SR 9/I-95 at Hypoluxo Road

INTERCHANGE MODIFICATION REPORT (IMR)

Financial Project ID: 413257-1

Final Report

July 8, 2020

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[413257-1]

Florida Department of Transportation

Determination of Engineering and Operational Acceptability

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

Requestor	DocuSigned by: Damaris Williams 06E39150145A4E3...	7/14/2020 | 4:22 PM EDT
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	Will Watts, P.E. Central Office	Date

SYSTEMS IMPLEMENTATION OFFICE

QUALITY CONTROL CERTIFICATION FOR INTERCHANGE ACCESS REQUEST SUBMITTAL

Submittal Date: 7/8/2020

FM Number: 413257-1

Project Title: SR 9/I-95 at Hypoluxo Road IMR

District: Four

Requestor: Damaris Williams, P.E. Phone: 954/777-4679

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Document Type: ☐ MLOU ☐ IJR ☒ IMR ☐ IOAR ☐ OTHER_____

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

Quality Control (QC) Statement

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

DocuSigned by:
Damaris Williams
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Requestor_____ Date: 7/14/2020 | 4:22 PM EDT

Damaris Williams, P.E.

DocuSigned by:
Cesar Martinez
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IRC _____ Date: 7/14/2020 | 4:25 PM EDT

Cesar Martinez, P.E.

PROFESSIONAL ENGINEER CERTIFICATE

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

PROJECT: SR 9/I-95 at Hypoluxo Road IMR

LOCATION: Palm Beach County, FL

FINANCIAL PROJECT ID: 413257-1

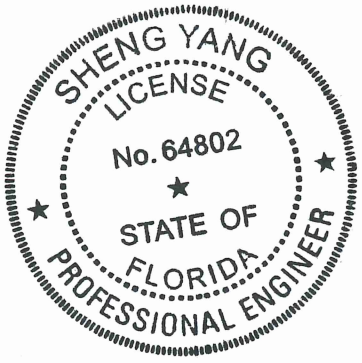
This report includes a summary of data collection effort, traffic forecast, traffic analysis, alternative analysis, summary and conclusions. I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of transportation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

Name: Sheng Yang, P.E., PTOE Florida

P.E. No.: 64802

Signature: _____

Date: 7/8/20



EXECUTIVE SUMMARY

In 2014, as part of the SR 9/I-95 Interchange Master Plan Study (IMP), an Interchange Concept Development Report (ICDR) was completed by FDOT. The ICDR identified short-term and long-term needs developing design concepts to address the traffic spillback onto I-95 and improve interchange operations and safety at the interchange. Some of the short-term improvements have been implemented through the I-95 at Hypoluxo Road Interim Interchange Improvement Project (Financial Project ID [FPID] #413257-2) and have been included as part of the No-Build Alternative. As part of the I-95 at Lantana Road pre-PD&E effort (FPID #413258-1-22-01), in September 2017, FDOT conducted data collection and prepared project traffic for the No-Build conditions for the Hypoluxo Road interchange and other adjacent interchanges. The Department programmed the ultimate IMP recommendations for design phase in fiscal year 2021 (FPID #413257-1-52-01). To implement the recommendations from the ICDR, an Interchange Operational Analysis Report (IOAR) study was required to advance the project to the Design phase.

During the IOAR process and through coordination meetings with the District Interchange Review Coordinator (DIRC) and Central Office (CO), a Diverging Diamond Interchange (DDI) concept was proposed for the I-95 at Hypoluxo Road Interchange to determine whether it is a better option to address the safety and operational issues by year 2045 than the proposed improvements in the ICDR, and whether it will make the interchange ready for potential additional managed lanes along I-95. Therefore, an Interchange Modification Report (IMR), instead of an IOAR, was conducted for the study interchange. The purpose of the IMR study is to obtain safety, operational, and engineering (SO&E) acceptability to proceed to the Design phase and obtain NEPA approval. The IMR would be conducted in coordination with the following existing and on-going FDOT projects in the area:

1. Interim Interchange Improvement Project for I-95 at Hypoluxo Road Interchange (FPID #413257-2);
2. Design Project to improve I-95 at Hypoluxo Road Interchange (FPID #413257-1);
3. PD&E Project for I-95 at Lantana Road Interchange (FPID #413258-1);
4. Design Project for I-95 at Gateway Boulevard Interchange (FPID #231932-1-32-01);

5. I-95 Managed Lanes Project (FPID #444202-1).

A Methodology Letter of Understanding (MLOU) was prepared to describe the methodology for the analysis and evaluation of this Interchange Modification Report. The MLOU was approved by the FDOT District 4 Interchange Review Coordinator (IRC) in April 2020. The traffic projections used in the IMR were developed using existing field traffic counts and the South East Regional Planning Model (SERPM) Version 7.071. SERPM 7.071 is calibrated to base year 2010 conditions and includes a future year scenario for 2040. The analysis years for this study include Existing Year 2017, Opening Year 2025, and Design Year 2045. The operational analysis for this study was performed using the Highway Capacity Software (HCS) Version 7.7 and SYNCHRO Version 10.

Traffic data was collected in September 2017 as part of the I-95 at Lantana Road PD&E Study. The 2017 turning movement counts were used for existing condition analysis. The existing condition analysis indicates that the ramp terminals at the I-95/Hypoluxo Road Interchange are still over capacity after the construction of the short-term improvements identified in the ICDR (FPID #413257-2). The I-95 southbound ramp terminal is operating at LOS D during the AM peak hour and LOS C during the PM peak hour. The I-95 northbound ramp terminal at the Hypoluxo Road Interchange is currently operating at LOS E during the AM peak period and LOS F and during the PM peak period. The intersections of Hypoluxo Road at High Ridge Road and at Seacrest Boulevard/S 14th Street are currently operating at LOS D during the AM and PM peak periods. The northbound and southbound movements are operating at LOS E. These delays are expected to worsen in the future with the projected growth of traffic in the area.

Crash analysis was performed using the five-year crash data from 2013 to 2017. The crash data were obtained from the FDOT Crash Analysis Reporting System database and Signal Four Analytics. The crash analysis indicated that rear-end, left-turn, sideswipe, and angle crashes are the most prominent crash types within the study area and are an indicator of congested roadway conditions.

Several alternatives were evaluated to address the needs identified for this project. The alternatives include the No-Build Alternative and two Build Alternatives (Build Alternative 1 and 2). The Build

Alternative 1 improvements were obtained from the long-term improvements identified in the ICDR, with exception to the improvements already implemented under the I-95 at Hypoluxo Road Interim Interchange Improvement Project (FPID #413257-2). The remaining recommended improvements for the Build Alternative 1 include:

- Add a second left-turn lane on the I-95 southbound off-ramp;
- Add a third left-turn lane on the I-95 northbound off-ramp;
- Add a receiving lane on the I-95 northbound on-ramp;
- Add one right-turn lane on eastbound, northbound, and southbound approaches at the High Ridge Road intersection; and
- Add a third westbound through lane on Hypoluxo Road from Seacrest Boulevard/S 14th Street to the existing six-lane section of Hypoluxo Road at the median opening east of High Ridge Road; extend the westbound right-turn lane from Seacrest Boulevard to I-95 northbound on-ramp; and add one southbound through lane and restripe the southbound approach as left-turn, through, and right-turn lanes (currently there is a shared left-through lane and right-turn lane).

The Build Alternative 2 will reconfigure the existing Tight Urban Diamond Interchange (TUDI) to a Diverging Diamond Interchange (DDI).

The mainline I-95 is currently operating over capacity. FDOT has programmed a PD&E Study (FPID #444202-1) in its fiscal year 2022 to evaluate the implementation of Managed Lanes to improve the mainline I-95 mobility and operations. Therefore, no improvements are recommended on the mainline I-95 (including the merge, diverge, and weaving sections) under this study, as the I-95 main line improvement project will address those deficiencies. An I-95 ramp merge/diverge/weaving analysis was performed for future years. The lane geometry and volumes on the I-95 and the I-95 ramps at the junction areas will be the same in future years in this study. In 2045, the weaving segments of I-95 northbound and southbound between Hypoluxo Road and Lantana Road are predicated to operate at LOS F during the AM and PM peak hours. The volume-to-capacity (v/c) ratio at the weaving section is greater than 1. The I-95 southbound on-ramp during the AM peak hour and I-95 northbound off-ramp during the PM peak hour will operate at LOS F. The I-95 northbound off-ramp during the AM peak hour and I-95 southbound on-ramp

during the PM peak hour will operate at LOS B and LOS C, respectively.

Under the No-Build Alternative, the I-95 southbound ramp terminal will operate at LOS D by 2045. However, the I-95 northbound ramp terminal will operate at E or F by 2045. The northbound and southbound off-ramps will operate at LOS E or F during the AM and PM peak hours. The queue on the eastbound left-turn movement from eastbound Hypoluxo Road to I-95 northbound on-ramp will spill back to the west of the interchange termini during the AM peak hour. The intersection of Hypoluxo Road at High Ridge Road will operate at LOS E during the AM peak hour and LOS D during the PM peak hour in 2045. The intersection of Hypoluxo Road and Seacrest Boulevard/S 14th Street will operate at LOS D during the AM peak hour and LOS E during the PM peak hour. By 2045, the queues on the I-95 southbound off-ramp and northbound off-ramp will not extend to the I-95 mainline.

Under the Build Alternative 1, the interchange termini intersections will operate at LOS D or better during the AM and PM peak hours in 2045. However, the southbound and northbound approaches will operate at LOS E during the AM and PM peak hours in 2045. Under the Build Alternative 1, the queues on the I-95 southbound off-ramp and northbound off-ramp will not extend to the I-95 mainline. With the proposed improvements at the nearby intersections, the operation at the nearby intersections will subsequently be improved. The intersections of Hypoluxo Road at High Ridge Road, and at Seacrest Boulevard/S 14th Street will operate at LOS D or better during the AM and PM peak hours in 2045. The eastbound and westbound through movement will operate at LOS D or better in 2045 as well.

Under the Build Alternative 2 with the proposed Diverging Diamond Interchange (DDI), the I-95 at Hypoluxo Road Interchange termini intersections will operate at LOS C or better during the AM and PM peak hours in 2045. All movements at these intersections will operate at LOS D or better. The queues on I-95 southbound off-ramp and northbound off-ramp will not extend to the I-95 mainline.

Future 2045 crash analysis was performed for the No-Build and Build Alternatives 1 and 2. Based on the future predicted 2045 number of crashes, the No-Build expected number of crashes in the study area will be 152.2. The Build Alternative 1 expected number of crashes will be 147.9. Under

the DDI Build Alternative 2, there will be 27.7 crashes decrease as compared to the No-Build Alternative and 23.4 crashes decrease as compared to the Build Alternative 1 in 2045. The Build Alternative 2 expected number of crashes will be 124.5. The Build Alternative 2 will improve the safety performance of the I-95 mainline, the ramp terminals, ramp segments, and Hypoluxo Road as compared to the No-Build Alternative and the Build Alternative 1.

Based on the analysis of the No-Build and Build Alternatives, the Build Alternative 2 significantly improves traffic operations and safety conditions as compared to the No-Build Alternative and Build Alternative 1. The Build Alternative 2 is selected as the preferred alternative.

The Federal Highway Administration (FHWA) Interchange Access Policy was checked to assure that the adequate level of service is provided in terms of safety and mobility.

FHWA Policy Points 1

With the recommended Build Alternative 2 - DDI Interchange concept, the interchange termini intersections will operate at LOS C or better in 2025 and 2045, and all approaches will operate at LOS C or better. Compared to the No-Build Alternative, the delay at the interchange termini intersections will significantly decrease during the AM and PM peak hours in 2045. The future year 2045 safety analysis shows that there will be 27.7 decrease on the expected number of crashes as compared to the No-Build Alternative, and 23.4 decrease as compared to the Build Alternative 1. The Build Alternative 2 is anticipated to improve the safety and operations of mainline I-95, I-95 ramps, and the interchange termini.

FHWA Policy Points 2

The proposed DDI concept will provide full access and accommodate all traffic movements between Hypoluxo Road and I-95. The proposed improvements were designed to meet the current standards for federal-aid projects on the interstate system and to conform to the American Association of State and Transportation Officials (AASHTO) and FDOT design standards.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 Introduction

In 2014, as part of the SR 9/I-95 Interchange Master Plan Study (IMP), an Interchange Concept Development Report (ICDR) was completed by FDOT. The ICDR identified short-term and long-term needs developing design concepts to address the traffic spillback onto I-95 and improve interchange operations and safety at the interchange. Some of the short-term improvements have been implemented through the I-95 at Hypoluxo Road Interim Interchange Improvement Project (Financial Project ID [FPID] #413257-2) and have been included as part of the No-Build Alternative. As part of the I-95 at Lantana Road pre-PD&E effort (FPID #413258-1-22-01), in September 2017, FDOT conducted data collection and prepared project traffic for the No-Build conditions for the Hypoluxo Road interchange and other adjacent interchanges. The Department programmed the ultimate IMP recommendations for Design phase in fiscal year 2021 (FPID #413257-1-52-01) and Construction phase in fiscal year 2023 (tentatively). To implement the recommendations from the ICDR, an Interchange Operational Analysis Report (IOAR) study was required to advance the project to the Design phase.

During the IOAR process and meetings with the District Interchange Review Coordinator (DIRC) and Central Office (CO), the Diverging Diamond Interchange (DDI) concept was proposed for the I-95 at Hypoluxo Road Interchange to determine if it is a better option to address the safety and operational issues by year 2045 than the proposed improvements in the ICDR. Therefore, an Interchange Modification Report (IMR), instead of an IOAR, was conducted for the study interchange. The purpose of the IMR study is to evaluate the effectiveness of the proposed DDI and identify additional improvements, if needed, to enhance the operation of the I-95 at Hypoluxo Road Interchange and its area of influence. The IMR would be conducted in coordination with the following existing and on-going FDOT projects in the area:

1) Interim Interchange Improvement Project for I-95 at Hypoluxo Road Interchange (FPID #413257-2);
2) Design Project to improve I-95 at Hypoluxo Road Interchange (FPID #413257-1);
3) PD&E Project for I-95 at Lantana Road Interchange (FPID #413258-1);
4) Design Project for I-95 at Gateway Boulevard Interchange (FPID #231932-1-32-01);

5) I-95 Managed Lanes Project (FPID #444202-1).

1.1 Purpose and Needs

The purpose of preparing the Interchange Modification Report (IMR) for the I-95 at Hypoluxo Road Interchange is to improve the interchange operations, and to improve safety and reduce congestion of the interchange and the adjacent intersections.

As indicated in the ICDR, the study intersections near the interchange termini are operating at level of service (LOS) D or better during the AM peak hour. However, During the AM peak hour, as indicated in the ICDR, the eastbound left-turn lane from eastbound Hypoluxo Road to I-95 northbound on-ramp, and westbound left-turn lane from westbound Hypoluxo Road to I-95 southbound on-ramp experienced longer queues. During the PM peak hour, the I-95 southbound and northbound ramps termini intersections are operating at LOS F and LOS E during the PM peak hour, respectively. The southbound off-ramp, westbound and northbound approaches at the intersection of Hypoluxo Road and I-95 northbound ramp experienced long queues.

The short-term improvements identified in the ICDR were recently partially implemented under the Interim Interchange Improvement Project (FPID #413257-2). However, the ramp terminals at the I-95 at Hypoluxo Road Interchange are still over capacity after construction. The I-95 northbound off-ramp, I-95 southbound off-ramp, and eastbound left-turn from eastbound Hypoluxo Road to the northbound I-95 on-ramp are experiencing excessive delays during the AM and PM peak hours. The southbound ramp terminal is operating at LOS D during the AM period and LOS C during the PM peak period. The northbound ramp terminal is currently operating at LOS E during the AM peak period. Moreover, the I-95 northbound ramp terminal is operating at LOS F during the PM peak period. The I-95 northbound left-turn is also experiencing significant delays during the PM peak period. The intersections of Hypoluxo Road at High Ridge Road and at Seacrest Boulevard/S 14th Street are currently operating at LOS D during the AM and PM peak periods. The northbound and southbound movements are operating at LOS E. These delays are expected to worsen in the future with the projected growth of traffic in the area.

The proposed improvements in IMR are designed to meet the long-term transportation needs at the interchange and to support the anticipated population/employment growth and economic

development. The goal of this study is to conduct a comprehensive analysis of the impacts of these improvements, recommend additional improvements or alternatives if necessary, and to seek approval of safety, operational, and engineering (SO&E) acceptability for implementation.

The primary need for this project is to alleviate existing and future traffic congestion thereby improving safety at the interchange. If no improvements are made to the interchange, traffic operations and safety within the interchange area will continue to deteriorate as traffic volumes increase. The ICDR also identified operational deficiencies at the terminal intersections and adjacent intersections at the I-95 at Hypoluxo Road Interchange and determined there is a need for improvements.

1.2 Project Location

Figure 1 shows the project location of the I-95 at Hypoluxo Road Interchange and the surrounding area. The I-95 at Hypoluxo Road Interchange is located in Central Palm Beach at the southwest corner of the Town of Lantana. It is approximately 1.03 miles south of the I-95 at Lantana Road Interchange and 1.5 miles north of the I-95 at Gateway Boulevard Interchange. The I-95/Hypoluxo Road is currently a Tight Urban Diamond Interchange. The intersections of Hypoluxo Road at High Ridge Road, and Hypoluxo Road at Seacrest Boulevard/S 14th Street immediately west and east of the interchange, are signalized intersections within the half-mile influencing area of the interchange.

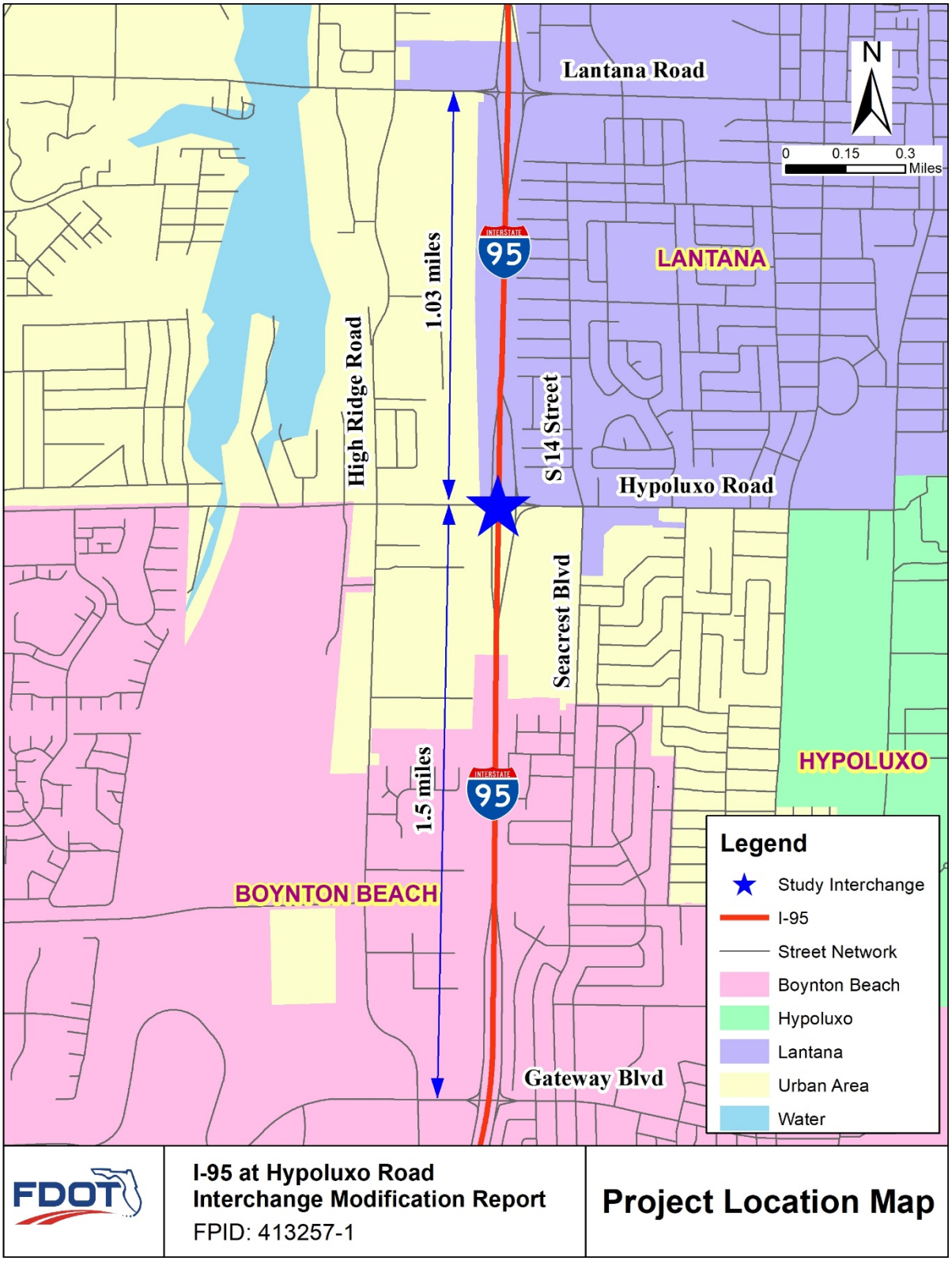


Figure 1 - Project Location

2 Methodology

2.1 Overview

A Methodology Letter of Understanding (MLOU) was prepared to document the methodology for the analysis and evaluation of this IMR. The MLOU is provided in **Appendix A**. The methodology is summarized in the following sections.

The methodology used for traffic forecasting and development of future turning movement volumes is consistent with the latest *FDOT project Traffic Forecasting Handbook*. The traffic data collection and future AADT volumes for the No-Build Condition were performed in December 2017 and detailed information can be found in the Traffic Data Collection and Traffic Projections for the I-95 at Lantana Road PD&E Study. The study report is attached in **Appendix B**.

2.2 Analysis Years

The analysis years for this IMR are listed as follows:

A. Traffic Forecasting

- Base Year: 2010
- Horizon Year: 2040

B. Traffic Operational Analysis

- Existing Year: 2017
- Opening Year: 2025
- Design Year: 2045

A year of failure analysis shall be performed for Preferred Alternative, in case a failing LOS is obtained in Design Year.

2.3 Area of Influence

In urban areas, the area of influence (AOI) as defined in the Interchange Access Request User's Guide (IARUG) includes one adjacent interchange in each direction and signalized intersections within half-a-mile of the interchanges. However, these limits have been modified as follows: The

AOI along I-95 extends from the on- and southbound off-ramps at the Gateway Boulevard interchange to the south, and to the southbound on- and northbound off- ramps at Lantana Road to the north. The AOI also includes the full interchange and the intersections of Hypoluxo Road at High Ridge Road, and at Seacrest Boulevard/S 14th Street. Since the interchange of I-95 at Lantana Road is under the PD&E phase (FPID #413258-1-22-1) and the interchange of I-95 at Gateway is under the Design phase (FPID #231932-1-32-01), these two interchanges are included in the AOI and, as based on the discussion with the District and Central Office, analysis for those two interchanges (including the merge/diverge) should refer to the specific interchange access request document.

Figure 2 illustrates the AOI for this project.

2.4 Data Collection

The following lists the sources of the data used in the project:

- I-95 Interchange Concept Development Report (ICDR)
- Traffic data collection for I-95 at Lantana Road pre-PD&E Study
- Southeast Florida Regional Model (SERPM), Version 7.071 and Socioeconomic Data Files
- Florida Traffic Online
- FDOT Roadway Characteristic Inventory (RCI)
- FDOT Crash Analysis Reporting System (CARS)
- SIGNAL 4 Analytics
- Palm Beach Transportation Planning Agency (TPA)
- Palm Beach County Traffic and Engineering Division
- Field data collection and observations including using Google Maps.

2.5 Travel Demand Forecasting

The future 2025 and 2045 AADT volumes were included in the Traffic Data Collection and Traffic Projections Report dated December 2017. SERPM 7.071 was used for the travel demand forecasting of this study. The SERPM 7 has a 2010 base year and 2040 horizon year. The future AADT volumes were checked for reasonableness.

