INTERCHANGE OPERATIONAL ANALYSIS REPORT

I-10 (SR 8) at US 90 (Mahan Drive)
LEON COUNTY, FLORIDA

ETDM Number: 14394
Financial Project ID: 406585-3-22-01

Florida Department of Transportation

District Three

March 2021

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

TECHNICAL REPORT COVERSHEET

Interchange Operational Analysis Report

Florida Department of Transportation

District Three

I-10 (SR 8) at US 90 (Mahan Drive)

Limits of Project: From Walden Road to Summit Lake Drive

Leon County, Florida

Financial Management Number: 406585-3-22-01

ETDM Number: 14394

Date: March 2nd, 2021

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Joseph N Samus Digitally signed by Joseph N Samus Date: 2021.03.02 16:51:01 -05'00'

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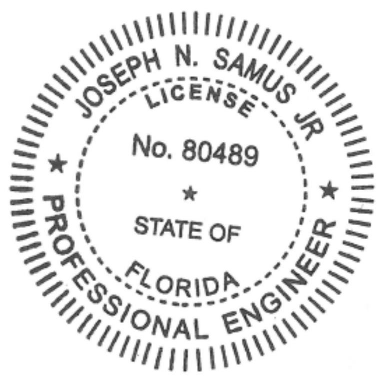

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Interchange Operational Analysis Report (IOAR)

I-10 (SR 8) at US 90 (Mahan Drive)

Leon County, Florida

406585-3-22-01

Florida Department of Transportation

Determination of Safety, Operational and Engineering Acceptability

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

		Date
Requestor	DocuSigned by: Iris Waters F7595C693CCA40D... Iris Waters, PE District Three I-10 PD&E Project Manager	3/3/2021 | 9:23 AM EST
Interchange Review Coordinator	DocuSigned by: Starsky Harrell E3F2EA2D0F5440D... Starsky Harrell District Three	3/3/2021 | 9:22 AM EST
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State Chief Engineer	DocuSigned by: 022E6284290B41A... Will Watts, P.E. Central Office	3/25/2021 | 8:38 AM EDT

SYSTEMS IMPLEMENTATION OFFICE

QUALITY CONTROL CERTIFICATION FOR INTERCHANGE ACCESS REQUEST SUBMITTAL

Submittal Date: 3/2/2021

FM Number: 406585-3-22-01

Project Title: I-10 (SR 8) at US 90 (Mahan Drive)

District: Three

Requestor: Iris Waters, PE   Phone: (850) 330-1625

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Document Type: ☐ MLOU ☐ IJR ☐ IMR ☒ IOAR ☐ OTHER______(Specify)______________

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

Quality Control (QC) Statement

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

Requestor DocuSigned by: Iris Waters F7595C693CCA40D... Date: 3/3/2021 | 9:23 AM EST

[SIGN NAME]

IRC DocuSigned by: Starsky Harrell E3F2EA2D0F5440D... Date: 3/3/2021 | 9:22 AM EST

[SIGN NAME]

Executive Summary

The Florida Department of Transportation (FDOT) District Three (Requestor) is preparing an Interchange Operational Analysis Report (IOAR) to document the traffic operational and highway safety benefits of improving the I-10 (SR 8) ramp terminals at US 90 (Mahan Drive) in Leon County, Florida. The proposed improvements are needed to alleviate future traffic operational and safety concerns for the I-10 (SR 8) ramp terminals at US 90 (Mahan Drive) due to widening of I-10 mainlines from four to six lanes.

Existing Conditions

Existing intersection operational analysis indicates that the I-10 (SR 8) ramp terminals and adjacent intersections at US 90 (Mahan Drive) currently meet the Level of Service (LOS) target D.

Most of the observed queue lengths at these intersections are within the given storage lengths except for the northbound shared through and left lane at Walden Street and US 90 (Mahan Drive) Intersection.

Based on the existing freeway merge and diverge analysis, each of the freeway merge and diverge segments are operating at LOS target D or better.

A five-year period crash data analysis (2013 to 2017) within the study area of influence found that 135 crashes were observed during that period. Of these crashes, there were two (2) fatalities, five (5) severe injury crashes, and nine (9) moderate injury crashes within the study area over the observed period. The crash analysis indicated that 'hit-fixed object' and 'rear-end' crashes are the most prominent crash types within the study area.

Future Conditions

Operational analyses were performed for three alternatives: the No-Build and two Build Alternatives. In the Design Year (2045), the No-Build alternative includes the widening of the I-10 (SR 8) segment from east of SR 261 (Capital Circle NE) to west of SR 59 (Gamble Road) from four to six lanes. The No-Build Alternative will serve as a baseline for comparison against the Build Alternatives.

No-Build 2045 Operational analysis indicates that each of the freeway merge and diverge segments will operate at LOS target D or better in the Design Year (2045). The results of No-Build 2045 intersection analysis indicate the following intersections will operate at LOS E or F in the Design Year (2045).

- US 90 (Mahan Drive) and Walden Road intersection during the PM peak hour
- US 90 (Mahan Drive) and Apex Drive intersection during the AM and PM peak hours
- US 90 (Mahan Drive) and Summit Lake Drive intersection during the AM peak hour

Additionally, the eastbound left turn movement at Westbound I-10 Ramp terminal will fail during the AM Peak Hour in the Design Year (2045).

The results of the No-Build 2045 queue analysis indicate that the 95th percentile queue lengths for several movements at the study intersections are expected to exceed the storage length in the Design Year (2045). Based on 2045 queue analysis, the Walden Road intersection is expected to spillback into the eastbound I-10 (SR 8) ramp terminal intersection and the eastbound left turn into westbound I-10 (SR 8) ramp terminal intersection and northbound left turn at Apex Drive intersection are expected to exceed the storage length. However, most importantly, the queue lengths on the eastbound and westbound off-ramps are not expected to spillback onto the I-10 (SR 8) mainline.

Overall, the same operational deficiencies that were observed within the existing (2019) condition are expected to worsen by the Design Year (2045) under No-Build Alternative.

In order to accommodate the future travel demand while enhancing safety within the interchange area, two Build Alternatives were developed.

- Build Alternative 1 is based on the No-Build Alternative lane geometry and proposes the following improvements:
    - Signalize each of study intersections at the US 90 (Mahan Drive) interchange
    - Add eastbound and westbound right turn lanes at the Walden Road intersection,
    - Add a second eastbound through lane at the Apex Drive intersection that would merge down to one lane before Summit Lake Drive.
- Build Alternative 2 is based on Build Alternative 1 and proposes additional improvement plans, in conjunction with Build Alternative 1 to accommodate future queues and improve operational performance:
    - Add a second westbound left lane at the I-10 westbound ramp terminal intersection
    - Restripe northbound and southbound approach to provide one exclusive left turn lane and one shared through/ right lane at the Walden Road and US 90 (Mahan Drive) intersection
    - Add a second westbound through lane at the US 90 (Mahan Drive) and Apex Drive
    - Add a second eastbound through lane at the US 90 (Mahan Drive) and Summit Lake Drive intersection, that would merge down to one lane before Plantation Forest Drive

Compared to No-Build Alternative, both Build Alternatives are projected to provide better operating conditions. Under the Build Alternatives, each of the freeway merge and diverge segments and study intersections at US 90 (Mahan Drive) will operate at LOS target D or better in the Design Year (2045). While the operational improvements under Build Alternative 1 and Build Alternative 2 are comparable, Build Alternative 2 better services the demand along US 90 (Mahan Drive) with additional turning storage at the westbound ramp terminal and minimizes queuing.

FHWA Policy Points

Policy Point 1

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

Satisfaction of Policy Point 1

An operational and safety analysis was conducted to evaluate the future alternatives. The measure of effectiveness, including vehicle delays for the intersections at I-10 (SR 8) and US 90 (Mahan Drive) Interchange, Walden Road at US 90 (Mahan Drive), Apex Drive at US 90 (Mahan Drive), and Summit Lake Drive at US 90 (Mahan Drive) were compared between No-Build and Build Alternatives.

Under No-Build Alternative, most of the study intersections will operate at LOS E or worse during both the AM and PM peak hours, with the exception of the I-10 Ramp terminal. However, the eastbound left turn movement at Westbound I-10 Ramp terminal will fail during the AM peak hour in the Design Year, the 2045 No-Build queue analysis indicates that queues on eastbound approach along US 90 (Mahan Drive) at the Westbound I-10 Ramp terminal could adversely affect the flow of traffic along I-10 (SR 8).

Under Build Alternative 1 and Build Alternative 2, each of the I-10 ramp terminals and adjacent intersections at US 90 (Mahan Drive) will operate at LOS target D or better in the Opening Year (2025) and Design Year (2045). Compared to the No-Build Alternative, the congestion and delay at the I-10 ramp terminals and adjacent intersections at US 90 (Mahan Drive) will be significantly improved under the Build Alternatives during both the AM and PM peak hours in the Design Year (2045).

Additional, when examining FDOT crash modification factors between the No Build and Build Alternatives the proposed improvements are expected to significantly improve safety along the corridor. With the proposed improvements under Build Alternative 1, collisions are expected to be reduced by up to 24 percent. With Build Alternative 2's focus on improving Build Alternative 1 by reducing queuing along the US 90 (Mahan Drive) corridor, collisions are expected to be reduced by up to 42 percent.

Based upon this analysis, the proposed improvements under Build Alternatives provide significant improvements to the network configuration to improve corridor operation, mitigate congestion, and enhance safety within the study Area of Influence.

Policy Point 2

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

Satisfaction of Policy Point 2

The proposed Build Alternatives will provide full access to all the traffic movement on US 90 (Mahan Drive) to and from I-10. The design will meet current standards for the projects on the interstate system and comply with the American Association of State Highway and Transportation Officials (AASHTO) and FDOT design standards.

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Glossary of Terms

Term	Definition
AADT	Annual Average Daily Traffic
BEBR	Bureau of Economic and Business Research
CAR Online	Crash Analysis Reporting System Online
CRTPA	Capital Region Transportation Planning Agency
DDHV	Directional Design Hour Volume
DHT	Design Hour Truck
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FSUTMS	Florida Statewide Urban Transportation Modeling Structure
FT	Facility Type
HCM	Highway Capacity Manual
HCS	Highway Capacity Software
LOS	Level of Service
MPH	Miles per Hour
NCHRP	National Cooperative Highway Research Program
OD	Origin-Destination
PD&E	Project Development and Environment
PHF	Peak Hour Factor
PTAR	Project Traffic Analysis Report
ROW	Right-of-Way
SIS	Strategic Intermodal System
SLD	Straight-Line Diagram
TAZ	Traffic Analysis Zones
T_{24}	Daily Truck Factor
TMC	Turning Movement Count
USC	United States Code

1.0 Introduction

1.1 Project Overview

Florida Department of Transportation (FDOT), District Three is conducting a Project Development and Environment (PD&E) Study to evaluate the need for capacity improvements along I-10 (SR 8) from east of Capital Circle NE (SR 261) to west of Gamble Road (SR 59). This section of I-10, a distance of approximately 13 miles, will be assessed for widening from a four-lane to a six-lane section.

This project is a continuation of an on-going effort to increase capacity on I-10 and will link to numerous widening projects on I-10 throughout north Florida from Leon County through Santa Rosa County. Some of the completed and on-going projects include: a completed I-10 widening, from the Escambia Bay Bridge to east of SR 281 (Avalon Boulevard); a planned (ETDM #14391) widening of I-10 from SR 281 (Avalon Boulevard) to West of CR 189 (Log Lake Road) in Santa Rosa and Okaloosa Counties; a planned (ETDM #14392) widening of I-10 from the West of CR 189 (Log Lake Road) to East of SR 85 in Okaloosa County; and a planned widening project (ETDM #14393) from west of US 90 to west of SR 263 in Gadsden and Leon Counties.

In addition, the City of Tallahassee and Capital Region Transportation Planning Agency (CRTPA) have identified the needs to construct a new interchange at Welaunee Boulevard in the Northeast Gateway Study by the year 2045. With the proposed developments and widening of I-10 (SR 8), the demand for access to I-10 (SR 8) is expected to significantly increase, resulting in future traffic operational and safety concerns for the I-10 (SR 8) ramp terminals at US 90 (Mahan Drive).

This Interchange Operational Analysis Report (IOAR) will document traffic and safety analysis undertaken to evaluate the impacts of the anticipated increase in traffic demand for all proposed developments and to identify any necessary improvements to enhance the operation of the I-10 (SR 8) at US 90 (Mahan Drive) interchange.

1.2 Project Purpose and Need

The purpose of this IOAR is to evaluate the safety, operational and engineering acceptability of the proposed I-10 (SR 8) interchange ramp terminal improvements at US 90 (Mahan Drive). The need for this project is based on the impacts of growth expected by the forecasted demand volumes related to the Welaunee Development, west of the US 90 (Mahan Drive) interchange and widening of the I-10 corridor. Build Alternatives for this project will focus on enhancing traffic flow and improving safety for motorists entering and exiting I-10 to/from US 90 (Mahan Drive).

1.3 Methodology

This IOAR has been prepared in accordance with the Methodology Letter of Understanding (MLOU) and is provided in **Appendix A**. The traffic data collection and forecasted volumes for this IOAR are detailed in the Project Traffic Analysis Report (PTAR) for the I-10 Project Development and Environment (PD&E) Study, From East of Capital Circle NE (SR 261) to West of Gamble Road (SR 59). The PTAR is attached in **Appendix B**.

The analysis years for this study are as follows:

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

The area of influence (AOI), as shown in **Figure 1.1**, includes the I-10 merge/diverge influence areas at the US 90 (Mahan Drive) interchange and US 90 (Mahan Drive) from west of Walden Road to east of Summit Lake Drive. The AOI includes the following segments and intersections:

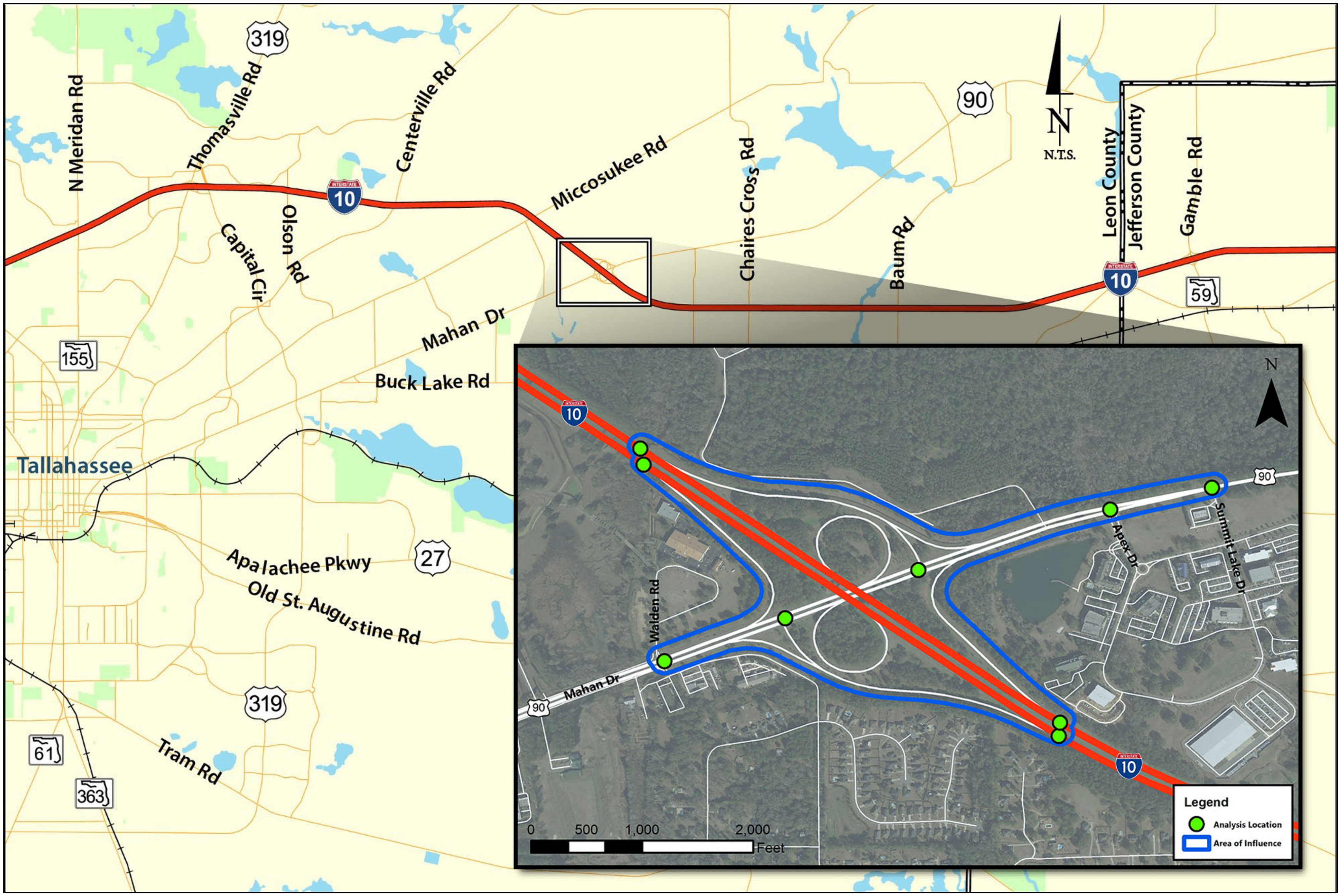
Along the Mainline

- Eastbound I-10 Off-Ramp (Diverge)
- Eastbound I-10 On-Ramp (Merge)
- Westbound I-10 Off-Ramp (Diverge)
- Westbound I-10 On-Ramp (Merge)

Along the Arterials

- US 90 (Mahan Drive) at Walden Road (Signalized)
- US 90 (Mahan Drive) at the I-10 Eastbound Ramps (Un-Signalized)
- US 90 (Mahan Drive) at the I-10 Westbound Ramps (Un-Signalized)
- US 90 (Mahan Drive) at Apex Drive (Un-Signalized)
- US 90 (Mahan Drive) at Summit Lake Drive (Un-Signalized)

Figure 1.1: Project Location Map



2.0 Existing Conditions

2.1 Roadway Characteristics

I-10 is a four-lane divided limited access facility and is designated as a Strategic Intermodal System (SIS) corridor. US 90 (Mahan Drive) is a four-lane divided arterial throughout the study area and transitions to a two-lane undivided roadway east of Apex Drive. **Table 2.1** describes the roadway characteristics of I-10 and US 90 (Mahan Drive) utilizing the FDOT straight-line diagrams (SLDs).

