SYSTEMS INTERCHANGE MODIFICATION REPORT (SIMR)

PD&E STUDY

For SR 9/I-95 at
SR 804/Boynton Beach Boulevard Interchange
and
SR 9/I-95 at Gateway Boulevard Interchange
Palm Beach County, Florida

Financial Management Number: 435804-1-22-01
Financial Management Number: 231932-1-22-01
Efficient Transportation Decision Making (ETDM) Numbers: 14180 and 14181

February 2017

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Prepared for
Florida Department of Transportation - District Four
Ft. Lauderdale, Florida

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Florida Department of Transportation

Determination of Engineering and Operational Acceptability

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

☒	Requestor	Thuc H. Le, P.E. Project Manager, FDOT District 4	Date
☒	Expressway Authority		Date
☒	Other		Date
	Interchange Review Coordinator	Scott Peterson, P.E. Project Development Manager, FDOT District 4	Date
	State Interchange Review Coordinator	Andrew Young, P.E. State Interchange Coordinator, Central Office	Date
	State Chief Engineer	Courtney Drummond, P.E. Chief Engineer, Central Office	Date
☒	Assistant Secretary Intermodal Systems Development		Date
☒	Federal Highway Administration	N/A (Programmatic) Chad Thompson, P.E. Program Operations Engineer, FHWA	Date

SYSTEMS PLANNING OFFICE

QUALITY CONTROL CERTIFICATION FOR INTERCHANGE ACCESS REQUEST SUBMITTAL

Submittal Date: February 27, 2017

FM Numbers: 435804-1-22-01 and 231932-1-22-01

Project Title: PD&E Study for SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange and SR 9/I-95 at Gateway Boulevard Interchange

District: District 4

Requester: Thuc H. Le, P.E. Phone: 954.777.4552

District IRC: Scott Peterson, P.E. Phone: 954.777.4416

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

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

Draft Systems Interchange Modifications Report

Quality Control (QC) Statement

This document has been prepared following FDOT Procedure Topic No. 525-030-260 (New or Modified Interchanges) and complies with the FHWA Eight Policy requirements. Appropriate District level quality control reviews have been conducted and all comments and issues have been resolved to their satisfaction. A record of all comments and responses provided during QC review is available in the project file or Electronic Review Comments (ERC) system.

Requester________________________________ Date: _______________
Thuc H. Le, P.E.

IRC ________________________________ Date: _______________
Scott Peterson, P.E.

EXECUTIVE SUMMARY

The purpose of this Systems Interchange Modification Report (SIMR) is to seek engineering and operational acceptability of the modifications proposed to interstate system access along Interstate 95 (I-95) at State Route (SR) 804/Boynton Beach Boulevard and SR 9/I-95 at Gateway Boulevard in Palm Beach County, Florida. The SR 9/I-95 corridor is a significant component of the Strategic Intermodal System (SIS) and provides a key transportation element in linking the major ports, airports, and railways that handle Florida's passenger and freight traffic.

Demand exceeds capacity on this segment of road, resulting in peak hour congestion and speeds well below the posted speed limits. This condition is expected to worsen in the future as the population of the State of Florida, including the Boynton Beach area, continues to grow. The volume-to-capacity (V/C) ratio for this segment of SR 9/I-95, its corresponding ramps, and arterial roadway networks will be significantly greater than 1.0 in the future, resulting in deteriorated operations and safety along the corridor unless capacity improvements are provided.

A Methodology Letter of Understanding (MLOU) was approved by the Florida Department of Transportation (FDOT) District 4 Interchange Review Committee (DIRC) and the FDOT Central Office in November 2015. Traffic forecasting and traffic operational and safety analyses for this project were performed in accordance with the guidelines established in the MLOU.

Several alternatives were evaluated to address the purpose and needs identified for this project. These include the No-Build Alternative, Transportation Systems Management and Operations (TSM&O) Alternative, and six Build Alternatives (three at each interchange location). The Build Alternatives proposed for this project include similar improvements to accommodate future traffic patterns. The first Build Alternative for either interchange implemented the improvements suggested in the SR 9/I-95 Interchange Master Plan (IMP) referred as the Concept Design Alternatives (CDA).

Rear-end crashes are the most predominant crash type within the region and are indicative of congested roadway conditions. The Build Alternatives show improved traffic operations and safety within the project study area when compared to the No-Build Alternative.

The three Build Alternatives at each interchange were compared with each other with respect to traffic operations and safety. The detailed comparison of traffic operations with the three Build Alternatives along with the No-Build and TSM&O Alternatives is presented in Section 6. Safety evaluation of the Build Alternatives is presented in Section 7.

Based on the evaluations of the No-Build and Build Alternatives, and in coordination with the FDOT District 4, the District Interchange Review Committee, affected stakeholders, and public comments, the below Build Alternatives are recommended as the Preferred Alternatives for approval in this study:

- The recommended Preferred Alternative for SR 804/Boynton Beach Boulevard interchange is Build Alternative 2 – Streamlined CDA.
- The recommended Preferred Alternative for Gateway Boulevard interchange is Build Alternative 3- Single-Point Urban Interchange (SPUI).

Both Preferred Alternatives will incorporate viable TSM&O improvements and will be developed further as the PD&E project progresses.

E.1 Compliance with FHWA General Requirements

The Federal Highway Administration's (FHWA) Policy on Access to the Interstate System provides the requirements for the justification and documentation necessary to substantiate any proposed changes in access to the Interstate System. The policy is published under the Federal Register, Volume 74, Number 43743, dated May 22, 2017. The responses provided herein for each of the two policy statements demonstrate compliance with these requirements and justification for the proposed interchange modifications along the segment of SR 9/I-95 at SR 804/Boynton Beach Boulevard and Gateway Boulevard in Palm Beach County Florida.

Policy:

It is in the national interest to preserve and enhance the Interstate System to meet the needs of the 21st Century by assuring that it provides the highest level of service in terms of safety and mobility. Full control of access along the Interstate mainline and ramps, along with control of access on the crossroad at interchanges, is critical to providing such service. Therefore, FHWA's decision to approve new or revised access points to the Interstate System under Title 23, United States Code (U.S.C.), Section 111, must be supported by substantiated information justifying and documenting that decision. The FHWA's decision to approve a request is dependent on the proposal satisfying and documenting the following requirements.

Point #1: Proposal does not adversely impact operational safety of the existing freeway

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

An in-depth operational and safety analysis was conducted to study the impacts of the proposed improvements on the existing freeway. The area of influence of the study included one interchange on either side of the proposed access points along the mainline and the first major intersection on either side of the proposed change in access along the arterials.

Several performance measures were used to compare the operations of the existing system under No-Build and Build conditions. Key measures included freeway densities, intersection delays, and safety under existing and proposed conditions.

Three Build Alternatives were considered to address the needs identified for the corridor at each interchange location. The Build Alternatives performed better than the No-Build Alternative for all intersections within the study area for the above-identified performance measures. The Build Alternatives also alleviate the congestion points in the existing system and thus, will be able to serve a significantly higher number of vehicles that would have been delayed by these bottlenecks under the No-Build conditions. A summary of the traffic operational analyses performed for the No-Build, TSM&O, and Build Alternatives for SR 804/Boynton Beach Boulevard study area is provided in Table E-1. A summary of the traffic operational analyses performed for the No-Build, TSM&O, and Build Alternatives for the Gateway Boulevard study area is provided in Table E-2.

Table E-1: SR 804/Boynton Beach Boulevard Alternatives Operational Analysis Comparison

		No-Build	TSM&O	BUILD ALTERNATIVES		
				Alternative 1: CDA	Alternative 2: Streamlined CDA	Alternative 3: SPUI
2020	Total Delay Per Vehicle (seconds) (AM +PM Peaks)	542.6	357.0	324.7	258.0	253.4
	Total Delay Per Vehicle (minutes) (AM +PM Peaks)	9.0	6.0	5.4	4.3	4.2
	Reduction in Delay from No-Build	-	**34%**	**40%**	**52%**	**53%**
2030	Total Delay Per Vehicle (seconds) (AM +PM Peaks)	759.4	558.7	410.7	356.5	330.2
	Total Delay Per Vehicle (minutes) (AM +PM Peaks)	12.7	9.3	6.8	5.9	5.5
	Reduction in Delay from No-Build	-	**26%**	**46%**	**53%**	**57%**
2040	Total Delay Per Vehicle (seconds) (AM +PM Peaks)	1,173.4	944.1	668.8	569.4	527.0
	Total Delay Per Vehicle (minutes) (AM +PM Peaks)	19.6	15.7	11.1	9.5	8.8
	Reduction in Delay from No-Build	-	**20%**	**43%**	**51%**	**55%**

Table E-2: Gateway Boulevard Alternatives Operational Analysis Comparison

		No-Build	TSM&O	BUILD ALTERNATIVES		
				Alternative 1: CDA	Alternative 2: Streamlined CDA	Alternative 3: SPUI
2020	Total Delay Per Vehicle (seconds) (AM +PM Peaks)	521.5	403.8	317.0	321.9	285.9
	Total Delay Per Vehicle (minutes) (AM +PM Peaks)	8.7	6.7	5.3	5.4	4.8
	Reduction in Delay from No-Build	-	**23%**	**39%**	**38%**	**45%**
2030	Total Delay Per Vehicle (seconds) (AM +PM Peaks)	708.2	606.0	339.2	351.8	309.0
	Total Delay Per Vehicle (minutes) (AM +PM Peaks)	11.8	10.1	5.7	5.9	5.2
	Reduction in Delay from No-Build	-	**14%**	**52%**	**50%**	**56%**
2040	Total Delay Per Vehicle (seconds) (AM +PM Peaks)	1,051.9	937.6	403.3	448.4	365.9
	Total Delay Per Vehicle (minutes) (AM +PM Peaks)	17.5	15.6	6.7	7.5	6.1
	Reduction in Delay from No-Build	-	**11%**	**62%**	**57%**	**65%**

A Conceptual Signing Plan was prepared for all Build Alternatives and are provided as part of this SIMR in Appendix O.

In summary, the proposed improvements will not adversely impact the operational safety of the existing freeway. In fact, the improvements will result in reduced delays of approximately 50 percent at SR 804/Boynton Beach Boulevard and 65 percent at Gateway Boulevard by Design Year 2040. Queue lengths under No-Build conditions that cause spillback onto the SR 9/I-95 mainline by Design Year 2040 are eliminated under Build conditions. In addition, reduced driver frustration will result in crash rate reduction of approximately 56 percent of total crashes at SR 804/Boynton Beach Boulevard and Gateway Boulevard (review Section 6 and 7 for more detail).

Point #2: A full interchange with all traffic movements at a public road is provided

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.

SR 9/I-95 is a public facility and all interchanges within the study area provide full access and will continue to do so with the proposed interchange improvements.

The interchange improvements will occur at the interchanges of SR 9/I-95 at SR 804/Boynton Beach Boulevard and SR 9/I-95 at Gateway Boulevard. The proposed access is designed to meet or exceed current standards for federal-aid projects on the interstate system and conform to American Association of State Highway and Transportation Officials (AASHTO) and the FDOT design standards.

All basic movements are provided by the proposed design.

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1. Introduction

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study to identify improvements for the interchanges of SR 9/I-95 at SR 804/Boynton Beach Boulevard and Gateway Boulevard in Palm Beach County, Florida. The project study area is located in eastern Palm Beach County within the City of Boynton Beach between SR 9/I-95 at SR 804/Boynton Beach Boulevard to the south and SR 9/I-95 at Gateway Boulevard to the north.

This Systems Interchange Modification Report (SIMR) is for access modifications proposed to SR 9/I-95 for this project and follows guidelines provided in the FDOT Interchange Access Request Users Guide. Previously, a Methodology Letter of Understanding (MLOU) was approved summarizing and documenting all methodology agreements reached between the Requestor, FDOT's District Four Interchange Review Team, and FDOT Central Office. This MLOU is provided in Appendix A. The SIMR documents the existing conditions in the study area, the future year travel demand forecasts and the analysis of future conditions for the No-Build and Build Alternatives.

1.1 Background

The FDOT made improvements to the SR 9/I-95 mainline, adding a High Occupancy Vehicle (HOV) lane and auxiliary lanes from south of Linton Boulevard to north of PGA Boulevard in Palm Beach County in the 1990s and 2000s. Minor interchange improvements were also made to eight (8) of the existing 18 interchanges along this 30-mile long section of the corridor. At the time of that project, FDOT committed to re-examining the need for short-term and long-term interchange improvements at the interchanges not improved as a part of this previous SR 9/I-95 mainline project. FDOT District Four also identified the need to re-examine the 2003 SR 9/I-95 Master Plan Study for Palm Beach County to develop new improvements to interchanges based on changes in traffic volumes and updated design standards.

FDOT completed an Interchange Master Plan (IMP) for interchanges along SR 9/I-95 in Palm Beach County in October 2015. The IMP identified short-term and long-term needs and developed design concepts to address traffic spillback onto SR 9/I-95 mainline, improve interchange operations, reduce congestion, and increase safety near the interchanges at 17 interchanges within Palm Beach County for the Design Year (2040). The current PD&E Study interchanges at SR 804/Boynton Beach Boulevard and Gateway Boulevard were a part of this study. The study also considered Strategic Intermodal System (SIS) connector improvements needed within the project area and is consistent with plans for the SR 9/I-95 mainline, including the potential extension of SR 9/I-95 Express lanes through Palm Beach County.

Two previous Interchange Access Requests (IARs) were approved by the FHWA within the area of influence for this project. An Interchange Operational Analysis Report (IOAR) was completed and approved in March 2013 for SR 9/I-95 at Woolbright Road interchange and an IOAR was approved in March 2011 for SR 9/I-95 at Hypoluxo Road interchange. A Non-IAR was completed and approved by the Department in May 2014 for interim improvements near the SR 9/I-95 at Gateway Boulevard interchange. These interim improvements will be a part of the No-Build conditions for this project. The purpose of this SIMR is to request engineering and operational acceptability of the modifications proposed to SR 9/I-95 as part of this PD&E Study to address the Design Year (2040) needs at the two study interchanges. This SIMR has been prepared in accordance with FDOT Policy No. 000-525-015, FDOT Procedure No. 525-030-160, and the FDOT Traffic Forecasting Handbook (Procedure No. 525-030-120).

1.2 Purpose and Need

1.2.1 Purpose

The primary purpose of this project is to enhance overall traffic operations through Design Year (2040) at the study interchanges through implementation of operational and capacity improvements that will maintain and improve mobility, improve safety, support existing and future development, and enhance emergency evacuation and response times.

1.2.2 Need

The SR 804/Boynton Beach Boulevard and Gateway Boulevard interchanges with SR 9/I-95 are an important component of the Strategic Intermodal System (SIS) in Palm Beach County, Florida and provide a key transportation element. These interchanges are an important connection for commuters and freight traffic in the region.

The goal of this project is to improve traffic operations at the study interchanges through implementation of operational and capacity improvements that will maintain and improve mobility, improve safety, support existing and future development, and enhance emergency evacuation and response times.

The need for the project is based on the following factors:

Transportation Capacity

The study area was initially evaluated by the SR 9/I-95 at SR 804/Boynton Beach Boulevard interchange in Palm Beach County, Interchange Concept Development Report (June 2014) and the SR 9/I-95 at Gateway Boulevard interchange in Palm Beach County, Interchange Concept Development Report (June 2014) [CD Reports].

Based on the traffic operations analysis documented in the CD Reports for the two study area interchanges and adjacent signalized intersections, the existing operational capacity and overall traffic operations (Level of Service) are deficient. These deficiencies are based on existing and future AM and PM peak hour traffic conditions for ramp terminal intersections. Without improvements, these intersections will continue to experience excessive delays and queue lengths, and will continue to operate below acceptable LOS standards and the two study interchanges will have insufficient capacity to accommodate the projected travel demand.

Economic Development

The area surrounding the SR 9/I-95 at SR 804/Boynton Beach Boulevard interchange is urbanized containing a mixture of commercial, industrial, and residential land uses. According to the City of Boynton Beach Future Land Use Map, the SR 9/I-95 at SR 804/Boynton Beach Boulevard interchange falls within the designated Community Redevelopment Area (CRA). The residential neighborhoods and business districts within the CRA are intended to be redeveloped by implementing compact, more intensive urban growth patterns that provide opportunities for more efficient use and development of infrastructure, land, and other resources and services. The area surrounding the SR 9/I-95 at Gateway Boulevard interchange is urbanized containing a mixture of residential and recreational land uses to the east and commercial, office, industrial, and residential activities to the west as part of the Quantum Park Development of Regional Impact (DRI). According to the City of Boynton Beach Future Land Use Map, the area will continue to support the noted land uses.

Population within the vicinity of the SR 804/Boynton Beach Boulevard interchange is anticipated to grow by approximately 10 percent primarily in the areas northeast and southwest of the interchange during the period from 2005 to 2035. Anticipated population growth within the vicinity of the Gateway Boulevard interchange is 46 percent, with expected growth primarily east of Seacrest Boulevard and within the Quantum Park DRI during the same period.

Employment in the vicinity of SR 804/Boynton Beach Boulevard is projected to increase approximately 147 percent primarily in the areas northeast, east, and southwest of the interchange during the period from 2005 to 2035. In the vicinity of Gateway Boulevard, employment is expected to increase by approximately 173 percent primarily in the areas west and southeast of the interchange during the same period.

Improving the transportation infrastructure at the study area interchanges and adjacent intersections will support the redevelopment efforts in the vicinity of these interchanges and the overall vision of the City of Boynton Beach growth and economic development as identified in the Heart of Boynton Community Redevelopment Plan Update (April 2014).

Safety

MAP-21 establishes national performance goals for Federal highway programs including:

- Safety - to achieve a significant reduction in traffic fatalities and serious injuries on all public roads.
- System Reliability – to improve the efficiency of the surface transportation system.

MAP-21 continued the Highway Safety Improvement Program (HSIP) as a core Federal program. To receive funding under this program, States were required to develop Strategic Highway Safety Plans (SHSP). The SHSP is a data-driven, four to five-year comprehensive plan that establishes statewide goals and objectives to reduce fatalities and serious injuries.

If no operational and safety improvements are made within the project limits, traffic operations within the interchange area will progressively worsen, increasing the number of crashes, and deteriorating the access to and from SR 9/I-95 for users.

Emergency Evacuation and Response Times

SR 9/I-95 and SR 804/Boynton Beach Boulevard serve as part of the emergency evacuation route network designated by the Florida Division of Emergency Management and Palm Beach County. As designated evacuation facilities, these roadways are critical in facilitating traffic flow during emergency evacuation periods. SR 804/Boynton Beach Boulevard is a major east-west corridor in eastern Palm Beach County providing linkage between SR 9/I-95 and Florida's Turnpike. Both SR 804/Boynton Beach and Gateway Boulevards connect to other major arterials and highways of the State's designated evacuation route network.

1.3 Project Location

The project is located in eastern Palm Beach County within the City of Boynton Beach and the project study area consists of SR 9/I-95, SR 804/Boynton Beach Boulevard and Gateway Boulevard arterial roadways and the on/off-ramps to/from SR 9/I-95 along these arterials.

SR 9/I-95 at Woolbright Road interchange (MP 13.75) to the south and SR 9/I-95 at Hypoluxo Road interchange (MP

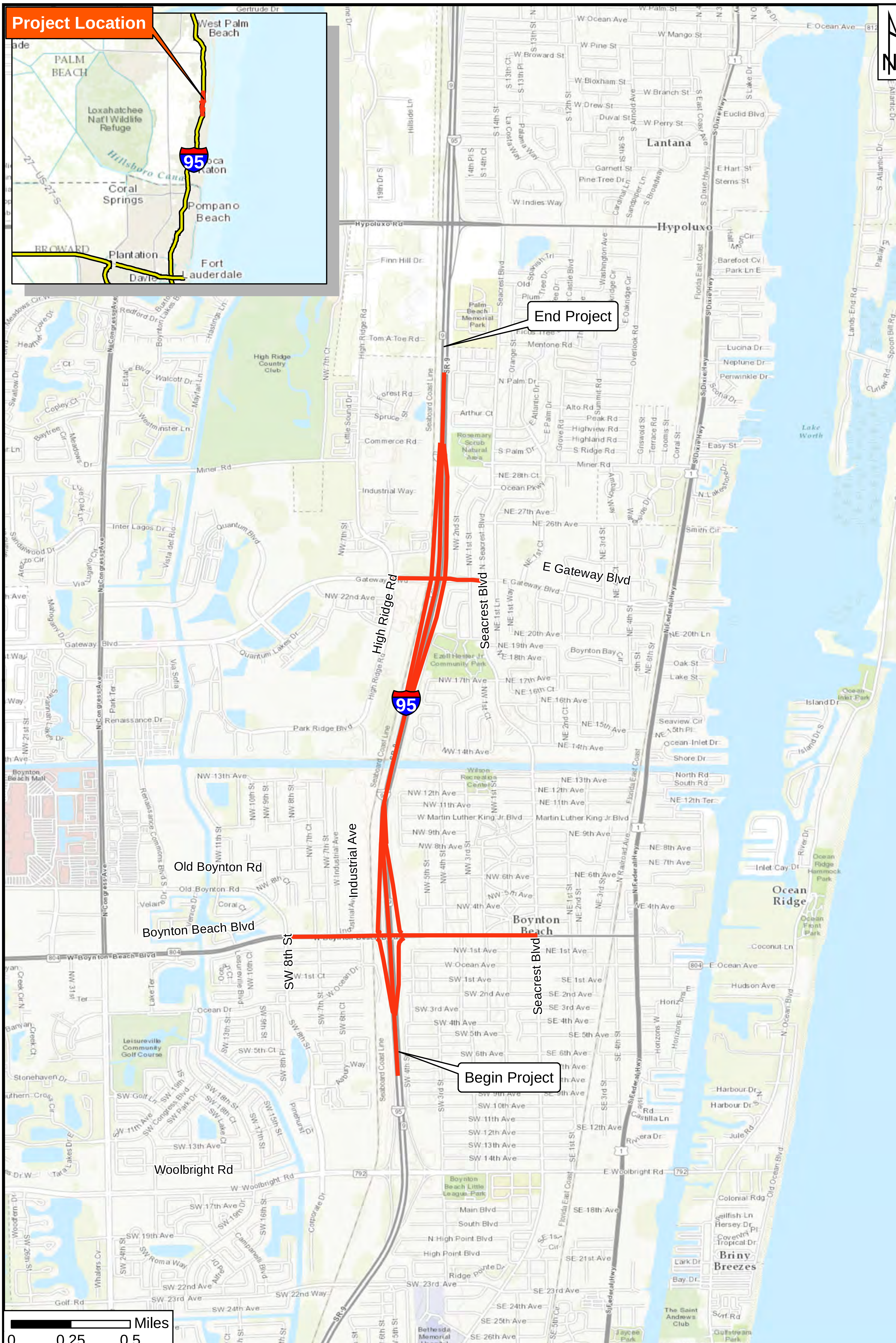
17.74) to the north are considered as adjacent interchanges to the project study area and are considered for traffic analysis purposes.

Figure 1-1 provides a Project Location Map and Table 1-1 summarizes the interchange spacing within the SIMR limits.

This SIMR includes two service interchanges along SR 9/I-95: SR 804/Boynton Beach Boulevard (MP 14.75) and Gateway Boulevard (MP 16.26).

Table 1-1: Interchange Spacing:

Interchange Cross Street	Approximate Cross Street Centerline Milepost	Approximate Interchange Spacing (Miles)
Woolbright Road	13.75	1.00
SR 804/Boynton Beach Boulevard	**14.75**	**1.51**
Gateway Boulevard	**16.26**	1.48
Hypoluxo Road	17.74	



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PROJECT LOCATION MAP

Figure 1-1

2. Methodology

2.1 Overview

A MLOU was developed to outline the procedures to be used and analysis to be conducted for this SIMR. The MLOU was approved by FDOT Central Office and District 4 in November 2015 and the signed copy of the MLOU is provided in Appendix A. This project is agreed to be evaluated under the Programmatic Agreement between FHWA and FDOT. The following sections summarize the methodology as set forth in the approved MLOU.

2.2 Analysis Years

The years used for the travel demand forecasting are:

- Base Year 2010
- Horizon Year 2040

The forecasting of the traffic volumes is based on the Southeast Florida Regional Planning Model, version 7.0 (SERPM 7.0) which was released in February 2015. The years used for the traffic operational analysis are:

- Existing Year 2015
- Opening Year 2020
- Design Year 2040

An Interim Year (2030) analysis was also conducted for this project to evaluate the traffic operational characteristics of the various alternatives considered for a mid-year between the Open and Design Years for this project.

2.3 Area of Influence

The area of influence included SR 9/I-95 mainline, from Woolbright Road to Hypoluxo Road. Along crossroads, the area of influence extended from each study interchange ramp terminal intersection to the nearest adjacent signalized intersection to the east and west of the ramp terminal intersection. The cross street roadway limits and the intersections that were analyzed in the SIMR are identified below:

- SR 804/Boynton Beach Boulevard from NW 8th Street/Old Boynton Road to Seacrest Boulevard
    - SR 804/Boynton Beach Boulevard at NW 8th Street/Old Boynton Road
    - SR 804/Boynton Beach Boulevard at Industrial Avenue
    - SR 804/Boynton Beach Boulevard at SR 9/I-95 southbound off-ramp
    - SR 804/Boynton Beach Boulevard at SR 9/I-95 northbound off-ramp
    - SR 804/Boynton Beach Boulevard at Seacrest Boulevard
- Gateway Boulevard from High Ridge Road to Seacrest Boulevard
    - Gateway Boulevard at High Ridge Road
    - Gateway Boulevard at SR 9/I-95 southbound off-ramp
    - Gateway Boulevard at SR 9/I-95 northbound off-ramp

  - Gateway Boulevard at Seacrest Boulevard

The below listed adjacent interchanges were included in the traffic operational analysis per the guidance provided in the FHWA's Traffic Analysis Toolbox Volume III:

- Woolbright Road from SW 8th Street/Corporate Drive to Seacrest Boulevard
  - Woolbright Road at SW 8th Street/Corporate Drive
  - Woolbright Road at SR 9/I-95 southbound off-ramp
  - Woolbright Road at SR 9/I-95 northbound off-ramp
  - Woolbright Road at Seacrest Boulevard
- Hypoluxo Road from High Ridge Road to Seacrest Boulevard
  - Hypoluxo Road at High Ridge Road
  - Hypoluxo Road at SR 9/I-95 southbound off-ramp
  - Hypoluxo Road at SR 9/I-95 northbound off-ramp
  - Hypoluxo Road at Seacrest Boulevard

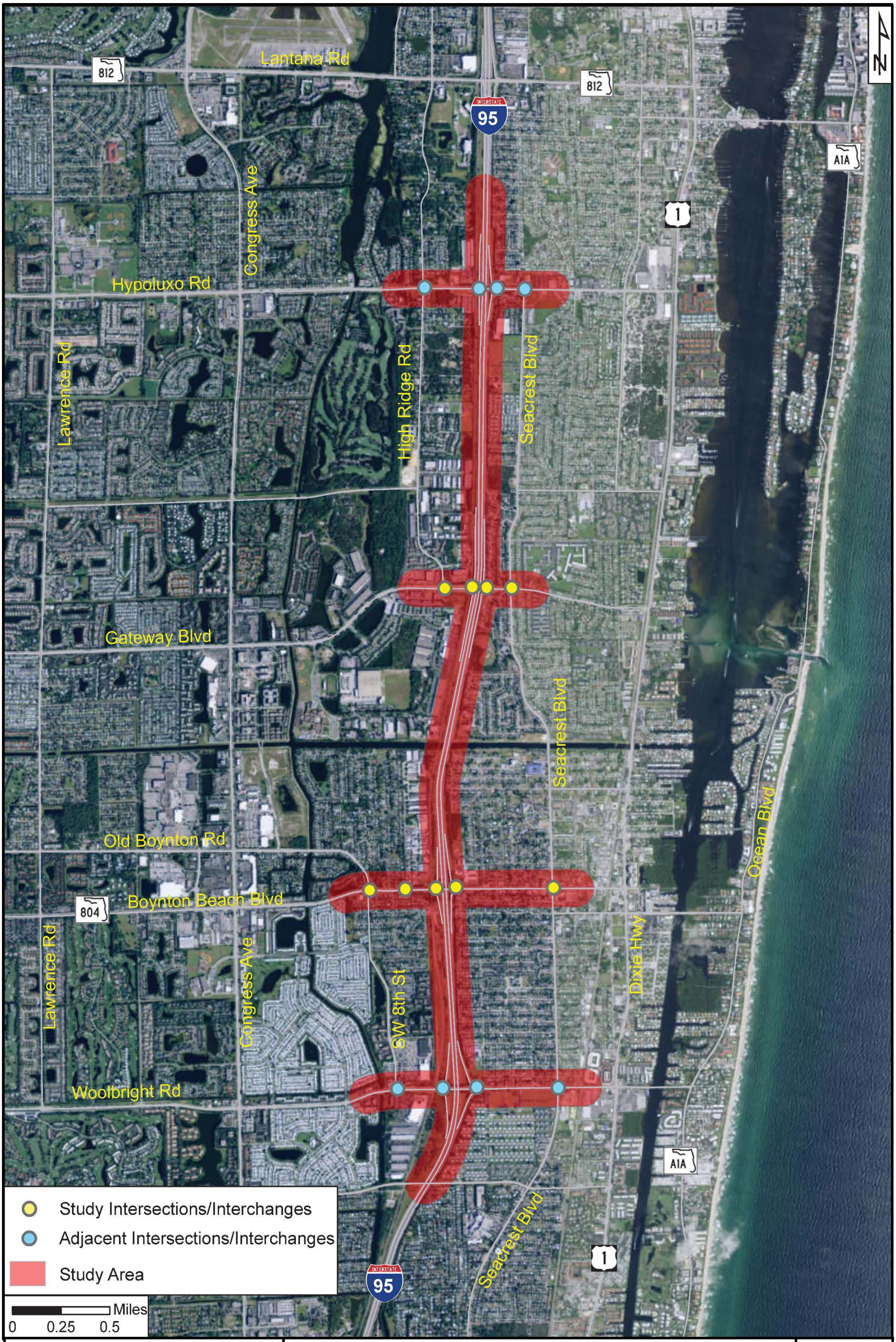
The area of influence is shown in Figure 2-1.

2.4 Data Collection

The analysis conducted for this SIMR is based on a combination of data that include recent data collection efforts and additional data available from the FDOT Annual Courts Program. Existing daily vehicle counts and turning movement counts were conducted to evaluate the 2015 existing conditions and to provide a basis for future traffic analysis within the study area by the Department under a separate contract and were provided to the PD&E team. The information presented in this section is a summary from the *Traffic Data Collection and Traffic Projections for SR 9/I-95 Interchange PD&E Studies Report* (provided in Appendix B) a companion document to this PD&E Study. The traffic data was collected between February and May 2015. Daily vehicle and classification counts were conducted for up to seventy-two (72) hours; peak hour turning movement counts were conducted from 6:00 a.m. to 9:00 a.m. and from 4:00 p.m. to 7:00 p.m. for the morning and evening peak hours, respectively. The turning movement counts and tube counts were conducted during typical weekdays (Tuesday, Wednesday and Thursday) and are collected according to the guidelines in the Project Traffic Forecasting Handbook. Traffic counts were adjusted with appropriate seasonal and axle correction factors. Historical traffic volume information available from FDOT Florida Traffic Information (FTI) online website was used to supplement additional data needs.

2.4.1 Traffic Factors

The design traffic factors agreed upon through the MLOU process for use in this study are summarized in Table 2-1. The T factor is a percentage of heavy vehicles during a 24-hour period. T_f is the percentage of heavy vehicles during the peak hours. The truck factor (T-factor) was calculated from the recent five-year average of the T-factor from the FDOT Traffic Online historical count data. The peak hour factors from the turning movement and tube counts will be utilized for operational analysis for locations with available data. A minimum peak hour factor of 0.95 will be applied for locations without detailed traffic volume information, which is reflective of the expected conditions with the high overall level of travel demand in the area of influence.



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AREA OF INFLUENCE

Figure 2-1

Table 2-1: Traffic Factors:

Roadway	K(1)	D(2)	T_{24}(1)	T_f(1)
SR 9/I-95	8.0%	59.0% (AM-SB/PM-NB)	7.0%	3.5%
SR 804/Boynton Beach Blvd (West of I-95)	9.0%	58.0% (AM-EB/PM-WB)	3.6%	1.8%
SR 804/Boynton Beach Blvd (East of I-95)		53.6% (AM-EB/PM-WB)	3.9%	2.0%
Gateway Blvd (West of I-95)	9.0%	56.5% (AM-EB/PM-WB)	5.1%	2.5%
Gateway Blvd (East of I-95)		60.3% (AM-WB/PM-EB)	4.4%	2.2%
Woolbright Rd (West of I-95)	9.0%	52.1% (AM-EB/PM-WB)	3.5%	1.8%
Woolbright Rd (East of I-95)		53.4% (AM-WB/PM-EB)	3.1%	1.6%
Hypoluxo Rd (West of I-95)	9.0%	63.4% (AM-EB/PM-WB)	3.9%	2.0%
Hypoluxo Rd (East of I-95)		56.1% (AM-WB/PM-EB)	5.0%	2.5%
Other Cross Streets (West of I-95)	9.0%	60.9%	6.1%	3.1%
Other Cross Streets (East of I-95)		58.2%	3.6%	1.8%

Source: (1) FDOT Traffic Online, Year 2014 Traffic Factors;
(2) Existing Year 2015 Traffic Data

2.5 Travel Demand Forecasting

The travel demand modeling and future year AADT forecasts for this project were performed by the Department under a separate report called *Traffic Data Collection and Traffic Projections for SR 9/I-95 Interchange PD&E Studies* (refer Appendix B) and were provided to the PD&E team for developing the Directional Design Hourly Volumes (DDHV) Forecasts. The Southeast Florida Regional Planning Model (SERPM Version 7.0) was utilized for the development of future year daily (AADT) traffic projections within the study area. Future traffic forecasts were based on the SERPM, Version 7.0 and area historical growth rates. The SERPM 7.0 model is the approved and validated model available for the metropolitan area. The model provided volumes for base (2010) and future (2040) year conditions.

The traffic forecasting methodology used for this project was based on the 2015 AADT (from field data), and 2010 and 2040 SERPM 7.0 model runs volumes. The raw 2040 model volumes were adjusted following the “Factoring Procedure–Difference Method” per NCHRP report 765. For roadway segments where the SERPM 7.0 2040 model volumes were lower than the SERPM 7.0 2010 model volumes, or are not included in the SERPM 7.0 network, the future 2040 AADTs was calculated using the 2015 AADT collected in the field and applying a compounded growth factor of 0.5%. The Open Year 2020 AADT values were calculated by interpolation between the final 2015 and 2040 AADT values. The future year traffic forecasts developed based on SERPM Version 7.0 included two express lanes in either direction of travel along SR 9/I-95 within the project study area.

The DDHVs were calculated by applying the K- and D-factors approved in the MLOU. Traffic volumes were then balanced by holding the mainline volumes and adding and subtracting the ramp volumes. The DDHV turning movements were developed by applying existing turning percentages to the intersection approach DDHVs. The volumes were then balanced along the arterials. The traffic projections developed were checked for reasonableness and consistency with other on-going studies.

The detailed methodology used for travel demand forecasting and development of design hour traffic volumes is documented in the approved *Traffic Forecasting Technical Memorandum* (refer to Appendix C) dated January 2016 for this project.

2.6 Level of Service Criteria

FDOT Topic No. 525-000-006 provides LOS standards for the State Highway System (SHS). The acceptable LOS standard from this document for the area of influence is LOS "D" for the intersections, freeway, and ramps.

Palm Beach County Comprehensive Plan lists the acceptable LOS standard for all county roadways as LOS "D". Gateway Boulevard within the project is a Palm Beach County maintained roadway and follows the Palm Beach County Comprehensive Plan set LOS standard criteria.

2.7 Traffic Operational Analysis

Analyses of SR 9/I-95 system, SR 804/Boynton Beach Boulevard and Gateway Boulevard arterials, including the mainline and the interchange ramps, were based on criteria and policies detailed in the FDOT Traffic Analysis Handbook, March 2014 Edition. Freeway and ramp merge/diverge or weaving operational analyses were conducted utilizing Highway Capacity Software (HCS 2010). Intersection capacity analyses were conducted using Synchro 9.0 software. Results were reported utilizing the HCM 2000 outputs from Synchro 9 for all alternatives analyzed to maintain consistency. Synchro 9 software currently does not have the capability of producing HCS 2010 outputs for complicated cluster phasing or other complicated signal timing/phasing operations. All ramp terminal intersections within the study area are utilizing cluster phasing. Therefore, HCM 2000 outputs were used for all alternatives to evaluate performance and to maintain consistency. The MOEs summarized and reported to evaluate the performance of the Build and No-Build alternatives considered are consistent with the MOEs approved in the MLOU for this project.

When performing operational analysis for the SR 804/Boynton Beach Boulevard, Gateway Boulevard, and adjacent interchange segments, existing right turn on red (RTOR) values calculated from Existing Year (2015) count data were used in the Synchro 9 models. For future year analysis, the *Right Turn on Red Data Collection and Estimation Memorandum* (2016) prepared by FDOT was utilized. Future year RTOR volumes were calculated, where applicable, based on intersection type as suggested by the Memorandum and were applied in the future year Synchro models. The RTOR reductions were applied only to the right-most right turn lane volumes where multiple right turn lanes existed. The volume in the right-most right turn lanes were calculated by utilizing the actual right turn volume and the corresponding lane utilization factor.

In addition, lane utilization factors were calculated based on HCM 2010 methodology and applied to the SR 804/Boynton Beach Boulevard, Gateway Boulevard, and adjacent interchange segments' Synchro models, when applicable.

When performing operational analysis for the SR 9/I-95 freeway segments, a service volume of 1,500 vehicles per hour per lane is assumed to be utilizing the existing HOV facility within the project study area and a maximum service express lane volume of 1,650 vehicles per hour per lane is assumed to be utilizing any future express lanes. These assumptions are consistent with recent studies, the FDOT Express Lanes Handbook, and similar facilities that are currently operational in District 4.

2.8 Alternatives Considered

The following scenarios were considered for this project:

- Existing Year 2015 – AM and PM peak hours
- No Build Alternative – Open Year 2020, Interim Year 2030, and Design Year 2040 – AM and PM peak hours
- Transportation Systems Management and Operations (TSM&O) Alternative (No-Build conditions with optimized signal timings) – Open Year 2020, Interim Year 2030, and Design Year 2040 – AM and PM peak hours
- Build Alternatives – Open Year 2020, Interim Year 2030, and Design Year 2040 – AM and PM peak hours

The conceptual layouts of the Build Alternatives developed for the study interchanges are included in Section 5.

3. Existing Conditions

This section provides a discussion and evaluation of existing conditions within the area of influence for the PD&E Study. This discussion includes existing land use, transportation systems data, existing traffic data, existing operating conditions, and existing environmental constraints.

3.1 Land Use

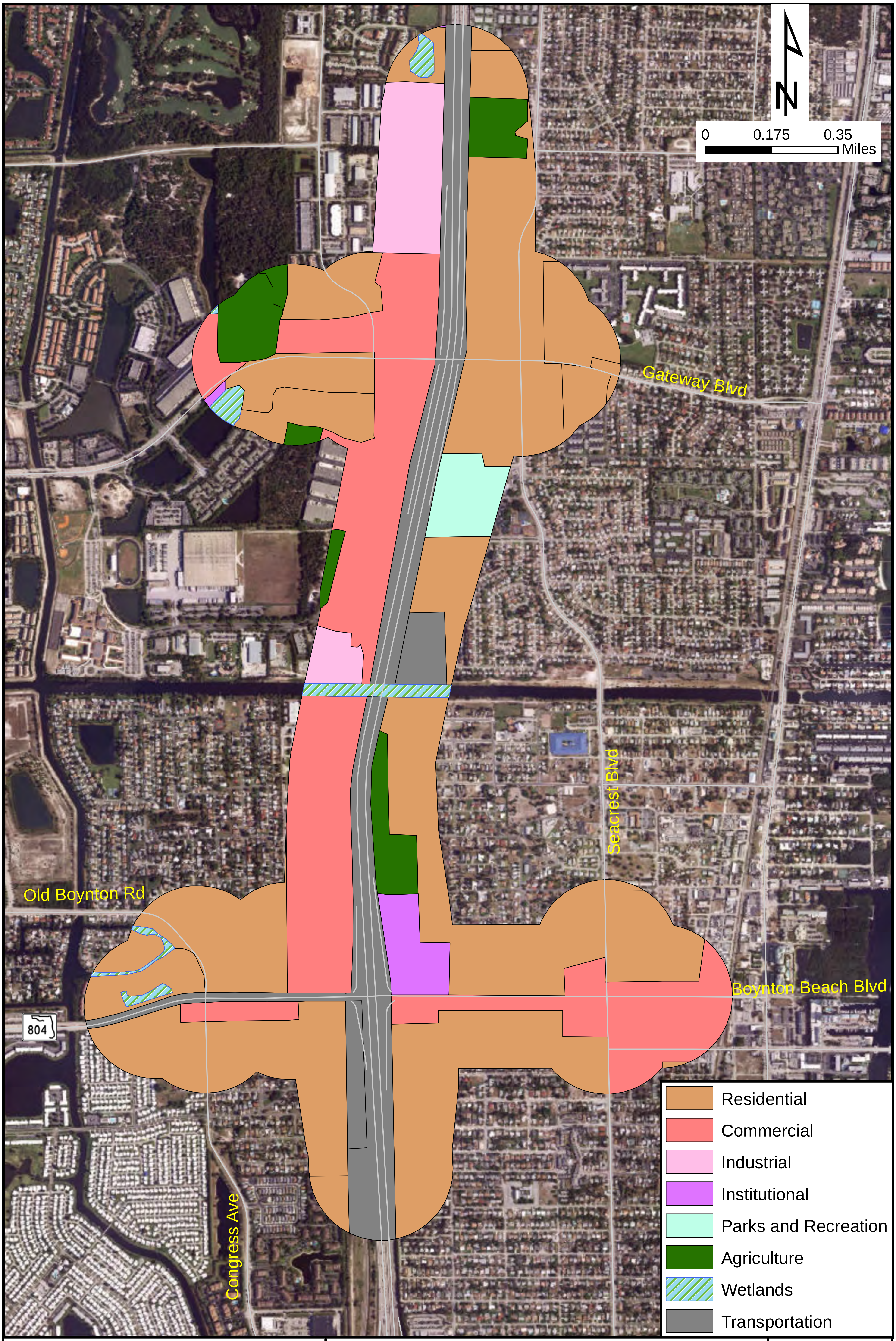
The SR 9/I-95 at SR-804/Boynton Beach Boulevard interchange lies within the City of Boynton Beach. The project area is partially located within the City's Community Redevelopment Area and is comprised primarily of transportation land use. The interchange and surrounding area is urbanized consisting of a mix of single and multifamily residential, commercial, office, light industrial, and public school land uses. According to the City of Boynton Beach's Future Land Use Map, the project area remains urbanized with a mix of low and high density residential and local commercial uses.

The SR-9/I-95 at Gateway Boulevard interchange also lies within the City of Boynton Beach. The project area is partially located within the City's Community Redevelopment Area and the Quantum Development of Regional Impact (DRI). The project area is comprised primarily of transportation land use. The interchange and surrounding area is urbanized consisting of a mix of single and multifamily residential, commercial, light industrial, and transit land uses. According to the City of Boynton Beach Future Land Use Map, the project area remains urbanized with a mix of low and high density residential and local commercial uses.

Existing land use map for the project study area is shown in Figure 3-1.

The proposed improvements associated with the Build Alternatives will require a minimal amount of additional right-of-way (ROW) and are not anticipated to significantly affect the land use in the area. The character of the study area remains unchanged and will continue to support the existing and future land uses within the project and surrounding area maintaining the goals of the City of Boynton Beach's Future Land Use Map, the Community Redevelopment Area and Quantum DRI goals.

This project was reviewed by the Environmental Technical Advisory Team (ETAT) agencies through the Efficient Transportation Decision Making (ETDM) process and assigned a degree of effect of minimal for land use. The Florida Department of Economic Opportunity (FDEO) assigned the degree of effect as none, the FHWA as minimal, and FDOT District Four as minimal. The proposed improvements are compatible with the City of Boynton Beach Comprehensive Plan and supports the plan's land use element. Effects on the area's character resulting from the project improvements are anticipated to be minor. The City of Boynton Beach does not have a Future Transportation Map. The FDOT will coordinate with the City of Boynton Beach to ensure that the project is included on the Future Transportation Map of the adopted Comprehensive Plan, and the Palm Beach MPO to ensure that funding is identified for future project phases in the TIP, LRTP, STIP, and FDOT Cost Feasible Plan.