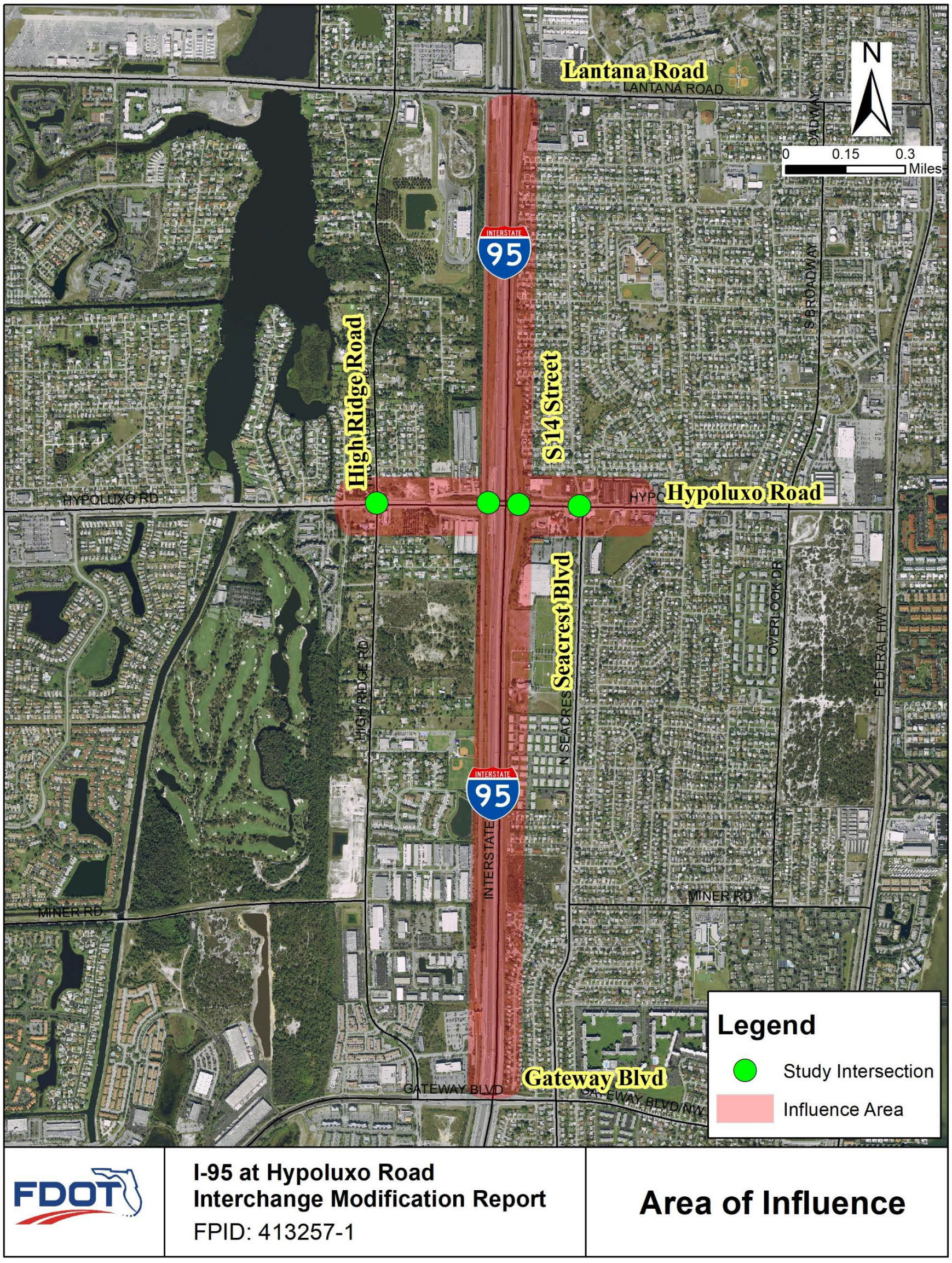


Figure 2 – Area of Influence

2.6 Traffic Factors

The traffic data used for this study was collected in September 2017 on typical weekdays at the study intersections in the vicinity of the I-95 at Hypoluxo Road Interchange. The traffic data included 6-hour turning movement counts (6:00 AM to 9 AM, and 4:00 PM to 7:00 PM) for three consecutive days, and 72-hour approach/departure machine counts for all approaches. 72-hour classification counts were also collected for all the I-95 on/off-ramps and Hypoluxo Road east and west of I-95. The traffic factors, such as D, K, peak hour factors, and truck factors were checked based on the 2018 Florida Traffic Online data. The traffic factors recommended are shown in **Table 1**:

Table 1 Traffic Factors

Roadway	K	D	T	PHF	DHT
I-95/SR-93	8.0	60.0	7.4	0.95	3.7
Hypoluxo Road	9.0	59.5	3.6	0.95	1.8
High Ridge Road	9.9	67.6	2.0	0.95	1.0
Seacrest Boulevard/S 14 Street	6.8	66.1	2.0	0.95	1.0

The FDOT Standard K Factors are recommended for SR-9/I-95 and Hypoluxo Road. The D and T factors were estimated using the FDOT historical counts within the study area obtained from the 2018 Florida Traffic Online data (Site #932222 for I-95, Sites #930068 and #930069 for Hypoluxo Road) and mechanical counts collected for this study. The Design Hour Truck (DHT) factors were calculated as half the daily value in accordance with the *FDOT Project Traffic Forecasting Handbook*. Field K and D factors, and a truck factor of 2.0%, will be used for High Ridge Road and Seacrest Boulevard/S 14th Street.

The peak hour factor (PHF) for I-95 within the study area was estimated to be 0.96. Peak hour values from the turning movement counts were derived from the three-hour field data during the AM period and the three-hour field data during the PM peak period for three weekdays. The PHF values for intersections ranged from 0.94 to 0.98. A PHF value of 0.95 will be used for future year analysis.

2.7 Level of Service Target

All roadways within the study area are located inside the urbanized area of Palm Beach County. I-95 is a SIS facility. The LOS target for I-95 is LOS D according to the FDOT LOS Policy. Hypoluxo Road and other roadways, such as High Ridge Road and Seacrest Boulevard/S 14th Street, are local roads. The LOS target for these roads is also LOS D.

2.8 Traffic Operational Analysis

The traffic operational analysis was conducted for the existing year (2017) conditions, and No-Build and Build Alternatives for Opening Year (2025) and Design Year (2045). The HCS Version 7.7 and SYNCHRO Version 10.0 were used for the analysis. Due to the NEMA phase requirement in the Highway Capacity Manual (HCM) 6th Edition, the HCM 2000 results were used to report the LOS and 95th-percentile queue length. The measure of effectiveness (including delays, LOS, 95th-percentile queue length) were summarized for existing, future No-Build, and Build Alternatives.

The operational analysis of I-95 is included in the I-95 Managed Lanes Project (FPID #444202-1). The operational analysis results and improvements are not included in this IMR.

The short-term improvements identified in the ICDR, including widening the I-95 southbound off-ramp bridge and retrofitting a traffic railing and the addition of an eastbound left-turn lane at the northbound on/off-ramp intersection with a receiving lane on the northbound on-ramp, have been implemented through the I-95 at Hypoluxo Road Interim Interchange Improvement Project (Financial Project ID (FPID) #413257-2). These improvements were part of the existing conditions and were included in the No-Build and Build Alternatives.

2.9 Alternatives

The following scenarios were considered for future year 2025 and 2045 analysis:

- No-Build Alternative - This alternative represents the existing physical and operational conditions within the area of influence, including the implemented short-term improvements under FPID # 413257-2, including all planned and programmed

roadway improvements over the course of the analysis years.

- Build Alternative 1 - This alternative includes the lane geometry in the No-Build condition and the improvements recommended in the ICDR report.
- Build Alternative 2 – An alternative under which the existing Tight Urban Diamond Interchange will be converted into a Diverging Diamond Interchange (DDI).
- Build Alternative 3 – Alternative wherein the existing interchange will be converted into Single-Point Urban Interchange (SPUI).
- Build Alternative 4 - A flyover ramp will be constructed to accommodate the northbound left-turn movement from northbound I-95 to westbound Hypoluxo Road.
- Build Alternative 5 - A loop ramp will be built for the northbound I-95 to westbound Hypoluxo Road movement.

Based on the input from the DIRC, the Build Alternatives 3, 4, and 5 were not recommended to be further evaluated due to the high cost of right of way taken, construction feasibility, and impact on local traffic operations and mobility. The main issue for the Alternative 3 is the size of structure potentially needed; the main issue for the Build Alternative 4 is the touch down point on Hypoluxo Road west of I-95 (impacting local roadway network), the main issue with the Build Alternative 5 is the potential cost of the right of way impacts and the position of the northbound on-ramp. In addition, the mainline I-95 is currently operating over capacity. FDOT has programmed a PD&E Study (FPID #444202-1) in its fiscal year 2022 to evaluate the implementation of Managed Lanes to improve the mainline I-95 mobility and operations. Therefore, no improvements are recommended on the mainline I-95 (including the merge, diverge, and weaving sections) under this IMR, as the I-95 main line improvement project will address those deficiencies. The DIRC also indicated that no improvements will be recommended for the two adjacent signalized intersections (High Ridge Road and Seacrest Boulevard), unless those improvements will benefit the I-95 interchange operations. Both intersections are not within the state jurisdiction.

The conceptual layouts of ICDR and the Build Alternatives developed under this study (and presented to DIRC) are included in **Appendix C**.

3 Existing Conditions

3.1 Existing Land Use

The existing land uses around the interchange are graphically depicted in **Figure 3**. The land use information is obtained from Palm Beach County. The northwest quadrant of the interchange is designated as commercial and industrial zones, and some vacant land, whereas the northeast quadrant is designated as commercial and residential zones. The southeast quadrant is commercial and institutional land use, while the southwest quadrant is commercial, industrial, residential, and conservation land use. The area around the I-95 at Hypoluxo Road Interchange is primarily residential with some commercial land use.

3.2 Geometric Conditions

Within the project limits, north of Hypoluxo Road, SR-9/I-95 is a twelve-lane divided interstate freeway with four (4) general purpose lanes, one (1) High Occupancy Vehicle (HOV) lane, and one (1) auxiliary lane in each direction. The auxiliary lanes provide a direct connection between the adjacent interchanges. South of Hypoluxo Road, SR-9/I-95 is a ten-lane divided interstate freeway with four (4) general purpose lanes and one (1) High Occupancy Vehicle (HOV) in each direction between Hypoluxo Road and the Lantana Road Interchange to the north. The HOV lanes are enforced from 7:00am to 9:00am and from 4:00pm to 6:00pm, Monday through Friday. The posted speed limit is 65 miles per hour (mph). As part of the roadway functional classification, I-95 is classified as principal arterial - interstate.

Hypoluxo Road is classified as an urban minor arterial and is under the jurisdiction of the City, not a State Road. Hypoluxo Road west of the median opening, which is between I-95 and High Ridge Road, is a six-lane divided roadway. Designated sidewalk is only present on the north side along Hypoluxo Road. Hypoluxo Road from the median opening to Seacrest Boulevard/S 14th Street, is a four-lane divided roadway. A designated sidewalk is present on both south and north sides of this Hypoluxo Road segment. Hypoluxo Road east of Seacrest Boulevard/S 14th Street is a five-lane divided roadway with a two-way left-turn lane. A designated sidewalk is present on both sides of Hypoluxo Road east of Seacrest Boulevard/S 14th Street. There is no bicycle lane along Hypoluxo Road. The posted speed limit on Hypoluxo Road is 40 miles per hour.

High Ridge Road is located just west of I-95 crossing Hypoluxo Road. High Ridge Road north of Hypoluxo Road is classified as a two-lane minor collector with a posted speed limit of 30 miles per hour. High Ridge Road south of Hypoluxo Road is a two-lane major collector with a posted speed limit of 30 miles per hour. Seacrest Boulevard/S 14th Street is located just east of I-95 crossing Hypoluxo Road. Seacrest Boulevard south of Hypoluxo Road is a four-lane urban minor collector with a posted speed limit of 40 miles per hour. S 14th Street north of Hypoluxo Road is a two-lane urban local road with a posted speed limit of 25 miles per hour.

The short-term improvements, such as widening the I-95 southbound off-ramp bridge and retrofitting a traffic railing and addition of an eastbound left turn lane at the northbound on/off-ramp intersection with a receiving lane on the northbound on-ramp, have been implemented through the I-95 at Hypoluxo Road Interim Interchange Improvement Project (FPID: #413257-2), which were included in the existing condition analysis.

The I-95 at Hypoluxo Road Interchange is a Tight Urban Diamond Interchange with northbound and southbound on-ramps and off-ramps. The southbound off-ramp operates as a one-lane off-ramp that transitions into a three-lane approach at the ramp terminus with Hypoluxo Road. The southbound off-ramp approach consists of one left-turn lane, one shared left-turn/right-turn lane, and one right-turn lane. The northbound off-ramp operates in a similar fashion where the two-lane off-ramp transitions into a three-lane approach at the ramp terminus. The northbound off-ramp approach consists of two left-turn lanes, and one right-turn lane. The northbound on-ramp provides two lanes that merge into one lane before the gore area. The southbound on-ramp is a one-lane ramp.

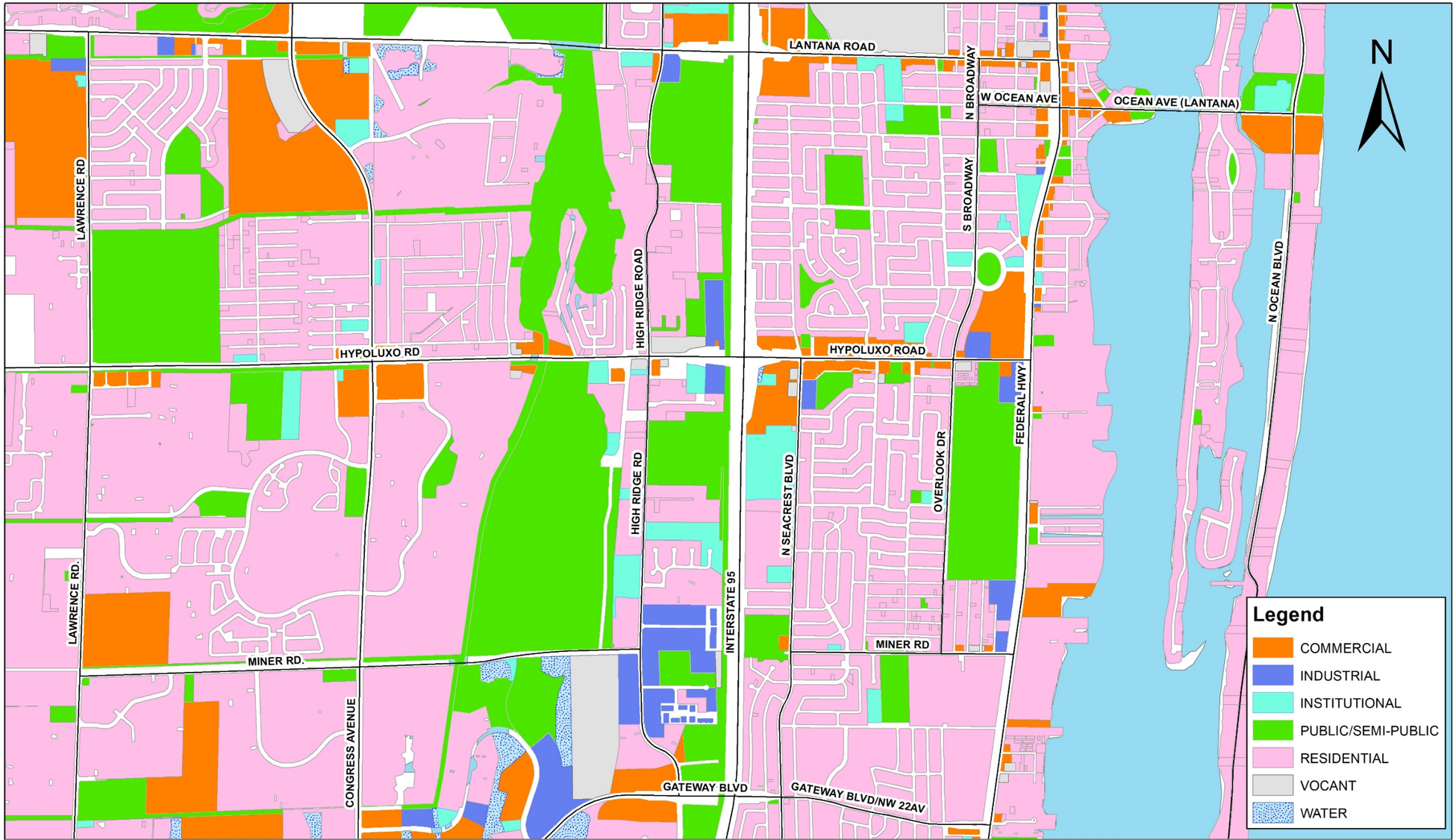


Figure 3 – Existing Land Use

The functional classification, posted speed limits, and number of lanes for I-95, Hypoluxo Road, High Ridge Road, and Seacrest Boulevard/S 14th Street are summarized in **Table 2**.

Table 2 Study Roadway Information

Roadway	Functional Classification	Posted Speed Limit (mph)	Number of Lanes
I-95 north of Hypoluxo Road	Urban Principal Arterial - Interstate	65	12
I-95 north of Hypoluxo Road	Urban Principal Arterial - Interstate	65	10
Hypoluxo Road west of I-95 SB off-ramp	Urban Minor Arterial	40	6
Hypoluxo Road from I-95 SB off-ramp to Seacrest Boulevard/S 14 Street	Urban Minor Arterial	40	4
Hypoluxo Road east of Seacrest Boulevard/S 14 Street	Urban Minor Arterial	40	5
High Ridge Road north of Hypoluxo Road	Urban Minor Collector	30	2
High Ridge Road south of Hypoluxo Road	Urban Major Collector	30	2
S 14 Street	Local Road	25	2
Seacrest Boulevard	Urban Minor Collector	40	4

Existing lane geometry for the I-95 at Hypoluxo Road Interchange termini and study intersections is shown in **Figure 4**.

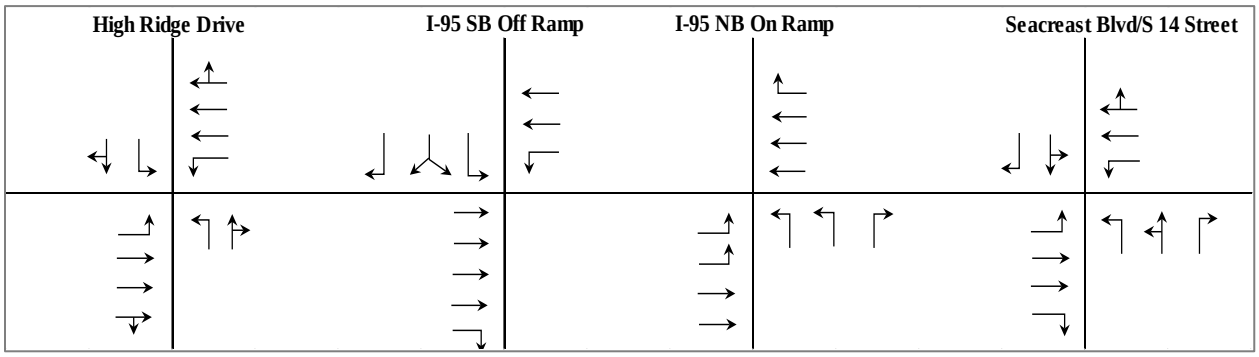


Figure 4 – Existing Intersection Lane Geometry

3.3 Traffic Data

Three-day (72-hour) intersection data collection for I-95 at Lantana Road PD&E Study from September 26 through 28, 2017 was used for the following intersections:

- Hypoluxo Road at High Ridge Road
- Hypoluxo Road at I-95 southbound ramp Terminal
- Hypoluxo Road at I-95 northbound ramp Terminal
- Hypoluxo Road at Seacrest Boulevard/S 14th Street

The intersection data collection includes 6-hour peak period turning movement counts (TMC), three (3) hours in the AM peak from 6:00am to 9:00am and three (3) hours in the PM peak from 4:00pm to 7:00pm.

Table 3 and **Figure 5** show the 2017 AADT for each leg of the intersections, I-95, and I-95 ramps.

Table 3 2017 AADT

Intersection	Location	2017 AADT
I-95 at Lantana Road Interchange	I-95 Southbound On-ramp from Lantana Road	14,000
	I-95 Northbound Off-ramp to Lantana Road	13,000
	I-95 South of Lantana Road	235,000
High Ridge Road	High Ridge Road north of Hypoluxo Road	3,400
	Hypoluxo Road east of High Ridge Road	46,000
	High Ridge Road south of Hypoluxo Road	7,500
	Hypoluxo Road west of High Ridge Road	45,000
I-95 Southbound Ramps	I- 95 Southbound off-ramp	14,000
	Hypoluxo Road east of I-95 Southbound ramps	42,000
	I-95 Southbound on-ramp	11,000
	Hypoluxo Road west of I-95 Southbound ramps	43,000
I-95 Northbound Ramps	I-95 Northbound On-ramp	16,000
	Hypoluxo Road east of I-95 Northbound ramps	38,000
	I- 95 Northbound Off-ramp	14,000
	Hypoluxo Road west of I-95 Northbound Ramps	42,000
Seacrest Blvd/S 14 Street	S 14 Street north of Hypoluxo Road	5,600
	Hypoluxo Road east of Seacrest Blvd	25,000
	Seacrest Blvd south of Hypoluxo Road	17,000
	Hypoluxo Road west of Seacrest Blvd	34,000
	I-95 South of Hypoluxo Road	230,000
I-95 at Gateway Blvd Interchange	I-95 Southbound Off-ramp to Gateway Blvd	14,000
	I-95 Northbound On-ramp from Gateway Blvd	13,000

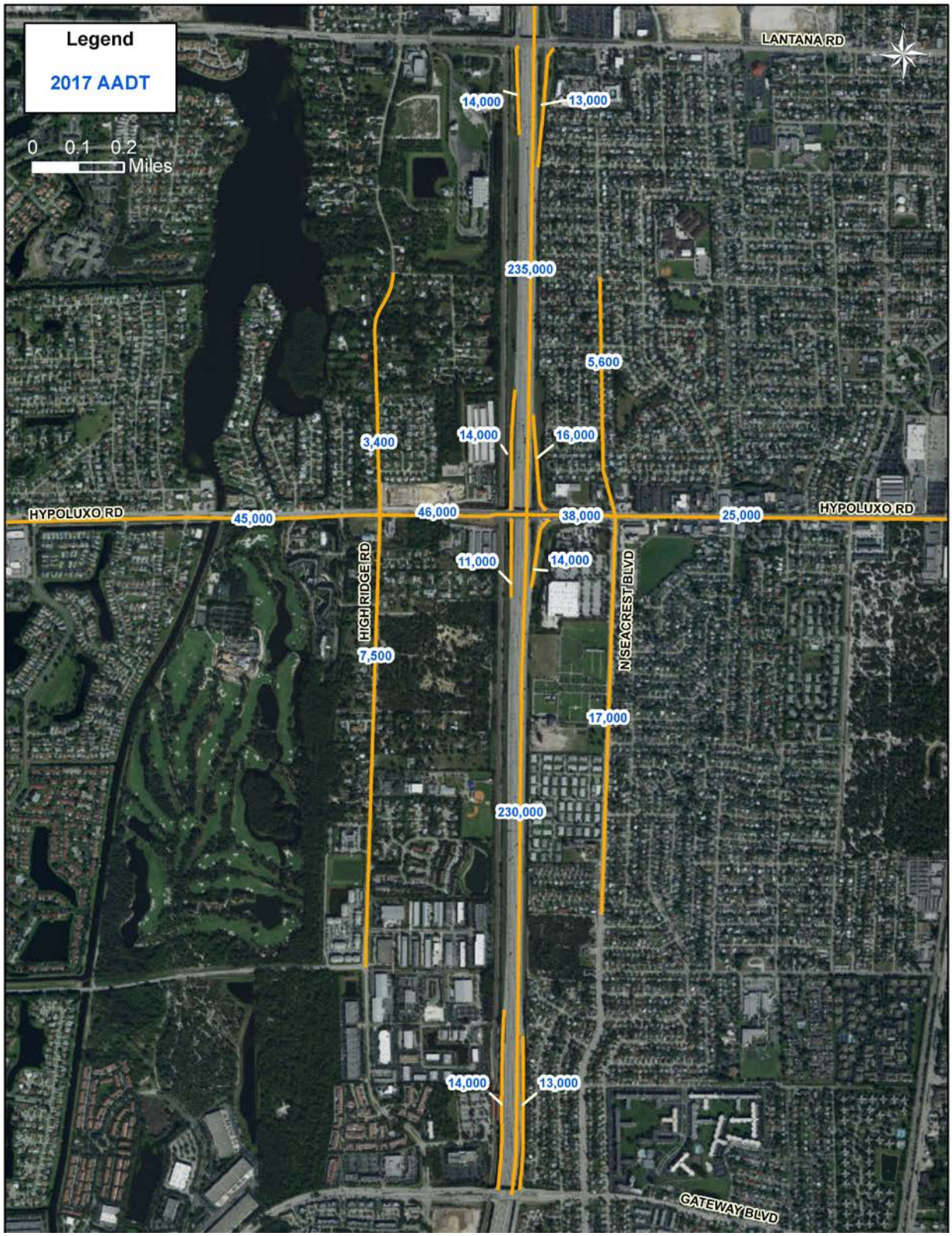


Figure 5 – 2017 AADT

The balanced 2017 AM and PM peak hour intersection turning movement volumes are depicted in **Figure 6**.

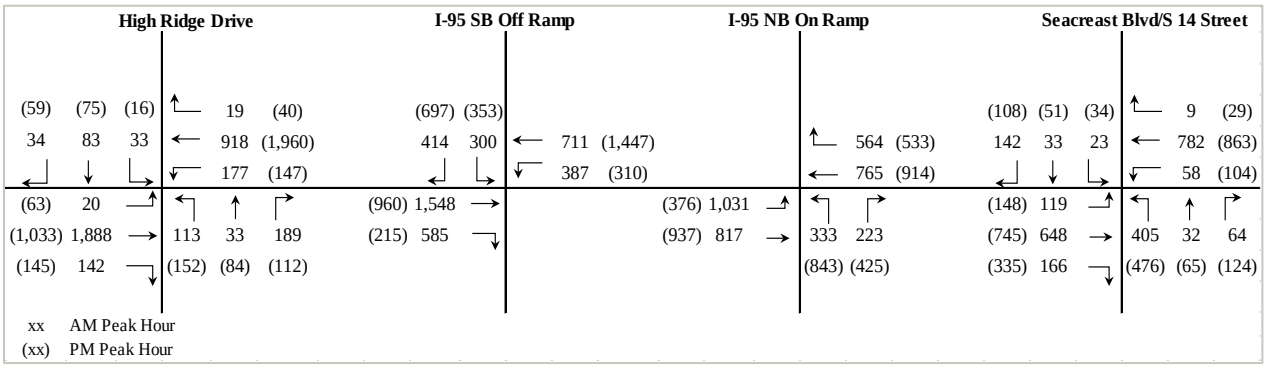


Figure 6 – 2017 Peak Hour Balanced Turning Movement Volumes

The 2017 traffic count data on the I-95 ramps were checked by comparing them with the available traffic count data from 2019 Florida Traffic Online. The 2017 AADT and the 2019 AADT (obtained from 2019 Florida Traffic Online) of the study I-95 ramps were summarized in **Table 4**.

