

SR-9/I-95 from south of 45th Street to north of 45th Street Interchange
Palm Beach County, FL

INTERCHANGE MODIFICATION REPORT RE-EVALUATION

Financial Project ID (FPID): 436519-1-32-01

Federal Aid Number: TBD

Prepared for



Florida Department of Transportation
District Four
3400 W Commercial Boulevard
Fort Lauderdale, FL 33309

JULY 2024

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Interchange Modification Report (IMR)



SR-9/I-95 from south of 45th Street to north of 45th Street Interchange

IMR Re-evaluation

FPID 436519-1-32-01

Florida Department of Transportation

Determination of Safety, Operational and Engineering Acceptability

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

Requestor	Robert Lopes, PE District Four Project Manager	Date
Interchange Review Coordinator	Cesar Martinez, PE District Four	Date
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Chief Engineer	Dan Hurtado, PE Central Office	Date



QUALITY CONTROL CERTIFICATION FOR INTERCHANGE ACCESS REQUEST SUBMITTAL

Submittal Date: July 18, 2024

FM Number: 436519-1-32-01

Project Title: SR-9/I-95 from south of 45th Street to north of 45th Street Interchange

District: 4

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Document Type: ☐ MLOU ☐ IJR ☒ IMR ☐ IOAR ☐
OTHER _____

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

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

Requestor _____

Robert Lopes, P.E.
FDOT District 4 Project Manager

Date: _____

IRC _____

Cesar Martinez, P.E.
FDOT District 4 District Interchange Review Coordinator

Date: _____

PROFESSIONAL ENGINEER CERTIFICATION

I hereby certify that I am a registered Professional Engineer in the State of Florida acting in accordance with the Florida Statutes (F.S.) Chapter 471. I am practicing with Stantec Consulting Services Inc, a company authorized to provide engineering services under the provisions FS Chapter 471.

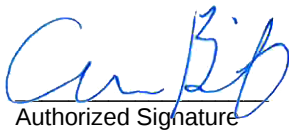
I certify that I was in responsible charge of preparing and had the engineering expertise to produce the document. I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of transportation engineering as applied through professional judgement and experience.

Report: Interchange Modification Report Re-Evaluation

Project: SR-9/I-95 from south of 45th Street to north of 45th Street Interchange

Location: Palm Beach County, Florida

Financial Management Number: 436519-1-32-01


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1.0 EXECUTIVE SUMMARY

The interchange of SR-9/I-95 at 45th Street interchange is located in the City West Palm Beach, Palm Beach County and connects major areas like Mangonia Park, Rivera Beach, Palm Beach, and Port of Palm Beach. The interchange provides primary access to commuters as well as trucks to these destinations. The I-95 and 45th Street interchange is a diamond type configuration. 45th Street is a six lane Divided Urban Minor Arterial within the study area, and I-95 is classified as Urban Principal Arterial Interstate.

An Interchange Modification Report (IMR) and a Project Development & Environment (PD&E) study was conducted, and the project received Location and Design Concept Acceptance (LDCA) and Safety, Operational, and Engineering (SO&E) acceptability in 2018. The preferred alternative was a Diverging Diamond interchange (DDI). The project advanced to the design phase in 2020.

A Value Engineering (VE) study was completed in May 2022 which identified a new approved/permitted development at the southeast corner of the interchange. In September 2022, the Florida Department of Transportation (FDOT) initiated a preliminary traffic forecasting and microsimulation analysis of the future traffic conditions with the new development. The results of the analysis indicated the following: 1) the development would substantially increase traffic volumes compared to what was projected during the PD&E study process; 2) spacing between the intersection at Corporate Way and the DDI crossover was reduced compared to the PD&E study preferred alternative due to the future mainline bridge widening; and 3) the DDI revealed significant traffic operational concerns, likely due to the significant increase in traffic volumes coupled with the short intersection spacing along 45th Street between the DDI ramp terminal intersections and Corporate Way which provides access to the new development.

This Interchange Modification Report (IMR) re-evaluation is being initiated due to the change in the approved IAR design concept. This IMR re-evaluation is being conducted to satisfy the requirements described Federal Highway Administrations (FHWA's) "Policy on Access to the Interstate System" and the FDOT Interchange Access Request (IAR) – User's Guide (September 2022).

The analysis consisted of traffic data collection, project traffic forecasting, traffic analysis using PTV's VISSIM 2023 software, safety analysis, and other considerations which are consistent with the FDOT IAR User's Guide. The analysis included Opening Year 2030 and Design Year 2050 traffic projections. The alternatives that were evaluated consisted of the following:

- Approved IAR Concept (also known as the DDI)
- Diamond Interchange Build Alternative (during the previous IAR, this alternative was the second best alternative)

Both alternatives are projected to result in similar expressway operations resulting in LOS D or better. The only exception to this are two locations with the Approved IAR Concept During the AM peak hour, the Approved IAR Concept is projected to operate at LOS F in the southbound direction by the southbound off-ramp to 45th Street. During the PM peak hour, the Approved IAR Concept is projected to operate at LOS F in the northbound direction by the northbound off-ramp to 45th Street. These poor operations are due to the ramp terminal intersection off-ramp queue spillback onto the expressway mainline.

The Diamond Interchange Build Alternative is projected to operate with more intersections at LOS D or better, no queue spillback onto the expressway mainline, and a higher number of vehicles processed at the intersections when compared to the Approved IAR Concept. The arterial analysis comparison of the results show that the Diamond Interchange Build Alternative is projected to process more vehicles (40,000 vehicles processed compared to 34,000 vehicles with the Approved IAR Concept) and result in slightly higher vehicle operating speeds. The Diamond Interchange Build Alternative is projected to result in lower total delays, travel times, latent delay, latent demand, and total stops. This alternative is also projected to result in higher vehicles arrived compared to the Approved IAR Concept. A summary comparison of the results is shown in the following table:

Table – Summary Comparison of Build Alternatives

Topic	Approved IAR Concept	Diamond Interchange Build Alternative
Freeway Analysis	Projected to result in acceptable expressway operations except at two locations	Best performing alternative
Intersection Analysis	Potential off-ramp spillback into I-95 expressway	Best performing alternative
Arterial Analysis	Projected to result in slower vehicle speeds	Best performing alternative
Network-wide Analysis	Projected to service less vehicles and result in higher delays	Best performing alternative
Safety Analysis	Projected to result in lower predicted crash frequencies	Projected to result in higher predicted crash frequencies

Based on the results, the preferred Build Alternative is the Diamond Interchange Build Alternative. The Diamond Interchange Build Alternative satisfies the FHWA Policy Points. No access changes are proposed with this improvement. Planning consistency updates will need to be coordinated with Palm Beach Transportation Planning Agency (TPA) for the Long Range Transportation Plan (LRTP) and Transportation Improvement Program (TIP). An environmental re-evaluation is scheduled to be conducted in August 2024. A Public Information Meeting is scheduled for February 2026.

The following is a summary of the evaluation in relation to the FHWA policy points:

Policy Point 1

An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes; existing, new or modified ramps; and ramp intersections with crossroad) or on the local street network

based on both the current and the planned future traffic projections. The analysis should, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (Title 23, 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)).

The preferred Diamond Interchange Build Alternative does not adversely impact the safety and operation of the Interstate facility. The following is a summary of the design year 2050 analysis results:

Freeway Analysis Results: Based on a comparison of the results, both alternatives are projected to operate with similar density and travel speeds and a LOS of D or better along all expressway segments with the study area except for the Approved IAR Concept at two locations and time periods. During the AM peak hour, the Approved IAR Concept is projected to operate at LOS F in the southbound direction by the southbound off-ramp to 45th Street. During the PM peak hour, the Approved IAR Concept is projected to operate at LOS F in the northbound direction by the northbound off-ramp to 45th Street. These poor operations are due to the ramp terminal intersection off-ramp queue spillback onto the expressway mainline.

Intersection Analysis Results: the Diamond Interchange Build Alternative is projected to operate with more intersection at LOS D or better, no queue spillback onto the expressway mainline, and a higher number of vehicles processed at the intersections when compared to the Approved IAR Concept. The Approved IAR Concept is projected to result in queue spillback onto the mainline expressway during the AM peak hour at the I-95 southbound off-ramp and during the PM peak hour at the I-95 northbound off-ramp. The PD&E study LDCA included intersection improvements. There are no additional improvements that can be implemented to resolve projected queue spillback without additional right of way impacts beyond what was approved in the PD&E study phase and presented to the public. Therefore, no additional intersection improvements are recommended.

Arterial Analysis Results: The arterial analysis comparison of the results show that the Diamond Interchange Build Alternative is projected to process more vehicles (40,000 vehicles processed compared to 34,000 vehicles with the Approved IAR Concept) and result in slightly higher vehicle operating speeds.

Overall, the Diamond Interchange Build Alternative is projected to perform the best between both Build Alternatives.

Network-wide Analysis Results: The Diamond Interchange Build Alternative is projected to result in lower total delays, travel times, latent delay, latent demand, and total stops. This alternative is also projected to result in higher vehicles arrived compared to the Approved IAR Concept. During the AM peak hour, approximately 86,000 vehicles arrive in the model network for the Diamond Interchange Build Alternative compared to approximately 84,000 in the Approved IAR Concept. During the PM peak hour, approximately 95,000 vehicles arrive in the model network for the Diamond Interchange Build Alternative compared to approximately 90,000 for the Approved IAR Concept.

Safety Analysis Results: The preferred Diamond Interchange Build Alternative will not adversely impact safety since it is a common interchange design adhering to design criteria. The future safety analysis indicates that the Approved IAR Concept is projected to have a lower predictive crash frequency compared to the Diamond Interchange Build Alternative. DDI designs typically have lower statistical crash frequencies compared to a diamond interchange design; however, there are unquantifiable benefits with the Diamond Interchange Build Alternative since it is projected to result in better performing traffic operations which may minimize congestion related crashes compared to the Approved IAR Concept.

Policy Point 2

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

The proposed access connects to a public road only, provides all traffic movements, and will be designed to meet or exceed current standards from the FDOT Design Manual and the FHWA A Policy on Geometric Design of Highways and Streets, 7th Edition.

2.0 INTRODUCTION

2.1 Project Background

The interchange of SR-9/I-95 at 45th Street interchange is located in the City West Palm Beach, Palm Beach County and connects major areas like Mangonia Park, Rivera Beach, Palm Beach and Port of Palm Beach. The interchange provides primary access to commuters as well as trucks to these destinations. The I-95 and 45th Street interchange is a diamond type configuration. 45th Street is a six lane Divided Urban Minor Arterial within the study area, and I-95 is classified as Urban Principal Arterial Interstate.

An Interchange Modification Report (IMR) and a Project Development & Environment (PD&E) study was conducted and the project received Location and Design Concept Acceptance (LDCA) and Safety, Operational, and Engineering (SO&E) acceptability in 2018. The IMR study alternatives consisted of a No-Action Alternative, Transportation Systems Management and Operations (TSM&O) Alternative, Build Alternative 1 which was an enhanced diamond interchange, and Build Alternative 2 which was a Diverging Diamond interchange (DDI). The preferred alternative was a Diverging Diamond interchange (DDI). The project advanced to the design phase in 2020.

A Value Engineering (VE) study was completed in May 2022 which identified a new approved/permitted development at the southeast corner of the interchange. The new development called the Riverstone Palm Beach consisted of a 16-fuel pump gas station, 150 room hotel, and 374 dwelling unit mid-rise apartments.

In September 2022, the Florida Department of Transportation (FDOT) initiated a preliminary traffic forecasting and microsimulation analysis of the future traffic conditions with the new development. The preliminary analysis included new traffic data collection for the year 2022, traffic forecasting utilizing a newer version of the Southeast Florida Regional Planning Model (SERPM) version 8.524 compared to the PD&E study (SERPM version 7.0), and a traffic microsimulation analysis with PTV Vissim 2023 software. The results of the analysis indicated the following: 1) the development would substantially increase traffic volumes compared to what was projected during the PD&E study process; 2) spacing between the intersection at Corporate Way and the DDI crossover was reduced compared to the PD&E study preferred alternative due to the future mainline bridge widening; and 3) the DDI revealed significant traffic operational concerns, likely due to the significant increase in traffic volumes coupled with the short intersection spacing along 45th Street between the DDI ramp terminal intersections and Corporate Way which provides access to the new development.

2.2 Project Description

This Interchange Access Request (IAR) re-evaluation is being initiated due to the change in the approved IAR design concept. This IMR re-evaluation is being conducted to satisfy the requirements described

Federal Highway Administrations (FHWA's) "Policy on Access to the Interstate System" and the FDOT Interchange Access Request – User's Guide (September 2022).

2.3 Purpose and Need

Purpose: The purpose of this study is to complete an IMR to determine what improvements can be programmed to improve traffic spillback onto I-95, interchange operations, reduce congestion, and improve safety at this interchange location. Improvements are aimed at increasing the efficiency of the 45th Street and I-95 ramps while minimizing or eliminating right of way and bridge impacts.

The study will also evaluate short term or TSM&O improvements. Short term improvements should be feasible to implement without right-of-way acquisition.

Need: The primary need of the project is to alleviate existing and future traffic congestion thereby improving safety at the interchange. Studies completed in the region such as the Concept Development Report completed in 2014 identified operational deficiencies at ramps, the terminal intersections, and the adjacent intersections. Existing observations also show increased truck traffic from I-95 to Congress Avenue heading to the Port of Palm Beach contributing to the congestions in the study area.

If no operational and safety improvements are made within the interchange area, conditions will become progressively worse as traffic volumes continue to increase, thereby increasing the number of crashes and deteriorating access of this interchange.

2.4 Project Location

The project is located in the City of West Palm Beach, in Palm Beach County, Florida. The project study area is along I-95 just north of the Palm Beach Lakes Boulevard interchange and south of the SR 710 interchange. The interchange of I-95 and 45th Street is located at Milepost 31.040, Section number 93220000. A project location map is provided in **Figure 1**.

2.5 Project Schedule

The project is funded through construction. The project funding schedule provided in **Table 1** is based on the FDOT 2024-2029 Five-Year Work Program.

Table 1 – Project Funding Schedule

Phase/Activity	Funding by Fiscal Year					
	2024	2025	2026	2027	2028	2029
Preliminary Engineering	\$78,032	\$0	\$0	\$0	\$0	\$0
Right of Way	\$0	\$6,738,727	\$414,000	\$0	\$0	\$0
Railroad & Utilities	\$0	\$1,115,000	\$0	\$0	\$0	\$0
Construction	\$0	\$0	\$20,396,730	\$67,618	\$0	\$0
Contract Incentives	\$0	\$0	\$0	\$200,000	\$0	\$0
Preliminary Engineering	\$78,032	\$0	\$0	\$0	\$0	\$0
Right of Way	\$0	\$6,738,727	\$414,000	\$0	\$0	\$0
Total	\$78,032	\$7,853,727	\$20,810,730	\$267,618	\$0	\$0

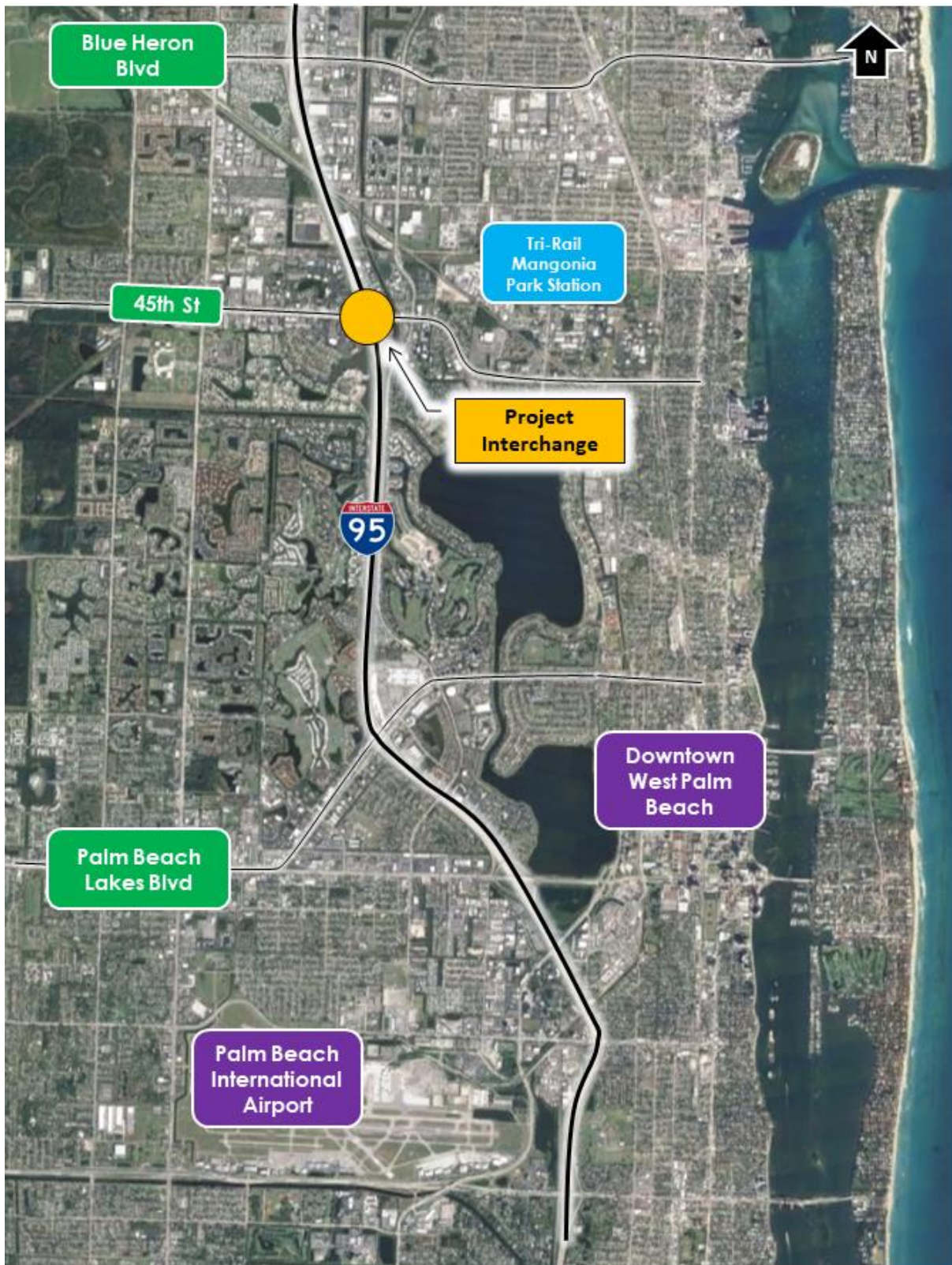


Figure 1 - Project Location Map

3.0 METHODOLOGY

The Methodology Letter of Understanding (MLOU) which was approved in January 2024, is included in **Appendix A**.

3.1 Analysis Years

- Travel Demand Model
 - Base Year of 2015
 - Horizon Year of 2045
- Traffic Operational Analysis
 - Existing (2022)
 - Opening Year (2030)
 - Design Year (2050)

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

3.2 Area of Influence

As per the requirements in the IARUG, the northbound on and southbound off ramps at Palm Beach Lakes Boulevard and the northbound off and southbound on ramps of Blue Heron Boulevard are included in the Area of Influence (AOI) along with the I-95 at 45th Street study interchange. The following are the major facilities within the AOI.

- 45th Street between Village Boulevard and Congress Avenue
- Signalized intersections:
 - 45th Street at Village Boulevard
 - 45th Street at Northpoint Boulevard
 - 45th Street at I-95 Northbound On and Off Ramps
 - 45th Street at I-95 Southbound On and Off Ramps
 - 45th Street at Corporate Way
 - 45th Street at Congress Avenue
- I-95 mainline between Palm Beach Lakes Boulevard and Blue Heron Boulevard
- Interchange ramps
 - I-95 at Palm Beach Lakes Northbound On and Southbound Off Ramps
 - I-95 at 45th Street Ramps
 - I-95 at Blue Heron Boulevard Northbound Off and Southbound On Ramps

The AOI is depicted in **Figure 2**.

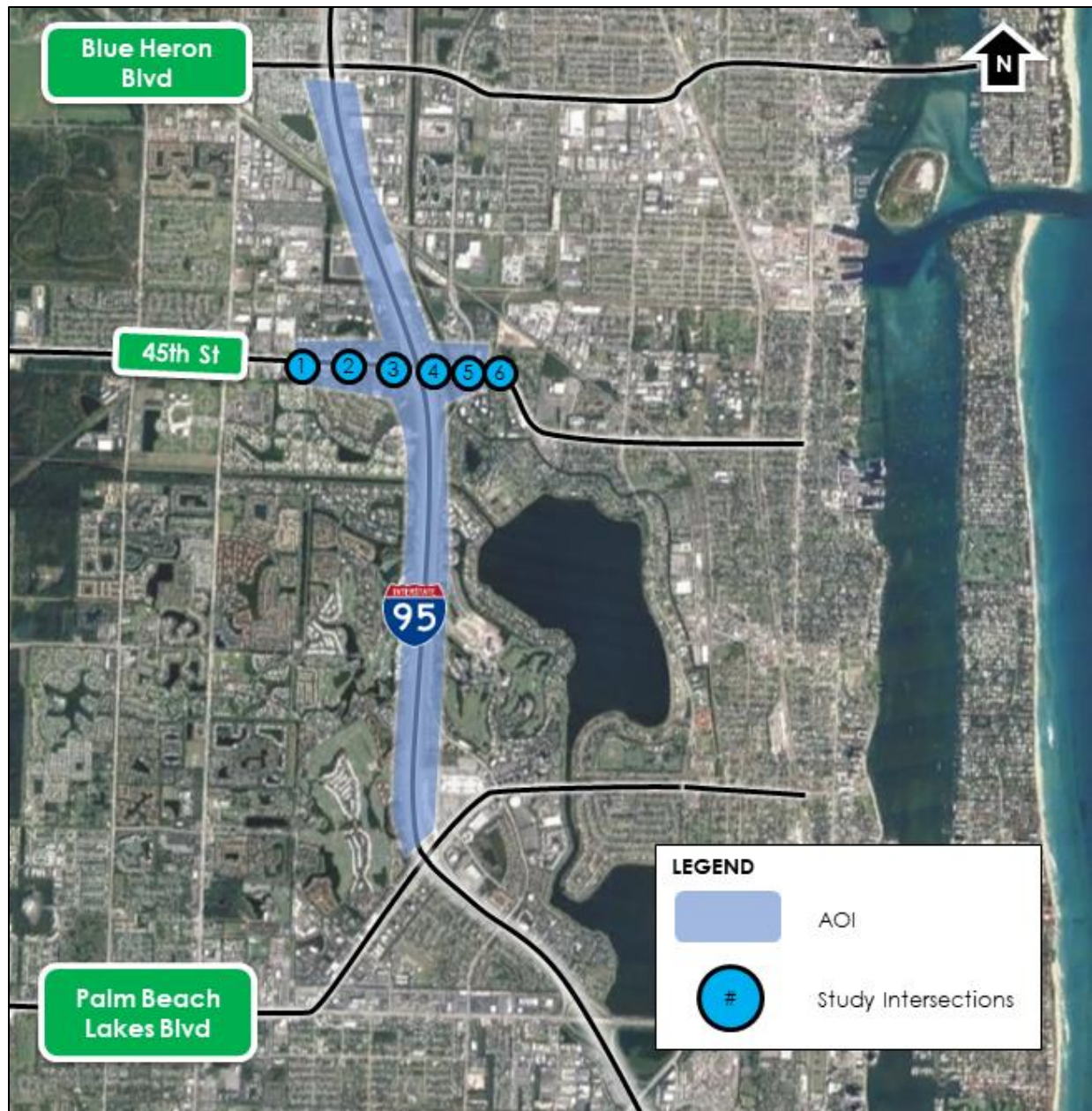


Figure 2 – Area of Influence

3.3 Traffic Data Collection

Traffic data was collected from all sites within the AOI and is included in **Appendix B**. A summary of the traffic data and sources are provided below:

- FDOT Florida Traffic Online (FTO) site data (year 2022 Annual Average Daily Traffic [AADT] and historical AADT, synopsis reports, and seasonal factors):

- I-95 mainline by 45th Street (Traffic Site 932172)
- I-95 northbound off ramp at 45th St (Traffic Site 934069)
- I-95 northbound on ramp at 45th St (Traffic Site 934070)
- I-95 southbound off ramp at 45th St (Traffic Site 934071)
- I-95 southbound on ramp at 45th St (Traffic Site 934072)
- I-95 northbound on ramp at Palm Beach Lakes Blvd (Traffic Site 934066)
- I-95 southbound off ramp at Palm Beach Lakes Blvd (Traffic Site 934067)
- I-95 northbound off ramp at Blue Heron Blvd (Traffic Site 934073)
- I-95 southbound on ramp at Blue Heron Lakes Blvd (Traffic Site 934076)
- 45th Street east of Congress Avenue (Traffic Site 937275)
- 45th Street between Congress Avenue and I-95 southbound ramp terminal (Traffic Site 930498)
- 45th Street between I-95 southbound ramp terminal and Northpoint/Metrocentre Boulevard (Traffic Site 930179)
- 45th Street between Northpoint/Metrocentre Boulevard and Village Boulevard (Traffic Site 938541)
- 45th Street west of Village Boulevard (Traffic Site 938540)
- Twenty Four-hour full intersection turning movement counts (4 hours during AM peak period, 4 hours during PM peak period, and 24-hour approach and departure counts) were collected at the study intersections along 45th Street on Wednesday, November 30, 2022.
- Twenty Four-hour vehicle classification counts were collected at the four on and off ramps at the 45th Street interchange on Wednesday, November 30, 2022.
- Intersection vehicle queue data was collected along the eastbound and westbound approaches of 45th Street on Wednesday, November 30, 2022.
- Travel time and delay runs were collected during the AM and PM peak periods along 45th Street between Northpoint/Metrocentre Boulevard and east of Congress Avenue on Wednesday, November 30, 2022. Each travel time and delay run included 8 runs per direction per peak period.
- Traffic signal timing plans from Palm Beach County
- Approved IAR traffic data
- Signal Four Analytics (crash database)
- Palm Beach Transportation Planning Agency (TPA) 2045 Long Range Transportation Plan (LRTP) and the 2024-2028 Transportation Improvement Program (TIP) documents

3.4 Traffic Factors

Existing traffic analysis will be based on the existing traffic factors from the data collection. Traffic factors used for the development of design hour traffic volumes include the K factor, Directional Distribution (D),

Daily Truck (T₂₄), Design Hour Truck (T_f) and peak hour factors (PHF). The Design Hour Truck percentage is calculated as one half of the daily truck percentage. The recommended K, D and T₂₄ factors for the freeway, ramps and arterial within the study area were documented in the approved MLOU which is included in **Appendix A** and summarized in **Table 2**.

