	14.4	B	24.1	C
	from Pine Forest Rd.	14.5	B	19.0	B
	to W. Nine Mile Rd.	13.1	B	18.1	B
	from W. Nine Mile Rd.	10.8	B	16.9	B
	to Beulah Beltway	6.9	A	11.4	B
	from Beulah Beltway	4.0	A	7.5	A
	to Weigh Station	5.2	A	10.3	B
	from Weigh Station	6.0	A	8.0	A

6.7.1.3 Arterial Segment LOS (2025 Build)

As shown in Table 28, the results of the HCS northbound-southbound arterial LOS analysis indicate target LOS goals would be met for opening year 2025 Build Alternative peak hour conditions except for Beulah Road from W. Kingsfield Road to Muscogee Road (LOS D/E). It is noted that this would be a temporary condition until the Beulah Beltway is extended north to Muscogee Road in 2045 per the Cost Feasible Plan. As indicated in Section 2.3, the extension of the Beulah Beltway is being evaluated as part of an ongoing PD&E study.

Table 28: Arterial Segment LOS Northbound-Southbound (2025 Build)

Location	Direction	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Beulah Beltway					
Beulah Rd. to I-10	NB	2.7	A	1.8	A
	SB	2.3	A	3.0	A
I-10 to W. Kingsfield Rd.	NB	1.8	A	4.9	A
	SB	7.8	A	3.8	A
Beulah Rd.					
South of W. Nine Mile Rd.	NB	57.9*	C	42.9*	B
	SB	40.5*	A	57.6*	C
W. Nine Mile Rd. to Frank Reeder Rd.	NB	3.5	A	7.5	A
	SB	7.6	A	5.5	A
Frank Reeder Rd. to Beulah Beltway	NB	4.0	A	6.9	A
	SB	7.0	A	5.6	A
Beulah Beltway to Trellis La.	NB	25.6*	A	52.4*	C
	SB	49.5*	B	38.3*	A
Trellis La. to W. Kingsfield Rd.	NB	27.1*	A	50.6*	B
	SB	47.3*	B	37.9*	A
W. Kingsfield Rd. to Muscogee Rd.	NB	37.6*	A	64.9*	D
	SB	71.1*	E	49.7*	B
Pine Forest Rd.					
Interstate Circle to Wilde Lake Blvd.	NB	14.3	B	13.7	B
	SB	13.2	B	13.9	B
Wilde Lake Blvd. to I-10	NB	13.2	B	12.2	B
	SB	21.3	C	21.3	C
I-10 to W. Detroit Blvd.	NB	13.1	B	16.2	B
	SB	13.6	B	13.2	B

* For a 2-lane undivided road, the mid-block section performance is measured in percent time spent following (PTSF).

SR 8 (I-10) / SR 99 (Beulah Road) Interchange

FPID 433113-1-22-01, 433113-2-22-01, & 433113-3-22-01

As shown in Table 29, the results of the HCS eastbound-westbound arterial LOS analysis indicate that target LOS goals would be met for opening year 2025 Build Alternative peak hour conditions except for Muscogee Road east of Beulah Road (LOS D). It is noted that this would be a temporary condition until the Beulah Beltway is extended north to Muscogee Road in 2045 per the Cost Feasible Plan.

Table 29: Arterial Segment LOS Eastbound-Westbound (2025 Build)					
Location	Direction	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Muscogee Rd.					
East of Beulah Rd.	EB	33.4*	A	61.5*	C
	WB	66.5*	D	47.9*	B
W. Kingsfield Rd.					
East of Beulah Rd.	EB	61.1*	C	30.5*	A
	WB	22.3*	A	45.4*	B
East of Beulah Beltway	EB	39.7*	A	41.2*	B
	WB	46.8*	B	45.4*	B
W. Nine Mile Rd.					
West of Beulah Rd.	EB	67.1*	D	43.4*	B
	WB	33.8*	A	65.1*	D
Beulah to Heritage Oaks Blvd.	EB	12.3	B	3.2	A
	WB	1.7	A	10.4	A
Heritage Oaks Blvd. to Navy Federal Way	EB	12.1	B	9.7	A
	WB	8.6	A	9.6	A
Navy Federal Way to I-10	EB	8.8	A	13.5	B
	WB	12.4	B	7.6	A
I-10 to Pinecone Dr.	EB	7.8	A	9.2	A
	WB	7.9	A	5.7	A

* For a 2-lane undivided road, the mid-block section performance is measured in percent time spent following (PTSF).

6.7.1.4 Signalized Intersection Operational Analysis (2025 Build)

As shown in Table 30 (5 pages), the results of the HCS signalized intersection LOS analysis indicate that overall target LOS goals would be met for signalized intersections in opening year 2025 Build Alternative peak hour conditions.

Within the limits of the proposed project, some left turn movements do not meet target LOS goals along Beulah Beltway (LOS C or better), but the overall intersection LOS does meet target LOS goals.

Beyond the project limits, but within the AOI, there are movements at the minor street approaches from Navy Federal Credit Union along W. Nine Mile Road, as well as the within the I-10 interchange area at Pine Forest Road that would not meet target LOS goals; however the overall intersection LOS does meet target LOS goals for each intersection. As indicated in Section 2.3, capacity improvements are being evaluated to address the intersection capacity deficiencies along W. Nine Mile Road under FPID 218605-4 (W. Nine Mile Road from US 90 to SR 297 PD&E). Capacity improvements are also being evaluated to address the deficiencies along Pine Forest Road in the vicinity of I-10 as part of 437905-1 (I-10 from East of the Alabama State Line to US 29 PD&E and SIMR). It is noted that target LOS goals would not be met for the same signalized intersection locations under the 2025 no-build conditions.

Table 30: Signalized Intersection Operational Analysis (2025 Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
Beulah Rd at Muscogee Rd.	EB	LT	5.4	A	24.7	C	10.2	B	10.8	B
		TH	5.4	A			10.2	B		
		RT	1.3	A			3.6	A		
	WB	LT	33.9	C			23.2	C		
		TH	5.2	A			10.3	B		
		RT	5.2	A			10.3	B		
	NB	LT	34.2	C			12.9	B		
		TH	34.2	C			12.9	B		
		RT	8.1	A			5.2	A		
	SB	LT	31.5	C			10.0	A		
		TH	31.5	C			10.0	A		
		RT	31.5	C			10.0	A		

Florida Department of Transportation

INTERCHANGE JUSTIFICATION REPORT (IJR)

SR 8 (I-10) / SR 99 (Beulah Road) Interchange

FPID 433113-1-22-01, 433113-2-22-01, & 433113-3-22-01

Table 30: Signalized Intersection Operational Analysis (2025 Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
Beltway at W. Kingsfield Rd.	EB	LT	44.4	D	28.9	C	16.8	B	11.1	B
		TH	44.4	D			16.8	B		
		TH	2.4	A			5.7	A		
		RT	2.4	A			5.7	A		
	SB	LT	26.0	C			12.8	B		
		RT	26.0	C			12.8	B		
Beltway at I-10 WB Ramps	WB	LT	48.0	D	8.9	A	36.9	D	13.2	B
		RT	10.4	B			13.5	B		
	NB	LT	52.2	D			54.2	D		
		TH	0.0	A			4.4	A		
	SB	TH	7.3	A			7.5	A		
		RT	0.1	A			0.0	A		
Beltway at I-10 EB Ramps	EB	LT	47.1	D	21.5	C	38.4	D	13.9	B
		RT	15.3	B			1.9	A		
	NB	TH	20.8	C			20.7	C		
		RT	3.7	A			2.5	A		
	SB	LT	30.6	C			26.1	C		
		TH	0.5	A			1.5	A		
Beulah Rd. at Beulah Beltway	EB	LT	43.3	D	10.7	B	34.0	C	10.5	B
		RT	15.9	B			13.8	B		
	NB	LT	4.5	A			10.6	B		
		TH	3.9	A			1.1	A		
	SB	TH	7.6	A			12.7	B		
		RT	7.6	A			12.7	B		

Florida Department of Transportation

INTERCHANGE JUSTIFICATION REPORT (IJR)

SR 8 (I-10) / SR 99 (Beulah Road) Interchange

FPID 433113-1-22-01, 433113-2-22-01, & 433113-3-22-01

Table 30: Signalized Intersection Operational Analysis (2025 Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
Beulah Rd. at Frank Reeder Rd.	EB	LT	11.1	B	8.6	A	24.1	C	6.1	A
		TH	11.1	B			24.1	C		
		RT	11.1	B			24.1	C		
	WB	LT	12.8	B			28.2	C		
		TH	12.8	B			28.2	C		
		RT	12.8	B			28.2	C		
	NB	LT	8.0	A			4.4	A		
		TH	7.4	A			4.2	A		
		RT	2.3	A			1.4	A		
	SB	LT	7.4	A			4.4	A		
		TH	8.4	A			3.9	A		
		RT	8.4	A			3.9	A		
W. Nine Mile Rd. at Beulah Rd.	EB	LT	39.9	D	20.5	C	37.1	D	18.6	B
		TH	24.9	C			26.1	C		
		RT	24.9	C			26.1	C		
	WB	LT	15.6	B			17.2	B		
		TH	22.3	C			21.9	C		
		RT	0.1	A			0.4	A		
	NB	LT	33.3	C			32.5	C		
		TH	33.4	C			34.4	C		
		RT	0.5	A			0.1	A		
	SB	LT	33.5	C			39.1	D		
		TH	17.5	B			22.2	C		
		RT	1.8	A			2.5	A		

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SR 8 (I-10) / SR 99 (Beulah Road) Interchange

FPID 433113-1-22-01, 433113-2-22-01, & 433113-3-22-01

Table 30: Signalized Intersection Operational Analysis (2025 Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
W. Nine Mile Rd. at Heritage Oaks Blvd.	EB	LT	6.4	A	7.3	A	29.7	C	40.0	D
		TH	6.4	A			37.5	D		
		RT	0.0	A			0.2	A		
	WB	LT	0.5	A			21.0	C		
		TH	0.9	A			34.2	C		
		RT	8.2	A			3.9	A		
	NB	LT	40.3	D			13.9	B		
		TH	11.2	B			3.1	A		
		RT	11.2	B			3.1	A		
	SB	LT	56.8	E			71.0	E		
		TH	56.8	E			71.0	E		
		RT	0.3	A			4.0	A		
W. Nine Mile Rd. at Navy Federal Way	EB	LT	16.3	B	12.2	B	9.5	A	20.7	C
		TH	4.3	A			15.3	B		
	WB	TH	16.4	B			24.3	C		
		RT	9.4	A			9.7	A		
	SB	LT	57.5	E			39.6	D		
		RT	19.7	B			8.8	A		
W. Nine Mile Rd. at I-10 EB Ramps	EB	TH	10.6	B	17.1	B	10.4	B	14.1	B
		LT	N/A	N/A			N/A	N/A		
	WB	TH	14.1	B			10.2	B		
		LT	37.5	D			37.9	D		
	SB	RT	9.9	A			0.1	A		
LT		6.0	A	7.6	A					
W. Nine Mile Rd. at I-10 WB Ramps	EB	TH	6.6	A	21.8	C	9.8	A	14.5	B
		WB	TH	16.7			B	11.1		
	NB	LT	47.9	D			32.7	C		
		RT	0.1	A			0.3	A		