Table 4 I-95 Ramps AADT Summary

Interchange	Ramp	2017 AADT	2019 AADT
I-95 at Lantana Road Interchange	I-95 SB On-ramp from Lantana Road	14,000	14,000
	I-95 NB Off-ramp to Lantana Road	13,000	13,500
I-95 at Hypoluxo Road Interchange	I-95 SB Off-ramp to Hypoluxo Road	14,000	14,000
	I-95 SB On-ramp from Hypoluxo Road	11,000	10,500
	I-95 NB Off-ramp to Hypoluxo	14,000	11,000
	I-95 NB On-ramp from Hypoluxo Road	16,000	16,000
I-95 at Gateway Blvd Interchange	I-95 SB Off-ramp to Gateway Blvd	14,000	12,000
	I-95 NB On-ramp from Gateway Blvd	13,000	13,000

Based on the comparison, the 2017 count data from the PD&E study is higher or close to the 2019 AADT. Therefore, the 2017 count data is still valid and could be used for the traffic analysis.

3.4 Existing Year Operational Analysis

I-95 Ramp Merge/Diverge/Weaving Analysis

The existing year ramp merge/diverge/weaving analysis was performed using HCS Version 7.7. The ramp peak hour volumes were calculated using the 2017 balanced turning movement volumes.

The I-95 mainline peak hour volume was obtained from the I-95 at Lantana Road Interchange PD&E Studies Traffic Data Collection & Traffic Projections report dated December 2017. A peak hour factor of 0.95 and heavy vehicle of 3.7% were used for the I-95 mainline. There are auxiliary lanes on I-95 between Hypoluxo Road and Lantana Road. A weaving analysis was conducted based on the *HCM* methodology. The short length (L_s), defined as the distance between the end points of any barrier markings that prohibit or discourage lane-changing, is approximately 2,936 feet between the I-95 southbound on-ramp from Lantana Road and I-95 southbound off-ramp to Hypoluxo Road, and 2,909 feet between the I-95 northbound on-ramp from Hypoluxo Road and I-95 northbound off-ramp to Lantana Road. Using Equation 13-4 from the *Highway Capacity Manual (HCM) 6th Edition*, the maximum weaving section length (L_{max}) is calculated to be 4,964 feet for I-95 southbound, and 5,315 feet for I-95 northbound (the calculations for maximum weaving length of existing condition are attached in **Appendix E**). Since the short length is shorter than the maximum weaving section length, a weaving analysis was performed for the I-95 segment between Lantana Road and Hypoluxo Road. The merge, diverge, and weaving analysis results are summarized in **Table 5**. The weaving segments of I-95 northbound and southbound between Hypoluxo Road and Lantana Road are operating at LOS F during the AM and PM peak hours. The I-95 northbound off-ramp and I-95 southbound on-ramp are operating at LOS C or better during the AM and PM peak hours. The HCS analysis documentation is provided in **Appendix E**.

Table 5 Existing Ramp Analysis Summary

Ramp	Analysis Type	AM Peak Hour					PM Peak Hour				
		Volume	Weaving Speed (mph)	Density (pc/mi/ln)	LOS	v/c Ratio	Volume	Weaving Speed (mph)	Density (pc/mi/ln)	LOS	v/c Ratio
I-95 NB Off-ramp	Diverge	556	-	14.2	B	0.15	1,268	-	21	C	0.34
I-95 NB On-ramp	Weaving	1,595	53.2	50.5	**F**	0.99	909	53.7	48.1	**F**	1.00
I-95 SB Off-ramp	Weaving	714	53.6	48.7	**F**	0.99	1,050	54.1	43.4	**F**	0.92
I-95 SB On-ramp	Merge	972	-	25	C	0.5	525	-	19.2	B	0.27

Intersection Analysis

Traffic operational analysis was conducted to evaluate the existing conditions for the four (4) study intersections along Hypoluxo Road. The intersection analysis was performed using SYNCHRO Version 10.0).

The existing 2017 turning movement volumes were used in the analysis. Traffic signal timing plans were obtained from the Palm Beach County Traffic Division and are included in **Appendix D**. Major analysis parameters, including truck percentages and peak hour factors were obtained from traffic counts. The intersection analysis results for the AM and PM peak hours are summarized in **Table 6**. Detailed SYNCHRO printouts are also provided in **Appendix E**.

Hypoluxo Road and High Ridge Road

As shown in **Table 6**, the intersection of Hypoluxo Road at High Ridge Road is operating at LOS D with an average delay of less than 40 seconds during both AM and PM peak hours. Furthermore, the eastbound and westbound through movements on Hypoluxo Road are operating at LOS D or better during the AM and PM peak hours.

Hypoluxo Road and I-95 Southbound Ramps

The intersection of Hypoluxo Road at the I-95 southbound ramps is operating at LOS D with an average delay of 54.7 seconds during the AM peak hour. However, the southbound approach is operating at LOS F with an average delay of 170.4 seconds. During the PM peak hour, the intersection is operating at LOS C. The southbound approach is operating at LOS E. The maximum 95th-percentile queue on the I-95 southbound off-ramp is 502 feet during the AM peak hour. The length of the I-95 southbound off-ramp is 1,763 feet. The queue does not spill back to I-95 mainline.

Hypoluxo Road and I-95 Northbound Ramps

The intersection of Hypoluxo Road at the I-95 northbound ramps intersection is operating at LOS E during the AM peak hour, while the westbound and northbound approaches are operating at LOS F with average delays of 93.6 and 131.5 seconds, respectively. During the PM peak hour, the intersection is operating at LOS F with an average delay of 81.8 seconds. The westbound and northbound approaches are operating at LOS F with average delays of 92.9 and 149.1 seconds, respectively. The maximum 95th-percentile queue on the I-95 northbound off-ramp is 685 feet during the PM peak hour. The length of the I-95 southbound off-ramp is 1,180 feet. The queue does not spill back to I-95 mainline.

Hypoluxo Road and Seacrest Boulevard/S 14th Street

The intersection of Hypoluxo Road at Seacrest Boulevard/S 14th Street is operating at LOS D during the AM and PM peak hours. The eastbound and westbound approaches are operating at LOS D or better. The northbound and southbound are operating at LOS E during the AM and PM peak hours with an average delay of approximately 70 seconds.

Table 6 Existing 2017 Intersection Analysis

Intersection	Movement	Storage Length (feet)	AM								PM							
			Movement				Approach		Intersection		Movement				Approach		Intersection	
			Volume	Delay (seconds)	LOS	Queue Length (feet)	Delay (seconds)	LOS	Delay (seconds)	LOS	Volume	Delay (seconds)	LOS	Queue Length (feet)	Delay (seconds)	LOS	Delay (seconds)	LOS
Hypoluxo Road at High Ridge Road	EBL	200	20	74.6	E	50	37.2	D	38.4	D	63	82.3	F	118	29.7	C	35.6	D
	EBT	-	1,888	36.8	D	#897					1,033	26.9	C	403				
	EBR	-	142								145							
	WBL	200	177	51.8	D	m265	33.4	C			147	85.3	F	m222	30.5	C		
	WBT	-	918	29.9	C	326					1,960	26.4	C	592				
	WBR	-	19								40							
	NBL	150	113	50.2	D	148	48.6	D			152	94.4	F	#277	69.7	E		
	NBT	-	33	47.7	D	98					84	50.6	D	206				
	NBR	-	189								112							
	SBL	150	33	64.7	E	67	70.9	E			16	66.0	E	40	77.7	E		
	SBT	-	83	72.7	E	169					75	79.0	E	190				
	SBR	-	34								59							
Hypoluxo Road at I-95 Southbound Ramps	EBT	-	1,548	47.0	D	513	34.3	C	54.7	D	960	41.4	D	333	33.9	C	29.6	C
	EBR	-	585	0.4	A	m1					215	0.2	A	0				
	WBL	340	387	52.2	D	m#533	19.3	B			310	18.7	B	m91	6.0	A		
	WBT	-	711	1.4	A	m0					1,447	3.3	A	m0				
	SBL	775	300	333.6	F	#502	170.4	F			353	64.3	E	464	64.4	E		
	SBR		414	64.0	E	94					697	62.6	E	409				
Hypoluxo Road at I-95 Northbound Ramps	EBL	340	1,031	11.7	B	m584	6.8	A	64.1	E	376	5.2	A	m27	4.5	A	81.8	F
	EBT	-	817	0.7	A	m1					937	4.3	A	444				
	WBT	-	765	63.3	E	344	131.5	F			914	63.7	E	426	92.9	F		
	WBR	800	564	224.0	F	#832					533	143.2	F	290				
	NBL	700	333	119.1	F	#275	93.6	F			843	162.7	F	#685	149.1	F		
	NBR		223	55.4	E	80					425	122.1	F	#512				
Hypoluxo Road at Seacrest Blvd/S 14 Street	EBL	200	119	75.6	E	198	17.5	B	36.8	D	148	94.2	F	m216	24.9	C	43.5	D
	EBT	-	648	10.0	B	158					745	19.3	B	m240				
	EBR	250	166	5.2	A	9					335	7.0	A	m21				
	WBL	-	58	74.5	E	106	29.8	C			104	82.1	F	183	40.7	D		
	WBT	-	782	26.6	C	408					863	35.9	D	535				
	WBR	-	9								29							
	NBL	150	405	76.3	E	320	72.7	E			476	77.7	E	409	73.7	E		
	NBT	-	32	75.1	E	316					65	79.6	E	423				
	NBR	-	64	52.4	D	0					124	52.0	D	58				
	SBL	-	23	70.3	E	103	67.2	E			34	77.7	E	153	72.3	E		
	SBT	-	33								51							
	SBR	150	142	66	E	69					108	68.1	E	63				

Note: # - 95th-percentile volume exceeds capacity, queue may be longer.
m - Volume for 95th-percentile queue is metered by upstream signal.

3.5 Existing Safety Analysis

The crash data for the most recent five years (from January 2013 to December 2017) along I-95 from Gateway Boulevard to Lantana Road, and I-95 Ramps at the interchange of I-95 at Hypoluxo Road, were downloaded from the FDOT Crash Analysis Reporting System (CARS). The crash data for Hypoluxo Road from the west of High Ridge Road to the east of Seacrest Boulevard/S 14th Street, High Ridge Road, and Seacrest Boulevard/S 14th Street were obtained from Signal Four Analytics. The crash summary tables are provided in **Appendix F**. Crash summaries were developed for the five years based on the crash data. A review of the crash summaries provides insight into the historical crash patterns along the study roadway segments.

I-95 Mainline from Gateway Boulevard to Lantana Road

The crash data on I-95 from Gateway Boulevard to Lantana Road (Section 93220000 from MP 16.246 to MP 18.802) 2013 to 2017 was downloaded from FDOT's CARS system and summarized in **Table 7**. The following is a summary of the findings based on the crash data:

- There was a total of 878 crashes documented during the referenced five-year period, with 136 crashes in 2013, 163 crashes in 2014, 179 crashes in 2015, 211 crashes in 2016, and 189 crashes in 2017. The number of crashes is depicted in **Figure 7.** The crash rate was calculated for each year. The crash rate was 0.68 in 2013, 0.85 in 2014, 0.94 in 2015, 1.06 in 2016, and 0.86 in 2017. The crash rate in 2016 is over the statewide average of 1.04. The crash rates in other years are lower than the statewide average.
- Of the 878 crashes, there were 503 (57.3%) property damage-only crashes, 374 (42.6%) injury crashes, and one fatal crash. The fatal crash occurred in 2015.
- There were 366 (41.7%) rear-end crashes, 147 (16.7%) sideswipe crashes, 150 (17.1%) fixed-object crashes, 48 (5.5%) non-fixed object crashes, 116 (13.2%) non-collision crashes, 47 (5.4) angle crashes, 1 (0.1%) pedestrian crash, and 71 (8.1%) other crashes.
- There were 544 (62.0%) crashes that occurred during daytime, and 334 (38.0 %) crashes that occurred during nighttime, which is over the statewide average of 29.95% for all roadways.

- There were 617 (70.3%) of the crashes that occurred under dry pavement conditions, and 261 (29.7%) crashes that occurred under wet pavement conditions, which is over the statewide average of 17.85% for all roadways.

Table 7 I-95 Crash Data Summary

I-95		Number of Crashes					5 Year Total Crashes	Average	%
		Year							
		2013	2014	2015	2016	2017			
Crash Type	Rear End	45	74	76	92	79	366	73	41.7%
	Head On	0	0	0	0	1	1	0	0.1%
	Angle	7	7	10	13	10	47	9	5.4%
	Left Turn	0	0	0	0	1	1	0	0.1%
	Sideswipe	25	26	28	41	27	147	29	16.7%
	Backed Into	0	0	0	0	1	1	0	0.1%
	Pedestrian	1	0	0	0	0	1	0	0.1%
	Fixed Object	26	26	32	34	32	150	30	17.1%
	Other Non-Fixed Object Collisions	12	7	11	9	9	48	10	5.5%
	Non-Collisions	20	23	22	22	29	116	23	13.2%
	Others	12	14	16	10	19	71	14	8.1%
	Total Crashes	136	163	179	211	189	878	176	100.0%
Severity	PDO Crashes	87	101	97	126	92	503	101	57.3%
	Fatal Crashes	0	0	1	0	0	1	0	0.1%
	Injury Crashes	49	62	81	85	97	374	75	42.6%
Lighting Conditions	Daylight	85	92	113	142	112	544	109	62.0%
	Dusk	9	11	5	3	3	31	6	3.5%
	Dawn	0	4	6	6	7	23	5	2.6%
	Dark	42	56	55	60	67	280	56	31.9%
Surface Conditions	Dry	94	97	128	148	150	617	123	70.3%
	Wet	42	66	51	63	39	261	52	29.7%

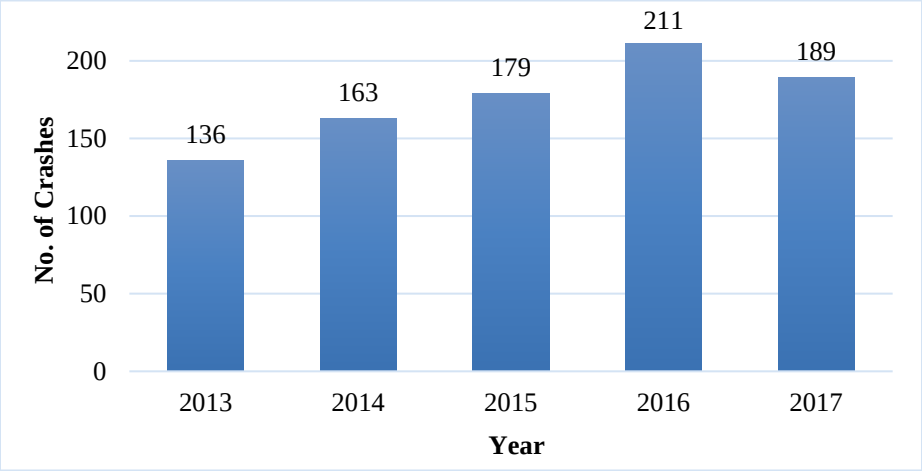


Figure 7 - Number of Crashes along I-95 from 2013 to 2017

I-95 Southbound Off-ramp

The crash data for the I-95 southbound off-ramp (Section 93220035 from MP 0.000 to MP 0.265) was downloaded from FDOT's CARS system and summarized in **Table 8**. The following is a summary of the findings based on the crash data:

- A total of 55 crashes occurred during the referenced five-year period, with 16 crashes in 2013, 5 crashes in 2014, 7 crashes in 2015, 16 crashes in 2016, and 11 crashes in 2017. The number of crashes is depicted in **Figure 8.** The crash rate was calculated for each year. The crash rate was 14.38 in 2013, 4.31 in 2014, 5.79 in 2015, 12.72 in 2016, and 8.42 in 2017. The crash rates in 2013 and 2016 are over the statewide average of 11.93. The crash rates in other years are lower than the statewide average.
- There were 34 (61.8%) property damage only crashes and 21 (38.2%) injury crashes that occurred on the I-95 southbound off-ramp during the referenced five-year period. There were no fatal crashes.
- There were 25 (45.5%) rear-end crashes, 13 (23.6%) angle crashes, 3 (5.5%) sideswipe crashes, 2 (3.6%) fixed object crash, 2 (3.6%) non-collision crash, one (1) left-turn crash, one (1) non-fixed object crash, and 8 (14.5%) other crashes.
- There were 28 (50.9%) crashes that occurred during daytime, and 27 (49.1%) crashes that occurred during nighttime, which is over the statewide average of 29.95% for all roadways.
- There were 47 (85.5%) crashes that occurred under dry pavement conditions, and 8 (14.5%) crashes that occurred under wet pavement conditions, which is lower than the statewide average of 17.85% for all roadways.

Table 8 I-95 Southbound Off-ramp Crash Data Summary

I-95 SB Off-Ramp		Number of Crashes Year					5 Year Total Crashes	Average	%
		2013	2014	2015	2016	2017			
Crash Type	Rear End	6	3	4	9	3	25	5	45.5%
	Angle	5	0	2	3	3	13	3	23.6%
	Left Turn	0	0	0	1	0	1	0	1.8%
	Sideswipe	0	0	0	2	1	3	1	5.5%
	Fixed Object	0	1	0	0	1	2	0	3.6%
	Other Non-Fixed Object Collisions	1	0	0	0	0	1	0	1.8%
	Non-Collisions	1	0	0	0	1	2	0	3.6%
	Others	3	1	1	1	2	8	2	14.5%
	Total Crashes	16	5	7	16	11	55	11	100.0%
Severity	PDO Crashes	10	1	4	11	8	34	7	61.8%
	Fatal Crashes	0	0	0	0	0	0	0	0.0%
	Injury Crashes	6	4	3	5	3	21	4	38.2%
Lighting Conditions	Daylight	10	2	4	8	4	28	6	50.9%
	Dusk	0	0	0	0	1	1	0	1.8%
	Dawn	1	1	0	0	0	2	0	3.6%
	Dark	5	2	3	8	6	24	5	43.6%
Surface Conditions	Dry	14	3	6	15	9	47	9	85.5%
	Wet	2	2	1	1	2	8	2	14.5%

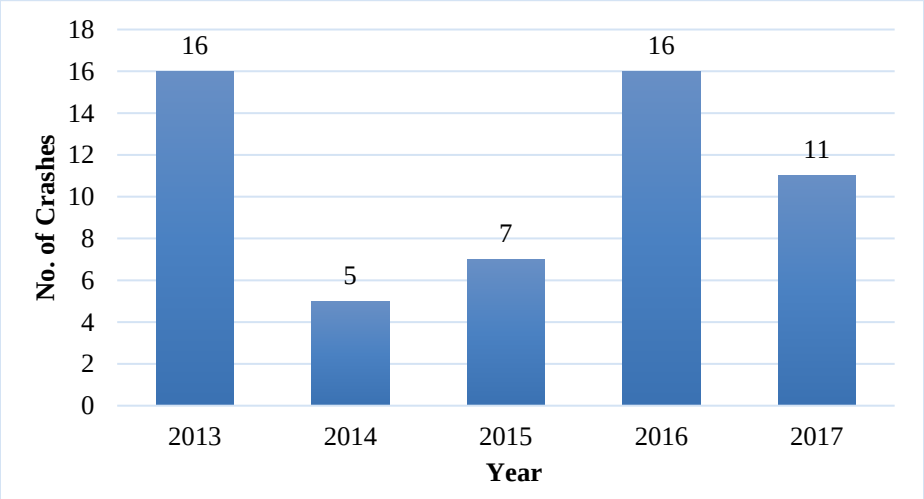


Figure 8 – Number of Crashes along I-95 Southbound Off-ramp from 2013 to 2017

I-95 Southbound On-ramp

The crash data on the I-95 southbound off-ramp (Section 93220033 from MP 0.000 to MP 0.169) was downloaded from FDOT's CARS system and summarized in **Table 9**. The following is a summary the findings based on the crash data.

- There were a total of nine (9) crashes that occurred during the referenced five-year period, with one (1) crash in 2013, two (2) crashes in 2014, two (2) crashes in 2015, two (2) crashes in 2016, and two (2) crashes in 2017 on the I-95 southbound on-ramp. The number of crashes is depicted in **Figure 9**. The crash rate was calculated for each year. The crash rate was 1.71 in 2013, 3.31 in 2014, 3.24 in 2015, 3.09 in 2016, and 3.24 in 2017. The crash rates in all the years are lower than the statewide average of 11.93.
- There was 4 (44.4%) fixed object crashes, 2 (22.2%) left-turn crashes, 2 (22.2) angle crashes, and 1 (11.1%) angle crash.
- There were and 6 (66.7%) property damage only crashes, and 3 (33.3%) injury crashes. There were no fatal crashes.
- There were 3 (33.3%) crashes that occurred during daytime and 6 (66.7%) crashes that occurred during nighttime, which is over the statewide average of 29.95% for all roadways.
- There were 8 (88.9%) crashes that occurred under dry pavement conditions, and one (11.1%) crash that occurred under wet pavement conditions, which is lower than the statewide average of 17.85% for all roadways.

Table 9 I-95 Southbound On-ramp Crash Data Summary

I-95 SB On-Ramp		Number of Crashes					5 Year Total Crashes	Average	%
		Year							
		2013	2014	2015	2016	2017			
Crash Type	Rear End	0	0	0	0	1	1	0	11.1%
	Angle	0	1	0	0	1	2	0	22.2%
	Left Turn	1	0	0	1	0	2	0	22.2%
	Fixed Object	0	1	2	1	0	4	1	44.4%
	Total Crashes	1	2	2	2	2	9	2	100.0%
Severity	PDO Crashes	0	1	2	1	2	6	1	66.7%
	Fatal Crashes	0	0	0	0	0	0	0	0.0%
	Injury Crashes	1	1	0	1	0	3	1	33.3%
Lighting Conditions	Daylight	0	2	0	0	1	3	1	33.3%
	Dawn	0	0	1	0	0	1	0	11.1%
	Dark	1	0	1	2	1	5	1	55.6%
Surface Conditions	Dry	1	2	2	1	2	8	2	88.9%
	Wet	0	0	0	1	0	1	0	11.1%

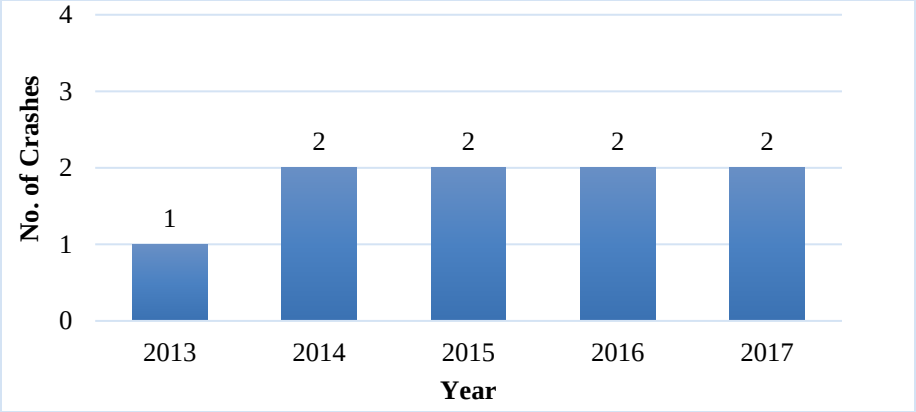


Figure 9 – Number of Crashes along I-95 Southbound On-ramp from 2013 to 2017

I-95 Northbound Off-ramp

The crash data for the I-95 northbound off-ramp (Section 93220034 from MP 0.000 to MP 0.155) was downloaded from FDOT's CARS system and summarized in **Table 10**. The following is a summary of the findings based on the crash data.

- There was a total of 93 crashes that occurred during the referenced five-year period, with 11 crashes in 2013, 23 crashes in 2014, 19 crashes in 2015, 26 crashes in 2016 and 14 crashes in 2017. The number of crashes is depicted in **Figure 10**. The crash rate was calculated for each year. The crash rate was 22.09 in 2013, 46.2 in 2014, 34.62 in 2015, 45.96 in 2016, and 23.57 in 2017. The crash rate in all the years are over the statewide average of 11.93.
- There were 74 (79.6%) rear-end crashes, 11 (11.8%) angle crashes, 4 (4.3%) fixed object crashes, 3 (3.2%) sideswipe crashes, and 1 (1.1%) non-collision crash.
- There were 49 (52.7%) property-damage-only crashes, and 44 (47.3%) injury crashes. There were no fatal crashes during the referenced period.
- There were 60 (64.5%) crashes that occurred during daytime, and 33 (35.5%) crashes that occurred during nighttime, which is over the statewide average of 29.95% for all roadways.
- There were 77 (82.8%) crashes that occurred under dry pavement conditions, and 16 (17.2%) crashes that occurred under wet pavement conditions, which is lower than the statewide average of 17.85% for all roadways.