Table 2 - Traffic Factors

Roadway	K	D (FTO)	D (traffic counts)		D (selected)	T _{Daily} (FTO)	T _{Daily} (Traffic Counts)	DHT	MOCF	PHF
			AM Pk. Hr.	PM Pk. Hr.						
I-95 mainline by 45th Street (Traffic Site 932172)	8.0	56.5			56.5	7.6		3.8	N/A	0.95
I-95 northbound off ramp at 45th St (Traffic Site 934069)	8.0	100	100	100	100	2.5	8.8	4.4	N/A	0.95
I-95 northbound on ramp at 45th St (Traffic Site 934070)	8.0	100	100	100	100	2.5	6.2	3.1	N/A	0.95
I-95 southbound off ramp at 45th St (Traffic Site 934071)	8.0	100	100	100	100	2.5	5.9	3.0	N/A	0.95
I-95 southbound on ramp at 45th St (Traffic Site 934072)	8.0	100	100	100	100	2.5	10.8	5.4	N/A	0.95
I-95 northbound on ramp at Palm Beach Lakes Blvd (Traffic Site 934066)	8.0	100	100	100	100	2.5		1.3	N/A	0.95
I-95 southbound off ramp at Palm Beach Lakes Blvd (Traffic Site 934067)	8.0	100	100	100	100	2.5		1.3	N/A	0.95
I-95 northbound off ramp at Blue Heron Blvd (Traffic Site 934073)	8.0	100	100	100	100	9.4		4.7	N/A	0.95
I-95 southbound on ramp at Blue Heron Lakes Blvd (Traffic Site 934076)	8.0	100	100	100	100	9.4		4.7	N/A	0.95
45th Street east of Congress Avenue (Traffic Site 937275)	9.0	57.9	63.4	55.8	57.9	8.3		4.7	N/A	0.95
45th Street between Congress Avenue and I-95 southbound ramp terminal (Traffic Site 930498)	9.0	57.9	59.1	55.1	57.9	7.5		5.6	N/A	0.95
45th Street between I-95 southbound ramp terminal and Northpoint/Metrocentre Boulevard (Traffic Site 930179)	9.0	57.9	53.8	52.6	57.9	6.0		4.9	N/A	0.95
45th Street between Northpoint/Metrocentre Boulevard and Village Boulevard (Traffic Site 938541)	9.0	57.9	59.0	57.1	57.9	8.3		4.3	N/A	0.95
45th Street west of Village Boulevard (Traffic Site 938540)	9.0	57.9	57.8	55.6	57.9	6.9		5.6	N/A	0.95

Source: FDOT's Florida Traffic Online (FTO) and traffic counts

3.5 Travel Demand Model

The travel demand forecasting approach is detailed in **Section 5.0**. The SERPM, 8.524 was utilized for travel demand forecasts in the AOI. This model reflects all MPO/TPO cost feasible projects in Broward, Miami-Dade, and Palm Beach Counties. The travel demand model was validated prior to use. The validation process consisted of a comparison of regionwide and project-level area assessment (within the AOI). The

adjustments to the validated model were then applied to the horizon year model along with the adjustments to account for future developments and transportation characteristics.

3.6 Analysis Tools

Traffic operational analysis was conducted using PTV VISSIM 2023 version (VISSIM) which is a microsimulation software that is acceptable for design-level analysis. The following steps were taken to build the microsimulation model and analyze improvements:

- Summarized existing traffic data to identify relevant demand and operational characteristics during the AM and PM peak hour, such as AADT, Directional Design Hour Volumes (DDHVs), balanced intersection traffic volumes, approach queuing, travel time and speed, and vehicle composition. Hourly variations in the traffic flow were summarized. VISSIM microsimulation routing decisions were coded using an Origin-Destination (OD) matrix estimation (ODME) process.
- Developed the existing year microsimulation base model (geometry, demand, and signal operations) and check for errors.
- Calibrated and validate the existing year base model using Table 7-7 (Classical Model Calibration Targets) detailed in the 2021 FDOT Traffic Analysis Handbook, which will be based on 10 simulation runs in order to average results. The calibration targets will include traffic volume and consider travel time, speed, queue length, and visualization.
- Created and run the design year microsimulation model by updating the network geometry to match the alternative, coding the future year demand, and modifying the signal operations.
- Compared the future microsimulation model outputs of AADT, DDHVs, and AM and PM peak hour turning movements to the estimated AADT, DDHVs, and peak hour turning movements developed using the project traffic forecast development methodology.

A quantitative safety analysis was conducted for this IAR re-evaluation by comparing the with the Approved IAR Concept and the Diamond Interchange Build Alternative. The latest available historical crash data was collected for the five year period between 2019 and 2023 within the study AOI. The data was reviewed, cleaned, summarized, and evaluated to identify crash trends such as type of crashes, crash locations, and crash severities.

A future conditions safety analysis was conducted of the alternatives in accordance with the FDOT IAR – User’s Guide and relevant documents. The analysis utilized the Interactive Highway Safety Design Model (IHSDM) and was based on the Highway Safety Manual (HSM) predictive method.

3.7 Performance Measures

The performance Measures of Effectiveness (MOEs) were obtained from the FDOT 2021 Traffic Analysis Handbook, Table 9-7 and consist of the following:

- Freeway Segments (documented graphically with lane schematics and density heat maps)
 - Density (veh/mi/ln)
 - Estimated Density (pc/mi/ln)
 - Estimated Level of Service (LOS)
 - Speed (mph)
 - Travel time (seconds)
 - Simulated volume (reported along with demand volume)
- Arterials intersections
 - Intersection delay (sec/veh)
 - Movement Delay (sec/veh)
 - Intersection LOS (estimated)
 - Movement LOS (estimated)
 - Maximum Queue Length (feet)
 - Simulated Volume (reported along with demand volume)
- Arterials
 - Speed (mph)
 - Travel time (seconds)
 - Simulated volume (reported along with demand volume)
- Network-wide
 - Total delay (hours)
 - Average delay (seconds per vehicle)
 - Total travel time (hours)
 - Latent delay (hours)
 - Latent demand (vehicle)
 - Vehicles arrived (vehicle)
 - Total stops (number)
 - Average speed (mph)

3.8 Considered Alternatives

The following alternatives were evaluated:

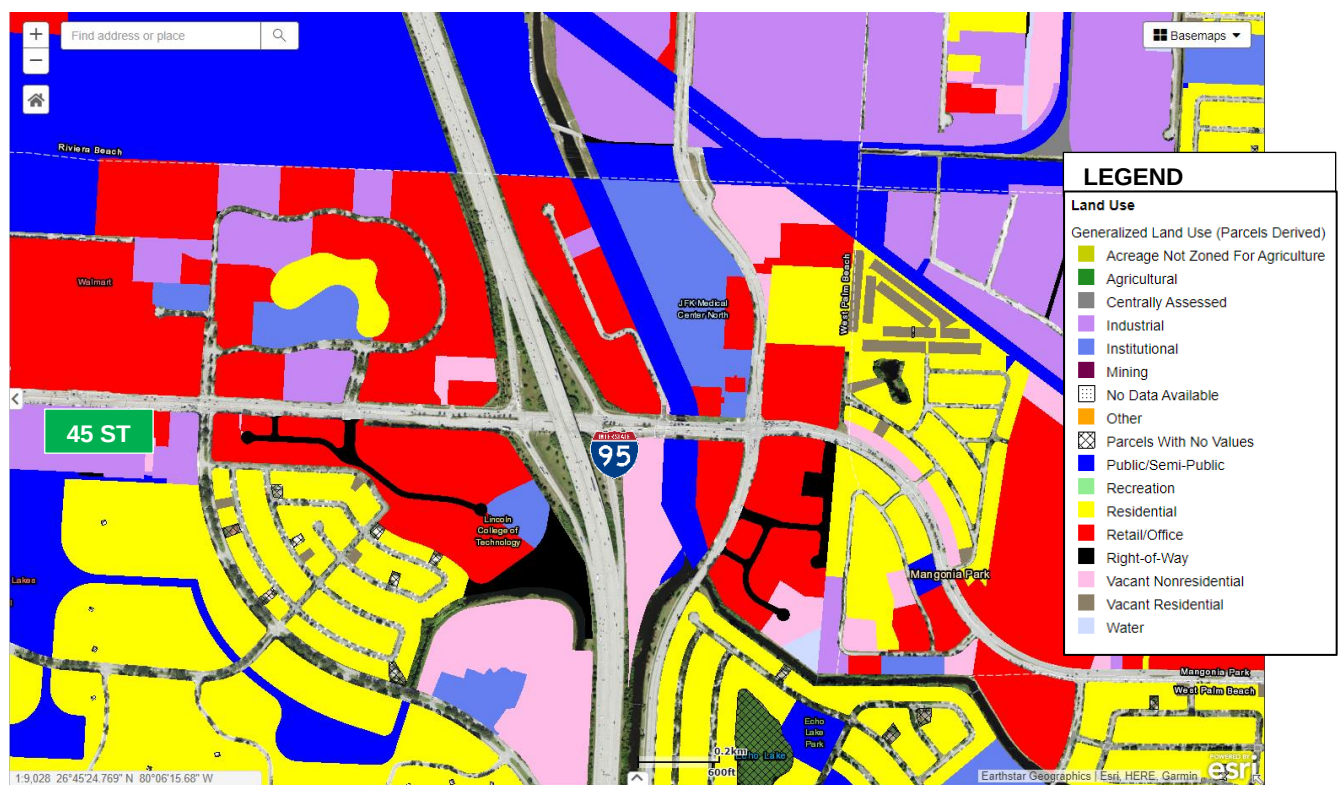
- Approved IAR Concept
- Diamond Interchange Build Alternative

4.0 EXISTING CONDITIONS

4.1 Land Use

The subject interchange is located in Palm Beach County's urbanized area. 45th Street between Village Boulevard and Congress Avenue provides access primarily to retail/office land uses followed by industrial. The northwest, northeast, and southwest quadrants of the interchange are predominantly retail/office land uses with some institutional land uses such as Lincoln College of Technology. The southwest quadrant is identified as vacant non-residential; however, this land use map is outdated as this quadrant has been infilled by the Palm Beach Riverstone development which consists of a gas station, hotel, and multi-family uses. Beyond the project limits are public/semi-public land uses (i.e., Palm Beach Lakes Community High School and the Ballpark of the Palm Beaches) and residential land uses with a mix of single family and multi-family homes.

Figure 3 – Land Uses



4.2 Transportation Characteristics

4.2.1 Roadway Descriptions

- I-95 – I-95 is functionally classified as an Urban Principal Arterial-Interstate and is part of the Strategic Intermodal System (SIS). Within the study area, I-95 is a ten-lane facility providing four general purpose lanes and one HOV lane in each direction with inside and outside shoulders. Auxiliary lanes are provided on both northbound and southbound directions between 45th Street and Blue Heron Boulevard. The median within this section is approximately 32 feet with a concrete barrier throughout. The posted speed limit along I-95 is 65 mph.
- 45th Street – 45th Street, also known as County Road 702, is an Urban Minor Arterial crossing underneath I-95 at approximately milepost 31.4. The typical section consists of six lanes (three lanes in each direction), divided with concrete median with exclusive turn lanes at the intersections and access points, bicycle lanes, and a sidewalk in each direction. The posted speed limit is 40 mph.
- Palm Beach Lakes Boulevard – Palm Beach Lakes Boulevard is an Urban Minor Arterial crossing underneath I-95 at approximately milepost 28.4. The typical section consists of six lanes (three lanes in each direction), divided with concrete median with exclusive turn lanes at the intersections and access points, bicycle lanes, and a sidewalk in each direction. The posted speed limit along is 40 mph.
- Blue Heron Boulevard – Blue Heron Boulevard, also known as County Road 708, is an Urban Minor Arterial that cross underneath I-95 at approximately milepost 32.9. The typical section consists of six lanes (three lanes in each direction), divided with concrete median with exclusive turn lanes at the intersections and access points, bicycle lanes, and a sidewalk in each direction. The posted speed limit is 40 mph.
- Village Boulevard – Village Boulevard is a four lane Urban Major Collector with sidewalks in each direction. There are no bicycle lanes.
- Northpoint Boulevard – Northpoint Boulevard is a two lane Local Road. Northpoint Boulevard is undivided, and there is a sidewalk in each direction with no bike lanes.
- Corporate Way – Corporate Way is a two lane Local Road. Corporate Way is undivided, and there is a sidewalk along the west side of the road. The segment south of 45th Street was recently redeveloped with a sidewalk along the west side and a new street name – River Grove Way.

- Congress Avenue – Congress Avenue is an Urban Minor Arterial. To the south of 45th Street, Congress Avenue is four lanes and undivided. To the north of 45th Street, Congress Avenue is six lanes and divided with a curbed median. There is a sidewalk and a bike lane and in each direction.

4.2.2 Interchanges

The interchange spacing within the project limits is between 1.50 miles (45th Street and Blue Heron Boulevard) and 2.8 miles (45th Street and Palm Beach Lakes Boulevard). All interchanges are a diamond configuration providing full access.

4.2.3 Transit

The Mangonia Park Tri-Rail Station is located off of 45th Street east of Congress Avenue. The 45th Street project area is serviced by two Palm Tran routes as of February 2024 – route 31 and route 20.

4.2.4 Lane Configuration

The existing lane configuration is depicted in **Figure 4**.

4.3 Traffic Conditions

4.3.1 Existing 2022 Traffic Volumes

4.3.1.1 AADT Volumes

The 2022 Annual Average Daily Traffic (AADT) along 45th Street was estimated from the daily traffic data collected on Wednesday, November 30, 2022. A seasonal factor was applied to this data. FDOT FTO Count data was utilized for the remaining facilities. The data was checked for reasonableness and balanced as necessary. The 2022 AADT volumes are depicted in **Figure 5**.

4.3.1.2 Peak Hour Volumes

The AM and PM peak period intersection volumes were obtained from the intersection turning movement counts collected on Wednesday, November 30, 2022. The AM peak period was 7:00 AM to 11:00 AM and the PM peak period was 2:30 PM to 6:30 PM. The data was compared to the 24-hour approach and departure counts and was determined to be acceptable. The AM and PM peak hours were calculated as 8:00 AM to 9:00 AM and 5:00 PM to 6:00 PM, respectively. The peak hour data along I-95 was obtained from the synopsis reports from the FDOT FTO sites. The data was checked for reasonableness and balanced as necessary. The 2022 balanced peak hour volumes are depicted in **Figure 6**.

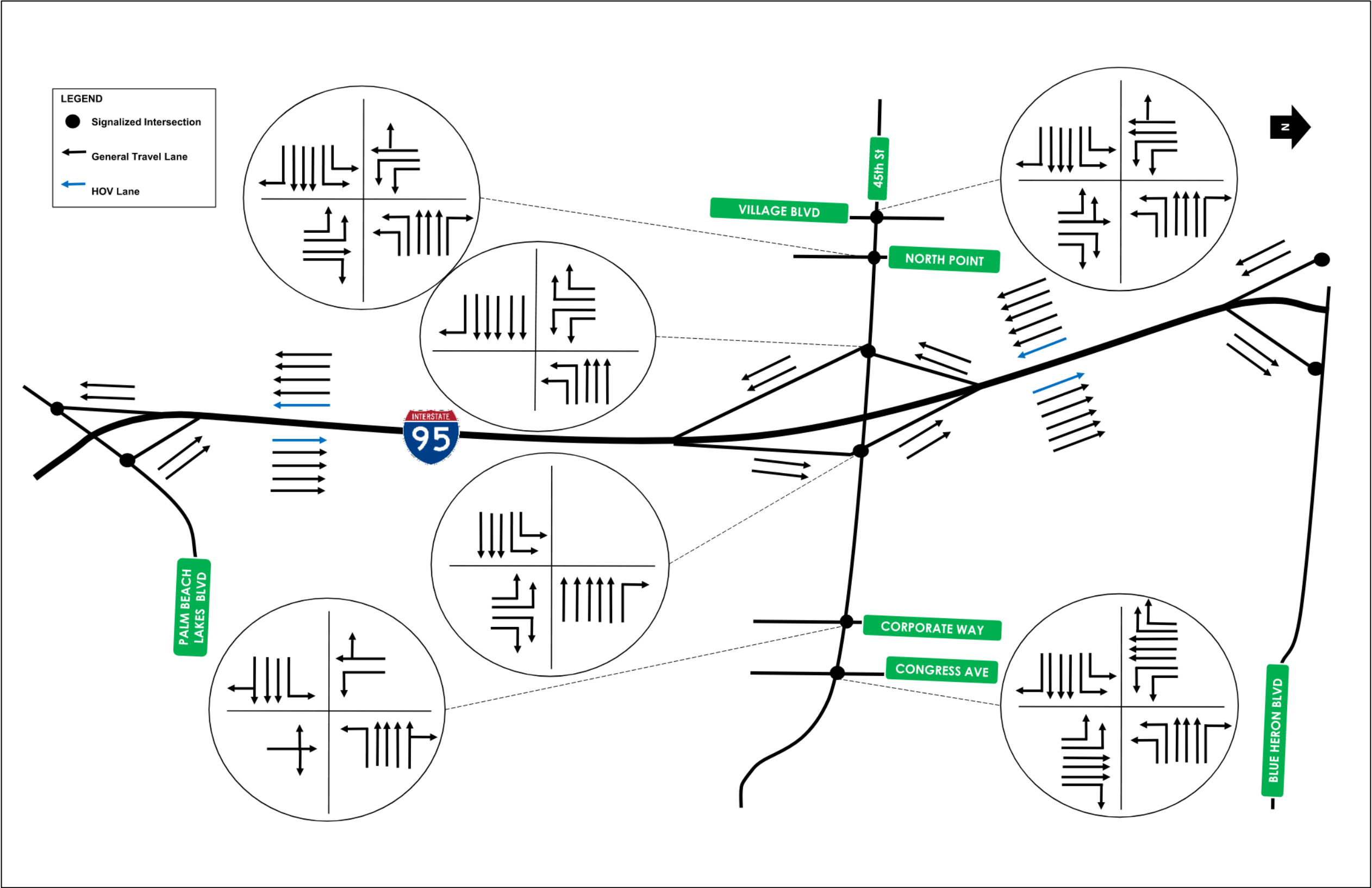


Figure 4 – Existing Lane Configuration

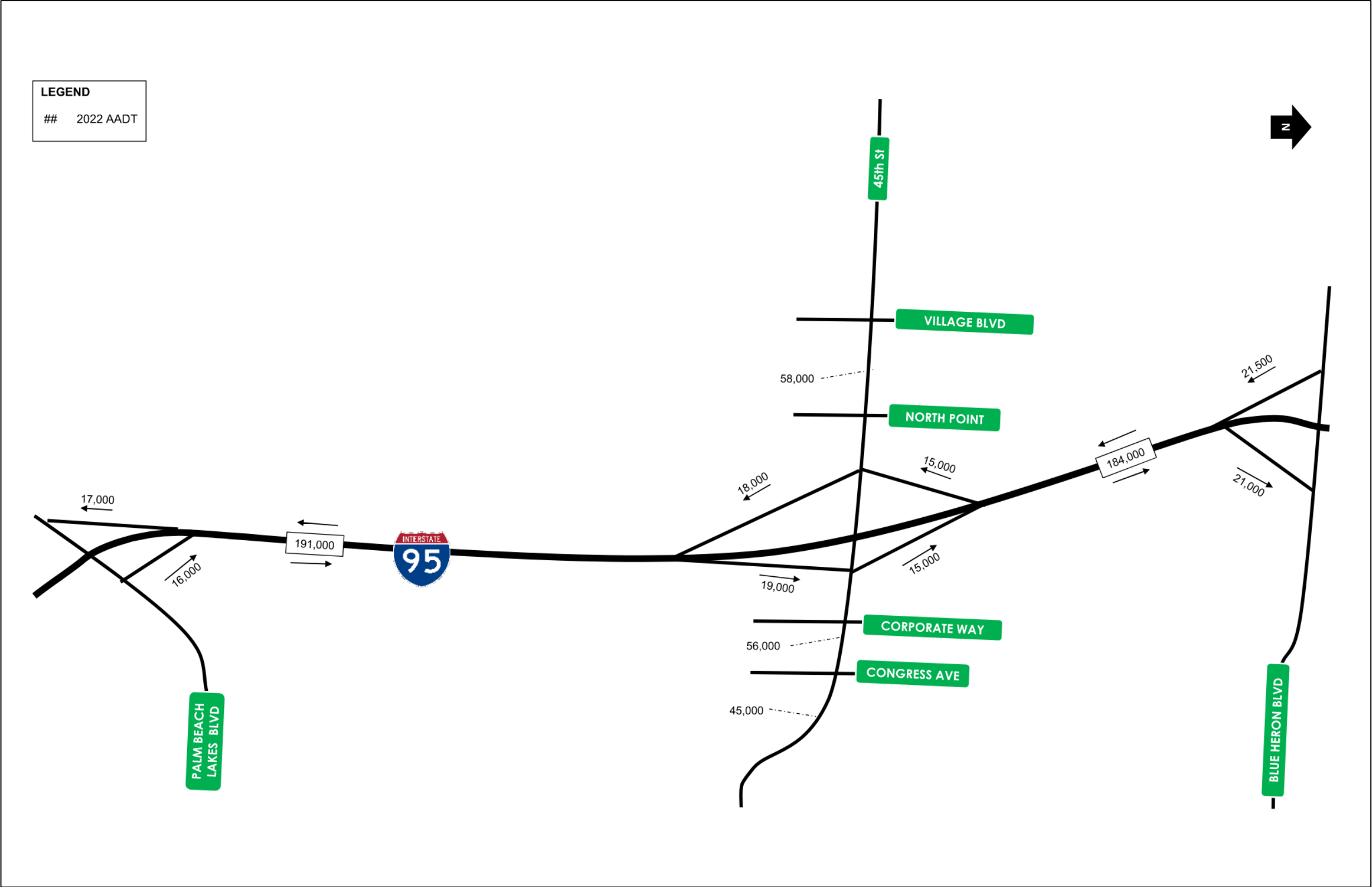


Figure 5 - Existing 2022 AADT Volumes

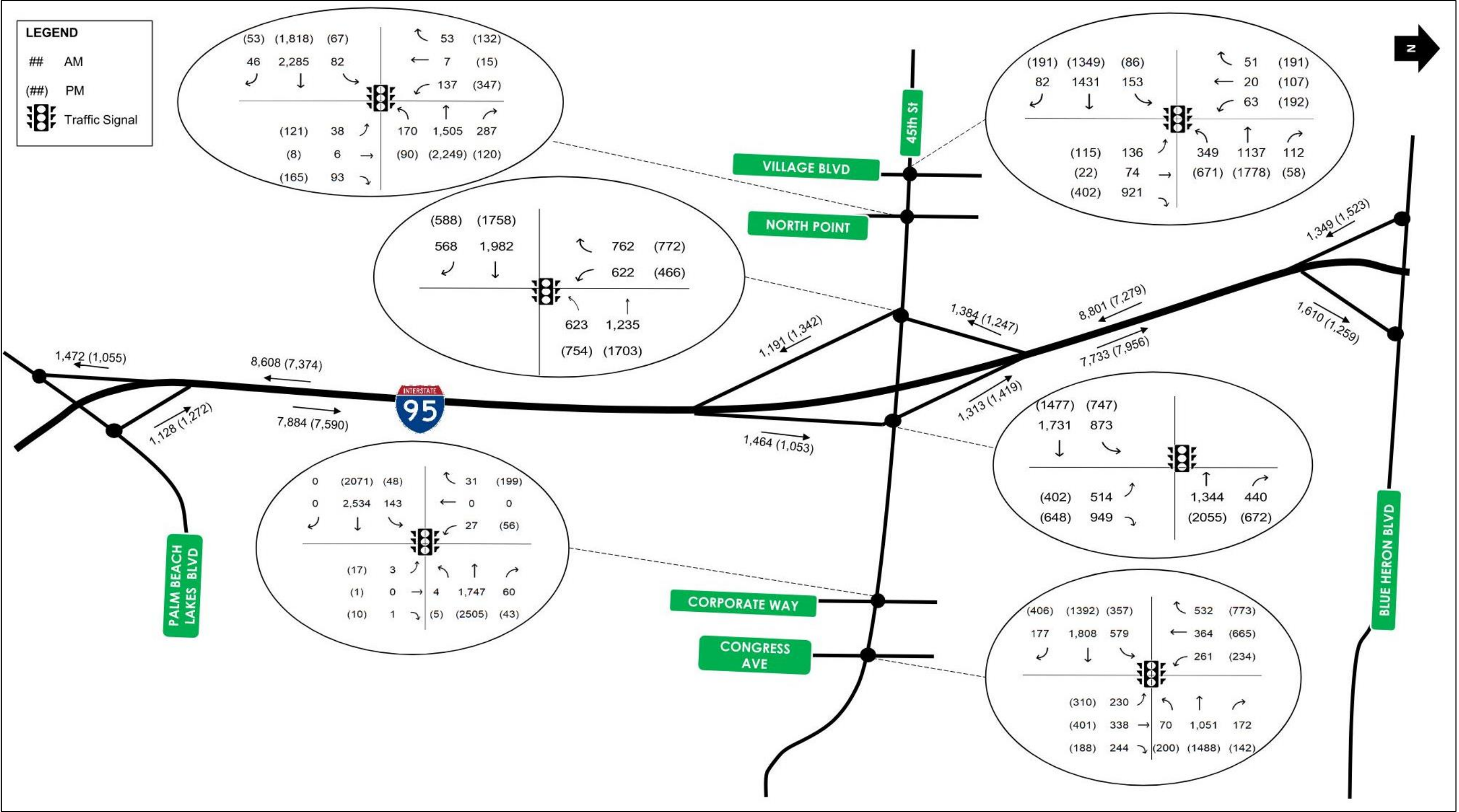


Figure 6 – Existing 2022 Balanced Peak Hour Volumes

4.3.2 Microsimulation Model Development and Calibration

Traffic microsimulation was developed using PTV's VISSIM 2023 software. The following steps were taken to develop, calibrate, and prepare the model for the future analysis:

- Summarized existing traffic data to identify relevant demand and operational characteristics during the AM and PM peak hour, such as AADT, Directional Design Hour Volumes (DDHVs), balanced intersection traffic volumes, approach queuing, travel time and speed, and vehicle composition. Hourly variations in the traffic flow were summarized. VISSIM microsimulation routing decisions were coded using an ODME process. Developed the existing year microsimulation base model (geometry, demand, and signal operations) and check for errors.
- Calibrated and validate the existing year base model using Table 7-7 (Classical Model Calibration Targets) detailed in the 2021 FDOT Traffic Analysis Handbook, which will be based on 10 simulation runs in order to average results. The calibration targets will include traffic volume and consider travel time, speed, queue length, and visualization.
- Created and run the design year microsimulation model by updating the network geometry to match the alternative, coding the future year demand, and modifying the signal operations.
- Compared the future microsimulation model outputs of AADT, DDHVs, and AM and PM peak hour turning movements to the estimated AADT, DDHVs, and peak hour turning movements developed using the project traffic forecast development methodology.
- Conflict areas were applied to the model intersection and the model animation was reviewed to ensure logical flow. Locations that resulted in unreasonable and unexpected traffic flow were adjusted using priority rules which replaced conflict areas. Priority rules offer greater flexibility than Conflict areas when determining how vehicle interactions should take place at intersections, however, priority rules also require a higher level of effort.

A model development and calibration report is included in **Appendix C**. Overall, the calibration of the existing conditions VISSIM models produced simulation output that replicated existing traffic operations and field observed driver behavior for both the AM and PM peak periods. The only exception to this was the short westbound segment between the ramp terminals during the AM peak period where the simulation is showing a lower travel time compared field measurements. This was determined to be an acceptable outcome from the simulation based on additional field observations and an in-depth review of the travel time data. The calibration parameters will be carried over to the future model, and it is anticipated that some of the calibration parameters may be modified if geometric improvements warrant changes in vehicle speeds or capacity. The calibration results are summarized in **Table 3**.

Table 3 –Microsimulation Calibration Summary

Calibration Parameter	Target/Goal	Targets Met?
Traffic Volume	Simulated and measured link volumes for more than 85% of links to be within target/goal established in Table 7-7 of FDOT 2021 Traffic Analysis Handbook	Yes
	Simulated and measured link volumes for more than 85% of links to have GEH statistic value of 5 or lower	Yes
	Sum of Link volumes within calibration area to be within 5%	Yes
	Sum of link volumes to have GEH statistic value of 5 or lower	Yes
Travel Time	Simulated travel time within +/- 1 minute for routes with observed travel times less than 7 minutes for all routes identified	91% of links meet target
Queue Length	Visually matched maximum queue lengths to field observed queues	Yes
Visualization	Checked for consistency with field conditions for off-ramp queuing and bottlenecks at the 45th Street interchange area	Yes

4.3.3 Traffic Analysis

The traffic analysis was conducted using the calibrated VISSIM model for the AM and PM peak periods. The results are summarized in the following subsections.

4.3.3.1 Freeway Analysis

The AM and PM peak hour freeway analysis is summarized in **Figure 7** and **Figure 8**, respectively. The results show that the existing expressway is operating at LOS D except at the northbound merge segment by Palm Beach Lakes Boulevard which is estimated to operate at LOS E during the AM and PM peak hour.