Table 30: Signalized Intersection Operational Analysis (2025 Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
Pine Forest Rd. at I-10 WB Ramps	WB	LT	66.0	E	20.8	C	46.8	D	40.9	D
		RT	26.4	C			120.4	F		
	NB	LT	26.3	C			29.5	C		
		TH	1.3	A			5.2	A		
	SB	TH	23.6	C			37.9	D		
		RT	0.1	A			0.0	A		
Pine Forest Rd. at I-10 EB Ramps	EB	RT	73.0	E	13.5	B	133.3	F	36.0	D
	NB	TH	0.3	A			0.3	A		
	SB	TH	13.5	B			46.0	D		
Pine Forest Rd. at Wilde Lake Blvd.	EB	LT	49.5	D	31.2	C	64.9	E	15.1	B
		TH	63.2	E			61.8	E		
		RT	63.2	E			61.8	E		
	NB	LT	54.8	D			26.1	C		
		TH	39.7	D			13.9	B		
		RT	13.1	B			2.5	A		
	SB	LT	42.9	D			1.6	A		
		TH	10.4	B			7.0	A		
		RT	1.4	A			2.8	A		

1. Delay measured in seconds per vehicle.

6.7.1.5 Unsignalized Intersection Operational Analysis (2025 Build)

The results of the HCS unsignalized intersection LOS analysis indicate that all unsignalized intersections would meet target LOS goals for opening year 2025 Build Alternative peak hour conditions within the limits of the proposed project as shown in Table 31 (2 pages).

Beyond the project limits, but within the AOI, the minor street sign-controlled approaches from Bell Ridge Drive, Foxtail Loop, and Security Place along W. Nine Mile Road; and from W. Detroit Boulevard and Interstate Circle along Pine Forest Road would not meet target LOS goals. As indicated in Section 2.3, capacity improvements are being evaluated to address the intersection capacity deficiencies along W. Nine Mile Road under FPID 218605-4 (W. Nine Mile Road from US 90 to SR 297 PD&E). Capacity improvements are also being evaluated to address the deficiencies along Pine Forest Road in the vicinity of I-10 as part of 437905-1 (I-10 from East of the Alabama State Line to US 29 PD&E and SIMR). It is noted that target LOS goals would not be met for the same unsignalized intersection movements under the 2025 no-build conditions.

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Table 31: Unsignalized Intersection Operational Analysis (2025 Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
Beulah Rd. at W. Kingsfield Rd.	WB	LT	9.4	A	9.4	A	16.6	C	16.6	C
		RT	9.4	A			16.6	C		
	NB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	9.3	A	5.3	A	8.8	A	3.1	A
		TH	0.0	A			0.0	A		
Beulah Rd. at Trellis Ln.	WB	LT	12.8	B	12.8	B	13.9	B	13.9	B
		RT	12.8	B			13.9	B		
	NB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	7.5	A	0.0	A	8.5	A	0.1	A
		TH	0.0	A			0.0	A		
W. Nine Mile Rd. at Bell Ridge Dr.	EB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	WB	LT	12.8	B	0.3	A	8.1	A	0.1	A
		TH	0.0	A			0.0	A		
	NB	LT	40.4	E	20.9	C	20.7	C	12.9	B
		RT	15.1	C			9.4	A		
W. Nine Mile Rd. at Foxtail Loop	EB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	WB	LT	13.0	B	0.8	A	8.3	A	0.5	A
		TH	0.0	A			0.0	A		
	NB	LT	42.8	E	42.8	E	17.1	C	17.1	C
		RT	42.8	E			17.1	C		
W. Nine Mile Rd. at Security Place	EB	LT	8.4	A	0.7	A	11.0	B	0.5	A
		TH	0.0	A			0.0	A		
	WB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	24.7	C	16.8	C	90.1	F	47.1	E
		RT	8.8	A			16.4	C		
W. Nine Mile Rd. at Pinecone Dr.	EB	LT	9.7	A	0.3	A	9.4	A	1.0	A
		TH	0.0	A			0.0	A		
	WB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	26.4	D	26.4	D	16.6	C	16.6	C
		RT	26.4	D			16.6	C		

Table 31: Unsignalized Intersection Operational Analysis (2025 Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
Pine Forest Rd. at W. Detroit Blvd.	WB	LT	698.4	F	588.8	F	476.0	F	377.9	F
		RT	13.4	B			14.7	B		
	NB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	11.4	B	0.3	A	12.6	B	0.2	A
		TH	0.0	A			0.0	A		
Pine Forest Rd. at Interstate Circle	EB	LT	229.9	F	99.5	F	387.2	F	244.8	F
		TH	229.9	F			387.2	F		
		RT	12.6	B			13.5	B		
	WB	LT	49.5	E	49.5	E	104.1	F	104.1	F
		TH	49.5	E			104.1	F		
		RT	49.5	E			104.1	F		
	NB	LT	0.0	A	0.0	A	11.7	B	0.0	A
		TH	0.0	A			0.0	A		
		RT	0.0	A			0.0	A		
	SB	LT	15.2	C	1.9	A	13.2	B	0.9	A
		TH	0.0	A			0.0	A		
		RT	0.0	A			0.0	A		

1. Delay measured in seconds per vehicle.

6.7.2 Build Alternative Design Year 2045 Operational Performance

6.7.2.1 Freeway Segment Analysis (2045 Build)

As shown in Table 32, target LOS goals would be met for the I-10 mainline segments for design year 2045 Build Alternative conditions.

Table 32: I-10 Freeway Segment LOS (2045 Build)					
Direction	Location	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
I-10 Eastbound	From State Line to Ag. Station	11.1	B	8.6	A
	Between Ramps at Ag. Station	9.0	A	7.0	A
	From Ag. Station to Beltway Off-Ramp	11.1	B	8.6	A
	Between Ramps at Beltway	9.2	A	7.4	A
	From Beltway to Weigh Station	17.1	B	13.1	B
	Between Ramps at Weigh Station	16.7	B	12.4	B
	From Weigh Station to Welcome Center	17.1	B	13.1	B
	Between Ramps at Welcome Center	16.7	B	12.7	B
	Between Welcome Ctr & W. Nine Mile Rd.	17.1	B	13.1	B
	Between Ramps at W. Nine Mile Rd.	13.1	B	10.5	A
	From W. Nine Mile Rd. to Pine Forest Rd.	15.9	B	17.1	B
	Between Off-Ramps at Pine Forest Rd.	14.1	B	15.1	B
	Between Off-Ramp & On-Ramp at SR 297	13.9	B	14.8	B
	From Pine Forest Rd. to US 29	20.6	C	17.2	B
I-10 Westbound	From US 29 to Pine Forest Rd.	17.6	B	20.9	C
	Between Ramps at Pine Forest Rd.	14.0	B	14.7	B
	From Pine Forest Rd. to W. Nine Mile Rd.	16.2	B	16.0	B
	Between Ramps at W. Nine Mile Rd.	8.9	A	13.3	B
	From W. Nine Mile Rd. to Weigh Station	11.4	B	15.7	B
	Between Ramps at Weigh Station	9.8	A	14.6	B
	From Weigh Station to Beltway	11.4	B	15.7	B
	Between Ramps at Beltway	6.9	A	9.8	A
From Beltway to State Line	8.9	A	11.0	A	

6.7.2.2 I-10 Ramp Merge/Diverge LOS (2045 Build)

As shown in Table 33, the results of the HCS I-10 ramp merge/diverge LOS analysis indicate target LOS goals would be met for design year 2045 Build Alternative peak hour conditions.

Table 33: I-10 Ramp Merge/Diverge LOS (2045 Build)					
Direction	Location	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
I-10 Eastbound	to Ag. Station	8.1	A	4.6	A
	from Ag. Station	13.4	B	9.8	A
	To Beulah Beltway	12.6	B	9.1	A
	From Beulah Beltway	20.9	C	15.6	B
	to Weigh Station	20.4	C	16.2	B
	from Weigh Station	13.9	B	10.7	B
	to Welcome Center	18.6	B	14.2	B
	from Welcome Center	14.8	B	10.6	B
	to W. Nine Mile Rd.	20.0	B	15.2	B
	from W. Nine Mile Rd.	16.3	B	20.1	C
	to Pine Forest Rd. SB	17.2	B	18.4	B
	to Pine Forest Rd. NB	15.4	B	16.6	B
I-10 Westbound	from Pine Forest Rd.	23.7	C	18.5	B
	to Pine Forest Rd.	18.0	B	21.7	C
	from Pine Forest Rd.	17.1	B	16.1	B
	to W. Nine Mile Rd.	19.9	B	16.9	B
	from W. Nine Mile Rd.	12.3	B	16.7	B
	to Beulah Beltway	13.5	B	17.9	B
	from Beulah Beltway	11.0	B	14.2	B
	to Weigh Station	13.0	B	18.4	B
from Weigh Station	9.2	A	11.0	B	

6.7.2.3 Arterial Segment LOS (2045 Build)

As shown in Table 34, the results of the HCS northbound-southbound arterial LOS analysis indicate target LOS goals would be met for design year 2045 Build Alternative peak hour conditions except for Beulah Road south of W. Nine Mile Road. It is noted that target LOS goals would not be met for the same section of Beulah Road south of W. Nine Mile Road under the 2045 no-build conditions.

Table 34: Arterial Segment LOS Northbound-Southbound (2045 Build)

Location	Direction	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Beulah Beltway					
Beulah Rd. to I-10	NB	10.6	A	10.2	A
	SB	9.1	A	8.4	A
I-10 to Realigned W. Kingsfield Rd.	NB	18.6	C	21.7	C
	SB	24.4	C	19.4	C
Realigned W. Kingsfield to Muscogee Rd.	NB	18.2	B	20.7	C
	SB	23.4	C	18.0	B
Beulah Rd.					
South of W. Nine Mile Rd.	NB	80.7*	E	55.7*	C
	SB	48.4*	B	74.9*	E
W. Nine Mile Rd. to Frank Reeder Rd.	NB	12.9	B	14.8	B
	SB	13.4	B	10.5	A
Frank Reeder Rd. to Beulah Beltway	NB	13.1	B	15.0	B
	SB	13.0	B	10.9	A
Beulah Beltway to Trellis La.	NB	35.8*	A	49.9*	B
	SB	45.3*	B	37.0*	A
Trellis La. to W. Kingsfield Rd.	NB	40.1*	A	51.0*	B
	SB	46.5*	B	39.9*	A
W. Kingsfield Rd. to Muscogee Rd.	NB	38.4*	A	51.4*	B
	SB	46.7*	B	39.9*	A
Pine Forest Rd.					
Interstate Circle to Wilde Lake Blvd.	NB	17.4	B	15.9	B
	SB	14.9	B	16.8	B
Wilde Lake Blvd. to I-10	NB	17.8	B	14.0	B
	SB	21.3	C	21.3	C
I-10 to W. Detroit Blvd.	NB	17.4	B	18.3	C
	SB	14.0	B	16.8	B

* For a 2-lane undivided road, the mid-block section performance is measured in percent time spent following (PTSF).