Table 10 I-95 Northbound Off-ramp Crash Data Summary

I-95 NB Off-Ramp		Number of Crashes					5 Year Total Crashes	Average	%
		Year							
		2013	2014	2015	2016	2017			
Crash Type	Rear End	7	19	17	18	13	74	15	79.6%
	Angle	2	2	1	6	0	11	2	11.8%
	Sideswipe	0	2	0	0	1	3	1	3.2%
	Fixed Object	1	0	1	2	0	4	1	4.3%
	Non-Collisions	1	0	0	0	0	1	0	1.1%
	Total Crashes	11	23	19	26	14	93	19	100.0%
Severity	PDO Crashes	7	18	11	10	3	49	10	52.7%
	Fatal Crashes	0	0	0	0	0	0	0	0.0%
	Injury Crashes	4	5	8	16	11	44	9	47.3%
Lighting Conditions	Daylight	4	19	13	16	8	60	12	64.5%
	Dusk	1	2	3	2	1	9	2	9.7%
	Dawn	0	0	0	0	1	1	0	1.1%
	Dark	6	2	3	8	4	23	5	24.7%
Surface Conditions	Dry	7	21	13	23	13	77	15	82.8%
	Wet	4	2	6	3	1	16	3	17.2%

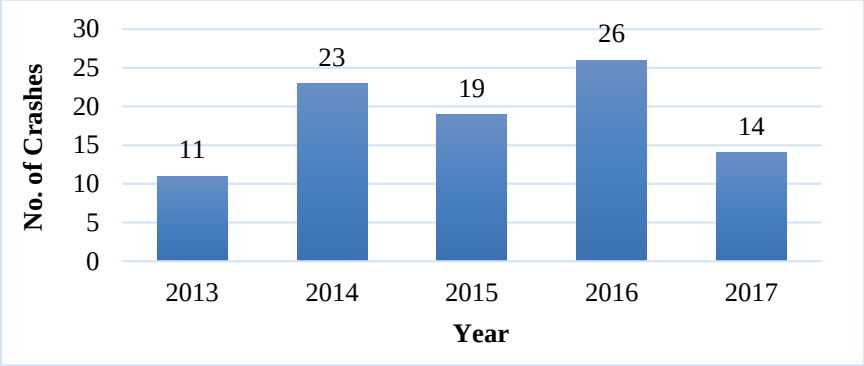


Figure 10 – Number of Crashes along I-95 Northbound Off-ramp from 2013 to 2017

I-95 Northbound On-ramp

The crash data for the I-95 southbound off-ramp (Section 93220036 from MP 0.000 to MP 0.214) was downloaded from FDOT's CARS system and summarized in **Table 11**. The following is a summary of the findings based on the crash data.

- There was a total of 32 crashes that occurred during the referenced five-year period, with four (4) crashes in 2013, one (1) crash in 2014, six (6) crashes in 2015, 13 crashes in 2016, and eight (8) crashes in 2017. The number of crashes is depicted in **Figure 11**. The crash rate was calculated for each year. The crash rate was 3.79 in 2013, 0.91 in

2014, 5.3 in 2015, 11.1 in 2016, and 6.61 in 2017. The crash rates in all the years are lower than the statewide average of 11.93.

- There were 15 (62.5%) rear-end crashes, 5 (15.6) angle crashes, 5 (15.6%) left-turn crashes, 2 (6.3%) sideswipe crashes, 2 (6.3%) non-collision crashes, 1 (3.1%) fixed object crash, and 2 (6.3%) other crashes.
- There were 20 (62.5%) property-damage only crashes and 12 (37.5%) injury crash. There were no fatal crashes during the referenced period.
- There were 27 (84.4%) crashes that occurred during daytime, and 5 (15.6%) crash that occurred during nighttime, which is lower than the statewide average of 29.95% for all roadways.
- There were 29 (90.6%) crashes that occurred under dry pavement conditions, and 3 (9.4%) crashes that occurred under wet pavement conditions, which is lower than the statewide average of 17.85% for all roadways.

Table 11 I-95 Northbound On-ramp Crash Data Summary

I-95 NB On-Ramp		Number of Crashes Year					5 Year Total Crashes	Average	%
		2013	2014	2015	2016	2017			
Crash Type	Rear End	2	1	4	5	3	15	3	46.9%
	Angle	1	0	1	1	2	5	1	15.6%
	Left Turn	0	0	0	3	2	5	1	15.6%
	Sideswipe	0	0	0	1	1	2	0	6.3%
	Fixed Object	0	0	1	0	0	1	0	3.1%
	Non-Collisions	0	0	0	2	0	2	0	6.3%
	Others	1	0	0	1	0	2	0	6.3%
	Total Crashes	4	1	6	13	8	32	6	100.0%
Severity	PDO Crashes	3	0	3	8	6	20	4	62.5%
	Fatal Crashes	0	0	0	0	0	0	0	0.0%
	Injury Crashes	1	1	3	5	2	12	2	37.5%
Lighting Conditions	Daylight	3	1	6	10	7	27	5	84.4%
	Dusk	1	0	0	0	0	1	0	3.1%
	Dark	0	0	0	3	1	4	1	12.5%
Surface Conditions	Dry	3	1	6	12	7	29	6	90.6%
	Wet	1	0	0	1	1	3	1	9.4%

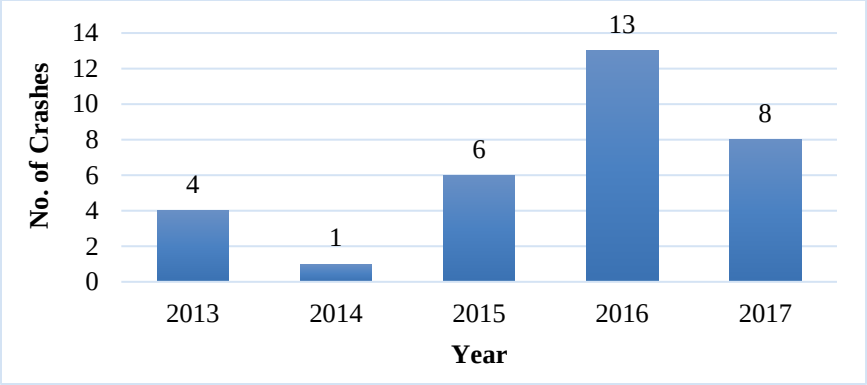


Figure 11 – Number of Crashes along I-95 Northbound On-ramp from 2013 to 2017

Hypoluxo Road

The crashes on Hypoluxo Road from the west of High Ridge Road to the east of Seacrest Boulevard (Roadway Section 93514500 from MP 2.262 to MP 2.662 and 95514501 from MP 0.000 to MP 0.500) were obtained from Signal Four Analytics. The crash summaries are included in **Table 12**. The following is a summary of the findings based on the crash data:

- A total of 446 crashes were documented during the referenced five-year period, with 55 crashes in 2013, 69 crashes in 2014, 83 crashes in 2015, 140 crashes in 2016, and 99 crashes in 2017. The number of crashes is depicted in **Figure 12.** The crash rate was calculated for each year. The crash rate was 4.41 for 2013, 5.0 for 2014, 6.09 for 2015, 9.8 for 2016, and 6.85 in 2017.
- There were 176 (39.5%) rear-end crashes, 92 (20.6%) left-turn crashes, 47 (10.5%) non-collision crashes, 44 (9.9%) sideswipe crashes, 28 (6.3%) angle crashes, 20 (4.5) head-on crashes, 12 (2.7 %) fixed object crashes, 6 (1.3%) right-turn crashes, and 17 (3.8%) other crashes. There were 3 (0.7%) pedestrian crashes during the referenced five-year period.
- Regarding crash severity, of the 446 crashes reported, 319 (71.5%) were property damage-only crashes and 126 (28.3%) were injury crashes. There was one (1) fatal crash which occurred in 2016.
- There were 297 (66.6%) crashes that occurred during daytime, and 139 (32.5%) night/dusk/dawn crashes reported, which is over the statewide average of 29.95% for all roadways.

- There were 376 (84.3%) crashes that occurred under dry pavement conditions, and 64 (14.3%) crashes reported occurred under wet/slippery pavement conditions, which is lower than the statewide average of 17.85% for all roadways.

Table 12 Crash Data Summary along Hypoluxo Road

Hypoluxo Road		Number of Crashes					5 Year Total Crashes	Average	%
		Year							
		2013	2014	2015	2016	2017			
CRASH TYPE	Rear End	18	27	34	56	41	176	35	39.5%
	Head On	6	6	3	4	1	20	4	4.5%
	Angle	4	6	6	9	3	28	6	6.3%
	Left Turn	14	11	16	28	23	92	18	20.6%
	Right Turn	0	0	2	2	2	6	1	1.3%
	Sideswipe	3	3	12	11	15	44	9	9.9%
	Pedestrian	0	0	0	3	0	3	1	0.7%
	Fixed Object	2	4	2	3	1	12	2	2.7%
	Other Non-Fixed Object Collisions	0	0	1	0	0	1	0	0.2%
	Non-Collisions	6	10	5	17	9	47	9	10.5%
	Others	2	2	2	7	4	17	3	3.8%
	Total Crashes	55	69	83	140	99	446	89	100.0%
Severity	PDO Crashes	35	45	59	103	77	319	64	71.5%
	Fatal Crashes	0	0	0	1	0	1	0	0.2%
	Injury Crashes	20	24	24	36	22	126	25	28.3%
Lighting Conditions	Daylight	32	52	52	91	70	297	75	66.6%
	Dusk	5	2	3	3	1	14	3	3.1%
	Dawn	1	2	2	2	3	10	2	2.2%
	Dark	17	11	24	44	25	121	24	27.1%
	Unknown	0	2	2	0	0	4	1	0.9%
Surface Conditions	Dry	47	48	66	121	94	376	75	84.3%
	Wet	8	19	13	19	5	64	13	14.3%
	Others	0	2	4	0	0	6	1	1.3%

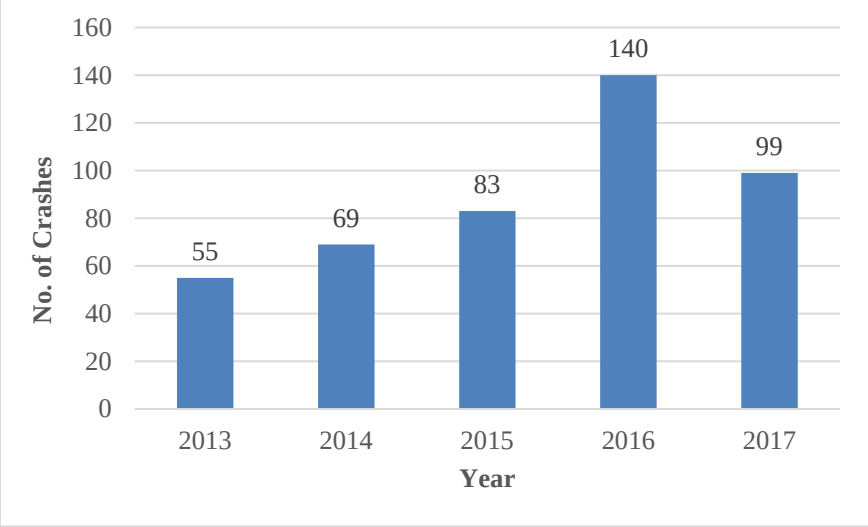


Figure 12 – Number of Crashes along Hypoluxo Road from 2013 to 2017

The most common crash types within the study area are rear-end, left-turn, sideswipe, and angle. The high percentage of rear-end crashes are a typical indicator for roadways where traffic congestion occurs. The high left-turn, angle, and sideswipe crashes indicate inadequate gaps for left-turn movement, inadequate clearance intervals, red light running, and/or aggressive driving maneuvers.

A review of the FDOT high crash segments/locations list for the referenced five-year period shows that there were no high crash locations within the study roadway segments. The I-95 segment from mile post 16.400 to mile post 16.600 in 2015, and from mile post 16.200 to 16.300 in 2016, were identified as high crash segments.

4 Future Traffic Forecast

4.1 Future Land Use

The future land use within the study area of influence (AOI) is primarily residential, commercial, industrial, and institutional. The future land use is shown in **Figure 13**.There are no significant land use changes within the study area compared to the existing land use.

4.2 Travel Demand Forecasting

The Southeast Florida Regional Planning Model (SERPM), Version 7.071 was used in travel demand forecasting for this project. SERPM is an Activity-based Model (ABM) designed to follow the principles of modeling individual travel choices with maximum behavioral realism. The SERPM model simulates both household-level and person-level travel choices, including intra-household interactions with household members. The model explicitly considers congestion and pricing effects on time-of-day and peak spreading. With the new features, SERPM can effectively address current planning issues such as highway pricing and managed lanes. The SERPM 7.071 model is calibrated to year 2010 conditions and includes a future year 2040 scenario based on the adopted Cost Feasible plans for the Palm Beach Transportation Planning Agency (TPA), the Broward Metropolitan Planning Organization (MPO), and the Miami Dade Transportation Planning Organization (TPO) in South Florida. It is approved by the Regional Transportation Technical Advisory Committee – Modeling Subcommittee (RTTAC-MS) in South Florida for transportation engineering and planning studies. The 2017, 2025, and 2045 AADT for the No-Build condition are obtained from the I-95 at Lantana Road Interchange PD&E Study report and presented in **Table 13**. The forecasted future AADT volumes are shown in **Figure 14** .

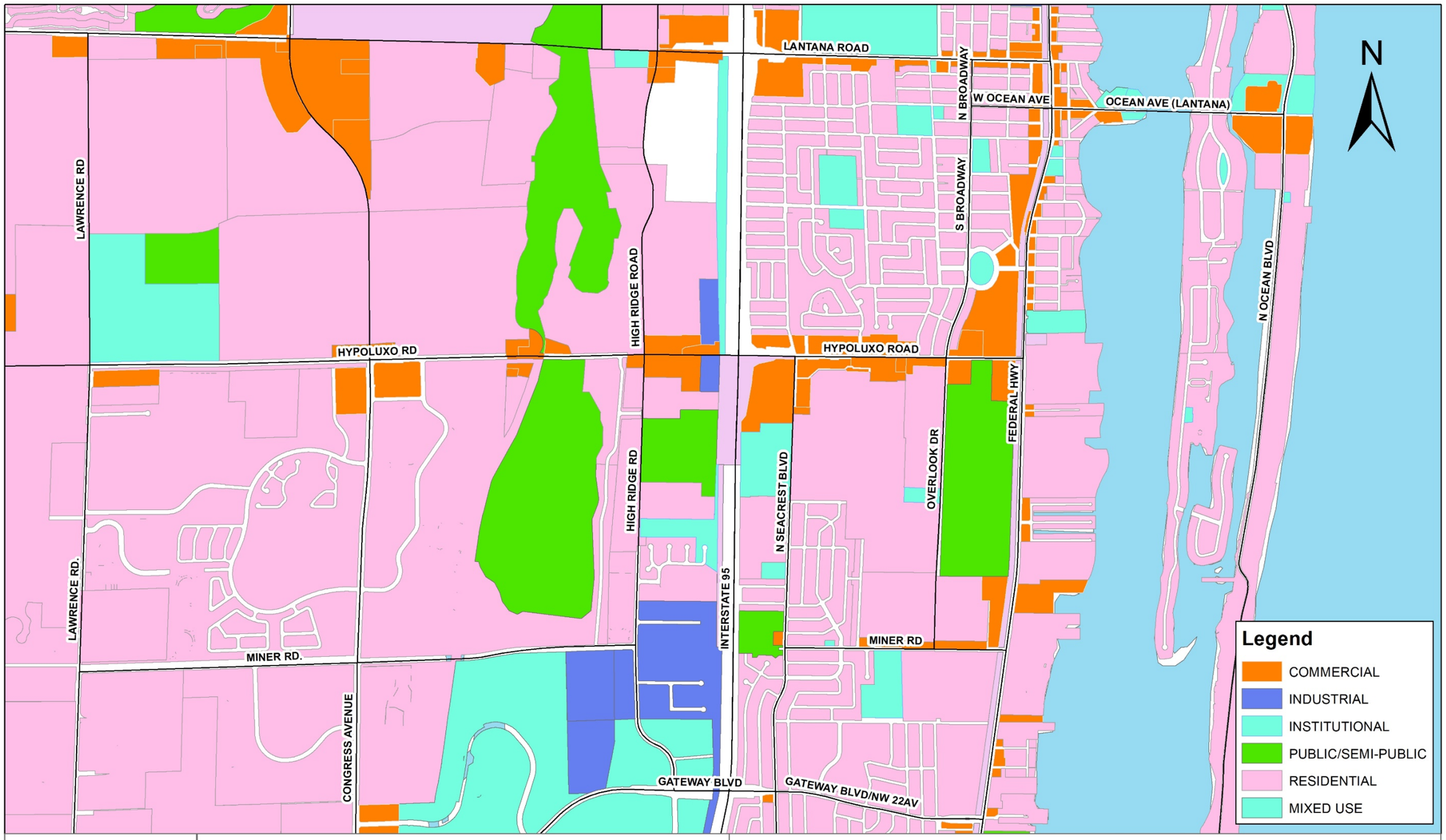


Figure 13 – Future Land Use

Table 13 2017 and Forecasted Future AADT

Roadway	2017	2025	2045
I-95 Southbound On-ramp from Lantana Road	14,000	15,000	16,000
I-95 Northbound Off-ramp to Lantana Road	13,000	14,000	17,000
I-95 South of Lantana Road	235,000	245,000	275,000
High Ridge Road north of Hypoluxo Road	3,400	3,900	5,700
Hypoluxo Road east of High Ridge Road	46,000	48,000	54,000
Corporate Drive south of Hypoluxo Road	7,500	8,200	10,400
Hypoluxo Road west of High Ridge Road	45,000	47,000	53,000
I-95 Southbound Off-ramp	14,000	15,000	16,400
Hypoluxo Road east of I-95 Southbound Ramps	42,000	44,000	48,000
I-95 Southbound On-ramp	11,000	11,400	12,500
Hypoluxo Road west of I-95 Southbound Ramps	43,000	45,000	50,000
I-95 Northbound On-ramp	16,000	17,000	18,800
Hypoluxo Road east of I-95 Northbound Ramps	38,000	40,000	44,000
I- 95 Northbound Off-ramp	14,000	15,000	16,000
Hypoluxo Road west of I-95 Northbound Ramps	42,000	44,000	48,000
S 14 Street north of Hypoluxo Road	5,600	5,800	6,400
Hypoluxo Road east of Seacrest Blvd	25,000	26,000	29,000
Seacrest Blvd south of Hypoluxo Road	17,000	19,000	27,000
Hypoluxo Road west of Seacrest Blvd	34,000	35,000	39,000
I-95 South of Hypoluxo Road	230,000	239,000	268,000
I-95 Southbound Off-ramp to Gateway Blvd	14,000	15,000	16,400
I-95 Northbound On-ramp from Gateway Blvd	13,000	14,000	15,600

The existing peak-to-daily ratios and D factors were calculated based on actual field data. The field peak-to-daily factors for I-95 ranged from 7.6% to 8.3%. The field D factors for I-95 ranged from 51.6% to 55.2%. For Hypoluxo Road, the field peak-to-daily factors ranged from 6.3% to 7.9%, and the field D factors ranged from 51.5% to 65.8%. The future K factors for the AM and PM peak period on I-95 were adjusted to 8.0% (Standard K). The field K and D factors on non-state roads, such as Hypoluxo Road, High Ridge Road, and Seacrest Boulevard/S 14th Street, were used as future D factors. The FDOT District IV TMTOOL (Version 2.0) was used for future turning movement volume forecast. The turning movement volumes were balanced. The final TMTOOL spreadsheets are included in **Appendix G**. Error! Reference source not found. and **Figure 16** depict the projected AM and PM peak hours intersection turning movement volumes and the Directional Design Hour Volumes (DDHV) for future year 2025 and 2045.