Table 2.1: Roadway Characteristics

From	To	Roadway ID	Begin Milepost	End Milepost	Speed Limit (mph)	Functional Classification	Length (mi)
I-10							
Westbound On-Ramp	Eastbound On-Ramp	55020000	14.687	15.355	70	Rural Principal Arterial Interstate	0.668
US 90 (Mahan Drive)							
Walden Road	Apex Drive	55020000	7.554	8.267	45	Urban Minor Arterial	0.713

The Walden Road intersection operates under signal control, each of the I-10 off-ramps operate under yield control, and the Apex Drive and Summit Lake Drive intersections operates under stop control for the northbound approach. **Figure 2.1** shows existing lane geometry of I-10 within the study area.

2.2 Land Use

The existing and future land uses within and directly adjacent to the I-10 (SR 8) US 90 (Mahan Drive) interchange were obtained from the Existing Land Use Map for Tallahassee and Leon County, 2019 and Urban Area Future Land Use Map, 2040 respectively, found on the Tallahassee-Leon County Planning Department webpage. The I-10 (SR 8) and US 90 (Mahan Drive) interchange is located within the Tallahassee Urban Service Area. The existing land use map is shown in **Figure 2.2**. The existing land use is predominately vacant parcels. Other surrounding land uses include office, hotel/motel, retail, open space resource protection, medical, and warehouse. The future land uses include suburban, residential preservation, and rural and can be found in **Figure 2.3**.

Figure 2.1: Existing Year (2019) Lane Geometry

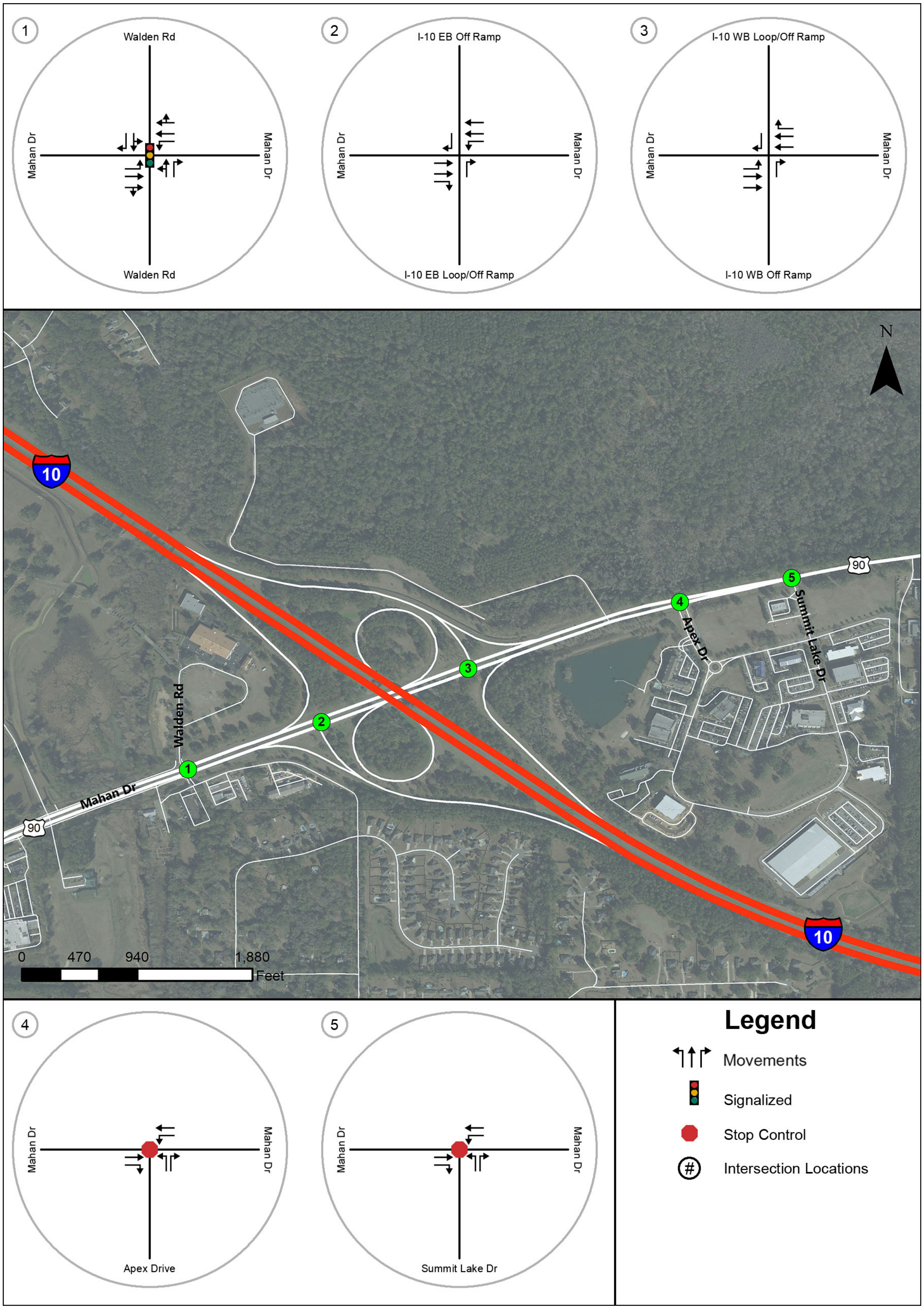
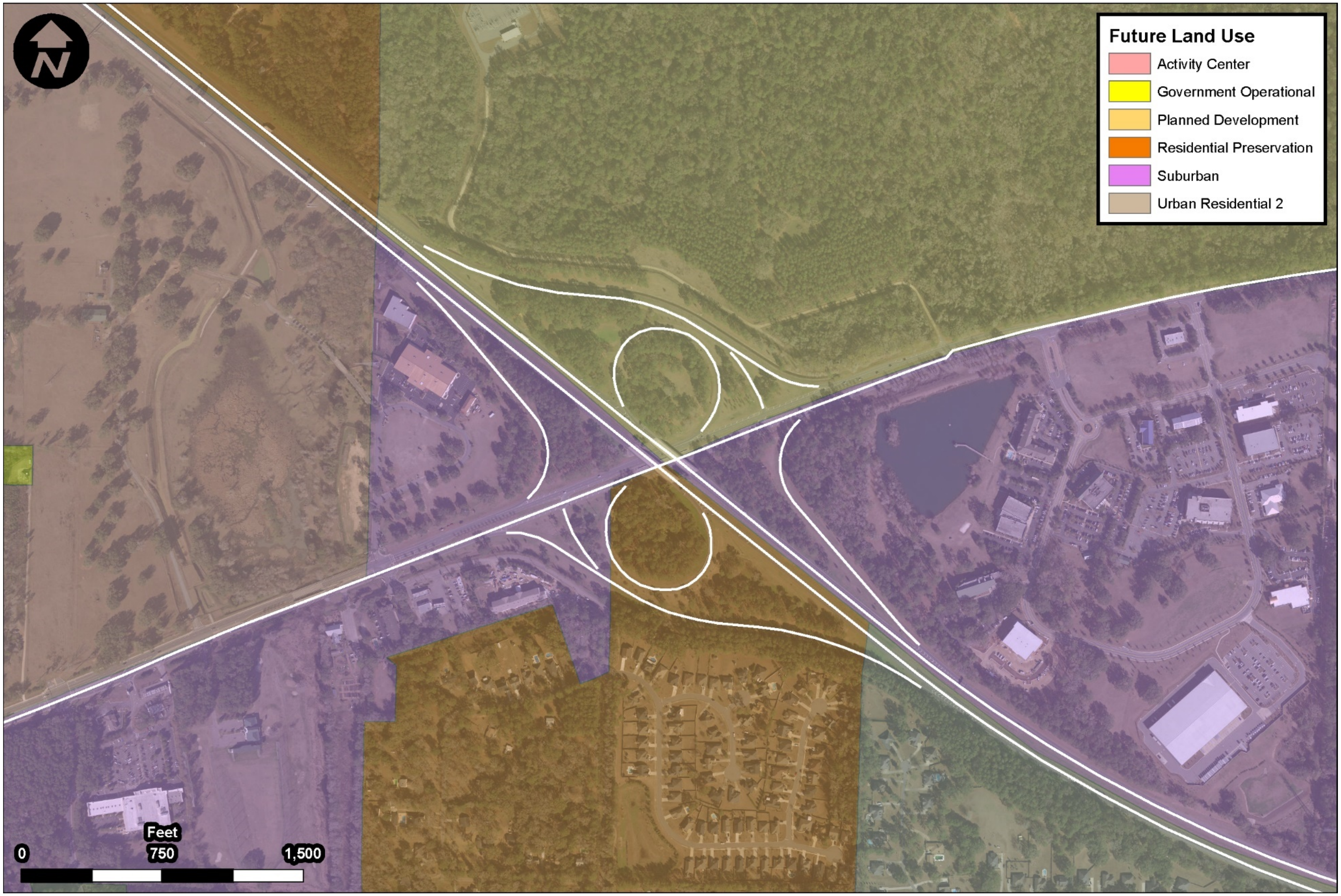


Figure 2.2: Existing Year (2019) Land Use

Source: Official Website of Tallahassee-Leon County Planning Department

Figure 2.3: Future (2040) Land Use



Source: Tallahassee-Leon County 2030 Comprehensive Plan

2.3 Traffic Data Collection

As part of the traffic count program for the I-10 PD&E Study SR 8 (I-10) from east of SR 261 (Capital Circle NE) to west of SR 59 (Gamble Road) in Leon County (Work Program Item Segment Number: 406585-3), traffic data was collected during the three-day period from October 8-10, 2019. Data collection and referenced documents are included in **Appendix C**.

The traffic volume data includes 8-hours of intersection turning movement volumes, during the A.M. and P.M. peak periods for weekdays and 48-hour and 72-hour approach volumes respectively for weekdays. It should be noted that this list varies slightly from the approved MLOU due the 48-hour counts along the minor streets being erroneously noted as 72-hour counts. This variation from the MLOU is not anticipated to impact this analysis due to the counts only impacting cross streets but needed to be noted for transparency.

48-hour Bi-Directional counts include the following locations:

- Walden Road – North of US 90 (Mahan Drive)
- Walden Road – South of US 90 (Mahan Drive)
- Apex Road – South of US 90 (Mahan Drive)

72-hour Bi-Directional counts include the following locations:

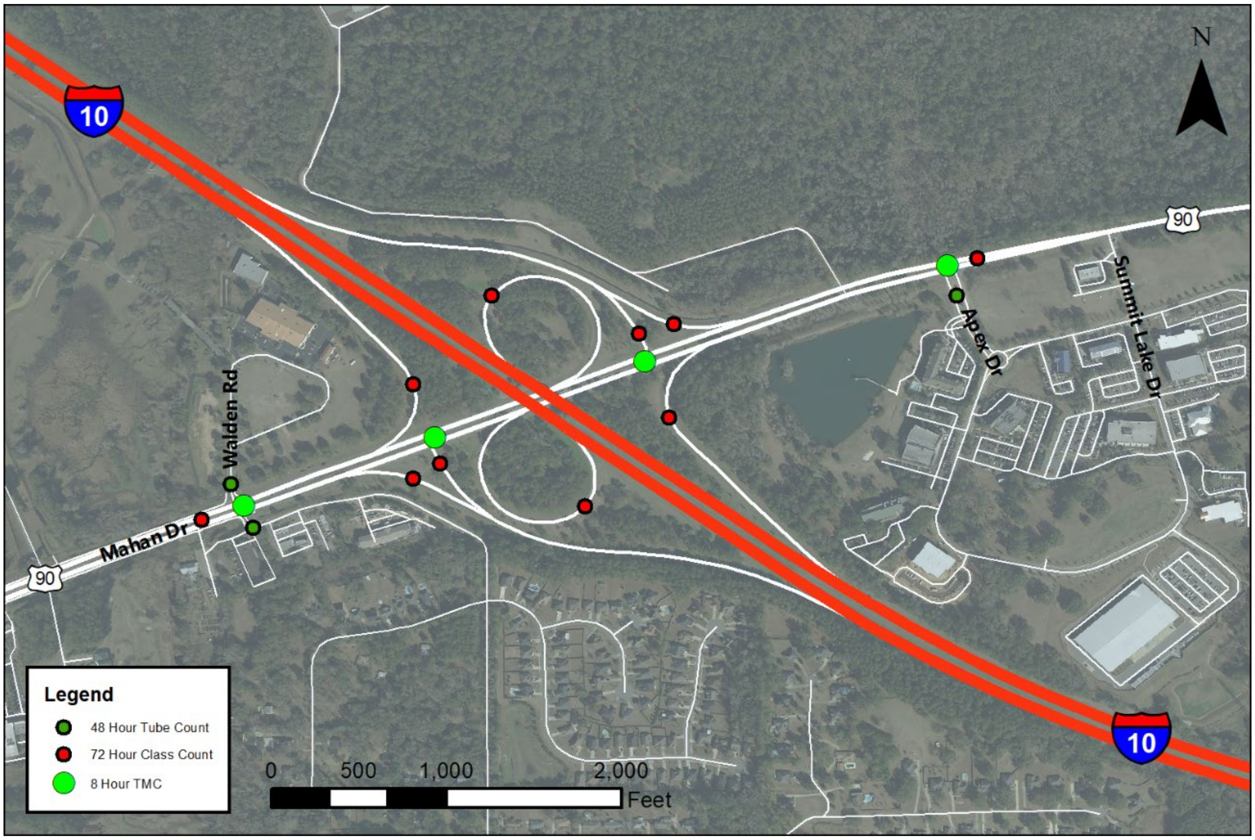
- Westbound I-10 off-ramp to Eastbound US 90 (Mahan Drive)
- Westbound I-10 off-ramp to Westbound US 90 (Mahan Drive)
- Westbound I-10 on-ramp from Westbound US 90 (Mahan Drive)
- Westbound I-10 on-ramp from Eastbound US 90 (Mahan Drive)
- Eastbound I-10 off-ramp to Westbound US 90 (Mahan Drive)
- Eastbound I-10 off-ramp to Eastbound US 90 (Mahan Drive)
- Eastbound I-10 on-ramp from Westbound US 90 (Mahan Drive)
- Eastbound I-10 on-ramp from Eastbound US 90 (Mahan Drive)
- US 90 (Mahan Drive) – East of Apex Road
- US 90 (Mahan Drive) – West of Walden Road

8-hour (6 AM to 10 AM and 3 PM to 7 PM) Turning Movement Volumes were collected for the following intersections:

- US 90 (Mahan Drive) and Walden Road
- US 90 (Mahan Drive) and Apex Drive

Based on the turning movement counts, the period from 7:45 AM to 8:45 AM and the period from 5:00 PM to 6:00 PM, were identified as the AM and PM peak hours respectively. The locations of turning movement counts of intersections mentioned above and the 72-hour approach volumes were shown in **Figure 2.4**.

Figure 2.4: Field Count Data Locations



2.4 Existing Year (2019) Traffic Volumes

A seasonal factor of 0.96 and axle correction factor of 0.99 collected from Florida Traffic Online website were applied to the collected traffic counts. Existing Year (2019) volumes were then balanced between adjacent intersections to ensure there was no loss in volume in the system. **Figure 2.5** and **Figure 2.6** show the balanced Existing Year (2019) AM and PM peak hour volumes, along with the existing lane geometry, for the US 90 (Mahan Drive) Interchange.

It should be mentioned that the intersection of US 90 (Mahan Drive) and Summit Lake Drive was added to this analysis after the data collection efforts had been conducted. Due to the impacts of COVID-19 on traffic patterns, collecting accurate turning movement volumes at this intersection are not possible at the time of this report submission. As per MLOU, the turning movement volumes at the intersection of US 90 (Mahan Drive) and Summit Lake Drive were synthesized using an iterative proportional fitting procedure (FRATAR method), as found in the *FDOT Project Traffic Forecasting Handbook* and *National Cooperative Highway Research Program (NCHRP) Report 765*.

2.4.1 Peak Hour Factor

The peak hour factor (PHF) represents the fluctuation in the arrival rate of traffic during the peak hour by converting the hourly volume into the flow rate for the peak 15-minute period. As identified in the MLOU, the Highway Capacity Manual (HCM) 6th Edition recommended PHF of 0.92 will be utilized for Opening Year (2025) and Design Year (2045) analyses. As a point of comparison, **Table 2.2** summarizes the field measured PHFs from the data collection effort.

Table 2.2: Field Measured Peak Hour Factors

Description	Peak Hour Factor		Source
	AM Peak Hour	PM Peak Hour	
US 90 (Mahan Drive) at Walden Road	0.94	0.93	Field Measured
US 90 (Mahan Drive) at Apex Drive	0.96	0.94	Field Measured
I-10 Mainline, west of US 90	0.89	0.94	FTO Count Site: 552007
I-10 Mainline, east of US 90	0.93	0.92	FTO Count Site: 542001
I-10 Eastbound Off-Ramp to Eastbound US 90 (Mahan Drive)	0.89	0.84	Field Measured
I-10 Eastbound Off-Ramp to Westbound US 90 (Mahan Drive)	0.86	0.91	Field Measured
I-10 Westbound Off-Ramp to Eastbound US 90 (Mahan Drive)	0.69	0.75	Field Measured
I-10 Westbound Off-Ramp to Westbound US 90 (Mahan Drive)	0.81	0.77	Field Measured
US 90 (Mahan Drive) Eastbound On-Ramp to Eastbound I-10	0.77	0.88	Field Measured
US 90 (Mahan Drive) Eastbound On-Ramp to Westbound I-10	0.86	0.84	Field Measured

2.4.2 Standard K Factor

The K factor represents the proportion of annual average daily traffic (AADT) occurring during the design hour. Based on the *FDOT Project Traffic Forecasting Handbook*, a standard K factor of 9.0 percent is used for arterials in an urban area. Therefore, the standard K factor of 9.0 percent was used in the development of traffic volumes for this IOAR.