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As shown in Table 35, the results of the HCS eastbound-westbound arterial LOS analysis indicate that target LOS goals would be met for design year 2045 Build Alternative peak hour conditions except for W. Nine Mile Road west of Beulah Road. It is noted that target LOS goals would not be met for the same section of W. Nine Mile Road west of Beulah Road under the 2045 no-build conditions.

Table 35: Arterial Segment LOS Eastbound-Westbound (2045 Build)					
Location	Direction	AM Peak		PM Peak	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Muscogee Rd.					
East of Beulah Rd.	EB	31.6*	A	44.5*	B
	WB	36.9*	A	32.8*	A
East of Beulah Beltway	EB	60.5*	C	59.8*	C
	WB	55.3*	C	53.9*	C
W. Kingsfield Rd.					
East of Beulah Rd.	EB	1.0	A	0.8	A
	WB	0.7	A	1.0	A
East of Beulah Beltway	EB	1.6	A	1.8	A
	WB	1.9	A	1.9	A
W. Nine Mile Rd.					
West of Beulah Rd.	EB	76.5*	E	47.2*	B
	WB	38.6*	A	71.1*	E
Beulah to Heritage Oaks Blvd.	EB	19.3	C	3.2	A
	WB	2.5	A	15.7	B
Heritage Oaks Blvd. to Navy Federal Way	EB	15.8	B	15.9	B
	WB	16.0	B	13.0	B
Navy Federal Way to I-10	EB	10.4	A	24.3	C
	WB	25.8	C	9.4	A
I-10 to Pinecone Dr.	EB	7.7	A	14.0	B
	WB	11.9	B	5.6	A

* For a 2-lane undivided road, the mid-block section performance is measured in percent time spent following (PTSF).

6.7.2.4 Signalized Intersection Operational Analysis (2045 Build)

As shown in Table 36 (5 pages), the results of the HCS signalized intersection LOS analysis indicate that overall target LOS goals would be met for signalized intersections within the limits of the proposed project in design year 2045 Build Alternative peak hour conditions.

Within the limits of the proposed project, some specific approach movements would not meet target LOS goals (LOS C or better), but the overall intersection LOS does meet target LOS goals.

Beyond the project limits, but within the AOI, the overall LOS goals are not met at Heritage Oaks Boulevard and Navy Federal Way along W. Nine Mile Road (LOS F). As indicated in Section 2.3, capacity improvements are being evaluated to address these signalized intersection deficiencies under FPID 218605-4 (W. Nine Mile Road from US 90 to SR 297 PD&E). Additionally, the traffic signals within the vicinity of the I-10 interchanges at W. Nine Mile Road and Pine Forest Road would not meet target LOS goals. As discussed in Section 2.3, interchange improvements are being evaluated to address these operational deficiencies under FPID 437905-1 (I-10 from East of the Alabama State Line to US 29 PD&E and SIMR).

It is noted that target LOS goals would not be met for the same signalized intersection movements under the 2045 no-build conditions.

Table 36: Signalized Intersection Operational Analysis (2045 Build)										
Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
Beulah Rd. at Muscogee Rd.	EB	LT	9.0	A	10.8	B	9.0	A	8.0	A
		TH	9.0	A			9.0	A		
		RT	3.6	A			1.7	A		
	WB	LT	19.3	B			17.0	B		
		TH	9.0	A			9.5	A		
		RT	9.0	A			9.5	A		
	NB	LT	11.0	B			10.1	B		
		TH	11.0	B			10.1	B		
		RT	3.7	A			3.1	A		
	SB	LT	10.3	B			9.3	A		
		TH	10.3	B			9.3	A		
		RT	10.3	B			9.3	A		

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Table 36: Signalized Intersection Operational Analysis (2045 Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
Beltway at Muscogee Rd.	EB	LT	52.4	D	26.7	C	40.5	D	29.9	C
		TH	59.7	E			48.7	D		
		RT	5.6	A			14.2	B		
	WB	LT	64.0	E			59.6	E		
		TH	52.0	D			44.5	D		
		RT	9.7	A			1.5	A		
	NB	LT	67.1	E			13.0	B		
		TH	17.9	B			27.3	C		
		RT	1.4	A			1.6	A		
	SB	LT	9.7	A			49.1	D		
		TH	29.8	C			36.8	D		
		RT	0.7	A			0.1	A		
Beltway at Realigned W. Kingsfield Rd.	EB	LT	46.6	D	23.7	C	37.1	D	26.3	C
		TH	46.6	D			37.1	D		
		RT	46.6	D			37.1	D		
	WB	LT	46.7	D			46.2	D		
		TH	46.7	D			46.2	D		
		RT	46.7	D			46.2	D		
	NB	LT	26.3	C			36.4	D		
		TH	26.3	C			36.4	D		
		RT	0.4	A			7.8	A		
	SB	LT	16.1	B			8.9	A		
		TH	18.9	B			12.4	B		
		RT	18.9	B			12.4	B		
Beltway at I-10 WB Ramps	WB	LT	49.3	D	7.9	A	52.2	D	17.3	B
		RT	1.8	A			2.4	A		
	NB	LT	20.6	C			6.9	A		
		TH	9.9	A			12.1	B		
	SB	TH	9.9	A			26.8	C		
		RT	2.5	A			6.1	A		

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Table 36: Signalized Intersection Operational Analysis (2045 Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
Beulah Beltway at I-10 EB Ramps	EB	LT	59.7	E	34.6	C	64.8	E	29.5	C
		RT	18.1	B			4.9	A		
	NB	TH	52.9	D			45.4	D		
		RT	25.6	C			8.1	A		
	SB	LT	40.6	D			30.4	C		
		TH	4.8	A			3.5	A		
Beulah Rd. at Beltway	EB	LT	44.2	D	10.8	B	43.3	D	13.9	B
		RT	16.2	B			16.6	B		
	NB	LT	7.9	A			15.1	B		
		TH	4.8	A			4.3	A		
	SB	TH	15.3	B			23.8	C		
		RT	15.3	B			23.8	C		
Beulah Rd. at Frank Reeder Rd.	EB	LT	18.5	B	16.8	B	3.5	A	12.4	B
		TH	18.5	B			3.5	A		
		RT	18.5	B			3.5	A		
	WB	LT	31.9	C			20.9	C		
		TH	31.9	C			20.9	C		
		RT	31.9	C			20.9	C		
	NB	LT	7.5	A			5.3	A		
		TH	15.8	B			14.0	B		
		RT	0.1	A			0.1	A		
	SB	LT	7.6	A			6.1	A		
		TH	16.6	B			11.4	B		
		RT	16.6	B			11.4	B		

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Table 36: Signalized Intersection Operational Analysis (2045 Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
W. Nine Mile Rd. at Beulah Rd.	EB	LT	77.1	E	41.8	D	43.2	D	26.1	C
		TH	46.3	D			26.9	C		
		RT	46.3	D			26.9	C		
	WB	LT	29.0	C			36.5	D		
		TH	38.8	D			29.4	C		
		RT	0.2	A			1.0	A		
	NB	LT	38.3	D			42.5	D		
		TH	69.3	E			37.9	D		
		RT	1.1	A			0.1	A		
	SB	LT	65.6	E			56.6	E		
		TH	17.7	B			35.7	D		
		RT	1.2	A			10.3	B		
W. Nine Mile Rd. at Heritage Oaks Blvd.	EB	LT	21.2	C	42.9	D	63.7	E	218.3	F
		TH	15.9	B			68.8	E		
		RT	0.0	A			0.2	A		
	WB	LT	0.5	A			40.3	D		
		TH	0.7	A			177.2	F		
		RT	90.4	F			4.0	A		
	NB	LT	76.4	E			15.3	B		
		TH	57.0	E			2.5	A		
		RT	57.0	E			2.5	A		
	SB	LT	65.0	E			412.5	F		
		TH	65.0	E			412.5	F		
		RT	0.4	A			9.8	A		
W. Nine Mile Rd. at Navy Federal Way	EB	LT	243.7	F	104.4	F	12.7	B	86.3	F
		TH	2.7	A			88.4	F		
	WB	TH	47.6	D			41.9	D		
		RT	182.4	F			5.0	A		
	SB	LT	230.7	F			175.1	F		
		RT	22.9	C			36.7	D		

Table 36: Signalized Intersection Operational Analysis (2045 Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
W. Nine Mile Rd. at I-10 EB Ramps	EB	TH	6.9	A	17.3	B	18.7	B	16.5	B
	WB	LT	N/A	N/A			N/A	N/A		
		TH	16.5	B			14.9	B		
	SB	LT	82.3	F			17.2	B		
		RT	0.7	A			0.1	A		
W. Nine Mile Rd. at I-10 WB Ramps	EB	LT	45.7	D	45.3	D	12.7	B	22.3	C
		TH	26.7	C			12.7	B		
	WB	TH	56.7	E			25.8	C		
	NB	LT	57.2	E			62.4	E		
		RT	0.0	A			1.6	A		
Pine Forest Rd. at I-10 WB Ramps	WB	LT	70.3	E	41.0	D	62.8	E	85.3	F
		RT	92.4	F			241.4	F		
	NB	LT	113.0	F			59.0	E		
		TH	4.8	A			11.4	B		
	SB	TH	37.3	D			94.1	F		
		RT	1.1	A			0.1	A		
Pine Forest Rd. at I-10 EB Ramps	EB	RT	138.7	F	45.0	D	209.3	F	96.9	F
	NB	TH	1.0	A			0.3	A		
	SB	TH	70.4	E			140.7	F		
Pine Forest Rd. at Wilde Lake Blvd.	EB	LT	103.8	F	65.7	E	66.0	E	56.0	E
		TH	70.2	E			58.4	E		
		RT	70.2	E			58.4	E		
	NB	LT	112.5	F			99.4	F		
		TH	75.6	E			20.4	C		
		RT	25.6	C			2.9	A		
	SB	LT	94.0	F			20.9	C		
		TH	46.3	D			79.7	E		
		RT	6.4	A			55.9	E		

1. Delay measured in seconds per vehicle.

6.7.2.5 Queue Length Analysis (2025 & 2045 Build)

Table 37 (2 pages) provides a comparison of the Build Alternative queue storage and the 95th percentile queue length (Synchro output) during the design year 2045 peak hour conditions.