4.3.3.2 Intersection Analysis

The existing intersection analysis results are summarized in **Table 4**. The overall intersection results show that all of the intersections are operating at LOS D or better except for the intersection at Congress Avenue which is operating at LOS E during the AM peak hour. At the individual movement level, the results show that several are operating at LOS E and F.

4.3.3.3 Arterial Analysis

The arterial analysis results are summarized in **Table 5**. The results show that the average vehicle speeds decrease below 18 mph (estimated LOS E) during the AM peak hour in both the eastbound and westbound directions towards the I-95 ramp terminals. These low vehicle speeds are similarly experienced during the PM peak period. Note that the color coded vehicle speeds in the table are similar to the Highway Capacity Manual 6th Edition Level of Service for Urban Street segments with a free flow speed of 45 mph where blank/white indicates LOS C or greater, yellow indicates an LOS D, and red indicates an LOS E or below.

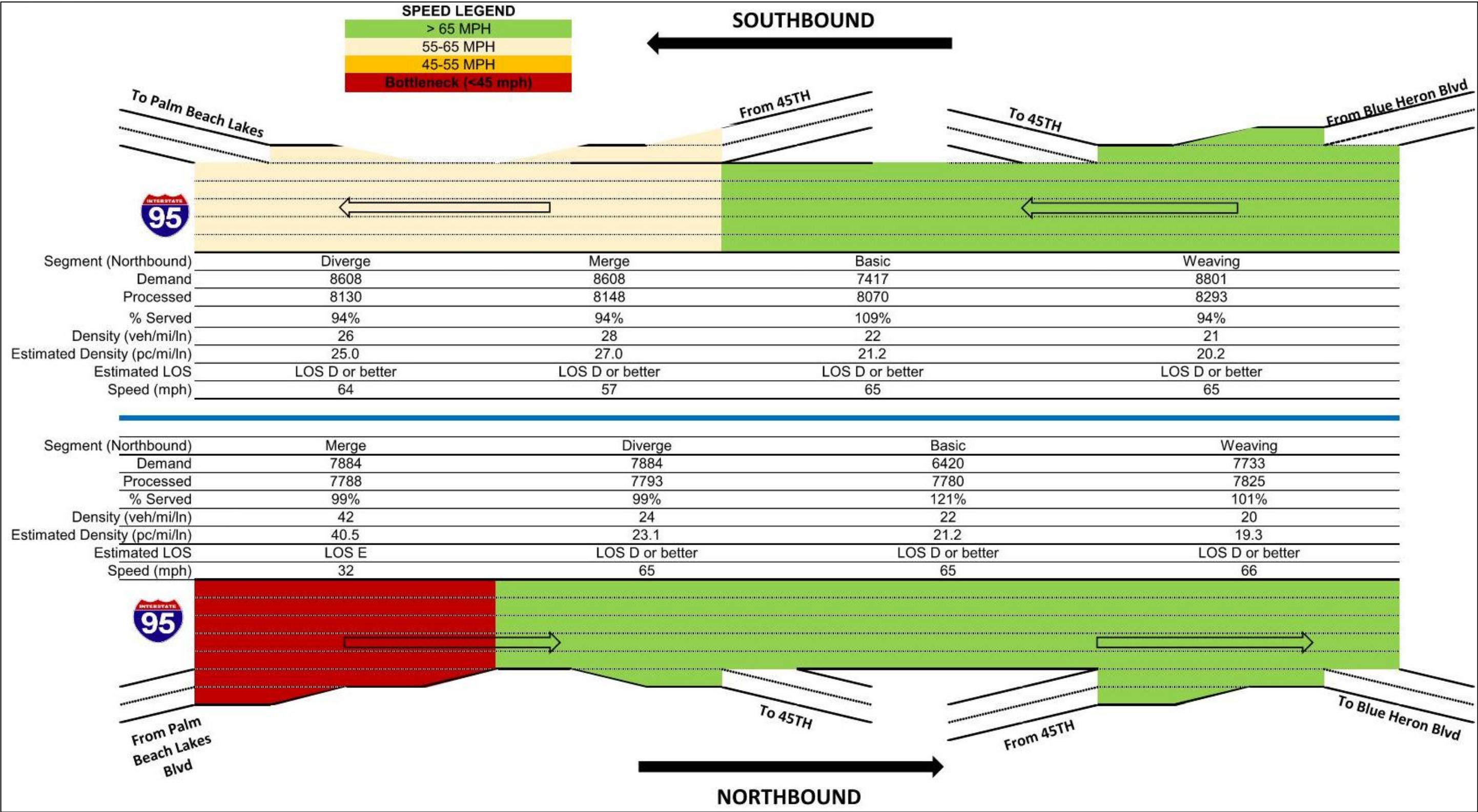


Figure 7 – Existing Freeway Analysis – AM Peak Hour

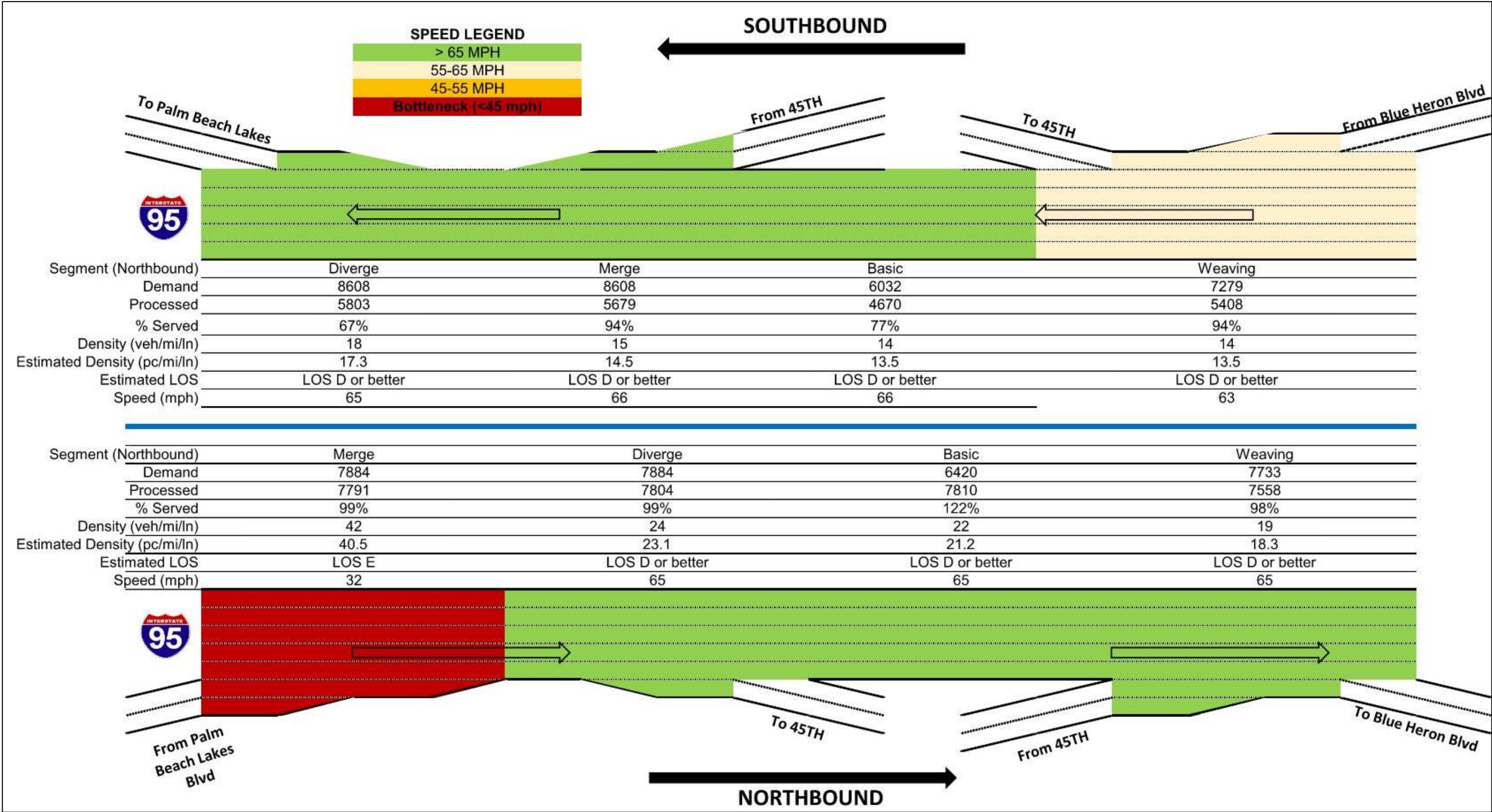


Figure 8 - Existing Freeway Analysis – PM Peak Hour

Table 4 - Existing Intersection Analysis Results

Intersection	Movement	AM Peak Hour						PM Peak Hour					
		Delay (sec)	LOS	Max Queue	Simulated Volume	Demand Volume	%Difference	Delay (sec)	LOS	Max Queue	Simulated Volume	Demand Volume	%Difference
45th Street & Village Boulevard	EB-L	76.1	E	182	169	153	10%	85.3	F	97	77	86	-10%
	EB-T	20.1	C	430	1553	1431	9%	38.1	D	505	1305	1349	-3%
	EB-R	3.0	A	28	31	82	-62%	10.4	B	171	204	191	7%
	WB-L	74.5	E	287	307	349	-12%	67.3	E	516	644	671	-4%
	WB-T	11.2	B	223	1176	1137	3%	24.0	C	825	1729	1778	-3%
	WB-R	2.4	A	66	117	112	4%	2.8	A	37	41	58	-29%
	NB-L	181.6	F	1674	160	136	18%	73.9	E	211	126	115	10%
	NB-T	226.2	F	1674	81	74	9%	80.7	F	211	33	22	50%
	NB-R	98.0	F	1674	763	921	-17%	19.4	B	162	408	402	1%
	SB-L	72.8	E	84	73	63	16%	72.8	E	243	189	192	-2%
	SB-T	75.5	E	84	25	20	25%	68.9	E	243	108	107	1%
45th Street & Northpoint Boulevard	SB-R	9.4	A	118	68	51	33%	31.5	C	277	186	191	-3%
	Intersection	46.5	D	-	-	-	-	37.7	D	-	-	-	-
	EB-L	92.7	F	134	128	82	56%	98.6	F	114	78	67	16%
	EB-T	13.7	B	832	2180	2285	-5%	13.0	B	362	1776	1818	-2%
	EB-R	3.4	A	32	51	46	11%	2.8	A	20	60	53	13%
	WB-L	68.6	E	179	201	170	18%	75.4	E	113	90	90	0%
	WB-T	16.3	B	550	1519	1505	1%	23.3	C	1021	2150	2249	-4%
	WB-R	16.3	B	127	255	287	-11%	23.3	C	83	133	120	11%
	NB-L	84.4	F	73	32	38	-16%	83.2	F	229	132	121	9%
	NB-T	77.4	E	76	14	6	133%	66.7	E	112	7	8	-13%
	NB-R	16.1	B	76	85	93	-9%	16.9	B	112	164	165	-1%
45th Street & I-95 SB	SB-L	73.0	E	191	195	137	42%	88.6	F	518	321	347	-7%
	SB-T	63.3	E	191	7	7	0%	70.9	E	518	5	15	-67%
	SB-R	69.3	E	191	55	53	4%	80.5	F	518	133	132	1%
	Intersection	22.0	C	-	-	-	-	28.1	C	-	-	-	-
	EB-T	78.9	E	1163	1995	1982	1%	65.5	E	856	1763	1758	0%
	EB-R	1.3	A	0	548	568	-4%	1.4	A	0	553	588	-6%
	WB-L	1.6	A	16	553	623	-11%	1.3	A	16	761	754	1%
	WB-T	1.1	A	48	1406	1235	14%	0.7	A	53	1654	1703	-3%
	SB-L	145.5	F	798	620	622	0%	69.0	E	446	434	466	-7%
	SB-R	45.6	D	790	688	762	-10%	54.7	D	437	705	772	-9%
	Intersection	48.5	D	-	-	-	-	31.8	C	-	-	-	-
45th Street & I-95 NB	EB-L	4.1	A	539	855	873	-2%	2.8	A	26	740	747	-1%
	EB-T	26.9	C	539	1670	1731	-4%	10.6	B	46	1420	1477	-4%
	WB-T	38.4	D	514	1353	1344	1%	36.8	D	548	2031	2055	-1%
	WB-R	2.0	A	0	393	440	-11%	2.5	A	28	628	672	-7%
	NB-L	79.7	E	1674	612	514	19%	66.7	E	288	381	402	-5%
	NB-R	122.6	F	1670	943	949	-1%	34.4	C	325	554	648	-15%
	Intersection	46.1	D	-	-	-	-	23.9	C	-	-	-	-
45th Street & Riverstone Palm Beach/ Corporate Way	EB-L	21.2	C	197	188	143	31%	37.0	D	46	31	48	-35%
	EB-T	18.1	B	637	2512	2534	-1%	14.5	B	540	1929	2071	-7%
	EB-R	4.8	A	50	82	0	0%	3.5	A	33	31	0	0%
	WB-L	101.2	F	798	187	4	4575%	29.6	C	72	59	5	1080%
	WB-T	15.2	B	776	1605	1747	-8%	5.7	A	705	2481	2505	-1%
	WB-R	15.4	B	814	80	60	33%	5.5	A	743	41	43	-5%
	NB-L	319.0	F	1160	92	3	2967%	61.5	E	142	22	17	29%
	NB-T	294.1	F	1160	5	0	0%	63.1	E	142	2	1	0%
	NB-R	240.8	F	1199	198	1	19700%	19.6	B	181	86	10	760%
	SB-L	79.4	E	161	34	27	26%	94.6	F	183	74	56	32%
	SB-T	0.0	A	137	0	0	0%	208.2	F	920	2	0	0%
45th Street & Congress Ave	SB-R	78.3	E	175	68	31	119%	180.4	F	959	161	199	-19%
	Intersection	35.8	D	-	-	-	-	17.3	B	-	-	-	-
	EB-L	83.9	F	759	616	579	6%	83.4	F	403	361	357	1%
	EB-T	27.8	C	756	1815	1808	0%	21.3	C	519	1268	1392	-9%
	EB-R	6.9	A	205	296	177	67%	6.5	A	155	403	406	-1%
	WB-L	56.8	E	150	134	70	91%	60.4	E	238	236	200	18%
	WB-T	88.8	F	1670	1030	1051	-2%	52.2	D	1665	1527	1488	3%
	WB-R	8.5	A	176	221	172	28%	6.1	A	118	182	142	28%
	NB-L	153.5	F	362	281	230	22%	93.1	F	328	307	310	-1%
	NB-T	50.1	D	182	268	338	-21%	53.0	D	246	438	401	9%
	NB-R	15.6	B	184	199	244	-18%	8.4	A	105	204	188	9%

Table 5 - Existing Arterial Analysis Results

Time Period	Direction	Segment	Time (s)	Speed (mph)	Volume (veh)
AM Peak Period	Eastbound	Start to Northpoint	23.4	17.0	2,182
		Northpoint to I-95 SB	114.5	8.3	1,750
		I-95 SB to I-95 NB	25.5	17.4	1,148
		I-95 NB to Congress	77.1	11.5	1,118
		Congress to South	25.7	36.7	1,817
		South to End	14.6	37.7	2,306
	Westbound	Start to South	47.4	12.1	1,356
		South to Congress	203.5	5.0	1,023
		Congress to I-95 NB	94.4	9.1	700
		I-95 NB to I-95 SB	12.3	32.5	793
		I-95 SB to Northpoint	39.2	24.5	1,051
		Northpoint to End	18.4	36.5	1,095
PM Peak Period	Eastbound	Start to Northpoint	21.8	18.3	1,776
		Northpoint to I-95 SB	83.6	11.4	1,374
		I-95 SB to I-95 NB	15.4	28.8	1,011
		I-95 NB to Congress	61.7	14.4	857
		Congress to South	25.1	37.5	1,268
		South to End	14.4	38.2	1,686
	Westbound	Start to South	42.9	13.4	1,948
		South to Congress	150.5	6.7	1,527
		Congress to I-95 NB	56.0	15.4	1,126
		I-95 NB to I-95 SB	11.8	33.7	1,270
		I-95 SB to Northpoint	44.4	21.6	1,539
		Northpoint to End	34.9	19.2	1,508

Note: Color coded vehicle speeds are similar to the Highway Capacity Manual 6th Edition Level of Service for Urban Street segments with a free flow speed of 45 mph where blank/white indicates LOS C or greater (23mph or faster), yellow indicates an LOS D (between 18 and 23 mph), and red indicates an LOS E or below (less than 18 mph)

4.4 Safety Analysis

Crash data was downloaded from the University of Florida's Signal Four Analytics web database for the five year period between 2019 and 2023. The data was reviewed and cleaned prior to use in this analysis which consisted of removing crashes coded in parking areas, outside of the AOI, and recoding the "unknown" and "other" crash types to the extent practical.

A total of 882 crashes occurred along the 45th Street study limits with the study time period. Along the I-95 northbound study limits, 1,021 crashes were reported, and along I-95 southbound there were 976 crashes that were reported.

The remaining sections describe the crash patterns in the study area. The crash data is summarized in **Appendix D**.

4.4.1 Crashes by Year

The crashes per year did not reveal anomalies in the data. The crashes per year varied along 45th street between 206 crashes and 158 crashes. Along I-95 northbound the crashes varied between 221 and 191 crashes. The crashes along I-95 southbound gradually increased between 163 to 255 crashes from 2019 to 2023. The crashes by year are depicted in the chart in **Figure 9**.

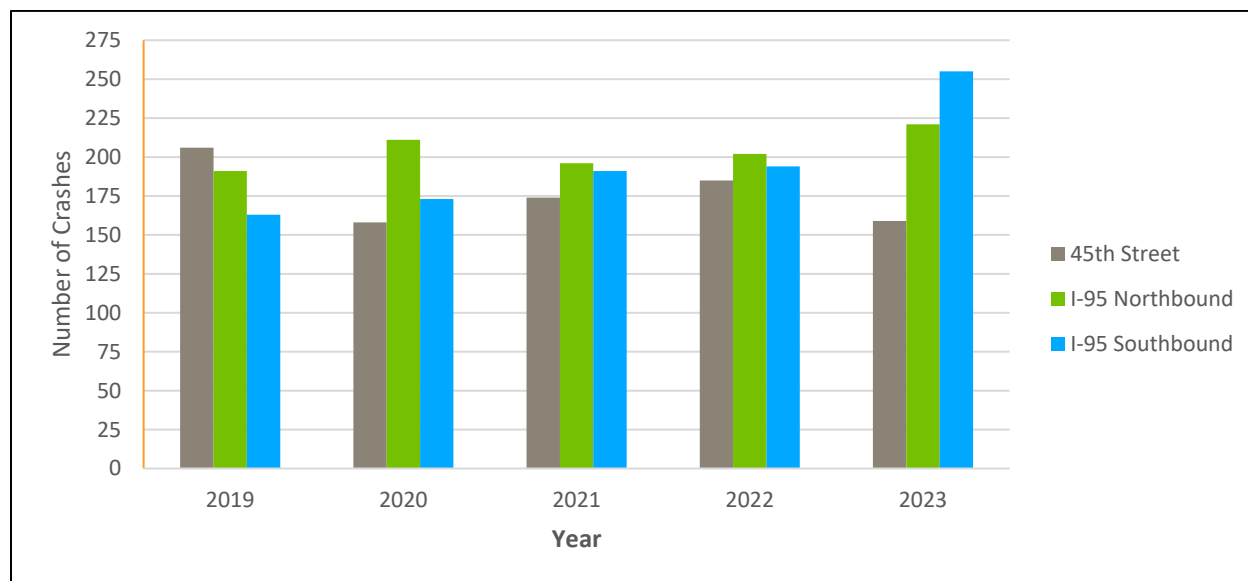


Figure 9 – Crashes by Year

4.4.2 Crash Severities

The proportion of crash severities along 45th Street consisted of approximately 84% as Property Damage Only, 15% coded as Injury, and 0.5% coded as Serious Injury and Fatal. These crash severities are lower than the statewide averages for similar facilities. The statewide crash statistics were extracted for similar facilities using the following parameters: urban, County facility, 6 lanes, curbed shoulder. The crash severity for similar facilities within the same five year period revealed approximately 70% of crashes coded as Property Damage Only, 26% coded as Injury, 2% coded as Serious Injury, and 1.4% coded as fatality.

Along I-95 northbound the recorded crashes consisted of approximately 70% coded as Property Damage Only, 28% coded as injury, 2% coded as serious injury, and 0.5% coded as fatality. The I-95 southbound shared a similar proportion of crash severities as I-95 northbound with approximately 72% coded as Property Damage Only, 27% coded as Injury, 1% coded as Serious Injury, and 0.5% coded as fatality. These crash statistics are comparable to the statewide averages for interstate facility. According to the data from Signal Four Analytics, the crash severity distribution along interstate facilities within the same five year period was 74% coded as Property Damage Only, 23% coded as injury, 2% coded as serious injury, and 0.5% coded as fatality.

The crash severities for each facility by year is depicted in **Figure 10**.

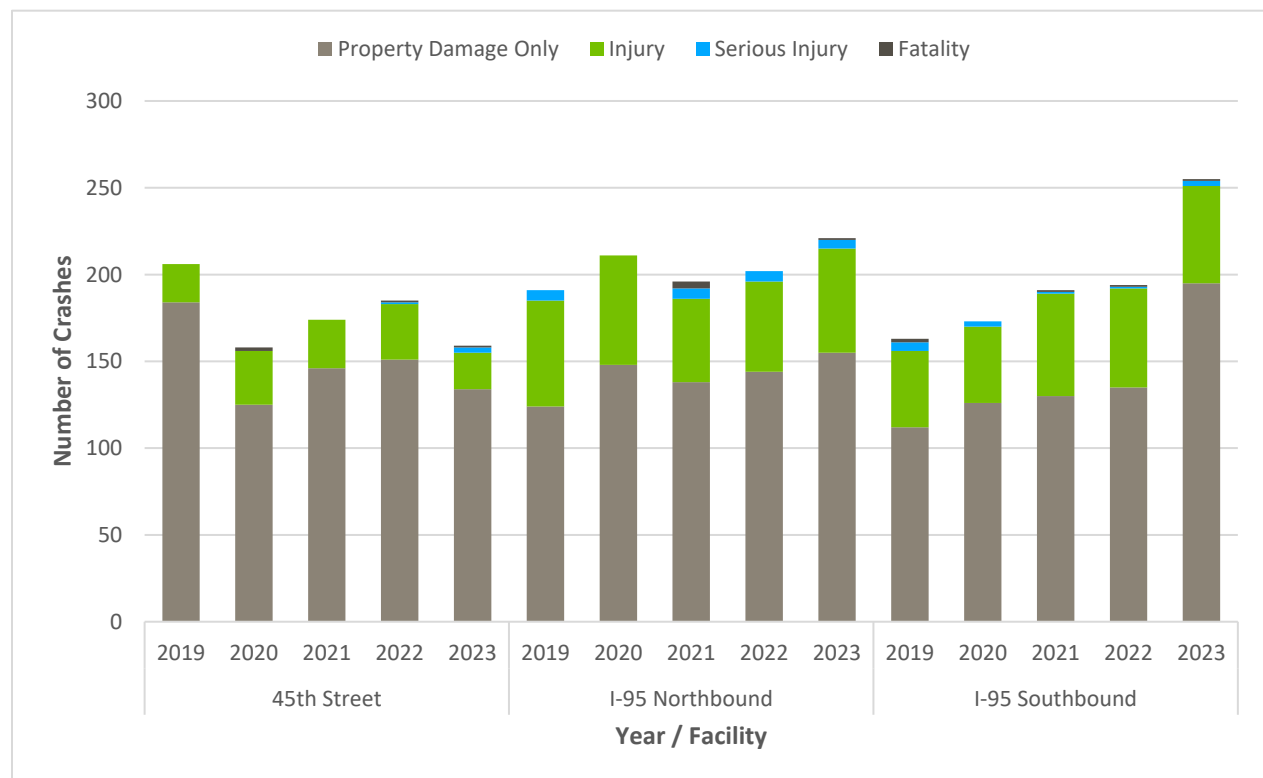
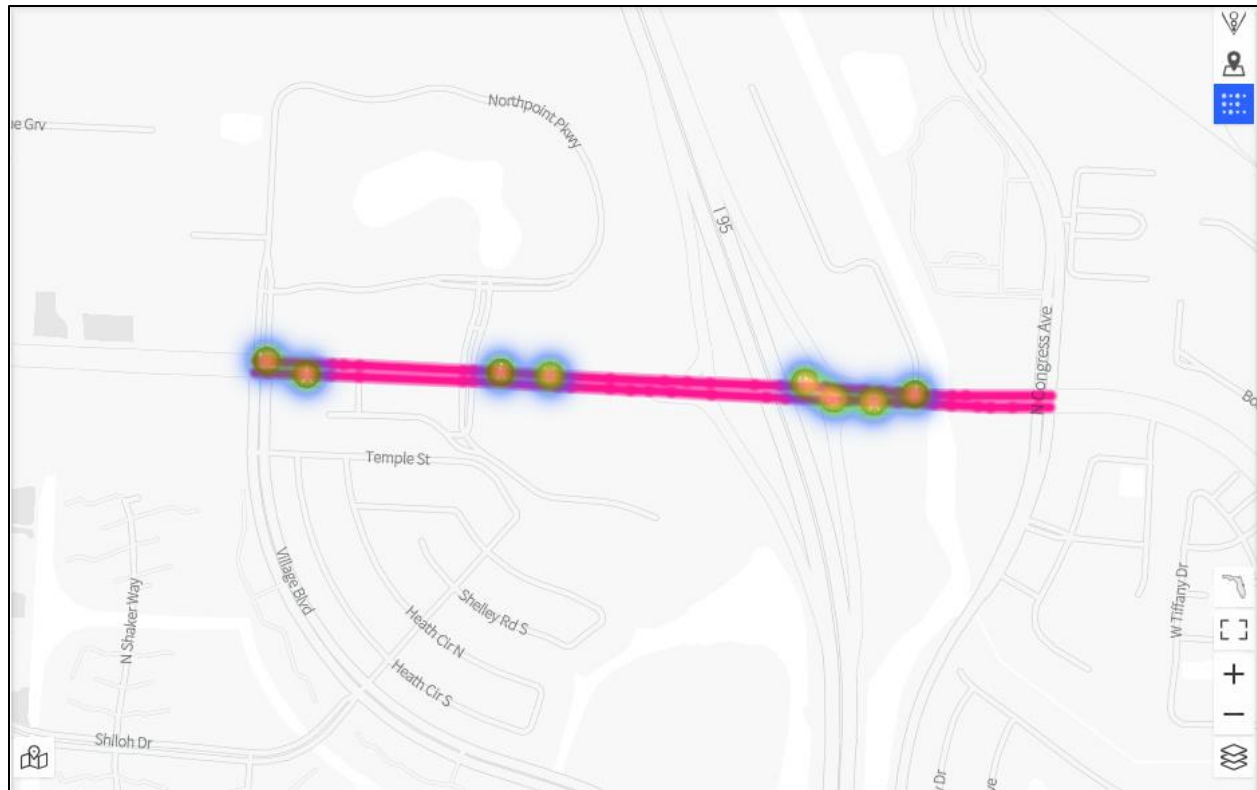


Figure 10 – Crashes by Severity

4.4.3 Fatal and Serious Injury

A total of 8 Fatal and Serious Injury crashes were recorded along 45th Street. The crash locations are depicted in **Figure 11**. A summary of these crashes is as follows:

- Four of those crashes occurred near the I-95 ramp terminal and Corporate Way intersections. Two of these crashes involved pedestrians which were both crossing the street illegally in the middle of the street (jaywalking). One of the crashes was attributable to speeding. One crash attributable to failure to keep in proper lane and resulted in a vehicle striking a signal pole.
- Two crashes occurred near the Northpoint Boulevard intersection which were both pedestrian-related and attributable to pedestrians crossing illegally.
- Two crashes occurred near the Village Boulevard intersection. One crash was coded as a pedestrian-related crash with suspected alcohol use. One crash was coded as an angle crash at the intersection which was attributable to a vehicle running the red light.