2.4.3 Directional Factor

The directional distribution (D) factor is the proportion of traffic traveling in the peak direction relative to the sum of the traffic volume in both directions during the design hour. The D factor was determined based on Florida Traffic Online (2018), found in **Appendix D**, and field measured D factors, the recommended seed D factors from the *FDOT Project Traffic Forecasting Handbook* were reviewed for applicability to the subject study area. The recommended low, average, and high D_{30} factors for an urban arterial are 50.8, 57.9, and 67.1, respectively. The D_{30} factor is defined as the proportion of traffic in the 30th highest hour of the year traveling in the peak direction. Therefore, the D factors summarized in **Table 2.3** are recommended, while using the low to high D_{30} factors from the *FDOT Project Traffic Forecasting Handbook* as the minimum and maximum values.

Table 2.3: Field Measured Directional Distribution (D) Factor

Location	AM Peak Hour		PM Peak Hour	
	D_{pk}(%)	Peak Direction	D_{pk}(%)	Peak Direction
I-10 Mainline				
West of US 90 (Mahan Drive)	54.6%	West	57.8%	East
East of US 90 (Mahan Drive)	58.0%	West	52.0%	East
East-West Corridors				
US 90 (Mahan Drive), west of Walden Road	56.9%	West	55.5%	East
US 90 (Mahan Drive), east of Apex Drive	69.8%	West	59.7%	East
North-South Corridors				
Walden Road, south of US 90 (Mahan Drive)	73.3%	North	62.9%	South
Walden Road, north of US 90 (Mahan Drive)	62.5%	North	80.0%	South
Apex Drive, south of US 90 (Mahan Drive)	91.6%	South	78.8%	North

2.4.4 Daily and Design Hour Truck Factors

The daily truck (T_{24}) factor is the percentage of medium and heavy truck traffic in a 24-hour period. The Design Hour truck (DHT) factor is the percentage of medium and heavy truck traffic during the peak hour. According to the *FDOT Project Traffic Forecasting Handbook*, DHT factor is estimated to be one half of the daily truck (T_{24}) percentage. T_{24} factors were obtained from Florida Traffic Online (2018) for the study area and are shown in **Table 2.4**.

Table 2.4: T_{24} and Design Hour Truck Factors

Location	Florida Traffic Online			Field Data	
	Site ID	T_{24}	DHT	T_{24}	DHT
I-10 Mainline					
West of US 90 (Mahan Drive)	552007	23.5%	12.0%	-	-
East of US 90 (Mahan Drive)	542001	26.0%	13.0%	-	-
Corridor Segments					
Eastbound I-10 Off-Ramp to Westbound US 90 (Mahan Drive)	552623	3.8%	2.0%	2.4%	2.0%
Eastbound I-10 Off-Ramp to Eastbound US 90 (Mahan Drive)	552628	3.8%	2.0%	3.3%	2.0%
Eastbound I-10 On-Ramp from US 90 (Mahan Drive)	552626	3.8%	2.0%	5.7%	3.0%
Westbound I-10 Off-Ramp to Eastbound US 90 (Mahan Drive)	552624	3.8%	2.0%	5.1%	3.0%
Westbound I-10 Off-Ramp to Westbound US 90 (Mahan Drive)	552629	3.8%	2.0%	6.4%	4.0%
Westbound I-10 On-Ramp from US 90 (Mahan Drive)	552620	3.8%	2.0%	2.7%	2.0%
US 90 (Mahan Drive) West of I-10 Interchange	550391	3.8%	2.0%	4.2%	3.0%
US 90 (Mahan Drive) East of I-10 Interchange	550390	6.5%	4.0%	2.8%	2.0%

2.4.5 Recommended Design Traffic Factors

The recommended design traffic factors are summarized in **Table 2.5**. These factors were developed utilizing Existing Year (2019) field data and will be used to develop Opening Year (2025), and Design Year (2045) design hour turning movement volumes.

Table 2.5: Recommended Design Traffic Factors

Roadway	K	D	DHT	PHF
I-10 west if US 90 (Mahan Drive)	9.0	56.0%	12.0%	0.92
I-10 east of US 90 (Mahan Drive)	9.0	58.0%	13.0%	0.92
US 90 (Mahan Drive)	9.0	60.0%	2.0%	0.92

Figure 2.5: Existing Year (2019) Turning Movement Volumes

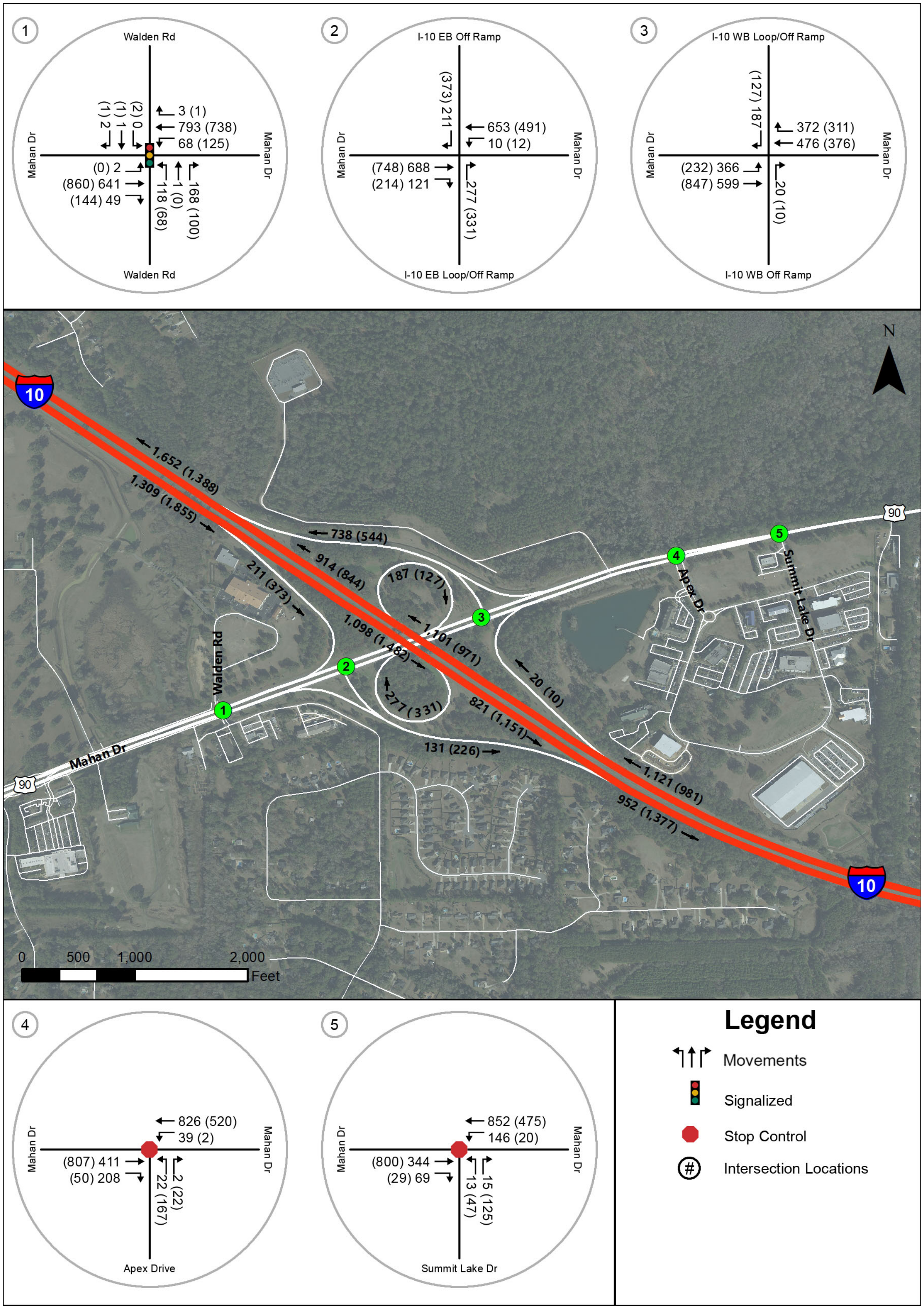
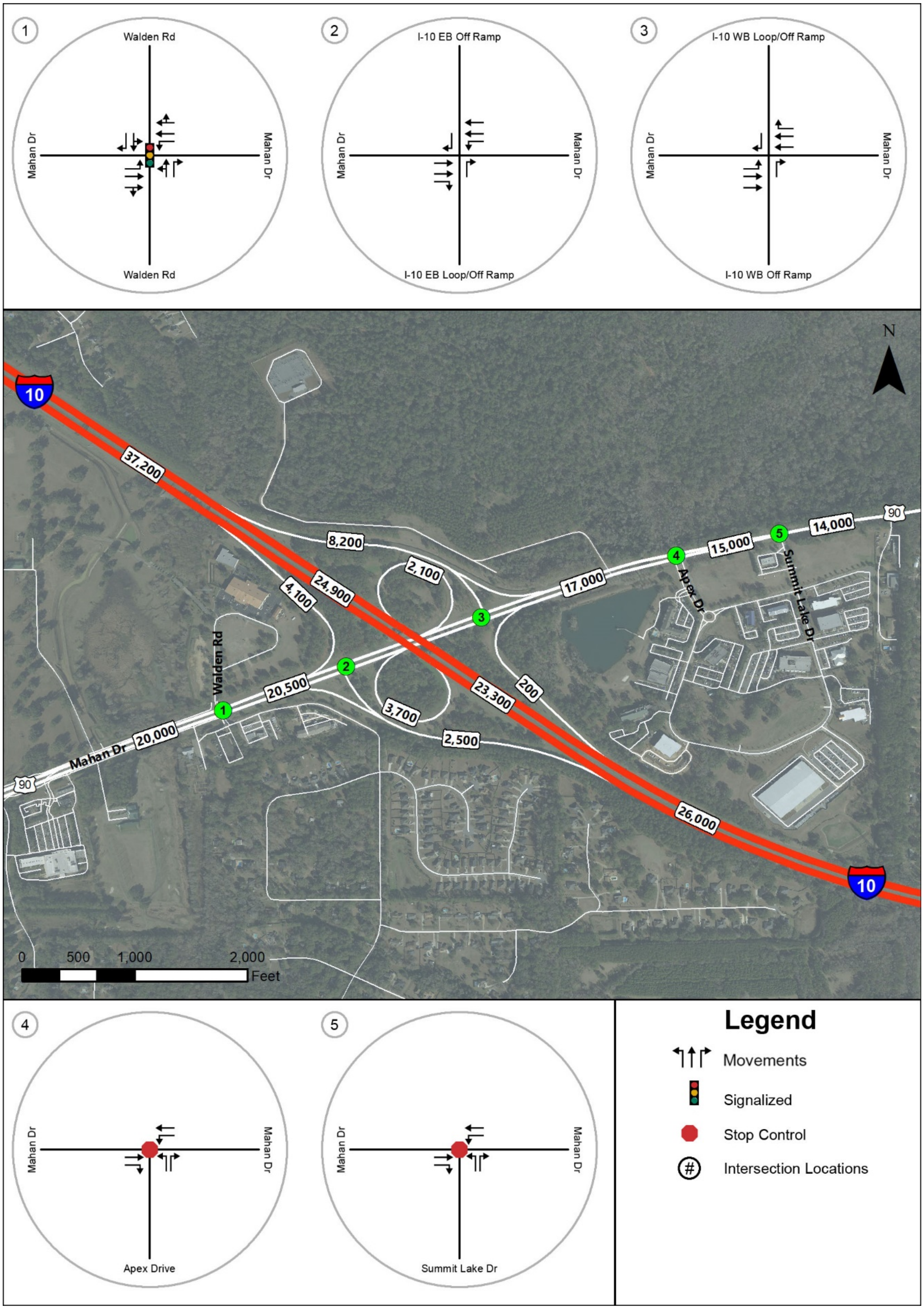


Figure 2.6: Existing Year (2019) AADTs



2.5 Existing Year (2019) Operational Analysis

Existing Year (2019) traffic operations at the I-10 and US 90 (Mahan Drive) Interchange were evaluated using Highway Capacity Software (HCS), Version 7.0 for the ramp merge and diverge on I-10 and Synchro, Version 10.0 for the ramp terminal intersection. The results of the traffic analysis are summarized in the following sections. HCS and Synchro 10 reports can be found in **Appendix E** and **Appendix F**, respectively.

2.5.1 Freeway Merge and Diverge Analysis

Freeway merge and diverge analyses was conducted at each of the I-10 (SR 8) ramps at US 90 (Mahan Drive) in the Existing Year (2019). Freeway merge and diverge for the AM and PM peak hours are summarized in **Table 2.6**. The results of the analysis indicate that each of the freeway merge and diverge areas currently meet the Level of Service (LOS) target D in the Existing Year (2019).

Table 2.6: Existing Year (2019) Freeway Merge and Diverge Analyses

Ramp	Analysis Type	AM Peak Hour			PM Peak Hour		
		Density (pc/mi/ln)	Speed (mi/h)	LOS	Density (pc/mi/ln)	Speed (mi/h)	LOS
Eastbound							
Off-Ramp to Westbound US 90 (Mahan Drive)	Diverge	16.2	57.4	B	21.0	57.0	C
Off-Ramp to Eastbound US 90 (Mahan Drive)	Diverge	9.0	51.8	A	12.4	51.5	B
On-Ramp from US 90 (Mahan Drive)	Merge	11.5	61.9	B	15.4	61.7	B
Westbound							
Off-Ramp to Eastbound US 90 (Mahan Drive)	Diverge	10.1	57.9	B	8.8	58.0	A
Off-Ramp to Westbound US 90 (Mahan Drive)	Diverge	8.5	52.0	A	7.3	52.1	A
On-Ramp from US 90 (Mahan Drive)	Merge	15.9	62.2	B	13.2	62.4	B

2.5.2 Freeway Segment Analysis

Freeway segment analysis was conducted along each segment of the I-10 mainline in the Existing Year (2019). The results for the Existing Year (2019) freeway segment analysis for the AM and PM peak hours are shown in **Table 2.7.**

The results of the analysis indicate that each of the freeway segments currently meet the LOS target D for urban areas and LOS target C for rural areas, as defined in the *FDOT 2013 Quality/Level of Service Handbook*. East of Baum Road overpass, I-10 transitions into a rural area.

Table 2.7: Freeway Segment Analysis

Segment	Number of Lanes	Density* (pc/mi/ln)	LOS*
Eastbound			
Raymond Diehl Road/Capital Circle to Westbound US 90 (Mahan Drive)	2	11.8 (15.8)	B (B)
Westbound US 90 (Mahan Drive) to Eastbound US 90 (Mahan Drive)	2	9.9 (12.6)	A (B)
Eastbound US 90 (Mahan Drive) to On-Ramp from US 90 (Mahan Drive)	2	7.1 (10.1)	A (A)
US 90 (Mahan Drive) to Gamble Road (SR 59)	2	8.3 (12.1)	A (B)
Westbound			
Gamble Road (SR 59) to Eastbound US 90 (Mahan Drive)	2	9.7 (8.6)	A (A)
Eastbound US 90 (Mahan Drive) to Westbound US 90 (Mahan Drive)	2	10.0 (8.3)	A (A)
Westbound US 90 (Mahan Drive) to On-Ramp from US 90 (Mahan Drive)	2	8.2 (7.2)	A (A)
US 90 (Mahan Drive) to Capital Circle NE (SR 261)	2	14.9 (11.8)	B (B)

2.5.3 Intersection Analysis

Intersection analysis was conducted at each of the study intersections within the area of influence at the I-10/US 90 (Mahan Drive) interchange for the Existing Year (2019) and are shown in **Table 2.8**. The results of the analysis indicate that each of the study intersections currently meets the overall LOS target D. However, at the Apex Drive intersection the northbound left turn of the stop-controlled cannot compete with the steady flow of traffic along US 90 (Mahan Drive) resulting in a failing LOS.

Table 2.8: Existing Year (2019) Intersection Analysis

Intersection	Control Type	Approach	Movement	Movement		Approach		Intersection	
				Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
Walden Road	Signalized	EB	L	9.2 (0)	A (A)	15.5 (19.0)	B (B)	16.9 (15.0)	B (B)
			TR	15.5 (19)	B (B)				
		WB	L	7 (9)	A (A)	12.7 (7.0)	B (A)		
			TR	13.1 (6.6)	B (A)				
		NB	TL	34.5 (32.6)	C (C)	32.7 (31.4)	C (C)		
			R	31.5 (30.6)	C (C)				
		SB	TL	41 (35.8)	D (D)	40.9 (35.7)	D (D)		
			R	40.9 (35.5)	D (D)				
Eastbound I-10 Ramps	Unsignalized	WB	L	8.9 (9.0)	A (A)	0.1 (0.2)	A (A)	0.1 (0.1)	A (A)
Westbound I-10 Ramps	Unsignalized	EB	L	10.5 (9.0)	B (A)	4 (1.9)	A (A)	2.7 (1.4)	A (A)
Apex Drive	TWSC	WB	L	9.0 (9.7)	A (A)	0.4 (0.0)	A (A)	0.7 (16.1)	A (B)
		NB	L	32.4 **(148.9)**	D **(F)**	30.6 **(133.2)**	D **(F)**		
			R	10.8 (15.4)	B (C)				
Summit Lake Drive	TWSC	WB	L	8.7 (9.7)	A (A)	1.3 (0.4)	A (A)	1.4 (2.9)	B (A)
		NB	L	25.6 (24.4)	D (C)	25.6 (24.4)	D (C)		
			R	N/A	N/A				

2.5.4 Queue Analysis

Queue analysis results for each of the study intersections within the area of influence of the I-10/US 90 (Mahan Drive) interchange during both the AM and PM peak travel periods of the Existing Year (2019) are shown in **Table** 2.9**2.9**. The analysis compares the available storage length and to 95th percentile queue lengths reported from the Synchro analysis. Under the Existing Year (2019) analysis, no notable queueing issues were initially evident. However, the northbound approach along Walden Road may experience queueing under conditions where the shared northbound through/left turn lane queue spills back past the available storage for the northbound right turn movement.