Table 37: Signalized Intersection Queue Lengths (Build Year 2025 and Year 2045)						
Intersection	Mvt.	Queue Storage (ft.)	Build 2025		Build 2045	
			AM Peak Queue (ft.)	PM Peak Queue (ft.)	AM Peak Queue (ft.)	PM Peak Queue (ft.)
Beulah Rd. at Muscogee Rd.	EBR	150	19	18	21	8
	NBR	150	54	53	33	42
Beulah Beltway at Muscogee Rd.	EBL	210	N/A		119	152
	EBR	210			27	86
	WBL	500			279 #	223 #
	WBR	500			45	0
	NBL	500			219 #	79
	NBR	500			29	32
	SBL	235			50	170 #
SBR	250	11	0			
Beulah Beltway at W. Kingsfield Rd.	SBL	240	N/A		23	18
Beulah Beltway at I-10 WB Ramps	WBL	320	17	42	27	111
	WBR	320	29	73	0	0
	NBL	255	58	46	22 ^m	10 ^m
	SBR	255	0	0	48 ^m	66 ^m
Beulah Beltway at I-10 EB Ramps	EBL	285	16	19	92	118 #
	EBR	285	45	0	76	10
	NBR	250	26	0	205	34
	SBL	1,220	276	84	467 #	429 #
Beulah Rd. at Beulah Beltway	EBR	230	96	67	88	75
	NBL	370	56	164	85	217
Beulah Rd. at Frank Reeder Rd.	NBL	235	18	14	15	15
	NBR	235	11	7	0	0
	SBL	235	15	9	17	17
W. Nine Mile Rd. at Beulah Rd.	EBL	500	56 #	57	252 #	135 #
	WBL	650	37	169	44	344 #
	WBR	425	0	0	0	0
	NBL	230	29	31	28	39
	NBR	285	0 #	0	0	0
	SBL	500	154 #	64	400 #	102 #
SBR	290	14	23	22	154	

Table 37: Signalized Intersection Queue Lengths (Build Year 2025 and Year 2045)

Intersection	Mvt.	Queue Storage (ft.)	Build 2025		Build 2045	
			AM Peak Queue (ft.)	PM Peak Queue (ft.)	AM Peak Queue (ft.)	PM Peak Queue (ft.)
W. Nine Mile Rd. at Heritage Oaks Blvd.	EBL	445	93	40	186	75
	EBR	400	0	0	0	0
	WBL	445	0 ^m	88 ^m	0 ^m	101 ^m
	WBR	435	595	15 ^m	1,583 ^{m#}	18 ^m
W. Nine Mile Rd. at Navy Federal Way	EBL	350	47	10 ^m	1,223 [#]	23 ^m
	WBR	350	244	68	1,657 [#]	60
W. Nine Mile Rd. at I-10 EB Ramps	SBL	750	192	149	237 [#]	106
	SBR		40	0	0	0
W. Nine Mile Rd. at I-10 WB Ramps	EBL	380	0 ^m	11	74 ^m	148 ^m
	NBL	780	327	145	986 [#]	273 [#]
	NBR		0	0	0	4
Pine Forest Rd. at I-10 WB Ramps	WBL	1,200	182 [#]	214	249	324
	WBR		149 [#]	646 [#]	443 [#]	941 [#]
	NBL	100	216	140	435 [#]	267
	SBR	250	0	0	6	0
Pine Forest Rd. at I-10 EB Ramp	EBL	980	n/a	n/a	n/a	n/a
	EBR		335 [#]	450 [#]	557 [#]	691 [#]
Pine Forest Rd. at Wilde Lake Blvd.	EBL	140	334	216	923 [#]	305
	NBL	120	143 [#]	95	322 [#]	396 [#]
	NBR	280	140	29	279	33
	SBL	160	353 ^{m#}	2 ^m	484 ^{m#}	73
	SBR	120	7 ^m	28 ^m	30 ^m	780 [#]

1 - Queue lengths based on 95th percentile as reported by the Synchro.

2 - The I-10 EB and I-10 WB Off-Ramps at W Nine Mile Rd are shown as SB and NB for Synchro purposes.

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

- V/C ratio > 1; queue length may be longer.

Queue storage is measured as the length of turn bay plus taper.

As shown in Table 37, the Build Alternative signalized intersection turn lanes and I-10 ramp terminals would provide adequate storage for 95th percentile vehicle queues within the limits of the proposed project for design year 2045 Build Alternative peak hour conditions.

Beyond the project limits, but within the AOI, 95th percentile vehicle queues would exceed the available queue storage at Heritage Oaks Boulevard and Navy Federal Way intersections. As indicated in Section 2.3, capacity improvements are being evaluated to address these deficiencies along W. Nine Mile Road under FPID 218605-4 (W. Nine Mile Road from US 90 to SR 297 PD&E). Additionally, the 95th percentile vehicle queues would exceed the available queue storage at the signalized intersections in the vicinity of the I-10 interchanges at W. Nine Mile Road and Pine Forest Road. As explained in further detail in Section 2.3, capacity improvements are being evaluated to

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address these interchange deficiencies under FPID 437905-1 (I-10 from East of the Alabama State Line to US 29 PD&E and SIMR).

It is noted that the 95th percentile vehicle queues would exceed the available queue storage at the same signalized intersection movements under the 2045 no-build conditions.

Regarding the Beltway interchange westbound right coded as free flow, it is noted that the Build Alternative 2045 volume forecast used in the analysis is based on the scenario where the Beulah Beltway is extended to the north as shown in the Cost Feasible Plan. Under this scenario, there is increased demand in 2045 along the Beulah Beltway north of I-10. For purposes of the analysis, it is assumed that the free flow right turn would be provided to meet 2045 conditions when the Beulah Beltway is extended to the north and the connection to W. Kingsfield Road would be dropped or relocated north to the realigned W. Kingsfield Road. The Beulah Beltway Extension and realignment of W. Kingsfield Road is being evaluated as part of a separate PD&E study as discussed in Section 2.3.

To confirm the interim operations of the proposed Build Alternative configuration with the Beulah Beltway terminating at W. Kingsfield Road, an analysis was conducted using 2035 Build Alternative traffic volumes and the proposed Build Alternative configuration (same as modeled above, but without the free flow right turn). As shown in Table 38, target LOS goals would be met for the 2035 Build condition. The 2035 Build Alternative AM and PM peak hour volumes were obtained from the Design Traffic Report (Appendix B).

Table 38: Build Alternative I-10/Beulah Interchange LOS (Year 2035)

Ramp Terminal	AM Peak		PM Peak	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Beltway at I-10 EB Exit Ramp	24.6	C	15.1	B
Beltway at I-10 WB Exit Ramp	10.0	A	22.4	C

6.7.2.6 Unsignalized Intersection Operational Analysis (Build Year 2045)

As shown in Table 39 (3 pages), the results of the HCS unsignalized intersection LOS analysis indicate that target LOS goals would be met for all unsignalized intersections within the limits of the proposed project in design year 2045 Build Alternative peak hour conditions.

Beyond the project limits, but within the AOI, the minor street sign-controlled approaches from Bell Ridge Drive, Foxtail Loop, Security Place, and Pinecone Drive along W. Nine Mile Road; and from W. Detroit Boulevard and Interstate Circle along Pine Forest Road would not meet target LOS goals.

As indicated in Section 2.3, capacity improvements are being evaluated to address these capacity deficiencies under FPID 218605-4 (W. Nine Mile Road from US 90 to SR 297 PD&E) and 437905-1 (I-10 from East of the Alabama State Line to US 29 PD&E and SIMR).

It is noted that target LOS goals would not be met for the same unsignalized intersection movements under the 2025 no-build conditions.

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Table 39: Unsignalized Intersection Operational Analysis (2045 Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
Beulah Rd. at W. Kingsfield Rd.	WB	LT	16.1	C	14.4	B	16.0	C	13.2	B
		RT	9.8	A			11.4	B		
	NB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	8.0	A	1.1	A	8.4	A	1.1	A
		TH	0.0	A			0.0	A		
Beulah Rd. at Trellis Ln.	WB	LT	13.6	B	13.6	B	12.8	B	12.8	B
		RT	13.6	B			12.8	B		
	NB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	7.9	A	1.0	A	8.5	A	1.2	A
		TH	0.0	A			0.0	A		
W. Nine Mile Rd. at Bell Ridge Dr.	EB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	WB	LT	21.5	C	0.3	A	8.2	A	0.2	A
		TH	0.0	A			0.0	A		
	NB	LT	299.8	F	168.8	F	30.8	D	16.0	C
		RT	24.6	C			9.3	A		
W. Nine Mile Rd. at Foxtail Loop	EB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	WB	LT	21.9	C	1.0	A	8.2	A	0.4	A
		TH	0.0	A			0.0	A		
	NB	LT	1035.6	F	1035.6	F	18.3	C	18.3	C
		RT	1035.6	F			18.3	C		
W. Nine Mile Rd. at Security Place	EB	LT	10.1	B	1.4	A	14.7	B	2.1	A
		TH	0.0	A			0.0	A		
	WB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	95.2	F	35.3	E	991.8	F	413.4	F
		RT	8.9	A			128.0	F		

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Table 39: Unsignalized Intersection Operational Analysis (2045 Build)

Intersection	Approach	Movement	AM Peak				PM Peak			
			Approach		Overall		Approach		Overall	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
W. Nine Mile Rd. at Pinecone Dr.	EB	LT	12.2	B	0.4	A	9.3	A	0.6	A
		TH	0.0	A			0.0	A		
	WB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	40.6	E	40.6	E	17.7	C	17.7	C
		RT	40.6	E			17.7	C		
Pine Forest Rd. at W. Detroit Blvd.	WB	LT	1532.1	F	1305.3	F	1139.6	F	981.0	F
		RT	16.7	C			16.4	C		
	NB	TH	0.0	A	0.0	A	0.0	A	0.0	A
		RT	0.0	A			0.0	A		
	SB	LT	14.3	B	0.2	A	14.3	B	0.1	A
		TH	0.0	A			0.0	A		
Pine Forest Rd. at Interstate Circle	EB	LT	573.4	F	237.5	F	1440.2	F	897.5	F
		TH	573.4	F			1440.2	F		
		RT	13.6	B			15.5	C		
	WB	LT	184.3	F	184.3	F	376.4	F	376.4	F
		TH	184.3	F			376.4	F		
		RT	184.3	F			376.4	F		
	NB	LT	0.0	A	0.0	A	13.6	B	0.0	A
		TH	0.0	A			0.0	A		
		RT	0.0	A			0.0	A		
	SB	LT	20.2	C	2.2	A	15.5	C	0.9	A
		TH	0.0	A			0.0	A		
		RT	0.0	A			0.0	A		

1. Delay measured in seconds per vehicle.

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7.0 EVALUATION OF ALTERNATIVES

7.1 Conformance with Local, Regional and State Transportation Plans

The proposed interchange and related roadway improvements are included in the 2045 Needs Plan and 2045 Cost Feasible Plan elements of the FATPO's 2045 LRTP as adopted on October 14, 2020. The new interchange is identified as a SIS project with right-of-way and construction funded in fiscal year 2026-2045.