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Existing Land Use

Figure 3-1

3.2 Roadway Network

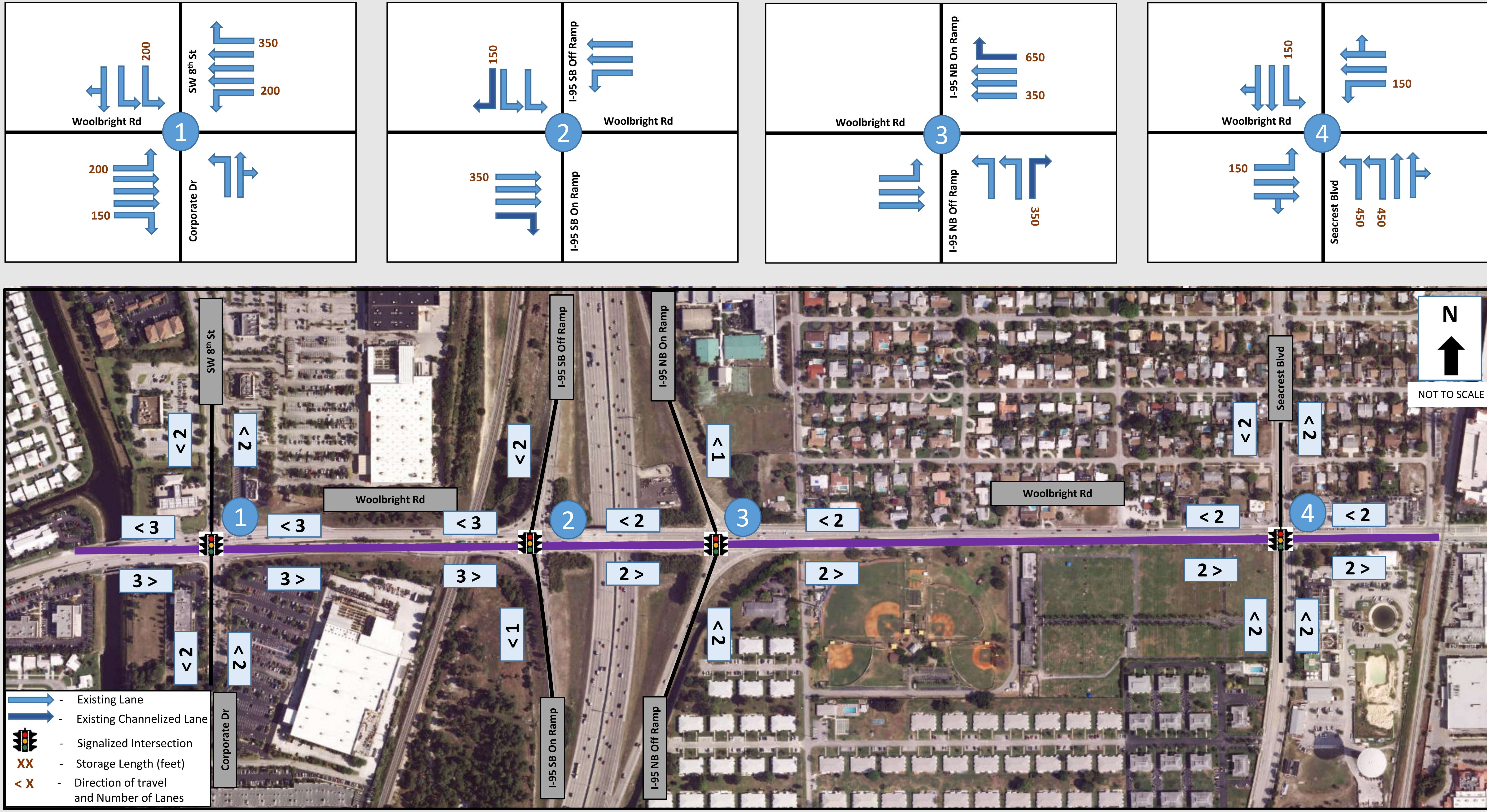
The general characteristics of the roadway facilities located within the project limits are shown in Table 3-1. The data is based on information gathered from the FDOT's Roadway Characteristics Inventory, Straight Line Diagrams (SLDs), Palm Beach County Comprehensive Plan and field reviews conducted for the PD&E Study. Four service interchanges are located along SR 9/I-95 within the project limits. The existing intersection lane configurations and number of lanes under existing conditions are depicted in Figure 3-2 through 3-5 for the four service interchanges within the study area (Woolbright Road, SR 804/Boynton Beach Boulevard, Gateway Boulevard, and Hypoluxo Road).

The SR 9/I-95 interchanges at SR 804/Boynton Beach Boulevard and Gateway Boulevard are the primary focus of this SIMR. SR 9/I-95 is a limited access highway and a designated SIS facility that provides regional connectivity along east coast of Florida. The existing typical section consists of four general purpose lanes and one High Occupancy Vehicle (HOV) lane in each travel direction (northbound/southbound). One auxiliary lane is provided along SR 9/I-95 in each travel direction between the Gateway Boulevard and SR 804/Boynton Beach Boulevard interchanges. Two southbound auxiliary lanes in the southbound travel direction and one auxiliary lane in the northbound travel direction are provided between SR 804/Boynton Beach Boulevard and Woolbright Road interchanges. No auxiliary lanes are present along SR 9/I-95 between Gateway Boulevard and Hypoluxo Road in either the southbound or northbound directions.

Table 3-1: Existing Roadway Characteristics

Roadway	Facility Type	Functional Classification	Access Class	Typical Section	Posted Speed Limit (mph)
SR 9/I-95	Interstate, Limited Access, SIS Facility	Urban Principal Arterial - Interstate	Class 1	4 NB GP lanes + 1 NB HOV lane + 4 SB GP lanes + 1 SB HOV lane + Barrier wall	65
Woolbright Road, West of SR 9/I-95	Arterial	Urban Minor Arterial	N/A	3 EB lanes + 3 WB lanes + raised median	40
Woolbright Road, East of SR 9/I-95	Arterial	Urban Minor Arterial	N/A	2 EB lanes + 2 WB lanes + 1 TWLTL	35
SR 804/Boynton Beach Boulevard, West of SR 9/I-95	**Arterial**	**Urban Principal Arterial - Other**	**Class 5**	**3 EB lanes + 3 WB lanes + Raised median**	**35**
SR 804/Boynton Beach Boulevard, East of SR 9/I-95	**Arterial**	**Urban Principal Arterial - Minor**	**Class 6**	**2 EB lanes + 2 WB lanes + 1 TWLTL**	**35**
Gateway Boulevard, West of SR 9/I-95	**Arterial**	**Urban Minor Arterial**	**N/A**	**3 EB lanes + 3 WB lanes + Raised median**	**35**
Gateway Boulevard, East of SR 9/I-95	**Arterial**	**Urban Collector**	**N/A**	**2 EB lanes + 2 WB lanes + Raised median**	**25**
Hypoluxo Road, West of SR 9/I-95	Arterial	Urban Minor Arterial	N/A	3 EB lanes + 3 WB lanes + Raised median	45
Hypoluxo Road, East of SR 9/I-95	Arterial	Urban Minor Arterial	N/A	2 EB lanes + 2 WB lanes + 1 TWLTL	45

NB – northbound, SB – southbound, EB – eastbound, WB – westbound
GP – general purpose, HOV – High Occupancy Vehicle, TWLTL – Two-way Left Turn Lanes



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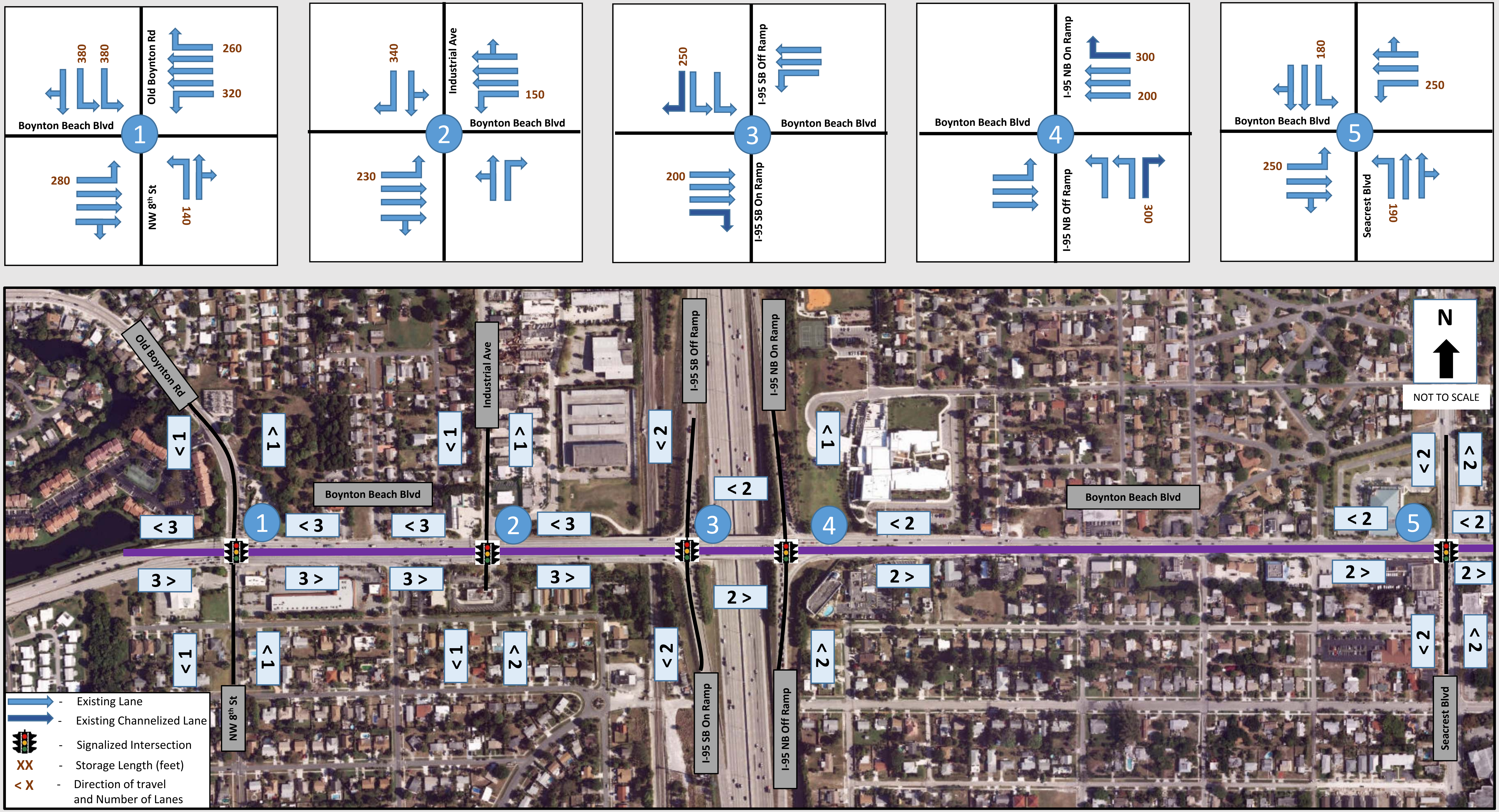
SR 9/I-95 at Woolbright Road Interchange
Existing Lane Configuration and Number of Lanes

Figure 3-2



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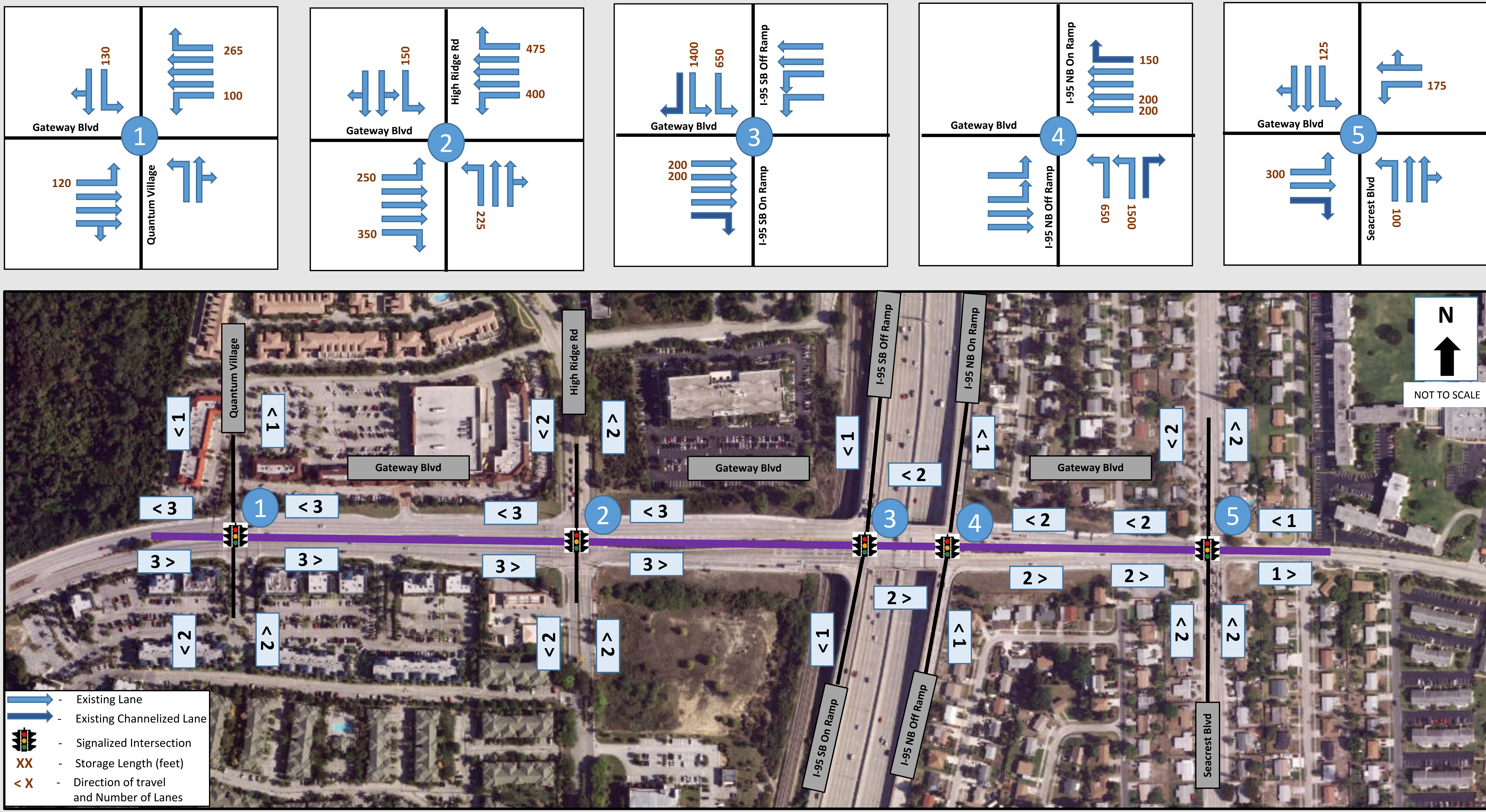
SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
Existing Lane Configuration and Number of Lanes

Figure 3-3



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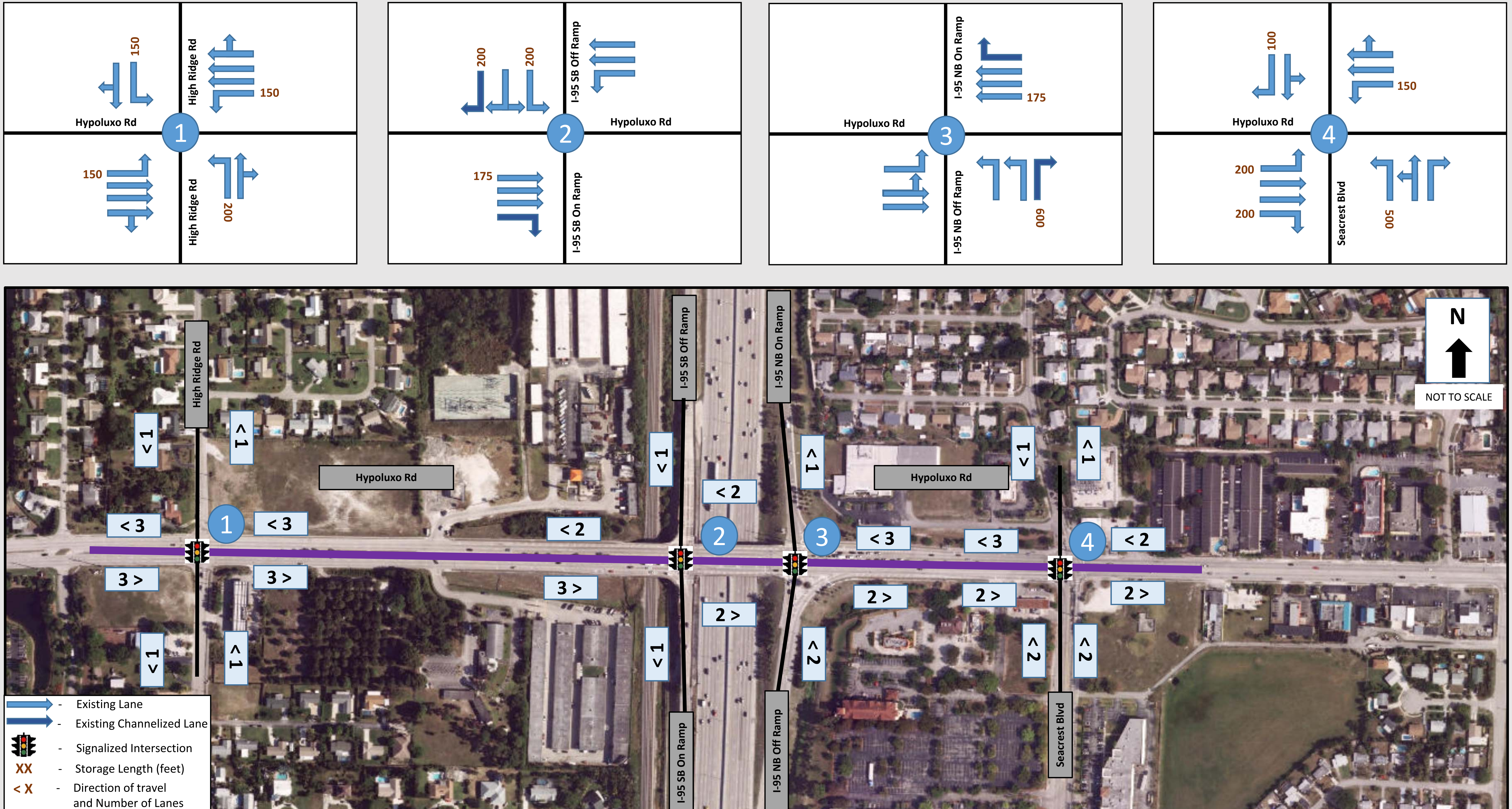
SR 9/I-95 at Gateway Boulevard Interchange
Existing Lane Configuration and Number of Lanes

Figure 3-4



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SR 9/I-95 at Hypoluxo Road Interchange
Existing Lane Configuration and Number of Lanes

Figure 3-5

3.3 Traffic Data

The information presented in this section is a summary of the *Traffic Forecasting Technical Memorandum for I-95 Interchange PD&E Studies Report* (refer to Appendix C), a companion document to this PD&E Study. Traffic data was collected to evaluate the 2015 existing conditions and to provide a basis for future traffic analysis. The traffic counts were performed during typical weekdays (Tuesday through Thursday) from February 2015 to May 2015 at arterials, interchange ramps and freeway segments within the project study limits. For each intersection, the traffic data collection effort consisted of 72-hour approach/departure machine counts for all approaches and 6-hour intersection Turning Movement Counts (TMCs) (including Right-Turn-On-Red volumes) on three consecutive days. The 6-hour TMCs were performed during the AM peak period (3 hours, from 6:00 AM to 9:00 AM) and the PM peak period (3 hours, from 4:00 PM to 7:00PM). Based on the traffic volumes on major crossing facilities, 7:30 AM to 8:30 AM and 5:00 PM to 6:00 PM were recommended as AM and PM peak hour for all study intersections.

In order to consider the potential impact to adjacent interchanges and corresponding major intersections, the data collection and traffic analysis effort were extended to the interchange north and south of the study interchanges, and signalized intersections east and west of the interchange termini. This study considered 17 intersections listed below:

- Woolbright Road
    - Woolbright Road at SW 8th Street/Corporate Drive
    - Woolbright Road at I-95 Southbound Off-Ramp
    - Woolbright Road at I-95 Northbound Off-Ramp
    - Woolbright Road at Seacrest Boulevard
- SR 804/Boynton Beach Boulevard Corridor
    - SR 804/Boynton Beach Boulevard at NW 8th Street/Old Boynton Road
    - SR 804/Boynton Beach Boulevard at Industrial Avenue
    - SR 804/Boynton Beach Boulevard at I-95 Southbound Off-Ramp
    - SR 804/Boynton Beach Boulevard at I-95 Northbound Off-Ramp
    - SR 804/Boynton Beach Boulevard at Seacrest Boulevard
- Gateway Boulevard Corridor
    - Gateway Boulevard at High Ridge Road
    - Gateway Boulevard at I-95 Southbound Off-Ramp
    - Gateway Boulevard at I-95 Northbound Off-Ramp
    - Gateway Boulevard at Seacrest Boulevard
- Hypoluxo Road Corridor
    - Hypoluxo Road at High Ridge Road
    - Hypoluxo Road at I-95 Northbound Off-Ramp
    - Hypoluxo Road at I-95 Southbound Off-Ramp
    - Hypoluxo Road at Seacrest Boulevard

Locations where the 2015 count data is available from the FDOT annual traffic data collection program and traffic data for I-95 mainline was obtained from the District Statistics Unit. For the remaining mainline segments with no 2015 data, the AADT was calculated based on 2012/2013 historical counts and a recommended growth rate of 0.5%. The following locations along the mainline are provided from the annual count program:

- I-95 North of Woolbright Road
- I-95 North of SR 804/Boynton Beach Boulevard
- I-95 North of Gateway Boulevard

Existing 2015 AADT and peak hour volumes were balanced and smoothed for the entire study area following the approved processes and techniques consistent with the FDOT Project Traffic Forecasting Handbook. It was found that there were differences between the TMCs and 72-hour road tube counts during the same period at some intersection approaches. Such differences were mainly due to long queues at intersections, which caused the traffic counter to double count stopped and/or low speed vehicles. The assessment confirmed that these differences would not have significant impact on the traffic projections for this PD&E Study.

The existing 2015 balanced peak-hour turning movement volumes as well as the development of 2015 AADT and peak hour ramp volumes were documented in the companion document, *Traffic Forecasting Technical Memorandum for I-95 Interchange PD&E Studies*. For ease of reference, the existing 2015 balanced peak-hour volumes are also shown in Figures 3-6 through 3-9.

The approved *Traffic Forecasting Technical Memorandum* that summarizes the Existing Year 2015 and future demand traffic projection for the PD&E Study is provided in Appendix C.

3.4 Operational Analysis

The Existing Year (2015) level of service conditions were evaluated for the road segments and intersections within the project study area. Traffic operational analysis were based on the network lane configurations and traffic volumes presented in the preceding sections of this report. LOS calculations for freeway segments (basic, merge and diverge areas) and analyses of freeway weaving segments were performed using the Highway Capacity Software (HCS). Synchro 9 models were developed for computing the LOS of ramp terminal intersections and other intersections within the study area. Signal timings were developed based on data gathered from Palm Beach County, Traffic Engineering Division. The existing signal timing information obtained from the SR 9/I-95 Master Plan are included in Appendix D.

Existing conditions operational analysis LOS calculations and output reports are provided in Appendix E.

3.4.1 SR 9/I-95 Freeway Segments

The results from HCS LOS analysis of the basic freeway segments, ramp merger or diverge sections, and weaving segments along SR 9/I-95 northbound and southbound directions are summarized in Table 3-2. Figure 3-10 depicts the existing conditions LOS results from this analysis.

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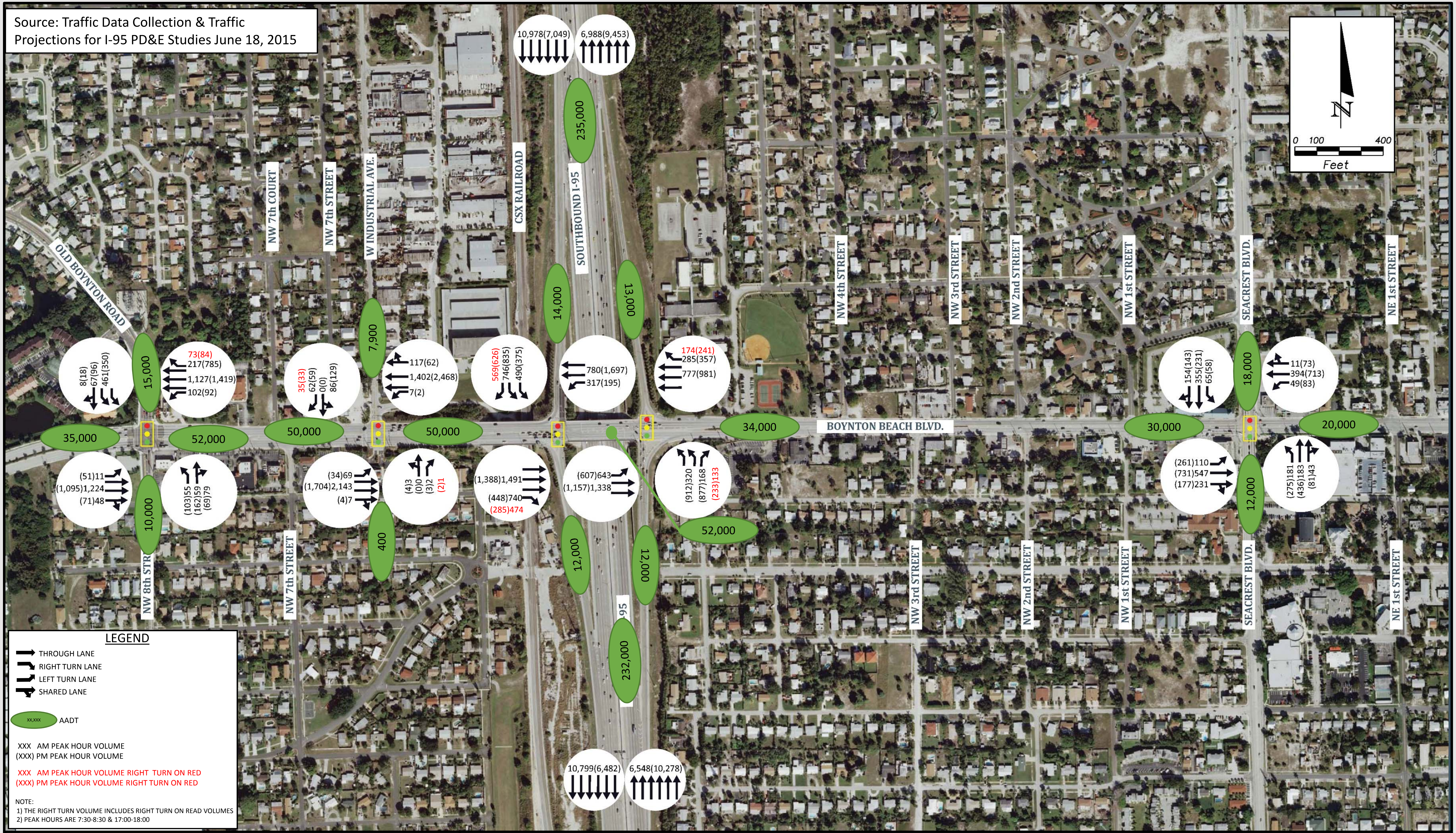
SR 9/I-95 at Woolbright Road Interchange
Existing Year (2015) Balanced Peak Hour Turning Movement Volumes and AADTs

Figure 3-6



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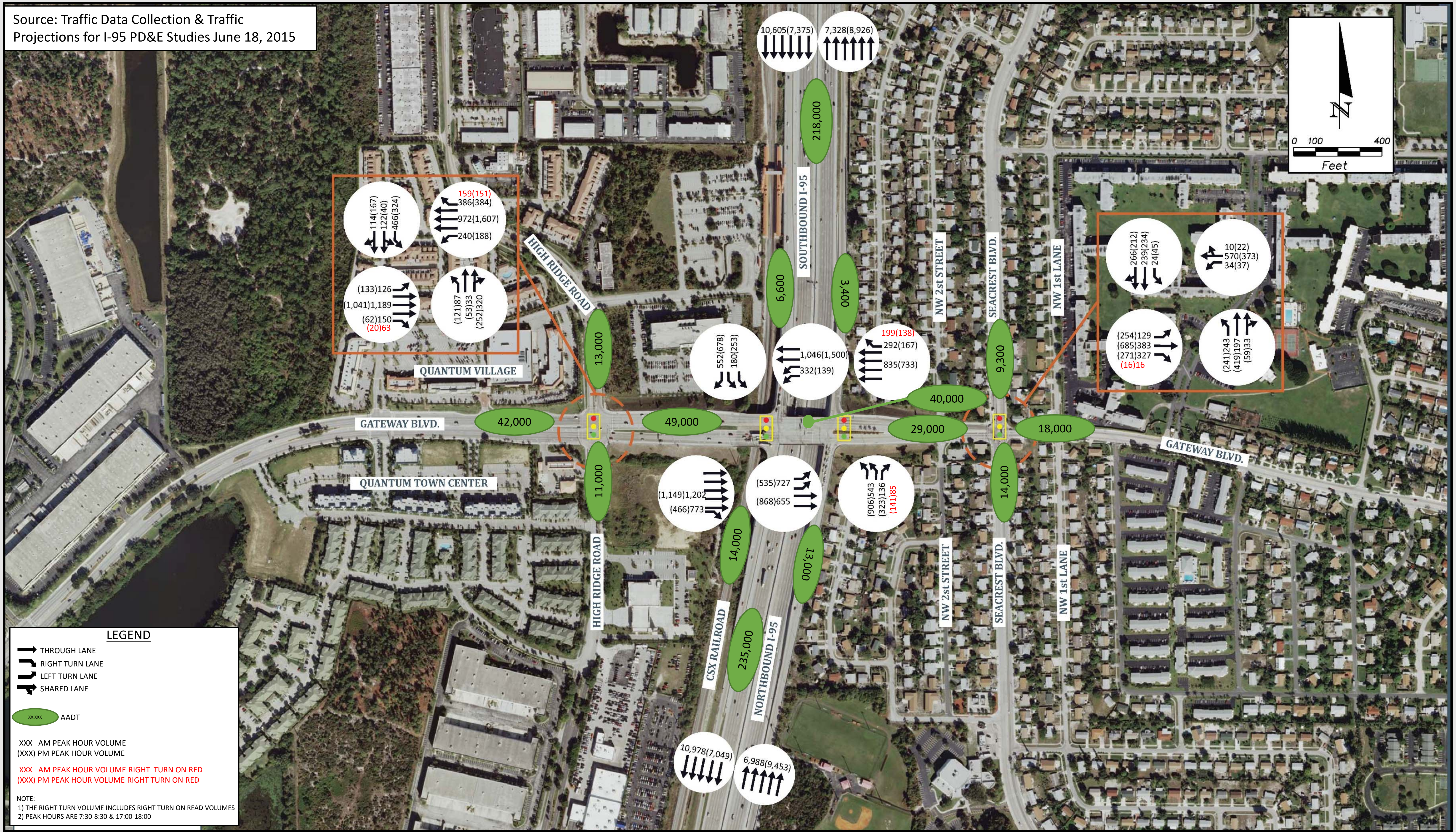
SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
Existing Year (2015) Balanced Peak Hour Turning Movement Volumes and AADTs

Figure 3-7



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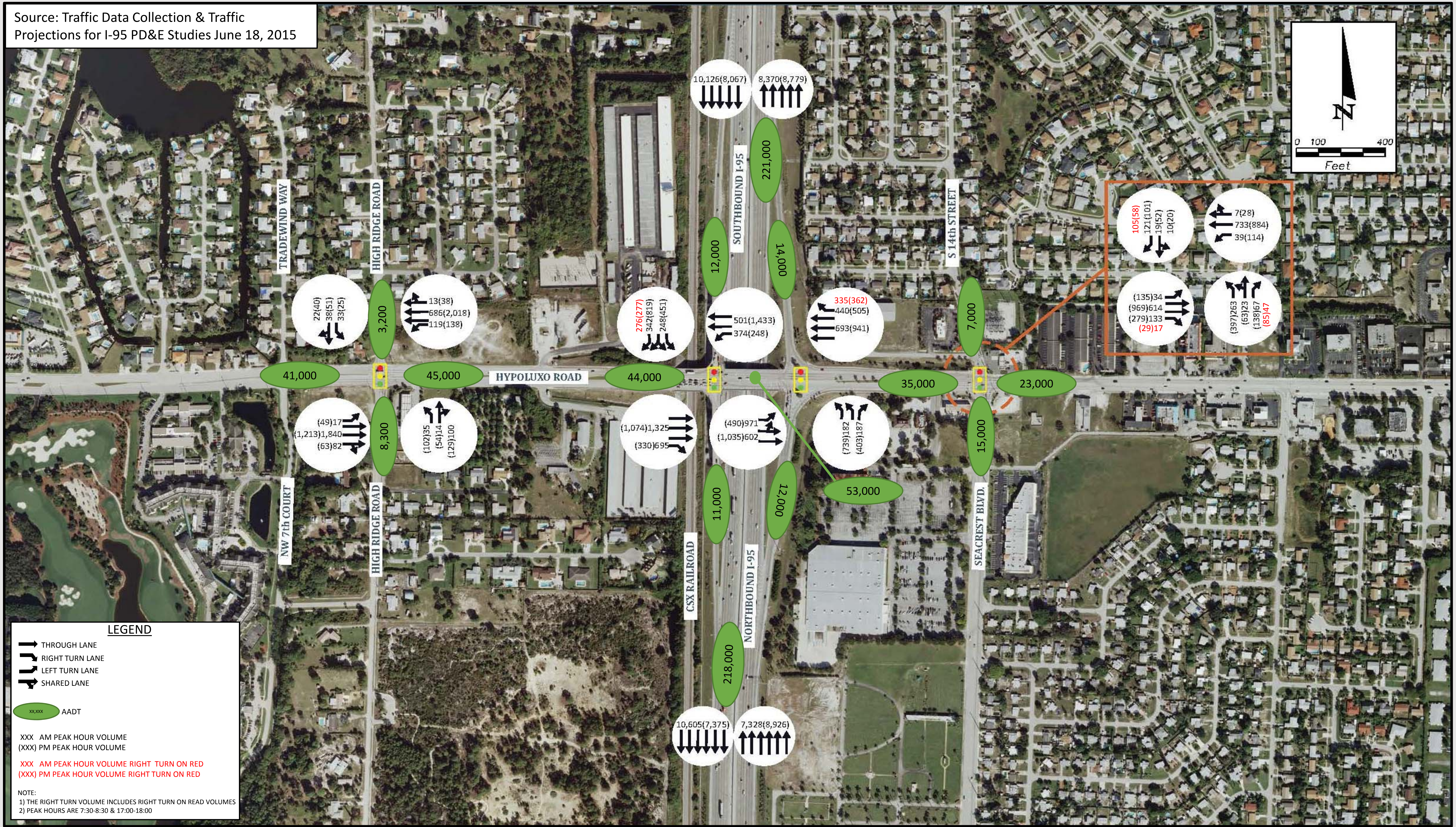
SR 9/I-95 at Gateway Boulevard Interchange
Existing Year (2015) Balanced Peak Hour Turning Movement Volumes and AADTs

Figure 3-8



PD&E Study **SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange** **SR 9/I-95 at Gateway Boulevard Interchange** **FM Nos. 435804-1-22-01;231932-1-22-01** **ETDM nos. 14180 and 14181**	**SR 9/I-95 at Hypoluxo Road Interchange** **Existing Year (2015) Balanced Peak Hour Turning Movement Volumes and AADTs**	**Figure 3-9** **Page 24**

Table 3-2: Freeway Segment LOS Summary – Existing Year (2015)

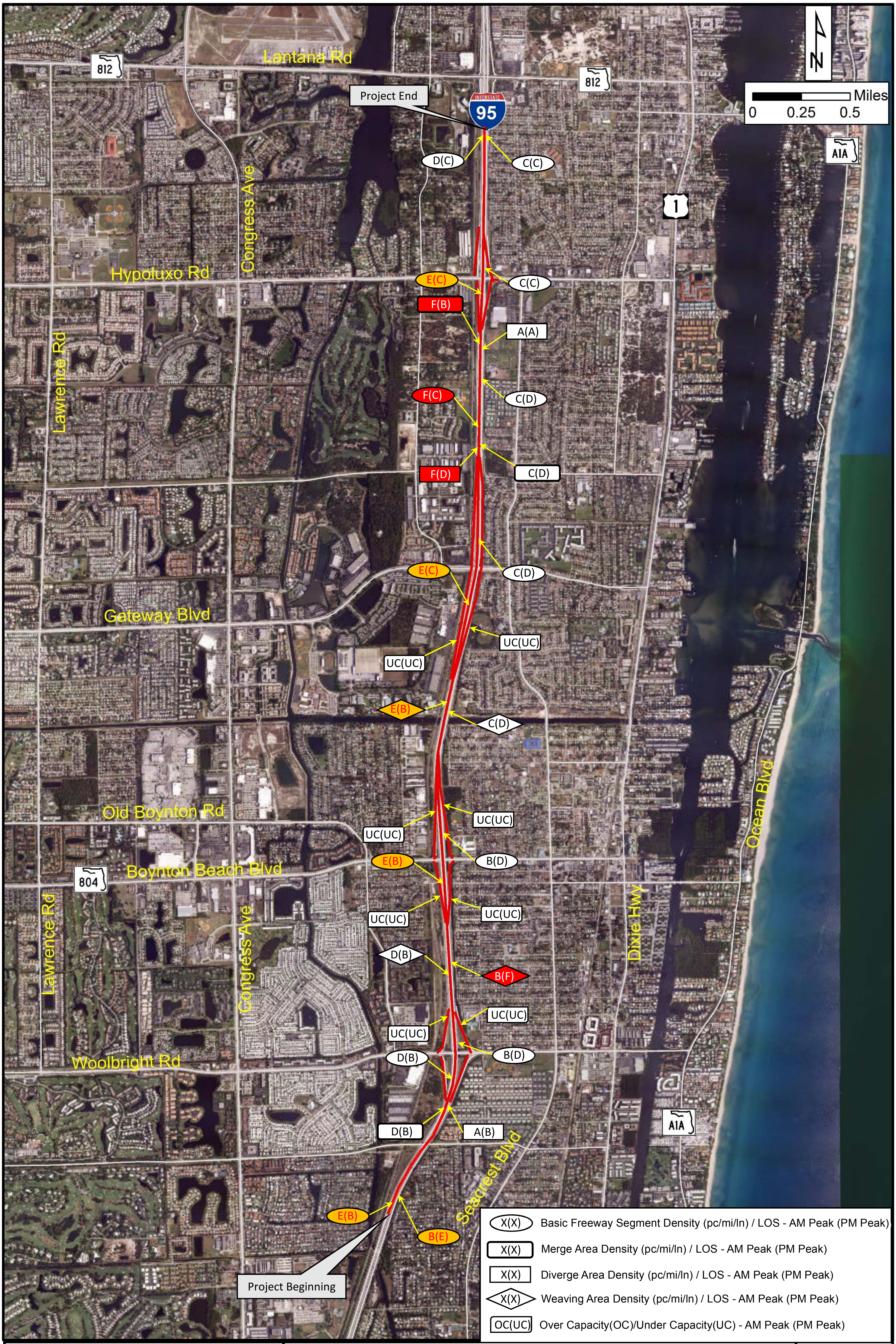
ID	Freeway	From	To	Type	AM Peak					PM Peak				
					Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS	Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS
NORTHBOUND														
1	I-95	Project Beginning	Woolbright Rd	BFS	4,349			16.7	B	8,455			40.0	E
2			Woolbright Rd Off-Ramp	Diverge	4,349		662	5.2	A	8,455		1,198	15.7	B
3		Woolbright Rd Off-Ramp	Woolbright Rd On-Ramp	BFS	3,687			14.1	B	7,257			30.7	D
4		Woolbright Rd On-Ramp	SR 804/Boynton Beach Blvd Off-Ramp	Weave	5,048	1,361	488	18.9	B	8,778	1,521	1,789	*	F
5		SR 804/Boynton Beach Blvd Off-Ramp	SR 804/Boynton Beach Blvd On-Ramp	BFS	4,560			17.7	B	6,989			29.0	D
6		SR 804/Boynton Beach Blvd On-Ramp	Gateway Blvd Off-Ramp	Weave	5,488	928	679	21.3	C	7,953	964	1,229	34.7	D
7		Gateway Blvd Off-Ramp	Gateway Blvd On-Ramp	BFS	4,809			18.5	C	6,724			27.5	D
8		Gateway Blvd On-Ramp		Merge	4,809	1,019		26.5	C	6,724	702		30.4	D
9		Gateway Blvd On-Ramp	Hypoluxo Rd Off-Ramp	BFS	5,828			22.8	C	7,426			31.8	D
10			Hypoluxo Rd Off-Ramp	Diverge	5,828		369	< 1.0	A	7,426		1,142	< 1.0	A
11		Hypoluxo Rd Off-Ramp	Hypoluxo Rd On-Ramp	BFS	5,459			21.2	C	6,284			25.1	C
12		Hypoluxo Rd On-Ramp	Project End	BFS	6,870			21.3	C	7,279			22.8	C

pc/mi/ln – passenger car per mile per lane
* - Volumes exceed available capacity leading to LOS F operations
Note:
1) As discussed in Section 2.7, a service volume of 1,500 vehicles per hour per lane were assumed as the HOV 2+ system present along SR 9/I-95 within the project limits This HOV 2+ assumed volume was excluded from the total mainline SR 9/I-95 traffic volumes presented in Figures 3-6 through 3-9 and these updated mainline SR 9/I-95 traffic volumes were used for the HCS analysis as presented in tables above.
2) Densities recorded as 0 pc/mi/ln are attributed to relatively low traffic demand volumes and long acceleration/deceleration lane lengths as provided by HCM 2010.

Table 3-2: Freeway Segment LOS Summary – Existing Year (2015) – continued

ID	Freeway	From	To	Type	AM Peak					PM Peak				
					Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS	Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS
SOUTHBOUND														
13	I-95	Project End	Hypoluxo Rd Off-Ramp	BFS	8,626			28.5	D	6,567			20.3	C
14		Hypoluxo Rd Off-Ramp	Hypoluxo Rd On-Ramp	BFS	8,036			36.3	E	5,297			20.5	C
15		Hypoluxo Rd On-Ramp		Merge	8,036	1,069		*	F	5,297	578		18.4	B
16		Hypoluxo Rd On-Ramp	Gateway Blvd Off-Ramp	BFS	9,105			47.0	F	5,875			23.1	C
17			Gateway Blvd Off-Ramp	Diverge	9,105		732	42.2	F	5,875		931	30.2	D
18		Gateway Blvd Off-Ramp	Gateway Blvd On-Ramp	BFS	8,373			39.2	E	4,944			19.0	C
19		Gateway Blvd On-Ramp	SR 804/Boynton Beach Blvd Off-Ramp	Weave	9,478	1,105	1,236	37.3	E	5,549	605	1,210	19.4	B
20		SR 804/Boynton Beach Blvd Off-Ramp	SR 804/Boynton Beach Blvd On-Ramp	BFS	8,242			38.1	E	4,339			16.6	B
21		SR 804/Boynton Beach Blvd On-Ramp	Woolbright Rd Off-Ramp	Weave	9,299	1,057	1,449	31.8	D	4,982	643	1,310	14.7	B
22		Woolbright Rd Off-Ramp	Woolbright Rd On-Ramp	BFS	7,850			34.9	D	3,672			14.1	B
23		Woolbright Rd On-Ramp		Merge	7,850	1,025		30.4	D	3,672	699		13.9	B
24		Woolbright Rd On-Ramp	Project Beginning	BFS	8,875			44.3	E	4,371			16.8	B

pc/mi/ln – passenger car per mile per lane
* - Volumes exceed available capacity leading to LOS F operations
Note:
1) As discussed in Section 2.7, a service volume of 1,500 vehicles per hour per lane were assumed as the HOV 2+ system present along SR 9/I-95 within the project limits This HOV 2+ assumed volume was excluded from the total mainline SR 9/I-95 traffic volumes presented in Figures 3-6 through 3-9 and these updated mainline SR 9/I-95 traffic volumes were used for the HCS analysis as presented in tables above.
2) Densities recorded as 0 pc/mi/ln are attributed to relatively low traffic demand volumes and long acceleration/deceleration lane lengths as provided by HCM 2010.