Table 2.9: Existing Year (2019) Queue Analysis

Intersection	Movement	Storage Length (ft)	Queue Length (ft)	
			AM Peak Hour	PM Peak Hour
Walden Road	EBL	135	4	0
	EBTR[1]	1,000	236	404
	WBL	300	38	56
	WBTR[1]	650	264	152
	NBTL[1]	1,600	112	70
	NBR	50	29	0
	SBTL[1]	325	5	9
	SBR	50	0	0
Eastbound I-10 Ramps	WBL	240	1	1
Westbound I-10 Ramps	EBL	250	45	21
Apex Drive	EBR	330	0	0
	WBL	450	3	0
	NBL	460	13	220
	NBR	210	1	5
Summit Lake Drive	EBR	490	0	0
	WBL	140	12	2
	NBL	440	11	38
	NBR	250	0	0

[1] The available storage lengths for through lanes on US 90 (Mahan Drive) are the roadway segment distance between upstream and downstream intersections.

2.6 Existing Safety Analysis

Crash data was obtained for the I-10 (SR 8) study area from the FDOT Crash Analysis Reporting System (CAR) Online for the five-year period from 2013 to 2017.

The crash rate at each location was calculated using the Federal Highway Administration's (FHWA's) crash rate formula, adjusted from terms of 100 million vehicle miles traveled/million entering vehicles to terms of one million vehicle miles traveled in accordance with FDOT's crash rate calculations as follows:

$$Crash\ Rate=\frac{1{,}000{,}000*C}{365*N*V*L}$$

Where:

- C = Total number of crashes for the analysis period.
- N = Number of years in the analysis period.
- V = Average AADT per year on the roadway segment or entering the intersection during the analysis period.
- L = The length of the roadway segment in miles when analyzing roadway segments. This variable is not included when analyzing intersections.

Each crash rate was then compared to the statewide average for that facility type using the procedure detailed in the FDOT CAR Online User Manual to determine the level of confidence that a location's crash rate is higher than the statewide average (i.e., the high crash confidence).

Based on the crash analysis, a total of 135 crashes occurred on I-10 (SR 8) and US 90 (Mahan Drive) Interchange over the five-year period and are detailed. **Table 2.10** details the total number of crashes within the project area as well as the crash rate compared to the statewide average. Ramp segments do not have a statewide crash rate. As shown in red text in the **Table 2.10** below, there was only one segment that had a significantly higher crash rate than the statewide average where the high crash confidence is greater than 95 percent, which is the westbound I-10 mainline segment at the off ramp to westbound US 90 (Mahan Drive). A detailed summary of FDOT CAR Online report is included in **Appendix G**.

Four of the 14 crashes at this location took place in dark conditions with no lighting. Eight of these crashes occurred on a wet road surface. Furthermore, the most common crash type at this location is hitting a fixed object, accounting for nine of the 14 crashes. According to the Highway Safety Manual, fixed object crashes can be caused by inadequate lighting, slippery pavement, inadequate roadside design or roadway geometry, or excessive speed. In nighttime conditions, poor lighting and excessive may also lead to crashes, and excessive speed may be a contributing factor for wet pavement crashes as well. It is therefore possible that the loop ramp geometry combined with poor lighting and roadway conditions may lead to this segment having a higher crash rate than the statewide average.

The westbound off ramp to eastbound Mahan Drive also has a relatively high crash rate for a ramp segment compared to the other ramp locations. Due to this location having low demand, the impact of even a single collision would significantly impact the crash rate along this ramp, and ultimately results in the observed higher crash rate. While care should be taken when attempting to draw conclusions from such a low number of crashes, it is worth noting that two of these three crashes involved collisions with fixed objects.

Of the 135 crashes, five crashes resulted in severe injury and two crashes resulted in a fatality. Hit-Fixed Object (38%) and Rear end (29%) are two most frequent crash types. A closer look into the crash types on location indicates that Hit-Fixed Object occurred mostly on the ramp segments and rear end on Mahan Drive.

Table 2.11 and **Table 2.12** provide the summary of crash types and crash severity within the study location. US 90 (Mahan Drive) between Apex Drive and Summit Lake Drive did not have any crashes.

Figure 2.7 shows the distribution of crash locations within the I-10 (SR 8) and US 90 (Mahan Drive) area of influence. Crashes are scattered through the interchange, showing no real pattern. However, the highest concentration of crashes is at the Walden Road intersection.

Table 2.10: Crash Rates

Location	AADT	Total Crashes	Crash Rate	Statewide Crash Rate*	High Crash Confidence
Eastbound I-10 Mainline					
Off-Ramp to Westbound US 90 (Mahan Drive)	15,400	10	0.76	0.976	50.00%
Off-Ramp to Eastbound US 90 (Mahan Drive)	12,300	7	0.96	0.976	50.00%
On-Ramp from US 90 (Mahan Drive)	12,300	7	0.74	0.976	50.00%
Westbound I-10 Mainline					
Off-Ramp to Eastbound US 90 (Mahan Drive)	13,000	8	0.70	0.976	50.00%
Off-Ramp to Westbound US 90 (Mahan Drive)	12,200	14	1.96	0.976	99.75%
On-Ramp from US 90 (Mahan Drive)	15,100	5	0.44	0.976	50.00%
Eastbound I-10 Ramps					
Off-Ramp to Westbound US 90 (Mahan Drive)	2,700	4	3.59	N/A	N/A
Off-Ramp to Eastbound US 90 (Mahan Drive)	2,800	7	5.36	N/A	N/A
On-Ramp from US 90 (Mahan Drive)	2,800	3	1.31	N/A	N/A
Westbound I-10 Ramps					
Off-Ramp to Eastbound US 90 (Mahan Drive)	300	3	23.92	N/A	N/A
Off-Ramp to Westbound US 90 (Mahan Drive)	2,700	16	12.88	N/A	N/A
On-Ramp from US 90 (Mahan Drive)	5,400	2	0.46	N/A	N/A
US 90 (Mahan Drive) Segments					
Walden Road to Apex Drive	16,600	13	0.69	1.73	50.00%
US 90 (Mahan Drive) Intersections					
US 90 (Mahan Drive) and Walden Road	22,600	27	0.65	0.62	50.00%
US 90 (Mahan Drive) and Apex Drive	13,900	4	0.15	0.49	50.00%
US 90 (Mahan Drive) and Summit Lake Drive	15,300	3	0.11	0.276	50.00%

*Source: FDOT CAR Online Database

Figure 2.7: 5-Year (2013-2017) Crash Heat Diagram

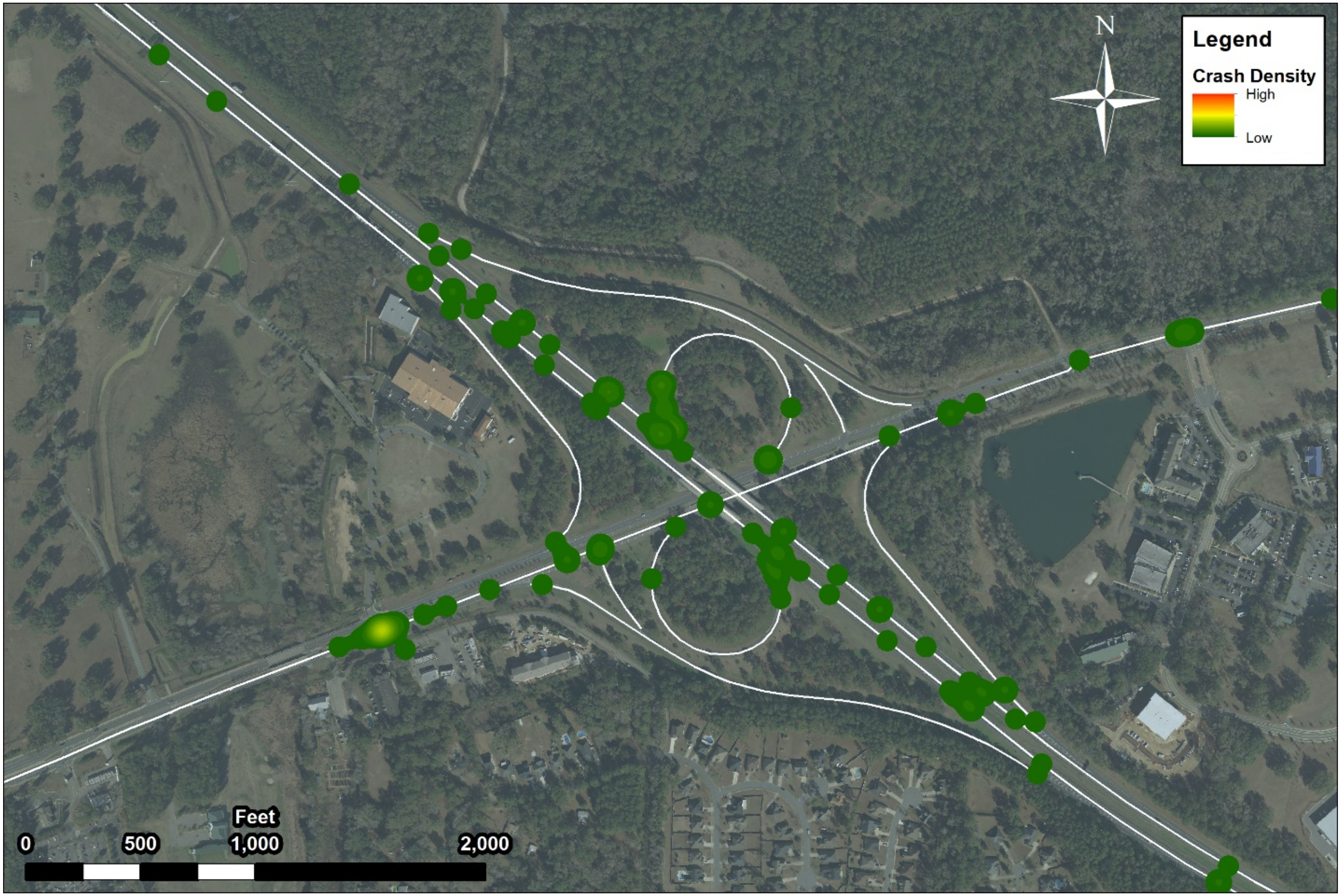


Table 2.11: Crash Types

Location	Angle		Head On		Hit Fixed Object		Other		Rear End		Sideswipe		Total #
	#	%	#	%	#	%	#	%	#	%	#	%	
Eastbound I-10 Ramps													
Off-Ramp to Eastbound US 90 (Mahan Drive)	0	0%	0	0%	4	57%	2	29%	1	14%	0	0%	7
Off-Ramp to Westbound US 90 (Mahan Drive)	0	0%	0	0%	2	50%	1	25%	0	0%	1	25%	4
On-Ramp from US 90 (Mahan Drive)	0	0%	0	0%	2	67%	0	0%	0	0%	1	33%	3
Westbound I-10 Ramps													
Off-Ramp to Eastbound US 90 (Mahan Drive)	0	0%	0	0%	2	67%	1	33%	0	0%	0	0%	3
Off-Ramp to Westbound US 90 (Mahan Drive)	0	0%	0	0%	10	63%	6	38%	0	0%	0	0%	16
On-Ramp from US 90 (Mahan Drive)	0	0%	0	0%	1	50%	0	0%	0	0%	1	50%	2
US 90 (Mahan Drive) Segments													
Walden Road to Apex Drive	1	8%	0	0%	4	31%	0	0%	4	31%	4	31%	13
US 90 (Mahan Drive) Intersections													
US 90 (Mahan Drive) and Walden Road	5	17%	1	3%	1	3%	1	3%	18	62%	3	10%	29
US 90 (Mahan Drive) and Apex Drive	2	50%	0	0%	0	0%	0	0%	2	50%	0	0%	4
US 90 (Mahan Drive) and Summit Lake Drive	1	33%	0	0%	0	0%	1	33%	1	33%	0	0%	3
Eastbound I-10 Mainline													
Off-Ramp to Eastbound US 90 (Mahan Drive)	0	0%	0	0%	4	57%	0	0%	2	29%	1	14%	7
Off-Ramp to Westbound US 90 (Mahan Drive)	0	0%	0	0%	4	40%	2	20%	3	30%	1	10%	10
On-Ramp from US 90 (Mahan Drive)	0	0%	0	0%	2	29%	2	29%	3	43%	0	0%	7
Westbound I-10 Mainline													
Off-Ramp to Eastbound US 90 (Mahan Drive)	1	13%	0	0%	5	63%	1	13%	1	13%	0	0%	8
Off-Ramp to Westbound US 90 (Mahan Drive)	0	0%	0	0%	9	64%	1	7%	2	14%	2	14%	14
On-Ramp from US 90 (Mahan Drive)	0	0%	0	0%	1	20%	1	20%	2	40%	1	20%	5
Total Crashes	10	7%	1	1%	51	38%	19	14%	39	29%	15	11%	135

Table 2.12: Injury Severity of Crashes

Location	Fatal		Severe Injury		Moderate Injury		Minor Injury		Property Damage Only		Total #
	#	%	#	%	#	%	#	%	#	%	
Eastbound I-10 Ramps											
Off-Ramp to Eastbound US 90 (Mahan Drive)	0	0%	0	0%	0	0%	3	43%	4	57%	7
Off-Ramp to Westbound US 90 (Mahan Drive)	0	0%	0	0%	1	25%	0	0%	3	75%	4
On-Ramp from US 90 (Mahan Drive)	0	0%	0	0%	0	0%	1	33%	2	67%	3
Westbound I-10 Ramps											
Off-Ramp to Eastbound US 90 (Mahan Drive)	0	0%	0	0%	0	0%	0	0%	3	100%	3
Off-Ramp to Westbound US 90 (Mahan Drive)	1	6%	1	6%	1	6%	4	25%	9	56%	16
On-Ramp from US 90 (Mahan Drive)	0	0%	0	0%	0	0%	0	0%	2	100%	2
US 90 (Mahan Drive) Segments											
Walden Road to Apex Drive	0	0%	0	0%	0	0%	3	23%	10	77%	13
US 90 (Mahan Drive) Intersections											
US 90 (Mahan Drive) and Walden Road	0	0%	2	7%	4	14%	8	28%	15	52%	29
US 90 (Mahan Drive) and Apex Drive	0	0%	0	0%	0	0%	2	50%	2	50%	4
US 90 (Mahan Drive) and Summit Lake Drive	0	0%	0	0%	0	0%	1	33%	2	67%	3
Eastbound I-10 Mainline											
Off-Ramp to Eastbound US 90 (Mahan Drive)	0	0%	0	0%	0	0%	0	0%	7	100%	7
Off-Ramp to Westbound US 90 (Mahan Drive)	0	0%	0	0%	0	0%	0	0%	10	100%	10
On-Ramp from US 90 (Mahan Drive)	0	0%	0	0%	0	0%	3	43%	4	57%	7
Westbound I-10 Mainline											
Off-Ramp to Eastbound US 90 (Mahan Drive)	0	0%	1	13%	2	25%	1	13%	4	50%	8
Off-Ramp to Westbound US 90 (Mahan Drive)	1	7%	1	7%	1	7%	0	0%	11	79%	14
On-Ramp from US 90 (Mahan Drive)	0	0%	0	0%	0	0%	2	40%	3	60%	5
Total Crashes	2	1%	5	4%	9	7%	28	21%	91	67%	135

3.0 Design Alternatives

3.1 No-Build Alternative

The No-Build Alternative represents the Existing Year (2019) lane geometry and traffic control features within the project area, including all programmed projects listed as being funded for construction in the 2040 Cost Feasible Plan. This alternative is viable if the cost savings of not constructing the improvements outweigh the safety and operational benefits associated with implementing the Build Alternative.

For the purpose of this IOAR, the study roadway network will include a six-lane I-10 mainline segment from East of Capital Circle NE (SR 261) to West of Gamble Road (SR 59) for both Opening Year (2025) and Design Year (2045), and a new interchange at Welaunee Boulevard for the Design Year (2045) only, assuming this new interchange will not be open for operation by 2025.

3.2 Build Alternatives

The Build Alternatives are evaluated to mitigate deficiencies identified in No-Build Alternative resulting from anticipated increase in traffic due to widening of the I-10 mainline. Build Alternative 1 was developed during the Project Traffic Analysis Report (PTAR) effort, with an intent to improve safety and operations via Transportation Management and Operations (TSM&O) strategies with a focus on cost savings and minimizing Right-of-Way (ROW) impacts, whereas Build Alternative 2 will serve as the ultimate development plan to accommodate both target LOS and future queues through the use of capacity improvements.

3.2.1 Build Alternative 1

Build Alternative 1, which is depicted in **Figure 3.1** proposes to signalize each of study intersections within the I-10/US 90 (Mahan Drive) interchange area of influence and minor improvements to the adjacent intersections. The following provides the summary of all the improvements considered for the Build Alternative 1:

- Signalize each of the ramp terminals of US 90 (Mahan Drive) interchange, Apex Drive, and Summit Lake Drive.
- Add eastbound and westbound right turn lanes at the Walden Road intersection,
- Add a second eastbound through lane at the Apex Drive intersection that would merge down to one lane before Summit Lake Drive.