7.2 Compliance with Policies and Engineering Standards

The design criteria used in the development of this project are based on the requirements set forth in the FDM, January 2020; the FDOT Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways, 2018; and AASHTO's A Policy on Geometric Design of Highway and Streets, 2011, 6th edition.

7.3 Alternatives Comparison

7.3.1 Regional Connectivity & Mobility

The Build Alternative provides improved regional connectivity and mobility that is driven by the current and planned growth within the greater Escambia County area.

The proposed improvement would provide improved connectivity along an approximately 18-mile stretch of I-10 (from CR 64 in Alabama to W. Nine Mile Road) that is without access to the local roadway network. This improvement will reduce circuitous routing (back-tracking, in some cases) and provide more direct connectivity - both regional and local.

Areas such as the township of Cantonment, FL located north of the proposed project (with an estimated population of 26,000 as of the 2010 census) would be provided with improved access to the interstate system. For instance, a trip from I-10 at the state line to Cantonment would be reduced from 13-miles to 7-miles with the new connection and beltway in place. The Mid-West Escambia County Optional Sector Plan is anticipated to result in an increase of up to 23,500 residential units in this area by 2035. This increase in population, along with the associated growth in employment (such as Navy Federal Credit Union), would greatly influence and increase travel demand on the local area roadway network, estimated at 371,000 additional trips per day. The Navy Federal Credit Union is currently the area's largest employer at 8,200 employees and growing. According to a local news journal published November 7, 2019, the company is ahead of schedule in its effort to reach 10,000 employees by 2026. The existing network and future development of the Escambia County Sector Plan will need to be supported by an interconnected transportation system that efficiently links housing with employment and retail centers. The proposed hierarchical transportation system would be anchored by the Beulah/I-10 interchange.

From a systemwide perspective, mobility is also enhanced since average travel speeds would be increased with more vehicles being afforded the opportunity to use the interstate system. As detailed in Appendix J, an analysis of No-Build and Build Alternative vehicle-miles traveled (VMT), vehicle-hours traveled (VHT), and overall average travel speeds (VMT/VHT) was conducted using outputs from the regional travel demand model.

The analysis shows an increase in overall VMT and reduced VHT and higher average travel speeds under the build scenario. Increased VMT and reduced VHT and higher average travel speeds are

observed as a result of routing opportunities along facilities of higher mobility/safety standards and higher travel speeds offered by the Build Alternative. At the regional-level, a shift in travel demand from US 29 to the Beltway and I-10 is observed resulting in longer trips being made at higher speeds and in less time. At the local level, a shift in travel demand is observed from W. Nine Mile Road to SR 99 (Beulah Road) and the I-10 interstate system under the build scenario. This shift in travel demand is a result of the added interchange providing route choice with higher travel speeds and improved roadway standards along the widened Beulah Road and new interchange access to I-10 under the Build Alternative.

The Build Alternative would align relatively longer-distance trips (such as between northern Escambia County and Pensacola) with a facility (I-10) that is designed for this purpose, thereby supporting facilities with higher mobility and safety standards. Without the Build Alternative, there would be increased use of the existing US 29 corridor to satisfy this travel demand. Recognizing US 29 is an interrupted flow facility, mobility (and safety) are enhanced under the build scenario by providing linkage between I-10 and the Beltway to support regional trips on the interstate system rather than the arterial system.

The shift of regional travel demand from US 29 to I-10 and the Beltway is revealed through the “select link plots” as shown in Appendix J which provide a comparison of the 2045 build and no-build scenarios. The VMT, VHT and average travel speed analysis reveals an increase in VMT associated with the build alternative, largely on the freeway. But again, this is a result of trips sacrificing the shortest distance path to gain a mobility edge (as seen by the VHT savings and average speed increases) by re-routing to I-10 at the Beulah Road interchange. In realigning this market with the I-10 route option, not only are mobility benefits realized, but safety benefits are likely as well (reduced long-distance trips on the surface street system). The increased traffic on I-10 resulting from the build alternative would degrade average speed slightly on the interstate system. However, the slight decrease in travel speed on I-10 is not considered significant and it is noted that the volume-delay functions employed in regional travel demand models do not necessarily mirror congestion-deterioration effects.

In summary it is concluded that through an examination of VMT, VHT and average travel speeds, the new interchange and associated roadway improvements further support the purpose and need in terms of providing regional connectivity, mobility, and safety benefits.

Furthermore, as discussed in Section 5.3, the proposed interchange would offer an additional access point to the interstate system providing critically needed improved access and route choices for emergency evacuation.

7.3.2 Operational Analysis

7.3.2.1 Interstate System LOS

As summarized in Table 40 and Table 41, the I-10 mainline and ramp merge/diverge points would function similarly for the No-Build and Build alternatives at opening year 2025 and design year 2045. With the I-10 mainline and ramp merge/diverge points operating at (or better than) target LOS values, it is concluded that the proposed interchange does not negatively impact the interstate system.

Table 40: Alternative Comparison - I-10 Freeway Segments LOS

Location		2025				2045			
		No-Build		Build		No-Build		Build	
		AM	PM	AM	PM	AM	PM	AM	PM
I-10 Eastbound	From State Line to Ag. Station	B	A	A	A	A	A	B	A
	Between Ramps at Ag. Station	A	A	A	A	A	A	A	A
	From Ag. Station to Beltway Off-Ramp	B	A	A	A	A	A	B	A
	Between Ramps at Beltway			A	A			A	A
	From Beltway to Weigh Station			B	A			B	B
	Between Ramps at Weigh Station	B	A	B	A	A	A	B	B
	From Weigh Station to Welcome Center	A	A	B	A	A	A	B	B
	Between Ramps at Welcome Center	B	A	B	A	A	A	B	B
	Between Welcome Ctr & W. Nine Mile Rd.	B	A	B	B	A	A	B	B
	Between Ramps at W. Nine Mile Rd.	A	A	B	A	A	A	B	A
	From W. Nine Mile Rd. to Pine Forest Rd.	B	B	C	B	B	B	B	B
	Between Off-Ramps at Pine Forest Rd.	B	B	B	B	B	B	B	B
	Between Off-Ramp & On-Ramp at SR 297	B	B	B	B	B	B	B	B
	From Pine Forest Rd. to US 29	C	B	C	B	B	B	C	B
I-10 Westbound	From US 29 to Pine Forest Rd.	B	C	B	C	B	B	B	C
	Between Ramps at Pine Forest Rd.	A	B	B	B	A	B	B	B
	From Pine Forest Rd. to W. Nine Mile Rd.	B	B	B	B	B	B	B	B
	Between Ramps at W. Nine Mile Rd.	A	B	A	B	A	A	A	B
	From W. Nine Mile Rd. to Weigh Station	A	B	A	B	A	A	B	B
	Between Ramps at Weigh Station	A	B	A	A	A	A	A	B
	From Weigh Station to Beltway	A	B	A	A	A	A	B	B
	Between Ramps at Beltway			A	A			A	A
From Beltway to State Line	A			A	A			A	

Legend:

LOS	Target LOS goal met.
LOS	Target LOS goal not met.
	Build Alternative meets target LOS goals, but No-Build does not.
	No-Build Alternative meets target LOS goals, but Build does not.

Table 41: Alternative Comparison - I-10 Freeway Ramp Merge/Diverge LOS

Location		2025				2045			
		No-Build		Build		No-Build		Build	
		AM	PM	AM	PM	AM	PM	AM	PM
I-10 Eastbound	to Ag. Station	A	A	A	A	A	A	A	A
	from Ag. Station	B	B	B	A	B	A	B	A
	to Beltway	N/A	N/A	A	A	N/A	N/A	B	A
	from Beltway	N/A	N/A	B	A	N/A	N/A	C	B
	to Weigh Station	B	B	B	A	B	A	C	B
	from Weigh Station	B	A	A	A	A	A	B	B
	to Welcome Center	B	A	B	A	B	A	B	B
	from Welcome Center	B	A	B	A	A	A	B	B
	to W. Nine Mile Rd.	B	B	B	B	B	B	B	B
	from W. Nine Mile Rd.	B	B	B	B	B	B	B	C
	to Pine Forest Rd. SB	B	B	B	B	B	B	B	B
	to Pine Forest Rd. NB	B	B	B	B	B	B	B	B
from Pine Forest Rd.	C	B	C	B	C	B	C	B	
I-10 Westbound	to Pine Forest Rd.	B	C	B	C	B	B	B	C
	from Pine Forest Rd.	B	B	B	B	B	B	B	B
	to W. Nine Mile Rd.	B	B	B	B	B	B	B	B
	from W. Nine Mile Rd.	B	B	B	B	A	B	B	B
	to Weigh Station	A	B	A	B	B	B	B	B
	from Weigh Station	B	A	A	A	B	B	B	B
	to Beltway	N/A	N/A	A	B	N/A	N/A	B	B
	from Beltway	N/A	N/A	A	A	N/A	N/A	A	B

Legend:

LOS	Target LOS goal met.
LOS	Target LOS goal not met.
	Build Alternative meets target LOS goals, but No-Build does not.
	No-Build Alternative meets target LOS goals, but Build does not.
N/A	Ramp does not exist.

7.3.2.2 Arterial LOS

As shown in Table 42 and 43, the Build Alternative would function significantly better than the No-Build Alternative. In the no-build design year 2045 condition, Beulah Road would operate at LOS E/F in the peak direction for the entire section from W. Nine Mile Road to Muscogee Road, whereas this section of Beulah Road would operate at LOS B or better in the build condition.