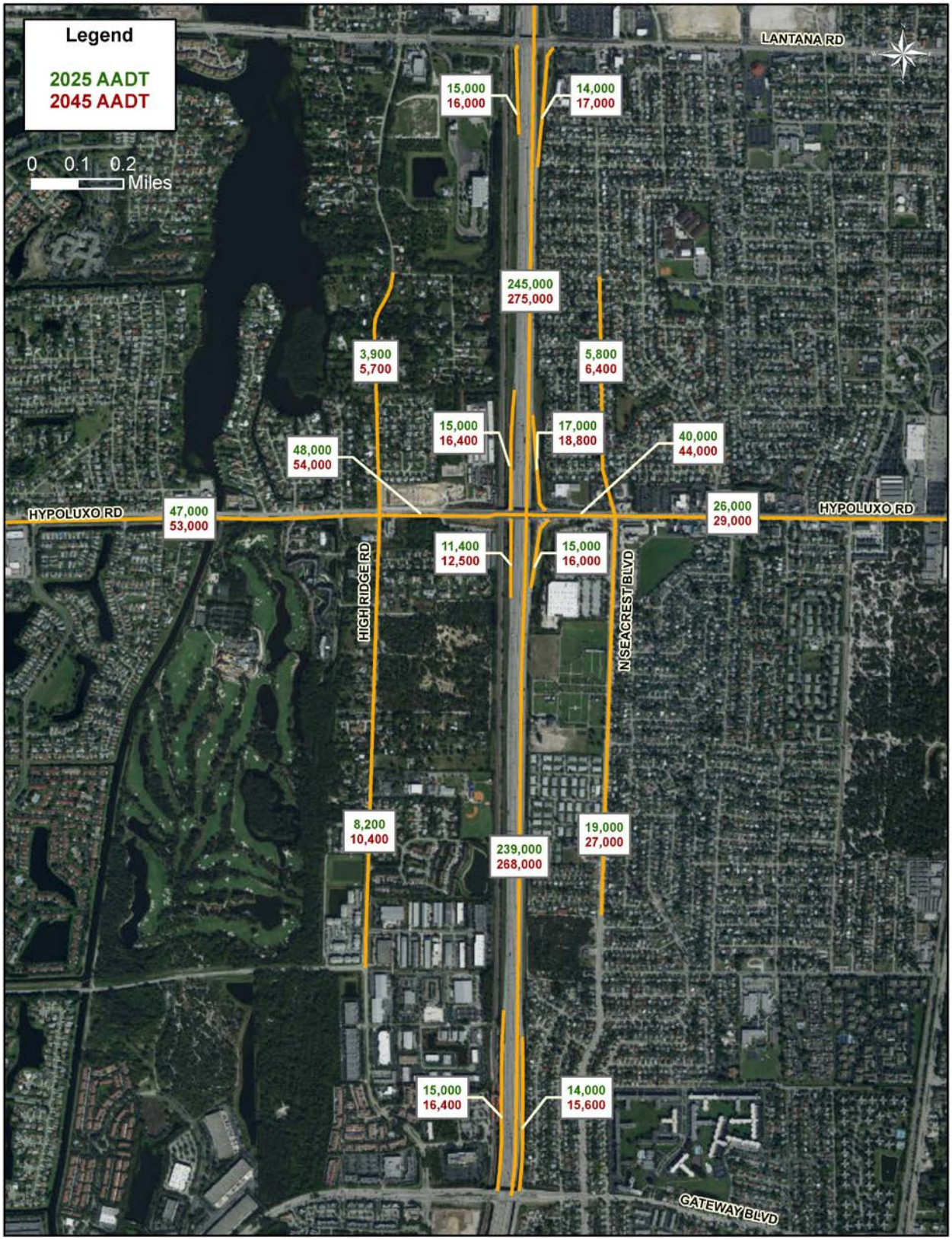


Figure 14 – Forecasted 2025 and 2045 AADT

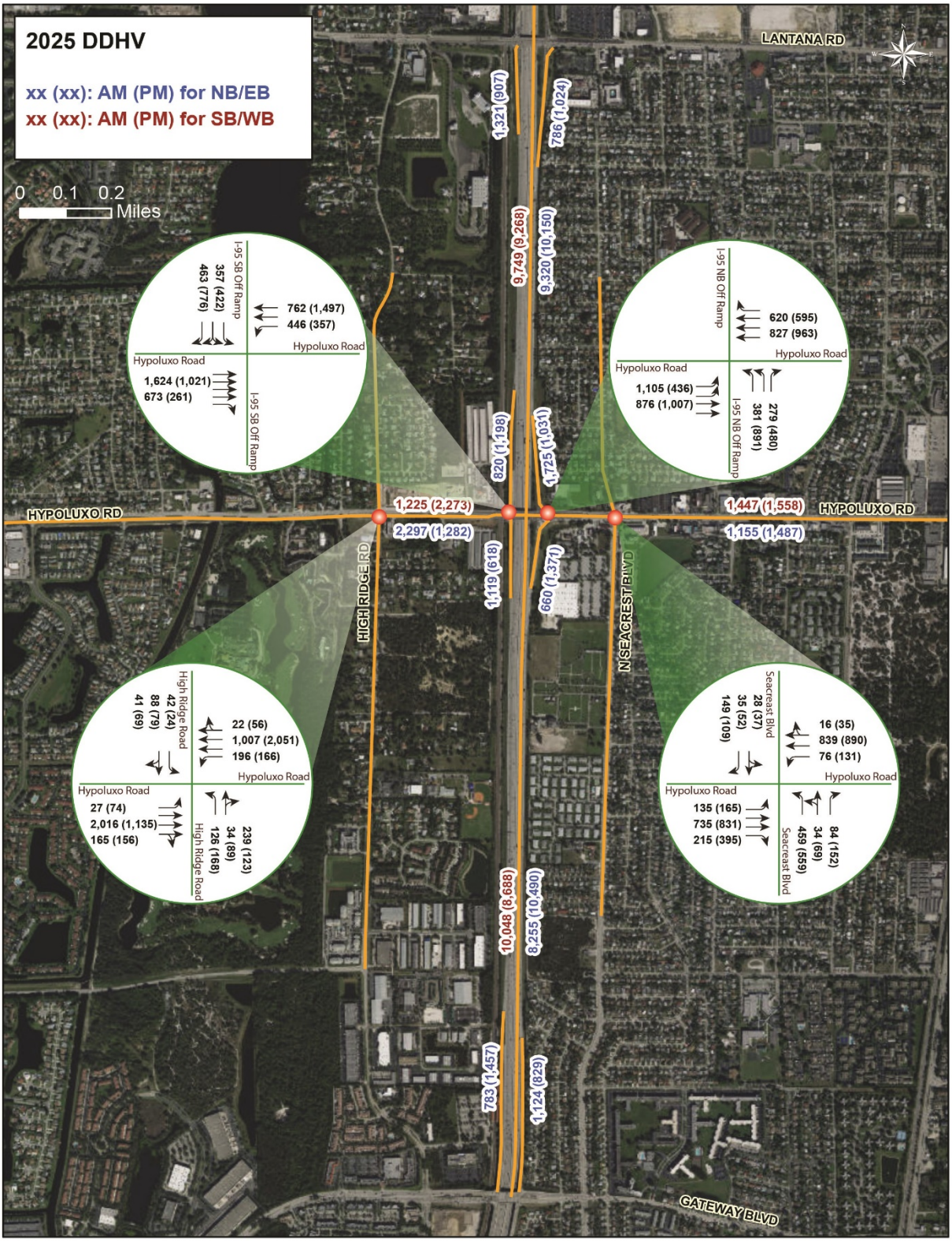


Figure 15 –2025 Turning Movement Volumes and DDHV for No-Build

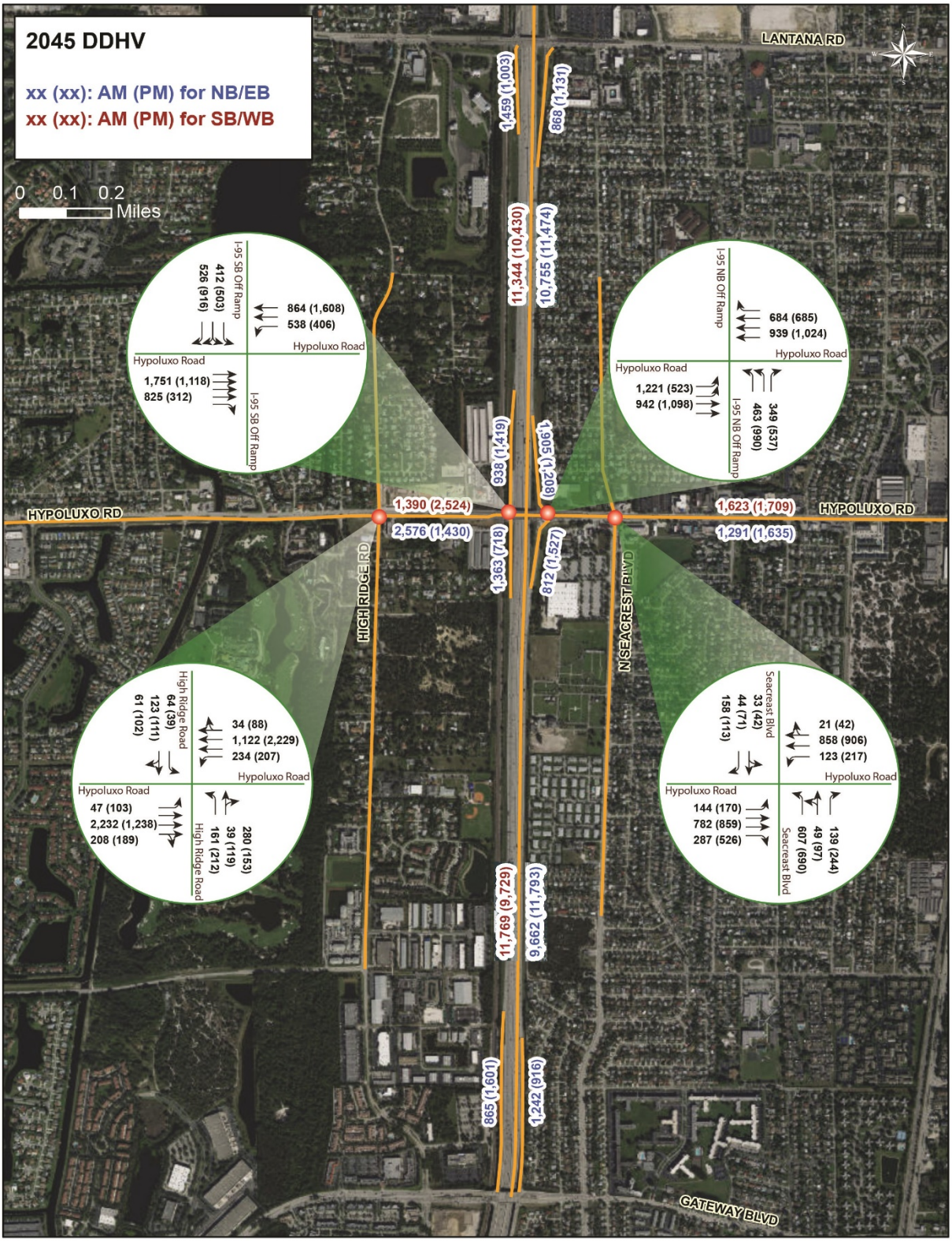


Figure 16 –2045 Turning Movement Volumes and DDHV for No-Build

5 No-Build Condition

The No-Build Alternative describes the conditions that will exist in the design year of 2045 which usually include planned/programmed improvements in the cost-feasible Long-Range Transportation Plan (LRTP) or improvements funded in FDOT Work Programs in the area. There are no committed roadway projects within the study area. Therefore, the roadway lane geometries of existing conditions are used for the future No-Build Alternative. The methodologies outlined in *Highway Capacity Manual* were used for operational analysis. HCS 7 software was used to perform the capacity analysis for I-95 on/off-ramps. SYNCHRO Version 10 was utilized for operational analysis of the study intersections.

A peak hour factor of 0.95 was used for the I-95 mainline and I-95 ramps, while heavy vehicle factors of 3.7% and 2% were used for I-95 mainline and I-95 ramps, respectively.

5.1 2025 No-Build Analysis

5.1.1 I-95 Ramp Merge/Diverge/Weaving Analysis

The Opening Year 2025 ramp merge/diverge/weaving analysis was performed using HCS 7 software. The ramp analysis results are summarized in **Table 14**. The weaving segments of I-95 northbound and southbound between Hypoluxo Road and Lantana Road are operating at LOS F during the AM and PM peak hours. The I-95 northbound off-ramp and I-95 southbound on-ramp are operating at LOS C or better during the AM and PM peak hours. The detailed analysis documents are provided in **Appendix H.**

Table 14 2025 Ramp Analysis Summary

Ramp	Analysis Type	AM Peak Hour					PM Peak Hour				
		Volume	Weaving Speed (mph)	Density (pc/mi/ln)	LOS	v/c Ratio	Volume	Weaving Speed (mph)	Density (pc/mi/ln)	LOS	v/c Ratio
I-95 NB Off Ramp	Diverge	660	-	15.6	B	0.18	1,371	-	23.1	C	0.37
I-95 NB On Ramp	Weaving	1,725	52.8	-	**F**	1.05	1,031	53.3	-	**F**	1.05
I-95 SB Off Ramp	Weaving	820	53.2	-	**F**	1.04	1,198	53.7	46.3	**F**	0.96
I-95 SB On Ramp	Merge	1,119	-	27.6	C	0.57	618	-	20.7	C	0.32

5.1.2 Intersection Analysis

The intersection lane geometry under the No-Build Alternative will be the same as under the existing condition, as shown in **Figure 17**.

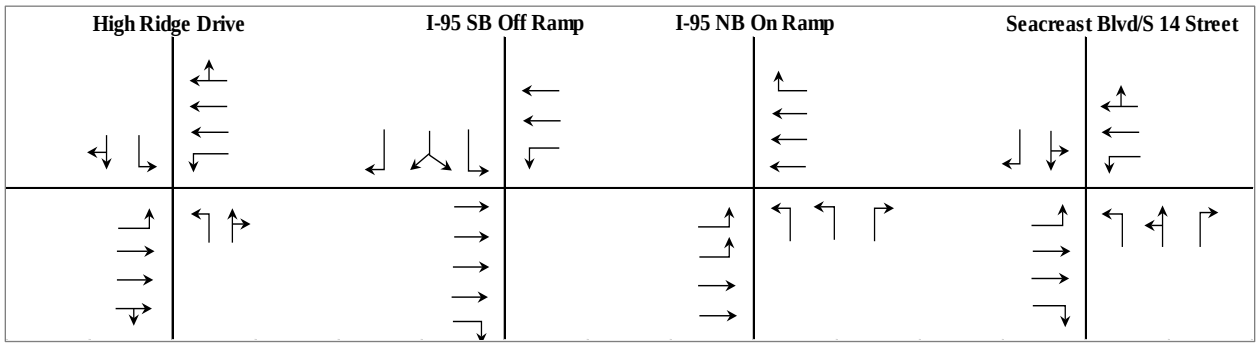


Figure 17 – Intersection Lane Geometry - No-Build Alternative

The existing signalized intersection's signal timing cycle length, phases, and actuated coordinated signalization were used in future year intersection analysis. The cycle length is the same as under the existing condition. Based on the existing analysis, movements at the study intersections are failing to operate at LOS target. With the increased traffic, more movements will be failing in 2025. The signal splits were optimized, and the analysis results are summarized in **Table 15**. Detailed SYNCHRO printouts are provided in **Appendix H**.

Hypoluxo Road and High Ridge Road

The intersection of Hypoluxo Road and High Ridge Road is expected to operate at LOS D during the AM and PM peak hours in 2025. The average vehicle delay are 39 seconds and 35.4 seconds during the AM and PM peak hours, respectively.

Hypoluxo Road and I-95 Southbound Ramps

In 2025, the intersection of Hypoluxo Road and I-95 southbound ramps will operate at LOS C, with an average vehicle delay of 34.9 seconds during the AM peak hour. The southbound approach will operate at LOS F, with an average delay of 92.5 seconds. During the PM peak hour, the intersection will operate at LOS D. The southbound approach will operate at LOS E, with an average delay of 69.7 seconds. The maximum 95th-percentile queue length for the I-95 southbound off-ramp will be

613 feet during the PM peak hour. The queue on the I-95 southbound off-ramp will not extend to the I-95 mainline.

Hypoluxo Road and I-95 Northbound Ramps

The intersection of Hypoluxo Road and I-95 northbound ramps will operate at LOS D during the AM peak hour in 2025. The eastbound left-turn movement will operate at LOS E with an average delay of 73.9 seconds. The 95-percentile queue length on the eastbound left-turn movement is 792 feet. During the PM peak hour, the intersection will operate at LOS E, with an average delay of 67.5 seconds. The westbound and northbound approaches will operate at LOS F. The delay on the westbound and northbound approaches will be 91.3 seconds and 100.9 seconds, respectively. The maximum 95th-percentile queue length for the northbound off-ramp will be 672 feet. The queue on the I-95 northbound off-ramp will not extend to the I-95 mainline.

Hypoluxo Road and Seacrest Boulevard/S 14th Street

The intersection of Hypoluxo Road and Seacrest Boulevard/S 14th Street is expected to operate at LOS D during the AM and PM peak hour in 2025. The eastbound and westbound approaches are operating at LOS D or better. However, the southbound and northbound approaches will operate at LOS E during the AM and PM peak hours.

Table 15 2025 Intersection Analysis – No-Build

			AM								PM							
			Movement				Approach		Intersection		Movement				Approach		Intersection	
Intersection	Movement	Storage Length (feet)	Volume	Delay (seconds)	LOS	Queue Length (feet)	Delay (seconds)	LOS	Delay (seconds)	LOS	Volume	Delay (seconds)	LOS	Queue Length (feet)	Delay (seconds)	LOS	Delay (seconds)	LOS
Hypoluxo Road at High Ridge Road	EBL	200	27	75.8	E	62	42.3	D	39.0	D	74	76.1	E	136	29.3	C	35.4	D
	EBT	-	2,016	41.9	D	#968					1,135	26.6	C	452				
	EBR	-	165								156							
	WBL	200	196	74.6	E	m289	22.1	C			166	82.7	F	m241	30.7	C		
	WBT	-	1,007	12.1	B	160					2,051	26.6	C	690				
	WBR	-	22								56							
	NBL	150	126	67.1	E	171	58.8	E			168	80.1	F	#245	66.3	E		
	NBT	-	34	54.9	D	214					89	55.4	E	244				
	NBR	-	239								123							
	SBL	150	42	66.2	E	81	71.7	E			24	65.6	E	55	77.9	E		
	SBT	-	88	73.4	E	185					79	79.9	E	209				
	SBR	-	41								69							
Hypoluxo Road at I-95 Southbound Ramps	EBT	-	1,624	25.2	C	504	17.9	B	34.9	C	1,021	52.8	D	376	42.1	D	38.5	D
	EBR	-	673	0.4	A	m0					261	0.2	A	0				
	WBL	340	446	59.3	E	#640	28.2	C			357	21.0	C	m294	15.8	B		
	WBT	-	762	10.0	A	196					1,497	14.5	B	m504				
	SBL	775	357	137.6	F	#488	92.5	F			422	70.7	E	#613	69.7	E		
	SBR		463	69	E	#137					776	65.8	E	#525				
Hypoluxo Road at I-95 Northbound Ramps	EBL	340	1,105	73.9	E	#792	48.6	D	42.5	D	436	22.3	C	m115	10.2	B	67.5	E
	EBT	-	876	16.7	B	m460					1,007	5.0	A	492				
	WBT	-	827	28.2	C	203	28.5	C			963	51.0	D	402	91.3	F		
	WBR	800	620	28.9	C	262					595	156.5	F	314				
	NBL	700	381	62.8	E	251	55.3	E			891	85.4	F	#643	100.9	F		
	NBR		279	44.9	D	77					480	129.6	F	#672				
Hypoluxo Road at Seacrest Blvd/S 14 Street	EBL	200	135	12.3	B	133	34.9	C	42.2	D	165	27.9	C	m182	43.7	D	48.8	D
	EBT	-	735	25.4	C	427					831	38.3	D	m495				
	EBR	250	215	81.7	F	164					395	61.7	E	m226				
	WBL	-	76	15.9	B	60	24.7	C			131	23.5	C	116	35.3	D		
	WBT	-	839	25.5	C	420					890	37.0	D	548				
	WBR	-	16								35							
	NBL	150	459	81.4	F	#386	74.8	E			559	75.4	E	457	69.9	E		
	NBT	-	34	78.4	E	#367					69	74.6	E	461				
	NBR	-	84	44.5	D	33					152	48.7	D	59				
	SBL	-	28	70	E	113	67.3	E			37	81.7	F	162	74.4	E		
	SBT	-	35								52							
	SBR	150	149	66.1	E	81					109	68.4	E	65				

Note: # - 95th-percentile volume exceeds capacity, queue may be longer.
m - Volume for 95th-percentile queue is metered by upstream signal.

5.2 2045 No-Build Analysis

5.2.1 I-95 Ramp Merge/Diverge/Weaving Analysis

The Design Year 2045 ramp merge/diverge/weaving analysis was performed using HCS 7 software. A peak hour factor of 0.95 was used for the I-95 mainline and I-95 ramps. Heavy vehicle factors of 3.7% and 2% were used for the I-95 mainline and I-95 ramps, respectively. The ramp analysis results are summarized in **Table 16**. The analysis results show that weaving segments of I-95 northbound and southbound between Hypoluxo Road and Lantana Road will operate at LOS F during the AM and PM peak hours. The volume-to-capacity (v/c) ratio at the weaving section is greater than 1. The I-95 southbound on-ramp during the AM peak hour and I-95 northbound off-ramp during the PM peak hour will operate at LOS F. The I-95 northbound off-ramp during the AM peak hour and I-95 southbound on-ramp during the PM peak hour will operate at LOS B and LOS C, respectively. The detailed analysis documents are provided in **Appendix H.**

Table 16 2045 Ramp Analysis Summary

Ramp	Analysis Type	AM Peak Hour					PM Peak Hour				
		Volume	Weaving Speed (mph)	Density (pc/mi/ln)	LOS	v/c Ratio	Volume	Weaving Speed (mph)	Density (pc/mi/ln)	LOS	v/c Ratio
I-95 NB Off Ramp	Diverge	812	-	19.8	B	0.22	1,527	-	32.9	**F**	0.41
I-95 NB On Ramp	Weaving	1,905	52.0	-	F	1.21	1,208	52.6	-	**F**	1.19
I-95 SB Off Ramp	Weaving	938	52.4	-	**F**	1.21	1,419	53.0	-	**F**	1.08
I-95 SB On Ramp	Merge	1,363	-	34.5	**F**	0.7	718	-	24.7	C	0.37

5.2.2 Intersection Analysis

The Design Year 2045 No-Build intersection analysis results are summarized in **Table 15** and **Table 17**. Detailed SYNCHRO printouts are also provided in **Appendix H**.

Hypoluxo Road and High Ridge Road

By 2045, the intersection of Hypoluxo Road and High Ridge Road will operate at LOS E, with an average vehicle delay of 64.5 seconds during the AM peak hour. The eastbound approach will operate at LOS E, with an average delay of 76.7 seconds. The intersection will operate at LOS D during the PM peak hour.

Hypoluxo Road and I-95 Southbound Ramps

With the increased volumes in 2045, the intersection of Hypoluxo Road and I-95 southbound ramps will operate at LOS D during the AM and PM peak hours. The southbound approach will operate at LOS F, with average delays of around 150 seconds during the AM and PM peak hours. The delay will be 264.4 seconds for the southbound left-turn movement and 104.7 seconds for the westbound left-turn movement during the AM peak hour. The maximum 95th-percentile queue length on the I-95 southbound off-ramp will be 846 feet during the PM peak hour. The queue on the I-95 southbound off-ramp will not extend to I-95 mainline.

Hypoluxo Road and I-95 Northbound Ramps

In 2045, the intersection of Hypoluxo Road and I-95 northbound ramps will operate at LOS E during the AM peak hour. The LOS of eastbound left-turn will be F, with an average delay of 119.5 seconds. The 95th-percentile queue length of the eastbound left-turn is 886 feet. During the PM peak hour, the LOS for this intersection is F, with an average delay of 121.3 seconds. The westbound and northbound approaches will operate at LOS F with average delay of 108.5 seconds and 258.9 seconds, respectively. The maximum 95th-percentile queue length for the northbound off-ramp will be 881 feet during the PM peak hour. The queue on the I-95 northbound off-ramp will not extend to I-95 mainline.

Hypoluxo Road and Seacrest Boulevard/S 14th Street

The intersection of Hypoluxo Road and Seacrest Boulevard/S 14th Street is expected to operate at LOS D during the AM peak hour in 2045. However, during the PM peak hour, this intersection will operate at LOS E with an average delay of 62.3 seconds. The eastbound, northbound, and southbound approaches will operate at LOS E.

Table 17 2045 Intersection Analysis – No-Build

Intersection	Movement	Storage Length (feet)	AM Movement Volume	AM Movement Delay (seconds)	AM Movement LOS	AM Movement Queue Length (feet)	AM Approach Delay (seconds)	AM Approach LOS	AM Intersection Delay (seconds)	AM Intersection LOS	PM Movement Volume	PM Movement Delay (seconds)	PM Movement LOS	PM Movement Queue Length (feet)	PM Approach Delay (seconds)	PM Approach LOS	PM Intersection Delay (seconds)	PM Intersection LOS
Hypoluxo Road at High Ridge Road	EBL	200	47	73.7	E	92	76.7	E	64.5	E	103	84.9	F	#237	42.0	D	51.1	D
	EBT	-	2,232	76.8	E	#1091					1,238	38.9	D	599				
	EBR	-	208								189							
	WBL	200	234	89.3	F	m#459	25.9	C			207	81.9	F	m270	37.9	D		
	WBT	-	1,122	13.1	B	166					2,229	33.9	C	m#978				
	WBR	-	34								88							
	NBL	150	161	180.7	F	#291	101.4	F			212	244.9	F	#477	134.9	F		
	NBT	-	39	61.6	E	307					119	49.1	D	297				
	NBR	-	280								153							
	SBL	150	64	119.8	F	#136	85.9	F			39	61.3	E	76	78.1	E		
	SBT	-	123	74.2	E	248					111	81.2	F	290				
	SBR	-	61								102							
Hypoluxo Road at I-95 Southbound Ramps	EBT	-	1,751	19.1	B	m391	13.0	B	49.3	D	1,118	28.2	C	198	22.1	C	52.5	D
	EBR	-	825	0.1	A	m0					312	0.2	A	0				
	WBL	340	538	104.7	F	#864	46.5	D			406	20.4	C	m118	8.2	A		
	WBT	-	864	10.2	B	268					1,608	5.2	A	m0				
	SBL	775	412	264.4	F	#623	153.1	F			503	145.5	F	#846	145.9	F		
	SBR		526	63.3	E	211					916	131.8	F	#749				
Hypoluxo Road at I-95 Northbound Ramps	EBL	340	1,221	119.5	F	m#886	74.7	E	59.4	E	523	8.9	A	m37	5.3	A	121.3	F
	EBT	-	942	16.7	B	m471					1,098	3.5	A	m1				
	WBT	-	939	34.8	C	298	39.2	D			1,024	78.0	E	#498	108.5	F		
	WBR	800	684	45.3	D	#429					685	154.0	F	#787				
	NBL	700	463	68.3	E	304	59.0	E			990	264.1	F	#881	258.9	F		
	NBR		349	46.5	D	86					537	249.3	F	#869				
Hypoluxo Road at Seacrest Blvd/S 14 Street	EBL	200	144	18.5	B	168	43.3	D	47.2	D	170	47.0	D	m175	71.5	E	62.3	E
	EBT	-	782	33.1	C	502					859	59.4	E	m467				
	EBR	250	287	83.5	F	208					526	99.1	F	m245				
	WBL	-	123	22.1	C	112	32.8	C			217	38.9	D	219	44.4	D		
	WBT	-	858	34.3	C	509					906	45.6	D	591				
	WBR	-	21								42							
	NBL	150	607	71.9	E	452	65.5	E			690	76.4	E	#608	65.4	E		
	NBT	-	49	71.1	E	451					97	74.0	E	#600				
	NBR	-	139	36.8	D	31					244	34.1	C	91				
	SBL	-	33	71.1	E	133	66.6	E			42	88.2	F	#213	77.8	E		
	SBT	-	44								71							
	SBR	150	158	64.4	E	72					113	67.3	E	65				

Note: # - 95th-percentile volume exceeds capacity, queue may be longer.
m - Volume for 95th-percentile queue is metered by upstream signal.

6 Future Build Alternatives

The following Build Alternatives have been considered to improve the operation and safety with the future travel demand:

- Build Alternative 1 - Enhanced Diamond Interchange
- Build Alternative 2 - Diverging Diamond Interchange (DDI)

For the future Build Alternatives, the number of lanes and volumes on I-95 and I-95 ramps at the junction areas will be the same as the No-Build Alternative. Therefore, the ramps merge/diverge/weaving analysis will also be the same as the No-Build Alternative.

Build Alternative 1 (Enhanced Diamond Interchange)

The Build Alternative 1 is based on the concept plan as recommended by the ICDR and includes improvements to the adjacent intersections. The recommended improvements are as follows:

- Add a second left-turn lane on the I-95 southbound off-ramp;
- Add a third left-turn lane on the I-95 northbound off-ramp;
- Add a receiving lane on the I-95 northbound on-ramp;
- Add one right-turn lane on eastbound, northbound, and southbound approaches at the High Ridge Road intersection; and
- Add a third westbound through lane on Hypoluxo Road from Seacrest Boulevard/S 14th Street to the existing six-lane section of Hypoluxo Road at the median opening east of High Ridge Road; extend the westbound right-turn lane from Seacrest Boulevard to I-95 northbound on-ramp; and add one southbound through lane and restripe the southbound approach as left-turn, through, and right-turn lanes (currently there is a shared left-through lane and right-turn lane).

The improvements are illustrated in **Figure 18**.