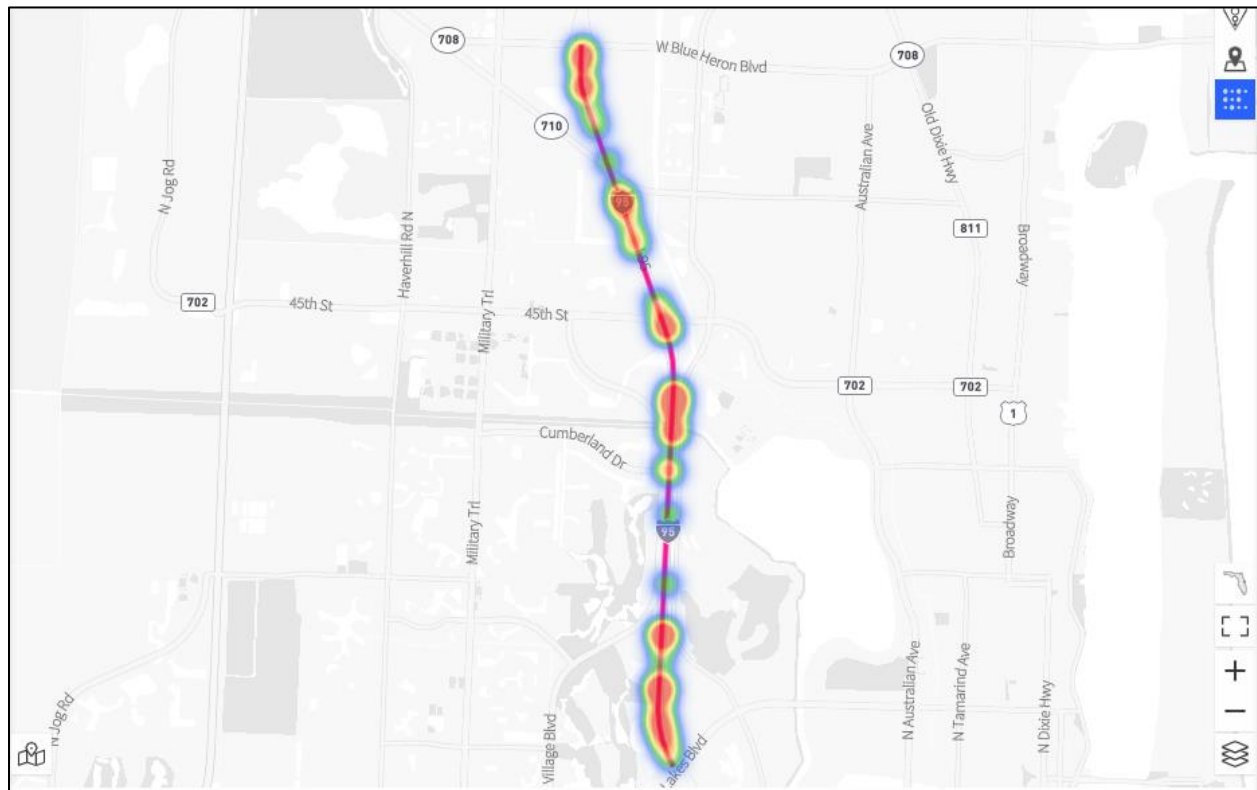
Source: Signal Four Analytics

Figure 11 – Fatal and Serious Injury Heat Map along 45th Street

A total of 46 Fatal and Serious Injury crashes occurred along the I-95 study limits. The crash locations are depicted in **Figure 12**. A summary of these crashes is as follows:

- Crashes by location:
 - Six crashes occurred near the Palm Beach Lakes Boulevard interchange area.
 - Twenty crashes occurred between Palm Beach Lakes Boulevard and 45th Street interchange areas.
 - Five crashes occurred near the 45th Street interchange area.
 - Nine crashes occurred between 45th Street and Blue Heron Boulevard interchange areas.
 - Six crashes occurred in the Blue Heron Boulevard interchange areas.
- The predominant crash type was Off Road crash with 16 recorded incidents followed by Rear End crashes (13 recorded) and sideswipe crashes (8 recorded).
- One Fatal crash involved a vehicle traveling northbound along the expressway which failed to maintain control and ran into the shoulder striking a pedestrian who was attending to their disabled vehicle.

- Six crashes were coded as alcohol and drug-related, one crash was coded with aggressive driving, four crashes were attributed to distracted driving



Source: Signal Four Analytics

Figure 12 – Fatal and Serious Injury Heat Map along I-95 Mainline

4.4.4 Crash Types

Along 45th Street, the predominant crash type was Rear End with approximately 51% of the total crashes followed by Sideswipe with approximately 16% and Angle crashes at approximately 15% of the crashes. Bicycle-related crashes accounted for approximately 0.5% of the total and Pedestrian-related crashes accounted for 0.8% of the total. These crash patterns are typical for an urbanized congested area with several signalized intersections and access point and are mostly similar to the statewide averages except that the corridor has a higher instance of angle crashes and a lower instance of pedestrian and bicyclist crashes. The statewide averages for similar facilities revealed that 52% of crashes were coded as Rear End, Sideswipe crashes accounted for 18% of the total, Angle crashes at 4%, Pedestrian-related crashes at 2% and Bicycle related crashes at 1%.

Along I-95 northbound, most of the crashes were coded as Rear End (41%) followed by Sideswipe (24%) and Off Road crashes (22%). The I-95 southbound had a higher proportion of crashes coded as Rear End (49%), similar proportion of crashes coded as Sideswipe (24%), and a lower proportion of crashes coded

as Off Road (14%). These statistics are comparable to the statewide average for urban interstate facilities in the same time period which revealed Rear End (48%) as the predominant crash type followed by Sideswipe (23%) and then Off Road crash types (14%). These crash patterns are typical for an urbanized congested high-speed Interstate facility.

The crash types are summarized with the severities in **Table 6**.

Table 6 – Crash Types and Crash Severities by Facility

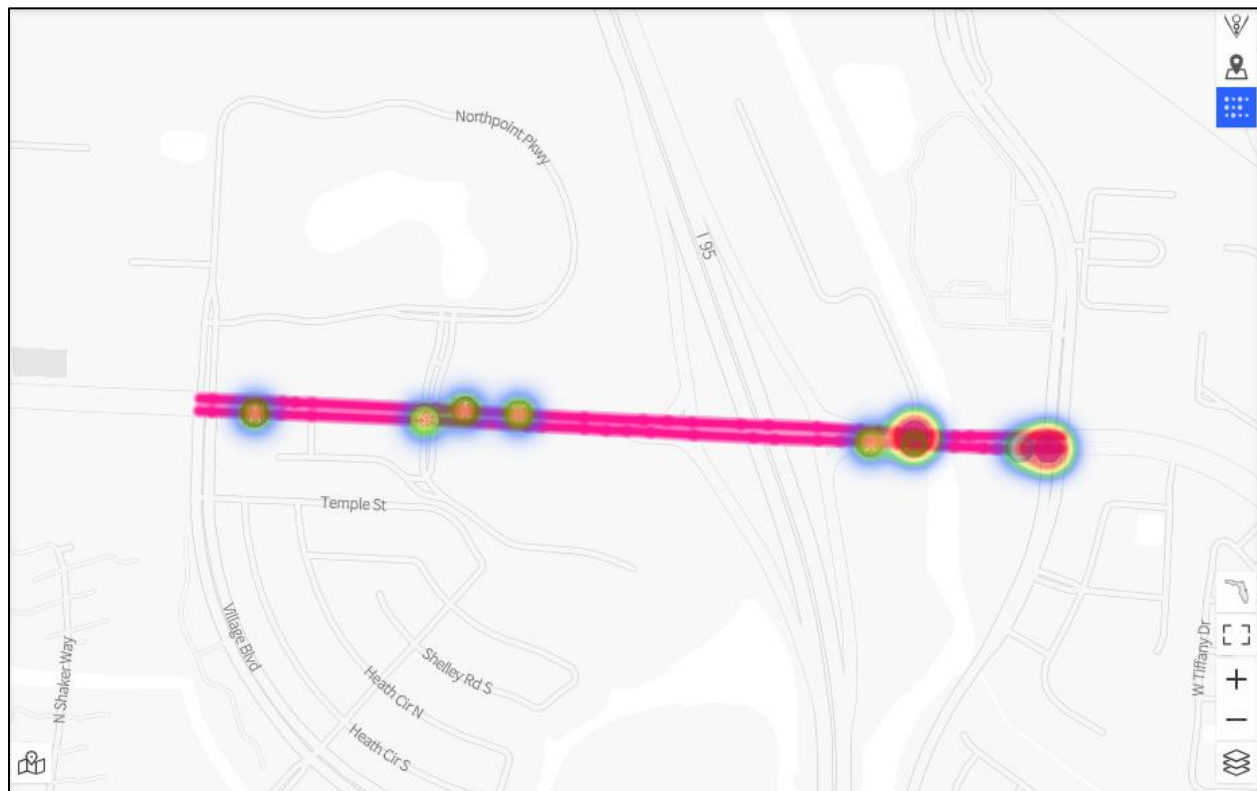
Crash Type	Crash Severity				Total Crashes	Annual Average	%
	Fatal	Serious Injury	Injury	Property Damage Only			
45th Street							
Angle	1		26	109	136	27	15.42%
Animal				1	1	0	0.11%
Bicycle			3	1	4	1	0.45%
Head On				3	3	1	0.34%
Left Turn			28	31	59	12	6.69%
Off Road			9	23	32	6	3.63%
Other		2	2	13	17	3	1.93%
Pedestrian	3	2		2	7	1	0.79%
Rear End			58	393	451	90	51.13%
Right Turn				14	14	3	1.59%
Roadway Debris				5	5	1	0.57%
Rollover			2	11	13	3	1.47%
Sideswipe			6	134	140	28	15.87%
I-95 Northbound							
Animal				1	1	0	0.10%
Bicycle						0	0.00%
Head On				2	2	0	0.20%
Left Turn						0	0.00%
Off Road	1	10	81	135	227	45	22.23%
Other		1	22	75	98	20	9.60%
Pedestrian	1				1	0	0.10%
Rear End	3	5	111	304	423	85	41.43%
Right Turn						0	0.00%
Roadway Debris			3	13	16	3	1.57%
Rollover		2	3	6	11	2	1.08%
Sideswipe		5	64	173	242	48	23.70%
I-95 Southbound							
Angle						0	0.00%
Animal				1	1	0	0.10%
Bicycle						0	0.00%
Head On			1	1	2	0	0.20%
Left Turn						0	0.00%
Off Road	1	4	40	96	141	28	14.45%
Other	1	2	25	50	78	16	7.99%
Pedestrian				2	2	0	0.20%
Rear End	3	2	132	342	479	96	49.08%
Right Turn						0	0.00%
Roadway Debris			4	24	28	6	2.87%
Rollover			4	3	7	1	0.72%
Sideswipe		5	54	179	238		24.39%

4.4.5 Pedestrians and Bicyclists

Along 45th Street, a total of 4 crashes were bicycle related and 7 crashes were pedestrian related. A summary of the crash patterns is as follows:

- Crashes by location:
 - Four crashes occurred at the intersection with Congress Avenue
 - Three crashes occurred at the intersection with Corporate Way with one coded as Fatal
 - One Serious Injury crash occurred near the I-95 ramp terminals
 - Three crashes were reported near Northpoint Boulevard and one of those crashes was Fatal and another of the crashes was coded with a Serious Injury
 - One Fatal crash was reported near Village Boulevard

These crashes are depicted in **Figure 13**.



Source: Signal Four Analytics

Figure 13 – Bicycle and Pedestrian-Related Crashes along 45th Street

4.4.6 Environmental Conditions

This section describes the crash patterns by lighting, weather, and road conditions.

4.4.6.1 Lighting

At all facilities the majority of the crashes occurred during daylight conditions followed by dark-lighted conditions as depicted in **Figure 14**. These statistics are comparable to the statewide averages for similar facilities. Along urban roadways, the five year statewide statistics showed that 75% occurred during daylight conditions and 20% occurred during dark-lighted conditions (similar to 45th Street). Along urban interstate facilities, 68% of crashes occurred during the daylight and 23% of crashes occurred during Dark-Lighted conditions.

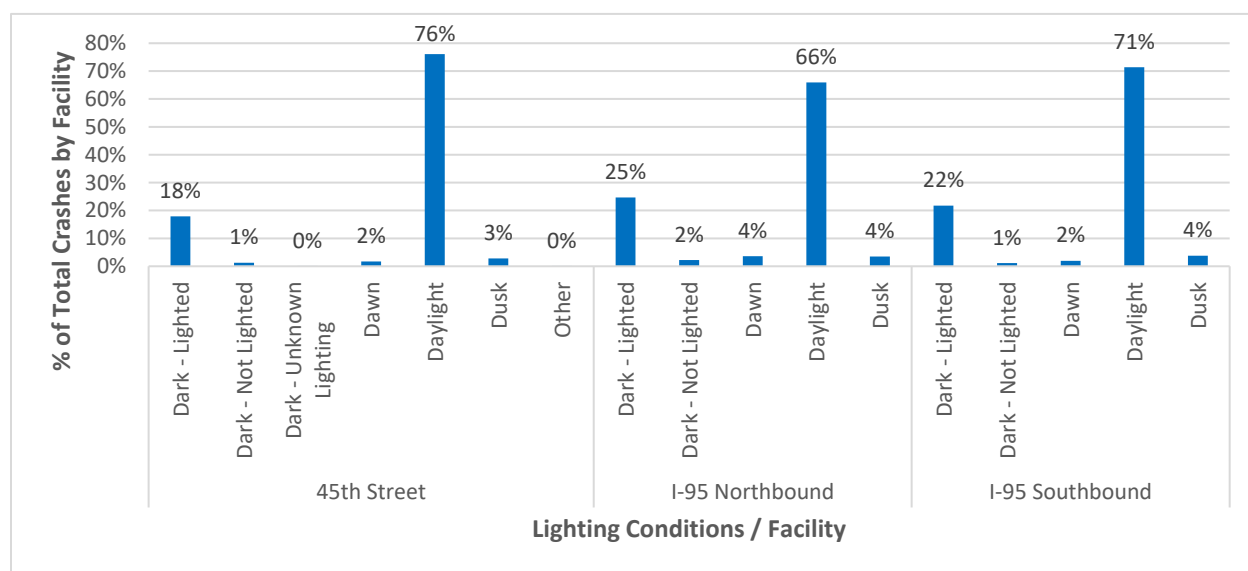


Figure 14 – Crashes by Lighting Conditions

4.4.6.2 Weather

At all facilities the majority of the crashes occurred during clear weather conditions (+57%). The next highest proportion of crashes occurred in Cloudy or Rainy conditions depending on the location. The results are depicted in **Figure 15**. These statistics are comparable to the statewide averages for similar facilities. Along urban roadways, the five year statewide statistics showed that 80% occurred during Clear weather conditions, 11% occurred during Cloudy weather conditions, and 8% occurred during Rain weather conditions. The 45th Street project limits had a slightly lower instance of crashes during Clear weather conditions and a slightly higher instance of crashes during Cloudy and Rain weather conditions. Along urban interstate facilities, the five year statewide statistics showed that 67% occurred during Clear weather conditions, 18% occurred during Cloudy weather conditions, and 15% occurred during Rain weather conditions. The I-95 project limits had slightly higher crash instances in Cloudy and Rain weather conditions.

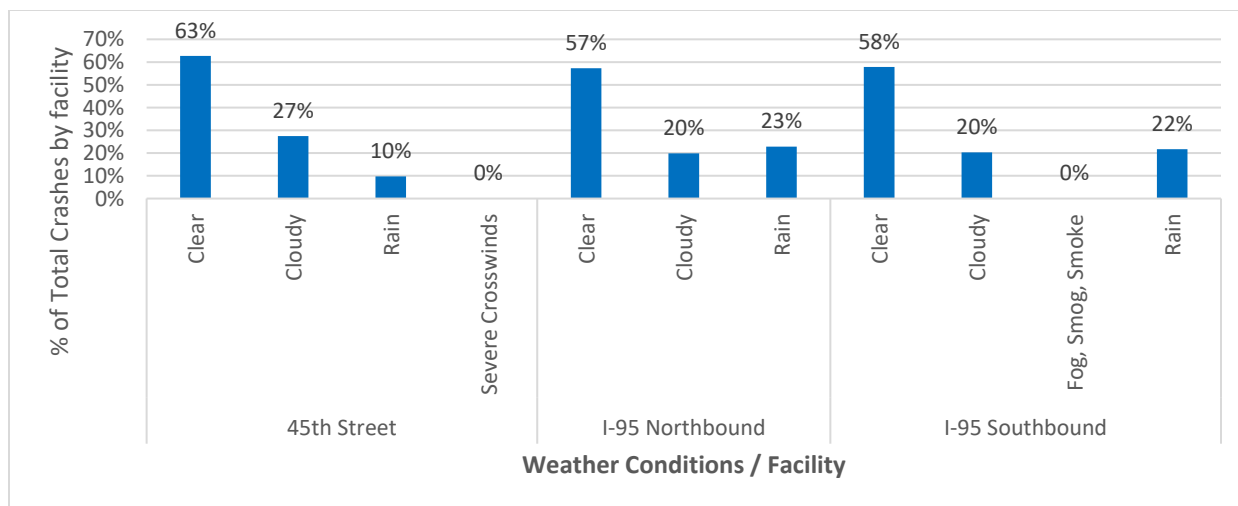


Figure 15 - Crashes by Weather Conditions

4.4.6.3 Road Surface

At all facilities the majority of the crashes occurred during dry road surface conditions (+66%). The I-95 limits included a higher proportion of crashes coded as wet road surface between approximately 31 and 34% of the crashes. The results are depicted in **Figure 16**. These statistics are comparable to the statewide averages for similar facilities. Along urban roadways, the five year statewide statistics showed that 87% occurred during Dry road conditions, 13% occurred during Wet road conditions. This is similar to the crash patterns along 45th Street. Along urban interstate facilities, the five year statewide statistics showed that 78% occurred during Dry road conditions, 21% occurred during Wet road conditions. The I-95 project limits had higher crash instances in Wet weather conditions. This is likely due to the higher frequency of rain events in the region compared to the State.

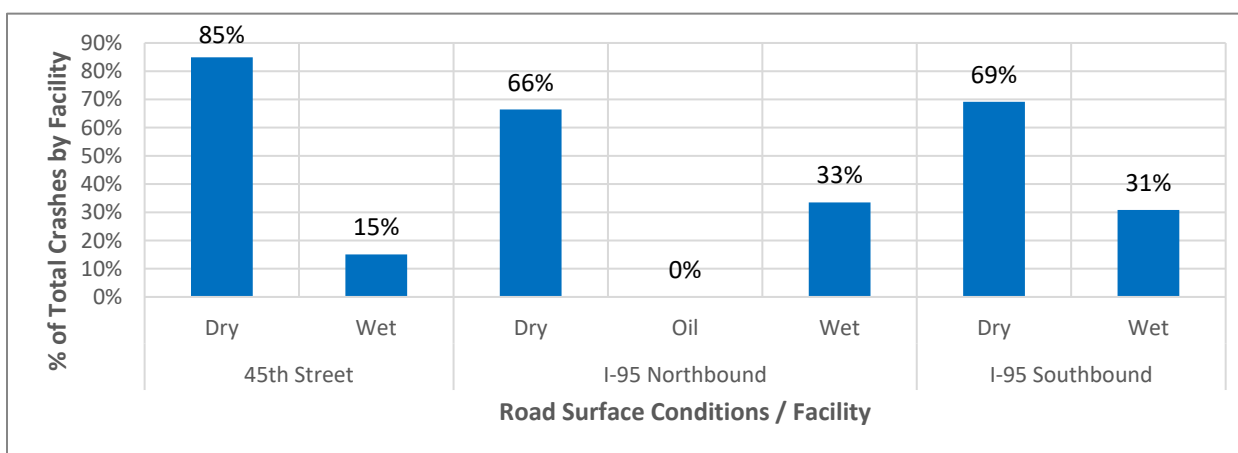


Figure 16 - Crashes by Road Surface Conditions

4.5 Environment

The following is a summary of the existing environmental conditions which was extracted from the PD&E Study. Note that there have been no significant changes in the area except for the recently redeveloped parcel on the southeast quadrant by the interchange with 45th Street. An PD&E Study environmental re-evaluation is scheduled for August 2024.

4.5.1 Social

The land use within or around the study area is primarily commercial. Community facilities identified within the buffer zone include six schools and colleges/universities, two community centers, one government facility, nine group care centers, three hospitals, forty-four other health care facilities, one library and cultural facility, one nursing home/assisted living facility, seventeen social services centers and four religious facilities.

4.5.2 Cultural

There are no archeological sites or cemeteries in the study area.

4.5.3 Natural

The majority of the project area and buffer zone consists of developed areas, including roadways and commercial, industrial, and residential developments which do not provide wildlife habitat. Small areas of undeveloped uplands were observed within the buffer zone. However, these areas were either actively maintained (i.e. mowed), overgrown with invasive/exotic vegetation, or displayed disturbed soil conditions (i.e. fill material) and therefore provide negligible habitat value for protected upland wildlife species. Habitat for wetland dependent protected species is limited due to the general absence of littoral zones and emergent wetland vegetation within the lakes and canals inside the buffer zone. There is no natural wetland habitat within the 45th Street and I-95 project areas.

4.5.4 Physical

4.5.4.1 Contamination

A total of 32 sites of potential environmental concern were identified within or around the study area. Based on review of regulatory records, the following five contaminated sites in the vicinity of the project were identified as High or Medium concern using the criteria outlined the PD&E manual:

High Concern Sites:

- National Freight Spill located at the northbound onramp to I-95 at 45th Street: It is presumed that here remains petroleum contaminated soil beneath the northbound ramp to I-95 as a result of an accidental diesel fuel spill. Petroleum contaminated soils, if encountered during construction, can

be excavated and disposed as contaminated materials. FDOT may choose to have their contractor conduct this or it may be conducted as part of construction.

- Falcon Crane located at 3679 SR 710: Based on the potential presence of groundwater contamination associated with a historical petroleum discharge at this facility, the contamination could potentially affect dewatering during construction, if the project extends to the east of the C-17 canal. The potential for its effect on the project will be determined when the proposed alternatives are further developed.
- Royal Palm Cleaners/Village Cleaners located at 2100 45th Street: Based on the documented presence of solvent contamination associated with the former operation of this drycleaner facility, groundwater contamination could affect dewatering during construction if the project extends north toward SR 710. The potential for its effect on the project will be determined when the alternatives are further developed.

Medium Concern Sites:

- Racetrac #562 located at 2995 45th Street: Petroleum groundwater impacts documented at this facility are not anticipated to have affected the project area.
- West Palm Hospital/Columbia Hospital located at 2201 45th Street: The presence of soil contamination remaining from a historical petroleum discharge has been documented at this facility. Based on the absence of groundwater impacts associated with this facility, no environmental impacts resulting from this facility are anticipated to affect the project.

5.0 TRAFFIC FORECASTING

The future project traffic volumes were forecasted for this IMR re-evaluation to account for the changing conditions related to new developments (i.e., Riverstone Palm Beach development). The project traffic forecasting was based on a combination technique using the travel demand model forecasts from the SERPM, 8.524, historical trends, population growth projections, and developing ODME using VISUM.

5.1 Project Traffic Forecast Development Methodology

The methodology for developing project traffic forecasts is consistent with the FDOT Project Traffic Forecasting Handbook. The validated base model and adjusted horizon year model was used to provide study time period forecasts and trip tables for use in the microsimulation model. Various forecasting methodologies were evaluated in the development of the AADT forecasts including:

- Regression analysis of AADTs from 2010 to 2022 from the FTO website using the FDOT Trend analysis worksheet
- Regression analysis of AADTs from 2010 to 2022 from the FTO website and the 2045 model volumes from the travel demand model projections using the FDOT Trend analysis worksheet
- Socioeconomic growth between 2015 and 2045 for TAZs within the study area
- Population projections from the University of Florida Bureau of Economic and Business Research (BEBR)

Linear growth rates were estimated for the various forecasting methodologies, summarized, and compared to each other. Approved developments were considered in the adjusted horizon year model. The growth rates were applied to the 2022 AADTs to estimate Opening Year 2030 and Design Year 2050 AADTs.

Directional Design Hourly Volumes (DDHV)s were estimated using the approved Standard K and D factors and FDOT's TMTTool software. The resulting projected traffic volumes will be reviewed for reasonableness and balanced within the study area. The traffic projections were checked for reasonableness and compared to the microsimulation outputs.

5.2 Base Year Validation

The base year model was validated as documented in the 2015 Validation Metrics memo in **Appendix E**. The validation process was in accordance with the FDOT 2019 Project Traffic Forecasting Handbook. The validation process consisted of a regionwide and a project-level area assessment. The model was run, validation metrics were reviewed, and model refinements were applied to improve model accuracy. A total of three iterations and sets of model refinements were completed. Following the third iteration, all required metrics in the study area that are noted in the 2019 Project Traffic Forecasting Handbook are within the

acceptable range except for the Freeway facility type. The Freeway facility type shows a 7% volume/count ratio which is only slightly over the acceptable range of 6%. The Root Mean Square Error (RMSE) results of the study area indicate a reliable model. The recommendation was to utilize the validated model.

5.3 Horizon Year Model Adjustments

The following adjustments were applied to the 2045 horizon year model:

- Updated the horizon year model to include any applicable changes made to the base year model
- Reviewed planned and programmed projects and confirmed that all Cost Feasible Plan project are included in the model including:
 - Palm Beach TPA 2045 LRTP Project # SIS037
 - Location: I-95 between Congress Avenue and Blue Heron Boulevard
 - Description: Add managed lanes (potentially convert HOV, add 2 managed lanes (12 total lanes + auxiliary lane)
- Coordinated with City of West Palm Beach, Mangonia Park, and Palm Beach County to obtain approved developments in the vicinity of the project. The list of developments include the following:
 - Riverstone Palm Beach: Located at the parcel in the southeast quadrant of the 45th Street interchange area with direct access to the Corporate Way and 45th Street intersection, this development includes 16 pump gas station, 6,119 square foot convenience store, 150 room hotel, and 374 dwelling unit multifamily Mid-Rise
 - Broadstone Lakeside: Located at 3600 Village Boulevard, the development includes 280 dwelling units
 - 45th Street Hotel: Located at 2921 45th Street, this development consists of a 160 room hotel
- The approved development site characteristics were compared to the Micro Analysis Zone (MAZ) and Traffic Analysis Zone (TAZ) socioeconomic data from the SERPM model. Adjustments were applied to the zone with the Riverstone Palm Beach since it was not capturing the intensity of the development. Trip generation of this development was also conducted and compared with SERPM model output. Note that the Palm Beach Riverstone Traffic Impact Study, dated June 2022 was provided to the project team; however, subsequent to this study the development program was modified to reduce the number hotel rooms. The Palm Beach Riverstone Traffic Impact Study and a separate trip generation analysis is provided in **Appendix F**.
- Following adjustments to the horizon year model, the model was run to check for reasonableness and then a subarea trip table was extracted for usage in the ODME effort.

5.4 Growth Rate

The selected growth rate is 0.7% based on a comparison of the growth rate methodologies. The 0.7% growth rate was applied to the existing 2022 AADT to project to the future year. In addition to the growth rate, the Riverstone Development trip generation results were estimated and included for the south leg of the Corporate Way/River Grove Way intersection. Therefore, the project traffic forecasting approach consists of a conservative methodology that includes a background growth rate in addition to the estimated trips from a development. The growth rate comparison and trend analysis spreadsheets are included in **Appendix G**.