3.2.2 Build Alternative 2

Build Alternative 2, which is depicted in **Figure 3.2**, proposes the following improvement plans, in conjunction with Build Alternative 1's plan:

- Add a second westbound left lane at the I-10 westbound ramp terminal intersection
- Restripe northbound and southbound approach to provide one exclusive left turn lane and one shared through and right turn lane at the Walden Road and US 90 (Mahan Drive) intersection
- Add a second westbound through lane at the US 90 (Mahan Drive) and Apex Drive
- Add a second eastbound through lane at the US 90 (Mahan Drive) and Summit Lake Drive intersection, that would merge down to one lane before Plantation Forest Drive

Figure 3.1: Build Alternative 1 Concept

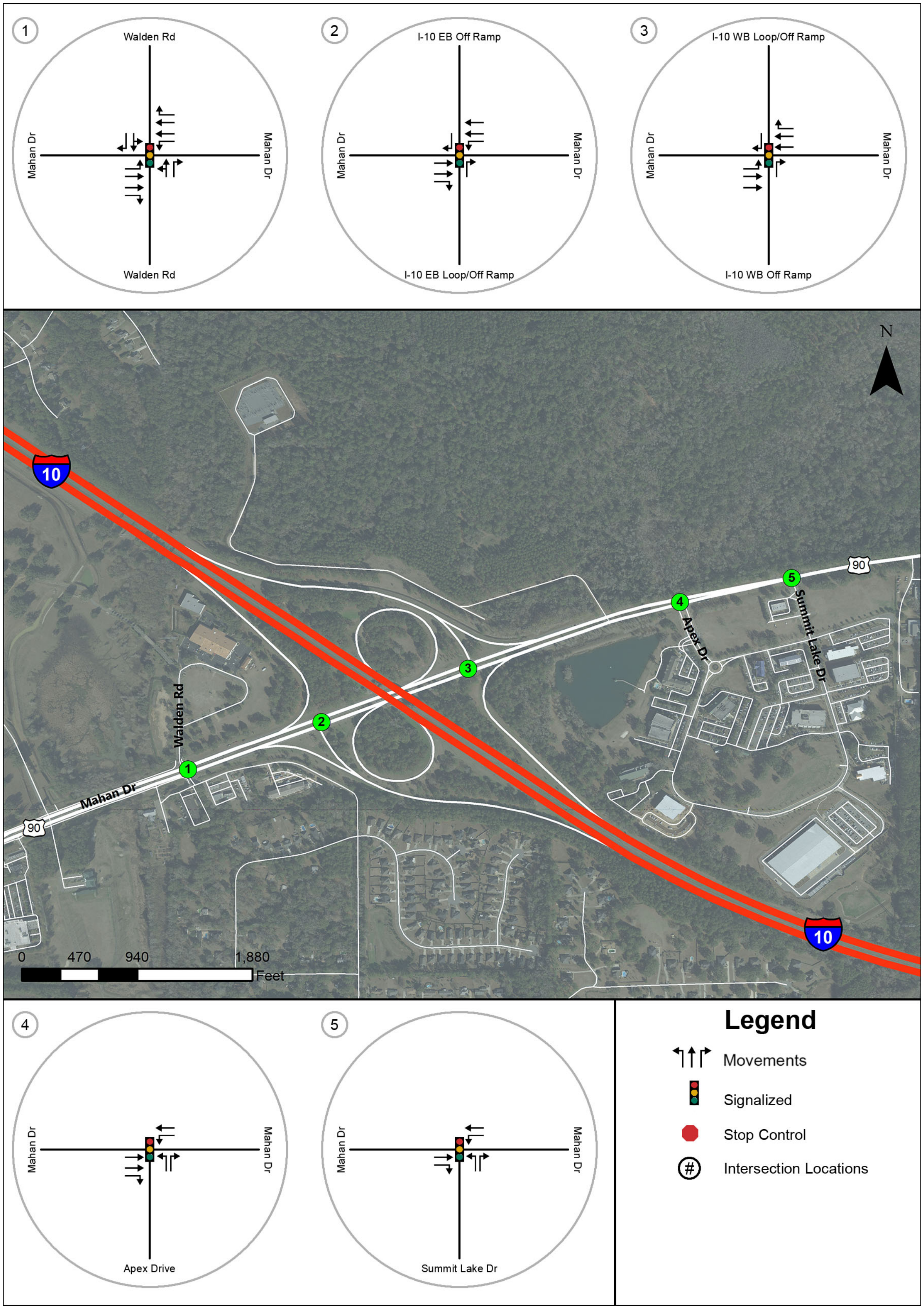
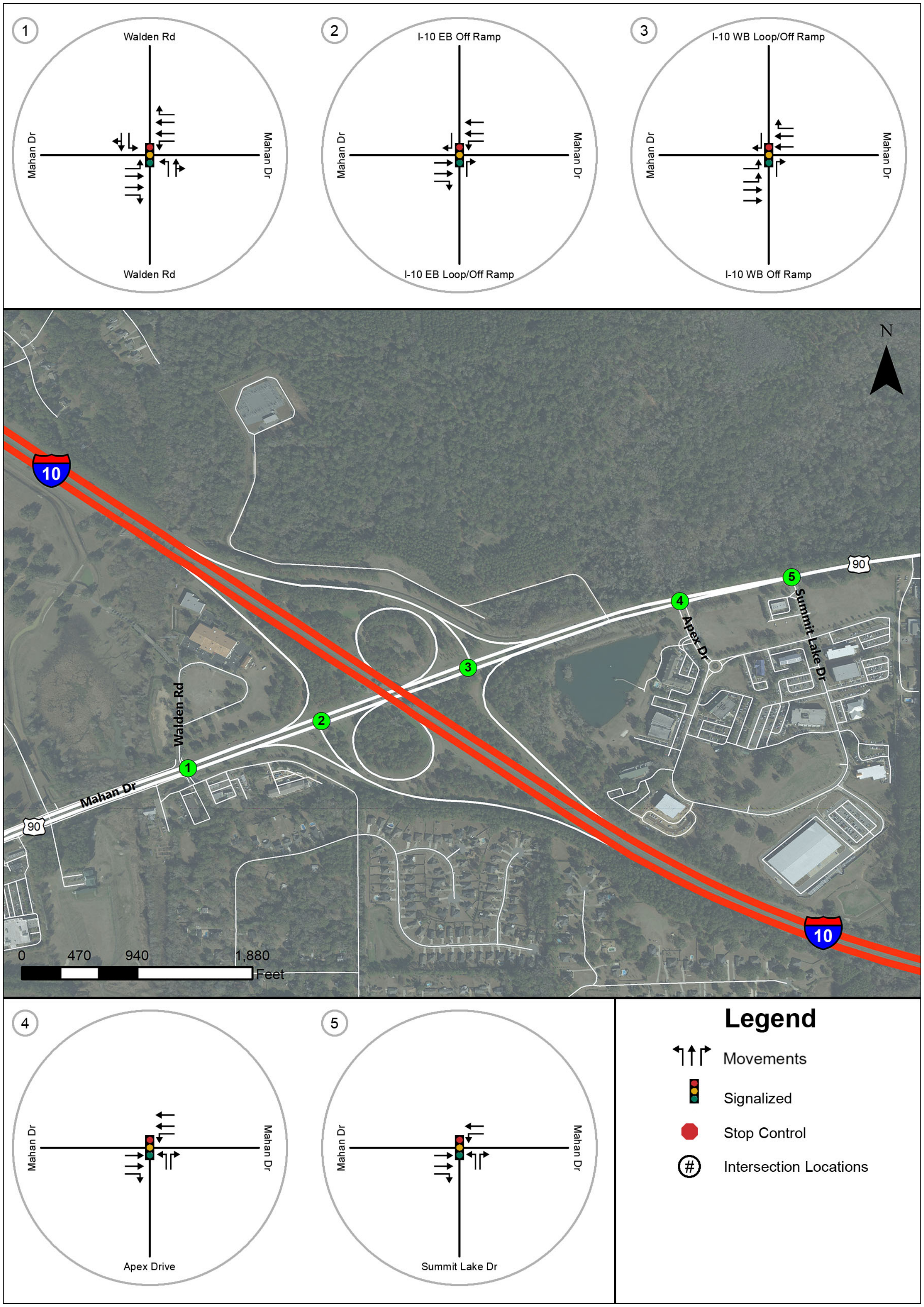


Figure 3.2: Build Alternative 2 Concept



4.0 Future Conditions

The development of future traffic for the study area requires the analysis of the historical growth along the corridor, an understanding of the local traffic patterns, and a detailed review of planned growth within the study area. Considering such analyses, future travel demand was determined for the corridor. This section summarizes the methodology for determining the Opening Year (2025) and Design Year (2045) design traffic for the No-Build and Build Alternatives.

4.1 Travel Demand Model

The latest available version of the FDOT CRTPA model, with the Base Year 2010 and Horizon Year 2040, was used to develop design traffic forecasts for the I-10 PD&E Study. It is important to note that this 2010/2040 CRTPA model is expected to be superseded by the 2045 Northwest Florida Regional Planning Model in 2020, as noted on the Florida Statewide Urban Transportation Modeling Structure (FSUTMS) website (FSUTMSOnline.net).

Validation year model volumes were compared with traffic count data already included in the CRTPA model network. The volume to count ratios of the released 2010/2040 CRTPA model were determined at various locations within the study area per validation criteria set forth in the *FDOT Project Traffic Forecasting Handbook*. Network enhancements were employed to the model to facilitate better use of parallel corridors, to incorporate the study area, and to validate the model without sacrificing the sub-area performance. All sub-area model validation procedures are in line with *FDOT Project Traffic Forecasting Handbook*.

Further detail on the development of the travel demand model used for the development of future traffic can be found in the PTAR, in **Appendix B**.

4.2 Projected Population and Employment Growth

Base Year 2010 and Cost Feasible Year 2040 population and employment data from the CRTPA travel demand model were compared for the model area Traffic Analysis Zones (TAZs). **Table 4.1** shows the overall growth in population and employment in the model by county. The focus of this analysis is on the regional population and employment figures as I-10 is a regional facility.

For comparative purposes, data was gathered from the Bureau of Economic and Business Research's (BEBR) "*Projections of Florida Population by County, 2018-2045*" and is summarized in **Table 4.2.** The expected population and employment growth for Leon County in the model is between the "Medium" and "High" growth projected by the BEBR data, the results seem reasonable based upon the potential for growth along the corridor.

Table 4.1: Sub-Area TAZ Population and Employment Data

County	Population			Employment		
	2010	2040	Annual Growth Rate	2010	2040	Annual Growth Rate
Gadsden	46,389	51,102	0.34%	20,080	17,865	-0.37%
Jefferson	14,761	16,298	0.35%	3,827	4,240	0.36%
Leon	275,487	362,732	1.06%	152,317	215,008	1.37%
Wakulla	29,380	39,725	1.17%	6,794	8,158	0.67%
Region	366,017	469,857	0.95%	183,018	245,271	1.13%

Table 4.2: BEBR Population Forecast

County	2018	2040 Forecasted Population			Annual Growth Rate		
		Low	Medium	High	Low	Medium	High
Gadsden	47,828	41,800	48,700	56,400	-0.57%	0.08%	0.81%
Jefferson	14,733	13,000	15,600	18,600	-0.53%	0.27%	1.19%
Leon	292,332	290,700	339,200	386,900	-0.03%	0.73%	1.47%
Wakulla	31,943	33,500	40,300	47,700	0.22%	1.19%	2.24%
Region	386,836	379,000	443,800	509,600	-0.09%	0.67%	1.44%

4.3 Forecast AADT Development

Using the network enhancements made to the Base Year 2010, the cost feasible 2040 model scenario was updated and ran to develop Opening Year (2025) and Design Year (2045) AADTs for the study. The 2010 and 2040 model AADTs were used to interpolate a 2019 model AADT, which was compared to the balanced 2019 AADT at count locations in the study area. For many of these links, the model interpolated 2019 AADT was reasonably close to the balanced 2019 AADT. For these links, the 2040 AADT from the model was linearly extrapolated from the balanced 2019 AADT to develop a forecast AADT. In some cases, the 2019 AADT varied significantly from the CRTPA model interpolated 2019 AADT or, in some cases, was lower than the CRTPA modeled 2040 AADT. In these cases, or in cases where no CRTPA model link was available, a study area annual average growth rate of 1.3 percent (weighted average growth rates for model links at US 90 / Mahan Drive) was instead applied. More detailed Future Forecasting Results can be found in PTAR report attached in **Appendix B**. Design Year (2045) AADTs are summarized in **Table 4.4**.

Due to the presence of the Welaunee Boulevard interchange in the Design Year (2045) and absence in the Opening Year (2025), direct linear interpolation between 2019 and 2040 forecasts to develop 2025 AADTs was not possible. Instead, the 2040 'Existing plus Committed' scenario of the CRTPA was used for Opening Year (2025) AADT development. The same procedures outlined above were also applied and the resulting Opening Year (2025) AADTs can be found in **Table 4.3**.

Balanced AADTs reflect the back calculated AADT once turning movement level smoothing was conducted to ensure no loss. To be conservative, Balanced AADTs were based upon the maximum observed AM or PM peak hour bidirectional volume, utilizing a standard K of 0.09, and then rounding the AADT in accordance with guidance found in the *FDOT Project Traffic Forecasting Handbook.*

It should be noted that growth along the westbound I-10 off-ramp to eastbound US 90 (Mahan Drive) is expected to experience minimal growth by the Design Year (2045). Based on CRTPA model forecast, the travel demand along US 90 (Mahan Drive) east of the I-10 interchange is not anticipated to drastically change over time due to due to the rural nature of this segment of I-10 and the next several adjacent interchanges, deeming these results reasonable.

Table 4.3: Opening Year (2025) AADTs

Location	CRTPA Model Output			2019 AADT	2025 AADT		
	2010 AADT	2040 AADT	AGR		Forecast	Balanced	AGR
I-10 Mainline							
West of US 90 (Mahan Drive)	32,000	62,000	3.1%	37,200	42,500	41,650	2.6%
East of US 90 (Mahan Drive)	33,500	42,000	0.8%	26,000	27,500	28,500	1.6%
Corridor Segments							
EB I-10 Off-Ramp to WB US 90 (Mahan Drive)	1,700	7,700	11.9%	4,100	7,100	4,800	2.8%
EB I-10 Off-Ramp to EB US 90 (Mahan Drive)	2,800	7,200	5.2%	3,700	4,800	4,200	2.3%
EB I-10 On-Ramp from US 90 (Mahan Drive)	5,600	5,000	-0.4%	2,500	2,700	2,600	0.7%
WB I-10 Off-Ramp to EB US 90 (Mahan Drive)	100	500	12.9%	200	400	250	4.2%
WB I-10 Off-Ramp to WB US 90 (Mahan Drive)	5,200	2,600	-1.6%	2,100	2,200	2,800	5.6%
WB I-10 On-Ramp from US 90 (Mahan Drive)	4,900	13,000	5.6%	8,200	11,000	9,800	3.3%
US 90 (Mahan Drive) West of I-10 Interchange	25,000	29,000	0.6%	20,000	21,000	21,500	1.3%
US 90 (Mahan Drive) East of I-10 Interchange	16,500	19,000	0.5%	14,000	15,500	15,500	1.8%

Table 4.4: Design Year (2045) AADT

Location	CRTPA Model Output			2019 AADT	2045 AADT		
	2010 AADT	2040 AADT	AGR		Forecast	Balanced	AGR
I-10 Mainline							
West of US 90 (Mahan Drive)	32,000	69,500	3.9%	37,200	72,000	71,750	3.6%
East of US 90 (Mahan Drive)	33,500	47,500	1.4%	26,000	35,500	45,500	2.9%
Corridor Segments							
EB I-10 Off-Ramp to WB US 90 (Mahan Drive)	1,700	8,700	14.1%	4,100	19,500	9,900	5.4%
EB I-10 Off-Ramp to EB US 90 (Mahan Drive)	2,800	8,300	6.4%	3,700	9,800	6,800	3.2%
EB I-10 On-Ramp from US 90 (Mahan Drive)	5,600	5,900	0.2%	2,500	2,600	4,300	2.8%
WB I-10 Off-Ramp to EB US 90 (Mahan Drive)	100	500	12.4%	200	950	250	1.0%
WB I-10 Off-Ramp to WB US 90 (Mahan Drive)	5,200	2,700	-1.6%	2,100	2,700	3,900	3.3%
WB I-10 On-Ramp from US 90 (Mahan Drive)	4,900	14,000	6.2%	8,200	21,500	18,000	4.6%
US 90 (Mahan Drive) West of I-10 Interchange	25,000	30,500	0.8%	20,000	24,000	33,500	2.6%
US 90 (Mahan Drive) East of I-10 Interchange	16,500	18,500	0.5%	14,000	17,000	21,500	2.1%

4.3.1 Peak Hour Volume Development

Both Opening Year (2025) and Design Year (2045) AM and PM directional design hour volumes (DDHVs) were developed by applying the design traffic factors to the initially forecasted AADTs. *National Cooperative Highway Research Program (NCHRP) 765* supported smoothing procedures were used to develop forecasted No-Build and Build Alternative AM and PM peak hour Design Year volumes (DDHVs).

Traffic volumes for both the No-Build and Build Alternatives were reviewed to ensure that individual turning movement volumes increased or stayed the same between the Existing Year (2019) and the Forecast Year. In any case where the volume decreased, the path of those trips were reviewed and engineering judgement was used to adjust the balancing. It is noteworthy to mention that the forecasted volumes will be same for both the No-Build and Build Alternative, since they include the same assumptions in the model networks as described in previous section. **Figure 4.1** through **Figure 4.4** provide 2025 and 2045 traffic volumes and AADTs.