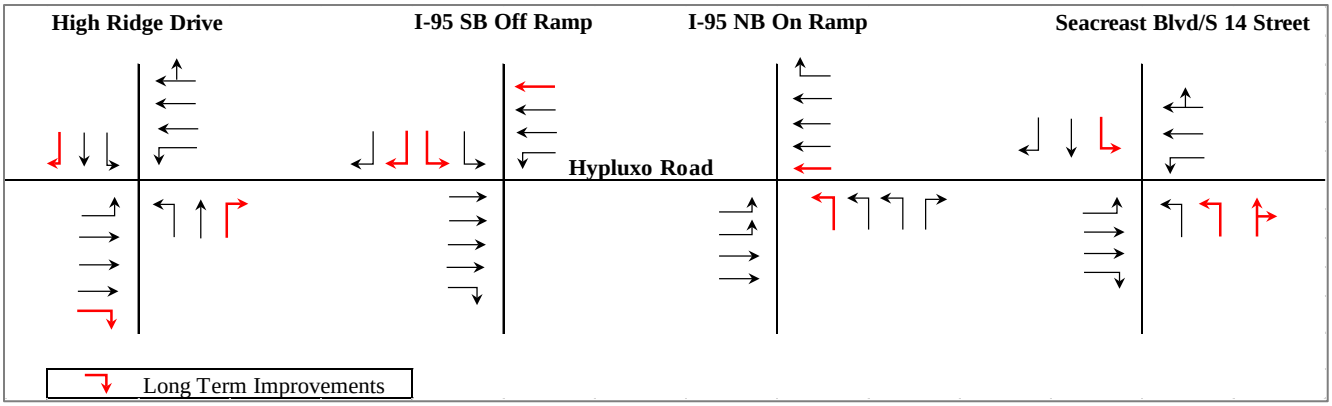


Figure 18 –Intersection Lane Geometry - Build Alternative 1

Build Alternative 2 (DDI)

Under the Build Alternative 2, the existing Tight Urban Diamond Interchange will be converted to a Diverging Diamond Interchange (DDI). The southbound off-ramp improvements proposed in the ICDR are included. There are no improvements proposed to High Ridge Drive and Seacrest Boulevard/S 14th Street. The DDI provides two crossing conflicts compared to the four crossing conflicts of a conventional diamond interchange. The proposed intersection lane geometry is depicted in **Figure 19**.

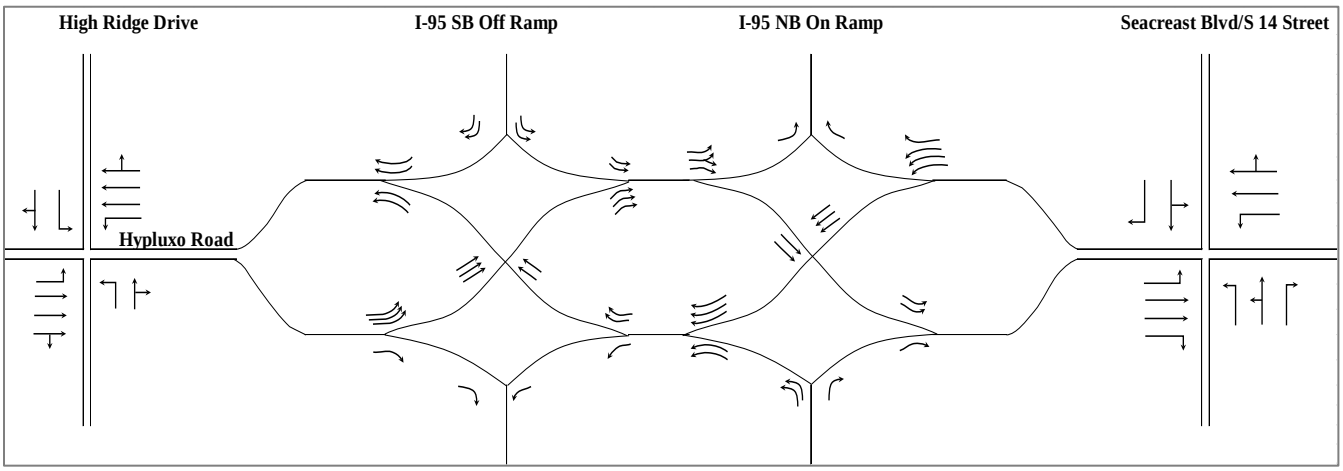


Figure 19 –Intersection Lane Geometry - Build Alternative 2 (DDI)

Traffic Volume for Build Alternatives

The traffic volumes for Build Alternatives in Opening Year 2025 and Design Year 2045 were developed by keeping the same volumes for I-95 mainline, ramps, and turning movement volumes

at the intersections under the No-Build Alternative. The AADT in the two Build Alternatives will be the same as the AADT under No-Build Alternative. The future year 2025 and 2045 intersection turning movement volumes and DDHV during the AM and PM peak hours for the Build Alternatives 1 and 2 are shown in **Figure 20** through **Figure 25**.

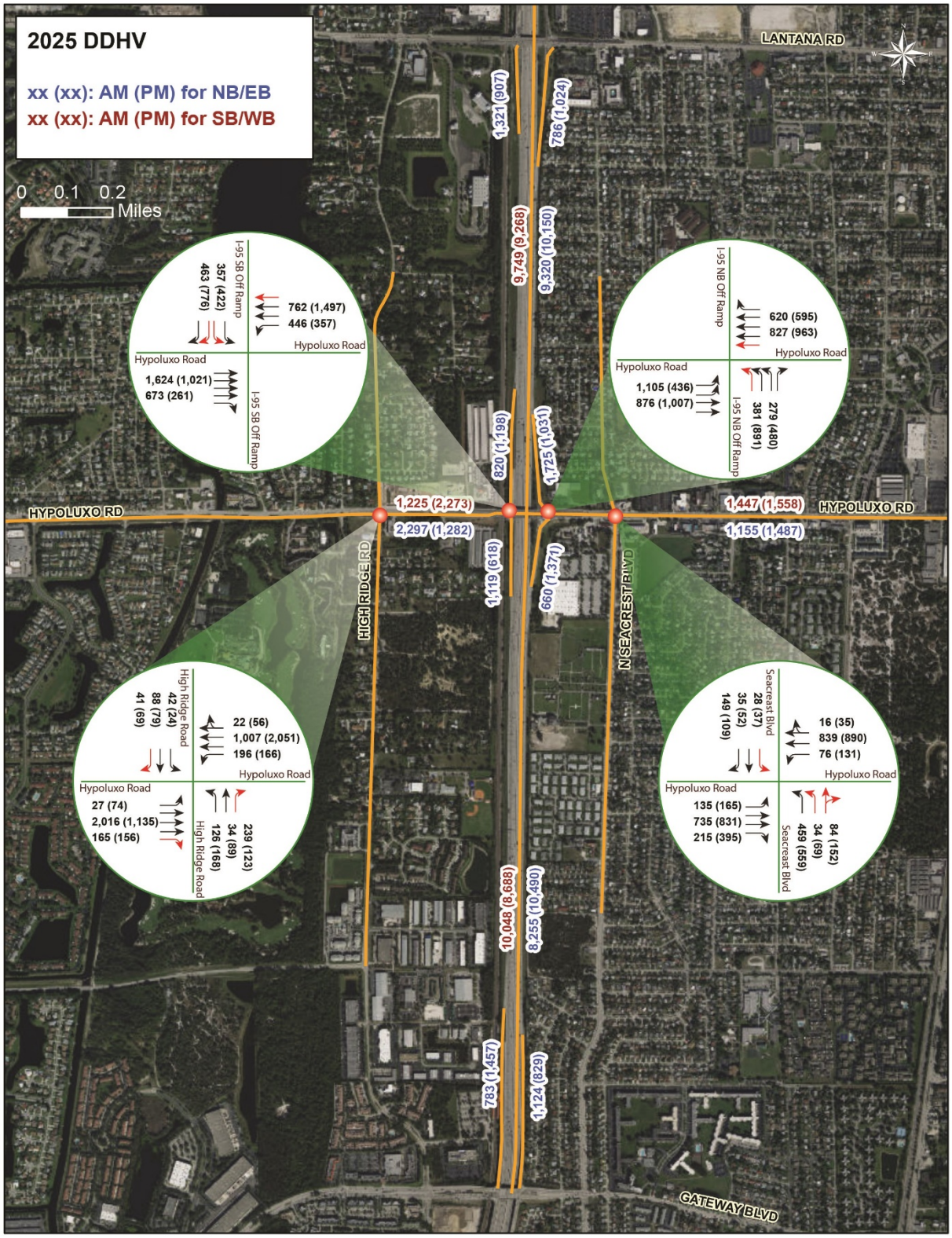


Figure 20 – 2025 Peak Hour Volumes and DDHV for Build Alternative 1

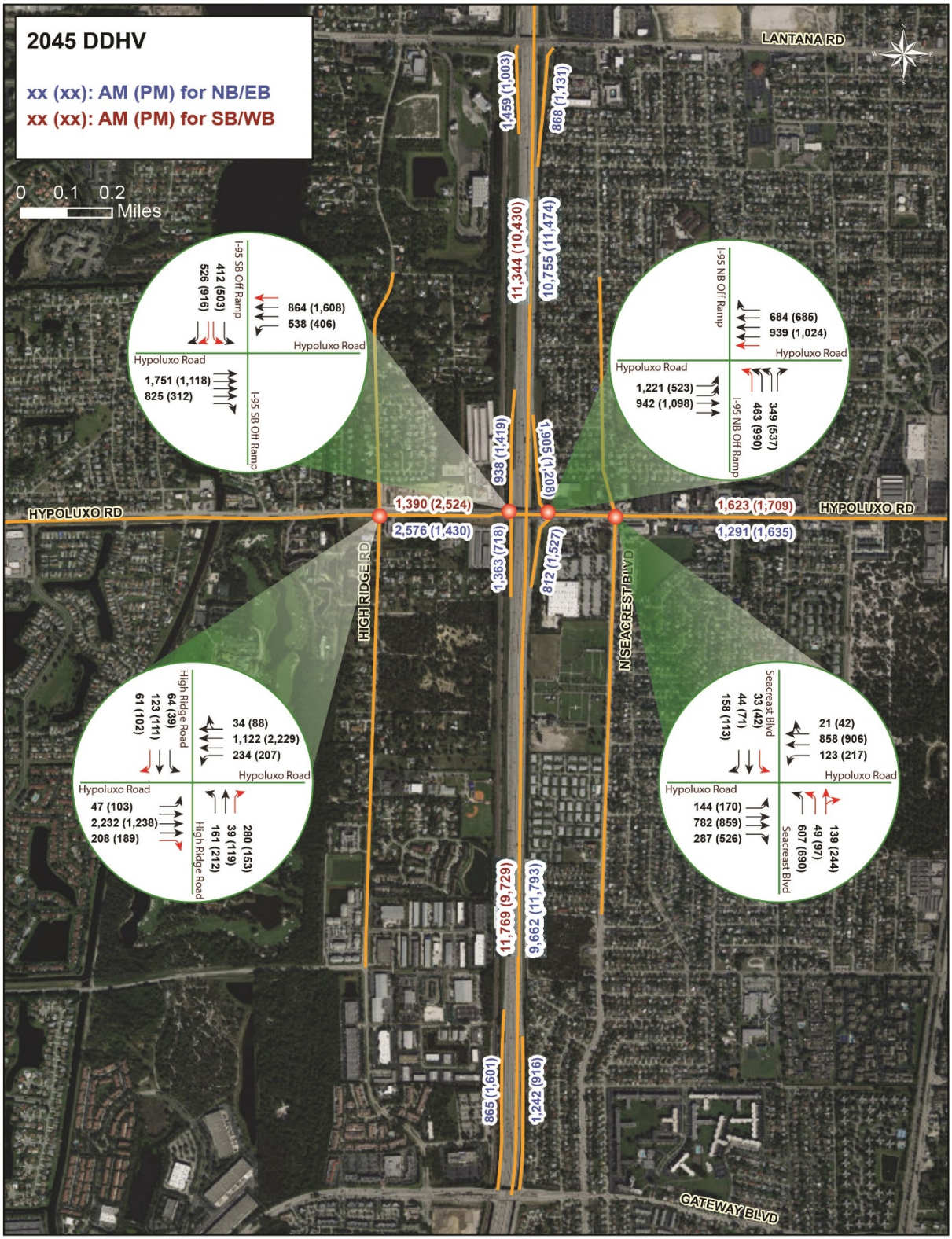


Figure 21 - 2045 Peak Hour Volumes and DDHV for Build Alternative 1

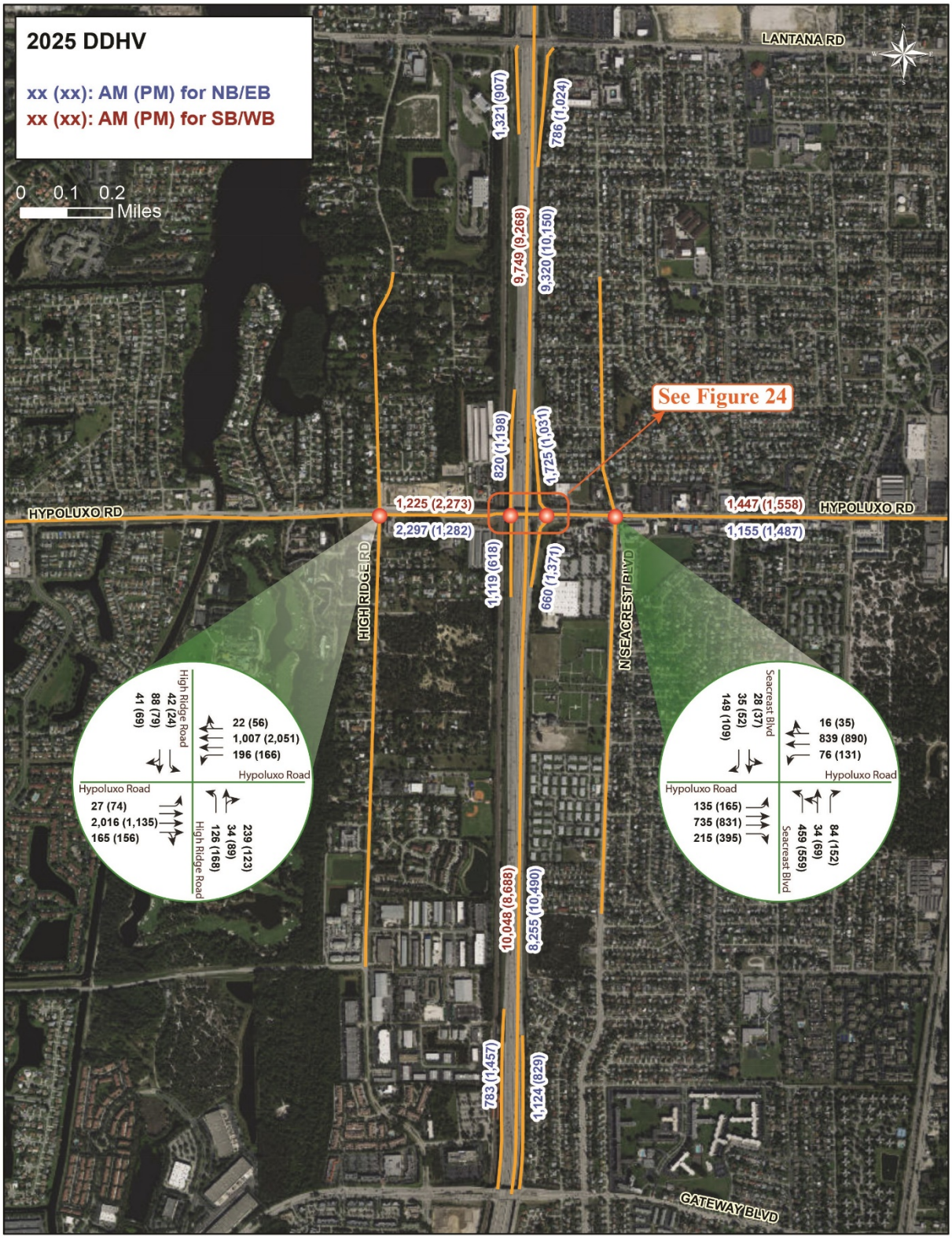


Figure 22 – 2025 Peak Hour Volumes and DDHV for Build Alternative 2

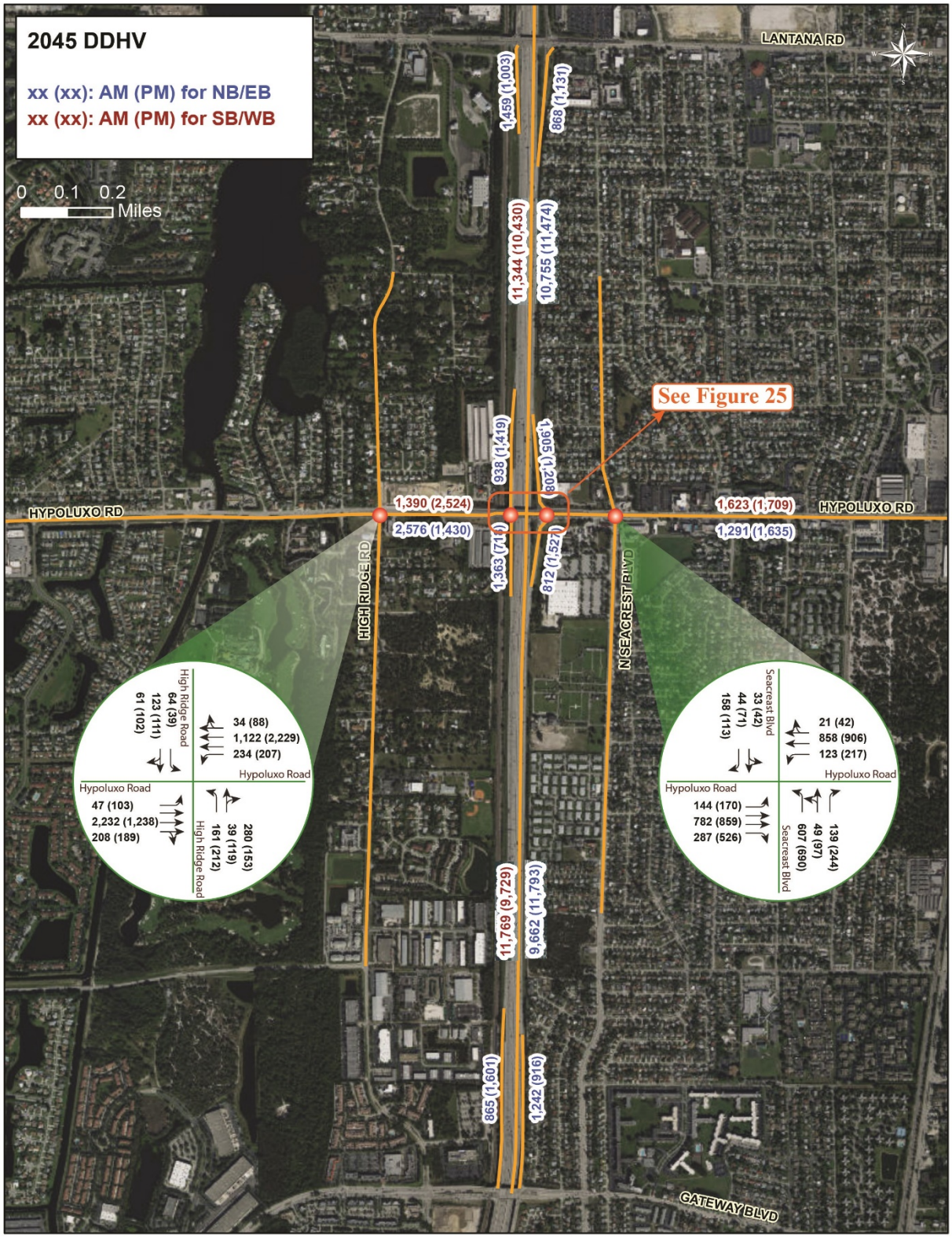


Figure 23 – 2045 Peak Hour Volumes and DDHV for Build Alternative 2

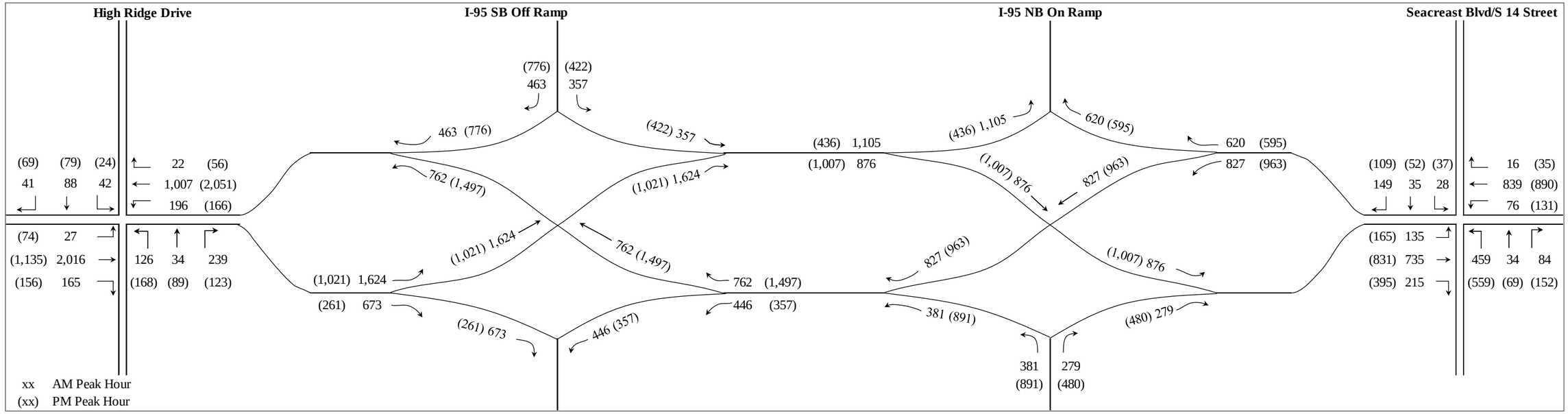


Figure 24 - 2025 Peak Hour Turning Movement Volumes for Build Alternative 2

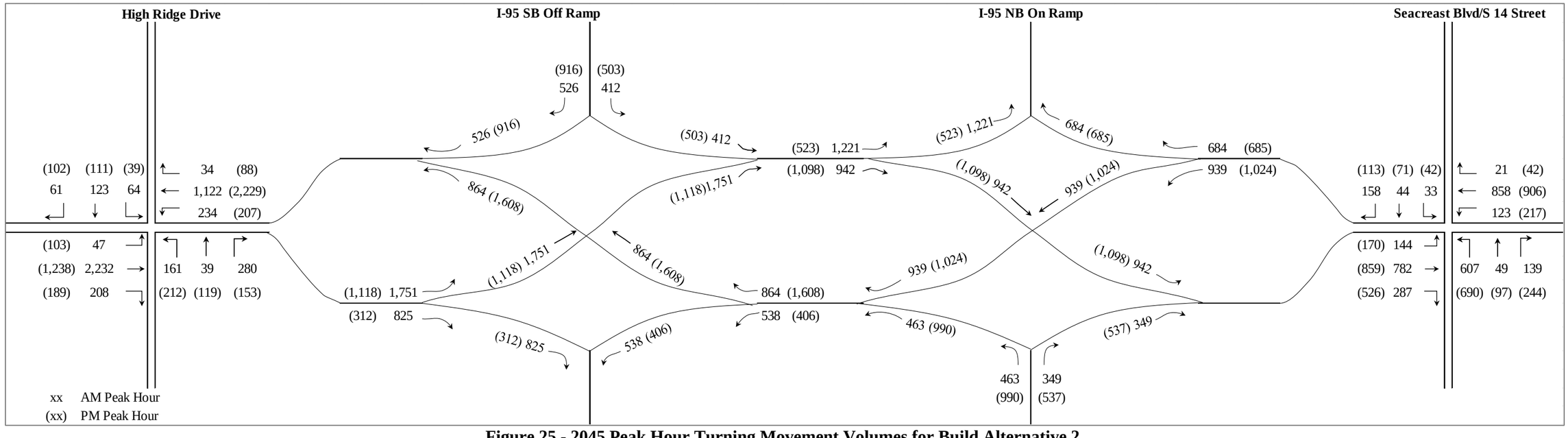


Figure 25 - 2045 Peak Hour Turning Movement Volumes for Build Alternative 2

7 Build Alternatives Analysis

The traffic operational analysis was conducted for Opening Year 2025 and Design Year 2045 for the Build Alternatives. The *Highway Capacity Manual (HCM) 6th Edition*, HCS Version 7.7, and Synchro Version 10.0 were used in the analysis. The existing signalized intersection's signal timing cycle length, phases, and actuated coordinated signalization were used in the future year intersection analysis. Due to the additional northbound left-turn lane on the northbound approach at the intersection of Hypoluxo Road at Seacrest Boulevard/S 14th Street, the split phase is changed to protected left-turn phase, plus the northbound/southbound through phase to the future signal timing of Build Alternatives. The Build Alternatives analyses were conducted to evaluate the increase in delay and congestion for the 2025 and 2045 future conditions.

7.1 2025 Build Alternative

7.1.1 Build Alternative 1 (Enhanced Diamond Interchange)

7.1.1.1 I-95 Mainline Ramp Merge/Diverge/Weaving Analysis

Under the Build Alternative 1, the lane geometry and volumes on the I-95 and the I-95 ramps at the junction areas will be the same as the No-Build Alternative in 2025. The ramp merge/diverge/weaving analysis is the same as the No-Build Alternative. The ramp analysis results are summarized in **Table 18**. The weaving segments of I-95 northbound and southbound between Hypoluxo Road and Lantana Road are operating at LOS F during the AM and PM peak hours. The I-95 northbound off-ramp and I-95 southbound on-ramp are operating at LOS C or better during the AM and PM peak hours.