5.5 Origin-Destination Matrix Estimation Process

PTV VISUM 2022 was used to produce a design year ODME for use in the VISSIM microsimulation analysis. The adjusted horizon year SERPM model was used as the initial trip table for the route decisions. The final balanced design year peak hour volumes were used as the targets. The development of the future VISUM model was an iterative ODME process to determine the trips between each zone for each 15-minute interval in the AM and PM periods. The resulting 15-minute trip matrices were used as input in the future VISSIM model.

5.6 Managed Lanes

The Managed Lanes (ML) are planned for implementation along the I-95 network within the study area. The I-95 Managed Lanes Master Plan from south of Linton Boulevard to Palm Beach/Martin County Line (Master Plan) was completed in 2019. Within the study area, the Master Plan proposes to implement ML by converting the existing HOV lane and adding another ML for a total of two MLs. The Master Plan also proposes maintaining the General Use Lanes (GUL) and adding auxiliary lanes at locations where there are no auxiliary lanes such as between 45th Street and Palm Beach Lakes Boulevard. The ML improvements are expected to be implemented by the year 2040. ML access locations would be determined during subsequent PD&E studies.

For the purposes of this study, the ML improvements were considered for the Design Year 2050 analysis. A percent split was estimated and applied to the total expressway demand that was projected as part of this study. Since ML access points have not been approved from a PD&E study, it was assumed that no ML access points are within the study area; therefore, the analysis for this study consists only of the GUL demand and expressway configuration in the VISSIM model.

In order to calculate the percent split of GUL demand compared to the total demand, future traffic projections from the Master Plan were extracted at various segments and directions within the I-95 study limits. The

percent split of GUL demand to the total demand was estimated at 82% for the I-95 northbound AM direction and 83% for the remaining directions and time periods.

This is a streamlined approach to calculate the GUL demand for this study and has been determined to be suitable for this type of analysis. The future traffic forecasting already considered the MLs since they were included in the horizon year model. The future ML PD&E studies will conduct a more detailed travel demand forecasting which may consist of various access point options and Travel Demand Model Value of Travel Time Savings, dynamic toll functions, or Express Lanes Time of Day (ELTOD) assignment model.

The source of the Master Plan future traffic projection figures, percent split calculations, and future GUL demand estimates are included in **Appendix H**.

5.7 Future Traffic Volumes

The Opening Year 2030 and Design Year 2050 AADTs were estimated by applying the selected growth rate to the 2022 AADT volumes. The future AADTs, existing peak hour turning movement count data, and factors were applied to the TMTools for each intersection. The preliminary set of future intersection volumes were post processed to check for reasonableness and were balanced. The final future intersection turning volumes were applied to a final set of TMTool files. The final TMtool files are provided in **Appendix I**.

5.7.1 Opening Year 2030

The Opening Year 2030 AADT volumes are presented in **Figure 17** and the Opening Year 2030 Peak Hour Volumes are presented in **Figure 18**.

5.7.2 Design year 2050

The Design Year 2050 AADT volumes are presented in **Figure 19** and the Design Year 2050 Peak Hour Volumes are presented in **Figure 20**.



Figure 17 – Opening Year 2030 AADT Volumes

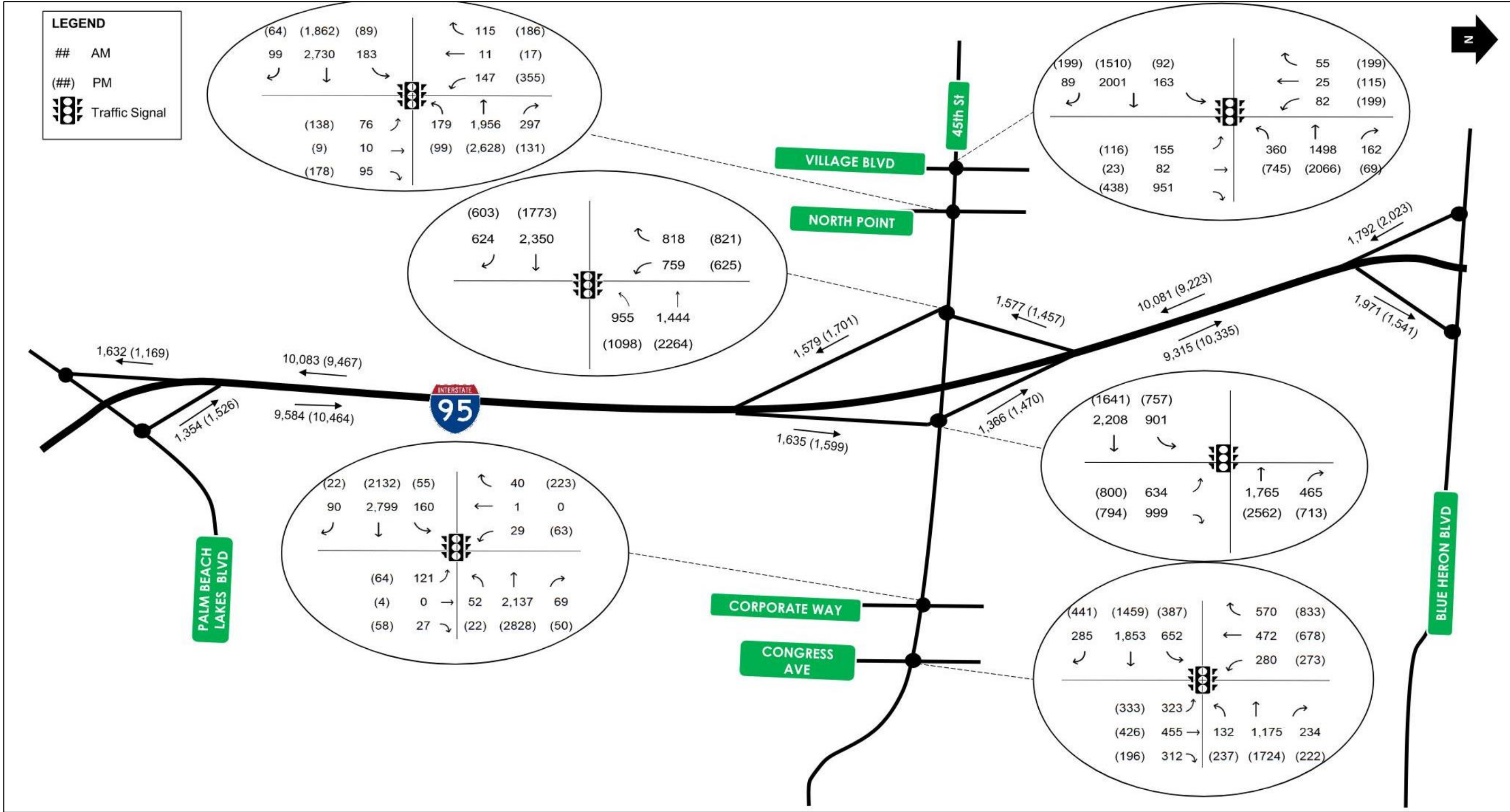


Figure 18 - Opening Year 2030 Peak Hour Volumes

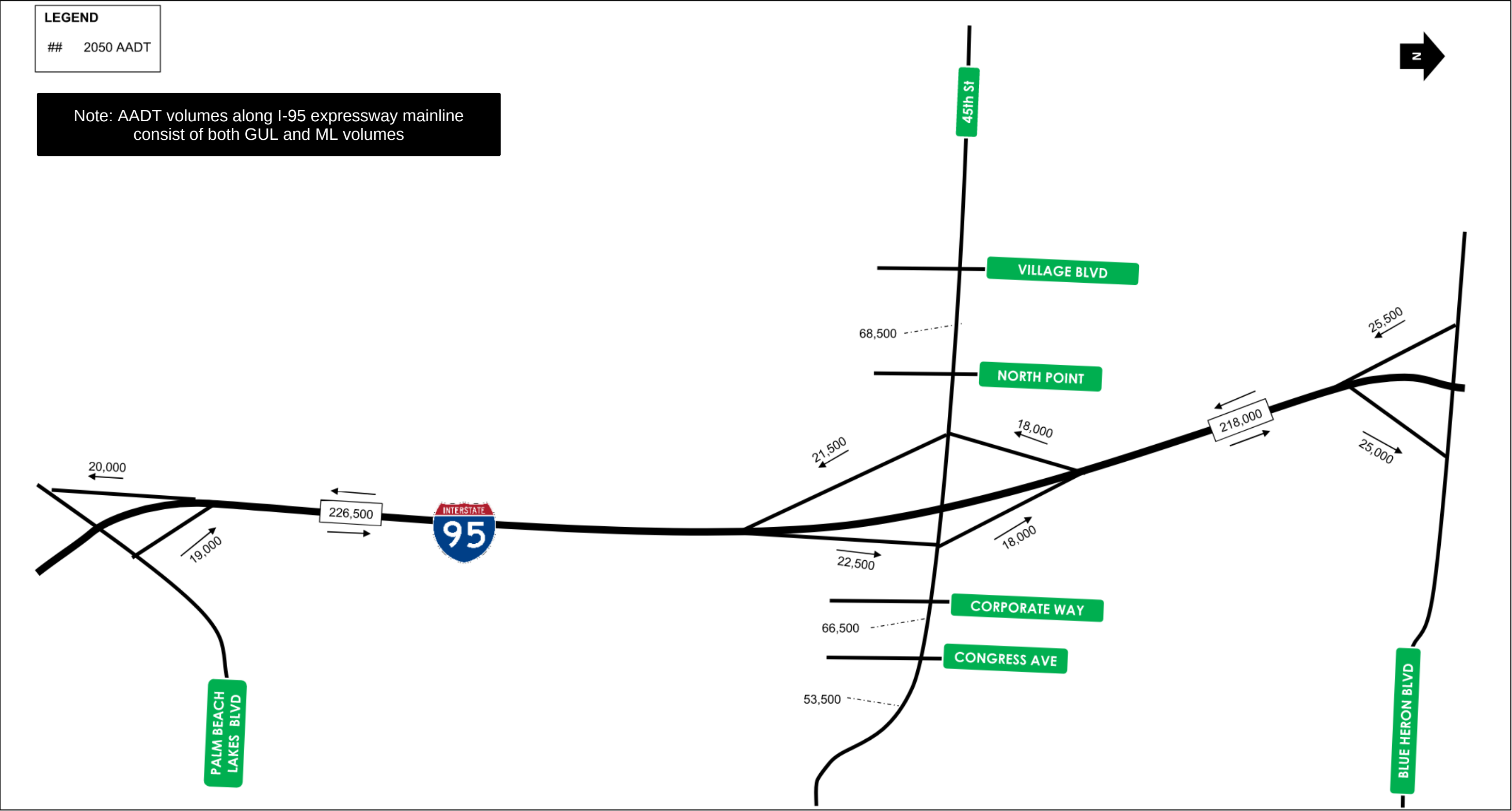


Figure 19 - Design Year 2050 AADT Volumes

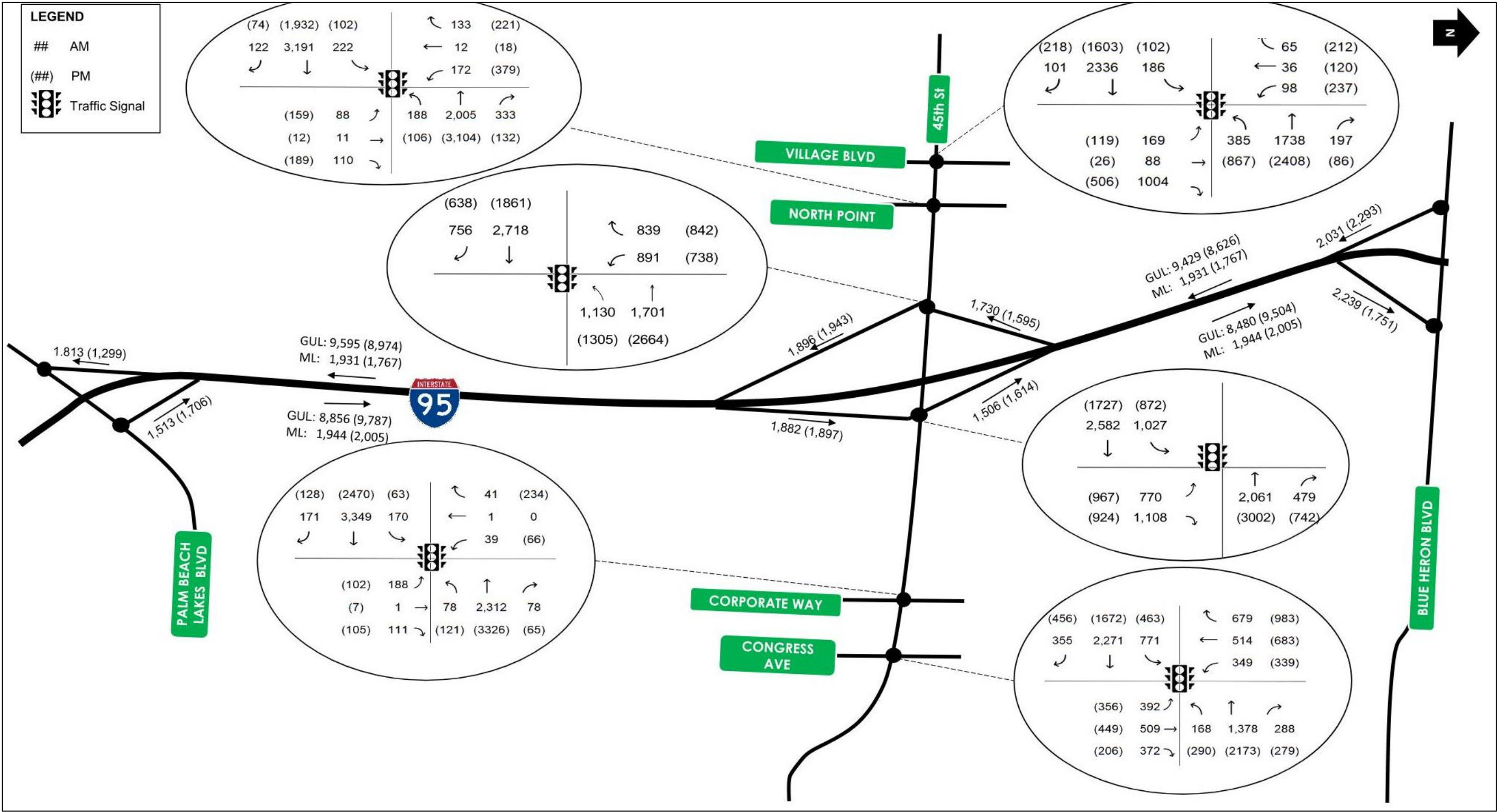


Figure 20 - Design Year 2050 Peak Hour Volumes

6.0 ALTERNATIVES

6.1 Approved IAR Concept

The Approved IAR Concept consists of a Diverging Diamond Interchange (DDI). The following are the major improvements for this Build Alternative:

- 45th Street at Northpoint Boulevard
 - Add a lane converting the eastbound right turn lane to a shared through/right turn lane
- Ramp Terminal Intersections
 - Implementation of DDI
- 45th Street at Congress Avenue
 - Add an eastbound left turn lane
 - Add a northbound left turn

The Build Alternative lane configuration is presented in **Figure 21**.

6.2 Diamond Interchange Build Alternative

The Build Alternative consists of improvements along 45th Street and the I-95 ramp terminals. The primary improvement is the widening of 45th Street to four lanes in each direction from Northpoint Boulevard to Congress Avenue. The following are the major improvements for this Build Alternative:

- 45th Street at Northpoint Boulevard
 - Add a lane converting the eastbound right turn lane to a shared through/right turn lane
- Ramp Terminal Intersections
 - Add an eastbound through lane
 - Add a westbound through lane
 - Add a southbound right turn lane and left turn lane
 - Add a northbound right turn lane and left turn lane
- 45th Street at Corporate Way
 - Add an eastbound shared through/right turn lane (convert the existing to a through lane)
 - Add a westbound shared through/right turn lane (convert the existing to a through lane)
- 45th Street at Congress Avenue
 - Add an eastbound left turn lane
 - Add a lane converting the westbound right turn lane to a shared through/right turn lane
 - Add a northbound left turn

The Build Alternative lane configuration is presented in **Figure 22**.

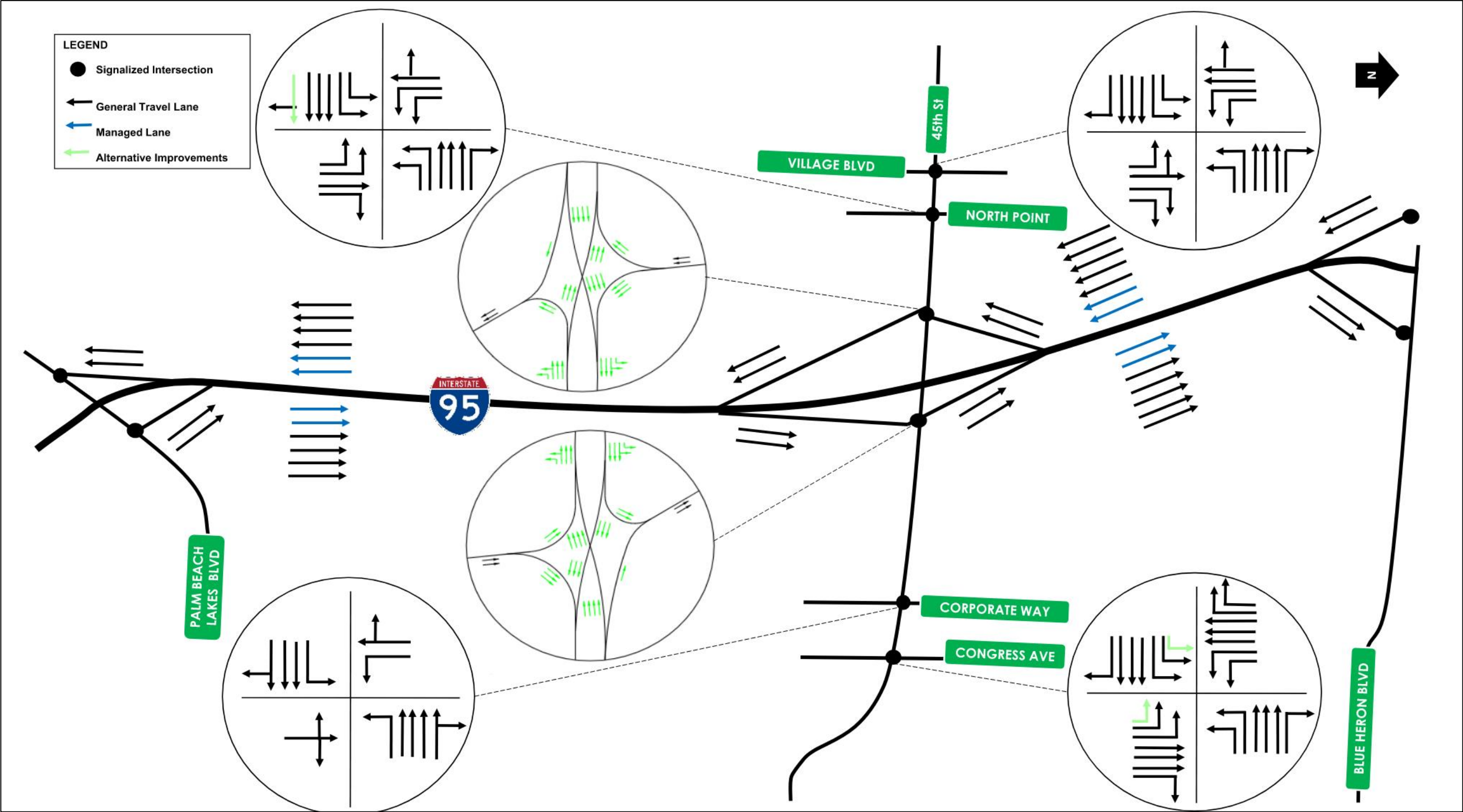


Figure 21 – Approved IAR Concept – Lane Configuration

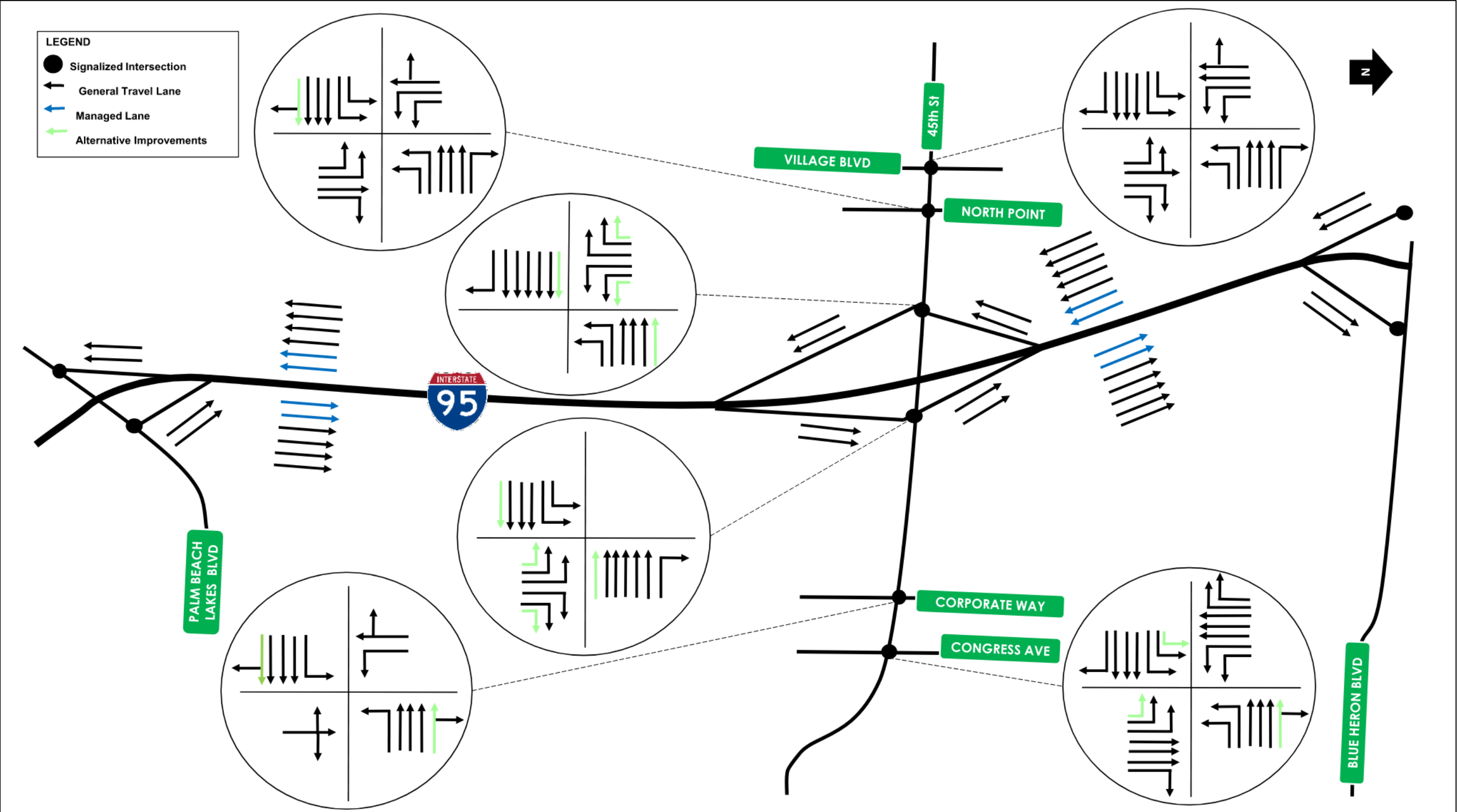


Figure 22 - Diamond Interchange Build Alternative – Lane Configuration

7.0 ALTERNATIVES ANALYSIS

7.1 Freeway Analysis

7.1.1 Opening Year 2030

The Opening Year 2030 freeway analysis results are summarized in **Figure 23** through **Figure 26** for the AM and PM peak hours and the Approved IAR Concept and Diamond Interchange Build Alternative, respectively. Based on a comparison of the results, both Build Alternatives are projected to experience similar operations and operate at LOS D or better for all segments. Note that the expressway network for the opening year 2030 does not include the future I-95 managed lanes project described in **Section 5.3** since the funding is identified in the 2040 to 2045 timeframe.

7.1.2 Design year 2050

The Design Year 2050 freeway analysis is summarized in **Figure 27** through **Figure 30** for the AM and PM peak hours and the Approved IAR Concept and Diamond Interchange Build Alternative, respectively. Based on a comparison of the results, both alternatives are projected to operate with similar density and travel speeds and a LOS of D or better along all expressway segments with the study area except for the Approved IAR Concept at two locations and time periods. During the AM peak hour, the Approved IAR Concept is projected to operate at LOS F in the southbound direction by the southbound off-ramp to 45th Street. During the PM peak hour, the Approved IAR Concept is projected to operate at LOS F in the northbound direction by the northbound off-ramp to 45th Street. These poor operations are due to the ramp terminal intersection off-ramp queue spillback onto the mainline which is described in the intersection analysis section (see **section 7.2.2**). At these same locations, the Diamond Interchange Build Alternative is projecting a slightly higher density which is due to the higher processed volumes, but the segments are operating at LOS D or better.