Figure 4.1: Opening Year (2025) Turning Movement Volumes for No-Build and Build Alternatives

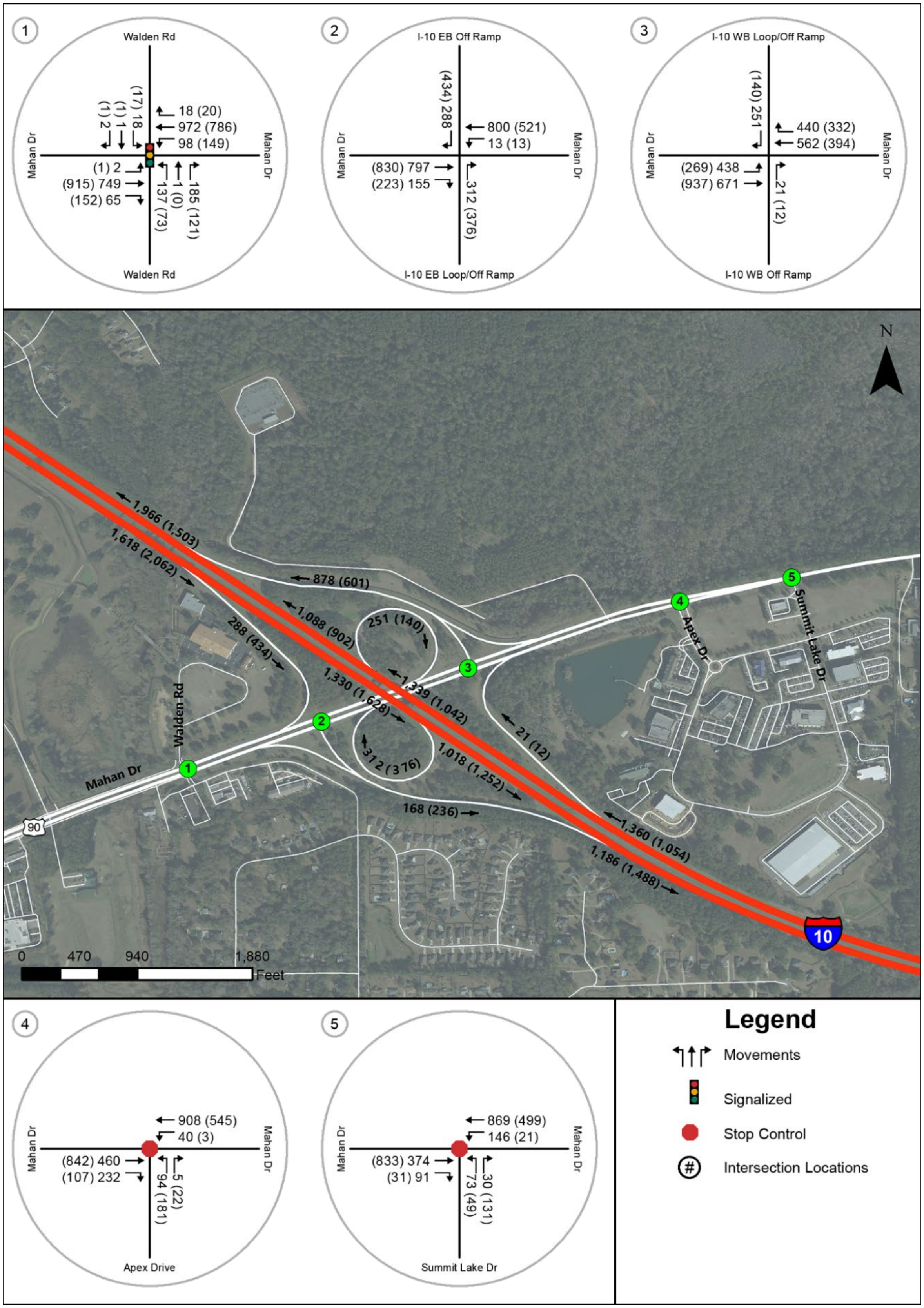


Figure 4.2: Opening Year (2025) AADTs and No-Build Lane Geometry

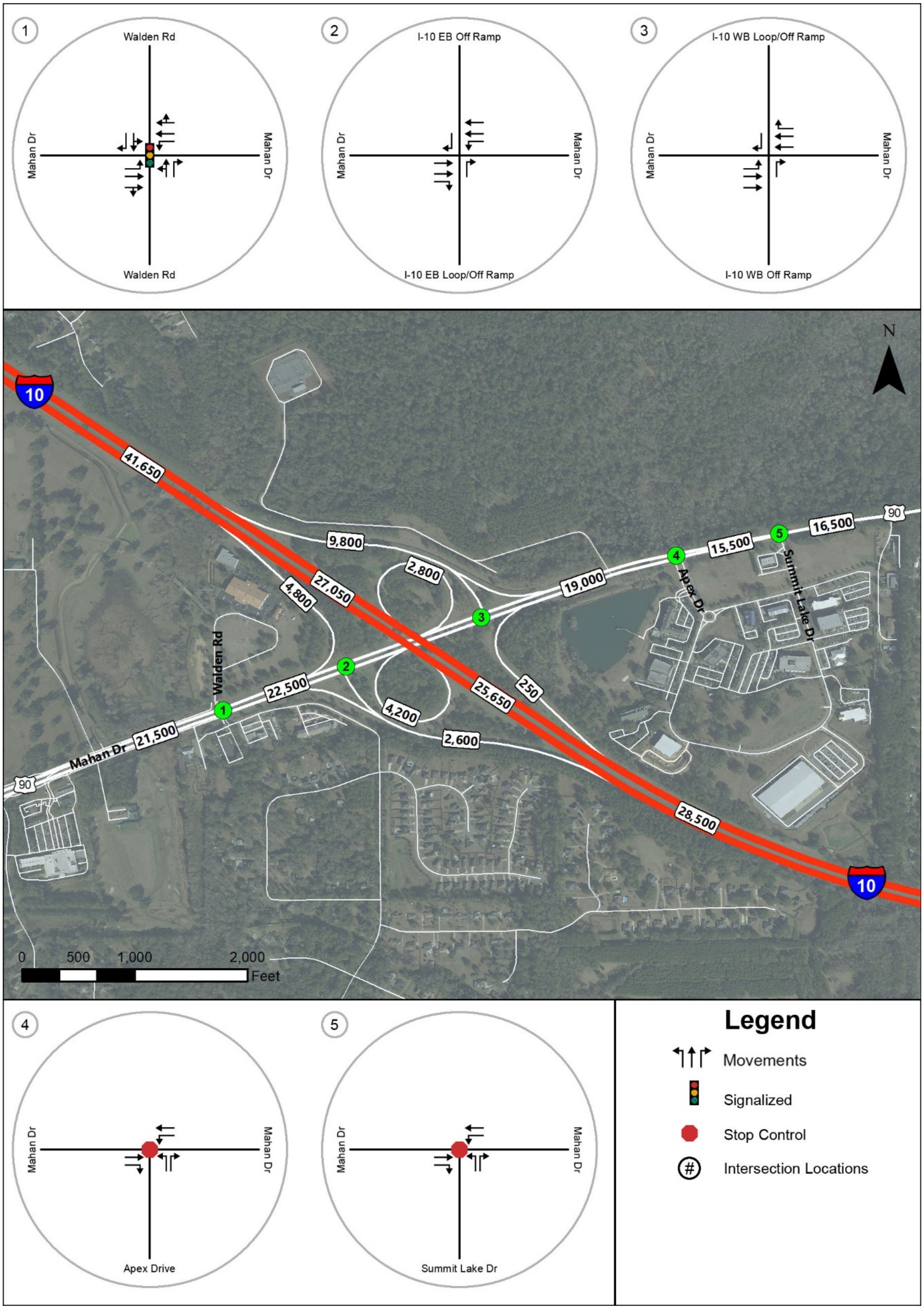


Figure 4.3: Design Year (2045) Turning Movement Volumes for No-Build and Build Alternatives

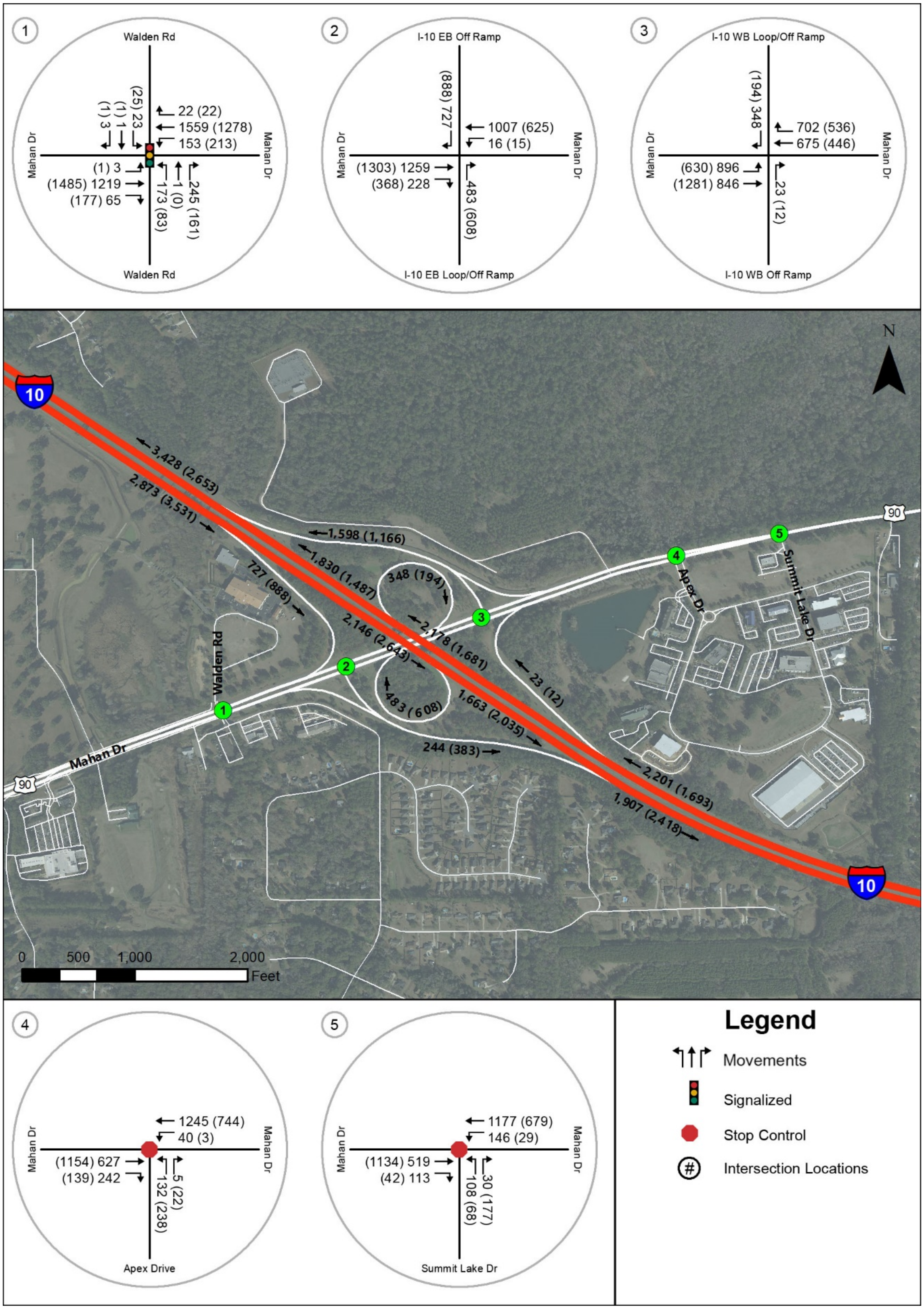
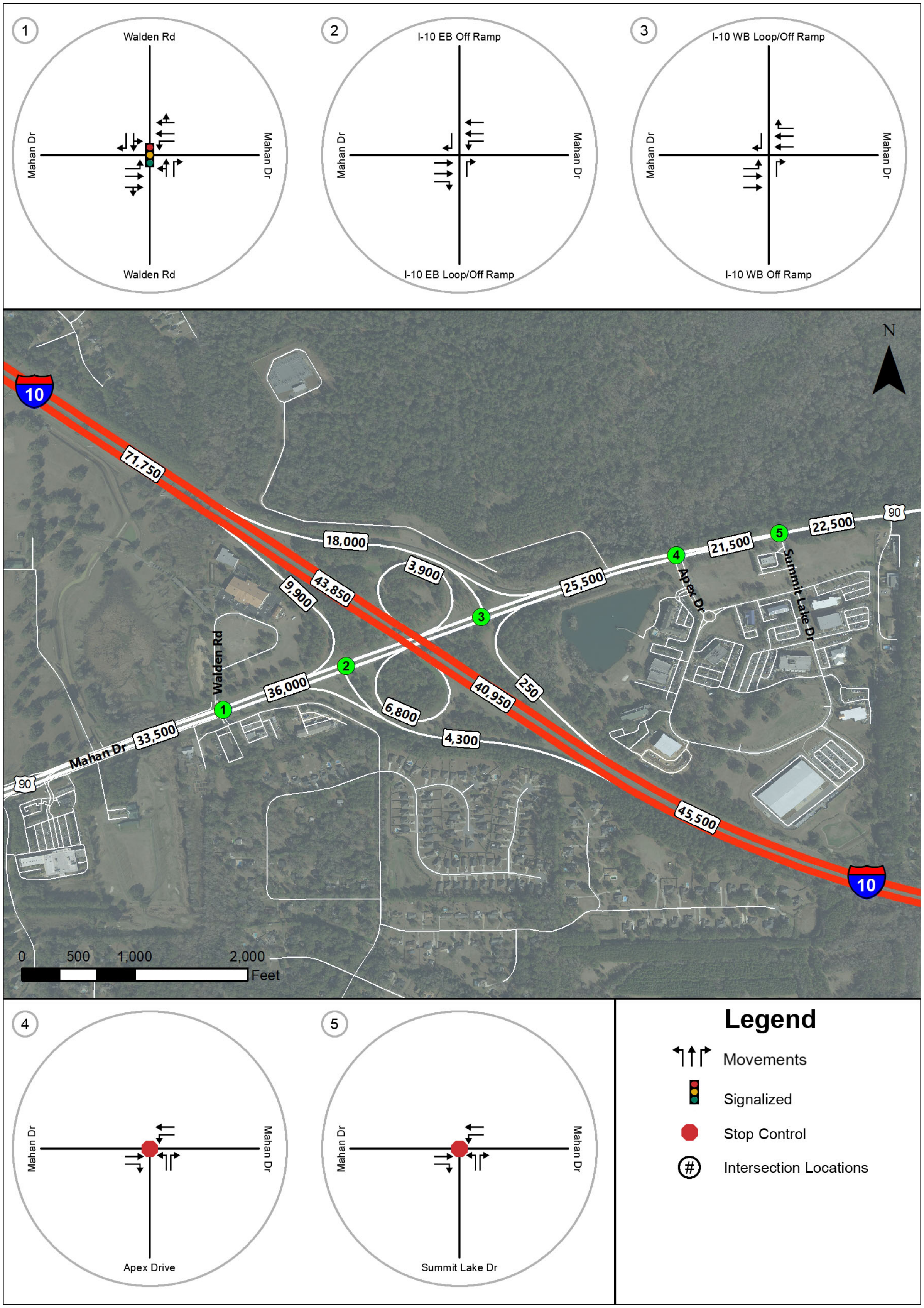


Figure 4.4: Design Year (2045) AADTs and No-Build Lane Geometry



4.4 Future Years Traffic Operational Analysis

The traffic operational analysis was conducted for both the No-Build and Build Alternatives for the Opening Year (2025) and Design Year (2045). The traffic operation analysis includes the intersection operation analysis and I-10 (SR 8) mainline merge/diverge analysis. The Highway Capacity Software (HCS), Version 7.0 and Synchro, Version 10.0 were used for the analysis. The results of the traffic analysis are summarized in the following sections.

4.4.1 No-Build Alternative Analysis

4.4.1.1 Merge and Diverge Analysis

The I-10 freeway merge and diverge analysis was conducted at US 90 (Mahan Drive) interchange using Highway Capacity Software (HCS 7), based on Highway Capacity Manual 6th Edition methodology for the AM and PM peak hours. HCS7 Merge/Diverge reports are attached in **Appendix H**. Due to project traffic at the gore point remaining unchanged for each alternative, this will serve as the merge and diverge conditions for all alternative scenarios.

Freeway merge and diverge results are summarized in **Table 4.5**. The results of the operational analysis show that each of the freeway merge and diverge areas will operate at a LOS D or better in the Opening Year (2025) and Design Year (2045).

Table 4.5: Freeway Merge and Diverge Analysis

Ramp	Analysis Type	Opening Year (2025)			Design Year (2045)		
		Density* (pc/mi/ln)	Speed* (mph)	LOS*	Density* (pc/mi/ln)	Speed* (mph)	LOS*
Eastbound							
Off-Ramp to Westbound US 90 (Mahan Drive)	Diverge	14.6 (17.9)	61.2 (61.0)	B (B)	23.9 (28.1)	60.4 (60.2)	C (D)
Off-Ramp to Eastbound US 90 (Mahan Drive)	Diverge	7.7 (9.9)	56.0 (56.0)	A (A)	13.6 (17.0)	56.1 (56.1)	B (B)
On-Ramp from US 90 (Mahan Drive)	Merge	9.5 (11.4)	64.6 (64.4)	A (B)	13.8 (17.1)	64.2 (63.7)	B (B)
Westbound							
Off-Ramp to Eastbound US 90 (Mahan Drive)	Diverge	8.8 (6.5)	62.3 (62.1)	A (A)	14.5 (11.1)	62.7 (62.4)	B (B)
Off-Ramp to Westbound US 90 (Mahan Drive)	Diverge	7.7 (5.4)	56.4 (56.7)	A (A)	13.7 (10.0)	56.8 (57.0)	B (A)
On-Ramp from US 90 (Mahan Drive)	Merge	13.9 (10.6)	64.0 (64.3)	B (B)	24.0 (18.5)	62.2 (63.8)	C (B)

4.4.1.2 Freeway Segment Analysis

Freeway segment analysis was conducted along each segment of the I-10 mainline in the opening year (2025) and design year (2045). Both No-Build and Build Condition assume that the I-10 mainlines will widen from four lanes to six-lanes. Therefore, this will serve as the freeway segment conditions for all alternative scenarios.

As shown in **Table 4.6**, the results of the analysis indicate that each of the freeway segments are anticipated to meet the LOS target D for urban areas and LOS target C for rural areas in the opening year (2025) and design year (2045). Overall, operations are expected to become less congested in future condition due to widening of I-10, though there is higher expected demand along I-10.