Table 42: Alternative Comparison - Arterial Segment LOS (Northbound-Southbound)

Location	Direction	2025				2045			
		No-Build		Build		No-Build		Build	
		AM	PM	AM	PM	AM	PM	AM	PM
Beulah Beltway									
Beulah Rd. to I-10	NB	N/A	N/A	A	A	N/A	N/A	A	A
	SB	N/A	N/A	A	A	N/A	N/A	A	A
I-10 to W. Kingsfield Rd.	NB	N/A	N/A	A	A	N/A	N/A	C	C
	SB	N/A	N/A	A	A	N/A	N/A	C	C
W. Kingsfield Rd. to Muscogee Rd.	NB	N/A	N/A	N/A	N/A	A	A	B	C
	SB	N/A	N/A	N/A	N/A	A	A	C	B
Beulah Rd.									
South of W. Nine Mile Rd.	NB	C	B	C	B	E	D	E	C
	SB	B	C	A	C	C	E	B	E
W. Nine Mile Rd. to Frank Reeder Rd.	NB	A	D	A	A	D	F	B	B
	SB	D	B	A	A	F	E	B	A
Frank Reeder Rd. to Beulah Beltway	NB	A	C	A	A	D	F	B	B
	SB	C	B	A	A	F	E	B	A
Beulah Beltway to Trellis La.	NB	A	C	A	C	D	F	A	B
	SB	C	B	B	A	F	E	B	A
Trellis La. to W. Kingsfield Rd.	NB	A	C	A	B	D	E	A	B
	SB	C	B	B	A	E	E	B	A
W. Kingsfield Rd. to Muscogee Rd.	NB	A	C	A	D	C	E	A	B
	SB	C	B	E	B	E	C	B	A
Pine Forest Rd.									
Interstate Circle to Wilde Lake Blvd.	NB	B	B	B	B	B	B	B	B
	SB	B	B	B	B	B	B	B	B
Wilde Lake Blvd. to I-10	NB	B	B	B	B	B	B	B	B
	SB	C	C	C	C	C	C	C	C
I-10 to W. Detroit Blvd.	NB	B	B	B	B	B	B	B	C
	SB	B	B	B	B	B	B	B	B
Legend:									
LOS	Target LOS goal met.								
LOS	Target LOS goal not met.								
	Build Alternative meets target LOS goals, but No-Build does not.								
	No-Build Alternative meets target LOS goals, but Build does not.								
N/A	Road segment does not exist.								

It is noted in opening year 2025, there are two rural arterial segments north of the project area, but within the AOI (Beulah Road from W. Kingsfield to Muscogee Road and Muscogee Road east of Beulah Road) that would not meet target LOS goals (LOS C or better) for the Build Alternative, but do meet target LOS goals for the No-Build Alternative as shown in Table 42 and 43. This would be a temporary condition that would be mitigated when the beltway is extended further north per the

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Cost Feasible Plan. As indicated in Section 2.3, the extension of the Beulah Beltway is being evaluated as part of an ongoing PD&E study and is included in the 2045 no-build and build analysis.

As shown in Table 43, Muscogee Road would operate at LOS D/E in the peak direction from Beulah Road to east of the Beulah Beltway in the 2045 no-build condition, whereas this section of Muscogee Road would operate at LOS C or better in the 2045 build condition. It is noted that capacity improvements are being evaluated under FPID 218605-4 (W. Nine Mile Road from US 90 to SR 297 PD&E) to address the section of W. Nine Mile Road west of Beulah Road that would not meet target LOS criteria in the 2045 build condition.

Table 43: Alternative Comparison - Arterial Segment LOS (Eastbound-Westbound)																			
Location	Direction	2025				2045													
		No-Build		Build		No-Build		Build											
		AM	PM	AM	PM	AM	PM	AM	PM										
Muscogee Rd.																			
East of Beulah Rd.	EB	A	B	A	C	D	E	A	B										
	WB	C	A	D	B	E	C	A	A										
East of Beulah Beltway	EB	N/A	N/A	N/A	N/A	A	D	C	C										
	WB	N/A	N/A	N/A	N/A	D	C	C	C										
W. Kingsfield Rd.																			
East of Beulah Rd.	EB	A	A	C	A	A	A	A	A										
	WB	A	A	A	B	A	A	A	A										
East of Beulah Beltway	EB	N/A	N/A	A	B	A	A	A	A										
	WB	N/A	N/A	B	B	A	A	A	A										
W. Nine Mile Rd.																			
West of Beulah Rd.	EB	D	B	D	B	E	C	E	B										
	WB	A	C	A	D	A	D	A	E										
Beulah to Heritage Oaks Blvd.	EB	B	A	B	A	D	A	C	A										
	WB	A	B	A	A	A	C	A	B										
Heritage Oaks Blvd. to Navy Federal Way	EB	B	B	B	A	C	C	B	B										
	WB	A	B	A	A	C	C	B	B										
Navy Federal Way to I-10	EB	B	B	A	B	C	D	A	C										
	WB	B	A	B	A	D	B	C	A										
I-10 to Pinecone Dr.	EB	A	A	A	A	A	C	A	B										
	WB	A	A	A	A	B	A	B	A										
Legend: <table border="1"> <tr> <td>LOS</td> <td>Target LOS goal met.</td> </tr> <tr> <td>LOS</td> <td>Target LOS goal not met.</td> </tr> <tr> <td></td> <td>Build Alternative meets target LOS goals, but No-Build does not.</td> </tr> <tr> <td></td> <td>No-Build Alternative meets target LOS goals, but Build does not.</td> </tr> <tr> <td>N/A</td> <td>Road segment does not exist.</td> </tr> </table>										LOS	Target LOS goal met.	LOS	Target LOS goal not met.		Build Alternative meets target LOS goals, but No-Build does not.		No-Build Alternative meets target LOS goals, but Build does not.	N/A	Road segment does not exist.
LOS	Target LOS goal met.																		
LOS	Target LOS goal not met.																		
	Build Alternative meets target LOS goals, but No-Build does not.																		
	No-Build Alternative meets target LOS goals, but Build does not.																		
N/A	Road segment does not exist.																		

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As shown in Table 44, the Build Alternative would function significantly better than the No-Build Alternative. In the no-build opening year 2025 condition, the Muscogee Road, Frank Reeder Road, and W. Nine Mile Road intersections along Beulah Road would not meet target LOS goals, whereas target LOS goals would be met under the build condition.

In the design year 2045 condition, the operations of the same intersections along Beulah Road would worsen to LOS F under the no-build condition, whereas target LOS goals would continue to be met under the build condition. In addition, all signalized intersections would fail to meet target LOS goals along W. Nine Mile Road and Pine Forest Road under the peak hour 2045 no-build condition, whereas target LOS goals are met for the majority of intersections along W. Nine Mile Road under the build condition.

Table 44: Alternative Comparison - Signalized Intersection LOS

Intersection	2025				2045			
	No-Build		Build		No-Build		Build	
	AM	PM	AM	PM	AM	PM	AM	PM
Beulah Rd. at Muscogee Rd.	E	D	C	B	F	F	B	A
Beltway at Muscogee Rd.	N/A	N/A	N/A	N/A	D	C	C	C
Beltway at W. Kingsfield	N/A	N/A	C	B	A	B	C	C
Beltway at I-10 WB Ramps	N/A	N/A	A	B	N/A	N/A	A	B
Beltway at I-10 EB Ramps	N/A	N/A	C	B	N/A	N/A	C	C
Beltway at Beulah Rd.	N/A	N/A	B	B	N/A	N/A	B	B
Beulah Rd. at Frank Reeder Rd.	F	E	A	A	F	F	B	B
W. Nine Mile Rd. at Beulah Rd.	F	D	C	B	F	F	D	C
W. Nine Mile Rd. at Heritage Oaks Blvd.	A	E	A	D	D	F	D	F
W. Nine Mile Rd. at Navy Federal Way	A	C	B	C	F	F	F	F
W. Nine Mile Rd. at I-10 EB Off-Ramp	B	B	B	B	F	A	B	B
W. Nine Mile Rd. at I-10 WB Off-Ramp	C	B	C	B	F	C	D	C
Pine Forest Rd. at I-10 WB Off-Ramp	B	D	C	D	C	E	D	F
Pine Forest Rd. at I-10 EB Off-Ramp	A	C	B	D	C	E	D	F
Pine Forest Rd. at Wilde Lake Blvd.	C	B	C	B	E	D	E	E

Legend:

LOS	Target LOS goal met.
LOS	Target LOS goal not met.
LOS	No-build condition unsignalized intersection LOS.
	Build Alternative meets target LOS goals, but No-Build does not.
	No-Build Alternative meets target LOS goals, but Build does not.
N/A	Intersection does not exist.

As shown in Table 45, the Build Alternative would function significantly better than the No-Build Alternative.

In the opening year 2025 condition, the Muscogee Road and Frank Reeder Road intersections along Beulah Road would not meet target LOS goals in the no-build condition, whereas target LOS goals would be met under the build condition due to the proposed signalization of these intersections.

In the design year 2045 condition, the operations of all 4 unsignalized intersections along Beulah Road would worsen to LOS F in the no-build condition, and target LOS goals would continue to be met under the build condition. The unsignalized intersections along W. Nine Mile Road and Pine Forest Road would also operate at LOS F in the 2045 no-build condition with the build condition operating better meeting target LOS goals in some instances.

As indicated in Section 2.3, capacity improvements are being evaluated to address the signalized and unsignalized intersection LOS deficiencies along W. Nine Mile Road under FPID 218605-4 (W. Nine Mile Road from US 90 to SR 297 PD&E). Since the FPID 218605-4 study is ongoing, the exact remedy to the intersection failures is unknown, and therefore has been omitted from the analysis.

Table 45: Alternative Comparison - Unsignalized Intersection LOS

Intersection	Direction	2025				2045			
		No-Build		Build		No-Build		Build	
		AM	PM	AM	PM	AM	PM	AM	PM
Beulah Rd. at Muscogee Rd.	NB	E	D	C	B	F	F	B	A
	SB	D	C			F	F		
Beulah Rd. at W. Kingsfield Rd.	WB	C	C	A	C	F	F	B	B
Beulah Rd. at Trellis Ln.	WB	C	C	B	B	F	F	B	B
Beulah Rd. at Frank Reeder Rd.	EB	C	C	A	A	F	F	B	B
	WB	F	E			F	F		
W. Nine Mile Rd. at Bell Ridge Dr.	NB	E	C	C	B	F	F	F	C
W. Nine Mile Rd. at Foxtail Loop	NB	F	D	E	C	F	F	F	C
W. Nine Mile Rd. at Security Place	SB	D	F	C	E	F	F	E	F
W. Nine Mile Rd. at Pinecone Dr.	SB	C	C	D	C	F	F	E	C
Pine Forest Rd. at W. Detroit Blvd.	WB	F	F	F	F	F	F	F	F
Pine Forest Rd. at Interstate Circle	EB	F	F	F	F	F	F	F	F
	WB	E	F	E	F	F	F	F	F

Legend:

LOS	Target LOS goal met.
LOS	Target LOS goal not met.
LOS	Build condition signalized intersection LOS.
	Build Alternative meets target LOS goals, but No-Build does not.
	No-Build Alternative meets target LOS goals, but Build does not.
N/A	Intersection does not exist.