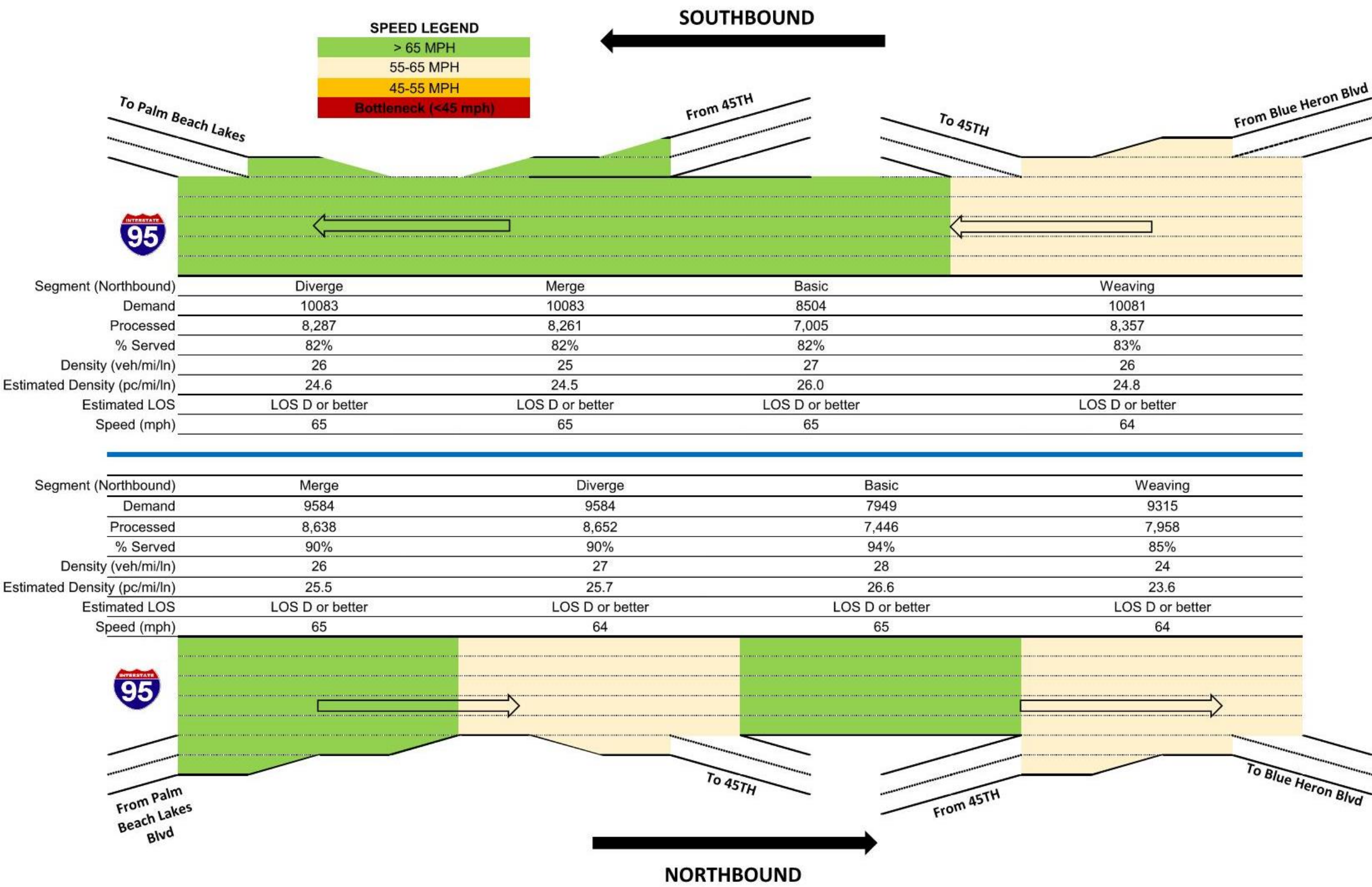


Figure 23 – Opening Year 2030 Freeway Analysis – AM Peak Hour – Approved IAR Concept

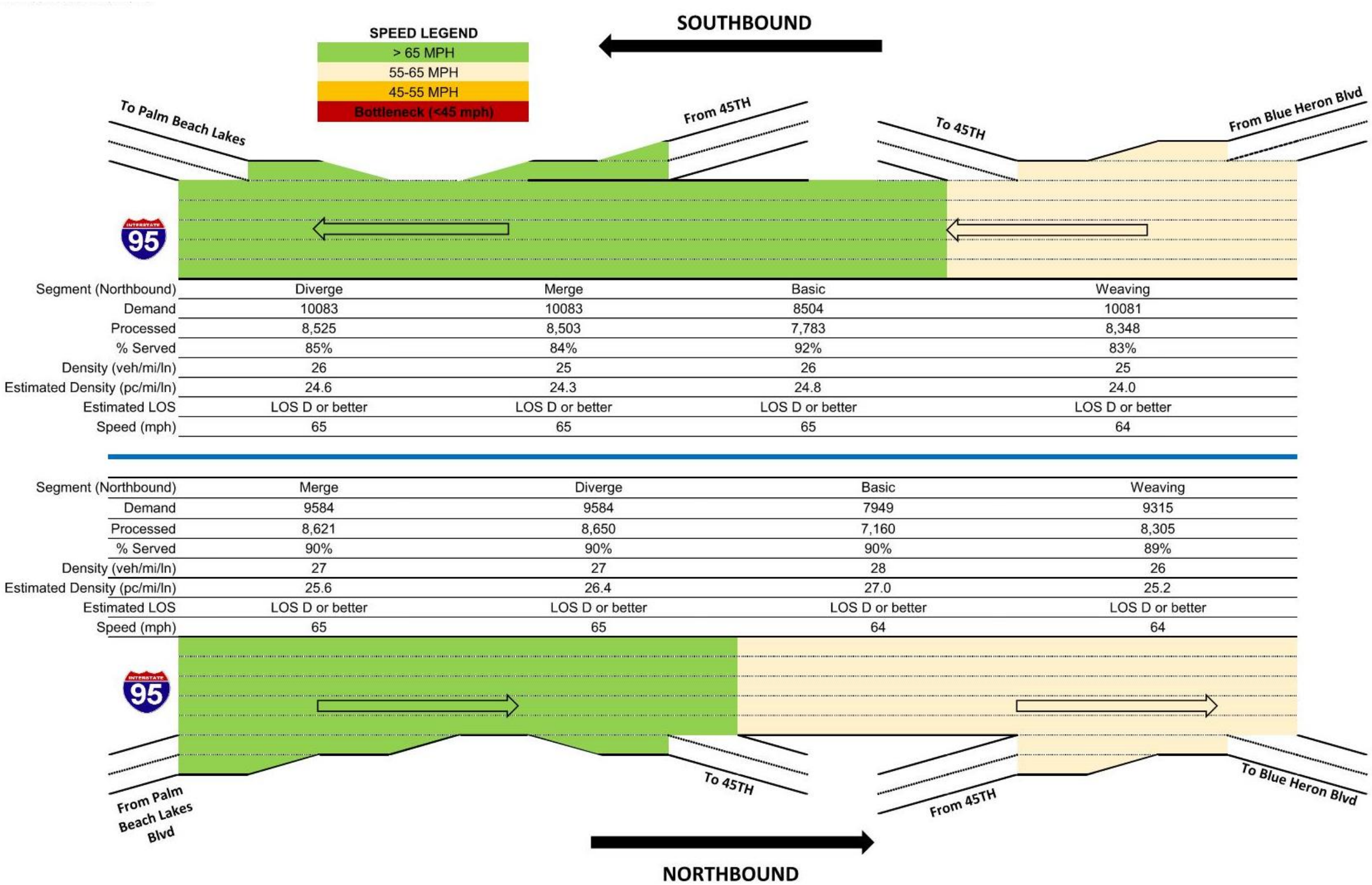


Figure 24 – Opening Year 2030 Freeway Analysis – AM Peak Hour – Diamond Interchange Build Alternative

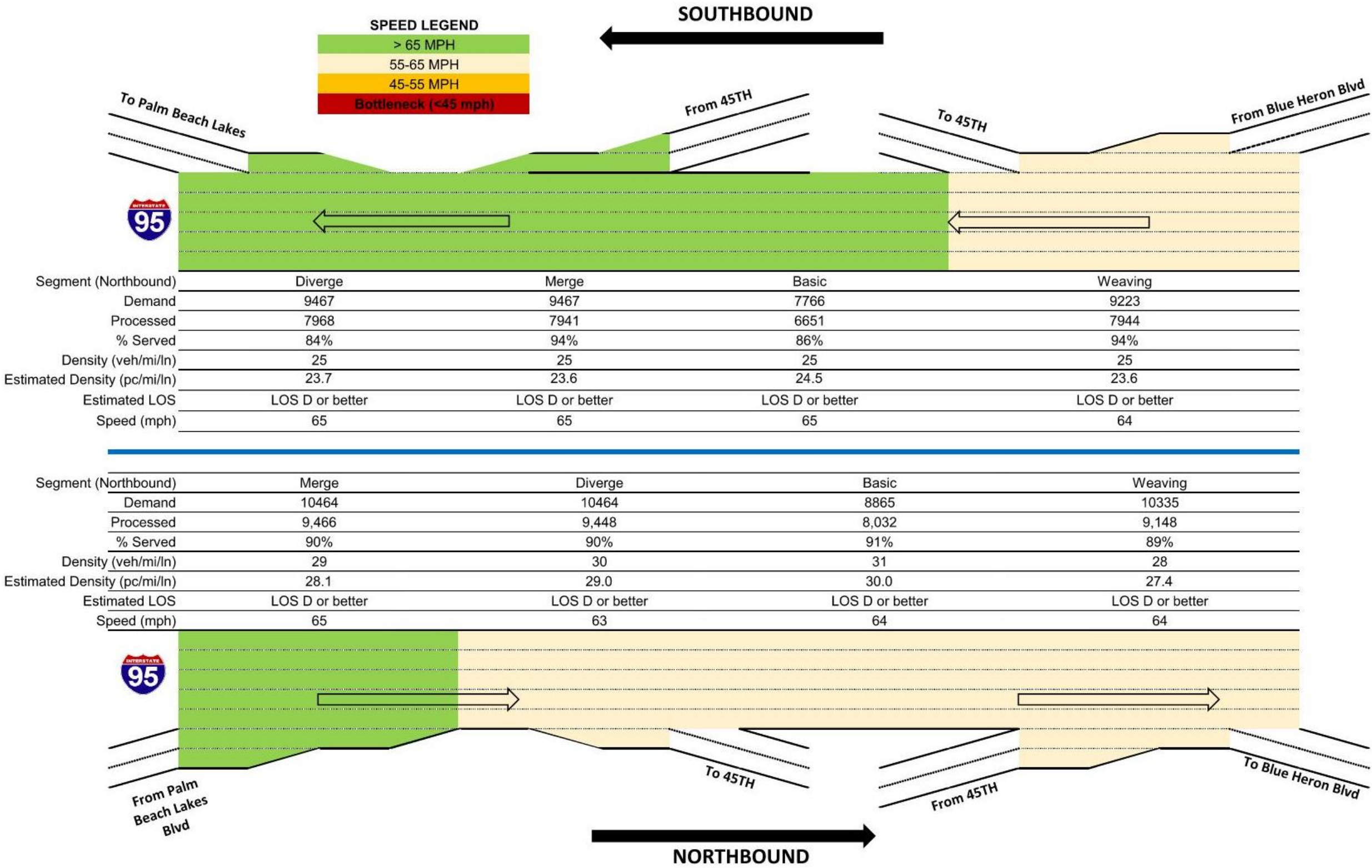


Figure 25 – Opening Year 2030 Freeway Analysis – PM Peak Hour - Approved IAR Concept

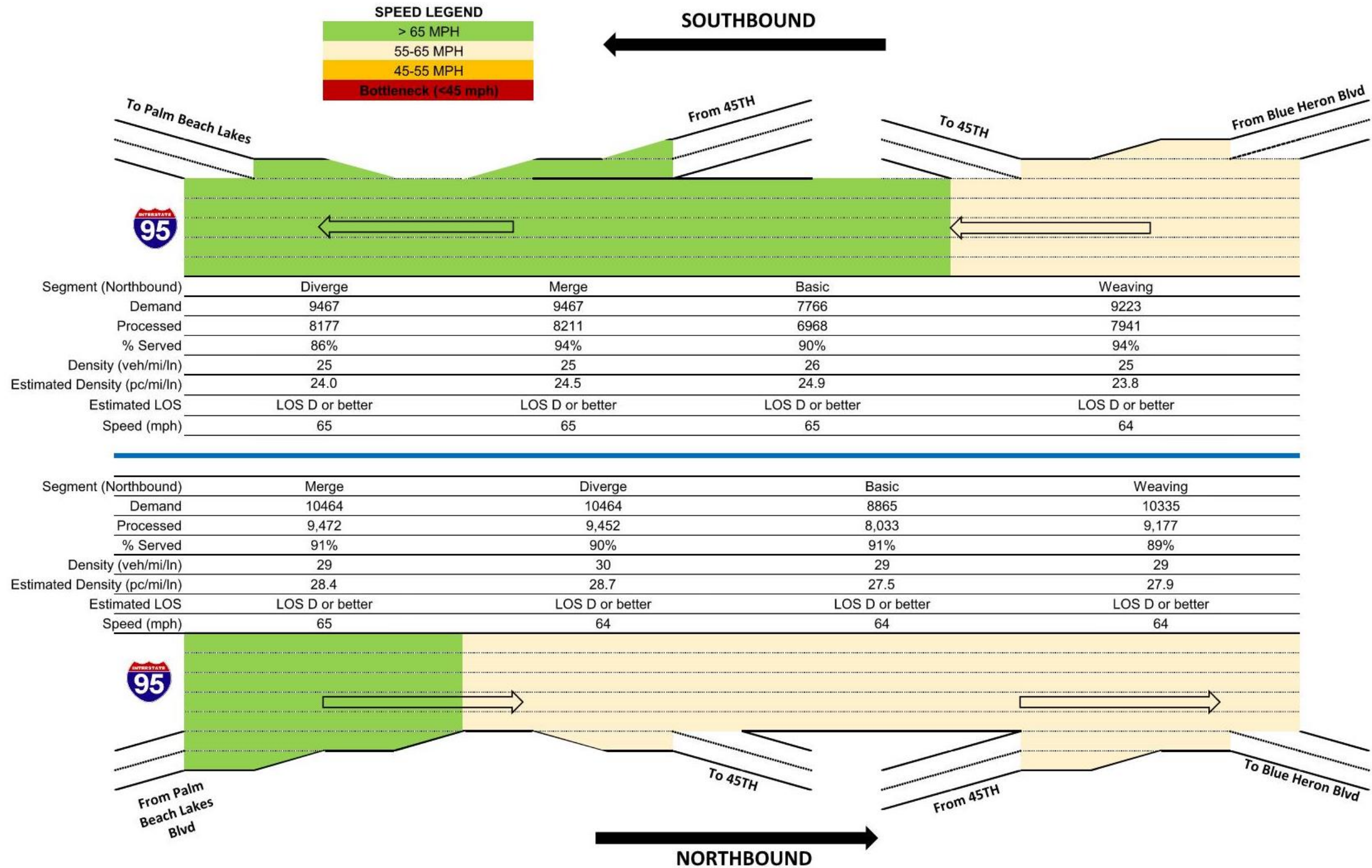


Figure 26 – Opening Year 2030 Freeway Analysis – PM Peak Hour – Diamond Interchange Build Alternative

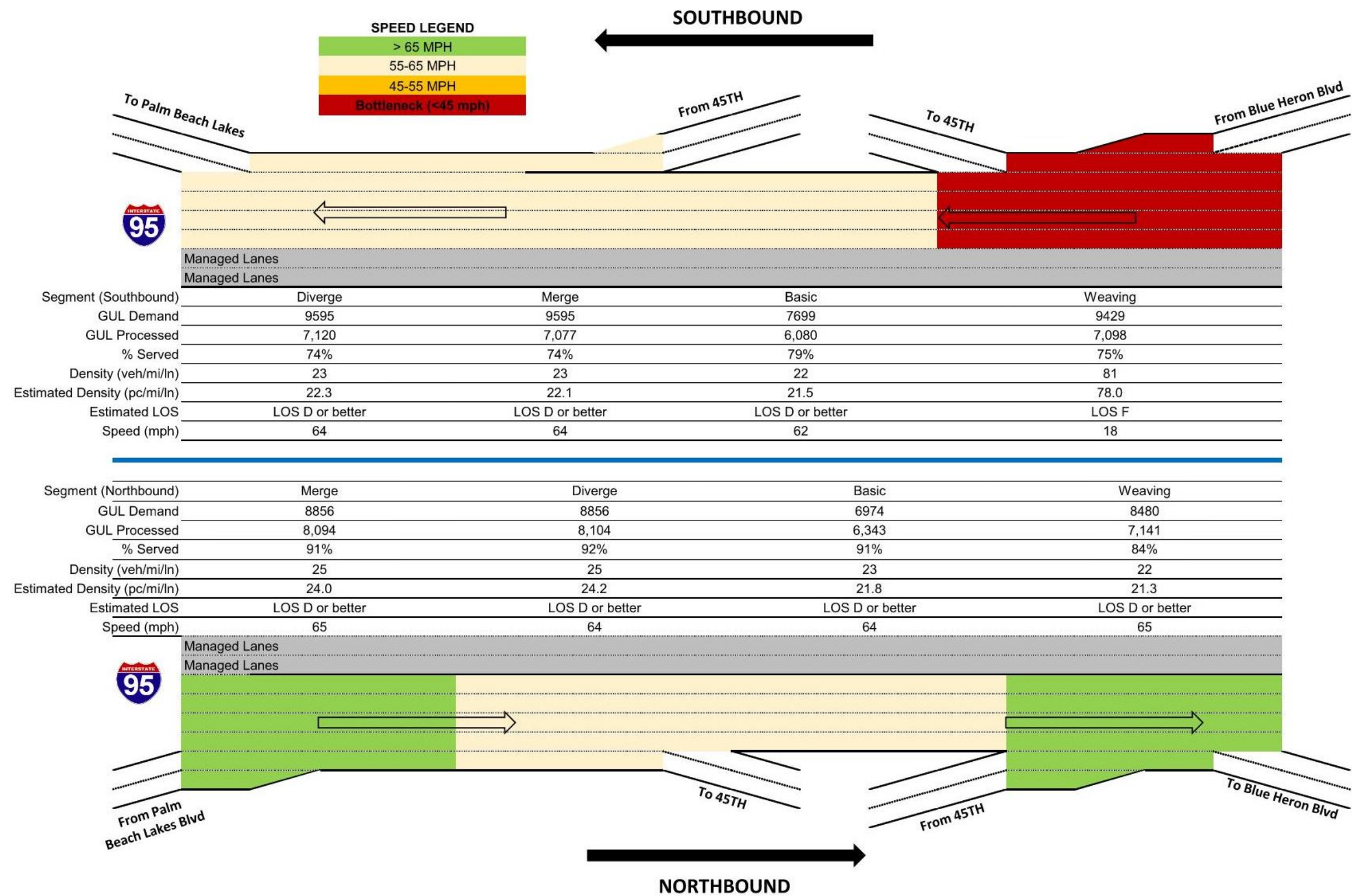


Figure 27 – Design Year 2050 Freeway Analysis – AM Peak Hour – Approved IAR Concept

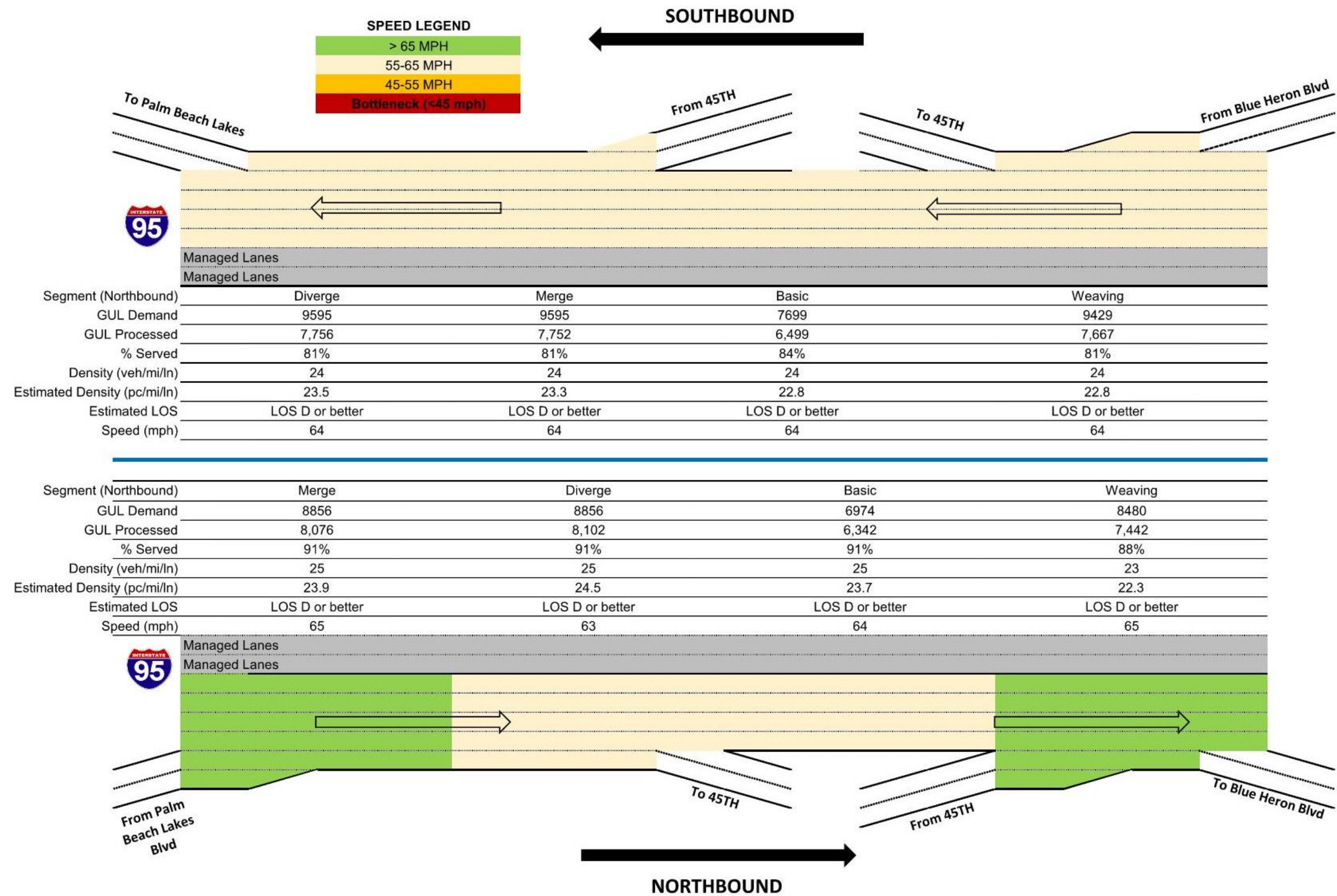


Figure 28 – Design Year 2050 Freeway Analysis – AM Peak Hour – Diamond Interchange Build Alternative

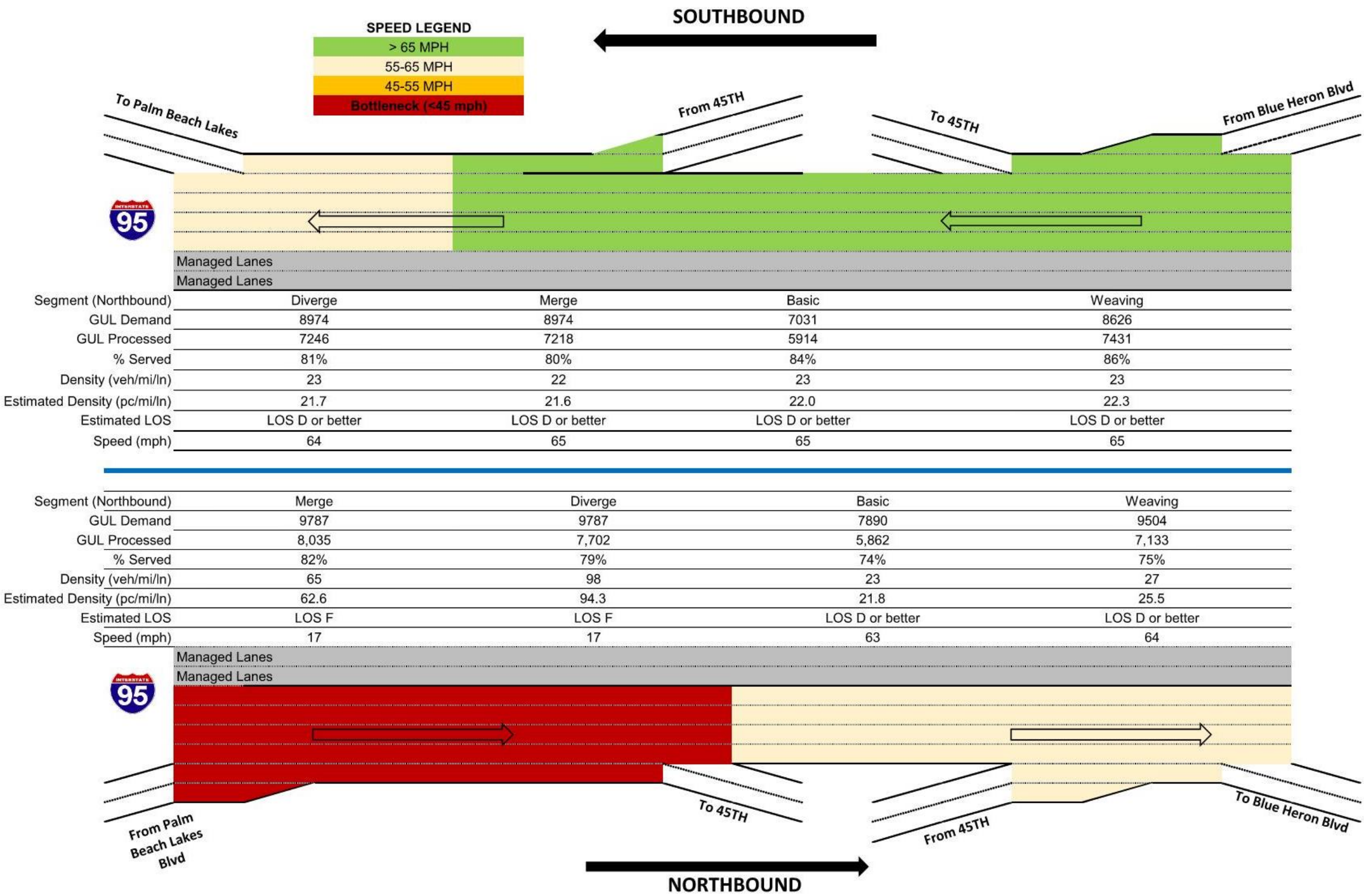


Figure 29 – Design Year 2050 Freeway Analysis – PM Peak Hour – Approved IAR Concept

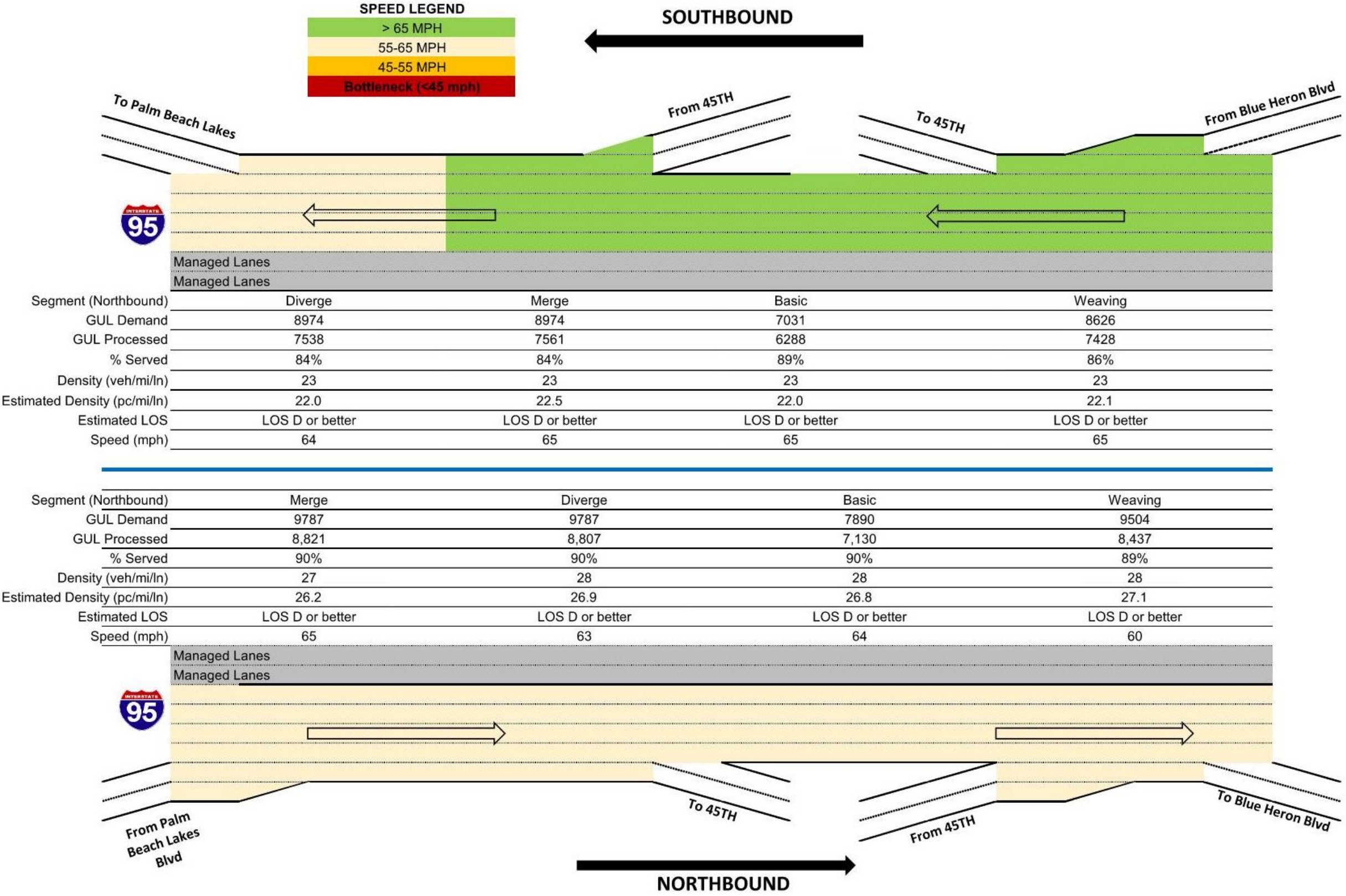


Figure 30 – Design Year 2050 Freeway Analysis – PM Peak Hour – Diamond Interchange Build Alternative

7.2 Intersection Analysis

7.2.1 Opening Year 2030

The Opening Year 2030 intersection analysis results for the AM and PM peak hours are summarized in **Table 7**. A summary of the comparative analysis is provided as follows:

- **Level of Service:** In both alternatives, the study intersections are projected to operate at LOS D or better except at two intersections with the Approved IAR Concept and two intersections with the Diamond Interchange Build Alternative. The ramp terminals are projected to operate at LOS D or better except with the Approved IAR Concept where the I-95 southbound ramp terminal is projected to operate at LOS E during the AM peak hour. Numerous movements are projected to operate at LOS E or worse during both peak hours and with both alternatives.
- **Max Queue along 45th Street:** During the AM peak hour, both alternatives are projected to operate with queue spillback in both eastbound and westbound directions for vehicles traveling towards the interchange. The only distinction is that the Diamond Interchange Build Alternative westbound queue spillback is projected to begin at the I-95 northbound ramp terminal which is just outside of the ramp terminal intersection area whereas the Approved IAR Concept is projected to begin at the I-95 southbound ramp terminal spilling back through the interchange area and beyond Congress Avenue. During the PM peak hour, both alternatives are projected to operate with queue spillback in the westbound direction within the study area. In the eastbound direction, the queue spillback is estimated to start at the intersection of Riverstone Palm Beach/Corporate Way and into the ramp terminal area. No queue spillback is projected at the off-ramps for both alternatives.
- **Simulated Volumes:** The Diamond Interchange Build Alternative is projected to process a higher number of vehicles through the intersections during both peak hours. The Diamond Interchange Build Alternative is projected to process approximately 25,000 vehicles at the ramp terminals during both peak hours combined. The Approved IAR Concept is projected to process approximately 18,500 vehicles at the ramp terminals during both peak hours.