Table 4.6: Freeway Segment Analysis

Segment	Number of Lanes	Opening Year (2025)		Design Year (2045)	
		Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
Eastbound					
Raymond Diehl Road/Capital Circle to Westbound US 90 (Mahan Drive)	3	9.4 (12.0)	A (B)	16.7 (20.6)	B (C)
Westbound US 90 (Mahan Drive) to Eastbound US 90 (Mahan Drive)	3	7.8 (9.5)	A (A)	12.4 (15.3)	B (B)
Eastbound US 90 (Mahan Drive) to On-Ramp from US 90 (Mahan Drive)	3	5.9 (7.3)	A (A)	9.7 (11.9)	A (B)
US 90 (Mahan Drive) to Gamble Road (SR 59)	3	6.9 (8.7)	A (A)	11.2 (14.1)	B (B)
Westbound					
Gamble Road (SR 59) to Eastbound US 90 (Mahan Drive)	3	8.0 (6.2)	A (A)	12.9 (9.9)	B (A)
Eastbound US 90 (Mahan Drive) to Westbound US 90 (Mahan Drive)	3	7.8 (6.1)	A (A)	12.7 (9.8)	B (A)
Westbound US 90 (Mahan Drive) to On-Ramp from US 90 (Mahan Drive)	3	6.3 (5.2)	A (A)	10.6 (8.6)	A (A)
US 90 (Mahan Drive) to Capital Circle NE (SR 261)	3	11.4 (8.7)	B(A)	20.0 (15.4)	C (B)

4.4.1.3 No-Build – Intersection Analysis

Table 4.7 shows the future No-Build intersection analysis results for the study intersections. The signal timings were optimized as part of the No-Build Alternative to account for traffic growth and demand. The detailed Synchro operational analysis reports are provided in **Appendix I**.

Based on the analysis results, each of the study intersections will operate at overall LOS D or better in the Opening Year (2025) during AM and PM peak hours. Overall, most of the study intersections will operate at overall LOS E or worse during both the AM and PM peak hours in the Design Year (2045), except for the Eastbound and Westbound I-10 Ramps that will operate at LOS D or better. The movement analysis results indicate the following:

- Walden Road intersection: Northbound through movement will fail during the PM peak hour in 2045.
- Westbound I-10 ramp intersection: Eastbound left movement will fail during the AM peak hour in 2045.
- Apex Drive intersection: Northbound left movement will fail during the AM and PM peak hours in 2025 and 2045.
- Summit Lake Drive intersection: Northbound left movement will fail during the AM peak hour in 2025 and 2045.

Table 4.7: No-Build – Intersection Analysis

Intersection	Control Type	Approach	Movement	Opening Year (2025)						Design Year (2045)					
				Movement		Approach		Intersection		Movement		Approach		Intersection	
				Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
Walden Road	Signalized	EB	L	10.1 (9.0)	B (A)	17.4 (21.1)	B (C)	18.8 (18.2)	B (C)	15.1 (10.5)	B (B)	28.9 (125.3)	C(F)	31.9 (71.3)	C (E)
			TR	17.4 (21.1)	B (C)					28.9 (125.4)	C (F)				
		WB	L	8.5 (11.1)	A (B)	14.9 (11.7)	B (B)			22.5 (26.6)	C (C)	31.8 (18.8)	C(B)		
			TR	15.5 (11.8)	B (B)					32.7 (17.5)	C (B)				
		NB	TL	36.1 (33.4)	D (C)	33.7 (31.9)	C (C)			48.6 (34.1)	D (C)	40.7 (32.3)	D(C)		
			R	31.9 (31.1)	C (C)					35.0 (31.4)	D (C)				
		SB	TL	42.1 (36.5)	D (D)	41.9 (36.4)	D (D)			41.3 (37.4)	D (D)	41.0 (37.3)	D(D)		
			R	40.0 (35.0)	D (C)					39.1 (35.0)	D (C)				
Eastbound I-10 Ramps	Unsignalized	WB	L	9.1 (9.1)	A (A)	0.1 (0.2)	A (A)	0.1 (0.1)	A (A)	10.4 (10.1)	B (B)	0.2 (0.2)	A (A)	0.1 (0.1)	A (A)
Westbound I-10 Ramps	Unsignalized	EB	L	12.3 (9.3)	B (A)	4.9 (2.1)	A (A)	3.2 (1.6)	A (A)	90.6 (14.1)	F (B)	46.6 (4.6)	E (A)	33.6 (3.8)	D (A)
Apex Drive	TWSC	WB	L	9.4 (10.4)	A (B)	0.4 (0.1)	A (A)	7.0 (34.5)	A (D)	10.3 (12.5)	B (B)	0.3 (0.0)	A (A)	55.3 (1036.1)	F (F)
		NB	L	125.1 (321.3)	F (F)	119.8 (288.2)	F (F)			959.4 (6272.9)	F (F)	927.5 (9153.1)	F (F)		
			R	11.4 (16.7)	B (C)					13.1 (24.4)	B (C)				
Summit Lake Drive	TWSC	WB	L	9.0 (10.1)	A (B)	1.3 (0.4)	A (A)	7.9 (3.6)	A (A)	9.8 (12.0)	A (B)	1.1 (0.5)	A (A)	63.9 (17.2)	F (B)
		NB	L	108.8 (30.6)	F (D)	108.8 (30.6)	F (D)			959.0 (148.1)	F (F)	959.0 (148.1)	F (F)		
			R	N/A	N/A					N/A	N/A				

4.4.1.4 No-Build – Queuing Analysis

Queue analysis was conducted at each of the study intersections for the No-Build Alternative for the Opening Year (2025) and Design Year (2045). The results of the queue analysis for the I-10/US 90 (Mahan Drive) interchange are shown in **Table 4.8**. The detailed Synchro operational analysis reports are provided in **Appendix I**.

The No-Build queuing analysis shows a continued breakdown of the northbound approach at Walden Road with the northbound shared through/left turning movement queue preventing access to the northbound right movement. In 2045, we also begin to see the eastbound left turn at the Westbound I-10 Ramp terminal exceed the available storage as the competition for gapping in the westbound direction becomes more difficult due to the forecasted demand. The northbound approach at Apex Drive also experiences significant queueing due to gapping challenges presented by demand along US 90 (Mahan Drive).

Table 4.8: No-Build – Queue Analysis

Intersection	Movement	Storage Length (ft)	Opening Year (2025) Queue Length (ft)		Design Year (2045) Queue Length (ft)	
			AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Walden Road	EBL	135	3	2	3	2
	EBTR[1]	1,000	267	339	551	715
	WBL	300	47	76	122	187
	WBTR[1]	650	336	211	**709**	471
	NBTL[1]	1,600	137	80	227	100
	NBR	50	45	0	105	17
	SBTL[1]	325	34	29	39	37
	SBR	50	0	0	0	0
Eastbound I-10 Ramps	WBL	240	1	1	2	2
Westbound I-10 Ramps	EBL	250	70	26	674	120
Apex Drive	EBR	330	0	0	0	0
	WBL	450	4	0	5	0
	NBL	460	135	341	374	2,593
	NBR	210	1	6	1	10
Summit Lake Drive	EBR	490	0	0	0	0
	WBL	140	13	2	16	5
	NBL	440	141	52	390	349
	NBR	250	0	0	0	0

[1] The available storage lengths for through lanes on US 90 (Mahan Drive) are the roadway segment distance between upstream and downstream intersections.

4.4.2 Build Alternative 1

The objective of Build Alternative 1 is to provide as much operational and safety benefit to the I-10/US 90 (Mahan Drive) Interchange as possible while utilizing TSM&O strategies and minimizing construction and Right-of-Way costs by limiting construction of additional lanes. This alternative proposes to signalize each of study intersections within the I-10/US 90 (Mahan Drive) interchange area of influence and provided minor improvements to the adjacent intersections. The following provides the summary of all the improvements considered for the Build Alternative 1:

- Signalize each of the ramp terminals of US 90 (Mahan Drive) interchange, Apex Drive, and Summit Lake Drive.
- Add eastbound and westbound right turn lanes at the Walden Road intersection,
- Add a second eastbound through lane at the Apex Drive intersection that would merge down to one lane before Summit Lake Drive.

4.4.2.5 Build Alternative 1 – Intersection Analysis

Table 4.9 shows the 2025 and 2045 Build Alternative 1 intersection analysis results for the study intersections. The optimized signal timings were used for the Build analysis to reflect routine maintenance operations. Build Alternative 1 Synchro 10 Intersection Analysis reports can be found in **Appendix J**.

Based on the analysis results, each of the study intersections will operate at overall LOS D or better in the Opening Year (2025) and Design Year (2045) during AM and PM peak hours. Based upon the intersection level results, the proposed improvements seem effective at mitigating the operational challenges presented under the No Build alternative. It should be noted that some minor movements, such as the northern and southern approaches to Walden Road, operate slightly worse under this Build Alternative than under the No-Build alternative. This is due to those approaches being relatively minor in demand when compared with US 90 (Mahan Drive) and the inclusion of the signals at the I-10 ramp terminals impacting the coordination and optimization of the east-west flow along US 90 (Mahan Drive). This may inadvertently shift green time from the cross streets to US 90 (Mahan Drive) resulting in this minor operational reduction.

Table 4.9: Build Alternative 1 – Intersection Analysis

Intersection	Control Type	Approach	Movement	Opening Year (2025)						Design Year (2045)					
				Movement		Approach		Intersection		Movement		Approach		Intersection	
				Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
Walden Road	Signalized	EB	L	10.0 (8.8)	B (A)	16.2 (17.0)	B (B)	22.9 (16.2)	C (B)	14.7 (12.2)	B (B)	24.0 (69.8)	C (E)	25.0 (44.1)	C (D)
			T	16.5 (17.8)	B (B)					24.7 (76.4)	C (E)				
			R	12.0 (11.9)	B (B)					12.1 (14.7)	B (B)				
		WB	L	14.8 (13.7)	B (B)	24.3 (11.6)	C (B)			30.3 (37.1)	C (D)	21.8 (17.4)	C (B)		
			T	25.6 (11.3)	C (B)					21.1 (14.3)	C (B)				
			R	9.3 (8.0)	A (A)					9.1 (9.1)	A (A)				
		NB	TL	36.1 (33.4)	D (C)	33.7 (31.9)	C (C)			47.8 (35.3)	D (D)	40.3 (33.9)	D (C)		
			R	31.9 (31.1)	C (C)					34.9 (33.2)	C (C)				
		SB	TL	42.1 (36.5)	D (D)	41.9 (36.4)	D (D)			41.3 (41.5)	D (D)	41.0 (41.4)	D (D)		
			R	40.0 (35.0)	D (C)					39.1 (39.1)	D (D)				
Eastbound I-10 Ramps	Signalized	EB	T	1.1 (1.1)	A (A)	1.1 (1.1)	A (A)	0.9 (1.0)	A (A)	0.6 (1.5)	A (A)	0.6 (1.5)	A (A)	0.8 (1.4)	A (A)
		WB	L	28.0 (29.1)	C (C)	0.6 (0.8)	A (A)			54.5 (54.8)	D (D)	1.1 (1.4)	A (A)		
			T	0.2 (0.1)	A (A)					0.2 (0.1)	A (A)				
Westbound I-10 Ramps	Signalized	EB	L	26.5 (20.0)	C (C)	10.6 (4.7)	B (A)	10.6 (4.9)	B (A)	24.5 (10.1)	C (B)	12.7 (3.6)	B (A)	17.6 (6.6)	B (A)
			T	0.2 (0.2)	A (A)					0.2 (0.4)	A (A)				
		WB	T	10.6 (5.5)	B (A)	10.6 (5.5)	B (A)			30.3 (19.5)	C (B)	30.3 (19.5)	C (B)		
Apex Drive	Signalized	EB	T	3.8 (12.9)	A (B)	4.3 (12.7)	A (B)	6.3 (12.7)	A (B)	2.4 (4.9)	A (A)	1.9 (4.4)	A (A)	12.7 (10.0)	B (B)
			R	5.4 (11.3)	A (B)					0.4 (0.2)	A (A)				
		WB	L	1.6 (3.2)	A (A)	4.2 (5.9)	A (A)			2.2 (6.0)	A (A)	15.2 (9.8)	B (A)		
			T	4.3 (5.9)	A (A)					15.6 (9.8)	B (A)				
		NB	L	41.3 (31.7)	D (C)	41.1 (31.0)	D (C)			59.5 (39.2)	E (D)	58.7 (38.2)	E (D)		
			R	35.4 (25.5)	D (C)					35.6 (27.4)	D (C)				
Summit Lake Drive	Signalized	EB	T	5.2 (17.0)	A (B)	4.4 (16.4)	A (B)	9.4 (14.4)	A (B)	5.3 (24.3)	A (C)	4.7 (23.4)	A (C)	20.5 (20.9)	B (C)
			R	1.1 (0.3)	A (A)					1.7 (0.0)	A (A)				
		WB	L	3.3 (5.6)	A (A)	8.7 (3.9)	A (A)			4.1 (16.2)	A (B)	25.3 (4.3)	C (A)		
			T	9.6 (3.8)	A (A)					28.0 (3.8)	C (A)				
		NB	L	40.2 (38.7)	D (D)	38.4 (35.3)	D (D)			49.5 (71.0)	D (E)	46.3 (57.1)	D (E)		
			R	34.1 (34.1)	D (C)					35.0 (51.7)	D (D)				

4.4.2.6 Build Alternative 1 – Queue Analysis

Queue analysis was conducted at each of the study intersections for the Build Alternative 1 for the Opening Year (2025) and Design Year (2045). The results of the queue analysis for the I-10/US 90 (Mahan Drive) interchange area are shown in **Table 4.10**. The detailed Synchro 10 queue analysis reports are provided in **Appendix J**.

The northbound approach at Walden Road is still experiencing potential queue spill back due to the shared through/left turn operation. The eastbound left at the Westbound I-10 ramp terminal, while operating with an acceptable LOS, still experienced queue spill back due to the signalization of the terminal and the high left turn volume. While the queuing of the Westbound I-10 ramp terminal is similar and seemingly worse under Build Alternative 1, due to the heavy movements involved and the possible safety impacts of the competition for gapping, a signal is still proposed under this alternative.

It is also worth noting the westbound through approach of Summit Lake Drive extending the available storage. Upon examination of the Synchro outputs, this result seems to be caused by intricacies within the Synchro software rather than due to capacity issues of the signal. It is for this reason that we note the queuing challenge but will not propose a mitigation strategy for this movement under Build Alternative 2.

Table 4.10: Build Alternative 1 – Queue Analysis

Intersection	Movement	Storage Length (ft)	Opening Year (2025)		Design Year (2045)	
			Queue Length (ft)		Queue Length (ft)	
			AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Walden Road	EBL	135	3	2	3	2
	EBT[1]	1,000	239	267	402	706
	EBR	135	0	6	0	25
	WBL	300	83	84	138	245
	WBT[1]	1,125	376	169	647	535
	WBR	700	0	0	0	0
	NBTL[1]	1,600	137	80	238	87
	NBR	50	45	0	122	27
	SBTL[1]	325	34	29	39	42
	SBR	50	0	0	0	0
Eastbound I-10 Ramps	EBT[1]	1,000	48	47	18	4
	WBL	350	17	22	15	23
Westbound I-10 Ramps	EBL	350	293	145	**768**	103
	WBT[1]	1,550	160	68	208	167
Apex Drive	EBT[1]	1,550	36	255	41	91
	EBR	1,300	0	44	0	0
	WBL	450	5	1	5	1
	WBT[1]	775	154	257	249	453
	NBL	500	104	145	179	212
	NBR	275	10	18	10	19
Summit Lake Drive	EBT[1]	800	27	306	59	701
	EBR	530	0	1	4	0
	WBL	140	30	5	28	5
	WBT[1]	850	379	102	**988**	135
	NBL	475	85	59	128	111
	NBR	250	26	51	27	116

[1] The available storage lengths for through lanes on US 90 (Mahan Drive) are the roadway segment distance between upstream and downstream intersections.

4.4.3 Build Alternative 2

The objective of Build Alternative 2 is to build off the successes observed under Build Alternative 1, but to focus on the mitigation of the queuing challenges through the implementation of additional lanes and modification to existing intersection geometry. This alternative proposes also seeks to signalize each of study intersections within the I-10/US 90 (Mahan Drive) interchange area of influence and provided minor improvements to the adjacent intersections. The following provides the summary of all the improvements considered for the Build Alternative 2:

- Add a second westbound left lane at the I-10 westbound ramp terminal intersection
- Restripe northbound and southbound approach to provide one exclusive left turn lane and one shared through and right turn lane at the Walden Road and US 90 (Mahan Drive) intersection
- Add a second westbound through lane at the US 90 (Mahan Drive) and Apex Drive
- Add a second eastbound through lane at the US 90 (Mahan Drive) and Summit Lake Drive intersection, that would merge down to one lane before Plantation Forest Drive

4.4.3.7 Build Alternative 2 – Intersection Analysis

Table 4.11 shows the 2025 and 2045 Build intersection analysis results for the study intersections. The optimized signal timings were used for the Build analysis to reflect routine maintenance operations. Build Alternative 2 Synchro 10 Intersection Analysis reports can be found in **Appendix K**.

Based on the analysis results, each of the study intersections will operate at overall LOS D or better in the Opening Year (2025) and Design Year (2045) during AM and PM peak hours.

Compared to No-Build Operational Analysis and Build Alternative 1, all the movements and approaches at study intersections will operate better under Build Alternative 2. These results are consistent with the improvement patterns observed under Build Alternative 1 and confirm the improved efficiencies the proposed additional improvements will have on the overall interchange operation.