As an example, minor side street intersection failures at Bell Ridge Drive and Foxtail Loop (non-through streets serving residential development) may be resolved by implementing a directional median opening that prohibits left turns from the minor street. The failing intersections at Security

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Place, Heritage Oaks Boulevard, and Navy Federal Way may be resolved by capacity and traffic signalization improvements to meet the traffic demand from the Navy Federal Credit Union. However, speculation of the exact remedy to be determined by other ongoing studies was intentionally omitted to avoid conflicting commitments. It is also noted that these arterial intersection failures would not affect the operations of the interstate system.

Capacity and interchange improvements are also being evaluated to address the deficiencies along Pine Forest Road in the vicinity of I-10 as part of FPID 437905-1 (I-10 from East of the Alabama State Line to US 29 PD&E and SIMR). Since the FPID 437905-1 study is ongoing with the exact remedy to the intersection failures unknown, potential improvements that may be implemented as part of FPID 437905-1 have been omitted from the analysis to avoid conflicting commitments.

7.3.3 Safety Analysis

Two analysis tools were applied for this study. The HSM spreadsheet tool was used to implement predictive methods on rural 2-lane and rural multilane roadways while the Enhanced Interchange Safety Analysis Tool (ISATe) was used to evaluate freeway and interchange safety. Crash frequencies were adjusted using calibration factors to account for site specific conditions for each facility type. Calibration factors used to adjust safety performance functions (SPFs) for Florida conditions were obtained from the FDOT HSM webpage¹. It is noted that the Empirical Bayes Method (EBM) cannot be applied to new location roadways where no relevant crash history exists and locations where a substantial proportion of the roadway length is proposed to undergo major improvements, hence it was not used for this project. Table 46 (2 pages) shows a comparison of expected crashes for the no-build and build scenarios. The detailed worksheets and output files from the safety analysis are included in Appendix K.

Table 46: No-Build vs. Build Predicted Crashes Over 20 years			
	Total	Fatal and Injury (FI)	Property Damage Only (PDO)
Beulah Road & Intersections			
No-Build	1340.9	467.0	874.0
Build	1036.8	394.6	642.3
Benefit	304.1	72.4	231.7
W. Nine Mile Road & Intersections			
No-Build	1616.3	582.8	1033.6
Build	1452.7	528.2	924.5
Benefit	163.6	54.6	109.1

¹ <http://www.fdot.gov/safety/11A-SafetyEngineering/TransSafEng/HighwaySafetyManual.shtm>

Table 46: No-Build vs. Build Predicted Crashes Over 20 years			
	Total	Fatal and Injury (FI)	Property Damage Only (PDO)
I-10 Mainline			
No-Build	356.8	115.9	240.8
Build	393.1	113.6	279.5
Benefit	-36.3	2.3	-38.7
I-10 & Beulah Road Interchange Ramps			
No-Build	0.0	0.0	0.0
Build	35.3	16.1	19.2
Benefit	-35.3	-16.1	-19.2
I-10 & Beulah Road Interchange Ramp Terminals			
No-Build	0.0	0.0	0.0
Build	274.7	78.9	195.9
Benefit	-274.7	-78.9	-195.9
Pine Forest Road and Intersections			
No Build	711.6	253.9	457.7
Build	669.2	241.2	427.9
Benefit	42.4	12.7	29.8
Overall			
No-Build	4025.6	1419.6	2606.1
Build	3861.8	1372.6	2489.3
Benefit	163.8	47.0	116.8
Predicted crashes for the 20-year analysis period were determined by multiplying mean of the predicted crashes for each of the two analysis years (2025, 2045) by 20.			

The results of the predictive analysis indicate that the Build Alternative would provide enhanced safety when compared to No-Build Alternative. Based on the safety analysis, it is predicted that the total number of crashes from opening year to design year would be reduced by 228.7, of which 57.3 are fatal/injury type and 171.4 are Property Damage Only (PDO) crashes.

While crashes for the new interchange ramps and ramp terminals are predicted to increase as a result of the new conflict points in the build condition, safety benefits are anticipated along Beulah Road, W. Nine Mile Road, and Pine Forest Road as a result of the decrease in AADTs along these arterials as compared to the no-build condition.

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A Safety Benefit Cost Analysis was performed utilizing “HSM Crash Distribution for Florida” and “KABCO Crash Costs” as presented in the January 2020 FDOT Design Manual. As shown below in Table 47, the total safety benefit for the project over the 20-year analysis period is approximately \$95,000,000.

	Fatal (K)	Incapacitating Injury (A)	Non-Incapacitating Injury (B)	Possible Injury (C)	Property Damage Only (PDO)
No-Build	78.5	259.1	527.2	553.9	2606.0
Build	71.5	240.9	503.5	555.9	2489.3
Crash Reduction	7.0	18.2	23.7	-2.1	116.7
Cost Per Crash (\$)	\$10,670,000	\$872,612	\$174,018	\$106,215	\$7,700
Benefit	\$74,262,374.76	\$15,887,961	\$4,118,131	-\$220,670	\$898,266
20 Year Life Cycle Benefit	\$94,946,063				

7.4 Alternative Comparison Summary

As presented in Section 7.3, the Build Alternative would address the project objectives, whereas the No-Build alternative would not. The Build Alternative provides improved regional connectivity and offers the added benefit of reduced congestion on adjacent roadways, enhanced emergency evacuation and response times and improved overall safety.

As described in further detail in section 7.3.1, the Build Alternative would provide the much-needed improved regional connectivity and mobility that is driven by the current and planned growth within the greater Escambia County area.

As discussed in further detail in Section 7.3.2, and as summarized in Figure 33 and Figure 34, the I-10 mainline and ramp merge/diverge points function similarly for the No-Build and Build alternatives at opening year 2025 and design year 2045 operating at (or better than) target LOS values.

The Build Alternative would function significantly better than the No-Build Alternative along Beulah Road. In the 2045 No-Build Alternative condition, the entire length of Beulah Road would operate at LOS E/F in the peak direction (from south of W. Nine Mile Road to Muscogee Road), and the intersections along Beulah Road would operate at LOS E/F. In the 2045 Build Alternative condition, all of Beulah Road and its intersecting side streets would meet target LOS goals (except for the segment of Beulah Road south of W. Nine Mile Road that would operate at LOS E).

Although the proposed I-10/Beulah interchange would reduce traffic demand along W. Nine Mile Road, operational failures are anticipated to occur at the signalized and unsignalized intersections along W. Nine Mile Road from east of Beulah Road to I-10 in design year 2045 no-build and build conditions. In addition, operational failures are anticipated to occur at the signalized and unsignalized intersection along Pine Forest Road within the AOI in design year 2045 no-build and

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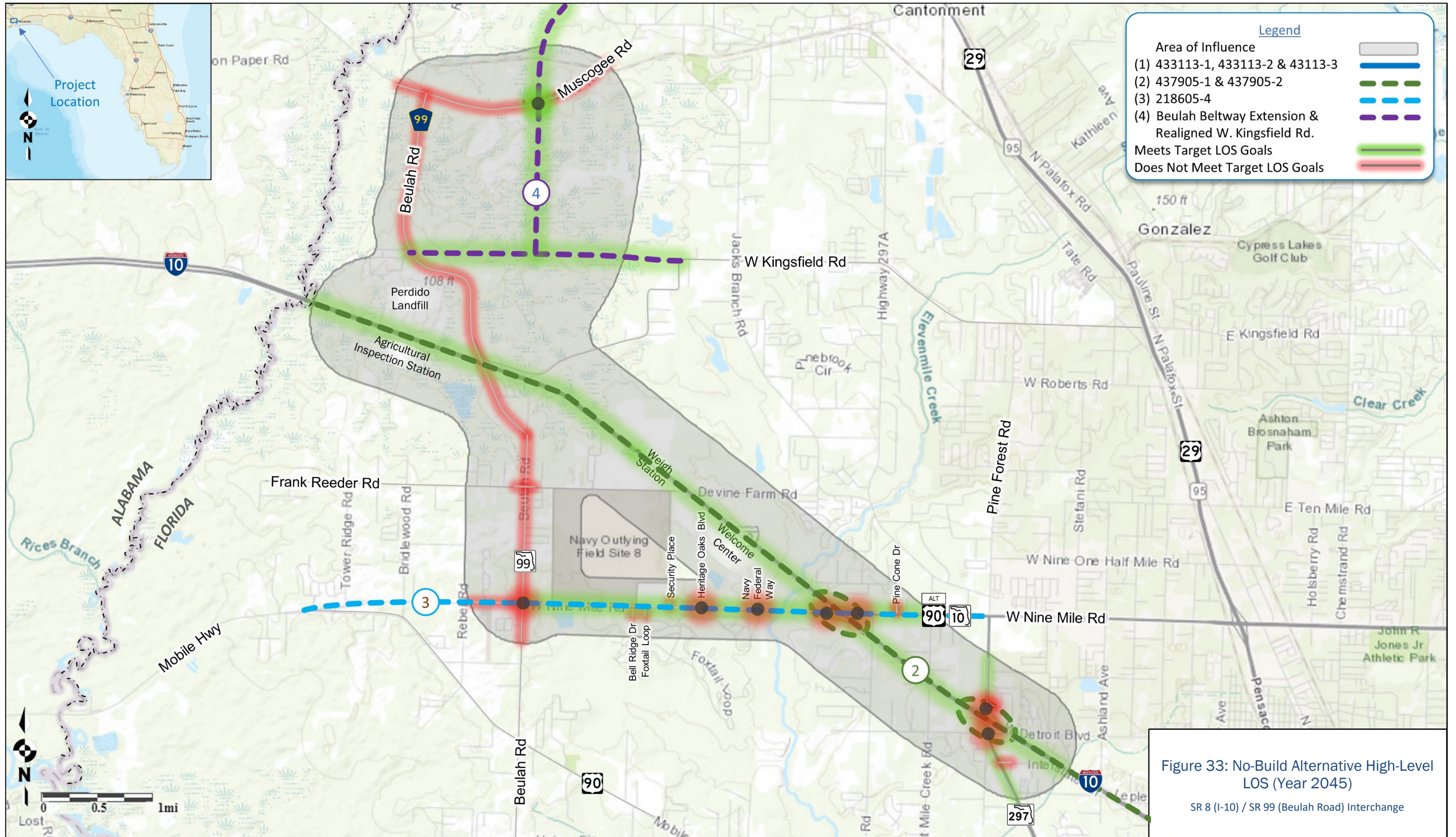
build conditions. As discussed in Section 2.3, these outlying capacity deficiencies are being evaluated as part of other PD&E studies.