Overall, the models are showing that both alternatives are processing vehicles, several intersections are projected to operate at LOS D or better, and there are no projected off-ramp spillback. The PD&E study LDCA included intersection improvements. There are no additional improvements that can be implemented to resolve projected queue spillback without additional right of way impacts beyond what was approved in the PD&E study phase and presented to the public. Therefore, no additional intersection improvements are recommended.

Table 7 – Opening Year 2030 Intersection Analysis

Intersection	Movement	Storage Length (ft) (1)	AM Peak Hour												PM Peak Hour											
			Approved IAR Concept						Diamond Interchange Build Alternative						Approved IAR Concept						Diamond Interchange Build Alternative					
			Delay (sec)	LOS	Max Queue (ft)	Simulated Volume (veh)	Demand Volume (veh)	% Delta - Volumes	Delay (sec)	LOS	Max Queue (ft)	Simulated Volume (veh)	Demand Volume (veh)	% Delta - Volumes	Delay (sec)	LOS	Max Queue (ft)	Simulated Volume (veh)	Demand Volume (veh)	% Delta - Volumes	Delay (sec)	LOS	Max Queue (ft)	Simulated Volume (veh)	Demand Volume (veh)	% Delta - Volumes
45th St & Village Blvd	EB-L	550	67.0	E	126	135	163	-17%	75.6	E	131	135	163	-17%	79.6	E	102	73	92	-21%	82.7	F	96	74	92	-20%
	EB-T	900	39.2	D	1612	1959	2001	-2%	23.9	C	682	2002	2001	0%	35.6	D	435	1216	1510	-19%	30.1	C	396	1223	1510	-19%
	EB-R	300	5.1	A	61	26	89	-71%	3.9	A	41	27	89	-70%	8.3	A	98	158	199	-21%	8.8	A	134	158	199	-21%
	WB-L	480	56.9	E	264	327	360	-9%	64.6	E	278	340	360	-6%	74.0	E	496	609	745	-18%	78.8	E	621	686	745	-8%
	WB-T	1000	14.3	B	385	1347	1498	-10%	11.7	B	386	1391	1498	-7%	17.7	B	456	1779	2066	-14%	12.0	B	471	1975	2066	-4%
	WB-R	420	3.7	A	90	173	162	7%	4.7	A	153	177	162	9%	2.9	A	60	86	69	25%	2.1	A	49	88	69	28%
	NB-L	220	117.3	F	1674	96	155	-38%	122.9	F	1335	122	155	-21%	77.6	E	171	99	116	-15%	81.7	F	196	97	116	-16%
	NB-T	220	126.5	F	1674	52	82	-37%	149.5	F	1335	68	82	-17%	80.1	F	171	25	23	9%	118.8	F	196	25	23	9%
	NB-R	1800	157.1	F	1674	566	951	-40%	83.1	F	1641	767	951	-19%	20.7	C	156	417	438	-5%	21.9	C	190	414	438	-5%
	SB-L	300	76.9	E	110	104	82	27%	76.9	E	127	103	82	26%	74.1	E	205	184	199	-8%	89.1	F	304	183	199	-8%
	SB-T	1300	64.9	E	110	30	25	20%	71.9	E	127	29	25	16%	71.9	E	205	97	115	-16%	116.2	F	304	96	115	-17%
	SB-R	1300	10.1	B	144	53	55	-4%	10.5	B	161	53	55	-4%	28.0	C	238	170	199	-15%	54.9	D	338	166	199	-17%
	Int.	-	49.7	D	-	4868	5623	-13%	37.7	D	-	5214	5623	-7%	34.8	C	-	4913	5771	-15%	34.5	C	-	5185	5771	-10%
45th St & Northpoint Blvd	EB-L	460	82.3	F	176	183	183	0%	90.9	F	205	206	183	13%	106.5	F	110	87	89	-2%	98.5	F	123	86	89	-3%
	EB-T	1040	38.5	D	1186	2315	2730	-15%	18.5	B	1149	2571	2730	-6%	9.1	A	218	1670	1862	-10%	10.1	B	210	1682	1862	-10%
	EB-R	210	33.9	C	1215	70	99	-29%	13.2	B	1176	78	99	-21%	3.4	A	246	67	64	5%	6.1	A	238	67	64	5%
	WB-L	390	73.8	E	170	140	179	-22%	75.9	E	151	151	179	-16%	65.7	E	112	64	99	-35%	87.6	F	136	89	99	-10%
	WB-T	1100	16.6	B	627	1593	1956	-19%	25.6	C	788	1659	1956	-15%	25.0	C	1099	2205	2628	-16%	16.3	B	1067	2521	2628	-4%
	WB-R	1060	2.5	A	95	262	297	-12%	15.9	B	769	268	297	-10%	1.9	A	54	91	131	-31%	14.8	B	1048	120	131	-8%
	NB-L	110	87.5	F	191	95	76	25%	92.2	F	211	96	76	26%	79.4	E	149	107	138	-22%	146.2	F	219	106	138	-23%
	NB-T	1400	76.3	E	114	12	10	20%	74.7	E	70	11	10	10%	84.4	F	92	6	9	-33%	89.1	F	78	6	9	-33%
	NB-R	200	60.2	E	114	73	95	-23%	6.1	A	70	71	95	-25%	13.1	B	92	146	178	-18%	7.1	A	78	146	178	-18%
	SB-L	160	89.0	F	464	155	147	5%	65.5	E	349	155	147	5%	79.1	E	435	276	355	-22%	233.5	F	1323	190	355	-46%
	SB-T	470	164.8	F	464	16	11	45%	92.3	F	349	16	11	45%	74.0	E	435	3	17	-82%	426.3	F	1323	3	17	-82%
	SB-R	470	135.3	F	464	141	115	23%	86.0	F	349	141	115	23%	90.0	F	435	168	186	-10%	448.4	F	1323	133	186	-28%
	Int.	-	38.3	D	-	5055	5898	-14%	29.3	C	-	5423	5898	-8%	27.0	C	-	4890	5756	-15%	38.6	D	-	5149	5756	-11%
45th St & I-95 SB	EB-T	1300	109.3	F	1333	1982	2350	-16%	86.5	F	991	2166	2350	-8%	18.5	B	378	1610	1773	-9%	52.2	D	340	1582	1773	-11%
	EB-R	1300							1.7	A	0	619	624	-1%							1.3	A	0	460	603	-24%
	WB-L	500/350							2.4	A	142	887	955	-7%							2.6	A	229	1096	1098	0%
	WB-T	500/350	19.9	B	576	1437	1444	0%	0.9	A	142	1531	1444	6%	31.2	C	471	1712	2264	-24%	3.1	A	229	2062	2264	-9%
	SB-L	1380	97.1	F	406	712	759	-6%	70.0	E	338	698	759	-8%	19.3	B	152	629	625	1%	73.0	E	296	632	625	1%
	SB-R	1380	19.9	B	214	578	818	-29%	26.9	C	311	571	818	-30%	19.4	B	205	631	821	-23%	32.2	C	275	641	821	-22%
	Int.	-	69.0	E	-	4709	5371	-12%	39.6	D	-	6472	6950	-7%	23.5	C	-	4582	5483	-16%	24.6	C	-	6473	7184	-10%
45th St & I-95 NB	EB-L	500/350							3.7	A	539	803	901	-11%							3.4	A	29	708	757	-6%
	EB-T	500/350	51.3	D	861	1878	2208	-15%	30.8	C	620	2045	2208	-7%	23.5	C	361	1454	1641	-11%	8.7	A	59	1477	1641	-10%
	WB-T	450	29.7	C	410	1664	1765	-6%	28.1	C	513	1691	1765	-4%	41.2	D	412	1761	2562	-31%	47.9	D	560	2357	2562	-8%
	WB-R	450							2.0	A	0	291	465	-37%							1.7	A	5	472	713	-34%
	NB-L	1450	63.0	E	690	657	634	4%	65.3	E	307	740	634	17%	19.2	B	243	797	800	0%	65.7	E	379	795	800	-1%
	NB-R	1450	27.2	C	678	616	999	-38%	33.3	C	326	703	999	-30%	49.0	D	284	578	794	-27%	24.7	C	399	598	794	-25%
	Int.	-	41.1	D	-	4815	5606	-14%	29.8	C	-	6273	6972	-10%	32.7	C	-	4590	5797	-21%	30.5	C	-	6407	7267	-12%

Intersection	Movement	Storage Length (ft) (1)	AM Peak Hour												PM Peak Hour											
			Approved IAR Concept						Diamond Interchange Build Alternative						Approved IAR Concept						Diamond Interchange Build Alternative					
			Delay (sec)	LOS	Max Queue (ft)	Simulated Volume (veh)	Demand Volume (veh)	% Delta - Volumes	Delay (sec)	LOS	Max Queue (ft)	Simulated Volume (veh)	Demand Volume (veh)	% Delta - Volumes	Delay (sec)	LOS	Max Queue (ft)	Simulated Volume (veh)	Demand Volume (veh)	% Delta - Volumes	Delay (sec)	LOS	Max Queue (ft)	Simulated Volume (veh)	Demand Volume (veh)	% Delta - Volumes
45th St & River-stone Palm Beach/ Corporate Way	EB-L	200/330	69.6	E	224	126	160	-21%	28.5	C	739	81	160	-49%	84.4	F	106	24	55	-56%	3.5	A	715	77	55	40%
	EB-T	200	9.6	A	330	2475	2799	-12%	17.2	B	557	2678	2799	-4%	12.6	B	351	2020	2132	-5%	11.1	B	500	1995	2132	-6%
	EB-R	150/200	2.2	A	49	69	90	-23%	2.7	A	596	78	90	-13%	1.9	A	34	68	22	209%	9.5	A	539	65	22	195%
	WB-L	300	120.3	F	228	84	52	62%	63.2	E	230	86	52	65%	73.4	E	142	38	22	73%	11.9	B	93	53	22	141%
	WB-T	600	18.3	B	600	1564	2137	-27%	23.7	C	704	1831	2137	-14%	57.3	E	643	1679	2828	-41%	9.4	A	685	2722	2828	-4%
	WB-R	350	3.6	A	636	81	69	17%	28.5	C	739	81	69	17%	11.8	B	679	68	50	36%	3.5	A	715	77	50	54%
	NB-L	250	1121.0	F	1273	47	121	-61%	75.4	E	188	54	121	-55%	118.3	F	111	27	64	-58%	91.7	F	102	29	64	-55%
	NB-T	530	330.0	F	1273	7	0	0%	58.3	E	188	7	0	0%	74.1	E	111	2	4	-50%	84.6	F	102	2	4	-50%
	NB-R	530	225.0	F	1273	56	27	107%	54.0	D	216	52	27	93%	16.6	B	111	89	58	53%	12.8	B	130	89	58	53%
	SB-L	120	77.2	E	118	27	29	-7%	79.9	E	136	27	29	-7%	374.0	F	568	40	63	-37%	139.9	F	681	61	63	-3%
	SB-T	2000	0.0	A	125	1	1	0%	76.0	E	126	1	1	0%	450.2	F	1328	3	0	0%	400.8	F	1356	2	0	0%
	SB-R	2000	71.2	E	125	49	40	23%	72.8	E	145	56	40	40%	615.6	F	1328	55	223	-75%	485.1	F	1375	101	223	-55%
	Int.	-	35.6	D	-	4586	5525	-17%	24.0	C	-	5032	5525	-9%	43.1	D	-	4113	5521	-26%	21.5	C	-	5273	5521	-4%
45th St & Congress Ave	EB-L	250	79.3	E	392	603	652	-8%	53.6	D	480	660	652	1%	94.1	F	229	386	387	0%	90.0	F	235	382	387	-1%
	EB-T	600	14.9	B	418	1689	1853	-9%	33.1	C	760	1825	1853	-2%	18.3	B	453	1384	1459	-5%	15.3	B	373	1374	1459	-6%
	EB-R	320/600	5.4	A	199	357	285	25%	21.6	C	793	378	285	33%	3.8	A	95	385	441	-13%	9.5	A	406	383	441	-13%
	WB-L	380	90.7	F	163	158	132	20%	103.6	F	175	162	132	23%	54.3	D	187	212	237	-11%	222.8	F	1144	239	237	1%
	WB-T	1350	29.9	C	421	1094	1175	-7%	29.9	C	440	1113	1175	-5%	61.8	E	1674	1615	1724	-6%	47.2	D	1674	1867	1724	8%
	WB-R	260	4.1	A	82	207	234	-12%	24.6	C	469	211	234	-10%	2.9	A	74	159	222	-28%	37.6	D	1674	217	222	-2%
	NB-L	330	111.8	F	350	396	323	23%	203.2	F	366	363	323	12%	4719.0	F	1468	7	333	-98%	85.5	F	231	314	333	-6%
	NB-T	+2000	73.1	E	260	360	455	-21%	64.9	E	209	340	455	-25%	72.4	E	101	35	426	-92%	64.0	E	219	355	426	-17%
	NB-R	300	15.8	B	219	245	312	-21%	16.2	B	193	243	312	-22%	10.5	B	57	20	196	-90%	8.2	A	87	174	196	-11%
	SB-L	280	77.6	E	373	240	280	-14%	157.3	F	1434	252	280	-10%	62.9	E	1106	211	273	-23%	81.7	F	1390	239	273	-12%
	SB-T	1160	107.9	F	561	408	472	-14%	150.3	F	1433	429	472	-9%	110.6	F	1674	335	678	-51%	86.1	F	1674	389	678	-43%
	SB-R	250	32.0	C	550	523	570	-8%	50.8	D	1357	538	570	-6%	117.2	F	1674	567	833	-32%	87.2	F	1674	665	833	-20%
	Int.	-	44.1	D	-	6280	6743	-7%	60.0	E	-	6514	6743	-3%	62.6	E	-	5316	7209	-26%	56.2	E	-	6598	7209	-8%

Note: (1) Storage length distance measured is turn lane length or segment length between signalized intersections or end of road. Two numbers indicates different storage length for each alternative. 1st number is the Approved IAR Concept and 2nd number is the Diamond Interchange Build Alternative

7.2.2 Design Year 2050

The Design Year 2050 intersection analysis results for the AM and PM peak hours are summarized in **Table**

8. A summary of the comparative analysis is provided as follows:

- **Level of Service:** During the AM and PM peak hours with both alternatives, several study intersections are projected to operate at LOS D or better, but the Diamond Interchange Build Alternative is projected to operate with more intersections at this acceptable LOS. The Approved IAR Concept is projected to operate with 6 intersections at LOS E or worse including both ramp terminal intersections. The Diamond Interchange Build Alternative is projected to operate with 4 intersections at LOS E or worse including one ramp terminal intersection. Numerous movements are projected to operate at LOS E or worse during both peak hours and with both alternatives.
- **Max Queue along 45th Street:** During the AM peak hour, both alternatives are projected to operate with queue spillback in both eastbound and westbound directions for vehicles traveling towards the interchange. The eastbound spillback is projected to extend into the ramp terminal area for both alternatives. The westbound spillback is projected to extend into the ramp terminal area for the Approved IAR Concept but the Diamond Interchange Build Alternative queue spillback is projected to start just outside of the interchange area at the I-95 northbound ramp terminal. During the PM peak hour in the eastbound direction within the ramp terminal intersection area, queue spillback is only projected for the Approved IAR Concept. In the westbound direction, queue spillback is projected for both alternatives starting from the intersection at Northpoint Boulevard and extending beyond the intersection to Congress Avenue. For the Diamond Interchange Build Alternative, there is no projected off-ramp queue spillback onto the expressway mainline whereas the Approved IAR Concept is projected to result in off-ramp queue spillback at the I-95 southbound off-ramp during the AM peak hour and at the I-95 northbound off-ramp during the PM peak hour.
- **Simulated Volumes:** The Diamond Interchange Build Alternative is projected to process a higher number of vehicles through the intersections during both peak hours. The Diamond Interchange Build Alternative is projected to process approximately 27,400 vehicles at the ramp terminals during both peak hours combined. The Approved IAR Concept is projected to process approximately 19,000 vehicles at the ramp terminals during both peak hours.

Overall, the Diamond Interchange Build Alternative is projected to operate with more intersection at LOS D or better, no queue spillback onto the expressway mainline, and a higher number of vehicles processed. The PD&E study LDCA included intersection improvements. There are no additional improvements that can be implemented to resolve projected queue spillback without additional right of way impacts beyond what was approved in the PD&E study phase and presented to the public. Therefore, no additional intersection improvements are recommended.

Table 8 – Design Year 2050 Intersection Analysis

Intersection	Movement	Storage Length (ft) (1)	AM Peak Hour												PM Peak Hour											
			Approved IAR Concept						Diamond Interchange Build Alternative						Approved IAR Concept						Diamond Interchange Build Alternative					
			Delay (sec)	LOS	Max Queue (ft)	Simulated Volume (veh)	Demand Volume (veh)	% Difference	Delay (sec)	LOS	Max Queue (ft)	Simulated Volume (veh)	Demand Volume (veh)	% Difference	Delay (sec)	LOS	Max Queue (ft)	Simulated Volume (veh)	Demand Volume (veh)	% Difference	Delay (sec)	LOS	Max Queue (ft)	Simulated Volume (veh)	Demand Volume (veh)	% Difference
45th St & Village Blvd	EB-L	550	46.1	D	88	42	186	-77%	59.1	E	148	128	186	-31%	83.1	F	108	87	102	-15%	83.1	F	121	86	102	-16%
	EB-T	900	180.4	F	1674	785	2336	-66%	67.8	E	1674	1698	2336	-27%	40.4	D	605	1440	1603	-10%	31.9	C	501	1447	1603	-10%
	EB-R	300	8.4	A	83	66	101	-35%	6.9	A	73	33	101	-67%	9.4	A	130	187	218	-14%	9.7	A	139	187	218	-14%
	WB-L	480	67.6	E	399	379	385	-2%	62.4	E	300	395	385	3%	70.7	E	503	617	867	-29%	77.3	E	641	691	867	-20%
	WB-T	1000	12.8	B	426	1546	1738	-11%	16.6	B	517	1602	1738	-8%	24.3	C	562	1974	2408	-18%	14.6	B	521	2084	2408	-13%
	WB-R	420	3.9	A	101	203	197	3%	5.5	A	132	205	197	4%	3.7	A	67	91	86	6%	2.5	A	63	101	86	17%
	NB-L	220	96.7	F	120	55	169	-67%	109.3	F	501	114	169	-33%	75.8	E	188	117	119	-2%	102.7	F	292	116	119	-3%
	NB-T	220	103.0	F	120	21	88	-76%	142.5	F	501	53	88	-40%	82.1	F	188	31	26	19%	164.0	F	292	31	26	19%
	NB-R	1800	242.5	F	1674	418	1004	-58%	137.8	F	1674	634	1004	-37%	24.6	C	206	489	506	-3%	25.5	C	201	485	506	-4%
	SB-L	300	114.5	F	147	117	98	19%	75.5	E	138	121	98	23%	72.5	E	222	215	237	-9%	98.4	F	871	211	237	-11%
	SB-T	1300	67.5	E	147	36	36	0%	72.4	E	138	35	36	-3%	66.8	E	222	114	120	-5%	160.2	F	871	109	120	-9%
	SB-R	1300	13.3	B	181	61	65	-6%	12.6	B	172	63	65	-3%	32.3	C	256	200	212	-6%	92.4	F	905	194	212	-8%
	Int.	-	84.6	F	-	3729	6403	-42%	58.1	E	-	5081	6403	-21%	38.1	D	-	5562	6504	-14%	39.1	D	-	5742	6504	-12%
45th St & Northpoint Blvd	EB-L	460	61.5	E	92	47	222	-79%	72.4	E	179	153	222	-31%	101.7	F	136	103	102	1%	98.4	F	140	103	102	1%
	EB-T	1040	126.4	F	1216	1255	3191	-61%	53.5	D	1221	2225	3191	-30%	11.0	B	407	1977	1932	2%	10.5	B	225	1981	1932	3%
	EB-R	210	29.2	C	1245	25	122	-80%	43.5	D	1248	64	122	-48%	3.6	A	436	77	74	4%	7.3	A	252	78	74	5%
	WB-L	390	92.2	F	205	159	188	-15%	76.0	E	162	175	188	-7%	70.2	E	103	68	106	-36%	78.8	E	113	75	106	-29%
	WB-T	1100	12.9	B	713	1874	2005	-7%	25.4	C	904	1908	2005	-5%	26.5	C	1357	2353	3104	-24%	15.9	B	1017	2654	3104	-14%
	WB-R	1060	3.1	A	138	299	333	-10%	15.4	B	885	302	333	-9%	2.3	A	57	77	132	-42%	12.8	B	998	95	132	-28%
	NB-L	110	268.4	F	1384	89	88	1%	119.7	F	444	111	88	26%	87.0	F	193	127	159	-20%	228.8	F	975	112	159	-30%
	NB-T	1400	424.8	F	1407	8	11	-27%	75.6	E	82	14	11	27%	71.8	E	121	7	12	-42%	106.0	F	127	6	12	-50%
	NB-R	200	755.1	F	1407	67	110	-39%	12.6	B	82	87	110	-21%	19.3	B	121	170	189	-10%	17.5	B	127	166	189	-12%
	SB-L	160	236.2	F	841	172	172	0%	117.1	F	434	185	172	8%	116.5	F	826	342	379	-10%	238.9	F	1323	175	379	-54%
	SB-T	470	294.3	F	841	18	12	50%	95.2	F	434	19	12	58%	151.7	F	826	4	18	-78%	444.9	F	1323	5	18	-72%
	SB-R	470	223.3	F	841	156	133	17%	92.8	F	434	166	133	25%	154.0	F	826	216	221	-2%	454.7	F	1323	129	221	-42%
	Int.	-	86.2	F	-	4169	6587	-37%	46.9	D	-	5409	6587	-18%	34.1	C	-	5521	6428	-14%	38.1	D	-	5579	6428	-13%
45th St & I-95 SB	EB-T	1300	190.9	F	1341	1138	2718	-58%	143.2	F	1488	1968	2718	-28%	34.2	C	628	1889	1861	2%	60.8	E	521	1812	1861	-3%
	EB-R	1300							1.5	A	11	531	756	-30%							1.3	A	12	536	638	-16%
	WB-L	500/350							2.5	A	153	969	1130	-14%							3.0	A	340	1119	1305	-14%
	WB-T	500/350	18.6	B	449	1756	1701	3%	1.3	A	153	1758	1701	3%	46.8	D	796	1744	2664	-35%	3.9	A	340	2057	2664	-23%
	SB-L	1380	415.3	F	1674	661	891	-26%	107.6	F	526	852	891	-4%	24.6	C	173	747	738	1%	76.4	E	340	747	738	1%
	SB-R	1380	67.8	E	1674	594	839	-29%	26.9	C	490	663	839	-21%	32.1	C	345	732	842	-13%	31.9	C	328	749	842	-11%
	Int.	-	135.9	F	-	4149	6149	-33%	58.8	E	-	6741	8035	-16%	36.8	D	-	5112	6105	-16%	29.0	C	-	7020	8048	-13%
45th St & I-95 NB	EB-L	500/350							3.5	A	603	739	1027	-28%							5.9	A	150	814	872	-7%
	EB-T	500/350	89.6	F	850	1282	2582	-50%	68.1	E	687	2073	2582	-20%	52.5	D	835	1685	1727	-2%	21.0	C	259	1709	1727	-1%
	WB-T	450	19.1	B	412	1892	2061	-8%	27.6	C	536	1872	2061	-9%	59.6	E	405	1514	3002	-50%	50.9	D	569	2226	3002	-26%
	WB-R	450							2.2	A	8	323	479	-33%							1.9	A	10	530	479	11%
	NB-L	1450	28.4	C	253	856	770	11%	67.7	E	352	870	770	13%	40.3	D	1674	1031	967	7%	69.7	E	424	939	967	-3%
	NB-R	1450	22.1	C	225	768	1108	-31%	41.6	D	372	827	1108	-25%	311.9	F	1674	725	924	-22%	30.7	C	444	718	924	-22%
	Int.	-	40.4	D	-	4798	6521	-26%	43.6	D	-	6704	8027	-16%	90.9	F	-	4955	6620	-25%	34.9	C	-	6936	7971	-13%