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Freeway Facilities Level Of Service Existing Year (2015)

Figure 3-10

Results indicate that all existing freeway segments operate at LOS D or better, except for the following:

- Northbound SR 9/I-95
  - During the PM peak hour, the freeway segment from the beginning of the project limits to Woolbright Road off ramp operates at LOS E.
  - During the PM peak hour, the weaving segment between the Woolbright Road on ramp to the SR 804/Boynton Beach Boulevard off ramp operates at LOS F
- Southbound SR 9/I-95
  - During the AM peak hour, the freeway segment between the Hypoluxo Road off ramp to the Hypoluxo Road on ramp operates at LOS E.
  - During the AM peak hour, the merge from Hypoluxo Road operates at LOS F.
  - During the AM peak hour, the freeway segment between the Hypoluxo Road on ramp to the Gateway Boulevard off ramp operates at LOS F.
  - During the AM peak hour, the diverge to Gateway Boulevard operates at LOS F.
  - During the AM peak hour, the freeway segment between the Gateway Boulevard off ramp to the Gateway Boulevard on ramp operates at LOS E.
  - During the AM peak hour, the weaving segment between the Gateway Boulevard on ramp to the SR 804/Boynton Beach Boulevard off ramp operates at LOS E.
  - During the AM peak hour, the freeway segment between the SR 804/Boynton Beach Boulevard off ramp to the SR 804/Boynton Beach Boulevard on ramp operates at LOS E.
  - During the AM peak hour, the freeway segment between the Woolbright Road on ramp to the beginning of the project limits operates at LOS E.

A total of ten locations, out of 24, with failing LOS (E or F) were observed in the Existing Year (2015).

3.4.2 Intersections

SR 9/I-95 at Woolbright Road Interchange Intersections

Existing Year 2015 approach and overall intersection LOS and delay results for intersections along Woolbright Road Interchange limits are summarized in Table 3-3. Existing Year 2015 approach and overall intersection volume to capacity (V/C) ratios are summarized in Table 3-4. The existing conditions 95th percentile queue lengths are summarized in Table 3-5. Figure 3-11 shows the analysis results for this corridor.

The findings indicate that all ramp terminal intersections along SR 9/I-95 and other adjacent intersections are expected to operate at LOS D or better, except for the following:

Table 3-3: Woolbright Road Intersections Delay and LOS Summary – Existing Year (2015)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Woolbright Rd at SW 8th St/Corporate Dr	Signalized	D	D	C	C	D	E	E	E	35.2	D	43.4	D
Woolbright Rd at I-95 Southbound Ramps	Signalized	D	C	A	A	-	-	C	F	26.2	C	45.8	D
Woolbright Rd at I-95 Northbound Ramps	Signalized	A	C	F	F	C	F	-	-	55.9	E	75.8	E
Woolbright Rd at Seacrest Blvd	Signalized	F	C	D	D	E	F	E	E	78.1	E	53.1	D
TOTAL										**195.4**		**218.1**	

Table 3-4: Woolbright Road Intersections Volume to Capacity Ratio – Existing Year (2015)

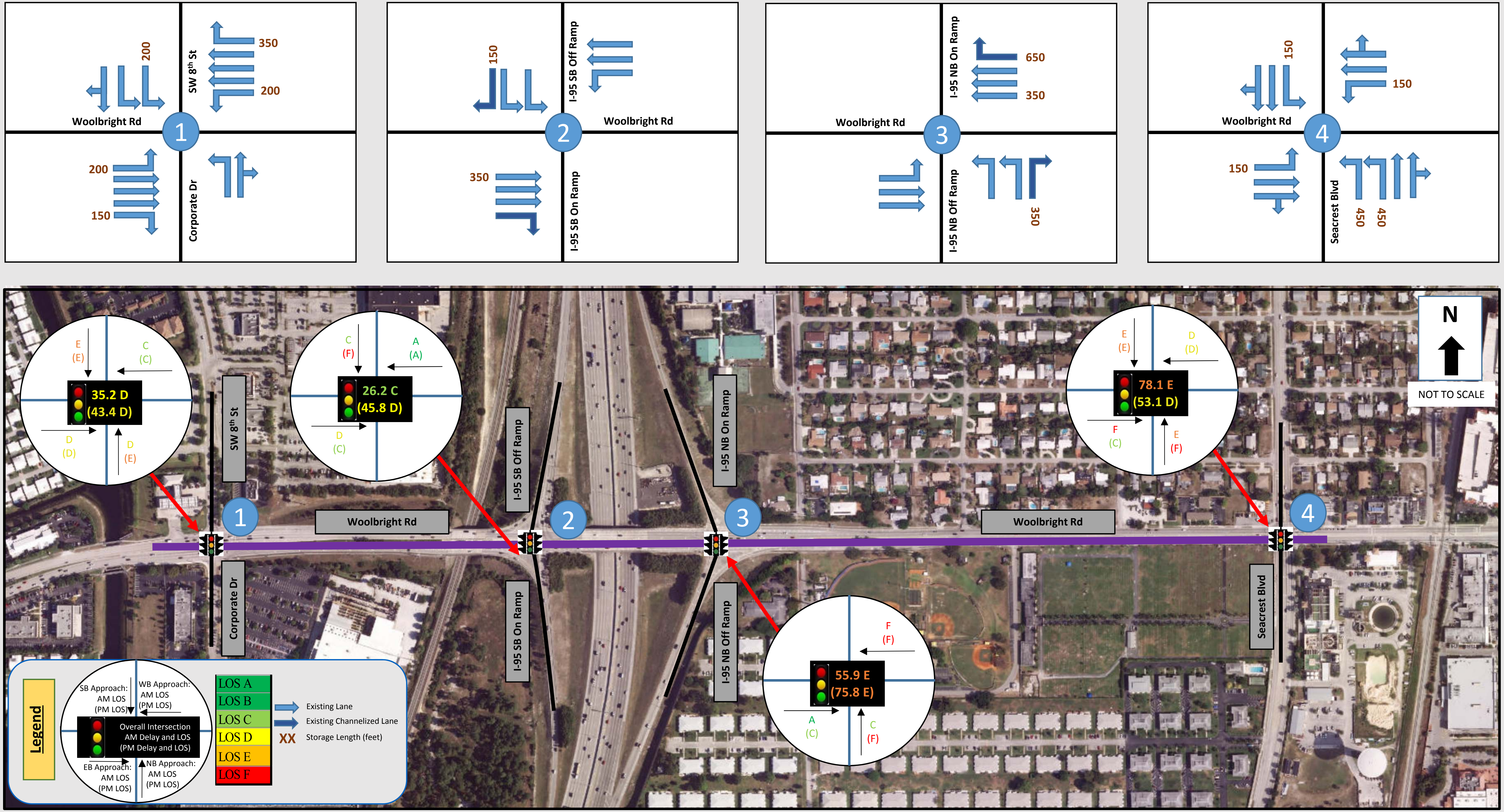
	Intersection	Time Period	Volume to Capacity Ratio												
			Eastbound			Westbound			Northbound			Southbound			Overall Intersection
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Woolbright Rd at SW 8th St/Corporate Dr	AM Peak	0.69	0.74	0.19	0.77	0.73	0.35	0.19	0.46	-	0.89	0.76	-	0.85
		PM Peak	0.85	0.88	0.08	0.54	0.81	0.54	0.58	0.88	-	0.79	0.57	-	0.92
2	Woolbright Rd at I-95 Southbound Ramps	AM Peak	-	0.72	0.87	0.84	0.39	-	-	-	-	0.89	-	0.55	0.91
		PM Peak	-	0.79	0.50	0.55	0.53	-	-	-	-	1.39	-	0.42	0.83
3	Woolbright Rd at I-95 Northbound Ramps	AM Peak	0.89	0.45	-	-	0.68	1.24	0.65	-	0.20	-	-	-	1.00
		PM Peak	1.15	0.52	-	-	0.67	1.18	1.19	-	0.35	-	-	-	1.21
4	Woolbright Rd at Seacrest Blvd	AM Peak	0.29	1.18	-	0.54	0.70	-	0.96	0.37	-	0.62	0.89	-	0.99
		PM Peak	0.65	0.90	-	0.61	0.73	-	1.07	0.75	-	0.75	0.80	-	0.92

= Movement with volume to capacity ratios exceeding 1.00.

Table 3-5: Woolbright Road Intersections 95th Percentile Queue Length Summary – Existing Year (2015)

	Intersection	Time Period	Queues (feet)												Remarks
			Eastbound			Westbound			Northbound			Southbound			
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Woolbright Rd at SW 8th St/Corporate Dr	AM Peak	130	#400	105	#227	#469	174	40	115	-	#269	294	-	Signalized Intersection
		PM Peak	234	#890	68	75	#750	263	181	357	-	213	258	-	
		Existing Storage Length (ft)	200	1,000	150	200	1,320	350	1,000	1,000		200	1,000		
2	Woolbright Rd at I-95 Southbound Ramps	AM Peak	-	280	m#434	#484	m1	-	-	-	-	344	-	0	Signalized Intersection
		PM Peak	-	189	m37	20	m10	-	-	-	-	#595	-	0	
		Existing Storage Length (ft)		1,320	1,320	730	730					**1,800**		150	
3	Woolbright Rd at I-95 Northbound Ramps	AM Peak	#413	m0	-	-	m329	m#861	195	-	0	-	-	-	Signalized Intersection
		PM Peak	#739	m31	-	-	m435	m#971	#544	-	0	-	-	-	
		Existing Storage Length (ft)	730	730			1,480	650	**1,320**		350				
4	Woolbright Rd at Seacrest Blvd	AM Peak	60	#803	-	86	391	-	#329	168	-	126	#339	-	Signalized Intersection
		PM Peak	146	#896	-	104	611	-	#432	331	-	#177	254	-	
		Existing Storage Length (ft)	150	1,480		150	1,000		450	1,000		150	1,000		

1) The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. This traffic was simulated for two complete cycles to account for the effects of spillover between cycles. If the reported v/c<1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue. In practice, 95th percentile queue shown will rarely be exceeded and the queues shown with the # footnote are acceptable for the design of storage bay (Trafficware 2012).
2) The m footnote indicates that the volume for the 95th percentile queue is metered by an upstream signal (Trafficware 2012).
3) The storage length values were calculated from aerials or design drawings.
4) To calculate reasonable queuing in the model, all terminal links were extended to 1,000 feet from the last node
5) For ramp terminals, the storage distance proved reflects the entire length of the ramp (**XXX feet**)
= Movement with queues exceeding available storage.



PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

SR 9/I-95 at Woolbright Road Interchange
Existing Lane Configuration, Intersection LOS and Delay - Existing Year (2015)

Figure 3-11

Ramp Terminal Intersections:

- Woolbright Road at SR 9/I-95 northbound ramp terminal Intersection operates at LOS E in the AM and PM peak hours.

Other Project Intersections:

- Woolbright Road at Seacrest Boulevard operates at LOS F during the AM peak hour.

Traffic volumes are not expected to exceed available capacity, except for the following movements:

Ramp Terminal Intersections:

- Woolbright Road at SR 9/I-95 Southbound Ramps
  - V/C ratio of 1.39 in the PM peak hour was observed for the southbound left movement.
- Woolbright Road at SR 9/I-95 Northbound Ramps
  - V/C ratio of 1.00 in the AM peak hour and 1.21 in the PM peak hour was observed for the overall intersection.
  - V/C ratio of 1.15 in the PM peak hour was observed for the eastbound left movement.
  - V/C ratio of 1.24 in the AM peak hour and 1.18 in the PM peak hour was observed for the westbound right movement.
  - V/C ratio of 1.19 in the PM peak hour was observed for the northbound left movement

Other Project Intersections:

- Woolbright Road at Seacrest Boulevard
  - V/C ratio of 1.18 in the AM peak hour was observed for the eastbound thru movement.
  - V/C ratio of 1.07 in the PM peak hour was observed for the northbound left movement.

In addition, review of queue lengths at the SR 9/I-95 ramp terminal intersections indicated that no spillback onto SR 9/I-95 mainline traffic occurs currently. However, queue lengths exceeding available storages were observed along eastbound and westbound Woolbright Road near the SW 8th Street/Corporate Drive, SR 9/I-95 southbound and northbound ramp terminal intersections for certain left and right turning movements.

SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange Intersections

Existing Year 2015 approach and overall intersection LOS and delay results for intersections along SR 804/Boynton Beach Boulevard interchange limits are summarized in Table 3-6. Existing Year 2015 approach and overall intersection V/C ratios are summarized in Table 3-7. The existing conditions 95th percentile queue lengths are summarized in Table 3-8. Figure 3-12 shows the analysis results for this corridor.

The findings indicate that all ramp terminal intersections along SR 9/I-95 and other adjacent intersections are expected to operate at LOS D or better except for the following:

Table 3-6: SR 804/Boynton Beach Boulevard Intersections Delay and LOS Summary – Existing Year (2015)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	Signalized	C	E	C	E	E	D	E	E	37.7	D	66.0	E
SR 804/Boynton Beach Blvd at Industrial Ave	Signalized	B	A	A	C	E	E	E	E	11.6	B	22.5	C
SR 804/Boynton Beach Blvd at I-95 Southbound Ramps	Signalized	F	C	A	A	-	-	C	D	79.3	E	21.7	C
SR 804/Boynton Beach Blvd at I-95 Northbound Ramps	Signalized	B	A	D	E	F	F	-	-	33.0	C	84.6	F
SR 804/Boynton Beach Blvd at Seacrest Blvd	Signalized	D	C	C	D	D	E	F	E	52.4	D	40.3	D
TOTAL										**214.0**		**235.1**	

Table 3-7: SR 804/Boynton Beach Boulevard Intersections Volume to Capacity Ratio – Existing Year (2015)

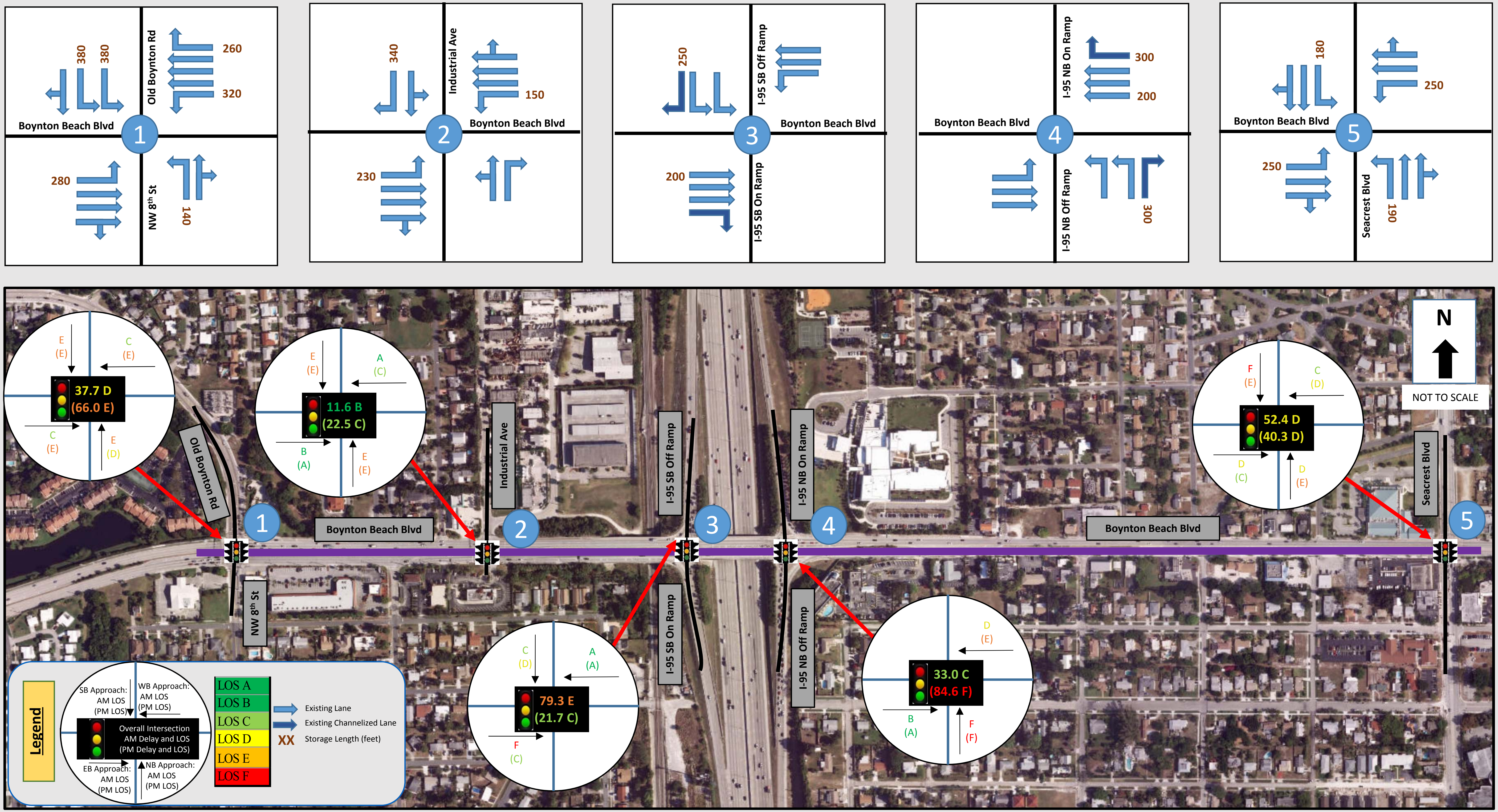
	Intersection	Time Period	Volume to Capacity Ratio												
			Eastbound			Westbound			Northbound			Southbound			Overall Intersection
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	SR 804/Boynton Beach Blvd and NW 8th St/Old Boynton Rd	AM Peak	0.06	0.54	-	0.45	0.43	0.23	0.26	0.67	-	0.89	0.17	-	0.62
		PM Peak	0.52	0.82	-	0.31	0.72	1.20	0.25	0.50	-	0.81	0.19	-	0.92
2	SR 804/Boynton Beach Blvd and Industrial Ave	AM Peak	0.34	0.64	-	0.09	0.48	-	-	0.02	0.01	-	0.67	0.17	0.65
		PM Peak	0.38	0.49	-	0.01	0.75	-	-	0.03	0.01	-	0.75	0.14	0.75
3	SR 804/Boynton Beach Blvd and I-95 Southbound Ramps	AM Peak	-	1.34	0.52	0.47	0.33	-	-	-	-	0.88	-	0.54	0.92
		PM Peak	-	0.94	0.27	0.25	0.59	-	-	-	-	1.07	-	0.55	0.82
4	SR 804/Boynton Beach Blvd and I-95 Northbound Ramps	AM Peak	1.03	0.55	-	-	0.52	0.30	1.03	-	0.45	-	-	-	0.84
		PM Peak	0.90	0.48	-	-	0.78	0.29	1.21	-	1.27	-	-	-	0.99
5	SR 804/Boynton Beach Blvd and Seacrest	AM Peak	0.27	0.56	-	0.22	0.29	-	0.84	0.31	-	0.26	0.95	-	0.68
		PM Peak	0.77	0.60	-	0.34	0.59	-	0.85	0.61	-	0.30	0.77	-	0.84

= Movements with volume to capacity ratios exceeding 1.00.

Table 3-8: SR 804/Boynton Beach Boulevard Intersections 95th Percentile Queue Length Summary – Existing Year (2015)

	Intersection	Time Period	Queues (feet)												Remarks
			Eastbound			Westbound			Northbound			Southbound			
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	SR 804/Boynton Beach Blvd and NW 8th St/Old Boynton Rd	AM Peak	16	444	-	111	274	141	72	213	-	#334	104	-	Signalized Intersection
		PM Peak	79	502	-	m90	407	#1,268	106	309	-	253	140	-	
		Existing Storage Length (ft)	280	1,000		320	1,045	260	140	1,000		380	1,000		
2	SR 804/Boynton Beach Blvd and Industrial Ave	AM Peak	m31	307	-	m4	197	-	-	13	9	-	155	70	Signalized Intersection
		PM Peak	m16	283	-	m1	1,023	-	-	16	10	-	208	63	
		Existing Storage Length (ft)	230	1,045		150	840		1,000		1,000	1,000		340	
3	SR 804/Boynton Beach Blvd and I-95 Southbound Ramps	AM Peak	-	#1,070	33	31	0	-	-	-	-	275	-	0	Signalized Intersection
		PM Peak	-	#501	0	m0	m12	-	-	-	-	#303	-	0	
		Existing Storage Length (ft)		840	840	370	370					**1,550**		250	
4	SR 804/Boynton Beach Blvd and I-95 Northbound Ramps	AM Peak	m10	m159	-	-	m323	m173	#179	-	70	-	-	-	Signalized Intersection
		PM Peak	m7	m2	-	-	501	m134	#714	-	#880	-	-	-	
		Existing Storage Length (ft)	370	370			2,730	300	**1,630**		300				
5	SR 804/Boynton Beach Blvd and Seacrest Blvd	AM Peak	148	548	-	47	199	-	#263	151	-	88	#396	-	Signalized Intersection
		PM Peak	m154	m367	-	76	467	-	#336	332	-	76	267	-	
		Existing Storage Length (ft)	250	2,730		250	1,000		190	1,000		180	1,000		

1) The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. This traffic was simulated for two complete cycles to account for the effects of spillover between cycles. If the reported v/c<1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue. In practice, 95th percentile queue shown will rarely be exceeded and the queues shown with the # footnote are acceptable for the design of storage bay (Trafficware 2012).
2) The m footnote indicates that the volume for the 95th percentile queue is metered by an upstream signal (Trafficware 2012).
3) The storage length values were calculated from aerials or design drawings.
4) To calculate reasonable queuing in the model, all terminal links were extended to 1,000 feet from the last node
5) For ramp terminals, the storage distance proved reflects the entire length of the ramp (**XXX feet**)
= Movement with queues exceeding available storage.



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ETDM nos. 14180 and 14181

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SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
Existing Lane Configuration, Intersection LOS and Delay - Existing Year (2015)

Figure 3-12

Ramp Terminal Intersections:

- SR 804/Boynton Beach Boulevard at SR 9/I-95 southbound ramp terminal Intersection operates at LOS E in the AM peak hour.
- SR 804/Boynton Beach Boulevard at SR 9/I-95 northbound ramp terminal Intersection operates at LOS F in the PM peak hour.

Other Project Intersections:

- SR 804/Boynton Beach Boulevard at NW 8th Street/Old Boynton Road operates at LOS E in the PM peak hour.

Traffic volumes are not expected to exceed available capacity, except for the following movements:

Ramp Terminal Intersections:

- SR 804/Boynton Beach Boulevard at SR 9/I-95 Southbound Ramps
  - V/C ratio of 1.34 in the AM peak hour was observed for the eastbound thru movement.
  - V/C ratio of 1.07 in the PM peak hour was observed for the southbound left movement.
- SR 804/Boynton Beach Boulevard at SR 9/I-95 Northbound Ramps
  - V/C ratio of 1.03 in the AM peak hour was observed for the eastbound left movement.
  - V/C ratio of 1.03 in the AM peak hour and 1.21 in the PM peak hour was observed for the northbound left movement.
  - V/C ratio of 1.27 in the PM peak hour was observed for the northbound right movement.

Other Project Intersections:

- SR 804/Boynton Beach Boulevard at NW 8th Street/Old Boynton Road
  - V/C ratio of 1.20 in the PM peak hour was observed for the westbound right movement.

In addition, review of the queue lengths at the SR 9/I-95 ramp terminal intersections indicate that no spillbacks onto SR 9/I-95 mainline traffic occurs currently. However, queue lengths exceeding available storages were observed along SR 804/Boynton Beach Boulevard and some adjacent cross streets to SR 804/Boynton Beach Boulevard for certain left and right turning movements and are highlighted in Table 3-8. These queue backups were also observed during field reviews and replicated existing operations along SR 804/Boynton Beach Boulevard accurately.

SR 9/I-95 at Gateway Boulevard Interchange Intersections

Existing Year 2015 approach and overall intersection LOS and delay results for intersections along Gateway Boulevard interchange limits are summarized in Table 3-9. Existing Year 2015 approach and overall intersection V/C ratios are summarized in Table 3-10. The existing conditions 95th percentile queue lengths are summarized in Table 3-11. Figure 3-13 shows the analysis results for this corridor.

The analysis conducted for this interchange utilized the Year 2015 geometric conditions near the SR 9/I-95 and Gateway Boulevard ramp terminal interchange and does not consider the recent Year 2016 restriping improvements implemented through a non-IAR completed and approved by the Department in May 2014. The reason for not

Table 3-9: Gateway Boulevard Intersections Delay and LOS Summary – Existing Year (2015)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Gateway Blvd at Quantum Village	Signalized	A	B	A	B	E	E	E	E	11.7	B	15.4	B
Gateway Blvd at High Ridge Road	Signalized	E	D	D	C	E	E	E	E	61.5	E	37.7	D
Gateway Blvd at I-95 Southbound Ramps	Signalized	F	F	A	A	-	-	F	F	195.0	F	146.4	F
Gateway Blvd at I-95 Northbound Ramps	Signalized	A	A	E	E	E	F	-	-	36.4	D	63.0	E
Gateway Blvd at Seacrest Blvd	Signalized	C	C	E	D	D	D	E	E	49.0	D	40.8	D
TOTAL										**353.6**		**303.3**	

Table 3-10: Gateway Boulevard Intersections Volume to Capacity Ratio – Existing Year (2015)

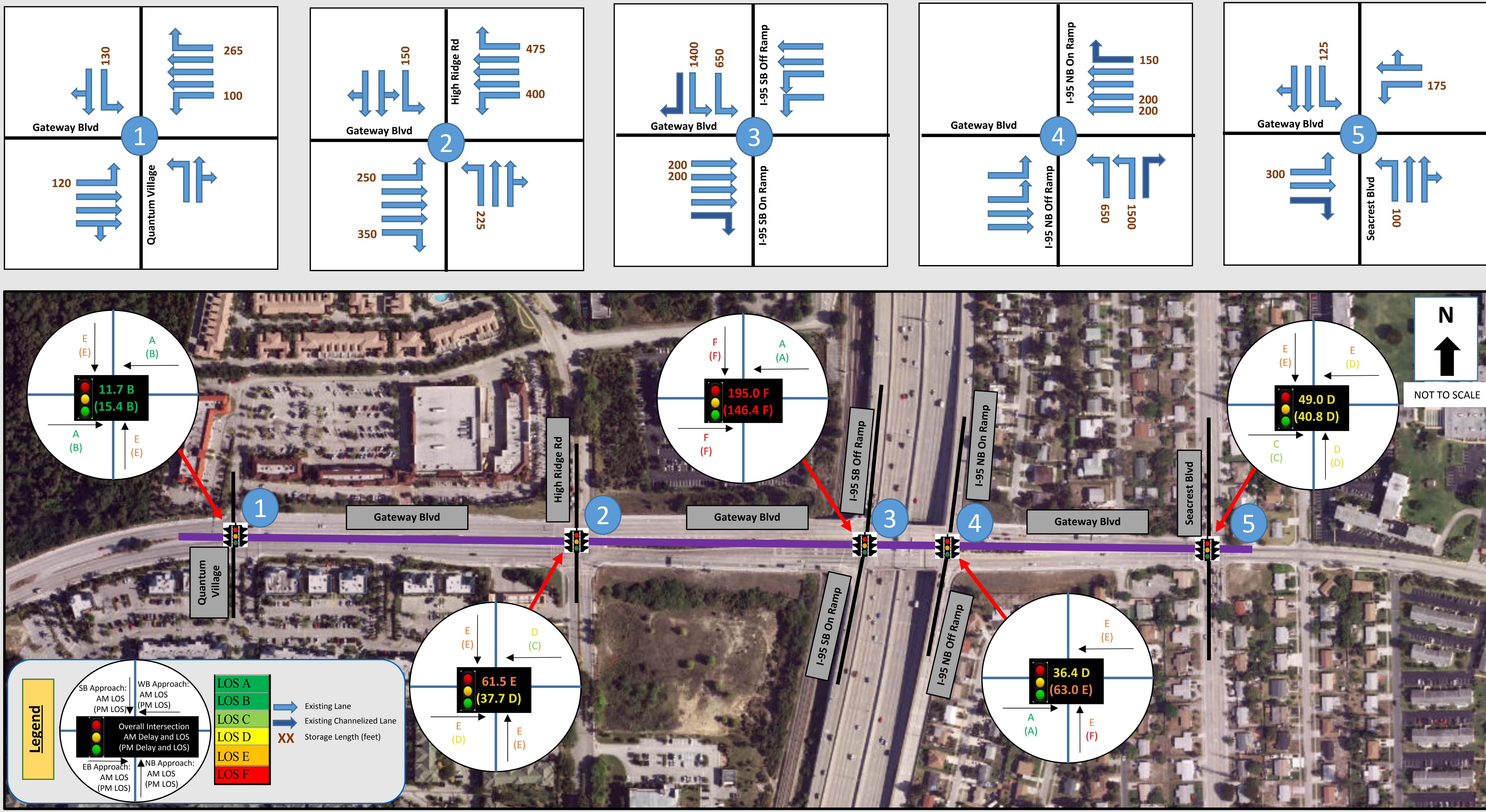
	Intersection	Time Period	Volume to Capacity Ratio												
			Eastbound			Westbound			Northbound			Southbound			Overall Intersection
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Gateway Blvd at Quantum Village	AM Peak	0.44	0.48	-	0.61	0.29	0.00	0.52	0.01	-	0.33	0.17	-	0.49
		PM Peak	0.60	0.35	-	0.46	0.57	0.01	0.04	0.01	-	0.59	0.18	-	0.58
2	Gateway Blvd at High Ridge Road	AM Peak	0.55	0.98	0.28	0.70	0.56	0.54	0.35	1.42	-	0.80	0.79	-	0.84
		PM Peak	0.72	0.56	0.09	0.56	0.77	0.46	0.55	1.27	-	0.78	0.77	-	0.77
3	Gateway Blvd at I-95 Southbound Ramps	AM Peak	-	0.63	1.65	0.25	0.41	-	-	-	-	0.42	-	2.80	1.30
		PM Peak	-	1.17	1.93	0.10	0.70	-	-	-	-	0.26	-	1.52	1.27
4	Gateway Blvd at I-95 Northbound Ramps	AM Peak	0.47	0.28	-	-	0.76	0.54	0.92	-	0.27	-	-	-	0.66
		PM Peak	0.33	0.37	-	-	0.78	0.23	1.16	-	0.61	-	-	-	0.69
5	Gateway Blvd at Seacrest Blvd	AM Peak	0.71	0.54	0.39	0.11	0.91	-	0.82	0.23	-	0.10	1.05	-	0.88
		PM Peak	0.56	0.78	0.27	0.18	0.54	-	0.77	0.53	-	0.22	0.87	-	0.81

= Movements with volume to capacity ratios exceeding 1.00.

Table 3-11: Gateway Boulevard Intersections 95th Percentile Queue Length Summary – Existing Year (2015)

	Intersection	Time Period	Queues (feet)												Remarks
			Eastbound			Westbound			Northbound			Southbound			
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Gateway Blvd and Quantum Village	AM Peak	53	343	-	m140	14		71	0	-	52	61	-	Signalized Intersection
		PM Peak	131	213	-	m55	755	m0	12	0	-	104	76	-	
		Existing Storage Length (ft)	120	1,000		100	850	1,000	1,000	1,000		130	1,000		
2	Gateway Blvd and High Ridge Road	AM Peak	191	#562	179	m#310	m353	m268	139	246	-	363	310	-	Signalized Intersection
		PM Peak	203	309	66	m118	m#638	m221	191	219	-	301	248	-	
		Existing Storage Length (ft)	250	850	350	400	800	480	230	1,000		150	1,000		
3	Gateway Blvd and I-95 SB Ramps	AM Peak	-	m174	m#1,330	0	0	-	-	-	-	94	-	#1,263	Signalized Intersection
		PM Peak	-	#500	#994	m0	m37	-	-	-	-	148	-	#1,267	
		Existing Storage Length (ft)		800	800	250	250					650		**2,560**	
4	Gateway Blvd and I-95 NB Ramps	AM Peak	12	2	-	-	m280	m141	#402	-	126	-	-	-	Signalized Intersection
		PM Peak	m0	m15	-	-	m271	m104	#727	-	310	-	-	-	
		Existing Storage Length (ft)	250	250			760	150	650		**2,600**				
5	Gateway Blvd and Seacrest Blvd	AM Peak	134	545	368	37	#858	-	#336	145	-	39	#422	-	Signalized Intersection
		PM Peak	88	898	185	36	472	-	282	301	-	63	#367	-	
		Existing Storage Length (ft)	300	760		780	1,000		100	1,000		130	1,000		

1) The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. This traffic was simulated for two complete cycles to account for the effects of spillover between cycles. If the reported v/c<1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue. In practice, 95th percentile queue shown will rarely be exceeded and the queues shown with the # footnote are acceptable for the design of storage bay (Trafficware 2012).
2) The m footnote indicates that the volume for the 95th percentile queue is metered by an upstream signal (Trafficware 2012).
3) The storage length values were calculated from aerials or design drawings.
4) To calculate reasonable queuing in the model, all terminal links were extended to 1,000 feet from the last node
5) For ramp terminals, the storage distance proved reflects the entire length of the ramp (**XXX feet**)
= Movement with queues exceeding available storage.



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SR 9/I-95 at Gateway Boulevard Interchange
Existing Lane Configuration, Intersection LOS and Delay - Existing Year (2015)

Figure 3-13

including the recent changes into the analysis was to maintain consistency between the analysis geometry and the geometry when traffic data was collected between February 2015 and May 2015.

The findings indicate that all ramp terminal intersections along SR 9/I-95 and other adjacent intersections are expected to operate at LOS D or better except for the following:

Ramp Terminal Intersections:

- Gateway Boulevard at SR 9/I-95 southbound ramp terminal Intersection operates at LOS F in the AM and PM peak hours.
- Gateway Boulevard at SR 9/I-95 northbound ramp terminal Intersection operates at LOS E in the PM peak hour.

Other Project Intersections:

- Gateway Boulevard at High Ridge Road operates at LOS E during the AM peak hours.

Traffic volumes are not expected to exceed available capacity, except for the following movements:

Ramp Terminal Intersections:

- Gateway Boulevard at SR 9/I-95 Southbound Ramps
    - V/C ratio of 1.30 in the AM peak hour and 1.27 in the PM peak hour was observed for the overall intersection.
    - V/C ratio of 1.17 in the PM peak hour was observed for the eastbound thru movement.
    - V/C ratio of 1.65 in the AM peak hour and 1.93 in the PM peak hour was observed for the eastbound right movement.
    - V/C ratio of 2.80 in the AM peak hour and 1.52 in the PM peak hour was observed for the southbound right movement.
- Gateway Boulevard at SR 9/I-95 Northbound Ramps
    - V/C ratio of 1.16 in the PM peak hour was observed for the northbound left movement.

Other Project Intersections:

- Gateway Boulevard at High Ridge Road
    - V/C ratio of 1.42 in the AM peak hour and 1.27 in the PM peak hour for the northbound shared thru and right movement.
- Gateway Boulevard at Seacrest Boulevard
    - V/C ratio of 1.05 in the AM peak hour for the southbound thru movement.

In addition, review of the queue lengths at the SR 9/I-95 ramp terminal intersections indicate that no spillbacks onto SR 9/I-95 occurs currently. However, queue lengths exceeding available storages were observed along eastbound Gateway Boulevard between High Ridge Road and the SR 9/I-95 southbound ramp terminals along with a few left turns backing into mainline along eastbound and westbound Gateway Boulevard near Quantum Village and Seacrest Boulevard intersections. These queue backups were also observed during field review and replicated existing operations along Gateway Boulevard accurately.

SR 9/I-95 at Hypoluxo Road Interchange Intersections

Existing Year 2015 approach LOS and overall intersection LOS and delay results for intersections along Hypoluxo Road interchange limits are summarized in Table 3-12. Existing Year 2015 approach and overall intersection V/C ratios are summarized in Table 3-13. The existing conditions 95th percentile queue lengths are summarized in Table 3-14. Figure 3-14 shows the analysis results for this corridor.

The findings indicate that all ramp terminal intersections along SR 9/I-95 and other adjacent intersections are expected to operate at LOS D or better except for the following:

Ramp Terminal Intersections:

- Hypoluxo Road at SR 9/I-95 northbound ramp terminal Intersection operates at LOS E in the PM peak hour.

Traffic volumes are not expected to exceed available capacity, except for the following movements:

Ramp Terminal Intersections:

- Hypoluxo Road at SR 9/I-95 Southbound Ramps
    - V/C ratio of 1.10 in the PM peak hour was observed for the eastbound thru movement.
- Hypoluxo Road at SR 9/I-95 Northbound Ramps
    - V/C ratio of 1.04 in the PM peak hour was observed for the westbound thru movement.
    - V/C ratio of 1.21 in the PM peak hour was observed for the northbound left movement.

In addition, review of the queue lengths at the SR 9/I-95 ramp terminal intersections indicate that spillbacks onto adjacent lanes occur at the southbound ramps currently. Queue lengths exceeding available storages were observed along eastbound Woolbright Road between the SR 9/I-95 northbound and southbound ramp terminals along with a few left turns backing into mainline along eastbound and westbound Woolbright Road near the Seacrest Boulevard intersections.

3.5 Existing Transit Operations

Bus services exist along SR 804/Boynton Beach Boulevard and Gateway Boulevard corridor within the study area. Bus route 73 operated by Palm Tran agency in Palm Beach County runs along SR 804/Boynton Beach Boulevard from SR 7/US-441 to SR 5/US-1. Palm Tran Bus route 70 runs along Seacrest Boulevard from Lantana Road to Delray Beach connecting the Boynton Beach Tri-Rail station along Gateway Boulevard. These bus routes provide services with headways of approximately 30-60 minutes during weekday peak periods.

No transit services are currently provided along SR 9/I-95 throughout the project limits. It is anticipated that implementation of the potential SR 9/I-95 Express Lanes project will facilitate operation of new express bus services along SR 9/I-95, similar to the current SR 9/I-95 Express bus services in Miami-Dade and Broward counties.

Table 3-12: Hypoluxo Road Intersections Delay and LOS Summary – Existing Year (2015)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Hypoluxo Rd at High Ridge Rd	Signalized	B	B	B	B	E	E	E	E	21.5	C	21.9	C
Hypoluxo Rd at I-95 Southbound Ramps	Signalized	D	F	B	A	-	-	E	E	37.8	D	54.8	D
Hypoluxo Rd at I-95 Northbound Ramps	Signalized	A	A	E	E	E	F	-	-	35.1	D	68.2	E
Hypoluxo Rd at Seacrest Blvd	Signalized	B	D	B	C	E	E	E	E	27.2	C	41.5	D
TOTAL										**121.6**		**186.4**	

Table 3-13: Hypoluxo Road Intersections Volume to Capacity Ratio – Existing Year (2015)

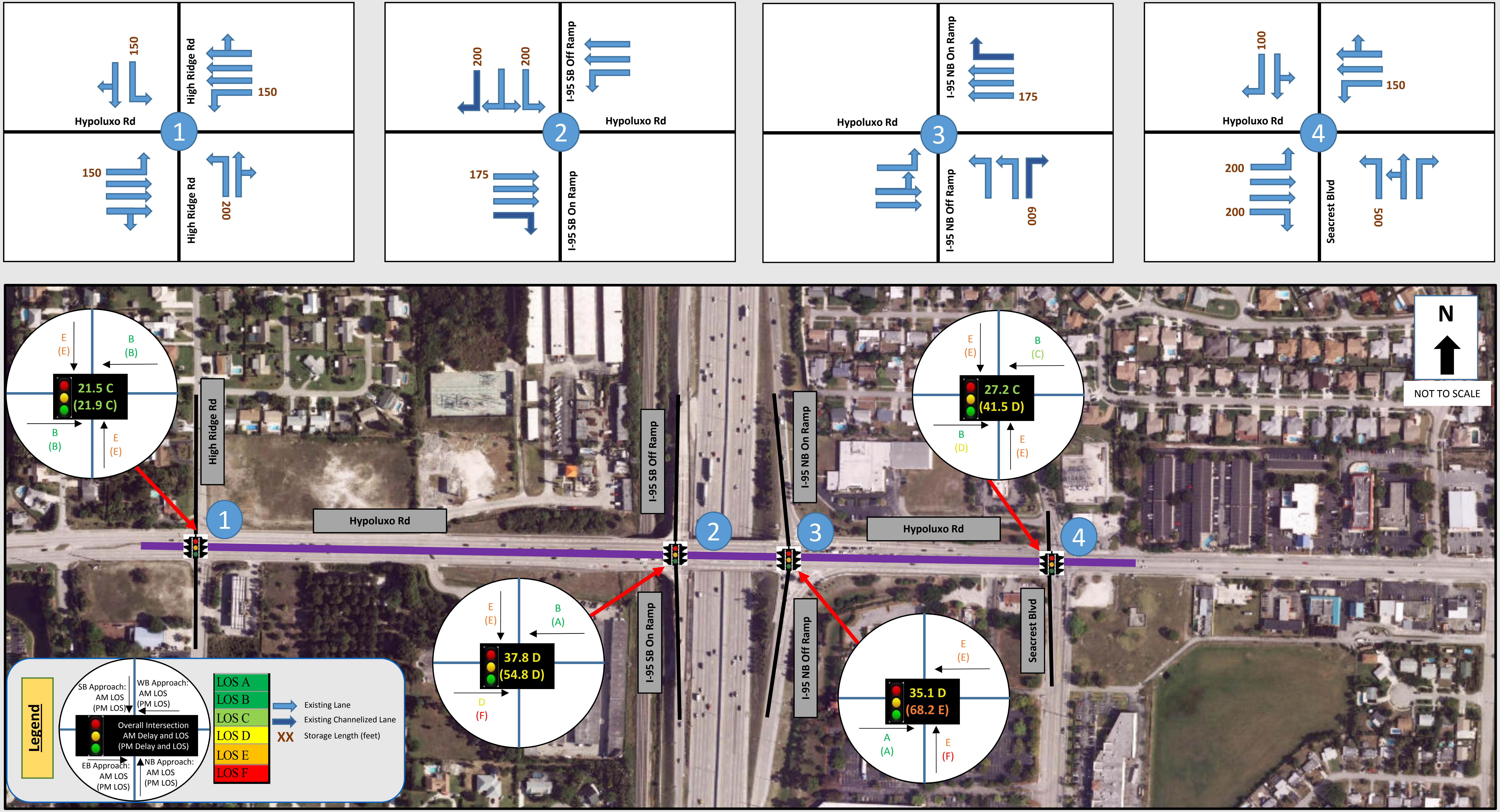
	Intersection	Time Period	Volume to Capacity Ratio												
			Eastbound			Westbound			Northbound			Southbound			Overall Intersection
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Hypoluxo Rd at High Ridge Rd	AM Peak	0.04	0.65	-	0.63	0.22	-	0.26	0.69	-	0.30	0.33	-	0.66
		PM Peak	0.38	0.41	-	0.47	0.63	-	0.56	0.78	-	0.23	0.38	-	0.66
2	Hypoluxo Rd at I-95 Southbound Ramps	AM Peak	-	0.57	0.73	0.95	0.20	-	-	-	-	0.59	0.71	0.68	0.88
		PM Peak	-	1.10	0.37	0.45	0.76	-	-	-	-	0.48	0.62	0.98	1.00
3	Hypoluxo Rd at I-95 Northbound Ramps	AM Peak	0.60	0.51	-	-	0.72	0.52	0.60	-	0.57	-	-	-	0.68
		PM Peak	0.45	0.64	-	-	1.04	0.53	1.21	-	0.90	-	-	-	0.91
4	Hypoluxo Rd at Seacrest Blvd	AM Peak	0.08	0.30	0.14	0.08	0.36	-	0.70	0.71	0.14	-	0.27	0.27	0.40
		PM Peak	0.43	0.56	0.34	0.39	0.53	-	0.80	0.78	0.26	-	0.55	0.43	0.60

= Movements with volume to capacity ratios exceeding 1.00.

Table 3-14: Hypoluxo Road 95th Intersections Percentile Queue Length Summary – Existing Year (2015)

	Intersection	Time Period	Queues (feet)												Remarks
			Eastbound			Westbound			Northbound			Southbound			
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2	Hypoluxo Rd and High Ridge Road	AM Peak	12	617	-	m152	202	-	71	186	-	69	106	-	Signalized Intersection
		PM Peak	29	317	-	m57	729	-	163	272	-	54	144	-	
		Existing Storage Length (ft)	150	1,000		150	1,450		200	1,000		150	1,000		
3	Hypoluxo Rd and I-95 SB Ramps	AM Peak	-	602	692	#562	1	-	-	-	-	195	236	#238	Signalized Intersection
		PM Peak	-	#600	149	m0	m0	-	-	-	-	331	427	#823	
		Existing Storage Length (ft)		1,450	1,450	340	340					**1,780**		200	
4	Hypoluxo Rd and I-95 NB Ramps	AM Peak	762	190	-	-	328	308	135	-	260	-	-	-	Signalized Intersection
		PM Peak	m3	m37	-	-	#525	163	#595	-	#611	-	-	-	
		Existing Storage Length (ft)	340	340			800	800	**1,200**		600				
5	Hypoluxo Rd and Seacrest Blvd	AM Peak	m21	178	70	33	301	-	216	220	65	-	63	86	Signalized Intersection
		PM Peak	m142	557	m289	97	501	-	340	337	115	-	133	113	
		Existing Storage Length (ft)	200	800	200	150	1,000		500	1,000	1,000	1,000		100	

1) The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. This traffic was simulated for two complete cycles to account for the effects of spillover between cycles. If the reported v/c<1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue. In practice, 95th percentile queue shown will rarely be exceeded and the queues shown with the # footnote are acceptable for the design of storage bay (Trafficware 2012).
2) The m footnote indicates that the volume for the 95th percentile queue is metered by an upstream signal (Trafficware 2012).
3) The storage length values were calculated from aerials or design drawings.
4) To calculate reasonable queuing in the model, all terminal links were extended to 1,000 feet from the last node
5) For ramp terminals, the storage distance proved reflects the entire length of the ramp (**XXX feet**)
= Movement with queues exceeding available storage.



PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at Hypoluxo Road Interchange
Existing Lane Configuration, Intersection LOS and Delay - Existing Year (2015)

Figure 3-14

3.6 Crash Data Analysis

Vehicular crash data along SR 804/Boynton Beach Boulevard and SR 9/I-95 was obtained from the FDOT Crash Analysis Reporting System (CARS). CARS is a database maintained annually by FDOT for crashes reported along state highway facilities. The database provides information on various characteristics associated with each crash including: collision type, severity, weather conditions, road surface conditions and date/time information. Crash data along Gateway Boulevard was obtained from the University of Florida's Signal Four Analytics system and the Palm Beach County Sherriff's Office as Gateway Boulevard is a non-state roadway. Data from the latest available five years (2010 to 2014) was downloaded. The crashes were analyzed to make an assessment of safety conditions along SR 9/I-95 and arterial roadways within the project limits and study interchanges.

A detailed *Safety Analysis Technical Memorandum* was prepared for this PD&E Study and is provided as Appendix F. Crash data analysis was performed for the below sections

1. SR 9/I-95 at SR 804/Boynton Beach Boulevard
2. SR 9/I-95 at Gateway Boulevard
3. SR 804/Boynton Beach Boulevard
4. Gateway Boulevard

A brief summary of the findings from the technical memorandum are discussed in this section.

3.6.1 SR 9/I-95 at SR 804/Boynton Beach Boulevard

The data along SR 9/I-95 at Boynton Beach Boulevard within the study limits showed a total of 360 crashes occurring during the five-year study period. The number of crashes involving injuries was 151 (42 percent). This segment of SR 9/I-95 recorded two fatal crashes during the study period. Rear-end collisions were the leading type of crashes along the study segment, accounting for 126 (35 percent) crashes during the five-year period. Sideswipe and fixed object crashes were the next leading types of crashes, accounting for 74 (21 percent) and 57 (16 percent), respectively. A majority of the crashes occurred during daytime (68 percent) and under dry conditions (70 percent). Crashes occurring during night time conditions was at 25 percent of the total number of crashes during the five-year period. Table 3-15 shows the crash summary for the study period. Table 3-16 summarizes the crashes for the study period by vehicle type and Table 3-17 summarizes the crash severity for the study period.

Raw crash data obtained from FDOT Safety Office and detailed crash data analyses with crash pattern tables and charts are included in the *Safety Analysis Technical Memorandum* provided in Appendix F.

Table 3-15: SR 9/I-95 at SR 804/Boynton Beach Boulevard Crash Summary (2010 to 2014)

Crash Type	Number of Crashes					5-Year Total Crashes	Percent of Total	Mean Crashes Per Year
	Year							
	2010	2011	2012	2013	2014			
Rear-End	**24**	**22**	**16**	**31**	**33**	**126**	**35.0%**	**25.2**
Head On	0	0	0	0	0	0	0.0%	0.0
Angle	0	2	0	0	0	2	0.6%	0.4
Left Turn	0	0	0	0	0	0	0.0%	0.0
Right Turn	0	0	0	0	0	0	0.0%	0.0
Sideswipe	**21**	**11**	**11**	**18**	**13**	**74**	**20.6%**	**14.8**
Backed Into	0	0	0	0	0	0	0.0%	0.0
Collision with Parked Car	0	0	1	1	0	2	0.6%	0.4
Collision with Pedestrian	0	0	0	0	0	0	0.0%	0.0
Collision with Bicycle	0	0	0	0	0	0	0.0%	0.0
Fixed Object	**12**	**10**	**16**	**11**	**8**	**57**	**15.8%**	**11.4**
Ran off Road	1	0	0	0	0	1	0.3%	0.2
Overturned	4	2	3	1	0	10	2.8%	2.0
Other	11	18	11	19	29	88	24.4%	17.6
TOTAL CRASHES	73	65	58	81	83	360	100.0%	72.0

Table 3-16: SR 9/I-95 at SR 804/Boynton Beach Boulevard Crash Summary by Vehicle Type (2010 to 2014)

Vehicle Type	Count of Crashes	Percent of Total
Bicycle	0	0.0%
Pedestrian	0	0.0%
Truck	0	0.0%
Motorcycle/Moped	3	0.8%
Car	316	87.8%
Other	41	11.4%
Total	360	100.0%

Table 3-17: SR 9/I-95 at SR 804/Boynton Beach Boulevard Crash Severity Summary (2010 to 2014)

Vehicle Type	2010	2011	2012	2013	2014	Total	Percent of Total
PDO* Crashes	37	38	36	44	50	207	57.5%
Injury Crashes	33	27	22	36	33	151	41.9%
Fatal Crashes	1	0	0	1	0	2	0.6%
Total Crashes	73	65	58	81	83	360	100.0%

*Property Damage Only

3.6.2 SR 9/I-95 at Gateway Boulevard

The data along SR 9/I-95 at Gateway Boulevard within the study limits showed a total of 406 crashes occurring during the five-year study period. Injuries were recorded for 167 crashes (41 percent) and three fatal crashes were recorded during the study period. Rear-end collisions were the leading type of crashes along the study segment, accounting for

176 crashes (43 percent). Sideswipe and fixed object crashes were the next leading types of crashes, accounting for 82 (20 percent) and 47 (12 percent), respectively. A majority of the crashes occurred during daytime (62 percent) and under dry conditions (72 percent). Crashes recorded during night time conditions accounted for 31 percent of the crashes occurring during the five-year period. Table 3-18 shows the crash summary for the study period. Table 3-19 summarizes the crashes for the study period by vehicle type and Table 3-20 summarizes the crash severity for the study period.

Raw crash data obtained from FDOT Safety Office and detailed crash data analyses with crash pattern tables and charts are included in the *Safety Analysis Technical Memorandum* provided in Appendix F.

Table 3-18: SR 9/I-95 at Gateway Boulevard Crash Summary (2010 to 2014)

Crash Type	Number of Crashes					5-Year Total Crashes	Percent of Total	Mean Crashes Per Year
	Year							
	2010	2011	2012	2013	2014			
Rear-End	**32**	**34**	**33**	**37**	**40**	**176**	**43.3%**	**35.2**
Head On	1	0	0	0	2	3	0.7%	0.6
Angle	0	0	0	0	1	1	0.2%	0.2
Left Turn	1	0	0	0	0	1	0.2%	0.2
Right Turn	0	0	0	0	0	0	0.0%	0.0
Sideswipe	**31**	**7**	**12**	**19**	**13**	**82**	**20.2%**	**16.4**
Backed Into	0	1	0	0	0	1	0.2%	0.2
Collision with Parked Car	0	1	0	0	1	2	0.5%	0.4
Collision with Pedestrian	0	0	0	1	0	1	0.2%	0.2
Collision with Bicycle	0	0	0	0	0	0	0.0%	0.0
Fixed Object	**8**	**13**	**9**	**8**	**9**	**47**	**11.6%**	**9.4**
Ran off Road	1	0	0	0	0	1	0.2%	0.2
Overturned	0	3	0	1	4	8	2.0%	1.6
Other	6	19	13	25	20	83	20.4%	16.6
TOTAL CRASHES	80	78	67	91	90	406	100.0%	81.2

Table 3-19: SR 9/I-95 at Gateway Boulevard Crash Summary by Vehicle Type (2010 to 2014)

Vehicle Type	Count of Crashes	Percent of Total
Bicycle	0	0.0%
Pedestrian	1	0.2%
Truck	0	0.0%
Motorcycle/Moped	3	0.7%
Car	366	90.3%
Other	36	8.8%
Total	406	100.0%

Table 3-20: SR 9/I-95 at Gateway Boulevard Crash Severity Summary (2010 to 2014)

Vehicle Type	2010	2011	2012	2013	2014	Total	Percent of Total
PDO* Crashes	46	40	39	51	60	236	58.1%
Injury Crashes	33	36	28	40	30	167	41.1%
Fatal Crashes	1	2	0	0	0	3	0.7%
Total Crashes	80	78	67	91	90	406	100.0%

*Property Damage Only

3.6.3 SR 804/Boynton Beach Boulevard

Table 3-21 provides a summary of the crashes reported along SR 804/Boynton Beach Boulevard within the study limits. A total of 249 crashes were reported along SR 804/Boynton Beach Boulevard during the five-year period – average of 50 crashes per year. Rear-end collisions were the most common crash pattern, accounting for approximately 41 percent of all reported crashes. Angle collisions are the second most common crash type with approximately 22 percent of all crashes and other collisions are the third most common with 17 percent of all crashes. The high percentage of rear-end collisions along the corridor are typical for roadway conditions where traffic congestion is a probable contributing cause. The probable contributing causes for angle collisions are inadequate clearance intervals and red light running. It is also common for left turn collisions to be wrongly coded as angle collisions. A majority of crashes occurred during day time (70 percent) and under dry conditions (82 percent). Crashes occurring during night time conditions accounted for 28 percent of the total crashes recorded for this segment.

Table 3-22 summarizes the crashes by vehicle type along SR 804/Boynton Beach Boulevard within the project limits. Approximately three percent of these crashes involved a pedestrian or bicycle.

Table 3-23 summarizes the crash severity for the study period. A total of 124 injury crashes (50 percent) were recorded during the study period with three fatal crashes along SR 804/Boynton Beach Boulevard.

Raw crash data obtained from FDOT Safety Office and detailed crash data analyses with crash pattern tables and charts are included in the *Safety Analysis Technical Memorandum* provided in Appendix F.

Table 3-21: SR 804/Boynton Beach Boulevard Crash Summary (2010 to 2014)

Crash Type	Number of Crashes					5-Year Total Crashes	Percent of Total	Mean Crashes Per Year
	Year							
	2010	2011	2012	2013	2014			
Rear-End	**16**	**17**	**17**	**20**	**32**	**102**	**41.0%**	**20.4**
Head On	3	0	1	4	1	9	3.6%	1.8
Angle	**8**	**7**	**5**	**18**	**16**	**54**	**21.7%**	**10.8**
Left Turn	7	1	1	0	1	10	4.0%	2.0
Right Turn	1	2	2	0	1	6	2.4%	1.2
Sideswipe	2	0	0	0	0	2	0.8%	0.4
Backed Into	2	1	0	0	1	4	1.6%	0.8
Collision with Parked Car	1	1	0	0	0	2	0.8%	0.4
Collision with Pedestrian	2	1	0	1	2	6	2.4%	1.2
Collision with Bicycle	1	1	0	0	0	2	0.8%	0.4
Fixed Object	0	3	1	3	3	10	4.0%	2.0
Ran off Road	0	0	0	0	0	0	0.0%	0.0
Overturned	0	1	0	0	0	1	0.4%	0.2
Other	**3**	**7**	**6**	**14**	**11**	**41**	**16.5%**	**8.2**
Total Crashes	**46**	**42**	**33**	**60**	**68**	**249**	**100.0%**	**49.8**

Table 3-22: SR 804/Boynton Beach Boulevard Crash Summary by Vehicle Type (2010 to 2014)

Vehicle Type	Count of Crashes	Percent of Total
Bicycle	2	0.8%
Pedestrian	6	2.4%
Truck	0	0.0%
Motorcycle/Moped	3	1.2%
Car	232	93.2%
Other	6	2.4%
Total	249	100.0%

Table 3-23: SR 804/Boynton Beach Boulevard Crash Severity Summary (2010 to 2014)

Vehicle Type	2010	2011	2012	2013	2014	Total	Percent of Total
PDO* Crashes	19	16	17	31	39	122	49.0%
Injury Crashes	26	26	14	29	29	124	49.8%
Fatal Crashes	1	0	2	0	0	3	1.2%
Total Crashes	46	42	33	60	68	249	100.0%

*Property Damage Only

3.6.4 Gateway Boulevard

Table 3-24 provides a summary of the crashes reported along Gateway Boulevard within the study limits. A total of 471 crashes were reported along Gateway Boulevard during the five-year period – average of 94 crashes per year. Rear-end collisions were the most common crash pattern, accounting for approximately 47 percent of all reported crashes. Left turn collisions are the second most common crash type with approximately 16 percent of all crashes and other collisions are the third most common with 12 percent of all crashes. The high percentage of rear-end and left turn collisions along the corridor are typical for roadway conditions where traffic congestion and unavailability of gaps are probable contributing causes. A majority of crashes occurred during day time (71 percent) and under dry conditions (50 percent). Crashes occurring during night time conditions accounted for 26 percent of the total crashes recorded for this segment.

Table 3-25 summarizes the crashes by vehicle type along Gateway Boulevard within the project limits. Vehicle classification data is limited as the facility considered is not a State Road. Approximately two percent of these crashes involved a pedestrian or bicycle.

Table 3-26 summarizes the crash severity for the study period. A total of 90 injury crashes (19 percent) were recorded during the study period along Gateway Boulevard. No fatal crashes occurred along Gateway Boulevard during the analysis period.

Raw crash data obtained from FDOT Safety Office and detailed crash data analyses with crash pattern tables and charts are included in the *Safety Analysis Technical Memorandum* provided in Appendix F.

Table 3-24: Gateway Boulevard Crash Summary (2010 to 2014)

Crash Type	Number of Crashes					5-Year Total Crashes	Percent of Total	Mean Crashes Per Year
	Year							
	2010	2011	2012	2013	2014			
Rear-End	**35**	**35**	**20**	**70**	**59**	**219**	**46.5%**	**43.8**
Head On	0	0	4	2	2	8	1.7%	1.6
Angle	8	5	11	10	9	43	9.1%	8.6
Left Turn	**23**	**13**	**9**	**15**	**14**	**74**	**15.7%**	**14.8**
Right Turn	1	1	0	2	0	4	0.8%	0.8
Sideswipe	7	7	3	14	11	42	8.9%	8.4
Backed Into	0	0	0	0	0	0	0.0%	0.0
Collision with Parked Car	0	0	0	0	0	0	0.0%	0.0
Collision with Pedestrian	0	0	2	1	3	6	1.3%	1.2
Collision with Bicycle	2	0	0	1	1	4	0.8%	0.8
Fixed Object	1	2	0	4	4	11	2.3%	2.2
Ran off Road	0	0	0	0	0	0	0.0%	0.0
Overturned	1	1	0	0	0	2	0.4%	0.4
Other	**5**	**5**	**7**	**28**	**13**	**58**	**12.3%**	**11.6**
Total Crashes	**83**	**69**	**56**	**147**	**116**	**471**	**100.0%**	**94.2**

Table 3-25: Gateway Boulevard Crash Summary by Vehicle Type (2010 to 2014)

Vehicle Type	Count of Crashes	Percent of Total
Bicycle	4	0.8%
Pedestrian	6	1.3%
Truck	0	0.0%
Motorcycle/Moped	0	0.0%
Car	461	97.9%
Other	0	0.0%
Total	471	100.0%

Note: Gateway Boulevard is not a State Road facility. Therefore, vehicle classification data is limited.

Table 3-26: Gateway Boulevard Crash Severity Summary (2010 to 2014)

Vehicle Type	2010	2011	2012	2013	2014	Total	Percent of Total
PDO* Crashes	62	54	46	118	101	381	80.9%
Injury Crashes	21	15	10	29	15	90	19.0%
Fatal Crashes	0	0	0	0	0	0	0.0%
Total Crashes	83	69	59	147	116	471	100.0%

*Property Damage Only

3.6.5 Fatal Crash Summary

Within the study area, a total of eight fatal crashes occurred during the analysis period (2010 – 2014). The most prominent crash type for these crashes was sideswipe collisions and nearly 40 percent of these crashes have a contributing cause of careless driving. Nearly 40 percent of the fatal crashes occurred during the day time with dry road conditions. Over 38 percent of the fatal crashes occurred during night time and over 38 percent of the fatal crashes occurred during wet road conditions. These crashes are summarized in Table 3-27.

Table 3-27: Fata Crash Location and Summary

Roadway Limits	MP	Year	Crash Type	Day or Night	Dry or Wet	Contributing Cause	Alcohol/Drug Involvement
SR 9/I-95 at SR 804/Boynton Beach Blvd Interchange (MP 14.280 to MP 15.407)	14.44	2010	Sideswipe	Day	Dry	Unknown/Not Coded	No
	14.44	2013	Hit Sign/Sign Post	Night	Wet	Careless Driving	No
SR 9/I-95 at Gateway Blvd Interchange (MP 15.407 to MP 16.910)	15.646	2010	Sideswipe	Day	Dry	Unknown/Not Coded	No
	16.766	2011	Sideswipe	Day	Wet	Careless Driving	No
	16.766	2011	Rear-End	Night	Dry	Careless Driving	Yes
SR 804/Boynton Beach Blvd and I-95 NB On Ramp	8.44	2012	Angle	Night	Dry	No Improper Driving/Act	No
SR 804/Boynton Beach Blvd and NW 8th St/Old Boynton Rd	7.814	2010	Left-Turn	Day	Wet	Failed to Yield Right-Of-Way	No
	7.817	2012	Rear-End	Day	Dry	Unknown/Not Coded	No

MP = milepost

No other fatal crashes occurred at any of the signalized intersections along SR 804/Boynton Beach boulevard or Gateway Boulevard within the study area during the analysis period.

3.6.6 High Crash Locations

High Crash Location lists were reviewed for the most recent five years available. Segments of SR 9/I-95 near the northbound on ramp and southbound off ramp at Gateway Boulevard were on the High Crash Location list in 2010, 2011, and 2012. These segment lengths varied from 0.1 miles to 0.4 miles. In 2011, the segment included the northbound on ramp and southbound off ramp at Gateway Boulevard. In 2010 and 2012, the segment between the northern and southern sets of ramps is listed as a high crash location. In 2013, a 0.2-mile segment between the northern and southern sets of ramps at SR 804/Boynton Beach Boulevard was included on the High Crash Location list. These locations are summarized in Table 3-28.

Table 3-28: High Crash Locations – Segments

Year	Rank	Roadway	Begin MP	End MP	Length (mi)	Crash Rate*	Fatalities	Injuries	PDO Crashes
2010	406	SR 9/I-95	16.4	16.6	0.2	1.619	0	11	16
2011	268	SR 9/I-95	16.3	16.7	0.4	1.474	0	24	21
2012	350	SR 9/I-95	16.0	16.1	0.1	2.386	0	4	10
2013	463	SR 9/I-95	14.7	14.9	0.2	1.914	0	17	15

*Crash Rate is expressed as crashes per 100 million vehicle-miles of travel
PDO – property damage only

The intersection of SR 804/Boynton Beach Boulevard and Seacrest Boulevard was on the High Crash Location list in 2011, 2013, and 2014. The northbound on ramp from SR 804/Boynton Beach Boulevard to SR 9/I-95 was on the High Crash Location list in 2011. The intersection of SR 9/I-95 southbound ramp terminal with SR 804/Boynton Beach Boulevard was on the High Crash Location list in 2010. These locations are summarized in Table 3-29.

Table 3-29: High Crash Locations – Intersections

Year	Rank	Intersection	Crash Rate*	Fatalities	Injuries	PDO Crashes
2010	440	SR 9/I-95 at SB Off Ramp to SR 804	0.304	0	13	11
2011	483	SR 804/Boynton Beach Blvd at SR 9/ I-95 NB On Ramp	0.609	0	6	4
2012	349	SR 804/Boynton Beach Boulevard at Seacrest Boulevard	1.494	0	12	1
2013	511	SR 804/Boynton Beach Boulevard at Seacrest Boulevard	1.768	0	10	6
2014	536	SR 804/Boynton Beach Boulevard at Seacrest Boulevard	2.131	0	2	12

*Crash Rate is expressed as crashes per 100 million vehicle-miles of travel
PDO – property damage only

Several high crash segments/spots were identified along the study corridors. Most of the high crash segments/spots are located within the vicinity of the interchanges. These locations experience higher congestion levels and higher lane changing maneuvers when compared to free-flowing freeway segments. The results further suggest that traffic congestion and lane changing activities are probable contributing causes for abnormally high rates along the corridor. No previous safety studies have been performed within the study area for the locations identified as high crash frequency locations.

FDOT estimates that the total economic loss resulting from each crash on an urban 6- or more lane divided roadway facility is approximately $151,384 per crash (Source: FDOT Roadway Design Bulletin 14-12). The annual economic loss resulting from crashes along the SR 804/Boynton Beach Boulevard and Gateway Boulevard corridors may therefore be estimated at approximately $109 million for a five-year period. The total economic loss resulting from each crash on an urban interstate facility is approximately $193,477 per crash (Source: FDOT Roadway Design Bulletin 14-12). The annual economic loss resulting from crashes along the SR 9/I-95 corridors may therefore be estimated at approximately $148 million for a five-year period.

3.6.7 Crash Analysis Conclusion

There are three intersections and five segments within the project study area that have appeared on one or more high crash lists during the study time period. The most common crash types within the project study area are rear-end, angle, and left turn collisions. The high percentage of rear-end collisions within the study area are typical for roadway conditions where traffic congestion is a probable contributing cause. Angle or left-turning collisions are lead indicators of in adequate gaps for left turning movements, inadequate clearance intervals, red light running, or aggressive driving maneuvers performed by excessively delayed drivers. The majority of the crashes within the project study area occurred during day light hours and on dry roads. Table 3-30 summarizes the potential countermeasures that can be applied to the predominant crash types observed for the study area.

Table 3-30: Potential Countermeasures for Predominant Crash Types

Crash Type	Potential Countermeasures
Rear-End	Decrease distance between interchange ramps along the arterial
	Improve signal visibility (e.g. replace signal bulbs, install advanced warning signs/flashers, etc.)
	Improve roadway surface
	Modify signal timing patterns (e.g. phasing, all red and clearance interval timings, etc.)
Angle	Decrease distance between interchange ramps along the arterial
	Improve signal visibility (e.g. replace signal bulbs, install advanced warning signs/flashers, etc.)
	Increase capacity and enhance intersection operations
Left Turn	Remove permissive left turn phase (protected only)
	Improve signal visibility (e.g. replace signal bulbs, install advanced warning signs/flashers, etc.)
	Increase capacity and enhance intersection operations
Sideswipe	Improve lane alignment and markings
	Increase capacity and enhance intersection operations

3.7 Existing Environmental Constraints

A program level ETDM screening has been completed for the improvements proposed to SR 9/I-95 at SR 804/Boynton Beach Blvd and Gateway Boulevard interchanges in May 2015. A copy of the ETDM reports compiled for these interchanges are provided in Appendix G Table 3-31 summarizes the program screening for the improvements considered at SR 9/I-95 and SR 804/Boynton Beach Boulevard. Table 3-32 summarizes the program screening for the improvements considered at SR 9/I-95 and Gateway Boulevard.

Table 3-31: SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange ETDM Screening Summary

	Land Use Changes	Social	Relocation Potential	Farmlands	Aesthetic Effects	Economic	Mobility	Section 4(f) Potential	Historic and Archaeological Sites	Recreation Areas	Wetlands	Water Quality and Quantity	Floodplains	Wildlife and Habitat	Coastal and Marine	Noise	Air Quality	Contamination	Infrastructure	Navigation	Special Designations
Degree of Effect	2	3	2	0	2	2	1	3	3	3	2	2	0	2	0	2	2	3	2	0	0

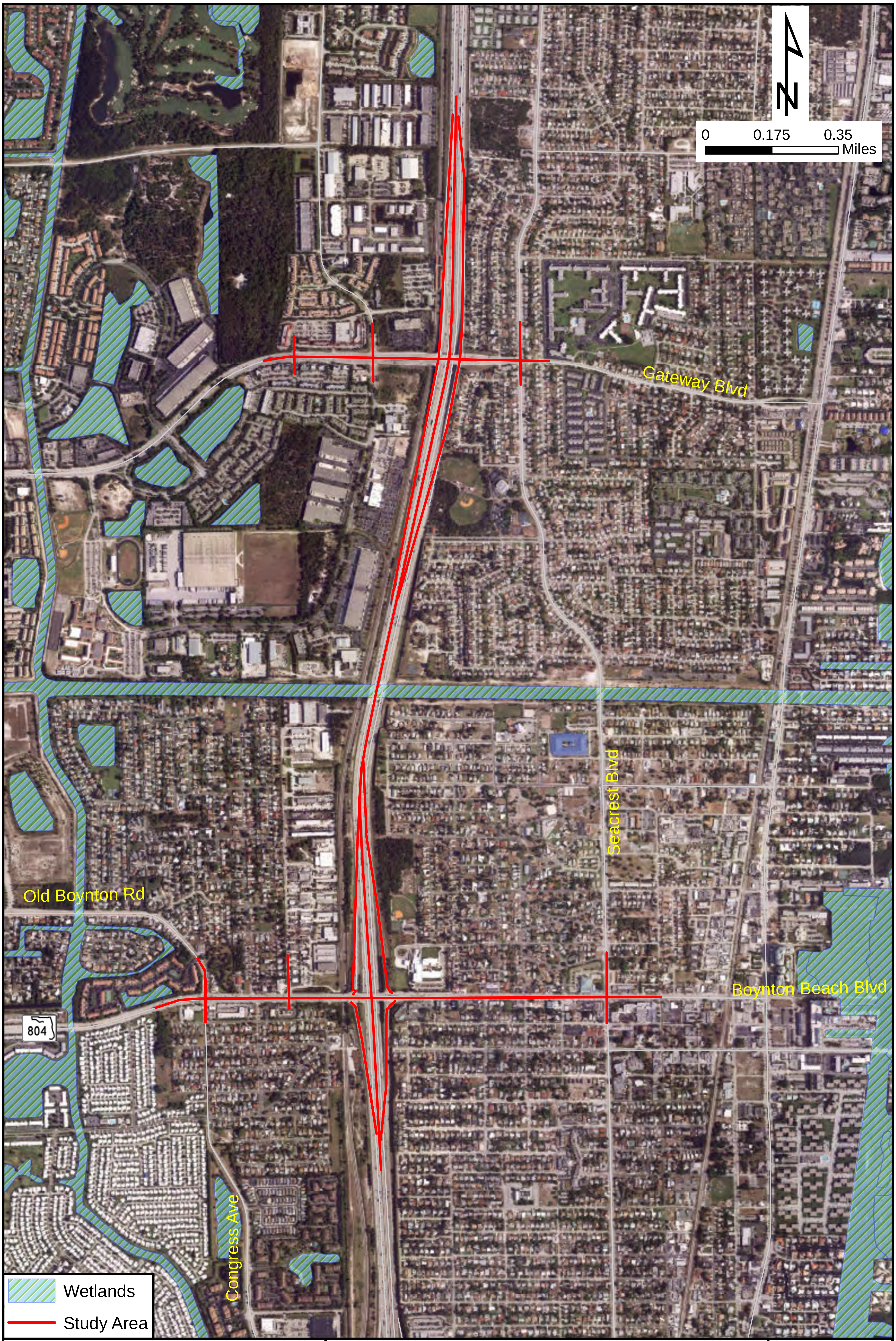
Table 3-32: SR 9/I-95 at Gateway Boulevard Interchange ETDM Screening Summary

	Land Use Changes	Social	Relocation Potential	Farmlands	Aesthetic Effects	Economic	Mobility	Section 4(f) Potential	Historic and Archaeological Sites	Recreation Areas	Wetlands	Water Quality and Quantity	Floodplains	Wildlife and Habitat	Coastal and Marine	Noise	Air Quality	Contamination	Infrastructure	Navigation	Special Designations
Degree of Effect	3	2	4	0	2	2	1	2	3	0	2	2	0	2	0	2	2	2	2	N/A	0

3.7.1 Natural Features

Wetlands and Surface Water

No natural wetland habitat exists within the Gateway Boulevard and SR 804/Boynton Beach Boulevard project areas. This is confirmed by the ETDM tool, the 2014 National Wetland Inventory (NWI), and the field reviews conducted in August 2015 and April 2016. However, there are several existing stormwater features throughout the project study area. Figure 3-15 depicts wetlands and other surface waters in the vicinity of SR 804/Boynton Beach Boulevard and Gateway Boulevard interchanges.



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FDOT

Wetlands Map

Figure 3-15

During field reviews and desktop review of aerial imagery, two surface waters which are part of existing stormwater facilities were identified within the SR 804/Boynton Beach Boulevard interchange project areas. The surface water systems are currently impacted by their close proximity to heavily traveled roads and by extensive anthropogenic activities at the adjacent residential community and industrial areas.

Roadside ditches and swales are also present intermittently within the right-of-way along SR 9/I-95 within the project areas. These features are associated with previous environmental resource permits (50-04473-P and 50-03485-S). Based on the design plans associated with these permits, roadside and median swales were part of the SR 9/I-95 drainage design. These surface waters provide very little support as a biological community due to their highly urbanized nature.

Adjacent to the Gateway Boulevard project area, a freshwater pond/palustrine system, which also serves as a stormwater pond, is present. The stormwater pond is part of the Quantum Lake Villas Apartment Homes, east of Quantum Boulevard and south of Gateway Boulevard, at the very western most portion of the Gateway project area. This surface water is depicted in NWI data but is outside the current project area.

A Wetland Evaluation Report will be prepared for this PD&E Study and will be submitted for the anticipated Class of Action (COA) of a Type II Categorical Exclusion (Type II CE) approval by FDOT Office of Environmental Management (OEM).

The ETDM Summary Report for Project #14180 – SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange published on May 27, 2015 identified the Wetlands Project Effect as minimal. According to the report, a limited number of wetlands are within the vicinity of the project and no impacts to the wetlands or surface waters are anticipated. A Summary Degree of Effect (DOE) of ***minimal*** has been assigned.

The ETDM Summary Report for Project #14181 – SR 9/I-95 at Gateway Boulevard Interchange published on November 24, 2014 identified the Wetlands Project Effect as minimal. According to the report, a limited number of wetlands are within the vicinity of the project and no impacts to the wetlands or surface waters are anticipated. A Summary DOE of ***minimal*** has been assigned.

A copy of both ETDM Reports are provided in Appendix G.

Water Quality and Quantity

The ETDM Summary Report for Project #14180 – SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange published on May 27, 2015 identified the Water Quality and Quantity Project Effect as minimal. It has determined that no impaired waters are located within the study area, but recognizes potential disturbances related to construction. According to the report, SFWMD has identified Environmental Resource Permits within the project area that will need to be modified. A DOE) of ***minimal*** has been assigned.

The ETDM Summary Report for Project #14181 – SR 9/I-95 at Gateway Boulevard Interchange published on November 24, 2014 identified the Water Quality and Quantity Project Effect as minimal. It has determined that no impaired waters are located within the study area, but recognizes potential disturbances related to construction. According to the report, SFWMD has identified Environmental Resource Permits within the project area that will need to be modified. A Summary DOE of minimal has been assigned.

A copy of both ETDM Reports are provided in Appendix G.

Threatened and Endangers Species

Table 3-33 identifies the federally and state wildlife listed species with the potential to occur within the project areas based on suitable habitat available, ETDM comments, and field reviews. Additional species known to occur in Palm Beach County identified by the US Fish and Wildlife Service (USFWS) include Whooping Crane, Everglades snail kite, Kirtland's Warbler, Red cockaded woodpecker, Audubon's crested caracara, Piping plover, Red knot, Florida Panther, Southeastern beach mouse, Puma, Hawksbill sea turtle, Leatherback sea turtle, Green sea turtle, Loggerhead sea turtle, and American crocodile. None of these species are expected to occur within the SR 804/Boynton Beach Boulevard Interchange and Gateway Boulevard Interchange project study areas due to lack of suitable habitat.

An Endangered Species Biological Assessment Report will be prepared for this PD&E Study and will be submitted for the anticipated COA of Type II CE approval by FDOT OEM.

Table 3-33: Listed Wildlife Species and Likelihood of Occurrence

Scientific Name	Common Name	Federal Status	State Status	Likelihood of Occurrence
Amphibian				
Lithobates capito	Gopher Frog	-	SCCS	Low
Reptile				
Drymarchon corais couperi	Eastern Indigo Snake	T	FT	Low
Pituophis melanoleucus mugitus	Florida Pine Snake	-	SSC	Moderate
Gopherus Polyphemus	Gopher Tortoise	-	ST	Moderate
Alligator mississippiens	American Alligator	T	T	No Involvement
Birds				
Sterna antillarum	Least Tern	-	ST	Low
Aramus guarauna	Limpkin	-	SSC	Moderate
Egretta thula	Snowy Egret	-	SSC	Moderate
Egretta caerulea	Little Blue Heron	-	SSC	Moderate
Egretta tricolor	Tricolored Heron	-	SSC	Moderate
Eudocimus albus	White Ibis	-	SSC	Moderate
Mycteria Americana	Wood Stork	T	FT	Moderate
Athene cunicularia	Burrowing Owl	-	SSC	Low
Haliaeetus leucocephalus	Bald Eagle	-	-	Low
Aphelocoma coerulescens	Florida Scrub-Jay	T	T	Low
Mammals				
Trichechus manatus	West Indian Manatee	E	FE	No Involvement
Podomys floridanus	Florida Mouse	-	SSC	Lowe

SSC – Species of Special Concern, ST – State-designated Threatened, FT – Federally-designated Threatened, T – Threatened, FE – Federally-designated Endangered, E – Endangered

Source: Florida Fish and Wildlife Conservation Commission. Florida's Endangered and Threatened Species Official Lists, January 2016; U.S. Fish and Wildlife Service, County Listed Species

The ETDM Summary Report for Project #14180 – SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange published on May 27, 2015 identified the Wildlife and Habitat Project Effect as minimal. According to the report, if construction takes place in previously disturbed sites, impacts could be minimized. A Summary DOE of ***minimal*** has been assigned.

The ETDM Summary Report for Project #14181 – SR 9/I-95 at Gateway Boulevard Interchange published on November 24, 2014 identified the Wildlife and Habitat Project Effect as minimal. According to the report, if construction takes place in previously disturbed sites, impacts could be minimized. A Summary DOE of ***minimal*** has been assigned.

A copy of both ETDM Reports are provided in Appendix G.

Contamination

The project corridor is surrounded by a mixture of residential and commercial land use. Contamination screening evaluation for this project included reviewing an environmental database, aerial photographs, performing a visual reconnaissance of the project corridor and surrounding area, obtaining pertinent environmental records from state and local agencies and assigning potential contamination ratings for each contamination source within and adjacent to the project corridor.

A total of 71 potential contamination sources and 36 adjacent contamination sites within a one-quarter mile of the project corridor were observed. In general, the environmental databases indicated these sources were associated with hazardous waste, landfills, former, or current petroleum/spill sites containing UST and/or AST systems, and known or former cleaning or dry cleaning facilities.

Based on an evaluation of site history and characteristics, 83 of the 107 sites were given Medium to High contamination risk ratings associated with hazardous waste, petroleum, or hazardous materials. Overall, the existence of these Medium to High contamination risk rated sources have the potential to impact construction schedule and costs and require further assessment to evaluate the impacts.

A Contamination Screening Evaluation Report will be prepared for this PD&E Study and will be submitted for the anticipated COA of a Type II CE approval by FDOT OEM.

The ETDM Summary Report for Project #14180 – SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange published on May 27, 2015 identified the Contamination Project Effect as moderate. According to the report, Florida Department of Environmental Protection (FDEP) and US Environmental Protection Agency (USEPA) have reported the following sites as potential contamination sites: three hazardous waste facilities, eight petroleum contamination monitoring sites, thirteen storage tank contamination monitoring sites, four Super Act risk sources, and five USEPA Resource Conservation and Recovery Act (RCRA)-regulated facilities. A Summary DOE of ***moderate*** has been assigned.

The ETDM Summary Report for Project #14181 – SR 9/I-95 at Gateway Boulevard Interchange published on November 24, 2014 identified the Contamination Project Effect as minimal. According to the report, FDEP and USEPA have reported the following sites as potential contamination: one hazardous waste facility, three petroleum contamination monitoring sites, seven storage tank contamination sites, one Super Act risk source, and two USEPA RCRA-regulated facilities. A Summary DOE of ***minimal*** has been assigned.

A copy of both ETDM Reports are provided in Appendix G.

3.7.2 Cultural Resources

The ETDM Summary Report for Project #14180 – SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange published on May 27, 2015 identified the Historic and Archaeological Sites Project Effect as moderate. A significant historical resource lies within the project study area: The Seaboard Air Line Railway. Also, four neighborhoods within the vicinity have been indicated as potential historic districts. These reasons and due to the possible presence of unrecorded cultural resources within the study area, a Summary DOE of ***moderate*** has been assigned.

The ETDM Summary Report for Project #14181 – SR 9/I-95 at Gateway Boulevard Interchange published on November 24, 2014 identified the Historic and Archaeological Sites Project Effect as moderate. The Seaboard Air Line Railway, a significant resource, lies within the study area. The area has not been comprehensively surveyed for cultural resources and due to the presence of sites that possibly are eligible for a listing in the National Registry of Historic Places within the area, a Summary DOE of ***moderate*** has been assigned.

A copy of both ETDM Reports are provided in Appendix G.

Figure 3-16 shows the cultural features within the project study area.

3.7.3 Community Resources

Community resources are described in the subsequent sections and are depicted in Figure 3-16.

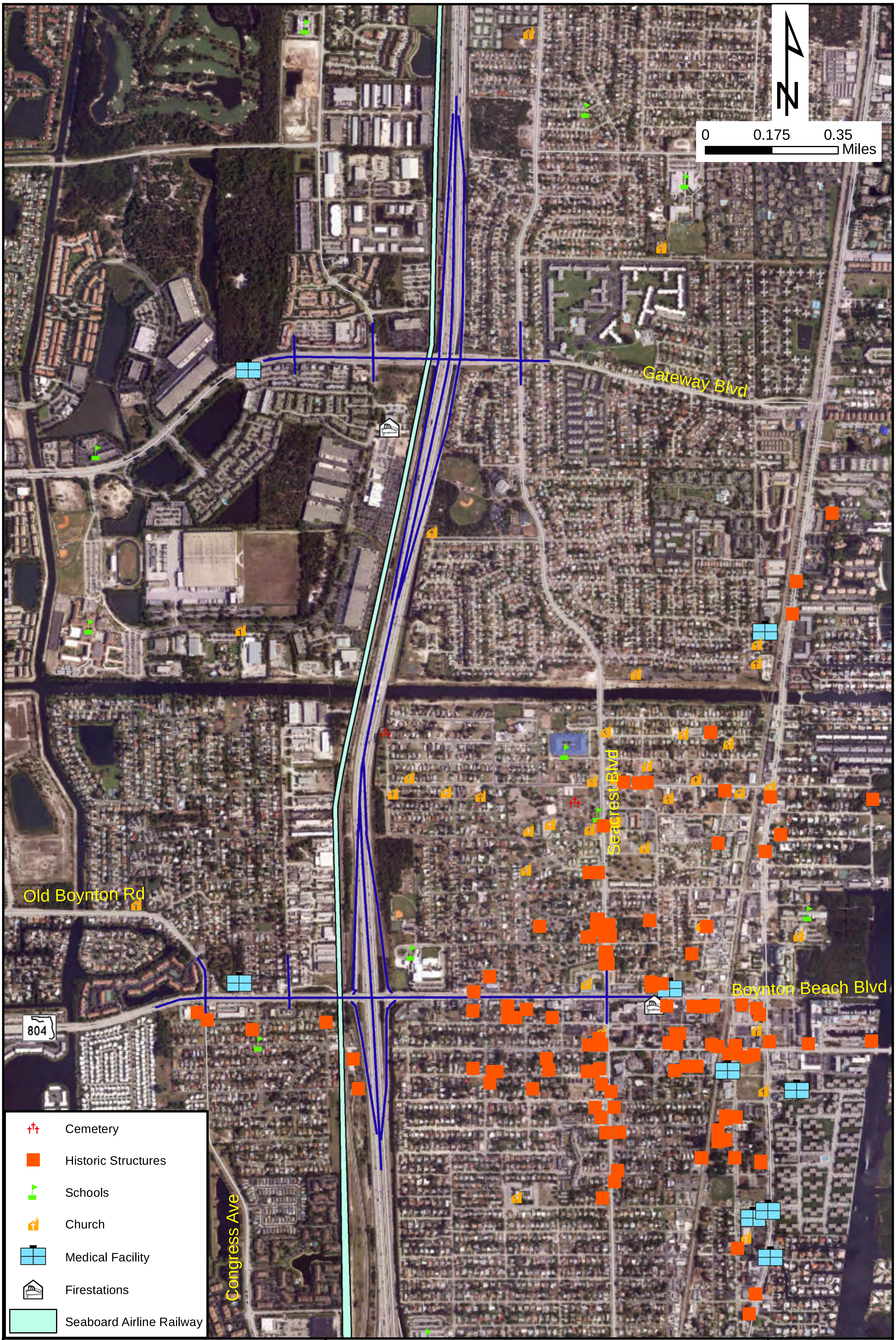
The ETDM Summary Report for Project #14180 – SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange published on May 27, 2015 identified the Social Project Effect as moderate. According to the report, the project is not located within an Area of Critical State Concern or within the Coastal High Hazard Area but the project is located near public parks. A Summary DOE of ***moderate*** has been assigned.

The ETDM Summary Report for Project #14181 – SR 9/I-95 at Gateway Boulevard Interchange published on November 24, 2014 identified the Social Project Effect as minimal. According to the report, overall impacts on the social environment and community cohesion are anticipated to be limited while the project accommodates expanding residential and industrial uses. A Summary DOE of ***minimal*** has been assigned.

A copy of both ETDM Reports is provided in Appendix G.

Schools

The study area along SR 804/Boynton Beach Boulevard has two schools within its limits: Galaxy Elementary School and Boynton Beach Elementary School. Although no schools are within the limits of the Gateway Boulevard study area, several are present within a five-mile buffer. These include Bright Horizons at Boynton Beach, Boynton Beach Community High School, and Poinciana Elementary School.



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Cultural Features and Communities

Figure 3-16

Properties, Recreational Facilities, and Community Centers

Several recreational facilities lie within a five-mile buffer of the study area. These locations include Ezell Hester, Jr. Community Park and Carolyn Sims Center.

No community centers are present within the limits of the project study area, but several are located a five-mile buffer. These include Hester Community Center, Community Caring Center-Boynton, and Boynton Beach Civic Center.

Medical Facilities

There are no medical facilities within the limits of the study area; however, two facilities fall within a five-mile buffer: Minute Clinic located at 131 Congress Avenue and Minute Clinic inside Target Store at 650 Congress Avenue. The nearest hospital is approximately four miles away. JFK Medical Center is located at 5301 South Congress Avenue in Atlantis, Florida.

Places of Worship

No places of worship are within the limits of the study area. Jesus House of Worship and First Presbyterian Church are within a five-mile buffer of the study area.

Police and Fire Stations

Boynton Beach Police Department is located within the study area limits along SR 804/Boynton Beach Boulevard at 100 East Boynton Beach Boulevard. It remains the only police station within a five-mile buffer of the study area.

Boynton Beach Fire Rescue Station is located at 100 East Boynton Beach Boulevard within the study area limits. In addition, Boynton Beach Fire Rescue Station 5 is located within five miles of the project study area at 2080 High Ridge Road.

Evacuation Routes

Florida has one-way evacuation plans in place for cases of emergency. SR 9/I-95, within the study area, in not one of the designated highways for one-way northbound traffic in the event of a coastal evacuation.

3.7.4 Physical Features

Noise

The ETDM Summary Report for Project #14180 – SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange published on May 27, 2015 identified the Noise DOE as minimal. Noise sensitive receptors such as hotels, funeral homes, health care facilities, schools, churches, parks, and single family homes are present within a quarter mile buffer of the study area. Existing sound barriers are present along northbound SR 9/I-95 mainline and off and on ramps at this interchange. Noise impacts may result, but are anticipated to be minor. A Summary DOE of ***minimal*** has been assigned.

The ETDM Summary Report for Project #14181 – SR 9/I-95 at Gateway Boulevard Interchange published on November 24, 2014 identified the Noise DOE as minimal. Noise sensitive receptors such as single family homes reside within 500 feet of the study area. Existing noise barriers are present along the northbound side of SR 9/I-95. Noise impacts may result and any mitigation measures will be documented A Summary DOE of ***minimal*** has been assigned.

A Noise Study Report will be completed for this PD&E Study and will be submitted for the anticipated COA of a Type II CE approval by FDOT OEM.

A copy of both ETDM Reports are provided in Appendix G.

Air Quality

The ETDM Summary Report for Project #14180 – SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange published on May 27, 2015 identified the Air Quality DOE as ***minimal***.