Table 4.11: Build Alternative 2 – Intersection Analysis

Intersection	Control Type	Approach	Movement	Opening Year (2025)						Design Year (2045)					
				Movement		Approach		Intersection		Movement		Approach		Intersection	
				Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
Walden Road	Signalized	EB	L	8.8 (8.1)	A (A)	14.7 (15.3)	B (B)	16.5 (15.2)	B (B)	13.8 (10.2)	B (B)	26.2 (40.4)	C (D)	27.6 (30.3)	C (C)
			T	15.0 (16.0)	B (B)					26.9 (43.7)	C (D)				
			R	10.9 (11.1)	B (B)					12.8 (12.5)	B (B)				
		WB	L	7.7 (9.9)	A (A)	12.7 (10.6)	B (B)			21.5 (29.9)	C (C)	27.2 (18.5)	C (B)		
			T	13.2 (10.9)	B (B)					28.0 (16.8)	C (B)				
			R	8.2 (6.8)	A (A)					8.5 (7.1)	A (A)				
		NB	TL	29.7 (30.7)	C (C)	32.3 (34.4)	C (C)			32.2 (30.3)	C (C)	33.4 (34.3)	C (C)		
			R	34.3 (36.7)	C (D)					34.2 (36.4)	C (D)				
		SB	TL	35.1 (36.6)	D (D)	35.7 (37.0)	D (D)			35.1 (37.0)	D (D)	35.6 (37.2)	D (D)		
			R	39.2 (40.5)	D (D)					38.9 (40.8)	D (D)				
Eastbound I-10 Ramps	Signalized	EB	T	2.7 (2.0)	A (A)	2.7 (2.0)	A (A)	1.7 (1.6)	A (A)	4.8 (6.6)	A (A)	4.8 (6.6)	A (A)	3.1 (4.9)	A (A)
		WB	L	34.1 (34.8)	C (C)	0.7 (1.0)	A (A)			42.6 (52.5)	D (D)	0.9 (1.3)	A (A)		
			T	0.2 (0.1)	A (A)					0.3 (0.1)	A (A)				
Westbound I-10 Ramps	Signalized	EB	L	28.8 (27.3)	C (C)	11.5 (6.3)	B (A)	9.4 (5.4)	A (A)	17.7 (33.6)	B (C)	9.2 (11.4)	A (B)	10.3 (10.7)	B (B)
			T	0.2 (0.2)	A (A)					0.2 (0.4)	A (A)				
		WB	T	5.3 (2.6)	A (A)	5.3 (2.6)	A (A)			13.3 (7.7)	B (A)	13.3 (7.7)	B (A)		
Apex Drive	Signalized	EB	T	7.1 (13.8)	A (B)	9.6 (13.7)	A (B)	7.2 (12.9)	A (B)	7.6 (19.5)	A (B)	8.1 (19.2)	A (B)	6.6 (16.6)	A (B)
			R	14.5 (13.0)	B (B)					9.7 (16.7)	A (B)				
		WB	L	1.8 (3.3)	A (A)	2.3 (3.1)	A (A)			1.6 (6.0)	A (A)	2.5 (4.9)	A (A)		
			T	2.3 (3.1)	A (A)					2.5 (4.9)	A (A)				
		NB	L	38.5 (36.4)	D (D)	38.3 (35.6)	D (D)			36.5 (38.2)	D (D)	36.3 (37.2)	D (D)		
			R	34.3 (29.1)	C (C)					31.4 (27.1)	C (C)				
Summit Lake Drive	Signalized	EB	T	1.8 (2.7)	A (A)	1.5 (2.6)	A (A)	7.9 (7.4)	A (A)	3.7 (4.4)	A (A)	3.5 (4.3)	A (A)	22.0 (9.5)	B (A)
			R	0.3 (0.0)	A (A)					2.8 (0.5)	A (A)				
		WB	L	2.3 (4.8)	A (A)	7.3 (7.4)	A (A)			3.0 (6.8)	A (A)	28.6 (10.5)	C (B)		
			T	8.1 (7.6)	A (A)					31.8 (10.7)	C (A)				
		NB	L	44.8 (30.8)	D (C)	42.2 (30.3)	D (C)			45.7 (30.8)	D (C)	43.2 (31.9)	D (C)		
			R	35.9 (30.0)	D (C)					34.1 (32.3)	C (C)				

4.4.3.8 Build Alternative 2 – Queue Analysis

Queue analysis was conducted at each of the study intersections for the Build Alternative 2 for the Opening Year (2025) and Design Year (2045). The results of the queue analysis for the US 90 (Mahan Drive) interchange area are shown in **Table 4.12**. The detailed Synchro 10 queue analysis reports are provided in **Appendix K**.

Based on the queuing analysis, the results indicate that the inclusion of the additional eastbound left turn lane at the Westbound I-10 ramp terminal was effective at servicing the demand mitigating the queuing issues observed under Build Alternative 1. The removal of the split phase operation at Walden Road and the additional northbound right/through storage also mitigated the northbound approach queuing issues. It should be noted that the westbound through approach queue will begin to near the gore point for the eastbound I-10 to westbound US 90 (Mahan Drive) ramp in the Design Year (2045). This may lead to merging challenges as Build Alternative 2 reaches the Design Year (2045).

As noted previously, while the westbound through movement queue at Summit Lake Drive is noted, no mitigation strategy is proposed under this alternative.

Table 4.12: Build Alternative 2 – Queue Analysis

Intersection	Movement	Storage Length (ft)	Opening Year (2025)		Design Year (2045)	
			Queue Length (ft)		Queue Length (ft)	
			AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Walden Road	EBL	135	3	2	4	2
	EBT[1]	1,000	257	298	626	640
	EBR	135	0	14	0	21
	WBL	300	48	67	119	226
	WBT[1]	1,125	227	193	752	469
	WBR	700	0	0	0	0
	NBL	1,600	112	74	135	80
	NBTR	250	58	0	64	31
	SBL[1]	325	24	25	27	32
	SBTR	50	8	7	9	7
Eastbound I-10 Ramps	EBT[1]	1,000	123	96	457	460
	WBL	350	25	24	20	31
Westbound I-10 Ramps	EBL	350	169	98	117	254
	WBT[1]	1,550	91	34	133	103
Apex Drive	EBT[1]	1,550	111	245	79	426
	EBR	1,300	46	47	9	44
	WBL	450	6	1	4	1
	WBT[1]	775	76	46	108	95
	NBL	500	97	159	125	209
	NBR	275	9	19	9	19
Summit Lake Drive	EBT[1]	800	11	25	50	8
	EBR	530	0	0	8	0
	WBL	140	26	10	30	13
	WBT[1]	850	331	182	999	314
	NBL	475	87	57	119	73
	NBR	250	27	48	26	92

[1] The available storage lengths for through lanes on US 90 (Mahan Drive) are the roadway segment distance between upstream and downstream intersections.

4.4.4 Build Safety Analysis

FDOT's Crash Reduction Factors (CRFs) and the Federal Highway Administration's (FHWA's) Crash Modification Factor (CMF) Clearinghouse were used to determine the anticipated effect of the proposed improvements for study area. To better reflect local conditions, FDOT's CRFs were chosen first. If an applicable FDOT CRF was unavailable, then the closest applicable CMF from the FHWA's CMF Clearinghouse was used. For groups of crashes to which multiple CMFs apply, the crash reduction was calculated for each set of crashes as follows

$$CRF = CRF_1 + (1 - CRF_1)(CRF_2) + (1 - CRF_1)(1 - CRF_2)CRF_3 + \cdots$$

The crash reduction for all groups was then summed to come up with a total crash reduction for the location, and the overall crash reduction factor calculated based on the total crashes reduced divided by the total crashes.

While the existing condition analysis analyzed the I-10 ramp terminals at US 90 (Mahan Drive) as part of a segment due to their lack of signalization, the proposed improvements include signalizing of the I-10 ramp terminals which changes their analysis classification. For purposes of calculating crash reduction, only the historical crashes within 250 feet of the ramp terminal intersections were considered correctable, as this is the influence area that the FDOT CAR Online system uses when calculating crash rates at signalized intersections.

A summary of the effect of the proposed improvements is shown in **Table 4.13**, and the list of crash reduction factors used is shown in **Table 4.14**. The supporting data and calculations for the results are found in **Appendix L**. Overall, the crash frequency at the Walden Road intersection is expected to decrease by 20.6%, and the crash frequency at the other intersections is expected to decrease by 15% compared to not implementing any improvements.

Table 4.13: Crash Reduction Summary for Build Alternatives

Location	Crashes Per Year	Overall CRF	Crashes Reduced Per Year
Walden Road	5.40	20.6%	1.112
I10 EB Ramp Terminal	1.20	15.0%	0.180
I10 WB Ramp Terminal	0.20	15.0%	0.030
Apex Drive	0.80	15.0%	0.120
Summit Lake Drive	0.60	15.0%	0.090

Table 4.14: Crash Reduction Factors Used

CMF/CRF Source	ID	Description	CRF
FDOT	2	New signal at non-channelized intersection	15%
FDOT	19	Add right turn	9%
FDOT	22	Add 2nd LT lane in same direction as existing	4%
FDOT	135	Modify signal timing and phasing	14%

It is noteworthy to mention that, although Build Alternative 2 includes additional geometrical improvements to Build Alternative 1 such as adding through lanes at Apex Drive and Summit Lake Drive intersections, there is no CRF available to quantify these safety benefits. As such, it is not possible to determine separate safety benefits for both alternatives, and the above-mentioned crash reductions will be applicable for both Build Alternatives.

5.0 Other Considerations

5.1 Cost of Improvement

Due to the minor variations between the two Build Alternatives, Build Alternative 2 will serve as the basis for the cost estimate and will represent an 'Ultimate' cost to the project. The total construction cost for this improvement includes costs for pay items and quantities calculated using the FDOT's Long Range Estimating (LRE) System. This estimate is based on conceptual design plans found in **Appendix M**. The total project cost in present day (2018) dollars to construct the recommended improvement is estimated to be $4.2 million in **Appendix N**. There is no right-of-way acquisition needed to construct the recommended improvement or offsite storm water management facilities.

5.2 Coordination/Consistency with Other Plans/Projects

Several planned and programmed projects are located within the vicinity but are not within the influence area of the I-10 (SR 8) and US 90 (Mahan Drive) Interchange. These projects are in various stages of the FDOT Work Program and are listed in the following:

- The ongoing I-10 PD&E Study from west of US 90 to west of SR 263 (Capital Circle NW) (FPID: 222530-5-22-01) will seek to widen I-10 and recommend interchange improvements at US 90 W and Capital Circle NW;
- The SR 8 (I-10) at SR 261 (US 319) Interchange Design Project (WPID: 222593-5) has proposed the reconfiguration of the eastbound I-10 off-ramp and Raymond Diehl Road to accommodate three through lanes of traffic in the eastbound direction up to SR 261; and
- FDOT District Three's US 90 Action Plan (WPID: 425832-2) which, in coordination with local municipalities, developed an Action Plan for US 90 in Tallahassee and Leon County that extended from N Duval Street to the I-10 and Mahan Drive interchange.

There are no other existing IARs, either approved or pending approval, currently located within the area of influence.

5.3 Environmental Considerations

The proposed improvements under Build Alternative 2 will not require the acquisition of any right of way. Therefore, it is anticipated there will be minimal to no natural, cultural, or socio-economic impacts associated with implementing the proposed improvements.

5.4 Anticipated Design Exceptions or Variations

There are no design exceptions or variations to FDOT or FHWA policies, rules, or standards anticipated for this project, but if any exception/variation should arise it will be processed per FHWA and FDOT standards.

5.5 Funding Plan

A funding plan for the proposed project has been developed and the interchange improvements are currently being conducted as part of the I-10 from East of SR 261 (Capital Circle) to West of Gamble Road FDOT District 3 PD&E (FM 406585-3) as follows:

- PD&E Advertisement – November 2018
- Contract Execution – July 2019
- Preliminary Engineering Report – July 2021
- Location and Design Concept Acceptance (LDCA) Public Notice – September 2021

Funding has been identified in the Work Program for the Traffic Analysis/Report, Interchange Access Report, Preliminary Engineering Report and LDCA Public notice phases in FY 2021 through FY 2025. The total estimated PD&E study cost is $110,067. Additionally, the subject project is in the CRTPA 2045 Long Range Transportation Plan (LRTP). The estimated construction cost is $114,770,558. Cost estimates have been developed based on an engineer's opinion of probable cost using current FDOT Long Range Estimates (LRE) base costs.

The MPO associated with the study limits is the Capital Region TPA (CRTPA). The CRTPA is in the process of updating the LRTP, which is referred as the Connections 2045 Regional Mobility Plan. The plan adoption was to occur in November 2020. A public hearing was held on November 23rd regarding the plan. Information from that public hearing is being utilized until the approved updated LRTP is available. The project limits, defined by the PD&E study, are listed within the LRTP, however, it is in the Unfunded Needs table. This project is included in the Unfunded Needs due to the delay in the FDOT SIS Plan updates. As a result of the overall financial and economic uncertainties brought about by the COVID-19 Pandemic, the Department decided to temporarily halt the production of the SIS CFP update, preventing this project from receiving funding as planned. The CRTPA Unfunded Needs is provided in **Table 5.1**.

Table 5.1: CRTPA Regional Mobility Plan 2040 Unfunded Needs

CRTPA Regional Mobility Plan 2045
Unfunded Needs
DRAFT as of 9/10/2020

ID	Project Name	From	To	Strategy	Bike/Ped	Transit	County
1	Adams Street	Orange Avenue	Bronough/Duval	2 to 4 Lanes	Yes		Leon
2	Blountstown Highway	Geddie Road	Capital Circle NW	2 to 4 Lanes			Leon
3	Capital Circle NW	Interstate 10	Monroe Street (North)	2 to 4 Lanes	Yes		Leon
10	Interstate 10	Capital Circle NE	Gamble Road	4 to 6 Lanes			Leon/Jefferson
13	Woodville Highway	Capital Circle SE	Natural Bridge Road	4 to 6 Lanes			Leon
28	Capital Circle NE	Centerville Road/Welaunee Boulevard		Major Intersection Reconfiguration		Yes	Leon
52	Interstate 10 Thomasville EB Exit	Thomasville Road		Major Interchange Reconfiguration			Leon
53	Interstate 10 Thomasville WB Entrance	Thomasville Road		Major Interchange Reconfiguration			Leon
54	West Tennessee Street	Ocala Road to Magnolia		Signal improvements & Signing and Pavement Markings		Yes	Leon

5.6 Conceptual Signing Plan

A conceptual signing and marking plan for the Build Alternative 2 in accordance with Manual on Uniform Traffic Control Devices (MUTCD) guidelines is included in **Appendix O**.

5.7 Access Management Plan

The access management within the area of influence will not be changed by the proposed operational and safety improvements. Therefore, an Access Management Plan or any update to an already existing Access Management Plan was not needed for this IOAR.

6.0 FHWA Policy Points

The FHWA's Policy on Access to the Interstate System provides the requirements for the justification and documentation necessary to substantiate any proposed changes in access to the Interstate System. This policy also facilitates decision-making regarding proposed changes in access to the Interstate System in a manner that considers and is consistent with the vision, goals, and long-range transportation plans of a metropolitan area, region, and State. All new or modified points of access must be approved by FHWA and developed in accordance with federal laws and regulations (as specified in 23 U.S.C. 109 and 111, 23 C.F.R. 625.4, and 49 C.F.R. 1.48(b)(1)). The following documents the adherence of the proposed I-10 at US 90 (Mahan Drive) improvements to FHWA's two Policy Points:

FHWA Policy Points 1

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

An operational and safety analysis was conducted to evaluate the future alternatives. The measure of effectiveness, including vehicle delays for the intersections at I-10 (SR 8) and US 90 (Mahan Drive) Interchange, Walden Road at US 90 (Mahan Drive), Apex Drive at US 90 (Mahan Drive), and Summit Lake Drive at US 90 (Mahan Drive) were compared between No-Build and Build Alternatives.

Under No-Build Alternative, most of the study intersections will operate at LOS E or worse during both the AM and PM peak hours, with the exception of the westbound I-10 Ramp terminal. The 2045 No-Build queue analysis indicates that queues on eastbound approach along US 90 (Mahan Drive) at the Westbound I-10 Ramp terminal could adversely affect the flow of traffic along I-10 (SR 8).

Under Build Alternative 1 and Build Alternative 2, each of the I-10 ramp terminals and adjacent intersections at US 90 (Mahan Drive) will operate at LOS target D or better in the Opening Year (2025) and Design Year (2045). Compared to the No-Build Alternative, the congestion and delay at the I-10 ramp terminals and adjacent intersections at US 90 (Mahan Drive) will be significantly improved under the Build Alternatives during both the AM and PM peak hours in the Design Year (2045).

Additional, when examining FDOT crash reduction factors between the No Build and Build Alternatives the proposed improvements are expected to significantly improve safety along the corridor. With the proposed improvements under Build Alternative 1, collisions are expected to be reduced by up to 24 percent. With Build Alternative 2's focus on improving Build

Alternative 1 by reducing queuing along the US 90 (Mahan Drive) corridor, collisions are expected to be reduced by up to 42 percent.

Based upon this analysis, the proposed improvements under Build Alternatives provide significant improvements to the network configuration to improve corridor operation, mitigate congestion, and enhance safety within the study Area of Influence.

FHWA Policy Points 2

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

The proposed Build Alternatives will provide full access to all the traffic movement on US 90 (Mahan Drive) to and from I-10. The design will meet current standards for the projects on the interstate system and comply with the American Association of State Highway and Transportation Officials (AASHTO) and FDOT design standards.

7.0 Recommendation

Considering the overall operations along I-10 ramp terminals and adjacent intersections at US 90 (Mahan Drive), all Build Alternatives are projected to provide better operating conditions than the No-Build. The Build Alternative 1 was developed during the Project Traffic Analysis Report (PTAR) effort and interim improvements, with an intent to save cost and require a minimum impact of Right-of-Way (ROW), whereas the Build Alternative 2 is the ultimate development plan to accommodate both target LOS and future queues. While the operational improvement under Build Alternative 1 and Build Alternative 2 are comparable, Build Alternative 2's ability to better mitigate congestion, reduce queueing, and improve safety distinguish it from Build Alternative 1. Therefore, the study proposes Build Alternative 2 as the preferred Build Alternative for further advancement in the PD&E study process.

Appendices

Appendix A:
Methodology Letter of Understanding

Appendix B:
Project Traffic Analysis Report

Appendix C:
Traffic Count Data

Appendix D:
Florida Traffic Online (2018) Data

Appendix E:
Existing Year (2019) HCS Operational Analysis

Appendix F:
Existing Year (2019) Synchro Intersection Analysis

Appendix G:
FDOT CAR Online Report Summary

Appendix H:
2025 & 2045 No-Build & Build Alternative HCS Operational Analysis

Appendix I:
2025 & 2045 No-Build Alternative Synchro Intersection Analysis

Appendix J:
2025 & 2045 Build Alternative 1 Synchro Intersection Analysis

Appendix K:
2025 & 2045 Build Alternative 2 Synchro Intersection Analysis

Appendix L:
Build Safety Analysis Summary

Appendix M:
Preferred Alternative Conceptual Plans

Appendix N:
Cost Estimates

Appendix O:
Build Alternative Signing Plan