Intersection	Movement	Storage Length (ft) (1)	AM Peak Hour												PM Peak Hour											
			Approved IAR Concept						Diamond Interchange Build Alternative						Approved IAR Concept						Diamond Interchange Build Alternative					
			Delay (sec)	LOS	Max Queue (ft)	Simulated Volume (veh)	Demand Volume (veh)	% Difference	Delay (sec)	LOS	Max Queue (ft)	Simulated Volume (veh)	Demand Volume (veh)	% Difference	Delay (sec)	LOS	Max Queue (ft)	Simulated Volume (veh)	Demand Volume (veh)	% Difference	Delay (sec)	LOS	Max Queue (ft)	Simulated Volume (veh)	Demand Volume (veh)	% Difference
45th St & Riverstone Palm Beach/ Corporate Way	EB-L	200/330	62.4	E	202	113	170	-34%	31.7	C	799	94	170	-45%	77.3	E	118	35	63	-44%	3.8	A	779	76	63	21%
	EB-T	200	11.5	B	344	2031	3349	-39%	22.3	C	560	2811	3349	-16%	13.8	B	334	2397	2470	-3%	14.2	B	554	2338	2470	-5%
	EB-R	150/200	2.3	A	60	73	171	-57%	3.8	A	599	79	171	-54%	2.2	A	42	67	128	-48%	12.0	B	593	77	128	-40%
	WB-L	300	148.2	F	301	98	78	26%	71.1	E	373	98	78	26%	126.3	F	504	92	121	-24%	26.5	C	128	59	121	-51%
	WB-T	600	22.5	C	608	1810	2312	-22%	26.6	C	764	2019	2312	-13%	73.8	E	643	1430	3326	-57%	11.0	B	744	2686	3326	-19%
	WB-R	350	6.6	A	643	98	78	26%	31.7	C	799	94	78	21%	9.6	A	679	54	65	-17%	3.8	A	779	76	65	17%
	NB-L	250	1731.3	F	1398	29	188	-85%	85.3	F	293	66	188	-65%	125.3	F	157	32	102	-69%	98.5	F	114	34	102	-67%
	NB-T	530	495.5	F	1398	4	1	300%	75.9	E	293	9	1	800%	60.3	E	157	2	7	-71%	74.1	E	114	2	7	-71%
	NB-R	530	546.5	F	1397	48	111	-57%	86.6	F	321	111	111	0%	27.0	C	157	105	105	0%	21.0	C	142	105	105	0%
	SB-L	120	369.9	F	362	31	39	-21%	95.6	F	142	32	39	-18%	334.7	F	878	39	66	-41%	143.2	F	385	33	66	-50%
	SB-T	2000	363.5	F	358	1	1	0%	88.4	F	172	1	1	0%	483.3	F	1328	3	0	0%	972.4	F	1348	1	0	0%
	SB-R	2000	258.2	F	358	50	41	22%	77.6	E	191	66	41	61%	625.6	F	1328	53	234	-77%	780.3	F	1367	66	234	-72%
	Int.	-	42.3	D	-	4386	6539	-33%	29.0	C	-	5480	6539	-16%	47.4	D	-	4309	6687	-36%	23.1	C	-	5553	6687	-17%
45th St & Congress Ave	EB-L	250	82.6	F	243	459	771	-40%	52.1	D	502	669	771	-13%	83.7	F	250	449	463	-3%	84.0	F	266	443	463	-4%
	EB-T	600	14.3	B	251	1370	2271	-40%	31.6	C	759	1953	2271	-14%	22.5	C	380	1628	1672	-3%	24.2	C	749	1581	1672	-5%
	EB-R	320/600	3.6	A	110	263	355	-26%	21.3	C	792	374	355	5%	4.9	A	153	465	456	2%	12.8	B	783	455	456	0%
	WB-L	380	104.8	F	183	183	168	9%	151.3	F	275	190	168	13%	52.2	D	183	157	290	-46%	158.0	F	922	221	290	-24%
	WB-T	1350	29.4	C	551	1285	1378	-7%	32.7	C	509	1314	1378	-5%	75.3	E	1674	1411	2173	-35%	55.0	D	1673	1791	2173	-18%
	WB-R	260	5.3	A	131	245	288	-15%	24.9	C	538	245	288	-15%	3.7	A	83	162	279	-42%	40.0	D	1673	183	279	-34%
	NB-L	330	208.7	F	1025	433	392	10%	322.6	F	369	366	392	-7%	3591.7	F	1469	31	356	-91%	147.7	F	358	367	356	3%
	NB-T	+2000	102.8	F	434	426	509	-16%	77.1	E	1008	363	509	-29%	69.6	E	180	52	449	-88%	63.4	E	249	412	449	-8%
	NB-R	300	15.6	B	273	292	372	-22%	23.5	C	558	256	372	-31%	10.8	B	52	18	206	-91%	9.6	A	130	206	206	0%
	SB-L	280	90.7	F	1674	301	679	-56%	167.6	F	1674	288	679	-58%	65.6	E	1378	206	339	-39%	89.5	F	1674	235	339	-31%
	SB-T	1160	188.1	F	1674	472	514	-8%	201.6	F	1674	434	514	-16%	120.1	F	1674	344	683	-50%	92.7	F	1674	388	683	-43%
	SB-R	250	71.1	E	1670	608	349	74%	63.8	E	1674	552	349	58%	112.9	F	1674	552	983	-44%	87.5	F	1674	657	983	-33%
	Int.	-	65.4	E	-	6337	8046	-21%	72.2	E	-	7004	8046	-13%	78.1	E	-	5475	8349	-34%	60.3	E	-	6939	8349	-17%

Note: (1) Storage length distance measured is turn lane length or segment length between signalized intersections or end of road. Two numbers indicates different storage length for each alternative. 1st number is the Approved IAR Concept and 2nd number is the Diamond Interchange Build Alternative

7.3 Arterial Analysis

7.3.1 Opening Year 2030

The Opening Year 2030 arterial analysis results are summarized in **Table 9**. The comparison of the results show that the Diamond Interchange Build Alternative is projected to process more vehicles (38,000 vehicles process compared to 32,000 vehicles for the Approved IAR Concept) and perform slightly better than the Approved IAR Concept during both peak periods. Note that the color coded vehicle speeds in the table are similar to the Highway Capacity Manual 6th Edition Level of Service for Urban Street segments with a free flow speed of 45 mph where blank/white indicates LOS C or greater, yellow indicates an LOS D, and red indicates an LOS E or below.

Table 9 – Opening Year 2030 45th Street Arterial Analysis Results

Time	Direction	Segment	Approved IAR Concept			Diamond Int. Build Alt.		
			Time (s)	Speed (mph)	Volume (veh)	Time (s)	Speed (mph)	Volume (veh)
AM Peak Period	EB	Start to Northpoint	135.3	2.9	1,356	28.7	13.9	2,572
		Northpoint to I-95 SB	405.3	2.2	1,059	114.1	8.4	1,993
		I-95 SB to I-95 NB	175.4	3.9	714	31.7	14.0	1,377
		I-95 NB to Congress	42.3	16.7	1,283	92.6	9.6	1,321
		Congress to South	24.0	39.4	1,386	25.5	36.9	1,805
		South to End	13.9	39.5	1,880	14.5	37.9	2,299
	WB	Start to South	14.6	39.2	1,477	14.6	39.2	1,472
		South to Congress	51.0	19.1	1,094	54.1	18.0	1,114
		Congress to I-95 NB	51.5	17.8	840	100.1	9.9	849
		I-95 NB to I-95 SB	28.7	20.9	788	9.0	34.3	1,538
		I-95 SB to Northpoint	34.1	22.3	1,648	57.4	16.6	1,252
		Northpoint to End	17.4	38.6	1,160	18.3	36.8	1,170
PM Peak Period	EB	Start to Northpoint	17.6	22.6	1,670	18.5	21.5	1,681
		Northpoint to I-95 SB	40.4	22.5	1,282	71.0	13.5	1,305
		I-95 SB to I-95 NB	35.5	19.5	840	15.2	29.1	866
		I-95 NB to Congress	49.1	14.4	1,279	53.7	16.5	905
		Congress to South	24.2	39.0	1,384	25.0	37.7	1,375
		South to End	13.9	39.5	1,623	14.3	38.4	1,805
	WB	Start to South	107.8	5.3	2,022	81.2	7.1	2,355
		South to Congress	202.0	4.8	1,615	152.9	6.4	1,867
		Congress to I-95 NB	148.7	6.2	1,257	91.2	10.9	1,478
		I-95 NB to I-95 SB	44.3	13.5	914	11.2	27.6	2,059
		I-95 SB to Northpoint	58.6	13.0	2,203	45.8	20.8	1,955
		Northpoint to End	17.8	37.8	1,539	20.7	32.4	1,768

Note: Vehicle speeds are color coded to represent Level of Service (LOS) thresholds from the *Highway Capacity Manual 6th Edition* for Urban Street Segments with a free flow speed of 45 mph. Blank/white indicates LOS C or greater (23mph or faster), yellow indicates an LOS D (between 18 and 23 mph), and red indicates an LOS E or below (less than 18 mph)

7.3.2 Design year 2050

The Design Year 2050 arterial analysis results are summarized in **Table 10**. The comparison of the results show that the Diamond Interchange Build Alternative is projected to process more vehicles (40,000 vehicles processed compared to 34,000 vehicles with the Approved IAR Concept) and result in slightly higher vehicle operating speeds. Overall, the Diamond Interchange Build Alternative is projected to perform the best between both Build Alternatives. Note that the color coded vehicle speeds in the table are similar to the Highway Capacity Manual 6th Edition Level of Service for Urban Street segments with a free flow speed of 45 mph where blank/white indicates LOS C or greater, yellow indicates an LOS D, and red indicates an LOS E or below.

Table 10 – Design Year 2050 Arterial Analysis Results

Time	Direction	Segment	Approved IAR Concept			Diamond Int. Build Alt.		
			Time (s)	Speed (mph)	Volume (veh)	Time (s)	Speed (mph)	Volume (veh)
AM Peak Period	EB	Start to Northpoint	152.0	2.6	1,252	67.9	5.8	2,219
		Northpoint to I-95 SB	450.5	2.0	941	285.7	3.3	1,753
		I-95 SB to I-95 NB	192.0	3.6	650	62.8	7.1	1,261
		I-95 NB to Congress	43.0	16.5	1,299	99.1	9.0	1,367
		Congress to South	23.9	39.4	1,387	25.5	37.0	1,925
		South to End	13.9	39.5	1,992	14.5	37.9	2,469
	WB	Start to South	14.7	39.1	1,736	14.7	39.1	1,736
		South to Congress	54.3	17.9	1,283	57.3	17.0	1,317
		Congress to I-95 NB	59.8	15.3	998	99.8	10.0	1,005
		I-95 NB to I-95 SB	31.8	18.8	907	9.2	33.5	1,765
		I-95 SB to Northpoint	32.3	23.5	1,877	59.8	16.0	1,430
		Northpoint to End	17.9	37.5	1,321	20.5	32.8	1,343
PM Peak Period	EB	Start to Northpoint	50.9	13.9	1,541	18.9	21.0	1,980
		Northpoint to I-95 SB	24.2	39.0	1,637	81.1	11.8	1,537
		I-95 SB to I-95 NB	13.9	39.5	1,876	17.1	25.9	982
		I-95 NB to Congress	138.6	4.1	1,735	73.7	12.1	1,056
		Congress to South	255.7	3.8	1,413	25.1	37.6	1,583
		South to End	159.3	5.8	1,095	14.4	38.2	2,048
	WB	Start to South	49.0	12.2	836	90.5	6.3	2,230
		South to Congress	61.4	12.4	2,147	171.0	5.7	1,791
		Congress to I-95 NB	19.3	34.8	1,529	97.2	10.2	1,366
		I-95 NB to I-95 SB	19.6	20.2	1,976	12.0	25.8	2,052
		I-95 SB to Northpoint	52.2	17.4	1,499	45.1	21.2	1,994
		Northpoint to End	80.1	8.6	961	22.3	30.2	1,871

Note: Vehicle speeds are color coded to represent Level of Service (LOS) thresholds from the *Highway Capacity Manual 6th Edition* for Urban Street Segments with a free flow speed of 45 mph. Blank/white indicates LOS C or greater (23mph or faster), yellow indicates an LOS D (between 18 and 23 mph), and red indicates an LOS E or below (less than 18 mph)

7.4 Network-wide Analysis

7.4.1 Opening Year 2030

The Opening Year 2030 network-wide analysis results are summarized in **Table 11**. The Diamond Interchange Build Alternative is projected to result in lower total delays, travel times, latent delay, latent demand, and total stops. This alternative is also projected to result in higher vehicles arrived compared to the Approved IAR Concept. During the AM peak hour, approximately 85,000 vehicles arrive in the model network for the Diamond Interchange Build Alternative compared to approximately 83,000 in the Approved IAR Concept. During the PM peak hour, approximately 94,000 vehicles arrive in the model network for the Diamond Interchange Build Alternative compared to approximately 89,000 for the Approved IAR Concept.

Table 11 – Opening Year 2030 Network-wide Analysis Results

Time Period		Approved IAR Concept								Diamond Interchange Build Alternative							
		Total Delay (s)	Delay/ Vehicle (s/veh)	Total Travel Time (s)	Latent Delay (s)	Latent Demand (veh)	Vehicles Arrived (veh)	Total Stops (stops)	Average Speed (mph)	Total Delay (s)	Delay/ Vehicle (s/veh)	Total Travel Time (s)	Latent Delay (s)	Latent Demand (veh)	Vehicles Arrived (veh)	Total Stops (stops)	Average Speed (mph)
AM Peak Period	Hour 1	3,160,603	128	7,685,004	1,827,845	1,284	22,218	96,666	36	1,566,720	61	6,322,867	6,194	4	23,470	33,298	46
	Hour 2	3,960,018	159	8,492,975	7,418,010	2,682	22,579	136,871	33	1,887,378	73	6,694,827	4,458	0	24,322	39,073	44
	Hour 3	3,210,961	149	7,133,441	10,494,340	2,951	19,617	97,985	34	960,989	46	4,925,860	1,869	0	19,744	16,732	49
	Hour 4	3,213,996	159	6,862,414	10,111,202	2,564	18,418	89,107	32	1,297,880	68	4,886,306	20,811	10	17,917	30,799	45
	Total	13,545,577	-	30,173,834	29,851,396	9,481	82,832	420,629	-	5,712,967	-	22,829,861	33,332	14	85,453	119,902	-
PM Peak Period	Hour 1	2,697,095	111	7,292,018	1,065,447	837	22,177	68,874	39	1,425,553	57	6,168,266	18,556	38	23,094	33,141	47
	Hour 2	3,244,689	136	7,658,712	6,257,768	2,594	21,839	82,983	35	2,664,046	108	7,216,872	1,279,587	709	22,680	68,586	38
	Hour 3	3,277,978	126	8,123,581	12,335,074	4,341	23,740	77,833	37	3,106,810	114	8,129,649	3,589,155	1,246	24,921	72,581	38
	Hour 4	3,237,395	136	7,625,762	18,057,356	5,496	21,724	78,169	35	2,717,104	109	7,315,526	4,535,974	1,188	23,231	65,290	38
	Total	12,457,157	-	30,700,073	37,715,645	13,268	89,480	307,859	-	9,913,514	-	28,830,312	9,423,273	3,180	93,926	239,598	-

7.4.2 Design year 2050

The Design Year 2050 network-wide analysis results are summarized in **Table 12**. The Diamond Interchange Build Alternative is projected to result in lower total delays, travel times, latent delay, latent demand, and total stops. This alternative is also projected to result in higher vehicles arrived compared to the Approved IAR Concept. During the AM peak hour, approximately 86,000 vehicles arrive in the model network for the Diamond Interchange Build Alternative compared to approximately 84,000 in the Approved IAR Concept. During the PM peak hour, approximately 95,000 vehicles arrive in the model network for the Diamond Interchange Build Alternative compared to approximately 90,000 for the Approved IAR Concept.

Table 12 – Design Year 2050 Network-wide Analysis Results

Time Period		Approved IAR Concept								Diamond Interchange Build Alternative							
		Total Delay (s)	Delay/Vehicle (s/veh)	Total Travel Time (s)	Latent Delay (s)	Latent Demand (veh)	Vehicles Arrived (veh)	Total Stops (stops)	Average Speed (mph)	Total Delay (s)	Delay/Vehicle (s/veh)	Total Travel Time (s)	Latent Delay (s)	Latent Demand (veh)	Vehicles Arrived (veh)	Total Stops (stops)	Average Speed (mph)
AM Peak Period	Hour 1	4352929	155	9440453	4900848	2818	22301	145808	33	3011294	118	7583163	660444	572	23331	73464	36
	Hour 2	7641236	264	12798226	15204314	5043	22834	299398	25	4298415	169	8827822	4520930	1646	23596	108346	31
	Hour 3	6203756	240	10830021	19555372	5841	20787	304997	27	3346186	151	7281534	5345741	1203	20575	83290	32
	Hour 4	4679948	206	8768707	23073693	6816	18363	155405	29	2723956	136	6333060	3234031	872	18960	74770	34
	Total	22,877,868	-	41,837,407	62,734,227	20,518	84,285	905,608	-	13,379,851	-	30,025,580	13,761,146	4,293	86,462	339,870	-
PM Peak Period	Hour 1	4091327	173	8458778	3391448	2065	22284	162209	32	2552617	103	7137771	795271	643	23762	61304	39
	Hour 2	6095136	260	10164803	12557093	4947	21265	380886	24	3181123	131	7557183	5458854	2440	23256	78098	35
	Hour 3	7152621	272	11799972	22909759	7774	23556	282098	24	3409521	129	8216017	11737921	4064	24139	77644	35
	Hour 4	5667285	237	9932615	32412212	10013	22506	249094	26	3443126	139	7880508	15908365	4475	23738	83910	34
	Total	23,006,370	-	40,356,168	71,270,512	24,799	89,610	1,074,287	-	12,586,387	-	30,791,479	33,900,411	11,621	94,895	300,956	-

7.5 Safety Analysis

The future conditions safety analysis consisted of applying the Highway Safety Manual (HSM) predictive method to evaluate the Build Alternatives. The FHWA's SHDM version 17.0.0 was used for the analysis. The IHSDM is a suite of software analysis tools used to evaluate the safety and operational effects of geometric design decisions. The IHSDM version 17.0.0 Safety Performance Functions (SPF) are based on the First Edition of HSM and subsequent updates from the National Cooperative Highway Research Program (NCHRP) Project 17-58, NCHRP Project 17-70, NCHRP Research Report 888, NCHRP Project 17-68, and NCHRP Web-Only Document 297.

The study area of the safety analysis was established based on guidance from Chapter 6 of the FDOT IAR – User's Guide (September 2022). The guide states that *future safety analysis needs to be performed only for elements within the area of influence that are anticipated to be affected by the proposed modifications*. The guide also provides relevant examples stating that *if a modification to an existing interchange is proposed, in most cases the adjacent interchanges are not affected and, therefore, no future safety analysis is needed at the adjacent interchanges*. The proposed modifications are being implemented at the ramp terminal intersections and no modifications are proposed at the expressway mainline. The safety analysis study area was established at the ramp terminal intersections, but the I-95 mainline was also included in the analysis study area to verify potential changes in crash frequency.

There are numerous input variables that were applied to the IHSDM model such as area type, functional classification, AADT, horizontal alignment features (i.e., curves, deflections), vertical alignment features (note that all alternatives were evaluated as at-grade since the vertical alignment is similar between both Build Alternatives), number and type of travel lanes, median barrier, lighting, driveways, posted speed and speed category, and left turn phasing and intersection traffic control.

The models were created using aerial and street-level photography and FDOT Straight Line Diagrams. Design Year AADTs were applied to the models. Observed crashes were applied to the I-95 model. Note the following analysis limitations:

- SR-9/I-95: Maximum number of lanes along freeway segment that can be evaluated are ten (five in each direction). There is currently no SPF for High Occupancy Vehicle (HOV) and Managed Lanes. Therefore, the future planned managed lane and potential capacity improvement project was not modeled (LRTP # SSI037)
- 45th Street ramp terminal intersection area: Maximum number of lanes that can be evaluated are six (three in each direction). Therefore, the future capacity improvement as part of this project was not modeled.
- Approved IAR Concept: There are no SPFs for DDIs. Instead, the analysis for this alternative was based on the diamond interchange evaluation with the application of Crash Modification Factor (CMF) 10761 (*Convert diamond interchange to Diverging Diamond Interchange*).

Both Build Alternatives are projected to not adversely impact safety. The results comparison between the Build Alternatives indicates that the expected crash frequencies along SR-9/I-95 are projected to remain the same. At the ramp terminal intersection level, the Approved IAR Concept is projected to have a lower predictive crash frequency compared to the Diamond Interchange Build Alternative. DDI designs typically have lower statistical crash frequencies compared to a diamond interchange design; however, there are unquantifiable benefits with the Diamond Interchange Build Alternative because of the projected traffic operational improvements which may minimize congestion related crashes compared to the Approved IAR Concept.

The results are summarized in **Table 13**. The IHSDM evaluation summary and CMF are included in **Appendix D**.

Table 13 – Predicted/Expected Crash Frequencies by Design Year 2050

Alternative	I-95 Expressway			45th Street Ramp Terminal		
	Fatal and Injury	Property Damage Only	Total	Fatal and Injury	Property Damage Only	Total
Approved IAR Concept	94	272	366	15	40	55
Diamond Interchange Build Alternative	94	272	366	17	46	63

Note: crash frequencies were extracted from the IHSDM evaluation summaries and have been rounded to the nearest whole number

The PD&E study LDCA includes intersection improvements beyond the ramp terminal intersections at Northpoint Boulevard, Riverstone Palm Beach/Corporate Way, and Congress Avenue. These

improvements mainly consist of turn lane lengthening and additional turn lanes to improve intersection operations and mitigate potential queue spillback onto the travel lanes. These improvements are safety enhancement.

7.6 Other Considerations

7.6.1 Consistency with Other Plans/Projects

The project is listed in the local and state plans but will need to be modified in order to achieve planning consistency for the Diamond Interchange Build Alternative. The planning documents reviewed and suggested changes are as follows:

- Palm Beach Transportation Planning Agency (TPA) adopted 2045 LRTP (Project # SIS004): The description will need to be adjusted since it references “Construct Diverging Diamond Interchange”
- Palm Beach TPA currently adopted 2024-2028 Transportation Improvement Program (TIP) (FM 436519-1): The project description will need to be adjusted since it references a “...Diverging Diamond Interchange”.
- FDOT 2024-2029 Five-Year Work Program (Item 436519-1): No changes have been identified.
- FDOT’s Fiscal Year (FY) 2023/2024 through FY 2027/2028 Strategic Intermodal System (SIS) Adopted 5-Year Plan (Item 436519-1): No changes have been identified.
- FDOT State Transportation Improvement Plan (STIP) as of July 1, 2023 (Item 436519-1): No changes have been identified.

The Approved IAR Concept would not require updates to achieve planning consistency.

7.6.2 Environmental Considerations

A PD&E environmental re-evaluation is scheduled in August 2024. The PD&E re-evaluation will consist of reviewing the design changes potential environmental impacts, permitting, and approval from FDOT Office of Environmental Management (OEM) since they are the lead federal agency for this interstate project.

7.6.3 Coordination

A public information meeting is scheduled for February 2026 to support coordination activities with potentially affected developments and the community.

7.6.4 Anticipated Design Exceptions and Variations

Design exceptions and variations will be identified during the development of the Design phase which are scheduled to be submitted in August 2024.

7.6.5 Conceptual Signing Plan

A Conceptual Signing Plan of the recommended alternative is provided in **Figure 31**.

7.6.6 Access Management Plan

The access management plan in the AOI will not be changed by the proposed improvements.



Figure 31 – Conceptual Signing Plan – Diamond Interchange Build Alternative

7.6.7 FHWA Policy Points

Based on the results of the analysis, the Diamond Interchange Build Alternative is the preferred alternative. The proposed improvements at the 45th Street interchange with I-95 is consistent with the requirements set by the FHWA's "Policy on Access to the Interstate System," effective May 22, 2017 and FDOT's Topic 000-525-015: *Approval of New or Modified Access to Limited Access Highways on the State Highway System (SHS)*.

7.6.7.1 Policy Point 1

An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes; existing, new or modified ramps; and ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis should, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (Title 23, 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)).

The preferred Diamond Interchange Build Alternative does not adversely impact the safety and operation of the Interstate facility. The following is a summary of the design year 2050 analysis results:

Freeway Analysis Results: Based on a comparison of the results, both alternatives are projected to operate with similar density and travel speeds and a LOS of D or better along all expressway segments with the study area except for the Approved IAR Concept at two locations and time periods. During the AM peak hour, the Approved IAR Concept is projected to operate at LOS F in the southbound direction by the southbound off-ramp to 45th Street. During the PM peak hour, the Approved IAR Concept is projected to operate at LOS F in the northbound direction by the northbound off-ramp to 45th Street. These poor operations are due to the ramp terminal intersection off-ramp queue spillback onto the expressway mainline.

Intersection Analysis Results: the Diamond Interchange Build Alternative is projected to operate with more intersection at LOS D or better, no queue spillback onto the expressway mainline, and a higher number of vehicles processed at the intersections when compared to the Approved IAR Concept. The Approved IAR Concept is projected to result in queue spillback onto the mainline expressway during the AM peak hour at the I-95 southbound off-ramp and during the PM peak hour at the I-95 northbound off-ramp. The PD&E study LDCA included intersection improvements. There are no additional improvements that can be implemented to resolve projected queue spillback without additional right of way impacts beyond what was approved in the PD&E study phase and presented to the public. Therefore, no additional intersection improvements are recommended.

Arterial Analysis Results: The comparison of the results show that the Diamond Interchange Build Alternative is projected to process more vehicles (40,000 vehicles processed compared to 34,000 vehicles with the Approved IAR Concept) and result in slightly higher vehicle operating speeds. Overall, the Diamond Interchange Build Alternative is projected to perform the best between both Build Alternatives.

Network-wide Analysis Results: The Diamond Interchange Build Alternative is projected to result in lower total delays, travel times, latent delay, latent demand, and total stops. This alternative is also projected to result in higher vehicles arrived compared to the Approved IAR Concept. During the AM peak hour, approximately 86,000 vehicles arrive in the model network for the Diamond Interchange Build Alternative compared to approximately 84,000 in the Approved IAR Concept. During the PM peak hour, approximately 95,000 vehicles arrive in the model network for the Diamond Interchange Build Alternative compared to approximately 90,000 for the Approved IAR Concept.

Safety Analysis Results: The preferred Diamond Interchange Build Alternative will not adversely impact safety since it is a common interchange design adhering to design criteria. The future safety analysis indicates that the Approved IAR Concept is projected to have a lower predictive crash frequency compared to the Diamond Interchange Build Alternative. DDI designs typically have lower statistical crash frequencies compared to a diamond interchange design; however, there are unquantifiable benefits with the Diamond Interchange Build Alternative since it is projected to result in better performing traffic operations which may minimize congestion related crashes compared to the Approved IAR Concept.

7.6.7.2 Policy Point 2

The proposed access connects to a public road only and will provide for all traffic movements. Less than “full interchanges” may be considered on a case-by-case basis for applications requiring special access, such as managed lanes (e.g., transit or high occupancy vehicle and high occupancy toll lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2) and 655.603(d)). In rare instances where all basic movements are not provided by the proposed design, the report should include a full-interchange option with a comparison of the operational and safety

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

The proposed access connects to a public road only, provides all traffic movements, and will be designed to meet or exceed current standards from the FDOT Design Manual and the FHWA *A Policy on Geometric Design of Highways and Streets, 7th Edition*.

8.0 RECOMMENDATIONS

Based on the results, the preferred Build Alternative is the Diamond Interchange Build Alternative.

Both alternatives are projected to result in similar expressway operations resulting in LOS D or better except for the Approved IAR Concept. During the AM peak hour, the Approved IAR Concept is projected to operate at LOS F in the southbound direction by the southbound off-ramp to 45th Street. During the PM peak hour, the Approved IAR Concept is projected to operate at LOS F in the northbound direction by the northbound off-ramp to 45th Street. These poor operations are due to the ramp terminal intersection off-ramp queue spillback onto the expressway mainline.

The Diamond Interchange Build Alternative is projected to operate with more intersections at LOS D or better, no queue spillback onto the expressway mainline, and a higher number of vehicles processed at the intersections when compared to the Approved IAR Concept. The arterial analysis comparison of the results show that the Diamond Interchange Build Alternative is projected to process more vehicles (40,000 vehicles processed compared to 34,000 vehicles with the Approved IAR Concept) and result in slightly higher vehicle operating speeds. The Diamond Interchange Build Alternative is projected to result in lower total delays, travel times, latent delay, latent demand, and total stops. This alternative is also projected to result in higher vehicles arrived compared to the Approved IAR Concept. A summary comparison of the results is shown in **Table 14**.

Table 14 – Summary Comparison of Build Alternatives

Topic	Approved IAR Concept	Diamond Interchange Build Alternative
Freeway Analysis	Projected to result in acceptable expressway operations except at two locations	Best performing alternative
Intersection Analysis	Potential off-ramp spillback into I-95 expressway	Best performing alternative
Arterial Analysis	Projected to result in slower vehicle speeds	Best performing alternative
Network-wide Analysis	Projected to service less vehicles and result in higher delays	Best performing alternative
Safety Analysis	Projected to result in lower predicted crash frequencies	Projected to result in higher predicted crash frequencies

The Diamond Interchange Build Alternative satisfies the FHWA Policy Points. No access changes are proposed with this improvement. Planning consistency updates will need to be coordinated with Palm Beach Transportation Planning Agency (TPA) for the Long Range Transportation Plan (LRTP) and Transportation Improvement Program (TIP). An environmental re-evaluation is scheduled to be conducted in August 2024. A Public Information Meeting is scheduled for February 2026.