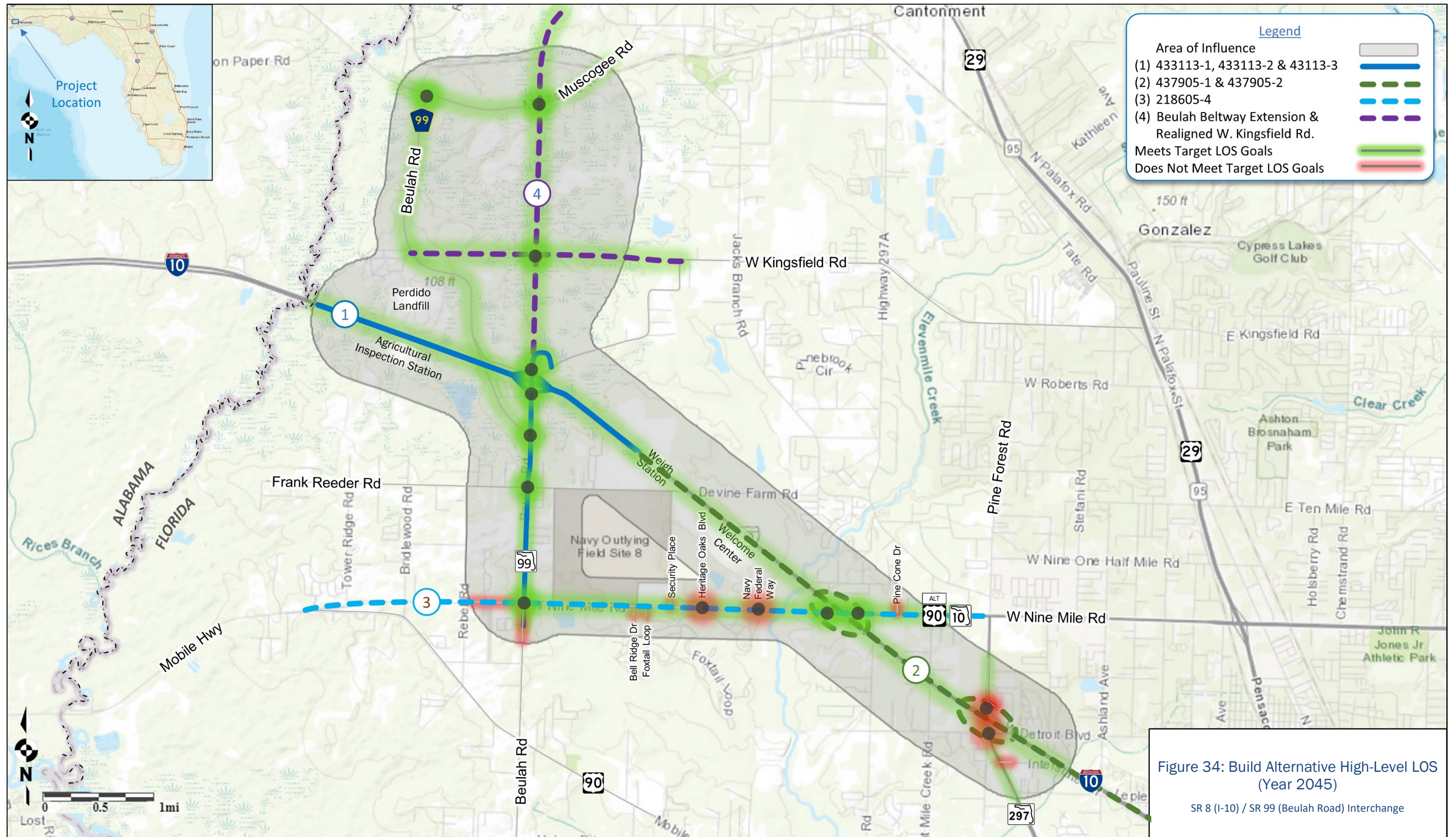
As presented in Section 7.3.3 and summarized in Table 47, the total safety benefit for the Build Alternative over the 20-year analysis period would be approximately \$95,000,000.

As presented in Section 5.3, the Build Alternative would also provide improved emergency evacuation and response times.

The following table summarizes whether each alternative meets the project needs and objectives.

Table 48: Alternative Comparison Summary		
Project Objective / Need	No-Build Alternative	Build Alternative
Improved Regional Connectivity	✘	✓
Reduced Congestion on Adjacent Roadways	✘	✓
Improved Safety	✘	✓
Enhanced Emergency Evacuation	✘	✓





7.5 Recommended Alternative

Based on the comparison of alternatives, the Build Alternative is recommended since it would address the project needs and objectives, whereas the No-Build alternative would not. The Build Alternative provides improved regional connectivity, and offers the added benefit of improved overall safety, traffic operations, and emergency evacuation and response times.

7.5.1 Proposed Concept Plans

Concept plans for the recommended Build Alternative are included in Appendix L: Build Alternative Concept Plans.

7.5.2 Conceptual Signing Plan

The Conceptual Signing Plan for the recommended Build Alternative is included in Appendix M: Build Alternative Conceptual Signing Plan.

7.5.3 Design Exceptions and Variations

The Build Alternative concept plans meet the design criteria as listed in Section 7.2 and no design exceptions or variations are anticipated. If design exceptions or variations become necessary as the project is further developed during final design, the FDOT procedure will be followed for obtaining approvals.

8.0 JUSTIFICATION & RECOMMENDATIONS

E.1.1 FHWA Policy Point 1

An operational and safety analysis was performed comparing the Build Alternative to the No-Build Alternative with the conclusion that the proposed interchange does not have a significant adverse impact on the safety and operation of the Interstate facility (including mainline lanes, existing and new ramps, and ramp intersections with crossroads) or on the local street network based on both the current and the planned future traffic projections.

Operational Analysis

As discussed in further detail in Section 7.3.2 Operational Analysis, and as summarized in Figure 33 and Figure 34, the I-10 mainline and ramp merge/diverge points function similarly for the No-Build and Build alternatives at opening year 2025 and design year 2045 operating at (or better than) target LOS values.

The Build Alternative would function significantly better than the No-Build Alternative along Beulah Road. In the 2045 No-Build Alternative condition, the entire length of Beulah Road would operate at LOS E/F in the peak direction (from south of W. Nine Mile Road to Muscogee Road), and the intersections along Beulah Road would operate at LOS E/F. In the 2045 Build Alternative condition, all of Beulah Road and its intersecting side streets would meet target LOS goals (except for the segment of Beulah Road south of W. Nine Mile Road that operates at LOS E).

Although the proposed I-10/Beulah interchange would reduce traffic demand along W. Nine Mile Road, operational failures are anticipated to occur at the signalized and unsignalized intersections along W. Nine Mile Road from east of Beulah Road to I-10 in design year 2045

no-build and build conditions. In addition, operational failures are anticipated to occur at the signalized and unsignalized intersection along Pine Forest Road within the AOI in design year 2045 no-build and build conditions. As discussed in Section 2.3 Ongoing Adjacent Capacity Improvement Studies, these outlying capacity deficiencies are being evaluated as part of other PD&E studies.

Safety Analysis

As described in further detail in Section 7.3.3 Safety Analysis, the results of the predictive crash analysis indicate that the Build Alternative would provide enhanced safety when compared to No-Build Alternative. Based on the safety analysis, it is predicted that the total number of crashes from opening year to design year would be reduced by 164, of which 47 are fatal/injury type and 117 are Property Damage Only (PDO) crashes.

While crashes for the new interchange ramps and ramp terminals are predicted to increase as a result of the new conflict points, safety benefits are anticipated along Beulah Road, W. Nine Mile Road, and Pine Forest within the AOI.

A Safety Benefit Cost Analysis was performed utilizing “HSM Crash Distribution for Florida” and “KABCO Crash Costs” as presented in the January 2020 FDOT Design Manual. As shown in Table 47: Benefit Cost Analysis, the total safety benefit for the project over the 20-year analysis period is approximately \$95,000,000.

E.1.2 FHWA Policy Point 2

The proposed access connects to a public road only and will provide for all traffic movements. 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)).

Recommendations

The recommended Build Alternative provides the needed regional connectivity, reduced congestion on adjacent roadways, and enhanced emergency evacuation within the AOI as compared to the No-Build Alternative and meets the criteria of both FHWA policy points. The Recommended Build Alternative will be incorporated into, and further developed in the PD&E study process.

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9.0 FUNDING PLAN AND SCHEDULE

The proposed interchange and related roadway improvements are included in the 2045 Needs Plan and 2045 Cost Feasible Plan elements of the FATPO 2045 LRTP as adopted October 14, 2020. The new interchange is identified as a Strategic Intermodal System (SIS) project with right-of-way and construction funded in fiscal year 2026-2045 as shown in Table 49.

Table 49: Build Alternative Funding Plan and Schedule		
Project ¹	Phase	Funding
I-10/SR 99 (Beulah Road) Interchange	ROW	\$ 9,500,000
	CST/CEI	\$ 124,000,000
SR 99 (Beulah Road) to US 29 Connector	ROW	\$ 5,259,754
	CST/CEI	\$ 12,097,434
Total Project		\$150,857,188

¹ As shown in the 2045 FATPO LRTP.

The construction cost of the proposed Build Alternative was estimated using the FDOT Long Range Estimating System as presented in Appendix N, Long Range Estimate and as summarized in Table 50.

Table 50: Build Alternative Construction Cost Estimate	
Project	Construction Cost
433113-1	\$ 86,050,000
433113-2	\$ 14,600,000
433113-3	\$ 5,450,000
Total	\$ 106,100,000

Appendix A: Methodology Letter of Understanding

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INTERCHANGE JUSTIFICATION REPORT (IJR)

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Appendix B: Design Traffic Report

Appendix C: Existing Year 2018 HCS and Synchro Outputs

Appendix D: Crash Data (FDOT Crash Analysis Reporting System)

**Appendix E:
Florida-Alabama 2045 Long Range Transportation Plan
(Adopted October 14, 2020)**

**Appendix F:
Planned Projects (218605-3, 218605-5, & 218605-7)**

**Appendix G:
No-Build Alternative Opening Year 2025 and Design Year
2045 HCS and Synchro Outputs**

Appendix H: Build Alternative Interchange Concept Development

**Appendix I:
Build Alternative Opening Year 2025 and Design Year
2045 HCS and Synchro Outputs**

Florida Department of Transportation

INTERCHANGE JUSTIFICATION REPORT (IJR)

SR 8 (I-10) / SR 99 (Beulah Road) Interchange

FPID 433113-1-22-01, 433113-2-22-01, & 433113-3-22-01

Appendix J: Purpose & Need Validation Memo

Appendix K: Safety Analysis Output

Appendix L: Build Alternative Concept Plans

Appendix M: Build Alternative Conceptual Signing Plan

Appendix N: Long Range Estimate (LRE)