Table 18 2025 Ramp Analysis – Build Alternative 1

Ramp	Analysis Type	AM Peak Hour					PM Peak Hour				
		Volume	Weaving Speed (mph)	Density (pc/mi/ln)	LOS	v/c Ratio	Volume	Weaving Speed (mph)	Density (pc/mi/ln)	LOS	v/c Ratio
I-95 NB Off Ramp	Diverge	660	-	15.6	B	0.18	1,371	-	23.1	C	0.37
I-95 NB On Ramp	Weaving	1,725	52.8	-	F	1.05	1,031	53.3	-	F	1.05
I-95 SB Off Ramp	Weaving	820	53.2	-	F	1.04	1,198	53.7	46.3	F	0.96
I-95 SB On Ramp	Merge	1,119	-	27.6	C	0.57	618	-	20.7	C	0.32

7.1.1.2 Intersection Analysis

The Build Alternative 1 includes improvements to the on- and off-ramps, as well as those to the adjacent intersections recommended by the ICDR. The 2025 intersection LOS analyses for AM and PM peak hours are summarized in **Table 19**. Detailed SYNCHRO printouts are provided in **Appendix I**.

Hypoluxo Road and High Ridge Road

With the recommended improvements, the intersection of Hypoluxo Road and High Ridge Road is expected to operate at LOS C during the AM and PM peak hours in 2025. The eastbound and westbound approaches will operate at LOS C. The southbound and northbound approaches will operate at LOS E, with average delays of less than 65 seconds during the AM and PM peak hours.

Hypoluxo Road and I-95 Southbound Ramps

The intersection operational analysis shows that the intersection of Hypoluxo Road and I-95 southbound ramps will operate at LOS C during the AM peak hour and LOS D during the PM peak hour in 2025. All movements will operate at LOS D or better except for the southbound left-turn movement during the AM peak hour and southbound right-turn during the PM peak hour. The southbound left-turn will operate at LOS E, with an average delay of 57.1 seconds during the AM peak hour. The southbound right-turn will operate at LOS E, with an average delay of 59.6 seconds during the PM peak hour. The maximum 95th-percentile queue length for the I-95 southbound off-ramp is 500 feet during the PM peak hour. The queue on the I-95 southbound off-ramp will not extend to I-95 mainline.

Hypoluxo Road and I-95 Northbound Ramps

The intersection operational analysis shows that the intersection of Hypoluxo Road and I-95 northbound ramps will operate at LOS C during the AM and PM peak hours in 2025. All movements will operate at LOS D or better except the northbound right-turn during the PM peak hour. The northbound right-turn will operate at LOS E, with an average delay of 67.3 seconds during the PM peak hour. The maximum 95th-percentile queue length for the I-95 northbound off-ramp is 612 feet during the PM peak hour. The queue on the I-95 northbound off-ramp will not extend to I-95 mainline.

Hypoluxo Road and Seacrest Boulevard/S 14th Street

The intersection of Hypoluxo Road and Seacrest Boulevard/S 14th Street is expected to operate at LOS D during the AM and PM peak hours in 2025. The eastbound and westbound approaches will operate at LOS D or better during the AM and PM peak hours. The northbound and southbound approaches will operate at LOS E, with an average delay of less than 70 seconds during the AM and PM peak hours.

Table 19 2025 Intersection Analysis - Build Alternative 1

Intersection	Movement	Storage Length (feet)	AM								PM							
			Movement				Approach		Intersection		Movement				Approach		Intersection	
			Volume	Delay (seconds)	LOS	Queue Length (feet)	Delay (seconds)	LOS	Delay (seconds)	LOS	Volume	Delay (seconds)	LOS	Queue Length (feet)	Delay (seconds)	LOS	Delay (seconds)	LOS
Hypoluxo Road at High Ridge Road	EBL	200	27	72.1	E	62	30.5	C	32.1	C	74	76.1	E	136	25.3	C	29.8	C
	EBT	-	2,016	31.0	C	749					1,135	22.9	C	349				
	EBR	-	165	17.9	B	40					156	18.4	B	40				
	WBL	200	196	75.5	E	297	22.0	C			166	89.6	F	m236	24.8	C		
	WBT	-	1,007	11.8	B	130					2,051	19.7	B	852				
	WBR	-	22								56							
	NBL	150	126	82.4	F	#190	58.9	E			168	70.3	E	245	60.0	E		
	NBT	-	34	62.5	E	70					89	62.5	E	151				
	NBR	-	239	46.0	D	208					123	44.0	D	90				
	SBL	150	42	60.6	E	73	63.2	E			24	64.8	E	50	63.6	E		
	SBT	-	88	67.9	E	147					79	70.7	E	143				
	SBR	-	41	55.7	E	0					69	55.1	E	6				
Hypoluxo Road at I-95 Southbound Ramps	EBT	-	1,624	33.8	C	540	24.1	C	28.1	C	1,021	49.3	D	309	39.3	D	36.1	D
	EBR	-	673	0.6	A	0					261	0.2	A	0				
	WBL	340	446	27.3	C	#471	17.7	B			357	24.7	C	327	22.3	C		
	WBT	-	762	12.1	B	183					1,497	21.8	C	357				
	SBL	775	357	57.1	E	221	54.4	D			422	44.1	D	243	54.1	D		
	SBR		463	52.3	D	77					776	59.6	E	500				
Hypoluxo Road at I-95 Northbound Ramps	EBL	340	1,105	33.3	C	#701	19.5	B	25.6	C	436	48.0	D	m285	22.6	C	32.1	C
	EBT	-	876	2.2	A	0					1,007	11.6	B	602				
	WBT	-	827	36.0	D	226	20.9	C			963	33.6	C	261	21.0	C		
	WBR	800	620	0.7	A	0					595	0.6	A	0				
	NBL	700	381	54.3	D	159	54.5	D			891	47.7	D	342	54.5	D		
	NBR		279	54.7	D	177					480	67.3	E	#612				
Hypoluxo Road at Seacrest Blvd/S 14 Street	EBL	200	135	20.6	C	163	37.8	D	39.8	D	165	39.3	D	m183	33.7	C	40.6	D
	EBT	-	735	32.1	C	441					831	45.8	D	464				
	EBR	250	215	68.3	E	81					395	6.0	A	m16				
	WBL	-	76	14.7	B	59	22.8	C			131	18.2	B	103	27.3	C		
	WBT	-	839	23.5	C	414					890	28.6	C	509				
	WBR	-	16								35							
	NBL	150	459	65.9	E	285	62.6	E			559	67.6	E	356	63.8	E		
	NBT	-	34	49.7	D	93					69	54.1	D	230				
	NBR	-	84								152							
	SBL	-	28	64.4	E	44	62.4	E			37	71.1	E	56	69.1	E		
	SBT	-	35	70.1	E	74					52	83.3	F	108				
	SBR	150	149	60.2	E	100					109	61.7	E	61				

Note: # - 95th-percentile volume exceeds capacity, queue may be longer.
m - Volume for 95th-percentile queue is metered by upstream signal.

7.1.2 Build Alternative 2 (DDI)

7.1.2.1 I-95 Mainline Ramp Merge/Diverge/Weaving Analysis

Under the Build Alternative 2, the lane geometry and volumes on the I-95 and the I-95 ramps at the junction areas will be the same as the No-Build Alternative in 2025. The Opening Year 2025 ramp merge/diverge/weaving analysis is the same as under the No-Build Alternative. The ramp analysis results are summarized in **Table 20**. The weaving segments of I-95 northbound and southbound between Hypoluxo Road and Lantana Road are operating at LOS F during the AM and PM peak hours. The I-95 northbound off-ramp and I-95 southbound on-ramp are operating at LOS C or better during the AM and PM peak hours.

Table 20 2025 Ramp Analysis – Build Alternative 2

Ramp	Analysis Type	AM Peak Hour					PM Peak Hour				
		Volume	Weaving Speed (mph)	Density (pc/mi/ln)	LOS	v/c Ratio	Volume	Weaving Speed (mph)	Density (pc/mi/ln)	LOS	v/c Ratio
I-95 NB Off Ramp	Diverge	660	-	15.6	B	0.18	1,371	-	23.1	C	0.37
I-95 NB On Ramp	Weaving	1,725	52.8	-	**F**	1.05	1,031	53.3	-	**F**	1.05
I-95 SB Off Ramp	Weaving	820	53.2	-	**F**	1.04	1,198	53.7	46.3	**F**	0.96
I-95 SB On Ramp	Merge	1,119	-	27.6	C	0.57	618	-	20.7	C	0.32

7.1.2.2 Intersection Analysis

Based on the existing analysis, movements at the study intersections are failing to operate at LOS target. With the increased traffic, more movements will be failing in 2025. The future 2025 intersection LOS analyses for the AM and PM peak hours are summarized in **Table 21**. Detailed SYNCHRO printouts are provided in **Appendix I**.

Hypoluxo Road and High Ridge Road

The intersection of Hypoluxo Road and High Ridge Road is expected to operate at LOS D or better during the AM and PM peak hours in 2025. The eastbound and westbound will operate at LOS D or better, while the northbound and southbound approaches will operate at LOS E during the AM and PM peak hours in 2025.

Hypoluxo Road and I-95 Southbound Ramps

The intersection operational analysis shows that the intersection of I-95 southbound ramps and Hypoluxo Road will operate at LOS B during the AM and PM peak hours in 2025. All movements will operate at LOS C or better. The maximum 95th-percentile queue length on the I-95 southbound off-ramp will be 293 feet during the PM peak hour. The queues on I-95 southbound off-ramp will not extend to I-95 mainline.

Hypoluxo Road and I-95 Northbound Ramps

The intersection operational analysis shows that the intersection of Hypoluxo Road and I-95 northbound ramps will operate at LOS B during the AM and PM peak hours in 2025. All movements will operate at LOS C or better. The maximum 95th-percentile queue length on the I-95 northbound off-ramp will be 285 feet during the PM peak hour. The queues on I-95 southbound off-ramp and northbound off-ramp will not extend to I-95 mainline.

Hypoluxo Road and Seacrest Boulevard/S 14th Street

The intersection of Hypoluxo Road and Seacrest Boulevard/S 14th Street is expected to operate at LOS D during the AM and PM peak hours in 2025. The eastbound and westbound approaches will operate at LOS D or better. The northbound and southbound approaches will operate at LOS E during the AM and PM peak hours.

Table 21 2025 Intersection Analysis - Build Alternative 2

Intersection	Movement	Storage Length (feet)	AM Peak								PM Peak							
			Movement				Approach		Intersection		Movement				Approach		Intersection	
			Volume	Delay (seconds)	LOS	Queue Length (feet)	Delay (seconds)	LOS	Delay (seconds)	LOS	Volume	Delay (seconds)	LOS	Queue Length (feet)	Delay (seconds)	LOS	Delay (seconds)	LOS
Hypoluxo Road at High Ridge Road	EBL	200	27	75.8	E	62	37.6	D	37.3	D	74	76.1	E	136	29.9	C	34.2	C
	EBT	-	2016	37.1	D	#930					1135	27.2	C	452				
	EBR	-	165								156							
	WBL	200	196	62.1	E	293	20.0	B			166	72.3	E	m211	28.8	C		
	WBT	-	1007	11.9	B	232					2051	25.4	C	765				
	WBR	-	22								56							
	NBL	150	126	102.8	F	#202	72.8	E			168	72.5	E	#245	62.5	E		
	NBT	-	34	59.0	E	226					89	54.6	D	244				
	NBR	-	239								123							
	SBL	150	42	77.4	E	84	74.4	E			24	65.6	E	55	77.9	E		
	SBT	-	88	73.4	E	185					79	79.9	E	209				
	SBR	-	41								69							
Hypoluxo Road at I-95 Southbound Ramps	EBT	-	1,624	22.2	C	386	15.7	B	14.6	B	1,021	28.1	C	382	22.4	C	16.0	B
	EBR	-	673	0	A	0					261	0	A	0				
	WBL	340	446	12.6	B	142	12.6	B			357	7.4	A	162	7.4	A		
	WBT	-	762	12.6	B	142					1,497	7.4	A	162				
	SBL	775	357	12.3	B	76	14.2	B			422	10.6	B	79	22.5	C		
	SBR		463	15.7	B	88					776	29	C	#293				
Hypoluxo Road at I-95 Northbound Ramps	EBL	340	1,105	22.2	C	386	22.2	C	19.0	B	436	28.1	C	382	28.1	C	19.8	B
	EBT	-	876	22.2	C	386					1,007	28.1	C	382				
	WBT	-	827	12.6	B	142	16.5	B			963	7.4	A	162	9.8	A		
	WBR	800	620	21.7	C	95					595	13.7	B	397				
	NBL	700	381	15.3	B	96	14.8	B			891	25.7	C	285	22.3	C		
	NBR		279	14.1	B	124					480	16	B	253				
Hypoluxo Road at Seacrest Blvd/S 14 Street	EBL	200	135	25.1	C	111	33.0	C	40.1	D	165	32.4	C	m121	40.5	D	46.7	D
	EBT	-	735	32.2	C	440					831	39.2	D	533				
	EBR	250	215	40.6	D	92					395	46.8	D	m323				
	WBL	-	76	17.1	B	68	26.2	C			131	22.6	C	115	33.6	C		
	WBT	-	839	27.0	C	463					890	35.2	D	554				
	WBR	-	16								35							
	NBL	150	459	70.8	E	343	66.1	E			559	75.1	E	451	68.0	E		
	NBT	-	34	69.0	E	337					69	74.3	E	454				
	NBR	-	84	43.3	D	21					152	40.6	D	42				
	SBL	-	28	70.7	E	114	67.1	E			37	82.7	F	#171	75.0	E		
	SBT	-	35								52							
	SBR	150	149	65.6	E	61					109	68.6	E	65				

Note: # - 95th-percentile volume exceeds capacity, queue may be longer.
m - Volume for 95th-percentile queue is metered by upstream signal.

7.2 2045 Build Alternatives

7.2.1 Build Alternative 1 (Enhanced Diamond Interchange)

7.2.1.1 I-95 Mainline Ramp Merge/Diverge/Weaving Analysis

Under the Build Alternative 1, the lane geometry and volumes on the I-95 and the I-95 ramps at the junction areas will be the same as under the No-Build Alternative in 2045. The ramp merge/diverge/weaving analysis is the same as under the No-Build Alternative. The ramp analysis results are summarized in **Table 22**. The weaving segments of I-95 northbound and southbound between Hypoluxo Road and Lantana Road are operating at LOS F during the AM and PM peak hours. The volume-to-capacity (v/c) ratio at the weaving section is greater than 1. The I-95 southbound on-ramp during the AM peak hour and I-95 northbound off-ramp during the PM peak hour will operate at LOS F. The I-95 northbound off-ramp during the AM peak hour and I-95 southbound on-ramp during the PM peak hour will operate at LOS B and LOS C, respectively. The detailed analysis documents are provided in **Appendix I.**

Table 22 2045 Ramp Analysis – Build Alternative 1

Ramp	Analysis Type	AM Peak Hour					PM Peak Hour				
		Volume	Weaving Speed (mph)	Density (pc/mi/ln)	LOS	v/c Ratio	Volume	Weaving Speed (mph)	Density (pc/mi/ln)	LOS	v/c Ratio
I-95 NB Off Ramp	Diverge	812	-	19.8	B	0.22	1,527	-	32.9	F	0.41
I-95 NB On Ramp	Weaving	1,905	52.0	-	F	1.21	1,208	52.6	-	F	1.19
I-95 SB Off Ramp	Weaving	938	52.4	-	F	1.21	1,419	53.0	-	F	1.08
I-95 SB On Ramp	Merge	1,363	-	34.5	F	0.7	718	-	24.7	C	0.37

7.2.1.2 Intersection Analysis

The 2045 intersection LOS analyses for the AM and PM peak hours are summarized in **Table 23**. Detailed SYNCHRO printouts are provided in **Appendix I**.

Hypoluxo Road and High Ridge Road

With the recommended improvements, the intersection of Hypoluxo Road and High Ridge Road is expected to operate at LOS D during the AM peak hour and LOS C during the PM peak hour in 2045. The eastbound and westbound approaches will operate at LOS D or better. The southbound approach will operate at LOS E with an average delay of less than 65 seconds during the AM and

PM peak hours by 2045. The northbound approach will operate at LOS E during the AM peak hour and LOS F during the PM peak hour.

Hypoluxo Road and I-95 Southbound Ramps

By 2045, the intersection of Hypoluxo Road and I-95 southbound ramps will operate at LOS D or better during the AM and PM peak hours. However, the southbound approach will operate at LOS E during the AM and PM peak hours. The average delay of the southbound approach will be 61.3 seconds during the AM peak hour and 77.1 seconds during the PM peak hour. Moreover, the southbound right-turn movement will operate at LOS F during the PM peak hour. The maximum 95th-percentile queue length on the southbound off-ramp will be 706 feet during the PM peak hour in 2045. The queue on the I-95 southbound off-ramp will not extend to the I-95 mainline.

Hypoluxo Road and I-95 Northbound Ramps

The intersection operational analysis shows that the intersection of Hypoluxo Road and I-95 northbound ramps will operate at LOS D during the AM and PM peak hours in 2045. However, the eastbound and northbound approaches will operate at LOS E during the AM peak hour. The eastbound left-turn movement will operate at LOS F, with an average delay of 95.9 seconds during the AM peak hour. The 95th-percentile queue length on the eastbound left-turn movement is 907 feet. The northbound approach will also operate at LOS E during the PM peak hour. The northbound right-turn movement will operate at LOS F, with an average delay of 124.1 seconds. The maximum 95th-percentile queue length on the I-95 northbound off-ramp will be 792 feet during the PM peak hour in 2045. The queue on the I-95 northbound off-ramp will not extend to I-95 mainline.

Hypoluxo Road and Seacrest Boulevard/S 14th Street

The intersection of Hypoluxo Road and Seacrest Boulevard/S 14th Street is expected to operate at LOS D during the AM and PM peak hours. The eastbound and westbound approaches will operate at LOS D or better during the AM and PM peak hours. The northbound and southbound approaches will operate at LOS E, with an average delay of less than 65 seconds during the AM and PM peak hours.

Table 23 2045 Intersection Analysis - Build Alternative 1

Intersection	Movement	Storage Length (feet)	AM	Build Alt 1							PM	Build Alt 1						
				Movement			Approach		Intersection			Movement			Approach		Intersection	
			Volume	Delay (seconds)	LOS	Queue Length (feet)	Delay (seconds)	LOS	Delay (seconds)	LOS	Volume	Delay (seconds)	LOS	Queue Length (feet)	Delay (seconds)	LOS	Delay (seconds)	LOS
Hypoluxo Road at High Ridge Road	EBL	200	47	70.4	E	91	49.5	D	45.3	D	103	73.7	E	174	29.1	C	32.9	C
	EBT	-	2232	51.5	D	#986					1238	26.7	C	427				
	EBR	-	208	23.0	C	74					189	21.2	C	71				
	WBL	200	234	75.0	E	346	24.3	C			207	88.3	F	m264	21.5	C		
	WBT	-	1122	14.1	B	155					2229	15.5	B	m768				
	WBR	-	34								88							
	NBL	150	161	140.6	F	#285	75.6	E			212	135.9	F	#392	88.6	F		
	NBT	-	39	59.8	E	75					119	64.3	E	189				
	NBR	-	280	40.6	D	244					153	42.1	D	113				
	SBL	150	64	59.5	E	100	61.9	E			39	63.5	E	70	62.9	E		
	SBT	-	123	68.5	E	190					111	73.7	E	185				
	SBR	-	61	51.2	D	0					102	50.9	D	38				
Hypoluxo Road at I-95 Southbound Ramps	EBT	-	1751	29.0	C	m575	19.9	B	32.3	C	1118	40.8	D	389	32.0	C	40.8	D
	EBR	-	825	0.6	A	m102					312	0.3	A	0				
	WBL	340	538	74.5	E	#783	35.7	D			406	28.4	C	390	21.4	C		
	WBT	-	864	11.5	B	200					1608	19.6	B	360				
	SBL	775	412	65.4	E	262	61.3	E			503	45.9	D	293	77.1	E		
	SBR		526	58.1	E	163					916	94.3	F	#706				
Hypoluxo Road at I-95 Northbound Ramps	EBL	340	1221	95.9	F	#907	57.1	E	44.9	D	523	43.3	D	326	19.0	B	40.4	D
	EBT	-	942	6.9	A	193					1098	7.4	A	516				
	WBT	-	939	34.4	C	252	20.2	C			1024	43.3	D	345	26.2	C		
	WBR	800	684	0.8	A	0					685	0.7	A	0				
	NBL	700	463	56.6	E	194	61.8	E			990	54.4	D	404	78.9	E		
	NBR		349	68.6	E	#338					537	124.1	F	#792				
Hypoluxo Road at Seacrest Blvd/S 14 Street	EBL	200	144	26.8	C	m177	48.2	D	45.5	D	170	30.4	C	m183	42.4	D	47.3	D
	EBT	-	782	40.0	D	500					859	48.9	D	m515				
	EBR	250	287	81.0	F	m98					526	35.8	D	m277				
	WBL	-	123	18.5	B	97	27.6	C			217	31.1	C	179	38.8	D		
	WBT	-	858	28.8	C	463					906	40.5	D	570				
	WBR	-	21								42							
	NBL	150	607	62.3	E	360	58.7	E			690	64.8	E	437	60.6	E		
	NBT	-	49	47.0	D	151					97	52.2	D	369				
	NBR	-	139								244							
	SBL	-	33	66.2	E	48	64.2	E			42	65.9	E	58	63.8	E		
	SBT	-	44	74.4	E	90					71	75.3	E	#139				
	SBR	150	158	60.9	E	112					113	55.8	E	64				

Note: # - 95th-percentile volume exceeds capacity, queue may be longer.
m - Volume for 95th-percentile queue is metered by upstream signal.

7.2.2 Build Alternative 2 (DDI)

7.2.2.1 I-95 Mainline Ramp Merge/Diverge/Weaving Analysis

Under the Build Alternative 2, the lane geometry and volumes on the I-95 and the I-95 ramps at the junction areas will be the same as the No-Build Alternative in 2045. The Design Year 2045 ramp merge/diverge/weaving analysis was the same as under the No-Build Alternative. The ramp analysis results are summarized in **Table 24**. The weaving segments of I-95 northbound and southbound between Hypoluxo Road and Lantana Road are operating at LOS F during the AM and PM peak hours. The volume-to-capacity (v/c) ratio at the weaving section is greater than 1. The I-95 southbound on-ramp during the AM peak hour and I-95 northbound off-ramp during the PM peak hour will operate at LOS F. The I-95 northbound off-ramp during the AM peak hour and I-95 southbound on-ramp during the PM peak hour will operate at LOS B and LOS C, respectively.

Table 24 2045 Ramp Analysis – Build Alternative 2

Ramp	Analysis Type	AM Peak Hour					PM Peak Hour				
		Volume	Weaving Speed (mph)	Density (pc/mi/ln)	LOS	v/c Ratio	Volume	Weaving Speed (mph)	Density (pc/mi/ln)	LOS	v/c Ratio
I-95 NB Off Ramp	Diverge	812	-	19.8	B	0.22	1,527	-	32.9	**F**	0.41
I-95 NB On Ramp	Weaving	1,905	52.0	-	F	1.21	1,208	52.6	-	**F**	1.19
I-95 SB Off Ramp	Weaving	938	52.4	-	**F**	1.21	1,419	53.0	-	**F**	1.08
I-95 SB On Ramp	Merge	1,363	-	34.5	**F**	0.7	718	-	24.7	C	0.37

7.2.2.2 Intersection Analysis

The 2045 intersection LOS analyses for the AM and PM peak hours are summarized in **Table 25**. Detailed SYNCHRO printouts are provided in **Appendix I**.

Hypoluxo Road and High Ridge Road

The intersection of Hypoluxo Road and High Ridge Road is expected to operate at LOS E during the AM peak hour and LOS D during the PM peak hours in 2045. The eastbound and westbound approaches will operate at LOS D or better, except for the eastbound approach during the AM peak hour. The eastbound approach will operate at LOS E during the AM peak hour. The queue length of the westbound through movement will be 1,023 feet during the PM peak hour. The distance between the intersection of Hypoluxo Road at High Ridge Road and at the southbound terminal

intersection is approximately 1,500 feet. Therefore, the westbound queue at this intersection will not affect the interchange terminal operation. The southbound approach will operate at LOS F during the AM peak hour and LOS E during the PM peak hour. The northbound approach will operate at LOS F during the AM and PM peak hours.

Hypoluxo Road and I-95 Southbound Ramps

The intersection operational analysis shows that the intersection of Hypoluxo Road and I-95 southbound ramps will operate at LOS B during the AM and PM peak hours in 2045. All movements will operate at LOS D or better. The maximum 95th-percentile queue length on the I-95 southbound off-ramp will be 400 feet during the PM peak hour. The queues on I-95 southbound off-ramp will not extend to the I-95 mainline.

Hypoluxo Road and I-95 Northbound Ramps

The intersection operational analysis shows that the intersection of Hypoluxo Road and I-95 northbound ramps will operate at LOS C or better during the AM and PM peak hours in 2045. All movements will operate at LOS D or better. The maximum 95th-percentile queue length on the I-95 northbound off-ramp will be 324 feet during the PM peak hour. The queues on I-95 northbound off-ramp will not extend to I-95 mainline.