The ETDM Summary Report for Project #14181 – SR 9/I-95 at Gateway Boulevard Interchange published on November 24, 2014 identified the Air Quality DOE as ***minimal***.

According to the ETDM Reports, the study area for both interchanges are not located within a USEPA-designated Air Quality Maintenance or Non-Attainment Area and thus, the Clean Air Act conformity requirements do not apply to this project at this time. A Summary DOE of ***minimal*** has been assigned.

A copy of both ETDM Reports are provided in Appendix G.

4. Future Traffic Forecasts

A *Traffic Forecasting Technical Memorandum* (Appendix C) dated January 2016 was compiled for this project that presents details on future year traffic projections for the study area. A brief summary of the future traffic volume forecasting from this report is discussed in this section.

4.1 Travel Demand Model Review

SERPM 7.0 was officially released in February 2015 and it is the first Activity Based Model in Florida. The model structure has been dramatically changed compared to the travel demand model structure of SERPM 6.5. The Base Year of SERPM 7.0 is 2010, and the Horizon Year is 2040. SERPM 7.0 adopted the region's 2040 LRTP. Based on the Department's guidance, SERPM 7.0 was used to develop the future 2040 traffic projections for this I-95 Interchange PD&E Study. To evaluate the model performance, the output from SERPM 7.0 was summarized and compared with the traffic projection performed using I-95 Corridor Design Consultant Corridor Model (Base Year of 2010, Horizon Year of 2040) and traffic projections from SERPM 6.5 (Base Year of 2005, Horizon Year of 2040). The population and employment data in Palm Beach County, Broward County, and Miami-Dade County, and the TAZs within the 2-mile buffer area of the study interchanges were also compared for the three models. The results of these comparisons are summarized and presented in the *Traffic Forecasting Technical Memorandum for I-95 Interchange PD&E Studies Report* (refer to Appendix C).

4.2 Travel Demand Forecasting/Development of AADTs

Any regional model has a margin of error associated with its results. A subarea validation was performed in order to better validate the model results and prepare the tool for a more reliable forecasting. Even with a subarea validation, achieving a perfect match with traffic counts is nearly impossible.

In order to obtain reasonable and consistent traffic projections, various traffic forecasting methodologies were evaluated and summarized under the *Traffic Forecasting Technical Memorandum for I-95 Interchange PD&E Studies Report* (refer to Appendix C). This study summarized and compared growth rates obtained through historical counts, historical counts plus model projections, SERPM socioeconomic growth, and the comprehensive model to model projections methodology.

Based on the comparison and discussions with the FDOT Project Manager, "Factoring Procedure–Difference Method" per NCHRP report 765 was used to develop AADTs for the PD&E Study. The traffic forecasting methodology used for each approach of each intersection was based on the 2015 AADT (from field), and 2010 and 2040 SERPM 7.0 model volumes. The 2015 model volume was interpolated using 2010 and 2040 model volumes. Then the differences of 2015 AADT (from field) and interpolated 2015 forecasted AADT from model was calculated. The recommended 2040 AADT were calculated by applying this difference to the 2040 SERPM 7.0 model volumes. Then the 2020 and 2030 volumes were interpolated using 2015 AADT and recommended 2040 volumes. For the roadway segments where the SERPM 7 2040 model volumes are lower than the SERPM 7 2010 model volumes, or are not included in the SERPM 7 network, the future 2020, 2030, and 2040 AADTs were calculated using 2015 AADT and a compound growth factor of 0.5 percent. For all the roadway links, the 2015 and 2040 AADT has been compared, and a minimum compound growth rate of 0.5 percent has been adopted. The AADTs used in this study to project future turning movement volumes at the study intersections were based on the recommended AADTs listed in *Traffic Data Collection & Traffic Projections for I-95 Interchange PD&E Studies Report*.

The recommended AADTs (2015, 2020, 2030 and 2040) are also shown in Figures 4-1 through 4-4.

4.3 Development of DDHV Volumes

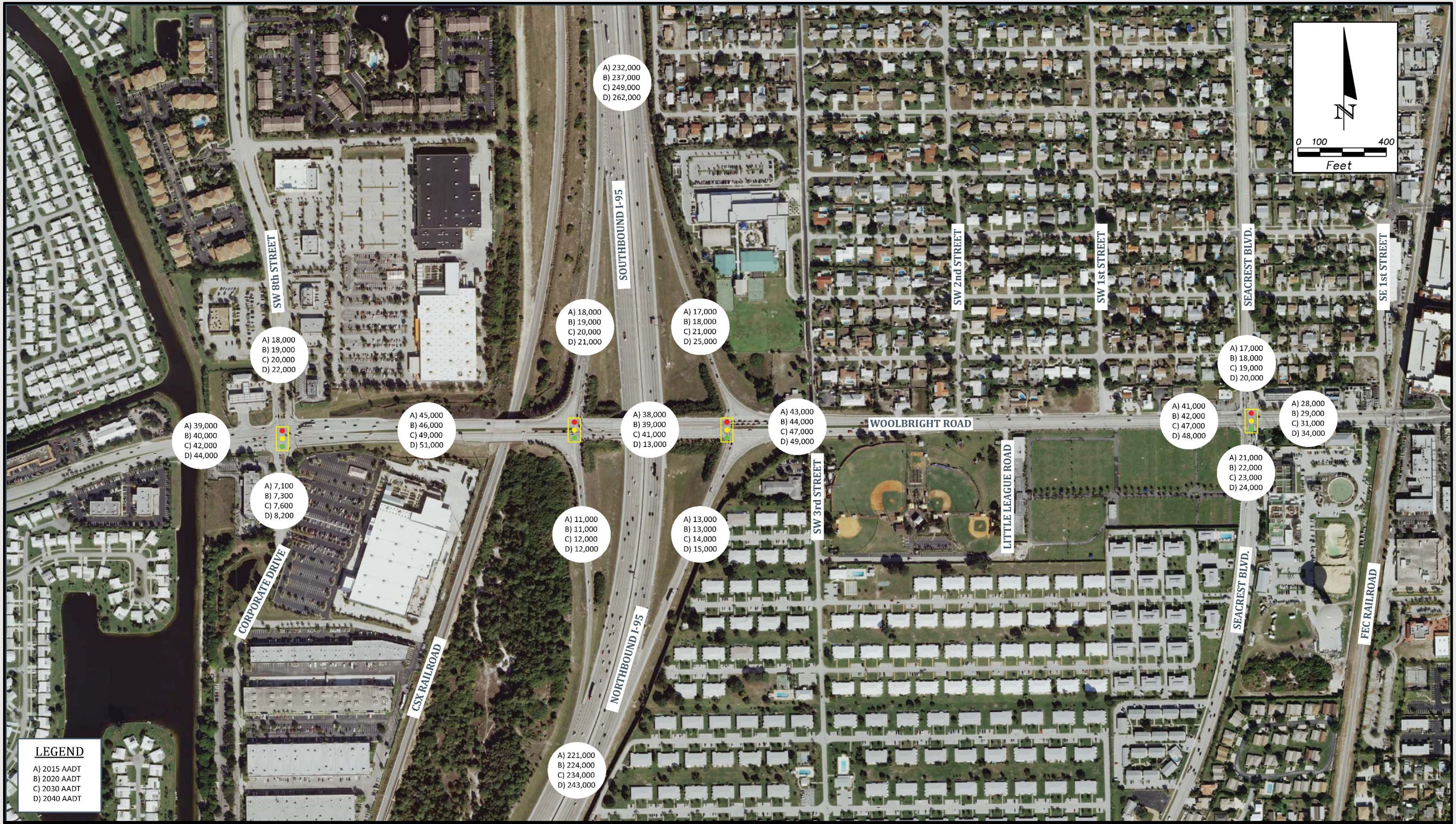
Design traffic factors (K and D) are necessary to determine the future year Directional Design Hourly Volumes (DDHV). These factors are basic traffic parameters that will influence the planning and design of the project study. The traffic factors for the subject PD&E Study will be consistent with the adopted standard FDOT factors (K factor) and with the calculated factors approved for this study (D factor). The recommended D and K factors used in this study were summarized in Table 2-1 and are consistent with the approved MLOU.

DDHVs were developed for this study area by following processes and techniques consistent with the FDOT Project Traffic Forecasting Handbook. As part of this study, TM Tool, Version 2 was used to determine DDHVs for each intersection approach based on the recommended AADTs (2015, 2020, 2030, and 2040), Existing Year (2015) turning movement counts and approved traffic factors. The TM Tool input and output sheets for each study intersection are presented in the *Traffic Forecasting Technical Memorandum* provided in Appendix C. Some of the keys steps are listed below:

- The DDHVs were computed by multiplying the AADT volumes by the adopted K and D traffic factors (identified in MLOU).
- The existing traffic patterns were used as a reference to determine the peak directions for the future conditions.
- Future traffic volumes were balanced through the interchanges and intersections throughout the study area. In some instances, the DDHVs may deviate from the adopted design hour factors as a result of balancing.
- The DDHVs were first established for the freeway mainlines and ramps. The volumes developed at the intersection approaches were used as control values in the subsequent development of the intersection turning movement volumes.
- The turning movement percentages from existing traffic volumes were applied to DDHVs at the intersection approaches to develop intersection turning volumes.

Balanced turning movement volumes at study intersections for the years 2020, 2030, and 2040 are provided as outputs from the TM Tool. Traffic projections were checked for reasonableness.

The DDHVs for years of 2020, 2030 and 2040 are presented in Figures 4-5 through 4-8. The balanced turning movement volumes for years of 2020, 2030 and 2040 are depicted in Figures 4-9 through 4-20.



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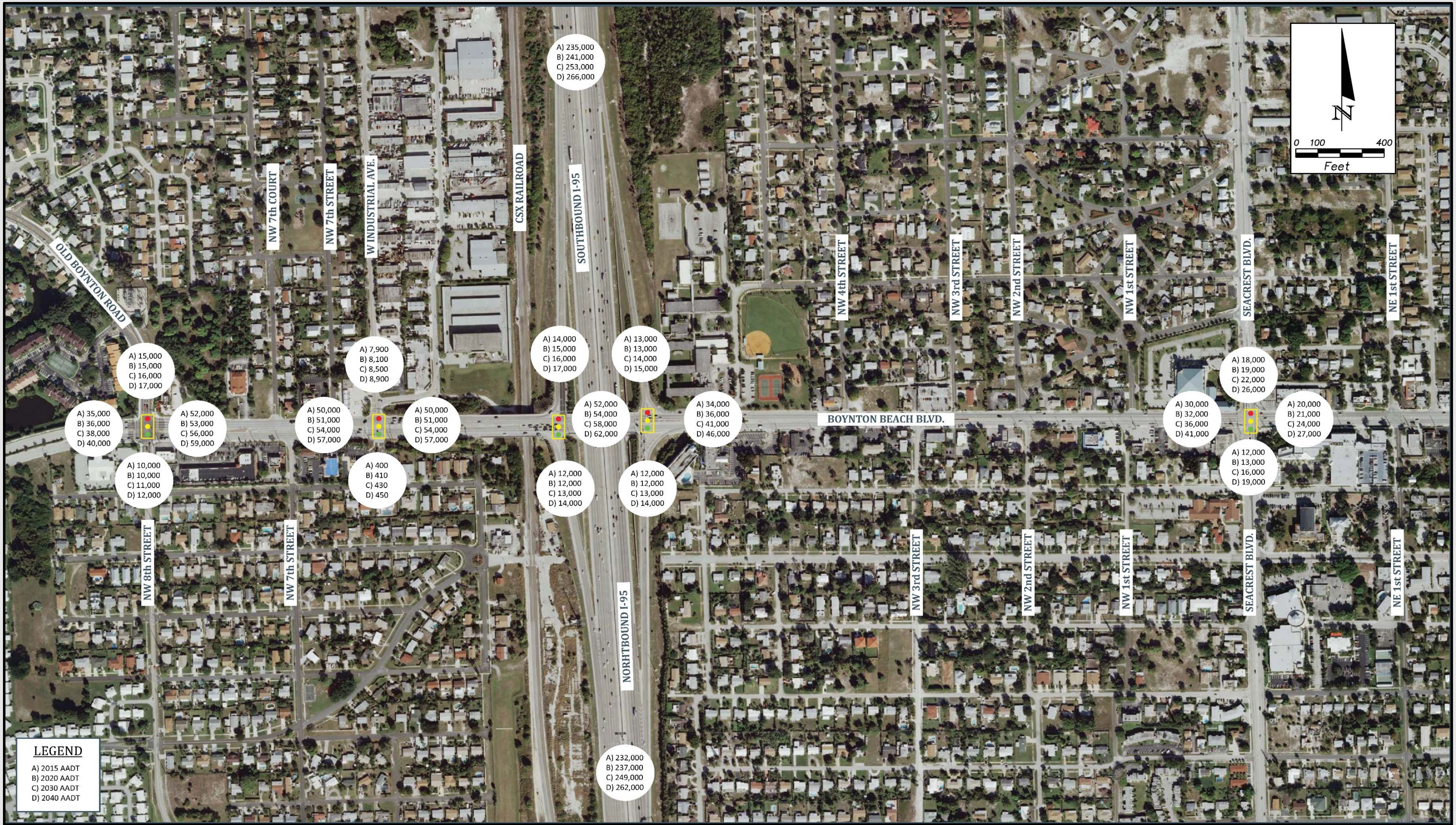
SR 9/I-95 at Woolbright Road Interchange
Recommended Future Year AADT

Figure 4-1



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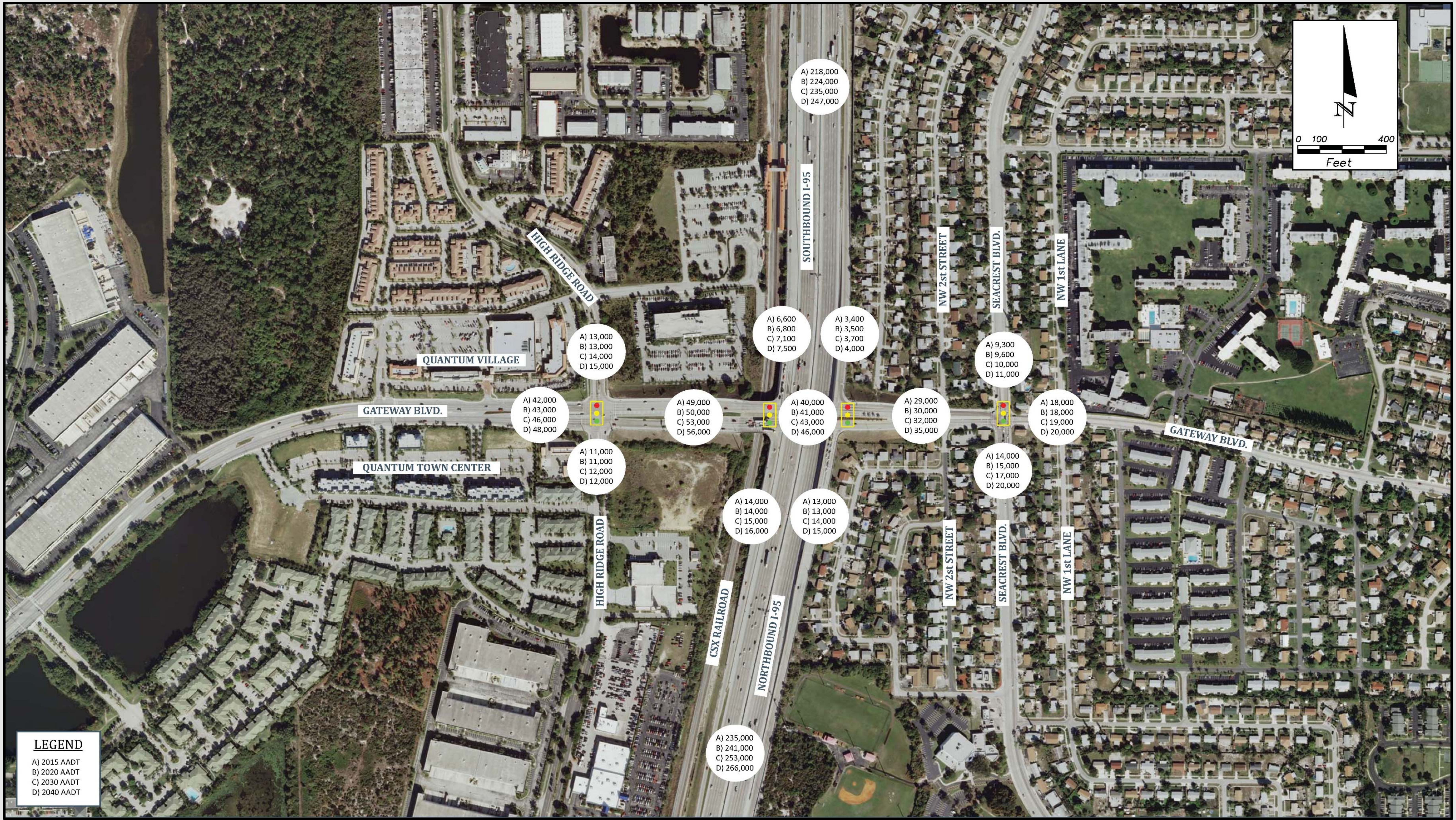
FDOT

SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
Recommended Future Year AADT

Figure 4-2



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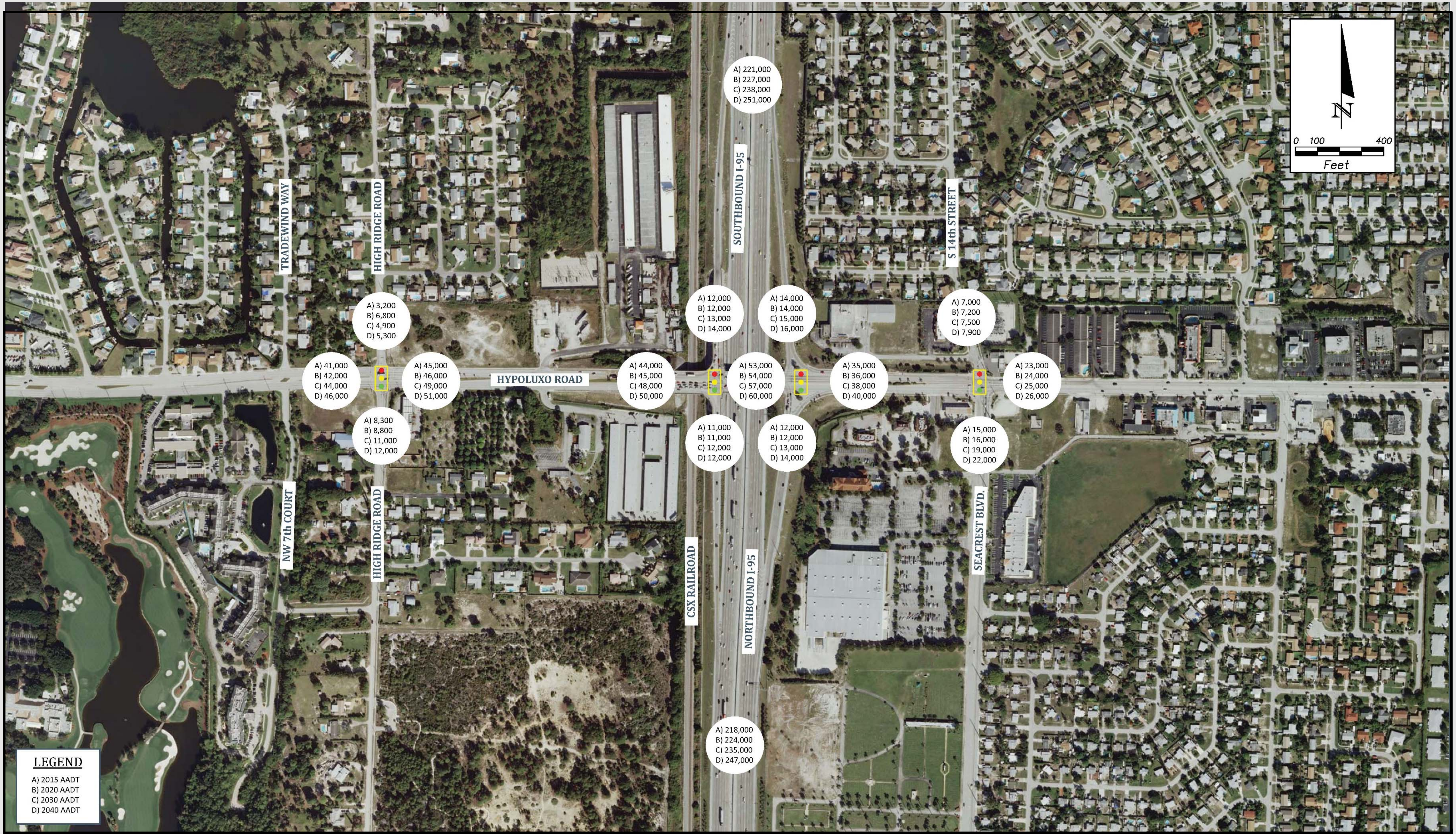
FDOT

SR 9/I-95 at Gateway Boulevard Interchange
Recommended Future Year AADT

Figure 4-3



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FDOT

SR 9/I-95 at Hypoluxo Road Interchange
Recommended Future Year AADT

Figure 4-4

PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
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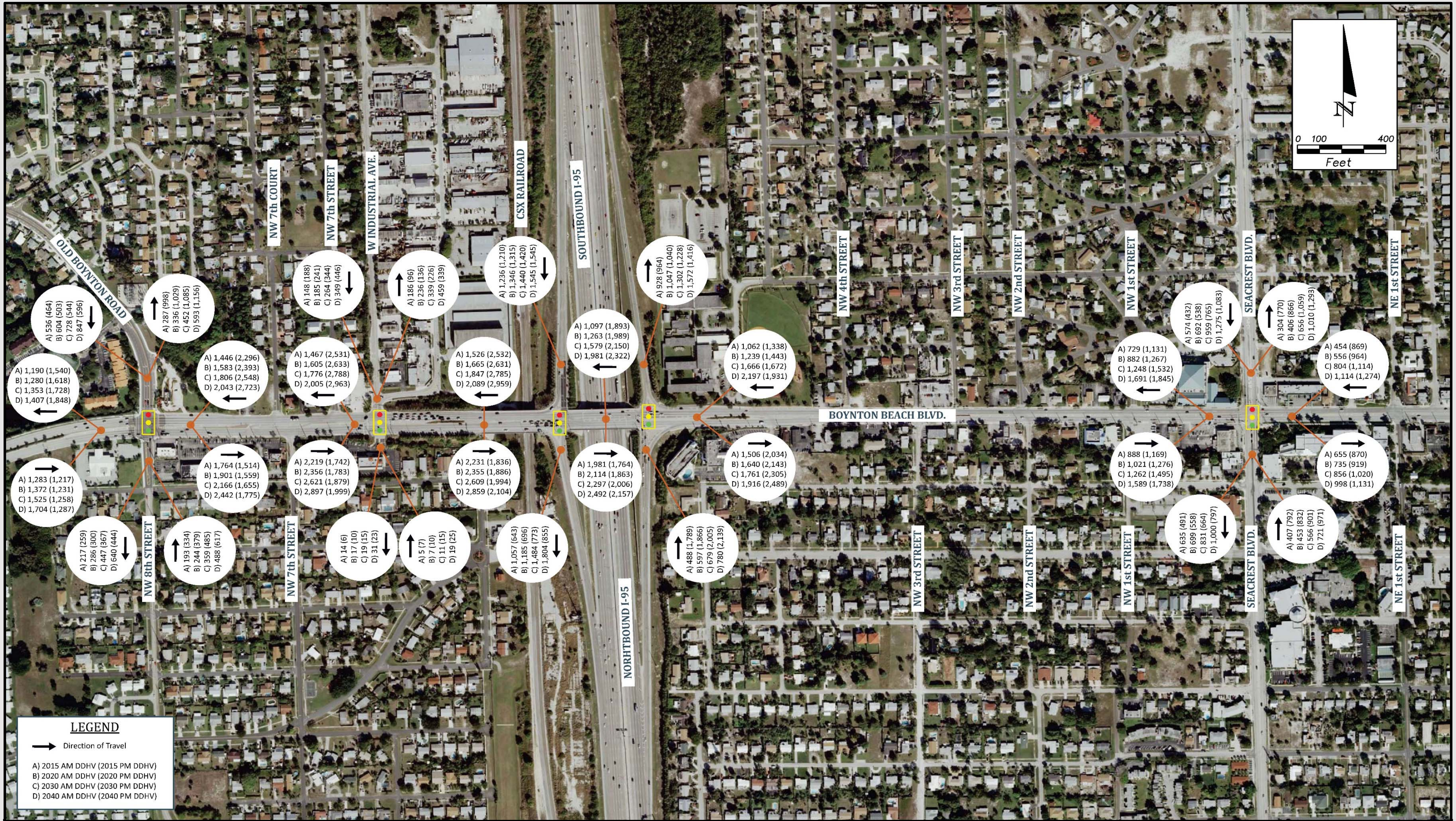
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at Woolbright Road Interchange
Directional Design Hourly Volume

Figure 4-5



PD&E Study
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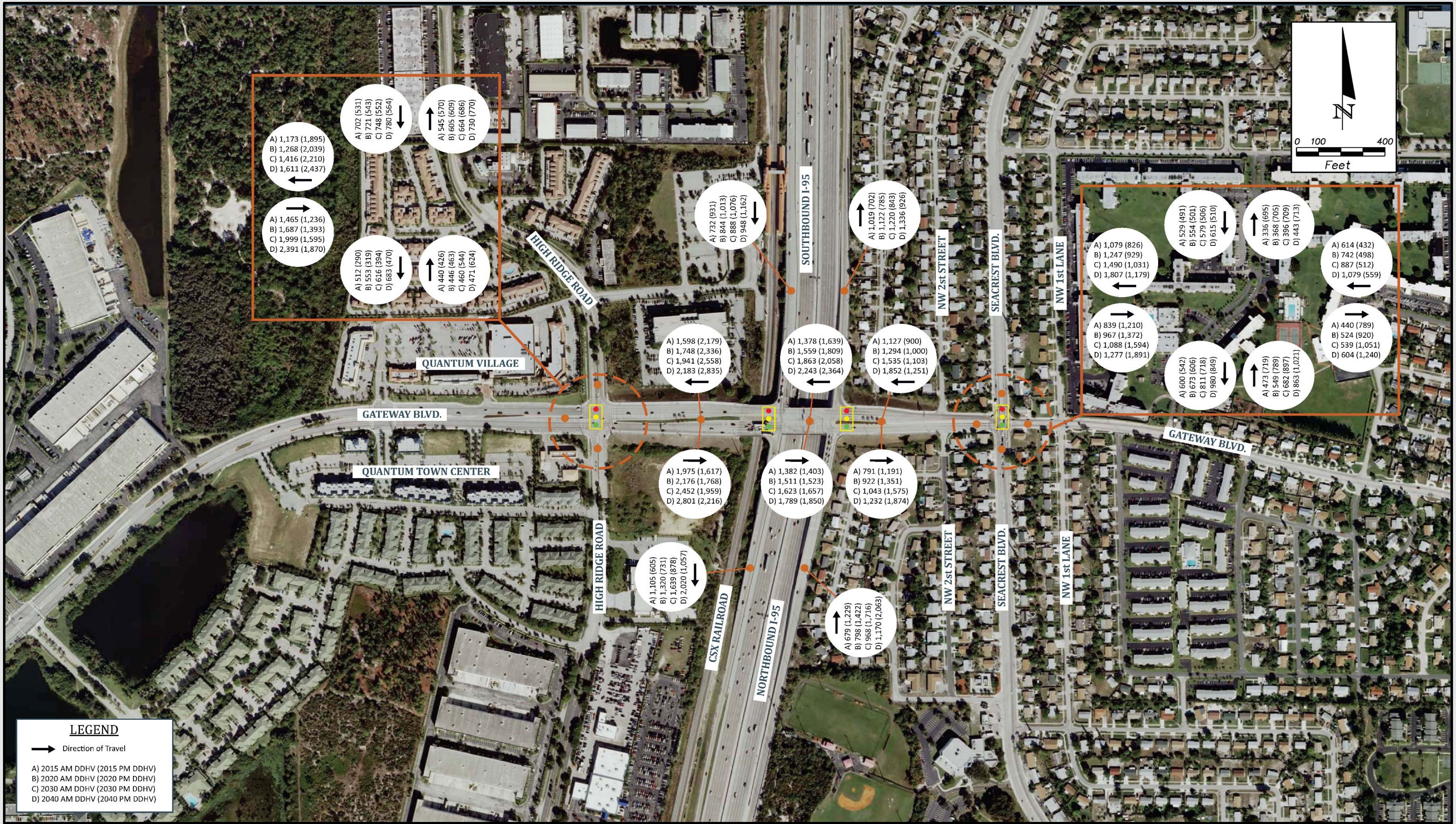
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
Directional Design Hourly Volume

Figure 4-6



PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

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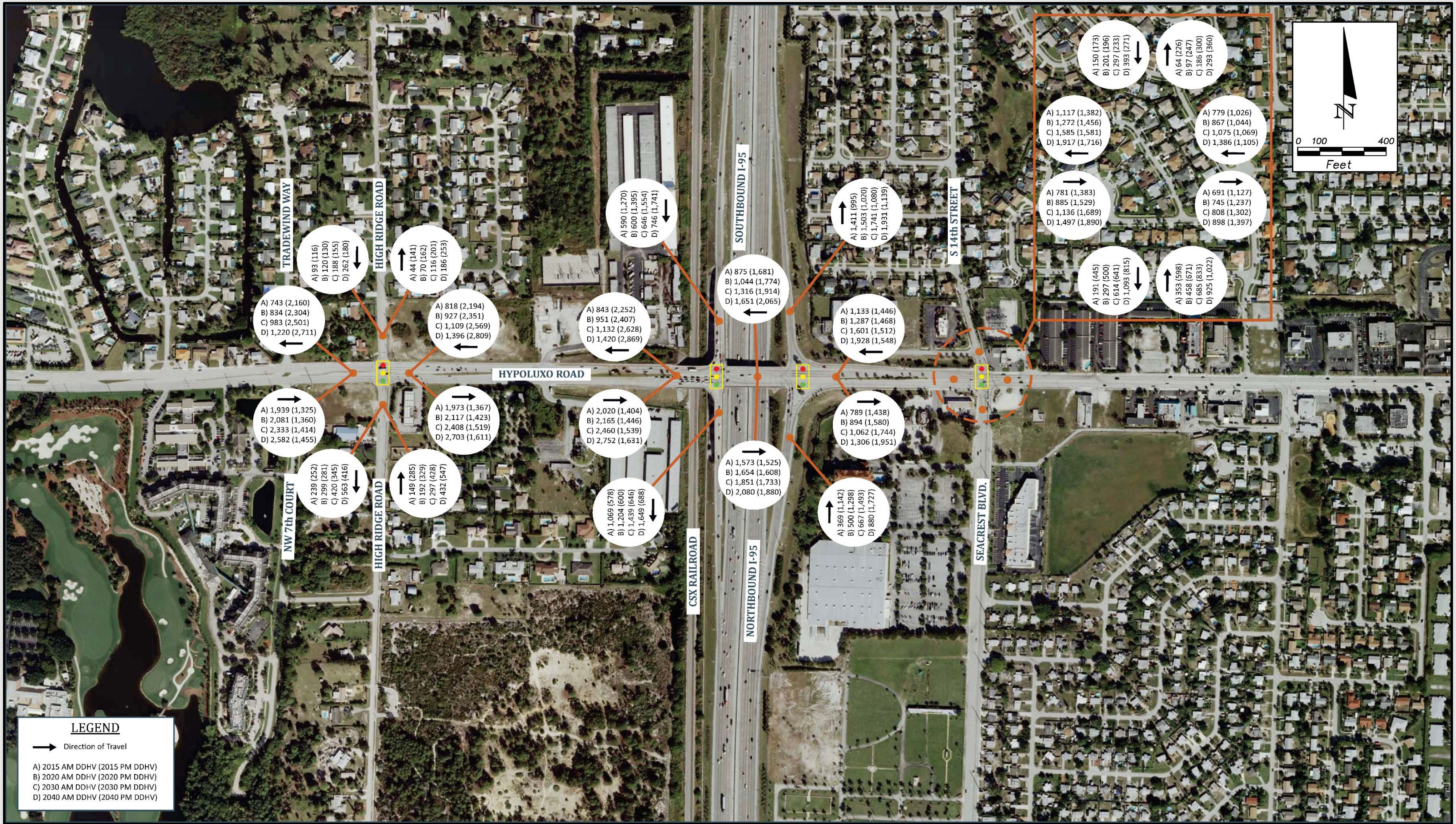
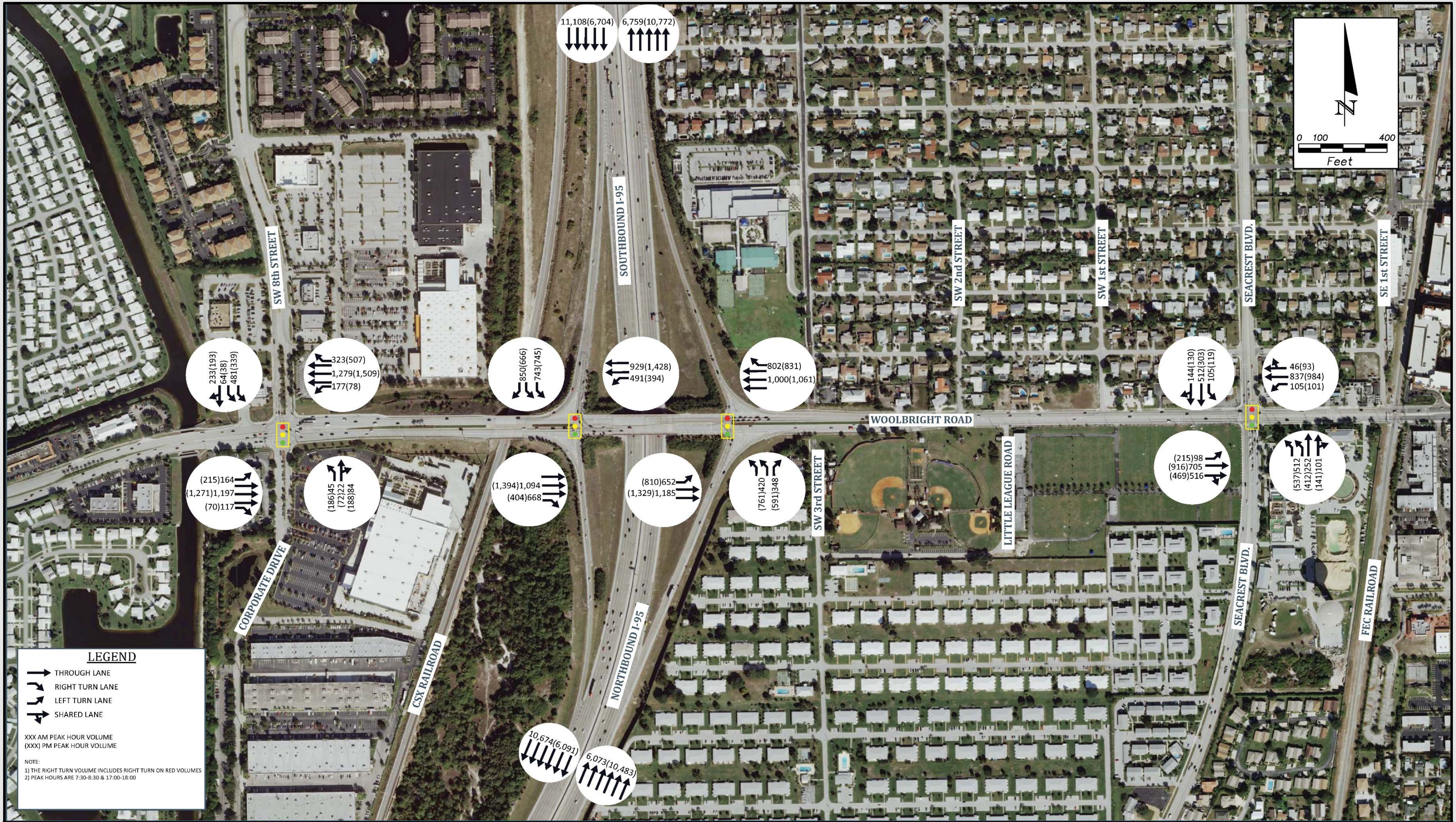
SR 9/I-95 at Gateway Boulevard Interchange
Directional Design Hourly Volume

Figure 4-7



PD&E Study SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange SR 9/I-95 at Gateway Boulevard Interchange FM Nos. 435804-1-22-01;231932-1-22-01 ETDM nos. 14180 and 14181	**SR 9/I-95 at Hypoluxo Road Interchange** **Directional Design Hourly Volume**	**Figure 4-8** **Page 72**



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FDOT

SR 9/I-95 at Woolbright Road Interchange
Open Year (2020) - Balanced Intersection Turning Movement Volumes

Figure 4-9

PD&E Study
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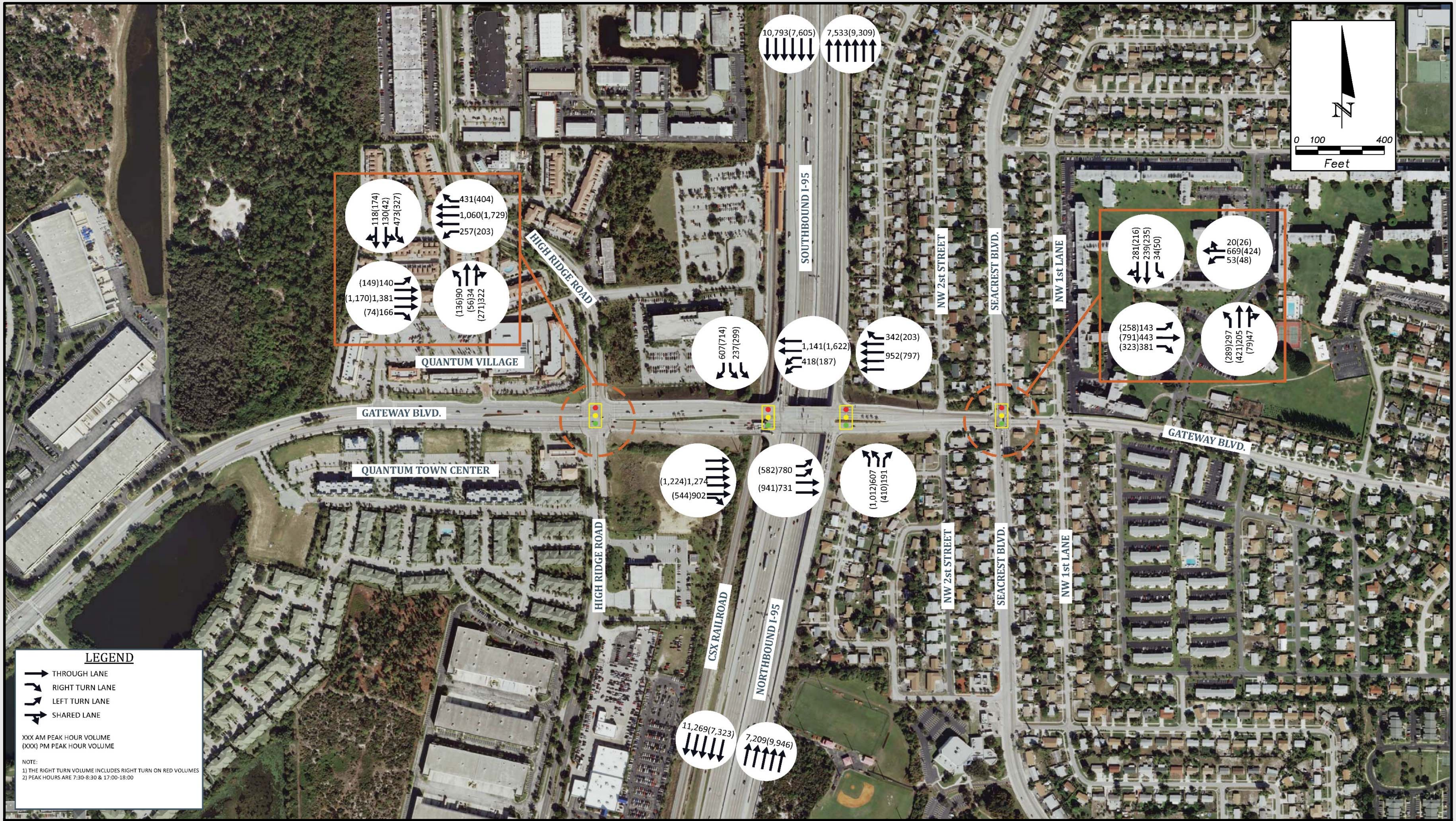
FDOT

SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
Open Year (2020) - Balanced Intersection Turning Movement Volumes

Figure 4-10



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ETDM nos. 14180 and 14181

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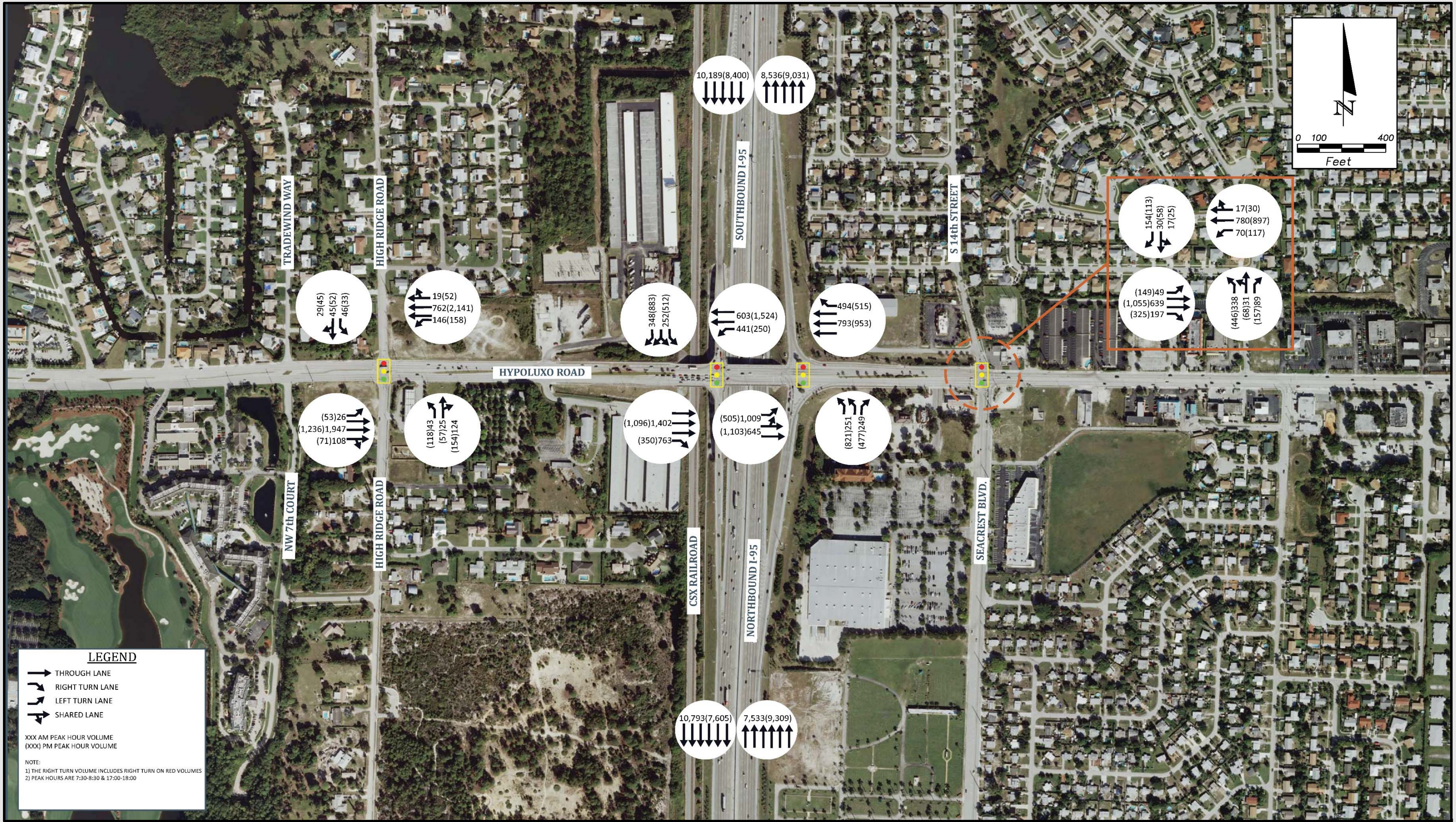
SR 9/I-95 at Gateway Boulevard Interchange
Open Year (2020) - Balanced Intersection Turning Movement Volumes