Hypoluxo Road and Seacrest Boulevard/S 14th Street

The intersection of Hypoluxo Road and Seacrest Boulevard/S 14th Street is expected to operate at LOS D during the AM and PM peak hours in 2045. The eastbound and westbound approaches will operate at LOS D or better. During the PM peak hour, the queue of eastbound through movement will be 546 feet during the PM peak hour. The distance between the northbound terminal intersection and the intersection of Hypoluxo Road and Seacrest Boulevard is approximately 800 feet. Therefore, the eastbound through queue will not affect the interchange terminal operation. The northbound and southbound approaches will operate at LOS E during the AM and PM peak hours.

Table 25 2045 Intersection Analysis - Build Alternative 2

Intersection	Movement	Storage Length (feet)	AM Peak								PM Peak							
			Movement				Approach		Intersection		Movement				Approach		Intersection	
			Volume	Delay (seconds)	LOS	Queue Length (feet)	Delay (seconds)	LOS	Delay (seconds)	LOS	Volume	Delay (seconds)	LOS	Queue Length (feet)	Delay (seconds)	LOS	Delay (seconds)	LOS
Hypoluxo Road at High Ridge Road	EBL	200	47	74.5	E	93	76.8	E	63.4	E	103	81.5	F	#249	38.7	D	45.6	D
	EBT	-	2232	76.8	E	#1091					1238	35.6	D	549				
	EBR	-	208								189							
	WBL	200	234	66.5	E	#462	22.0	C			207	71.8	E	m251	39.4	D		
	WBT	-	1122	13.0	B	272					2229	36.5	D	#1023				
	WBR	-	34								88							
	NBL	150	161	180.7	F	#291	102.6	F			212	121.9	F	#291	82.8	F		
	NBT	-	39	63.4	E	320					119	52.3	D	307				
	NBR	-	280								153							
	SBL	150	64	119.8	F	#135	85.9	F			39	61.3	E	76	78.1	E		
	SBT	-	123	74.2	E	248					111	81.2	F	290				
	SBR	-	61								102							
Hypoluxo Road at I-95 Southbound Ramps	EBT	-	1,751	17.9	B	m264	12.2	B	13.9	B	1,118	27	C	367	21.1	C	19.6	B
	EBR	-	825	0	A	0					312	0	A	0				
	WBL	340	538	16.5	B	175	16.5	B			406	9.8	A	163	9.8	A		
	WBT	-	864	16.5	B	175					1,608	9.8	A	163				
	SBL	775	412	14.6	B	95	14.5	B			503	10.7	B	96	32.0	C		
	SBR		526	14.5	B	118					916	43.7	D	#400				
Hypoluxo Road at I-95 Northbound Ramps	EBL	340	1,221	17.9	B	m264	17.9	B	19.9	B	523	27	C	367	27.0	C	21.8	C
	EBT	-	942	17.9	B	m264					1,098	27	C	367				
	WBT	-	939	16.5	B	175	24.8	C			1,024	9.8	A	163	14.6	B		
	WBR	800	684	36.1	D	117					685	21.7	C	467				
	NBL	700	463	13.8	B	107	15.6	B			990	28.1	C	324	24.3	C		
	NBR		349	18.1	B	178					537	17.3	B	297				
Hypoluxo Road at Seacrest Blvd/S 14 Street	EBL	200	144	31.4	C	135	41.1	D	45.8	D	170	38.0	D	m121	47.7	D	52.9	D
	EBT	-	782	40.9	D	494					859	45.3	D	m546				
	EBR	250	287	46.7	D	166					526	54.7	D	m235				
	WBL	-	123	22.2	C	110	32.8	C			217	38.4	D	213	42.9	D		
	WBT	-	858	34.3	C	506					906	44.0	D	578				
	WBR	-	21								42							
	NBL	150	607	68.6	E	442	62.7	E			690	77.1	E	#613	66.2	E		
	NBT	-	49	67.9	E	440					97	75.0	E	#605				
	NBR	-	139	36.3	D	43					244	34.7	C	100				
	SBL	-	33	74.8	E	137	68.4	E			42	91.1	F	#225	79.3	E		
	SBT	-	44								71							
	SBR	150	158	65.3	E	76					113	67.6	E	66				

Note: # - 95th-percentile volume exceeds capacity, queue may be longer.
m - Volume for 95th-percentile queue is metered by upstream signal.

7.3 Safety Analysis

A brief safety analysis was conducted comparing the No-Build Alternative and the Build Alternatives using *Highway Safety Manual (HSM)* methods. The analysis was qualitative and Crash Modification Factors (CMF), or Crash Reduction Factors (CRF), for the improvements were identified.

The future 2045 number of crashes for the No-Build Alternative and Build Alternatives are calculated for I-95 freeway segments, I-95 ramp weaving, merge, and diverge segments, I-95 interchange terminal, and nearby intersections using FDOT *HSM* safety analysis spreadsheets as directed by Central Office. Crash Modification Factors (CMF) from the *HSM* were then applied to the predicted crashes using Safety Performance Functions (SPF). The *HSM* safety analysis spreadsheets are attached in **Appendix J**. The predicted 2045 crashes are summarized in **Table 26**.

Table 26 Predicted 2045 Number of Crashes

	No-Build			Build Alternative 1			Build Alternative 2		
	Fatal & Injury	PDO	Total	Fatal & Injury	PDO	Total	Fatal & Injury	PDO	Total
I-95 from Lantana Road to Hypoluxo Road	13.70	35.10	48.8	13.34	35.10	48.4	12.47	31.94	44.4
I-95 from Hypoluxo Road to Gateway Blvd	10.63	28.01	38.6	10.31	28.01	38.3	9.67	25.49	35.2
I-95 SB On-ramp Merge from Hypoluxo Road	1.37	4.94	6.3	1.37	4.94	6.3	0.81	2.92	3.7
I-95 NB Off-ramp Diverge to Hypoluxo Road	0.25	0.48	0.7	0.25	0.48	0.7	0.15	0.28	0.4
I-95 Southbound Ramps Terminal	5.91	11.54	17.5	5.68	11.09	16.8	3.50	6.83	10.3
I-95 Northbound Ramps Terminal	7.26	16.73	24.0	7.03	15.56	22.6	4.30	9.90	14.2
Hypoluxo Road at High Ridge Road Intersection	3.0	5.2	8.2	2.6	4.6	7.2	3.0	5.2	8.2
Hypoluxo Road at Seacrest Blvd Intersection	2.9	5.2	8.1	2.7	4.9	7.6	2.9	5.2	8.1
Total	45.02	107.20	152.2	43.28	104.68	147.9	36.80	87.76	124.5

The existing I-95 ramps has left-turn and right-turn lanes. The improvement of adding turn lanes could not be reflected in the Build Alternative 1 HSM safety analysis. Therefore, the CRF of 22% was used for the Build Alternative 1 per the FDOT CRF Table. In the Build Alternative 1, the existing bridge will be widened. The shoulder width on I-95 will remain the same as the No-Build Alternative. There will be no safety improvement for the I-95 mainline. Therefore, the number of

crashes for the Build Alternative 2 was predicted using the FHWA CMF factors from the CMF clearinghouse. Based on the CMF clearinghouse, the crash modification factor for DDI is 59.2%. The CMF clearinghouse summary sheets is attached in **Appendix J**. The bridge will be reconstructed under the Build Alternative 2. The shoulder width along I-95 could be widened to enhance overall mobility and safety along mainline I-95. The CMF of 91% was used as the CRF is 9% for the widen shoulder from the FDOT CRF Table.

Based on the future predicted 2045 number of crashes, the No-Build Alternative expected number of crashes will be 152.2. The Build Alternative 1 expected crashes will be 147.9. The expected number of crashes under the DDI Build Alternative 2 will be 124.5, which means that there will be a 27.7 crashes reduction as compared to the No-Build Alternative and a 23.4 crashes reduction as compared to the Build Alternative 1 in future year 2045.

7.4 Alternatives Comparison

The No-Build Alternative and Build Alternatives were compared and summarized.

For the No-Build Alternative and the Build Alternatives, the lane geometry and volumes on the I-95 and the I-95 ramps at the junction areas will be the same. The ramp analysis results are the same for the No-Build Alternative, Build Alternative 1, and Build Alternative 2.

The intersection analysis results in future year 2025 and 2045 are summarized in **Table 27** for the interchange termini.

Table 27 Delay and LOS Comparison of All Alternatives

Year	Intersection	No-Build				Build Alternative 1				Build Alternative 2 (DDI)			
		AM		PM		AM		PM		AM		PM	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
2025	Hypoluxo Road at I-95 SB Ramps	34.9	C	38.5	D	28.1	C	36.1	C	14.6	B	16	B
	Hypoluxo Road at I-95 NB Ramps	42.5	D	67.5	**E**	25.6	C	32.1	C	19	B	19.8	B
2045	Hypoluxo Road at I-95 SB Ramps	49.3	D	52.5	D	32.3	C	40.8	D	13.9	B	19.6	B
	Hypoluxo Road at I-95 NB Ramps	59.4	**E**	121.3	**F**	44.9	D	40.4	D	19.9	B	21.8	C

Under the No-Build Alternative, the I-95 northbound ramps terminal is expected to operate at LOS E or F in design year 2045. The eastbound left-turn from eastbound Hypoluxo Road to the northbound I-95 on-ramp, I-95 northbound off-ramp, and I-95 southbound off-ramp will operate LOS E or F during the AM and PM peak hours in 2045.

In order to improve the traffic operation at the interchange and adjacent intersections, the two Build Alternatives were proposed. Under the Build Alternative 1, the interchange termini intersections will operate at acceptable LOS. However, the eastbound approach during the AM peak hour, I-95 southbound off-ramp and I-95 northbound off-ramp approaches during the AM and PM peak hours, will operate at LOS E in 2045.

Under the Build Alternative 2, the interchange termini intersections will operate at acceptable LOS and show no failing approaches in the design year 2045.

The future crash analysis shows that the expected number of crashes will be 152.2 under the No-Build Alternative in 2045. The Build Alternative 1 expected number of crashes will be 147.9. Under the Build Alternative 2, there will be a 27.7 crashes reduction as compared to the No-Build Alternative and a 23.4 crashes reduction as compared to the Build Alternative 1 in 2045.

Based on the analysis, the Build Alternative 2 provides significantly improved traffic operations and safety conditions when compared to the No-Build Alternative and the Build Alternative 1. The Build Alternative 2 is therefore selected as the preferred alternative.

Under the Build Alternative 2, the interchange termini intersections will operate at acceptable LOS with no failing movement in 2045. Therefore, a year of failure analysis is not needed.

8 Benefit/Cost Analysis

A quantitative benefit-cost analysis was performed to assess the proposed improvements based on safety and operations.

The total cost for the preferred Build Alternative is estimated at $67,102,021, which includes the construction cost of $63,703,402 and the Right-of-Way cost of $3,398,619. The annualized cost is expected to be $3,824,682.

The benefits include traffic operation and safety along I-95, I-95 ramps reconstruction, and interchange termini intersections improvements.

The I-95 lateral clearance will be over 6 feet due to the new bridge over I-95. The values of the AM and PM peak hour delay change for the I-95 at Hypoluxo Road Interchange termini intersections under the 2025 and 2045 No-Build and Build Alternatives were subsequently compared. The overall delay and travel time for the preferred Build condition will decrease during the AM and PM peak hour compared to the No-Build Alternative. Moreover, the travel time will decrease along I-95 due to the wider lateral clearance under the preferred Build Alternative. The Value-of-Time used for the analysis was $22.97, which is based on the Southeast Florida Road and Transit User Cost Study, dated June 2014. The traffic operation benefit analysis shows that the annual benefit will be $896,437.

In addition to the operational benefit, the proposed improvements provide important benefits in terms of safety and interstate access. Based on the future crash analysis, there will be 27.7 crashes reduced under the Build Alternative 2 as compared to the No-Build Alternative in future year 2045. The crash cost is estimated using the method in the Florida Design Manual (FDM). Based on the safety analysis, the annual safety benefit will be $4,479,220. The annual total benefit is $5,375,657. The calculated benefit/cost ratio is 1.41.

The total cost for the Build Alternative 1 is $16,679,505. The annual cost is expected to be $1,227,612. The traffic operation benefit analysis shows that the annual benefit will be $519,361. The Build Alternative 1 will improve the safety on the I-95 Southbound and northbound off-ramps by adding one extra lane on each ramp, and on the intersections of Hypoluxo Road at High Ridge Road and at Seacrest Boulevard. There is no safety and operational benefit on I-95 since the existing bridge will be widened. The annual safety benefit is $1,496,197. The annual total benefit is $2,015,558. The calculated benefit/cost ratio is 1.64 for Build Alternative 1.

The benefit/cost analysis results are presented in **Table 28**. Detailed benefit/cost analysis calculations can be found in **Appendix K**.

Table 28 Benefit-Cost Analysis of Build Alternatives

Benefit/Cost		Build Alternative 1	Build Alternative 2
Total Cost		$16,679,505	$67,102,021
Annual Cost		$1,227,612	$3,824,682
Annual Benefit	Operation	$519,361	$896,437
	Safety	$1,496,197	$4,479,220
	Total	$2,015,558	$5,375,657
Benefit/Cost Ratio		1.64	1.41

9 Consistency with Other Plans/Projects

The IMR is consistent with the current adopted Palm Beach TPA 2045 LRTP and FDOT SIS Funding Strategy Second Five Year Plan for FY 2021/2022 through FY 2025/2026. In addition, the IMR is conducted in coordination with the ongoing construction efforts along the I-95 corridor to implement managed lanes along the I-95 mainline. The projects include:

1. Design Project to improve I-95 at Hypoluxo Road Interchange (FPID #413257-1);
2. PD&E Project for I-95 at Lantana Road Interchange (FPID #413258-1);
3. Design Project for I-95 at Gateway Boulevard Interchange (FPID #231932-1-32-01);
4. I-95 Managed Lanes Project (FPID #444202-1).

10 Environmental Considerations

Environmental impacts have been evaluated in the I-95 ICDR. Several natural resources features were identified within the vicinity of the I-95 at Hypoluxo Road Interchange as follows:

- According to the National Wetlands Inventory (NWI), there are no wetlands or other surface waters within the limits of the proposed Hypoluxo Road interchange improvements.
- According to the United States Fish and Wildlife Service (USFWS), the interchange falls within USFWS Consultation Areas for Atlantic coast plants and Florida scrub jay. It is also within three (3) wood stork core foraging areas. However, no habitat for these

species exists within the project area; therefore, no impact to these species is anticipated.

- According to the Natural Resources Conservation Service (NRCS), soil types located within the proposed interchange improvements include:
  - (18) Immokalee Fine Sane
  - (21) Myakka Fine Sand
  - (41) St. Lucie-Paola-Urban Land Complex, 0 to 8 Percent Slopes
  - (48) Urban Land
- According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panel 1202140001C (revised 10/15/1982) and 1201920195B (revised 10/15/1982), the interchange traverses Flood Zones X and X500. Zone X is an area outside the 100-year flood plain and Zone X500 is an area outside the 500-year flood plain. Thus, the proposed improvements would have no impact on the base 100-year floodplain.
- There are four (4) noise sensitive receptors within the vicinity of the improvements: Grace Presbyterian Church, First Impressions Preschool, Super 8 Motel, and America's Best Value Inn Lantana/Palm Beach. Additional noise analyses may be required to determine the effects of the improvements, if any, on these receptors. There are currently no sound barriers in the vicinity of the Hypoluxo Road Interchange.

11 Coordination

Coordination with various FDOT offices, including FDOT District 4 Planning & Environmental Management Office (PLEMO), District 4 Design Office, District 4 Right of Way (ROW) Office, DIRC, and Central Office (CO), has occurred throughout the study. **Table 29** shows the coordination efforts with the relevant agencies.

Table 29 Coordination Meetings

Date	Attending Party	Purpose/Outcome
December 13, 2018	District 4 DIRC	The initial IOAR concept was presented and get approved, however, the DIRC recommends looking into other alternative for ultimate improvement of the interchange.
April 25, 2019	District 4 DIRC	The DDI concept and other 4 concepts were presented to DIRC, and the DIRC recommends moving forward with the DDI concept with further coordination with CO.
May 15, 2019	District 4 PLEMO, Design, and ROW	Review the DDI concept in detail and request ROW cost estimates
October 4, 2019	District 4 PLEMO, Design, and ROW	Review the final ROW cost estimates and confirm the parcels impacted by the DDI concept
December 10, 2019	NEPA Reevaluation Meeting for District 4 PLEMO, Design, and CO Office of Environmental Management (OEM)	Review the DDI concept and the reduced ROW impacts and OEM approved MiCE classification for the proposed DDI concept

12 Anticipated Design Exceptions and Variations

Based on the proposed design speed of 35 mph, and using Florida Greenbook criteria for Hypoluxo Road, there are no anticipated design exceptions or variations. If an exception or variation should arise, it will be processed per FHWA and FDOT standards. Hypoluxo Road is not a State Road. The Florida Greenbook criteria would therefore apply to the study segments along Hypoluxo Road.

13 Conceptual Plan

A conceptual signing and marking plan for the preferred alternative is included in **Appendix L**. The following is a list of key design parameters used in creating the concept drawing:

Proposed Design Speed

The proposed design speed used is 35 mph. This was discussed and agreed to at the DIRC meeting on April 26th, 2019. The design speed was chosen to be as close to the existing posted speeds on Hypoluxo (45 mph on eastbound approach and 40 mph on westbound approach) to minimize the impacts to the surrounding areas.

Diverging Diamond Interchange Crossovers

The minimum values used in the concept plan for the radii are 475 feet at -0.02 superelevation and 390 feet at 0.02 superelevation in order to develop the curved approaches to the crossover intersections. The tangent length through the crossovers was kept at approximately 100 feet to avoid intersecting curves through the intersections. The intersecting angle at both crossovers were kept to 40 degrees. The approach lane widths were transitioned from 11 feet to 13 feet through the crossover intersections in order to give more room for vehicle off-tracking.

Other Design Parameters

The following parameters were investigated based on the available information gathered from previous projects and as-built plans. The concept design is assumed to be able to satisfy all of these requirements for the reconstruction of the interchange:

- Maximum percent vertical grade is 7% for the 35-mph design speed.
- Stopping Sight Distance is 250 feet for level elevation, 237 feet for 3% grade elevation, and 229 feet for 6% grade elevation at 35 miles per hour.
- Maximum deflection without horizontal curve is 2 degrees for the design speed of 40 mile per hour or less.

The following are the bridge shoulder requirements:

- Outside: 2.5 feet minimum for bridges length of less than 500 feet and 6 feet curbing on approach roadway.
- Median: 2.5 feet minimum for bridges length of less than 500 feet, 13 feet shown on the conceptual plan including 7 feet of bike lane plus 6 feet of shoulder.
- Existing bridge length is approximately 450 feet. If new bridge length exceeds 500 feet, shoulder widths will need to be increased per Chapter 260 of the *Florida Design Manual (FDM)*.

14 Project Cost

The Build Alternative 2 (DDI) is the preferred alternative. The project cost for DDI is estimated to be $63,703,402. The cost for Right-of-Way is estimated to be $3,398,619. The total cost is

$67,102,021. The project cost for Build Alternative 1 is $16,679,505. The cost estimate is included in **Appendix M**.

15 Access Management Plan

Access management plan within the area of influence will not be changed by the proposed improvements to the interchange.

16 FHWA Policy Points

16.1 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-95 at Hypoluxo Road Interchange termini, Hypoluxo Road at High Ridge Road, and Hypoluxo Road at Seacrest Boulevard/S 14th Street was compared between the No-Build and Build Alternatives.

Under the No-Build Alternative, the I-95 southbound ramp terminal will operate at LOS D by 2045. However, the I-95 northbound ramp terminal will operate at LOS E or F by 2045. The northbound and southbound off-ramps will operate at LOS E or F during the AM and PM peak hours. The eastbound left-turn from eastbound Hypoluxo Road to I-95 northbound on-ramp will operate at LOS F during the AM peak hour. The eastbound left-turn queue will spill back to the west of the interchange termini during the AM peak hour.

The safety analysis performed for this study indicates that a total of 818 crashes occurred along I-95 and 379 crashes occurred along Hypoluxo Road from 2013 to 2017. The predominant crash types were rear-end, left turn, sideswipe, and angle crashes. These types of crashes are attributed to the congested conditions along Hypoluxo Road and ramp termini.

Based on the future operational analysis, under the recommended Build Alternative 2 - DDI Interchange, the interchange termini intersections will operate at LOS C or better by 2045. All movements will operate at LOS D or better. The queues on I-95 southbound off-ramp and northbound off-ramp will not extend to the I-95 mainline. Compared to the No-Build Alternative, the delay at the interchange termini intersections will significantly decrease during both the AM and PM peak hours in 2045.

The future 2045 number of crashes was predicted using the HSM methods. Based on the future predicted 2045 number of crashes, the No-Build Alternative expected number of crashes will be 152.2. The Build Alternative 1 expected number of crashes will be 147.9. The expected number of crashes under the Build Alternative 2 will be 124.5, which means that there will be a 27.7 crashes reduction as compared to the No-Build Alternative and a 23.4 crashes reduction as compared to the Build Alternative 1 in future year 2045. The proposed DDI will improve the safety performance of the ramp termini as compared to the No-Build Alternative and the Build Alternative 1.

In conclusion, the recommended interchange improvements will provide better traffic operation, reduce congestion and enhance the safety of the interchange.

16.2 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 DDI Build Alternative will provide full access to all the traffic movements on Hypoluxo Road to and from I-95. 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.

17 Conclusions and Recommendations

The I-95 at Hypoluxo Road IMR documented the analysis methodology, traffic forecasting, operational analysis, and safety analysis for existing and future conditions. The Build Alternative 2 – Diverging Diamond Interchange was selected as the preferred alternative. The operational and safety analysis demonstrated that Build Alternative 2 with DDI concept will improve the operation and safety of the I-95 mainline, ramps, and ramp terminal intersections when compared to the No-Build Alternative and Build Alternative 1 – Enhanced Diamond Interchange.

The improvements recommended by the ICDR for the intersections adjacent to the interchange only solves localized issues with no effect on the interchange operations. Therefore, they were not recommended as part of the preferred Build Alternative 2.

Crash analysis was performed using the five-year data from 2013 to 2017. The crash analysis

indicated that rear end, left-turn, sideswipe, and angle crashes are the most prominent crash types within the study area and are an indicator of congested roadway conditions.

The operational analysis of I-95 is included in the I-95 Managed Lanes Project (FPID #444202-1). The operational analysis results and improvements are not included in this IMR. The I-95 ramp merge/diverge/weaving analysis was performed for future years and the analysis results are the same for all alternatives. In future year 2045, the I-95 southbound off-ramp and southbound on-ramp will operate at LOS F during the AM peak hour. The northbound on-ramp and off-ramp will operate at LOS D or better. During the PM peak hour, the I-95 northbound off-ramp and northbound on-ramp will operate at LOS F. The I-95 southbound off-ramp will operate at LOS E, while the southbound on-ramp will operate at LOS C.

Under the No-Build Alternative, the I-95 southbound ramp terminal will operate at LOS D. However, the I-95 northbound ramp terminal will operate at LOS E or F by year 2045. The northbound and southbound off-ramps will operate at LOS E or F during the AM and PM peak hours.

Under Build Alternative 1, the interchange termini intersections will operate at LOS D or better during the AM and PM peak hours in the design year 2045. However, the eastbound left turn from Hypoluxo Road to the I-95 northbound on-ramp will operate at LOS F during the AM peak hour. The I-95 southbound off-ramp and the northbound off-ramp will operate at LOS E during the AM and PM peak hours. The queues on the I-95 southbound off-ramp and the northbound off-ramp will not extend to the I-95 mainline.

With the Diverging Diamond Interchange (DDI), the I-95 at Hypoluxo Road Interchange termini intersections will operate at LOS C or better during the AM and PM peak hours in 2045. All movements will operate at LOS D or better. The queues on the I-95 southbound off-ramp and northbound off-ramp will not extend to the I-95 mainline.

Based on the future predicted 2045 number of crashes, the No-Build Alternative expected number of crashes will be 152.2. The Build Alternative 1 expected number of crashes will be 147.9, which means that there will be a 4.3 crashes reduction in future year 2045 as compared to the No-Build Alternative. The expected number of crashes under the DDI Build Alternative 2 will be 124.5,

which means that there will be a 27.7 crashes reduction as compared to the No-Build Alternative and a 23.4 crashes reduction as compared to the Build Alternative 1 in future year 2045.

The future year operational and safety analysis indicates that Build Alternative 2 (DDI) would significantly improve traffic operations and safety conditions when compared to the No-Build Alternative and Build Alternative 1. Therefore, Build Alternative 2 is selected as the preferred alternative.

The Federal Highway Administration (FHWA) Interchange Access Policy Points were checked to assure that the adequate LOS is provided in terms of safety and mobility. Build Alternative 2 (DDI) meets all safety and mobility requirements and is therefore recommended. The recommended DDI concept is anticipated to improve the safety and operations of mainline I-95, I-95 ramps, and the interchange termini. It will provide full access and accommodate all traffic movements between Hypoluxo Road and I-95. The proposed improvements are designed to meet current standards for federal-aid projects on the interstate system and to comply with the American Association of State and Transportation Officials (AASHTO) and FDOT design standards.