Figure 4-11



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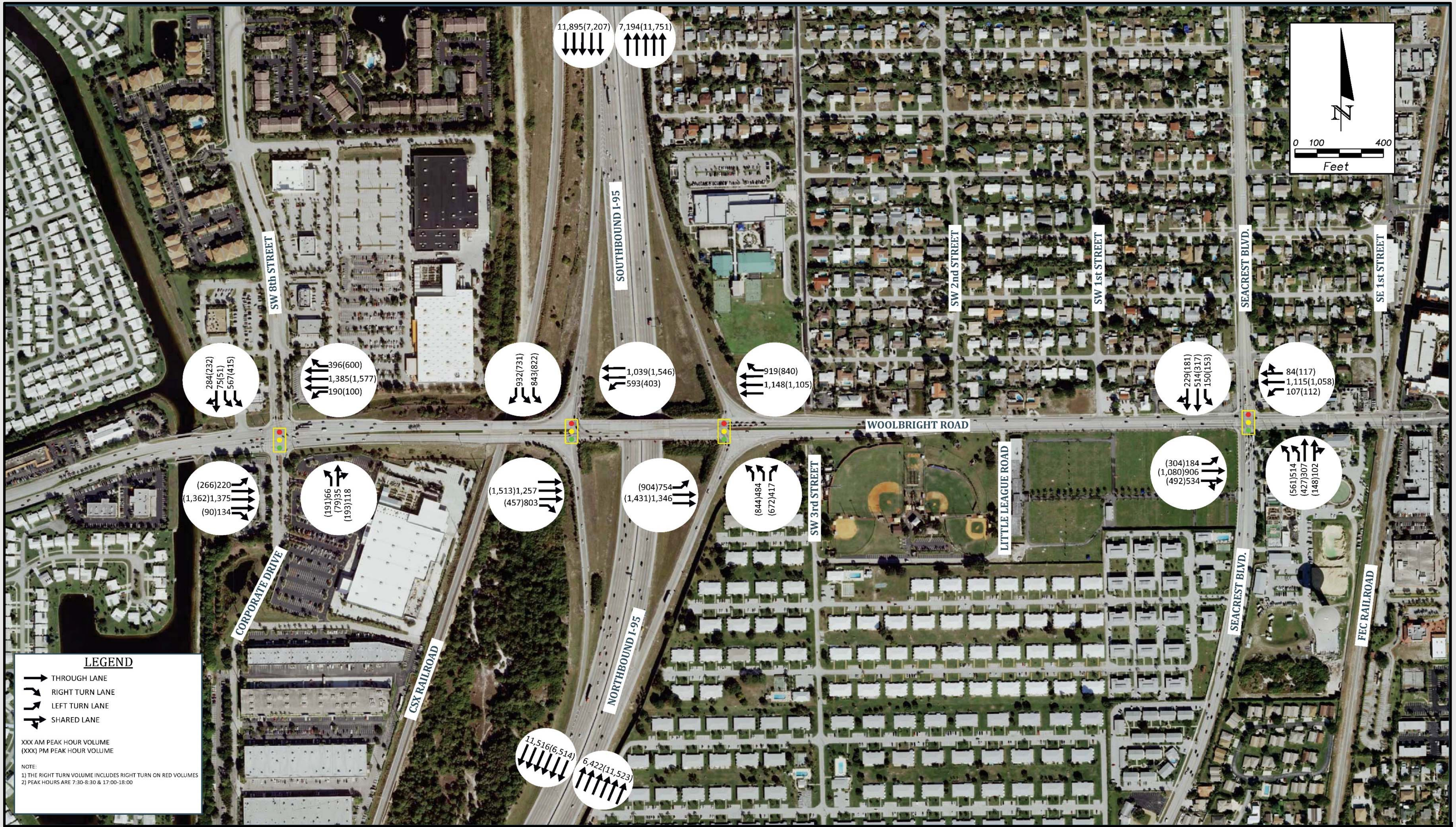
SR 9/I-95 at Hypoluxo Road Interchange
Open Year (2020) - Balanced Intersection Turning Movement Volumes

Figure 4-12



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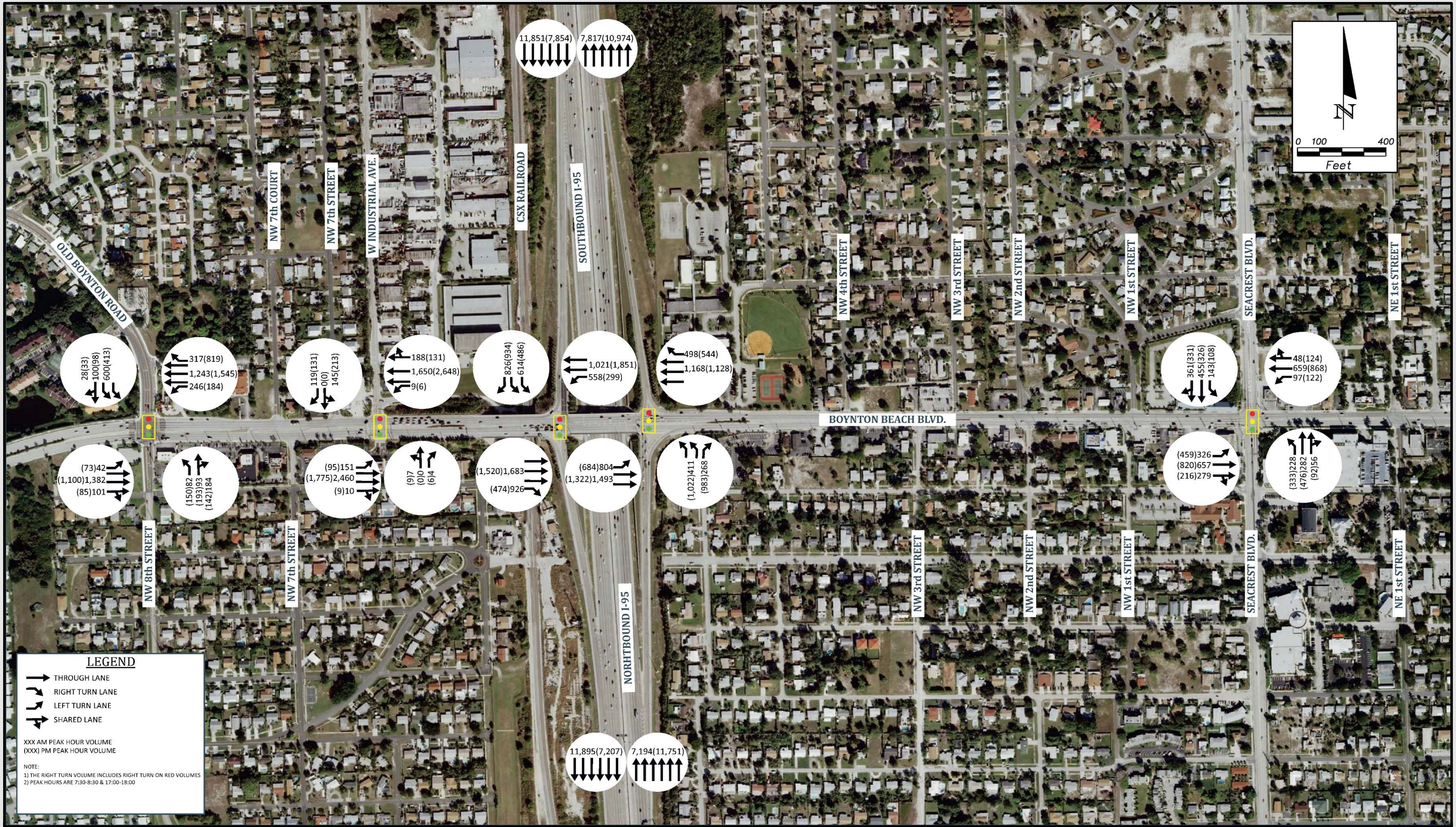
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at Woolbright Road Interchange
Interim Year (2030) - Balanced Intersection Turning Movement Volumes

Figure 4-13



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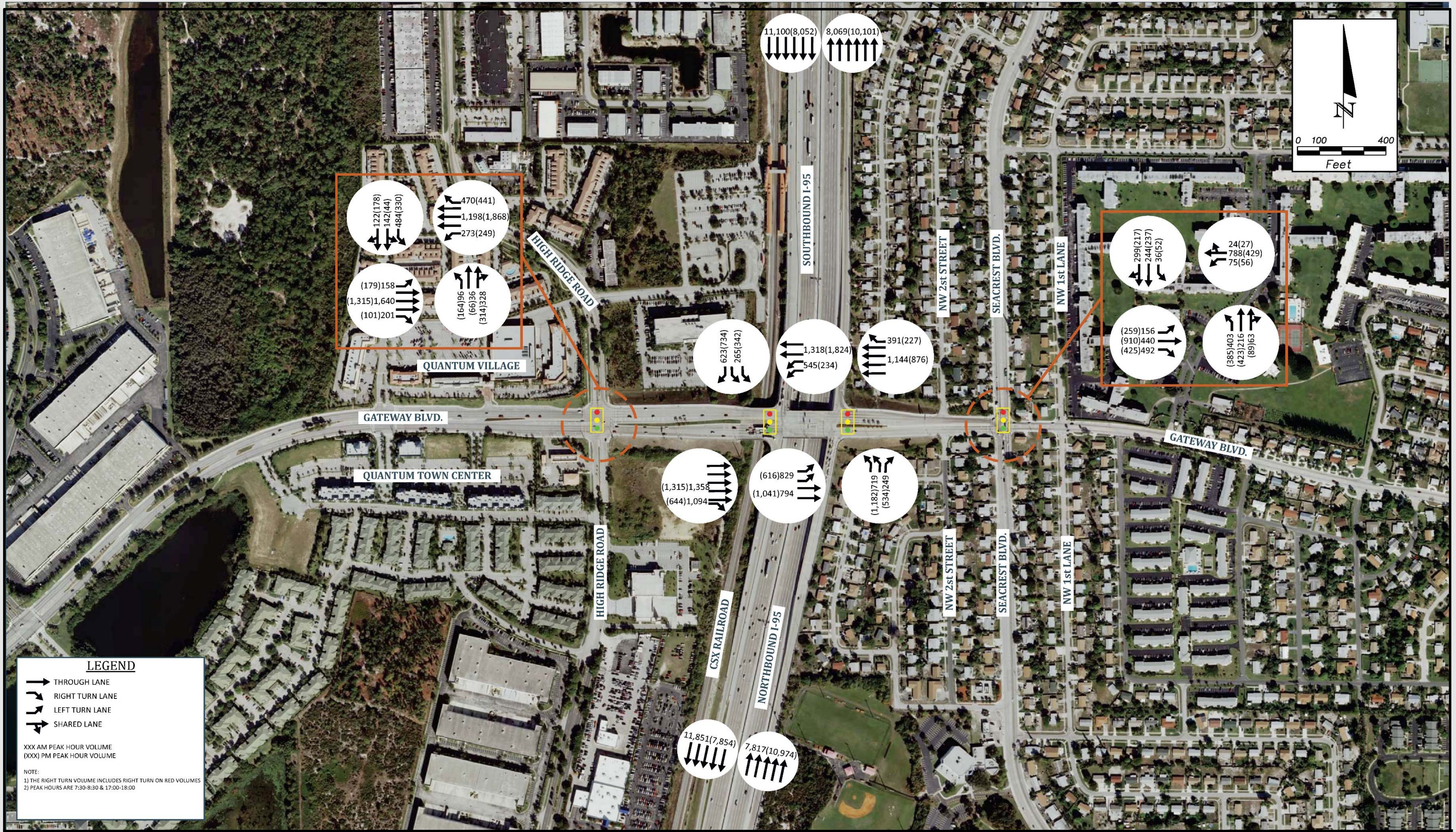
SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
Interim Year (2030) - Balanced Intersection Turning Movement Volumes

Figure 4-14



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SR 9/I-95 at Gateway Boulevard Interchange
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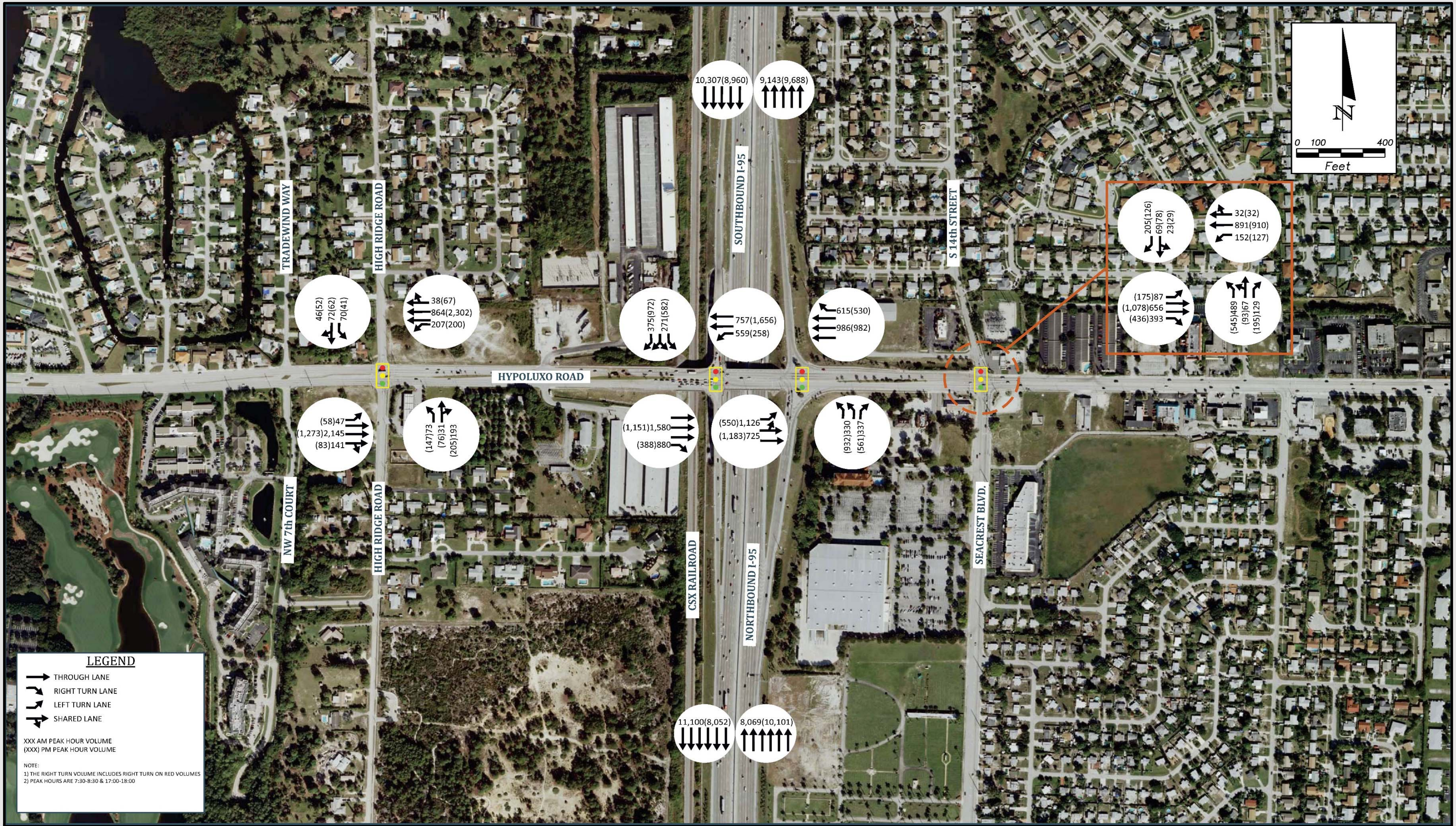
SR 9/I-95 at Gateway Boulevard Interchange
Interim Year (2030) - Balanced Intersection Turning Movement Volumes

Figure 4-15



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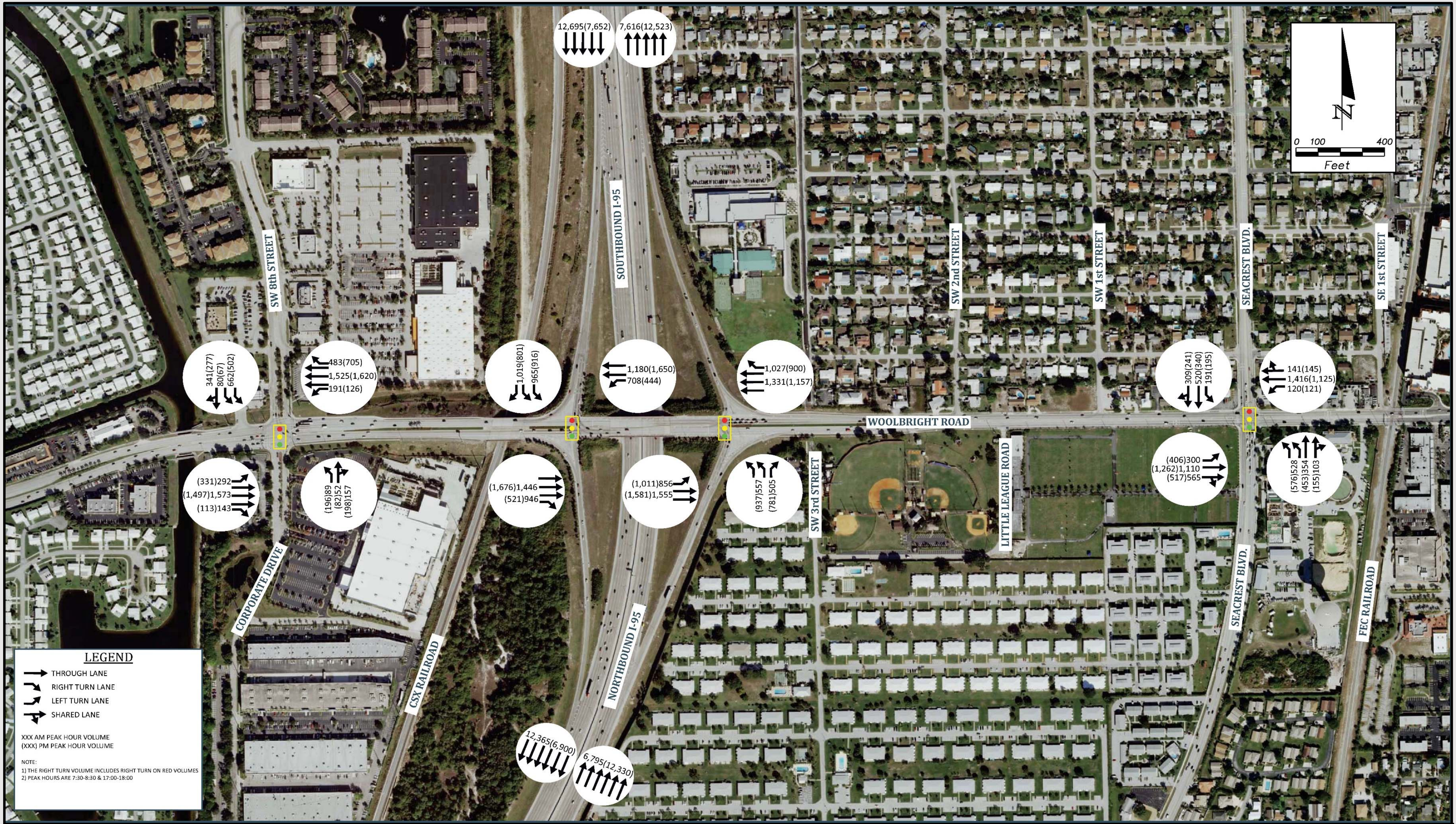
SR 9/I-95 at Hypoluxo Road Interchange
Interim Year (2030) - Balanced Intersection Turning Movement Volumes

Figure 4-16



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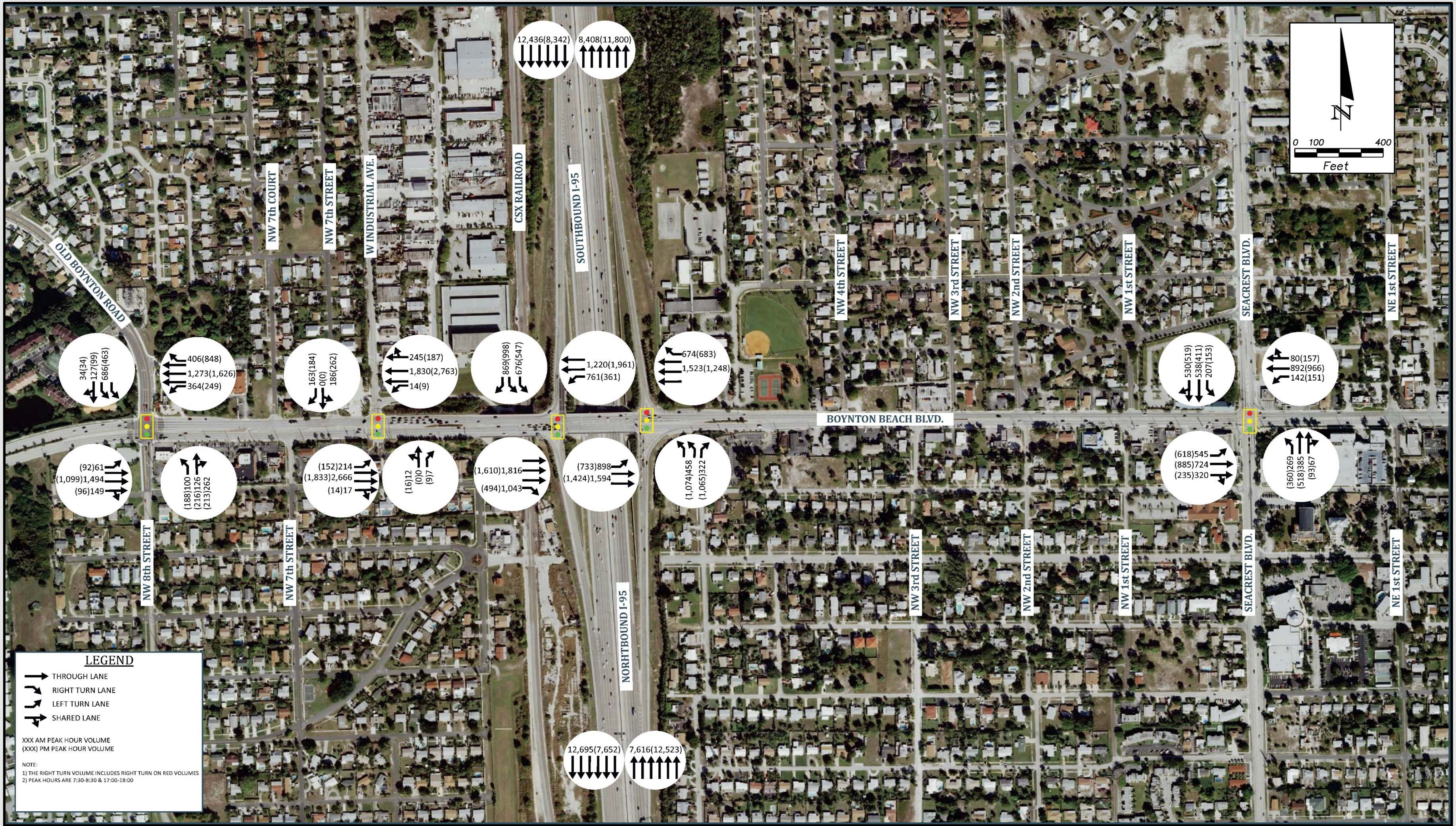
SR 9/I-95 at Woolbright Road Interchange
Design Year (2040) - Balanced Intersection Turning Movement Volumes

Figure 4-17



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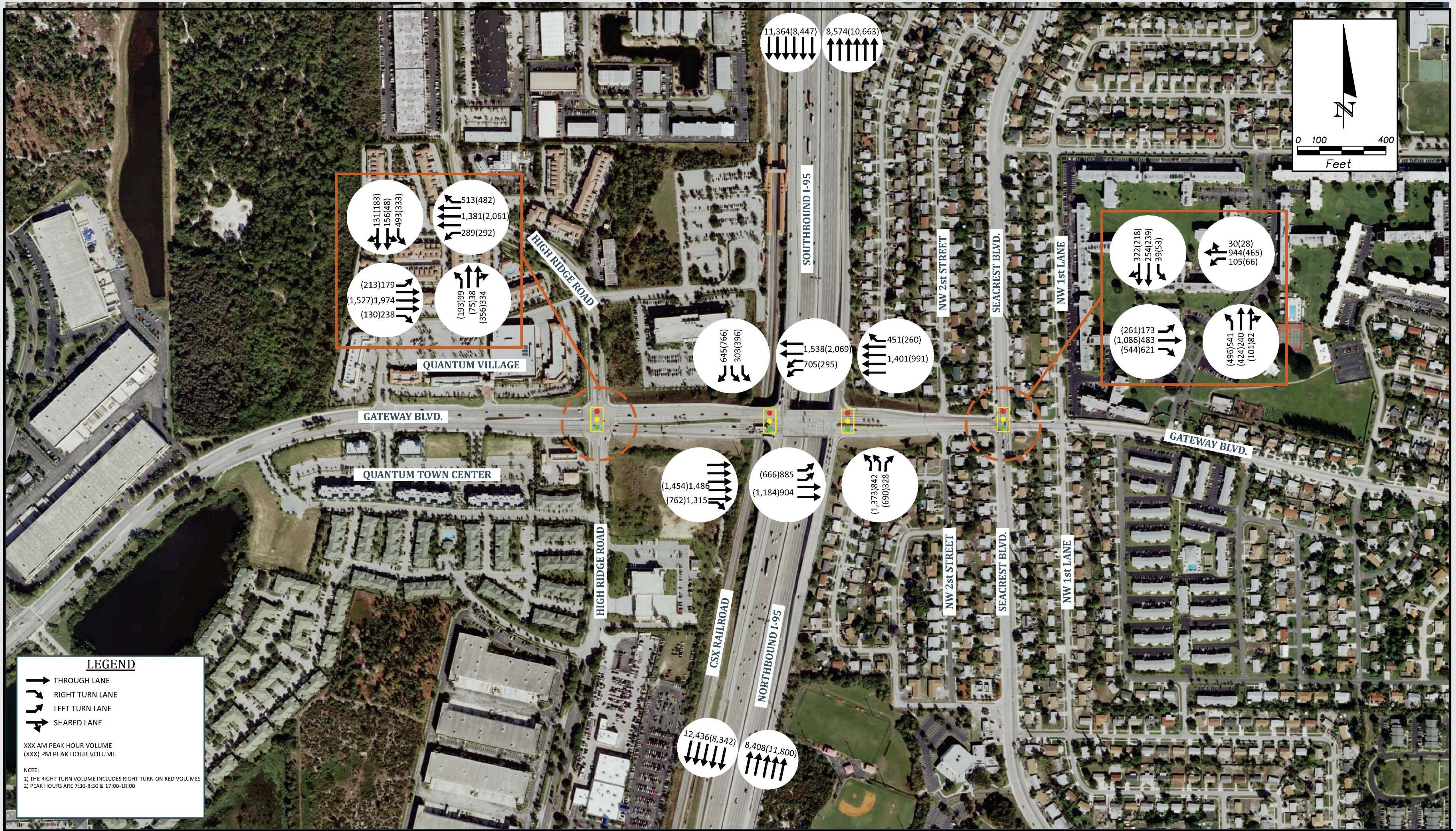
SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
Design Year (2040) - Balanced Intersection Turning Movement Volumes

Figure 4-18



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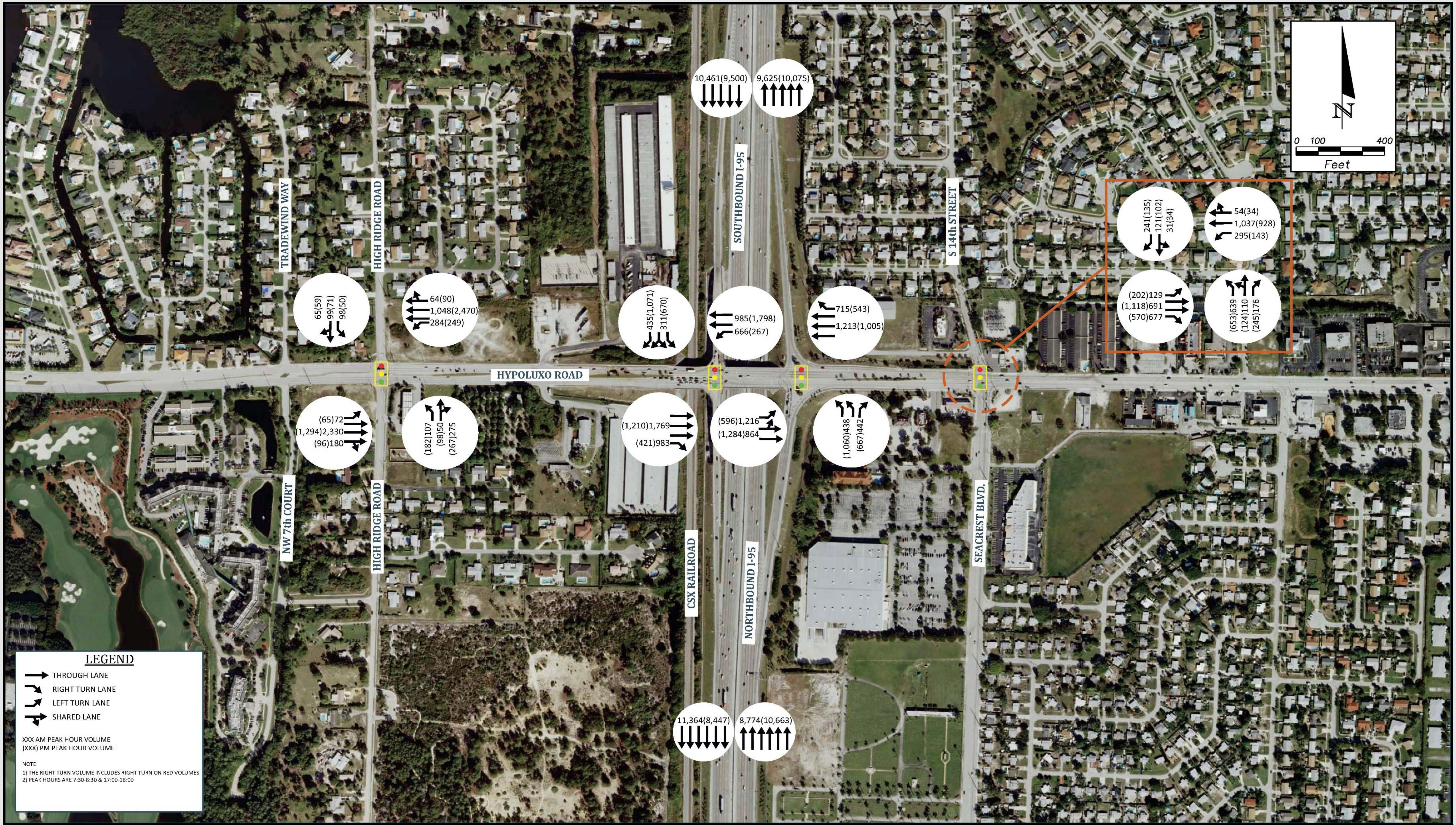
SR 9/I-95 at Gateway Boulevard Interchange
Design Year (2040) - Balanced Intersection Turning Movement Volumes

Figure 4-19



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SR 9/I-95 at Hypoluxo Road Interchange
Design Year (2040) - Balanced Intersection Turning Movement Volumes

Figure 4-20

5. Project Alternatives

NEPA project development must consider a range of alternatives that meet the purpose and need of the project while balancing engineering requirements, impacts, and benefits. Project alternatives include the No-Build, Transportation Systems Management & Operations, and Build Alternatives.

FDOT is committed to the practicable avoidance and minimization of potential impacts to the social and natural environment when considering approval of proposed transportation projects. The study of alternatives and the associated environmental consequences were evaluated according to NEPA and FDOT's PD&E process. This study process allows for coordination during the alternatives development process and thorough consideration of alternatives developed.

According to the City of Boynton Beach Future Land Use Map, the project area remains urbanized with a mix of low and high density residential and local commercial uses. The character of the study area remains unchanged and will continue to support the existing and future land uses within the project and surrounding area maintaining the goals of the City of Boynton Beach Future Land Use Map, the Community Redevelopment Area and Quantum DRI goals. All alternatives considered for this project are compatible with the future land uses envisioned by the City of Boynton Beach.

5.1 No-Build Alternative

NEPA requires that doing nothing to existing conditions be considered during the environmental review process. This alternative is designated as the No-Build Alternative, signifying that no new improvements or construction would take place. Although this alternative does not meet the purpose and need for the project, it will be considered serving as a baseline for comparison against other alternatives. The No-Build Alternative retains the existing roadway and planned/programmed short-term interchange improvements and would not have any direct impacts to the physical, natural, and social environments, right-of-way, structures, or utilities.

5.2 Transportation System Management and Operations (TSM&O) Alternative

The TSM&O Alternative includes implementation of non-capacity improvements to the existing transportation network that improve traffic flow, manage congestion, and maximize highway operations. Intelligent transportation systems (ITS), multimodal applications, adjusting signal phasing and timing, auxiliary lane additions, and higher land-use density strategies are TSM&O instruments used to maximize transportation infrastructure utilization. Such improvements are often less costly and require little to no right-of-way compared to physical expansion of the transportation network.

The TSM&O improvements considered for SR 804/Boynton Beach Boulevard included optimized signal timing and phasing plans and used coordinated signal timings with offsets, cycle lengths and splits optimized for the study area intersections. No additional roadway geometric improvements were considered. Similarly, signal timing enhancements, optimized splits, and improved phasing plans for the intersections within the Gateway Boulevard interchange influence area were evaluated for the TSM&O alternative. In addition, improvements that required additional right-of-way or adding lanes were not considered. Since, acquiring right-of-way to add more turn lanes were a component of the proposed Palm Beach County project at the intersection of High Ridge Road and Gateway Boulevard, these proposed improvements were not included in the TSM&O alternative.

TSM&O improvements alone would not adequately accommodate the future year traffic volumes within the project's area of influence. The TSM&O Alternative alone is not considered a viable alternative. However, the Build Alternatives developed will incorporate viable TSM&O improvements.

5.3 Alternative Travel Modes

Multimodal facilities such as transit routes currently exist within the proposed project limits. The existing modes are incorporated into the Build Alternatives with current design standards. The Build Alternative for this project will include bicycle lanes and sidewalks that will connect to existing facilities to the east and west of the project limits. The transit routes within the study area will not be affected by the Build Alternative. Alternative travel modes are not anticipated to reduce the future demand near this interchange.

5.4 Alternatives Development

As part of the PD&E Study, several roadway improvement alternatives were considered for improving traffic operations and safety near the SR 804/Boynton Beach Boulevard and Gateway Boulevard interchanges. Interchange Concept Development Reports (2014) were developed for the SR 804/Boynton Beach Boulevard and Gateway Boulevard interchanges as part of the SR 9/I-95 Master Plan project evaluated conceptual design alternatives for geometric criteria, impacts on structures, drainage, signing, and utilities, adjoining side street connections, signalized intersections, and constructability.

The recommended improvements from these reports resulted in the development of a Conceptual Design Alternative (CDA). The CDA has been retained and will be evaluated as a Build Alternative in this PD&E Study. A Tier 1 Alternatives Evaluation Technical Memorandum (March 2016) was prepared that identified preliminary alternatives that improved traffic operations and safety. Under Tier I evaluations, eight (8) conceptual alternatives were developed for SR 804/Boynton Beach Boulevard interchange in addition to the CDA and three (3) for Gateway Boulevard interchange in addition to the CDA. A preliminary screening of each alternative was completed with respect to the purpose and need for the project, traffic operations, traffic safety, constructability, cost, right of way, environmental, and socio-economic impacts.

Of the preliminary alternatives developed, the following Build Alternatives were retained for full evaluation for each interchange. All Build Alternatives will incorporate TSM&O improvements and will be developed further as the PD&E project progresses.

- Alternative 1 - Conceptual Design Alternative (CDA)
- Alternative 2 - Streamlined CDA
- Alternative 3 - Single-point Urban Interchange (SPUI)

The *Tier I Alternatives Evaluation Technical Memorandum* is provided in Appendix H.

5.5 Build Alternatives

5.5.1 SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange

Alternative 1 – CDA

This Build Alternative was retained from the Concept Development Reports previously prepared and discussed in Section 5.4. The development of this alternative considered practical design and evaluated traditional turn lane improvements for the existing Tight Urban Diamond Interchange configuration to optimize the benefit to cost (B/C) ratio without imperiling traffic operations and safety.

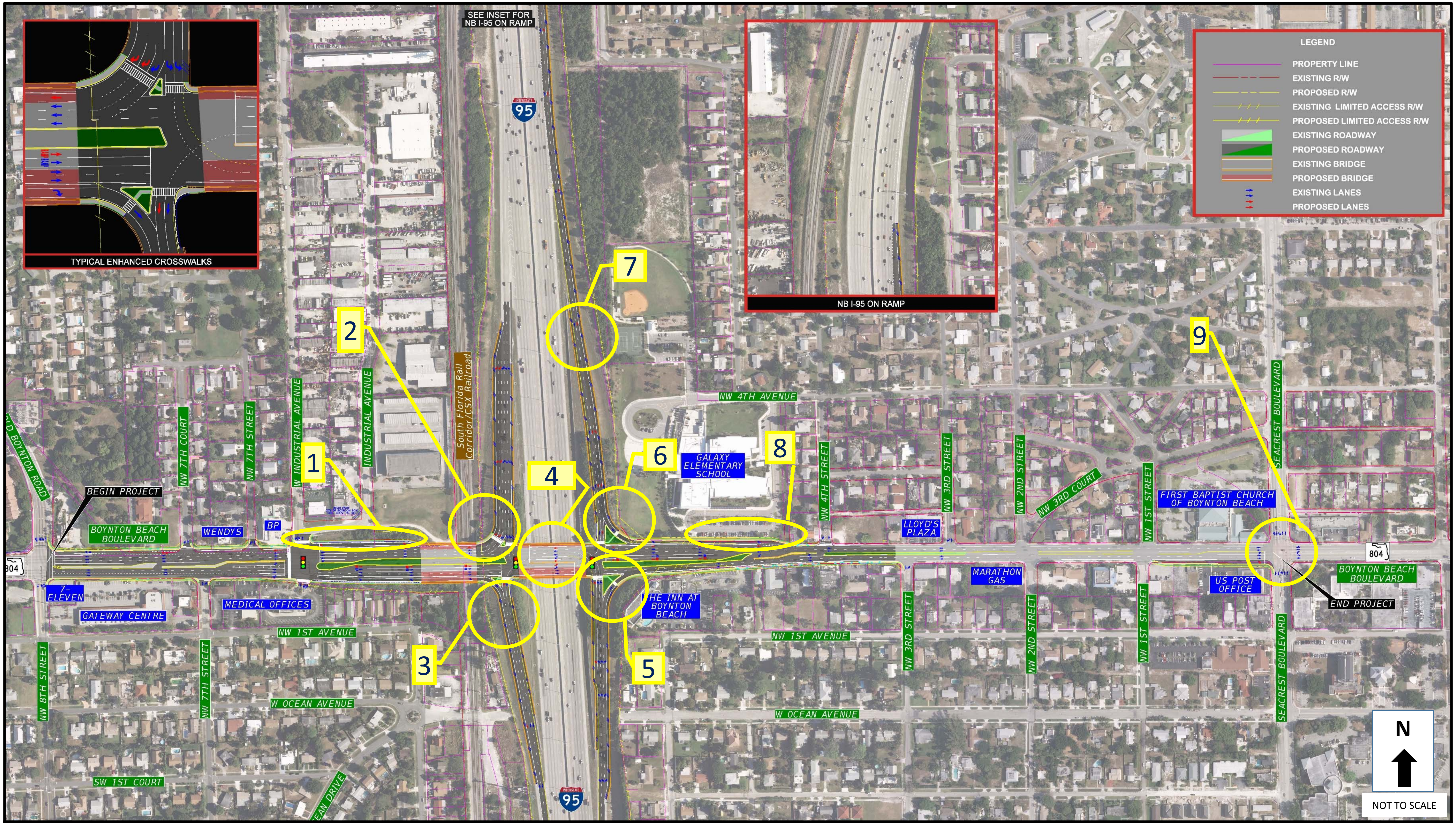
For this alternative, proposed improvements are described below and shown on Figure 5-1.

1. A new westbound right turn lane to Industrial Avenue
2. Dual left and triple right turn lanes in the southbound direction at the SR 9/I-95 southbound ramp terminal intersection
3. Continuously flowing channelized eastbound right turn lane and dual westbound left turn lanes that create three SR 9/I-95 southbound on-ramp lanes. The third lane on the SR 9/I-95 southbound on-ramp is merged south of the ramp terminal intersection from the right side to tie into the existing dual lane on-ramp
4. Dual left turn lanes in the eastbound and westbound direction along SR 804/Boynton Beach Boulevard
5. Triple left turn lanes and single channelized right turn lane in the northbound direction at the northbound SR 9/I-95 ramp terminal intersection
6. Dual left turn lanes with extended queue lengths, single channelized right turn lane and additional through lane in the westbound direction along SR 804/Boynton Beach Boulevard east of the SR 9/I-95 bridge
7. Continuously flowing channelized westbound right turn lane and dual eastbound left turn lanes that create three SR 9/I-95 northbound on-ramp lanes. Two of the three lanes on this SR 9/I-95 northbound on-ramp are merged north of the ramp terminal intersection from the right to tie into the existing axillary lane between SR 804/Boynton Beach Boulevard and Gateway Boulevard
8. Increase right turn storage lane along westbound SR 804/Boynton Beach Boulevard at the northbound SR 9/I-95 ramp terminal intersection
9. New right turn storage lane in the eastbound direction at the SR 804/Boynton Beach Boulevard and Seacrest Boulevard intersection

Alternative 1 also adds an additional westbound through lane between SR 9/I-95 southbound ramp terminal and NW 8th Street/Old Boynton Road. This additional westbound through lane is dropped near the intersection of SR 804/Boynton Beach Boulevard and NW 8th Street/Old Boynton Road as a westbound right turn lane.

Alternative 2 – Streamlined CDA

This Build Alternative enhances Alternative 1 and avoids reconstruction of the SR 804/Boynton Beach Boulevard bridges over the CSX/SFRC railroad (Bridge Number 930289) and SR 9/I-95 (Bridge Number 930285). This alternative retains most of Alternative 1 proposed improvements, but proposes the below described enhancements and are shown on Figure 5-2.



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SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
Build Alternative 1 – Conceptual Development Alternative (CDA)

Figure 5-1

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SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
Build Alternative 2 – Streamlined CDA

Figure 5-2

1. A closed median between 7th Street and NW 8th Street/Old Boynton Road
2. Dual right turn lanes, a single left turn lane and a shared left/right lane in the southbound direction at the SR 9/I-95 southbound ramp terminal intersection
3. Continuously flowing channelized eastbound right turn lane and dual westbound left turn lanes that create three SR 9/I-95 southbound on-ramp lanes. The third lane on the SR 9/I-95 southbound on-ramp is merged south of the ramp terminal intersection from the left side to tie into the existing dual lane on-ramp
4. Triple left and dual channelized right turn lanes in the northbound direction at the SR 9/I-95 northbound ramp terminal intersection
5. Eliminate the eastbound right turn storage near SR 804/Boynton Beach Boulevard and Seacrest Boulevard intersection.

Alternative 2 eliminates the additional westbound through lane between SR 9/I-95 southbound ramp terminal and NW 8th Street/Old Boynton Road added by the Alternative 1. Alternative 3 – Single-point Urban Interchange (SPUI)

Alternative 3 – Single-point Urban Interchange (SPUI)

This Build Alternative proposes the construction of a new SPUI at the SR 9/I-95 and SR 804/Boynton Beach Boulevard Interchange. A SPUI configuration combines turning movements at the SR 9/I-95 northbound and southbound exit ramps to operate under a single traffic control device, resulting in a high capacity interchange.

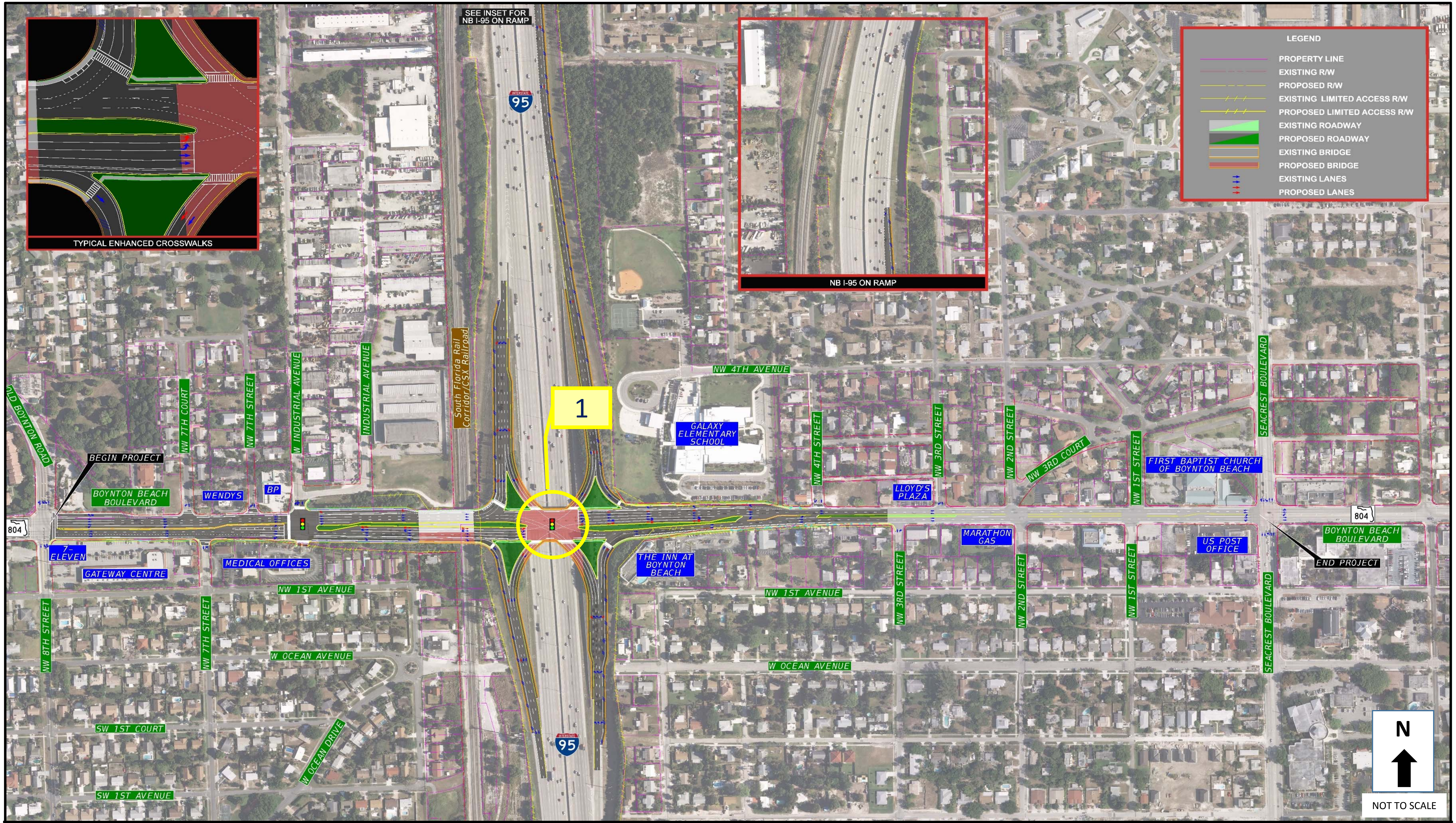
The following improvements are proposed for this alternative and are shown on Figure 5-3.

1. Convert existing dual ramp terminal signalized intersections into a single signalized intersection to serve both southbound and northbound ramp terminals. This Alternative will include:

   All improvements considered along SR 804/Boynton Beach Boulevard and SR 9/I-95 northbound and southbound ramps considered under Alternative 2 described above are replicated with the SPUI

Design Exceptions and Variations

All the Build Alternatives proposed modifications for this interchange are designed with the ultimate goal to meet current standards for federal-aid projects and conform to American Association of State Highway and Transportation Officials (AASHTO) design standards, but some design exceptions and variations are unavoidable considering the vicinity and project needs. Table 5-1 summarizes the anticipated design exceptions and variations for each Build Alternative.



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SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
Build Alternative 3 – Single Point Urban Interchange (SPUI)

Figure 5-3

Table 5-1: SR 804/Boynton Beach Boulevard Interchange – Design Exceptions and Variations

No.	Design Element	Alternative 1 (CDA)		Alternative 2 (Streamlined CDA)		Alternative 3 (SPUI)	
		Variation	Exception	Variation	Exception	Variation	Exception
1	Border Width	X		X		X	
2	Design Speed						
3	Lane Width						
4	Shoulder Width						
5	Bridge Width						
6	Structural Capacity						
7	Vertical Clearance			(*)			
8	Grade						
9	Cross Slope						
10	Superelevation						
11	Horizontal Alignment						
12	Vertical Alignment	X		X		X	
13	Stopping Sight Distance	X		X		X	
14	Horizontal Clearance (Lateral offset to Obstruction)	X		X		X	

(*) Alternative 2 (Streamlined CDA) proposes to widen the existing bridges along the arterial and will maintain existing deficient vertical clearance.

Most of the design deficiencies identified are a result of existing conditions and are being maintained with the proposed designs. The designs proposed for this project do not deteriorate these existing deficiencies.

5.5.2 SR 9/I-95 at Gateway Boulevard Interchange

Alternative 1 – CDA

This Build Alternative was retained from the Concept Development Reports previously prepared and discussed in Section 5.4. The development of this alternative considered practical design and evaluated traditional turn lane improvements for the existing Tight Urban Diamond Interchange configuration to optimize the benefit to cost (B/C) ratio without imperiling traffic operations and safety.

For this alternative, proposed improvements are described below and are shown on Figure 5-4.

1. Dual left turn lanes and a single right turn lane in the eastbound direction at the Gateway Boulevard and High Ridge Road intersection

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SR 9/I-95 at Gateway Boulevard Interchange
Build Alternative 1 – Conceptual Development Alternative (CDA)

Figure 5-4

2. Dual left turn lanes and a single right turn lane in the northbound direction at the Gateway Boulevard and High Ridge Road intersection
3. Triple left turn lanes from southbound High Ridge Road to eastbound Gateway Boulevard
4. Dual left and right turn lanes in the southbound direction at the SR 9/I-95 southbound ramp terminal intersection
5. Dual right turn lanes from eastbound Gateway Boulevard to southbound SR 9/I-95
6. Triple left and single right turn lanes in the northbound direction at the SR 9/I-95 northbound ramp terminal intersection
7. Dual left turn lanes from northbound Seacrest Boulevard to westbound Gateway Boulevard
8. Single right turn lane from southbound Seacrest Boulevard to westbound Gateway Boulevard

Alternative 1 adds an additional through lane in the eastbound and westbound direction to create an eight lane typical section along Gateway Boulevard within the project limits between Quantum Boulevard and NE 1st Way.

Alternative 2 – Streamlined CDA

This Build Alternative enhances Alternative 1 along with retaining most of Alternative 1 proposed improvements including the additional through lane in the eastbound and westbound direction along Gateway Boulevard between Quantum Boulevard and NE 1st Way. Most of the SR 9/I-95 northbound and southbound ramp termini turn lane improvements are retained from Alternative 1 with adjustments to the intersection turn lane improvements at High Ridge Road.

For this alternative, proposed modifications are described below and shown on Figure 5-5.

1. Dual left turn lanes from southbound High Ridge Road to eastbound Gateway Boulevard as opposed to triple left turn lanes in Alternative 1
2. A single right turn lane and shared through/right turn lane from eastbound Gateway Boulevard to southbound SR 9/I-95
3. Triple left and dual right turn lanes in the northbound direction at the SR 9/I-95 northbound ramp terminal intersection

Alternative 3 – Single-point Urban Interchange (SPUI)

This Build Alternative proposes the construction of a new SPUI at the SR 9/I-95 at Gateway Boulevard Interchange. A SPUI configuration combines turning movements at the SR 9/I-95 northbound and southbound exit ramps to operate under a single traffic control device, resulting in a high capacity interchange.

The following improvements are proposed for this alternative and are shown in Figure 5-6.

1. Convert existing dual ramp terminal signalized intersections into a single signalized intersection to serve both southbound and northbound ramp terminals. This Alternative will include:

   All improvements considered along Gateway Boulevard and SR 9/I-95 northbound and southbound ramps considered under Alternative 2 described above are replicated with the SPUI

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SR 9/I-95 at Gateway Boulevard Interchange
Build Alternative 2 – Streamlined CDA

Figure 5-5

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SR 9/I-95 at Gateway Boulevard Interchange
Build Alternative 3 – Single Point Urban Interchange (SPUI)

Figure 5-6

Design Exceptions and Variations

All the Build Alternatives proposed modifications are designed with the ultimate goal to meet current standards for federal-aid projects and conform to AASHTO design standards, but some design exceptions and variations are unavoidable considering the vicinity and project needs. Table 5-2 summarizes the anticipated design exceptions and variations for each Build Alternative.

Table 5-2: Gateway Boulevard Interchange – Design Exceptions and Variations

No.	Design Element	Alternative 1 (CDA)		Alternative 2 (Streamlined CDA)		Alternative 3 (SPUI)	
		Variation	Exception	Variation	Exception	Variation	Exception
1	Border Width	X		X		X	
2	Design Speed						
3	Lane Width						
4	Shoulder Width						
5	Bridge Width						
6	Structural Capacity						
7	Vertical Clearance	(*)		(*)		(*)	
8	Grade						
9	Cross Slope						
10	Superelevation						
11	Horizontal Alignment						
12	Vertical Alignment	X		X		X	
13	Stopping Sight Distance	X		X		X	
14	Horizontal Clearance (Lateral offset to Obstruction)	X		X		X	

(*) All Build Alternatives propose to widen the existing bridges along the arterial and will maintain existing deficient vertical clearance.

Most of the design deficiencies identified are a result of existing conditions and are being maintained with the proposed designs. The designs proposed for this project do not deteriorate these existing deficiencies.

5.6 Preferred Alternative

The No-Build Alternative will not provide adequate traffic operations nor improvements to safety for the SR 804/Boynton Beach Boulevard and Gateway Boulevard interchanges within the study area. Thus, the FDOT District 4, in coordination with the District Interchange Review Committee, has identified the below Build Alternatives as the Preferred Alternatives for each interchange based on detailed engineering and environmental analysis, agency coordination, and public comments:

- The recommended Preferred Alternative for SR 804/Boynton Beach Boulevard interchange is Build Alternative 2 – Streamlined CDA.
- The recommended Preferred Alternative for Gateway Boulevard interchange is Build Alternative 3 – SPUI.

These Preferred Build Alternatives developed incorporate viable TSM&O improvements and will be developed further as the PD&E project progresses.

Details of the operational and safety analysis and the reasoning for selecting these two Build Alternatives as the Preferred Alternatives are provided in Sections 6 and 7.

6. Alternative Analysis

6.1 Conformance with Transportation Plans

The improvements proposed in the SIMR for the Build Alternatives are consistent with improvement plans incorporated in Florida's Strategic Intermodal System (SIS) 2040 Long Range Cost Feasible Plan and the Statewide Transportation Improvement Program (STIP). The proposed improvements are consistent with the current 2040 Cost Feasible Long Range Transportation Plan (LRTP), adopted by Palm Beach County, Metropolitan Planning Organization (MPO). The improvements are also incorporated in the MPO's Transportation Improvement Program (TIP).

6.2 Compliance with Policies and Engineering Standards

The design criteria for this project are based on design parameters outlined in the Roadway Plans Preparation Manual, Volume I and II (FDOT, January 2016), the Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (FDOT), and A Policy on Geometric Design of Highway and Streets (AASHTO, 2011). A list of design exceptions and variations required for the proposed designs that deviated from these set standards are outlined in Section 5.5.

6.3 No-Build Alternative Operational Analysis

The future No-Build Alternative includes the Existing Year (2015) roadway network plus all funded and (planned/programmed) committed projects within the study corridor per the FDOT 5-Year Work program. It also incorporates all Cost Feasible Plan projects contained in Palm Beach County's 2040 Long Range Transportation Plan (LRTP). In addition, the development of the No-Build network involved extensive coordination with FDOT District Four and Palm Beach County to determine anticipated Opening Year for various planned projects and any additional road improvements that should be incorporated in the No-Build Alternative. Based on coordination with these agencies and reviews of the Department's 5-Year Work Program and LRTP, the below listed planned or programmed projects within the immediate vicinity of the study area are included in the No-Build transportation network:

1. The interchange improvements at Woolbright Road and SR 9/I-95 proposed through an IOAR approved in March 2013.
2. Short-term improvements proposed at Gateway Boulevard and SR 9/I-95 interchange proposed through a non-IAR completed in May 2014.
3. Intersection improvements proposed by Palm Beach County at the intersection of High Ridge Road and Gateway Boulevard.
4. The interchange improvements at Hypoluxo Road and SR 9/I-95 proposed through an IOAR approved in March 2011.
5. Two express lanes along SR 9/I-95 in either direction (northbound and southbound) within the project study area. FDOT is currently conducting a Planning Study of the feasibility of deploying these express lanes. No funding for implementation past the Planning Study was programmed for this project in the FDOT Work Program. However, this project was included in the SERPM model for volume development and in the Palm Beach MPO Year 2040 LRTP. Therefore, this project is included in both the No-Build and Build roadway operational analysis.

The No-Build roadway network is consistent for the three analysis years (2020, 2030, 2040) within the SIMR limits.

6.3.1 Operational Analysis

Future conditions operational analyses were performed for the No Build Alternative based on traffic forecasts and network conditions with the planned/programmed projects listed above for the years 2020, 2030 and 2040. LOS calculations for freeway segments (basic, merge and diverge areas) and analyses of freeway weaving segments were performed using the Highway Capacity Software (HCS). Synchro 9 models were developed for computing the LOS of ramp terminal intersections and other intersections within the study area.

No-Build conditions operational analysis LOS calculations and output reports for years 2020, 2030, and 2040 are provided in Appendix I.

6.3.1.1 SR 9/I-95 Freeway Segments

FDOT is currently evaluating the feasibility of deploying express lanes along SR 9/I-95 within the current project study area. Detailed analysis is currently underway to evaluate traffic operations along SR 9/I-95 between Linton Boulevard and Indiantown Road. The study is currently in Planning phase and no PD&E, Design, or Construction phases of any improvements from this study are programmed by FDOT. The preferred typical section for express lanes from this study included the installation of two express lanes in both the northbound and southbound direction along the study area. For the purposes of consistency between the no-build and build condition operations along the SR 9/I-95 freeway segments, it is assumed that two express lanes will be present along SR 9/I-95 within the study area and would serve up to 1,650 vehicles per hour per lane (3,300 vehicles per hour) through these express lanes. This volume of 3,300 vehicles per hour is deducted from the mainline volume to conduct the freeway segment HCS analysis owing to the limitations of HCS software.

The results from HCS LOS analysis of the basic freeway segment, ramp merge or diverge sections, and weaving segments along SR 9/I-95 northbound and southbound directions are summarized in Tables 6-1 through 6-3 for Open (2020), Interim (2030), and Design (2040) Years, respectively. Figures 6-1 through 6-3 depict the No-Build conditions results from this analysis along the freeway for the Open (2020), Interim (2030), and Design (2040) Years, respectively.

Results indicate that most of the basic freeway segments do not operate at LOS D or better by the Design Year (2040). The underperforming basic freeway segments are identified below:

Open Year (2020)

- Northbound SR 9/I-95
    - During the PM peak hour, the weave section, between the Woolbright Road on ramp and the SR 804/Boynton Beach Boulevard off ramp, operates at LOS F.
    - During the PM peak hour, the weave section, between the SR 804/Boynton Beach Boulevard on ramp and the Gateway Boulevard off ramp, operates at LOS F.
- Southbound SR 9/I-95
    - During the AM peak hour, the diverge to Gateway Boulevard operates at LOS E.
    - During the AM peak hour, the weave section, between the Gateway Boulevard on ramp and the SR 804/Boynton Beach Boulevard off ramp, operates at LOS F.

Table 6-1: Freeway Segment LOS Summary – No Build Conditions – Open Year (2020)

ID	Freeway	From	To	Type	AM Peak					PM Peak				
					Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS	Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS
NORTHBOUND														
1	I-95	Project Beginning	Woolbright Rd	BFS	2,773			10.6	A	7,138			30.2	D
2			Woolbright Rd Off-Ramp	Diverge	2,773		768	2.7	A	7,183		1,352	13.8	B
3		Woolbright Rd Off-Ramp	Woolbright Rd On-Ramp	BFS	2,005			7.7	A	5,831			22.9	C
4		Woolbright Rd On-Ramp	SR 804/Boynton Beach Blvd Off-Ramp	Weave	3,459	1,454	597	12.4	B	7,472	1,641	1,866	*	F
5		SR 804/Boynton Beach Blvd Off-Ramp	SR 804/Boynton Beach Blvd On-Ramp	BFS	2,862			11.0	A	5,606			21.8	C
6		SR 804/Boynton Beach Blvd On-Ramp	Gateway Blvd Off-Ramp	Weave	3,909	1,047	798	14.6	B	6,646	1,040	1,422	*	F
7		Gateway Blvd Off-Ramp	Gateway Blvd On-Ramp	BFS	3,111			11.9	B	5,224			20.2	C
8		Gateway Blvd On-Ramp		Merge	3,111	1,122		21.6	C	5,224	785		26.0	C
9		Gateway Blvd On-Ramp	Hypoluxo Rd Off-Ramp	BFS	4,233			16.2	B	6,009			23.7	C
10			Hypoluxo Rd Off-Ramp	Diverge	4,233		500	< 1.0	A	6,009		1,298	< 1.0	A
11		Hypoluxo Rd Off-Ramp	Hypoluxo Rd On-Ramp	BFS	3,733			14.3	B	4,711			18.1	C
12		Hypoluxo Rd On-Ramp	Project End	BFS	5,236			16.1	B	5,731			17.6	B

pc/mi/ln – passenger car per mile per lane
* Volumes exceed available capacity leading to LOS F operations
Note:
1) As discussed in Section 2.7, an express lane maximum capacity of 1,650 vehicles per hour per lane was assumed. Future conditions for this project assumes two express lanes in either direction; these vehicles are excluded from the mainline I-95 general purpose traffic volumes and therefore, not included in this analysis.
2) Densities recorded as 0 pc/mi/ln are attributed to relatively low traffic demand volumes and long acceleration/deceleration lane lengths as provided by HCM 2010.

Table 6-1: Freeway Segment LOS Summary – No Build Conditions – Open Year (2020) – continued

ID	Freeway	From	To	Type	AM Peak					PM Peak				
					Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS	Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS
SOUTHBOUND														
13	I-95	Project End	Hypoluxo Rd Off-Ramp	BFS	6,889			21.4	C	5,100			15.6	B
14		Hypoluxo Rd Off-Ramp	Hypoluxo Rd On-Ramp	BFS	6,289			25.1	C	3,705			14.2	B
15		Hypoluxo Rd On-Ramp		Merge	6,289	1,204		26.6	C	3,705	600		13.2	B
16		Hypoluxo Rd On-Ramp	Gateway Blvd Off-Ramp	BFS	7,493			32.2	D	4,305			16.5	B
17			Gateway Blvd Off-Ramp	Diverge	7,493		844	36.3	E	4,305		1,013	24.3	C
18		Gateway Blvd Off-Ramp	Gateway Blvd On-Ramp	BFS	6,649			27.0	D	3,292			12.6	B
19		Gateway Blvd On-Ramp	SR 804/Boynton Beach Blvd Off-Ramp	Weave	7,969	1,320	1,346	*	F	4,023	731	1,315	13.7	B
20		SR 804/Boynton Beach Blvd Off-Ramp	SR 804/Boynton Beach Blvd On-Ramp	BFS	6,623			26.9	D	2,708			10.4	A
21		SR 804/Boynton Beach Blvd On-Ramp	Woolbright Rd Off-Ramp	Weave	7,808	1,185	1,593	26.5	C	3,404	696	1,411	9.8	A
22		Woolbright Rd Off-Ramp	Woolbright Rd On-Ramp	BFS	6,215			24.7	C	1,993			7.6	A
23		Woolbright Rd On-Ramp		Merge	6,215	1,159		26.0	C	1,993	798		11.2	B
24		Woolbright Rd On-Ramp	Project Beginning	BFS	7,374			31.4	D	2,791			10.7	A

pc/mi/ln – passenger car per mile per lane
* Volumes exceed available capacity leading to LOS F operations
Note:
1) As discussed in Section 2.7, an express lane maximum capacity of 1,650 vehicles per hour per lane was assumed. Future conditions for this project assumes two express lanes in either direction; these vehicles are excluded from the mainline I-95 general purpose traffic volumes and therefore, not included in this analysis.
2) Densities recorded as 0 pc/mi/ln are attributed to relatively low traffic demand volumes and long acceleration/deceleration lane lengths as provided by HCM 2010.

Table 6-2: Freeway Segment LOS Summary – No Build Conditions – Interim Year (2030)

ID	Freeway	From	To	Type	AM Peak					PM Peak				
					Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS	Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS
NORTHBOUND														
1	I-95	Project Beginning	Woolbright Rd	BFS	3,122			12.0	B	8,223			37.9	E
2	I-95		Woolbright Rd Off-Ramp	Diverge	3,122		901	4.4	A	8,223		1,516	16.9	B
3	I-95	Woolbright Rd Off-Ramp	Woolbright Rd On-Ramp	BFS	2,221			8.5	A	6,707			27.3	D
4	I-95	Woolbright Rd On-Ramp	SR 804/Boynton Beach Blvd Off-Ramp	Weave	3,894	1,673	679	14.2	B	8,451	1,744	2,005	*	F
5	I-95	SR 804/Boynton Beach Blvd Off-Ramp	SR 804/Boynton Beach Blvd On-Ramp	BFS	3,215			12.3	B	6,446			25.9	C
6	I-95	SR 804/Boynton Beach Blvd On-Ramp	Gateway Blvd Off-Ramp	Weave	4,517	1,302	968	17.6	B	7,674	1,228	1,716	*	F
7	I-95	Gateway Blvd Off-Ramp	Gateway Blvd On-Ramp	BFS	3,549			13.6	B	5,958			23.5	C
8	I-95	Gateway Blvd On-Ramp		Merge	3,549	1,220		23.8	C	5,958	843		28.9	D
9	I-95	Gateway Blvd On-Ramp	Hypoluxo Rd Off-Ramp	BFS	4,769			18.3	C	6,801			27.9	D
10	I-95		Hypoluxo Rd Off-Ramp	Diverge	4,769		667	< 1.0	A	6,801		1,493	< 1.0	A
11	I-95	Hypoluxo Rd Off-Ramp	Hypoluxo Rd On-Ramp	BFS	4,102			15.7	B	5,308			20.5	C
12	I-95	Hypoluxo Rd On-Ramp	Project End	BFS	5,843			17.9	B	6,388			19.7	C

pc/mi/ln – passenger car per mile per lane
* Volumes exceed available capacity leading to LOS F operations
Note:
1) As discussed in Section 2.7, an express lane maximum capacity of 1,650 vehicles per hour per lane was assumed. Future conditions for this project assumes two express lanes in either direction; these vehicles are excluded from the mainline I-95 general purpose traffic volumes and therefore, not included in this analysis.
2) Densities recorded as 0 pc/mi/ln are attributed to relatively low traffic demand volumes and long acceleration/deceleration lane lengths as provided by HCM 2010.

Table 6-2: Freeway Segment LOS Summary – No Build Conditions – Interim Year (2030) – continued

ID	Freeway	From	To	Type	AM Peak					PM Peak				
					Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS	Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS
SOUTHBOUND														
13	I-95	Project End	Hypoluxo Rd Off-Ramp	BFS	7,007			21.8	C	5,660			17.4	B
14		Hypoluxo Rd Off-Ramp	Hypoluxo Rd On-Ramp	BFS	6,361			25.5	C	4,106			15.7	B
15		Hypoluxo Rd On-Ramp		Merge	6,361	1,439		28.7	D	4,106	646		14.9	B
16		Hypoluxo Rd On-Ramp	Gateway Blvd Off-Ramp	BFS	7,800			34.5	D	4,752			18.2	C
17			Gateway Blvd Off-Ramp	Diverge	7,800		888	37.8	E	4,752		1,076	26.5	C
18		Gateway Blvd Off-Ramp	Gateway Blvd On-Ramp	BFS	6,912			28.5	D	3,676			14.1	B
19		Gateway Blvd On-Ramp	SR 804/Boynton Beach Blvd Off-Ramp	Weave	8,551	1,639	1,440	*	F	4,554	878	1,420	15.8	B
20		SR 804/Boynton Beach Blvd Off-Ramp	SR 804/Boynton Beach Blvd On-Ramp	BFS	7,111			29.7	D	3,134			12.0	B
21		SR 804/Boynton Beach Blvd On-Ramp	Woolbright Rd Off-Ramp	Weave	8,595	1,484	1,775	31.2	D	3,907	773	1,553	11.4	B
22		Woolbright Rd Off-Ramp	Woolbright Rd On-Ramp	BFS	6,820			28.0	D	2,354			9.0	A
23		Woolbright Rd On-Ramp		Merge	6,820	1,396		29.9	D	2,354	860		13.1	B
24		Woolbright Rd On-Ramp	Project Beginning	BFS	8,216			37.8	E	3,214			12.3	B

pc/mi/ln – passenger car per mile per lane
* Volumes exceed available capacity leading to LOS F operations
Note:
1) As discussed in Section 2.7, an express lane maximum capacity of 1,650 vehicles per hour per lane was assumed. Future conditions for this project assumes two express lanes in either direction; these vehicles are excluded from the mainline I-95 general purpose traffic volumes and therefore, not included in this analysis.
2) Densities recorded as 0 pc/mi/ln are attributed to relatively low traffic demand volumes and long acceleration/deceleration lane lengths as provided by HCM 2010.

Table 6-3: Freeway Segment LOS Summary – No Build Conditions – Design Year (2040)

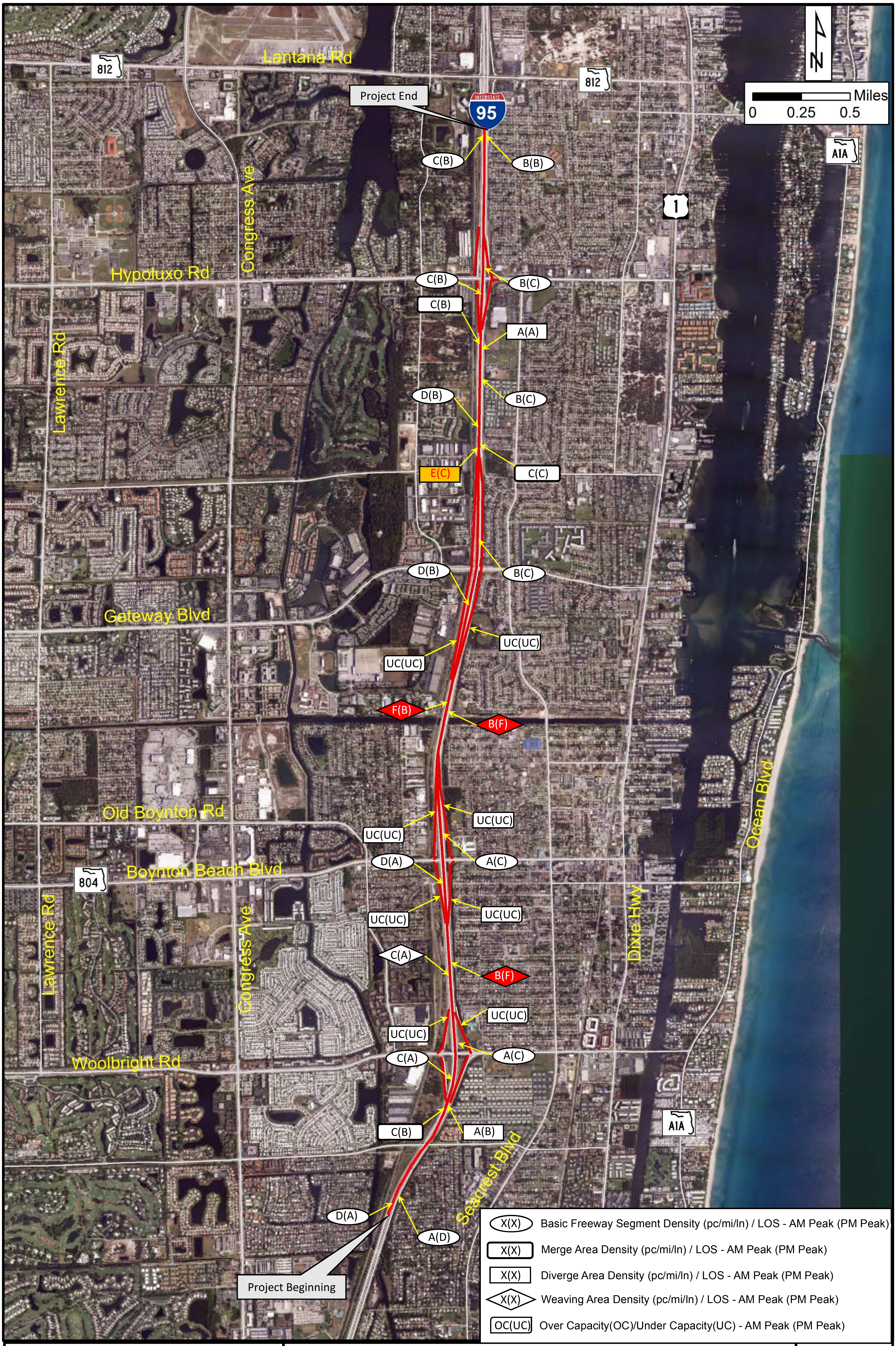
ID	Freeway	From	To	Type	AM Peak					PM Peak				
					Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS	Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS
NORTHBOUND														
1	I-95	Project Beginning	Woolbright Rd	BFS	3,495			13.4	B	9,030			46.1	F
2	I-95		Woolbright Rd Off-Ramp	Diverge	3,495		1,062	6.4	A	9,030		1,718	19.8	B
3	I-95	Woolbright Rd Off-Ramp	Woolbright Rd On-Ramp	BFS	2,433			9.3	A	7,312			31.0	D
4	I-95	Woolbright Rd On-Ramp	SR 804/Boynton Beach Blvd Off-Ramp	Weave	4,316	1,883	780	*	F	9,223	1,911	2,139	*	F
5	I-95	SR 804/Boynton Beach Blvd Off-Ramp	SR 804/Boynton Beach Blvd On-Ramp	BFS	3,536			13.6	B	7,084			29.6	D
6	I-95	SR 804/Boynton Beach Blvd On-Ramp	Gateway Blvd Off-Ramp	Weave	5,108	1,572	1,170	*	F	8,500	1,416	2,063	*	F
7	I-95	Gateway Blvd Off-Ramp	Gateway Blvd On-Ramp	BFS	3,938			15.1	B	6,437			25.9	C
8	I-95	Gateway Blvd On-Ramp		Merge	3,938	1,336		26.1	C	6,437	926		31.2	D
9	I-95	Gateway Blvd On-Ramp	Hypoluxo Rd Off-Ramp	BFS	5,274			20.4	C	7,363			31.4	D
10	I-95		Hypoluxo Rd Off-Ramp	Diverge	5,274		880	< 1.0	A	7,363		1,727	< 1.0	A
11	I-95	Hypoluxo Rd Off-Ramp	Hypoluxo Rd On-Ramp	BFS	4,394			16.8	B	5,636			22.0	C
12	I-95	Hypoluxo Rd On-Ramp	Project End	BFS	6,325			19.5	C	6,775			21.0	C

pc/mi/ln – passenger car per mile per lane
* Volumes exceed available capacity leading to LOS F operations
Note:
1) As discussed in Section 2.7, an express lane maximum capacity of 1,650 vehicles per hour per lane was assumed. Future conditions for this project assumes two express lanes in either direction; these vehicles are excluded from the mainline I-95 general purpose traffic volumes and therefore, not included in this analysis.
2) Densities recorded as 0 pc/mi/ln are attributed to relatively low traffic demand volumes and long acceleration/deceleration lane lengths as provided by HCM 2010.

Table 6-3: Freeway Segment LOS Summary – No Build Conditions – Design Year (2040) – continued

ID	Freeway	From	To	Type	AM Peak					PM Peak				
					Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS	Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS
SOUTHBOUND														
13		Project End	Hypoluxo Rd Off-Ramp	BFS	7,161			22.4	C	6,200			19.1	C
14		Hypoluxo Rd Off-Ramp	Hypoluxo Rd On-Ramp	BFS	6,415			25.8	C	4,459			17.1	B
15		Hypoluxo Rd On-Ramp		Merge	6,415	1,649		30.6	D	4,459	688		16.4	B
16		Hypoluxo Rd On-Ramp	Gateway Blvd Off-Ramp	BFS	8,064			36.6	E	5,147			19.9	C
17			Gateway Blvd Off-Ramp	Diverge	8,064		948	39.1	E	5,147		1,162	28.5	D
18		Gateway Blvd Off-Ramp	Gateway Blvd On-Ramp	BFS	7,116			29.8	D	3,985			15.3	B
19	I-95	Gateway Blvd On-Ramp	SR 804/Boynton Beach Blvd Off-Ramp	Weave	9,136	2,020	1,545	*	F	5,042	1,057	1,545	*	F
20		SR 804/Boynton Beach Blvd Off-Ramp	SR 804/Boynton Beach Blvd On-Ramp	BFS	7,591			32.9	D	3,497			13.4	B
21		SR 804/Boynton Beach Blvd On-Ramp	Woolbright Rd Off-Ramp	Weave	9,395	1,804	1,984	*	F	4,352	855	1,717	12.9	B
22		Woolbright Rd Off-Ramp	Woolbright Rd On-Ramp	BFS	7,411			31.7	D	2,635			10.1	A
23		Woolbright Rd On-Ramp		Merge	7,411	1,654		*	F	2,635	965		14.9	B
24		Woolbright Rd On-Ramp	Project Beginning	BFS	9,065			46.5	F	3,600			13.8	B

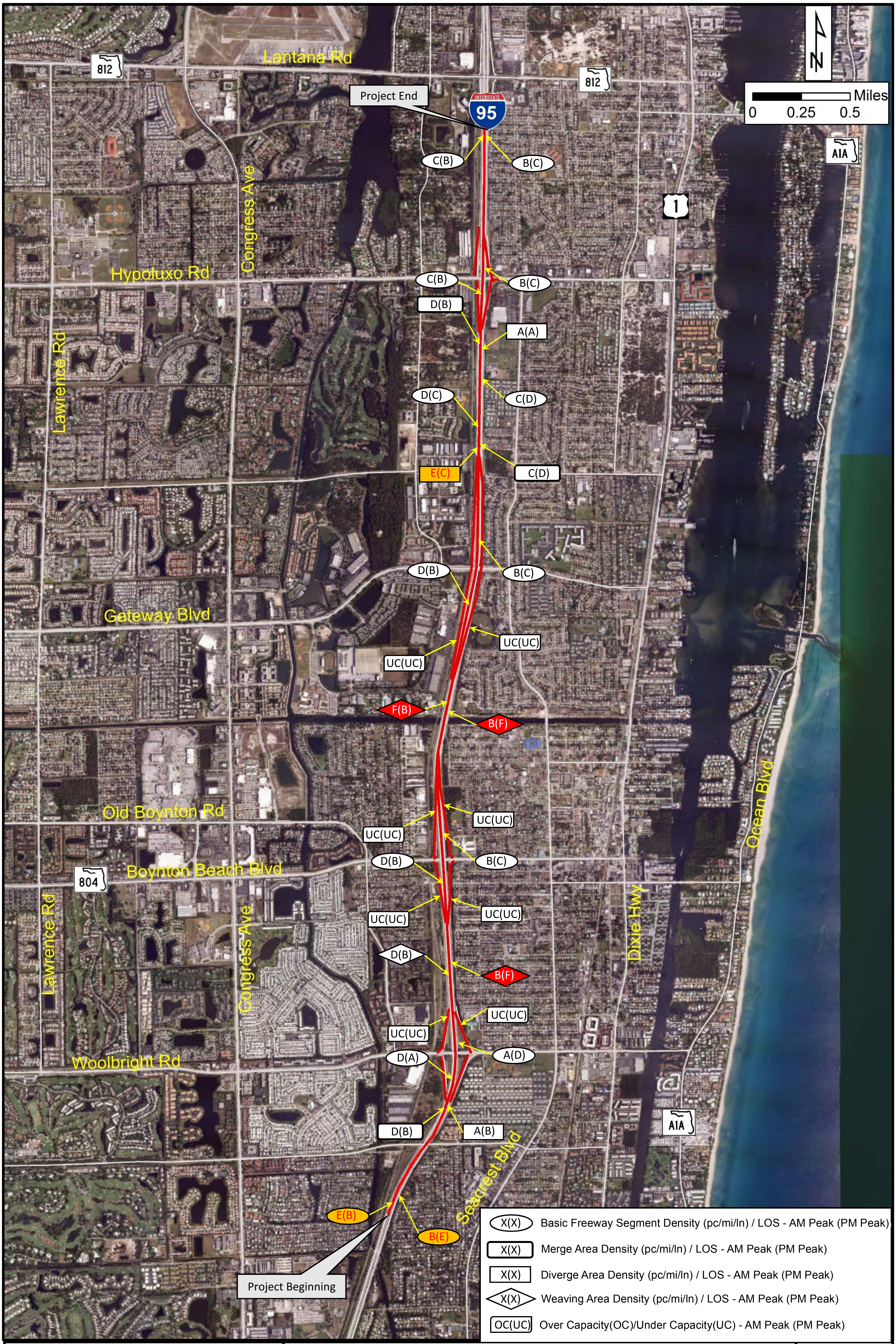
pc/mi/ln – passenger car per mile per lane
* Volumes exceed available capacity leading to LOS F operations
Note:
1) As discussed in Section 2.7, an express lane maximum capacity of 1,650 vehicles per hour per lane was assumed. Future conditions for this project assumes two express lanes in either direction; these vehicles are excluded from the mainline I-95 general purpose traffic volumes and therefore, not included in this analysis.
2) Densities recorded as 0 pc/mi/ln are attributed to relatively low traffic demand volumes and long acceleration/deceleration lane lengths as provided by HCM 2010.



PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

No-Build Alternative
Freeway Facilities Level Of Service
Open Year (2020)

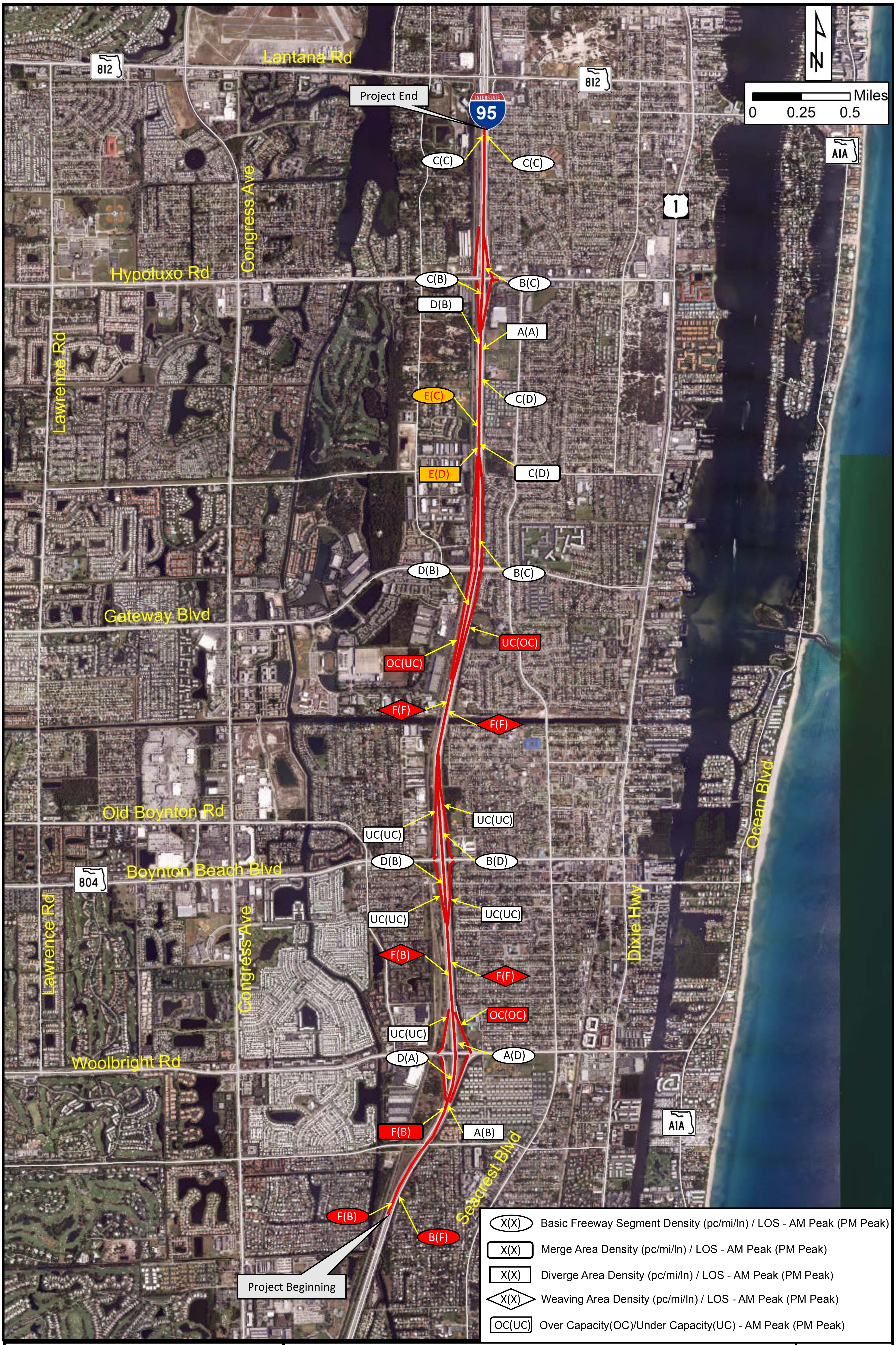
Figure 6-1



PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

No-Build Alternative
Freeway Facilities Level Of Service
Interim Year (2030)

Figure 6-2



PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

No-Build Alternative
Freeway Facilities Level Of Service
Design Year (2040)

Figure 6-3

A total of four locations, out of 24, with failing LOS (E or F) were observed in the Open Year (2020).

Interim Year (2030)

- Northbound SR 9/I-95
    - During the PM peak hour, the freeway segment, from the beginning of the project limits to Woolbright Road off ramp, operates at LOS E.
    - During the PM peak hour, the weave section, between the Woolbright Road on ramp and the SR 804/Boynton Beach Boulevard off ramp, operates at LOS F.
    - During the PM peak hour, the weave section, between the SR 804/Boynton Beach Boulevard on ramp and the Gateway Boulevard off ramp, operates at LOS F.
- Southbound SR 9/I-95
    - During the AM peak hour, the diverge to Gateway Boulevard operates at LOS E.
    - During the AM peak hour, the weave section, between the Gateway Boulevard on ramp and the SR 804/Boynton Beach Boulevard off ramp, operates at LOS F.
    - During the AM peak hour, the freeway segment, between the Woolbright Road on ramp and the end of the project limits, operates at LOS E.

A total of six locations, out of 24, with failing LOS (E or F) were observed in the Interim Year (2030).

Design Year (2040)

- Northbound SR 9/I-95
    - During the PM peak hour, the freeway segment, from the beginning of the project limits to Woolbright Road off ramp, operates at LOS F.
    - During the AM and PM peak hours, the weave section, between the Woolbright Road on ramp and the SR 804/Boynton Beach Boulevard off ramp, operates at LOS F.
    - During the AM and PM peak hours, the freeway segment, between the SR 804/Boynton Beach Boulevard on ramp and the Gateway Boulevard off ramp, operates at LOS F.
- Southbound SR 9/I-95
    - During the AM peak hour, the freeway segment, between the Hypoluxo Road on ramp and the Gateway Boulevard off ramp, operates at LOS E.
    - During the AM peak hour, the diverge to Gateway Boulevard operates at LOS E.
    - During the AM and PM peak hours, the weave section, between the Gateway Boulevard on ramp and the SR 804/Boynton Beach Boulevard off ramp, operates at LOS F.
    - During the AM peak hour, the weave section, between the SR 804/Boynton Beach Boulevard on ramp and the Woolbright Road off ramp, operates at LOS F.
    - During the AM peak hour, the merge from Woolbright Road operates at LOS F.
    - During the AM peak hour, the freeway segment, between the Woolbright Road on ramp and the end of the project limits, operates at LOS F.

A total of nine locations, out of 24, with failing LOS (E or F) were observed in the Design Year (2040).

6.3.1.2 Intersections

SR 9/I-95 at Woolbright Road Interchange Intersections

Future No-Build approach and overall intersection LOS and delay results for intersections along the Woolbright Road interchange limits are summarized in Table 6-4 through Table 6-6 for the Open (2020), Interim (2030), and Design (2040) Years, respectively. Intersection approach and overall V/C ratios are summarized in Table 6-7. The 95th percentile queue lengths are summarized in Table 6-8. Figures 6-4 through 6-6 depict the findings of this intersection analysis along Woolbright Road for the Open (2020), Interim (2030), and Design (2040) Years, respectively.

The results indicate that all ramp terminal intersections along SR 9/I-95 and other project intersections are expected to operate at LOS D or better, except for the following:

Ramp Terminal Intersections:

Neither ramp intersection operates with failing LOS (E or F) during the Open Year (2020).

Interim Year (2030)
- During the PM peak hour, the ramp terminal intersection for Woolbright Road at SR 9/I-95 southbound operates at LOS E.
- During the PM peak hour, the ramp terminal intersection for Woolbright Road at SR 9/I-95 northbound operates at LOS E.

Design Year (2040)
- During the PM peak hour, the ramp terminal intersection for Woolbright Road at SR 9/I-95 southbound continues to operate at LOS E.
- During the PM peak hour, the ramp terminal intersection for Woolbright Road at SR 9/I-95 northbound continues to operate at LOS E.

Other Project Intersections:

Open Year (2020)
- During the AM and PM peak hours, the intersection for Woolbright Road at Seacrest Boulevard operates at LOS F and LOS E, respectively.

Interim Year (2030)
- During the PM peak hour, the intersection for Woolbright Road at SW 8th Street/Corporate Drive operates at LOS E.
- The intersection for Woolbright Road at Seacrest Boulevard continues to operate at LOS F during the AM peak hour and changes from an LOS E operation to LOS F during the PM peak hour.

Design Year (2040)
- The intersection for Woolbright Road at SW 8th Street/Corporate Drive will change into LOS F operation for both AM and PM peak hours.
- During the AM and PM peak hours, the intersection for Woolbright Road at Seacrest Boulevard continues to operate at LOS F.

Table 6-4: Woolbright Road Intersections Delay and LOS Summary – No-Build Conditions – Open Year (2020)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Woolbright Rd at SW 8th St/Corporate Dr	Signalized	D	D	C	C	D	E	E	E	36.3	D	43.5	D
Woolbright Rd at I-95 Southbound Ramps	Signalized	C	C	A	A	-	-	C	F	20.6	C	51.6	D
Woolbright Rd at I-95 Northbound Ramps	Signalized	A	A	D	E	C	F	-	-	24.3	C	48.5	D
Woolbright Rd at Seacrest Blvd	Signalized	F	D	D	D	E	F	E	E	86.5	F	63.5	E
TOTAL										**167.7**		**207.1**	

Table 6-5: Woolbright Road Intersections Delay and LOS Summary – No-Build Conditions – Interim Year (2030)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Woolbright Rd at SW 8th St/Corporate Dr	Signalized	D	D	D	E	D	E	E	E	53.9	D	57.7	E
Woolbright Rd at I-95 Southbound Ramps	Signalized	C	C	A	A	-	-	D	F	29.0	C	60.9	E
Woolbright Rd at I-95 Northbound Ramps	Signalized	A	A	E	E	C	F	-	-	30.8	C	57.6	E
Woolbright Rd at Seacrest Blvd	Signalized	F	F	F	E	E	F	E	E	157.4	F	99.6	F
TOTAL										**271.1**		**275.8**	

Table 6-6: Woolbright Road Intersections Delay and LOS Summary – No-Build Conditions – Design Year (2040)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Woolbright Rd at SW 8th St/Corporate Dr	Signalized	F	D	F	F	D	E	F	F	110.2	F	96.8	F
Woolbright Rd at I-95 Southbound Ramps	Signalized	D	C	A	A	-	-	F	F	41.6	D	74.9	E
Woolbright Rd at I-95 Northbound Ramps	Signalized	A	A	F	E	D	F	-	-	43.6	D	68.6	E
Woolbright Rd at Seacrest Blvd	Signalized	F	F	F	F	E	F	F	F	256.7	F	164.4	F
TOTAL										**452.1**		**404.7**	

Table 6-7: Woolbright Road Intersections Volume to Capacity Ratio – No-Build Conditions

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Woolbright Rd at SW 8th St/Corporate Dr	AM Peak	2020	0.77	0.74	0.19	0.76	0.76	0.36	0.21	0.51	-	0.90	0.77	-	0.84
			2030	0.88	0.95	0.23	0.84	0.99	0.48	0.28	0.59	-	1.03	0.83	-	0.99
			2040	1.10	1.16	0.27	0.86	1.22	0.62	0.40	0.71	-	1.20	0.95	-	1.19
		PM Peak	2020	0.90	0.63	0.09	0.45	0.87	0.58	0.61	0.88	-	0.82	0.61	-	0.91
			2030	0.93	0.71	0.12	0.62	1.04	0.73	0.67	0.88	-	0.92	0.69	-	0.97
			2040	0.91	0.82	0.16	0.80	1.29	0.95	0.79	0.89	-	1.08	0.82	-	1.08
2	Woolbright Rd at I-95 Southbound Ramps	AM Peak	2020	-	0.57	0.66	0.49	0.41	-	-	-	-	0.96	-	0.58	0.80
			2030	-	0.66	0.79	0.59	0.46	-	-	-	-	1.09	-	0.63	0.91
			2040	-	0.75	0.93	0.70	0.52	-	-	-	-	1.25	-	0.69	1.04
		PM Peak	2020	-	0.64	0.60	0.32	0.55	-	-	-	-	1.46	-	0.45	0.79
			2030	-	0.71	0.48	0.33	0.59	-	-	-	-	1.61	-	0.50	0.87
			2040	-	0.79	0.55	0.36	0.63	-	-	-	-	1.79	-	0.54	0.95

Table 6-7: Woolbright Road Intersections Volume to Capacity Ratio – No Build Conditions – continued

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
3	Woolbright Rd at I-95 Northbound Ramps	AM Peak	2020	0.49	0.48	-	-	0.51	0.92	0.72	-	0.24	-	-	-	0.79
			2030	0.57	0.55	-	-	0.59	1.05	0.82	-	0.28	-	-	-	0.91
			2040	0.64	0.63	-	-	0.71	1.17	0.95	-	0.34	-	-	-	1.02
		PM Peak	2020	0.63	0.53	-	-	0.59	0.90	1.28	-	0.40	-	-	-	0.91
			2030	0.71	0.57	-	-	0.62	0.91	1.41	-	0.46	-	-	-	0.98
			2040	0.79	0.63	-	-	0.63	0.97	1.57	-	0.53	-	-	-	1.07
4	Woolbright Rd at Seacrest Blvd	AM Peak	2020	0.53	1.23	-	0.58	0.84	-	0.95	0.37	-	0.67	0.91	-	1.02
			2030	0.88	1.51	-	0.59	1.26	-	0.95	0.43	-	0.83	0.99	-	1.18
			2040	1.41	1.76	-	0.63	1.66	-	0.97	0.50	-	0.98	1.12	-	1.39
		PM Peak	2020	0.78	0.99	-	0.66	0.89	-	1.07	0.74	-	0.82	0.82	-	0.98
			2030	1.26	1.17	-	0.72	0.97	-	1.12	0.73	-	0.98	0.85	-	1.18
			2040	1.95	1.39	-	0.77	1.05	-	1.15	0.71	-	1.24	0.90	-	1.61

= Movements volume to capacity ratios exceeding 1.00.

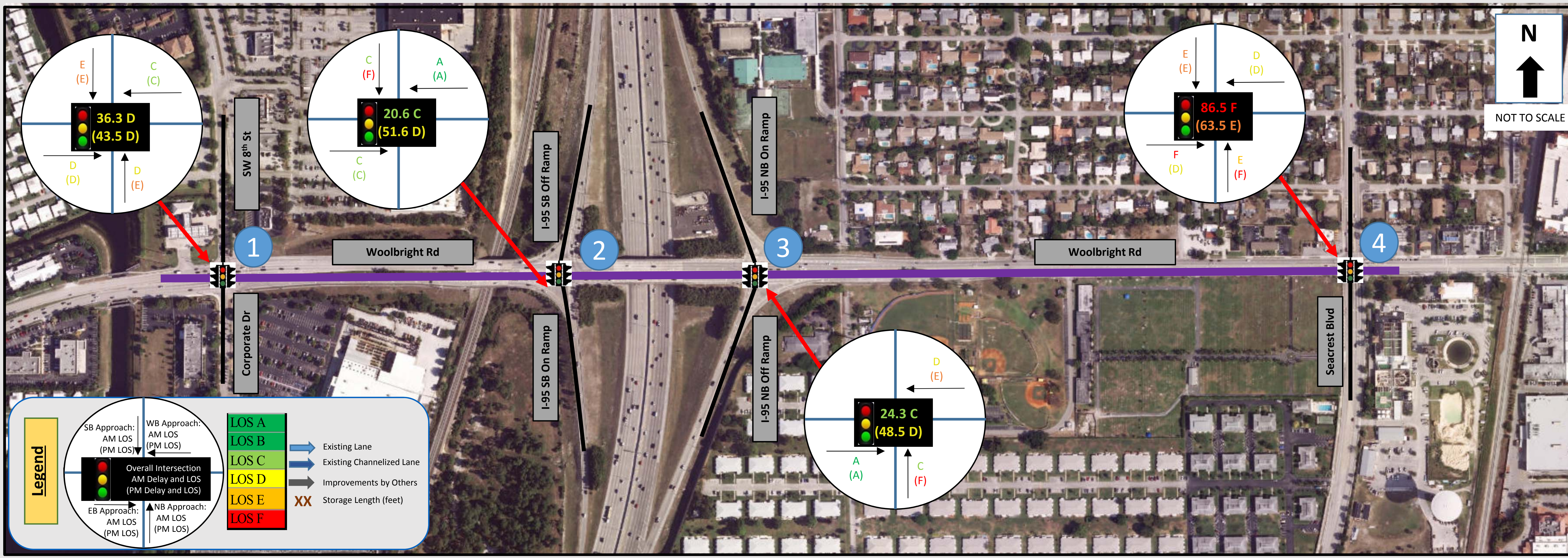
Table 6-8: Woolbright Road Intersections 95th Percentile Queue Length Summary – No-Build Conditions

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Woolbright Rd at SW 8th St/Corporate Dr	AM Peak	2020	163	#416	104	#216	#492	170	45	132	-	#288	318	-	Signalized Intersection
			2030	#270	#538	116	#234	#561	204	61	185	-	#369	#441	-	
			2040	#405	#662	123	m#226	#649	245	79	#256	-	#458	#560	-	
		PM Peak	2020	269	484	74	60	#776	266	184	357	-	232	285	-	
			2030	#391	529	90	107	#832	356	188	374	-	#314	353	-	
			2040	#528	600	107	#188	#867	#763	#198	#391	-	#416	444	-	
		Existing Storage Length (ft)		200	1,000	150	200	1,320	350	1,000	1,000		200	1,000		

Table 6-8: Woolbright Road Intersections 95th Percentile Queue Length Summary – No-Build Conditions – continued

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2	Woolbright Rd at I-95 Southbound Ramps	AM Peak	2020	-	221	m112	16	1	-	-	-	-	#400	-	0	Signalized Intersection
			2030	-	m243	m143	26	0	-	-	-	-	#491	-	0	
			2040	-	m226	m115	27	0	-	-	-	-	#601	-	0	
		PM Peak	2020	-	176	106	0	m22	-	-	-	-	#633	-	0	
			2030	-	233	m23	0	m43	-	-	-	-	#720	-	0	
			2040	-	m295	m18	0	m64	-	-	-	-	#825	-	0	
		Existing Storage Length (ft)			1,320	1,320	730	730					**1,800**		150	
3	Woolbright Rd at I-95 Northbound Ramps	AM Peak	2020	13	0	-	-	m244	m#680	217	-	0	-	-	-	Signalized Intersection
			2030	14	m0	-	-	m233	m340	252	-	0	-	-	-	
			2040	15	m14	-	-	m243	m267	#310	-	0	-	-	-	
		PM Peak	2020	18	m38	-	-	m383	m586	#604	-	0	-	-	-	
			2030	21	m59	-	-	m375	m531	#697	-	0	-	-	-	
			2040	25	m85	-	-	m360	m523	#802	-	0	-	-	-	
		Existing Storage Length (ft)		730	730			1,480	650	**1,320**		350				
4	Woolbright Rad at Seacrest Blvd	AM Peak	2020	95	#837	-	96	#497	-	#321	167	-	143	#369	-	Signalized Intersection
			2030	#244	#1,036	-	93	#786	-	#323	193	-	#227	#455	-	
			2040	#477	#1,247	-	106	#1,111	-	#336	217	-	#311	#537	-	
		PM Peak	2020	#364	#1,013	-	113	645	-	#437	335	-	#226	281	-	
			2030	#616	#1,223	-	#141	#778	-	#464	342	-	#313	320	-	
			2040	#853	#1,454	-	#164	#887	-	#481	364	-	#417	379	-	
		Existing Storage Length (ft)		150	1,480		150	1,000		450	1,000		150	1,000		

1) The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. This traffic was simulated for two complete cycles to account for the effects of spillover between cycles. If the reported v/c<1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue. In practice, 95th percentile queue shown will rarely be exceeded and the queues shown with the # footnote are acceptable for the design of storage bay (Trafficware 2012).
2) The m footnote indicates that the volume for the 95th percentile queue is metered by an upstream signal (Trafficware 2012).
3) The storage length values were calculated from aerials or design drawings.
4) To calculate reasonable queuing in the model, all terminal links were extended to 1,000 feet from the last node
5) For ramp terminals, the storage distance proved reflects the entire length of the ramp (**XXX feet**)
= Movements with queues exceeding available storage.

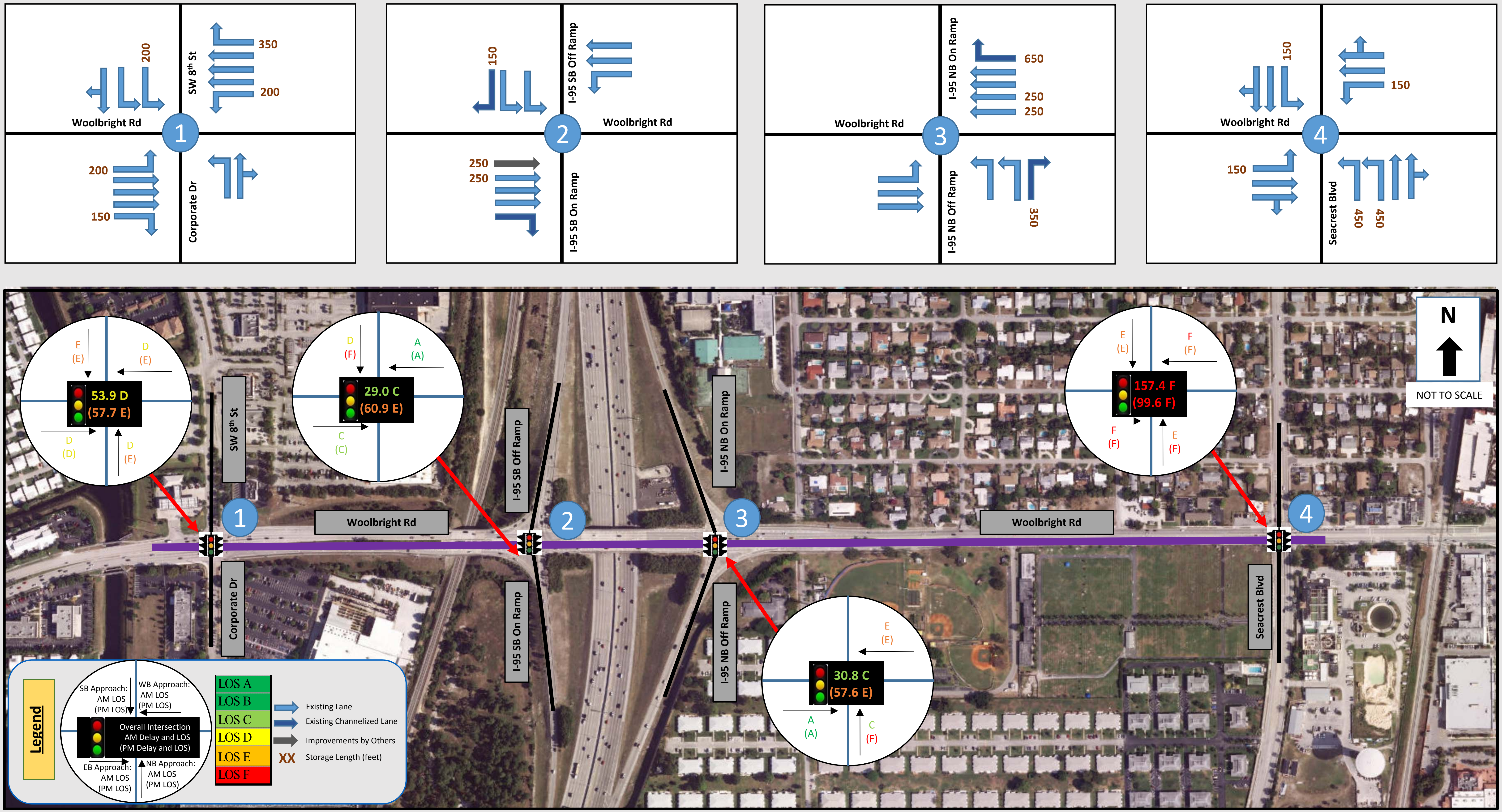


PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at Woolbright Road Interchange
No-Build Lane Configuration, Intersection LOS and Delay - Open Year (2020)

Figure 6-4



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ETDM nos. 14180 and 14181

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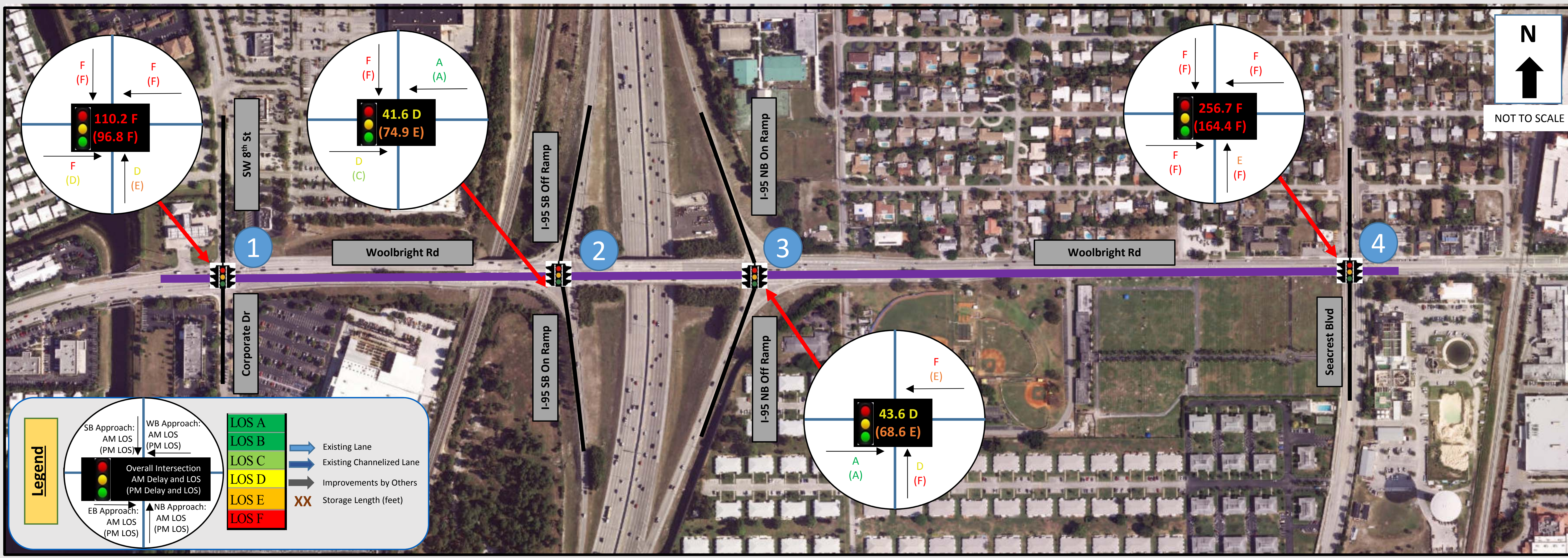
SR 9/I-95 at Woolbright Road Interchange
No-Build Lane Configuration, Intersection LOS and Delay - Interim Year (2030)

Figure 6-5



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SR 9/I-95 at Woolbright Road Interchange
No-Build Lane Configuration, Intersection LOS and Delay - Design Year (2040)

Figure 6-6

Volumes exceeding capacity were observed for several movements along Woolbright Road intersections and these V/C ratios become progressively worse over the three analysis years without any improvements. Intersections with overall intersection volumes exceeding capacity are summarized below:

Ramp Terminal Intersections:

Design Year (2040)

- Woolbright Road at SR 9/I-95 Southbound Ramps observed a V/C ratio of 1.04 in the AM peak hour.
- Woolbright Road at SR 9/I-95 Northbound Ramps observed a V/C ratio of 1.02 in the AM peak hour and 1.07 in the PM peak hour.

Other Project Intersections:

Open Year (2020)

- Woolbright Road at Seacrest Boulevard observed a V/C ratio of 1.02 in the AM peak hour.

Interim Year (2030)

- Woolbright Road at Seacrest Boulevard observed a V/C ratio of 1.18 in the AM and PM peak hours.

Design Year (2040)

- Woolbright Road at SW 8th Street/Corporate Drive observed V/C ratios of 1.19 and 1.08 in the AM and PM peak hours, respectively.
- Woolbright Road at Seacrest Boulevard observed V/C ratios of 1.39 and 1.61 in the AM and PM peak hours, respectively.

A review of the 95th percentile queue lengths indicate that several left turning movements and the westbound through movements near the intersection of Woolbright Road and Seacrest Boulevard are exceeding available storages.

SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange Intersections

Future No-Build approach and overall intersection LOS and delay results for the intersections along SR 804/Boynton Beach Boulevard interchange limits are summarized in Table 6-9 through Table 6-11 for the Open (2020), Interim (2030), and Design (2040) Years, respectively. Intersection approach and overall V/C ratios are summarized in Table 6-12. The 95th percentile queues are summarized in Table 6-13. Figures 6-7 through 6-9 depict the findings of this intersection analysis along SR 804/Boynton Beach Boulevard for the Open (2020), Interim (2030), and Design (2040) Years, respectively.

Table 6-9: SR 804/Boynton Beach Boulevard Intersections Delay and LOS Summary – No-Build Conditions – Open Year (2020)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	Signalized	D	E	C	E	E	D	F	E	44.5	D	60.9	E
SR 804/Boynton Beach Blvd at Industrial Ave	Signalized	B	A	A	D	E	E	E	E	13.4	B	27.4	C
SR 804/Boynton Beach Blvd at I-95 Southbound Ramps	Signalized	F	C	A	A	-	-	D	E	94.6	F	29.5	C
SR 804/Boynton Beach Blvd at I-95 Northbound Ramps	Signalized	C	A	D	E	F	F	-	-	48.1	D	106.0	F
SR 804/Boynton Beach Blvd at Seacrest Blvd	Signalized	D	D	C	D	E	E	F	E	65.1	E	53.1	D
TOTAL										**265.7**		**276.9**	

Table 6-10: SR 804/Boynton Beach Boulevard Intersections Delay and LOS Summary – No-Build Conditions – Interim Year (2030)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	Signalized	E	E	D	E	E	E	F	E	63.1	E	69.9	E
SR 804/Boynton Beach Blvd at Industrial Ave	Signalized	B	B	B	D	E	D	E	F	18.2	B	36.9	D
SR 804/Boynton Beach Blvd at I-95 Southbound Ramps	Signalized	F	D	A	A	-	-	E	F	121.2	F	42.2	D
SR 804/Boynton Beach Blvd at I-95 Northbound Ramps	Signalized	E	A	D	D	F	F	-	-	72.0	E	113.8	F
SR 804/Boynton Beach Blvd at Seacrest Blvd	Signalized	E	F	D	D	E	F	F	F	115.8	F	106.3	F
TOTAL										**390.3**		**369.1**	

Table 6-11: SR 804/Boynton Beach Boulevard Intersections Delay and LOS Summary – No-Build Conditions – Design Year (2040)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	Signalized	F	E	E	F	F	E	F	F	103.1	F	79.5	E
SR 804/Boynton Beach Blvd at Industrial Ave	Signalized	C	C	B	E	D	D	E	F	25.1	C	53.0	D
SR 804/Boynton Beach Blvd at I-95 Southbound Ramps	Signalized	F	E	C	A	-	-	E	F	154.9	F	58.8	E
SR 804/Boynton Beach Blvd at I-95 Northbound Ramps	Signalized	F	B	F	D	F	F	-	-	123.7	F	137.4	F
SR 804/Boynton Beach Blvd at Seacrest Blvd	Signalized	F	F	D	E	F	F	F	F	238.4	F	199.5	F
TOTAL										**645.2**		**528.2**	

Table 6-12: SR 804/Boynton Beach Boulevard Intersections Volume to Capacity Ratio – No-Build Conditions

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	AM Peak	2020	0.16	0.65	-	0.65	0.51	0.28	0.27	0.73	-	0.95	0.20	-	0.74
			2030	0.26	0.90	-	0.90	0.58	0.39	0.28	0.90	-	1.11	0.23	-	0.96
			2040	0.42	1.09	-	1.24	0.62	0.52	0.33	1.16	-	1.27	0.28	-	1.25
		PM Peak	2020	0.60	0.84	-	0.44	0.75	1.07	0.29	0.57	-	0.85	0.22	-	0.88
			2030	0.66	0.84	-	0.66	0.81	1.13	0.36	0.74	-	0.91	0.22	-	0.97
			2040	0.86	0.85	-	0.90	0.86	1.17	0.45	0.96	-	1.00	0.23	-	1.08
2	SR 804/Boynton Beach Blvd and Industrial Ave	AM Peak	2020	0.53	0.68	-	0.12	0.54	-	-	0.03	0.01	-	0.71	0.25	0.71
			2030	0.77	0.78	-	0.13	0.66	-	-	0.06	0.01	-	0.79	0.28	0.81
			2040	1.04	0.89	-	0.18	0.79	-	-	0.10	0.02	-	0.87	0.33	1.03
		PM Peak	2020	0.49	0.51	-	0.03	0.81	-	-	0.05	0.01	-	0.82	0.22	0.81
			2030	0.72	0.55	-	0.05	0.92	-	-	0.08	0.02	-	0.93	0.30	0.92
			2040	0.99	0.58	-	0.07	1.01	-	-	0.20	0.02	-	1.11	0.39	1.03

Table 6-12: SR 804/Boynton Beach Boulevard Intersections Volume to Capacity Ratio – No-Build Conditions – continued

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Intersection
3	SR 804/Boynton Beach Blvd and I-95 Southbound Ramps	AM Peak	2020	-	1.46	0.57	0.58	0.37	-	-	-	-	1.00	-	0.57	1.00
			2030	-	1.67	0.66	0.83	0.43	-	-	-	-	1.10	-	0.60	1.20
			2040	-	1.88	0.74	1.14	0.52	-	-	-	-	1.21	-	0.63	1.44
		PM Peak	2020	-	0.96	0.30	0.31	0.61	-	-	-	-	1.25	-	0.58	0.86
			2030	-	1.05	0.29	0.39	0.64	-	-	-	-	1.39	-	0.61	0.94
			2040	-	1.13	0.32	0.47	0.68	-	-	-	-	1.56	-	0.66	1.01
4	SR 804/Boynton Beach Blvd and I-95 Northbound Ramps	AM Peak	2020	1.12	0.59	-	-	0.64	0.42	1.15	-	0.85	-	-	-	0.94
			2030	1.29	0.62	-	-	0.92	0.61	1.28	-	1.01	-	-	-	1.15
			2040	1.44	0.66	-	-	1.25	0.82	1.43	-	1.21	-	-	-	1.38
		PM Peak	2020	0.93	0.51	-	-	0.79	0.43	1.27	-	1.50	-	-	-	1.07
			2030	1.01	0.55	-	-	0.81	0.54	1.35	-	1.53	-	-	-	1.12
			2040	1.09	0.59	-	-	0.87	0.72	1.42	-	1.76	-	-	-	1.23
5	SR 804/Boynton Beach Blvd and Seacrest Blvd	AM Peak	2020	0.46	0.63	-	0.32	0.39	-	0.90	0.34	-	0.36	1.11	-	0.79
			2030	1.03	0.71	-	0.53	0.61	-	1.02	0.46	-	0.59	1.54	-	1.18
			2040	2.29	0.80	-	0.89	0.84	-	1.21	0.61	-	1.00	2.08	-	2.12
		PM Peak	2020	1.01	0.66	-	0.45	0.74	-	0.97	0.62	-	0.34	0.88	-	1.03
			2030	1.76	0.77	-	0.64	0.85	-	1.12	0.65	-	0.45	1.19	-	1.55
			2040	2.46	0.86	-	0.84	0.97	-	1.21	0.76	-	0.64	1.86	-	2.09

= Movements volume to capacity ratios exceeding 1.00.

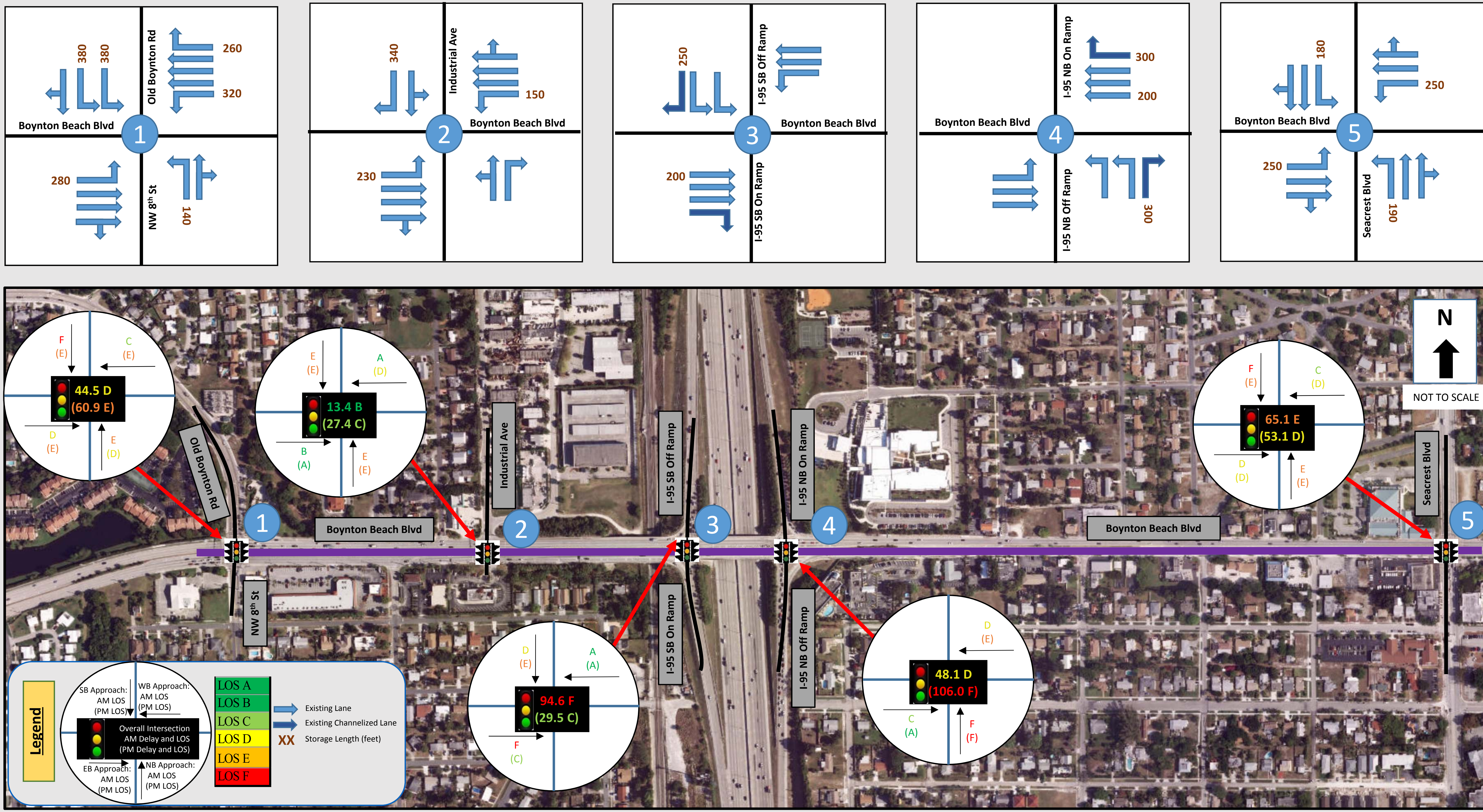
Table 6-13: SR 804/Boynton Beach Boulevard Intersections 95th Percentile Queue Length Summary – No-Build Conditions

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	AM Peak	2020	35	536	-	203	297	160	77	263	-	#390	123	-	Signalized Intersection
			2030	45	#684	-	#367	326	209	92	#435	-	#500	153	-	
			2040	60	#815	-	m#651	363	291	108	#704	-	#602	190	-	
		PM Peak	2020	87	506	-	m123	452	#1,105	119	352	-	#275	156	-	
			2030	#109	513	-	m163	500	m#1,072	149	462	-	#327	160	-	
			2040	#165	518	-	m211	m485	m#683	185	#694	-	#389	161	-	
		Existing Storage Length (ft)		280	1,000		320	1,045	260	140	1,000		380	1,000		
2	SR 804/Boynton Beach Blvd and Industrial Ave	AM Peak	2020	m90	345	-	m4	235	-	-	16	11	-	181	94	Signalized Intersection
			2030	m151	m402	-	m5	289	-	-	23	13	-	235	126	
			2040	m#241	m413	-	m7	316	-	-	33	18	-	#326	167	
		PM Peak	2020	m31	413	-	m3	1,079	-	-	21	13	-	252	95	
			2030	m74	573	-	m4	1,159	-	-	26	17	-	#393	139	
			2040	m#170	m648	-	m5	#1,298	-	-	42	21	-	#521	189	
		Existing Storage Length (ft)		230	1,045		150	840		1,000		1,000	1,000		340	
3	SR 804/Boynton Beach Blvd and I-95 Southbound Ramps	AM Peak	2020	-	#1,205	51	34	m0	-	-	-	-	#420	-	0	Signalized Intersection
			2030	-	#1,450	773	m123	m2	-	-	-	-	#488	-	0	
			2040	-	#1,697	265	m125	m0	-	-	-	-	#565	-	0	
		PM Peak	2020	-	#759	0	m0	m22	-	-	-	-	#378	-	0	
			2030	-	#894	m0	m0	m36	-	-	-	-	#438	-	0	
			2040	-	m#973	m0	m0	m52	-	-	-	-	#511	-	0	
		Existing Storage Length (ft)			840	840	370	370					**1,560**		250	

Table 6-13: SR 804/Boynton Beach Boulevard Intersections 95th Percentile Queue Length Summary – No-Build Conditions – continued

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4	SR 804/Boynton Beach Blvd and I-95 Northbound Ramps	AM Peak	2020	m10	m175	-	-	m398	m268	#243	-	#196	-	-	-	Signalized Intersection
			2030	m10	m178	-	-	m567	m378	#293	-	#260	-	-	-	
			2040	m10	m178	-	-	m#884	m464	#352	-	#340	-	-	-	
		PM Peak	2020	m6	m1	-	-	m499	m284	#771	-	#1,027	-	-	-	
			2030	m6	m1	-	-	m479	m294	#843	-	#1,101	-	-	-	
			2040	m6	m8	-	-	m445	m289	#904	-	#1,237	-	-	-	
		Existing Storage Length (ft)		370	370			2,730	300	**1,630**		300				
5	SR 804/Boynton Beach Blvd and Seacrest Blvd	AM Peak	2020	m205	593	-	59	258	-	#315	167	-	117	#514	-	Signalized Intersection
			2030	m#404	649	-	82	395	-	#390	221	-	173	#791	-	
			2040	m#1,129	m708	-	#197	595	-	#498	298	-	#336	#1,105	-	
		PM Peak	2020	m#374	m401	-	90	526	-	#462	343	-	96	330	-	
			2030	m#747	m474	-	108	631	-	#585	379	-	127	#580	-	
			2040	m#1,089	m524	-	#224	#800	-	#663	#458	-	175	#920	-	
		Existing Storage Length (ft)		250	2,730		250	1,000		190	1,000		180	1,000		

1) The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. This traffic was simulated for two complete cycles to account for the effects of spillover between cycles. If the reported v/c<1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue. In practice, 95th percentile queue shown will rarely be exceeded and the queues shown with the # footnote are acceptable for the design of storage bay (Trafficware 2012).
2) The m footnote indicates that the volume for the 95th percentile queue is metered by an upstream signal (Trafficware 2012).
3) The storage length values were calculated from aerials or design drawings.
4) To calculate reasonable queuing in the model, all terminal links were extended to 1,000 feet from the last node
5) For ramp terminals, the storage distance proved reflects the entire length of the ramp (**XXX feet**)
= Movements with queues exceeding available storage.

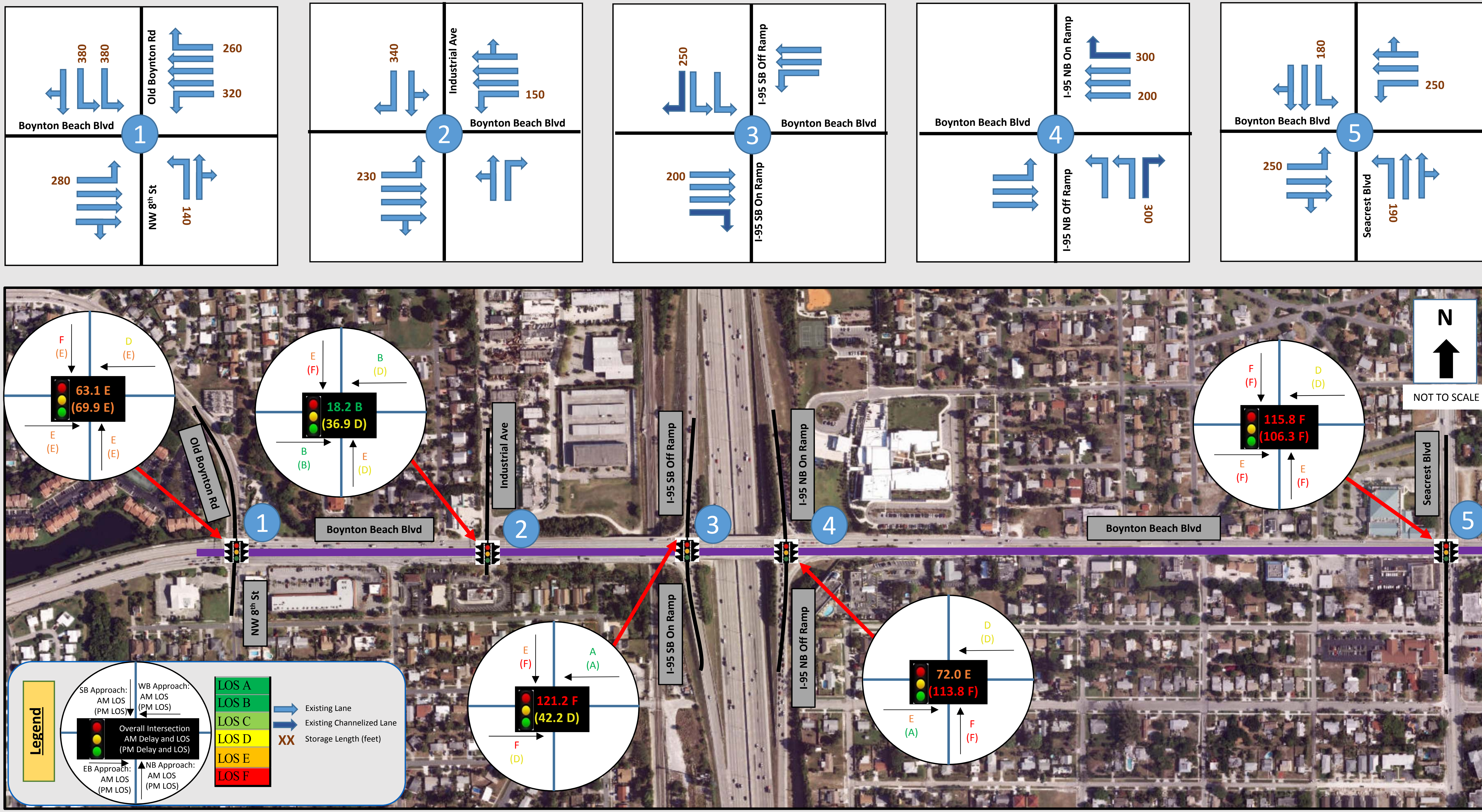


PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at SR 804/ Boynton Beach Blvd Interchange
No-Build Lane Configuration, Intersection LOS and Delay - Open Year (2020)

Figure 6-7



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SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

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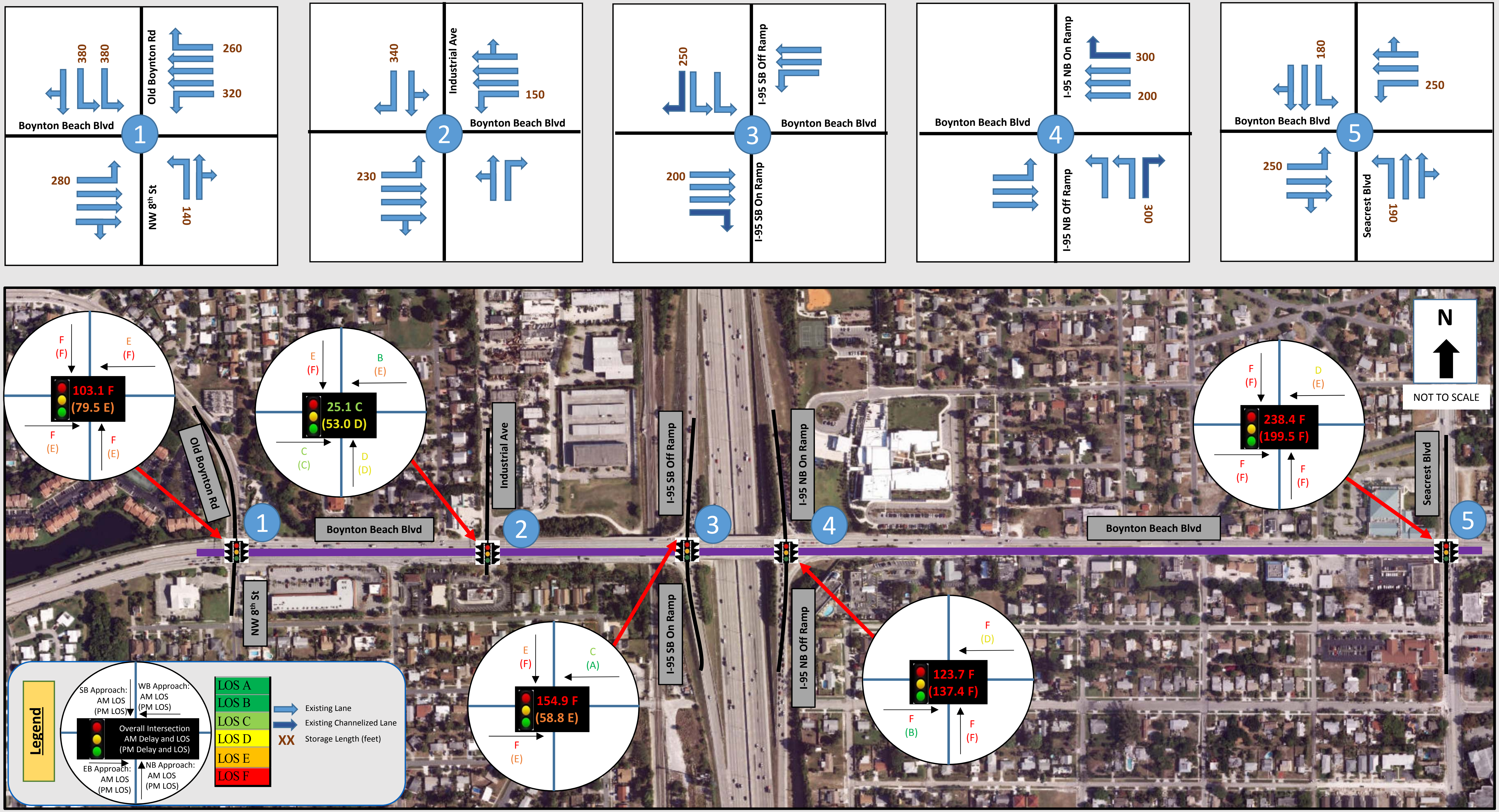
SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
No-Build Lane Configuration, Intersection LOS and Delay - Interim Year (2030)

Figure 6-8



PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
No-Build Lane Configuration, Intersection LOS and Delay - Design Year (2040)

Figure 6-9

The results indicate that all ramp terminal intersections along SR 9/I-95 and other project intersections are expected to operate at LOS D or better, except for the following:

Ramp Terminal Intersections:

Open Year (2020)

- During the AM peak hour, the ramp terminal intersection for SR 804/Boynton Beach Boulevard at SR 9/I-95 southbound operates at LOS F.
- During the PM peak hours, the ramp terminal intersection for SR 804/Boynton Beach Boulevard at SR 9/I-95 northbound operates at LOS F.

Interim Year (2030)

- The ramp terminal intersection for SR 804/Boynton Beach Boulevard at SR 9/I-95 southbound continues to operate at LOS F.
- The ramp terminal intersection for SR 804/Boynton Beach Boulevard at SR 9/I-95 northbound continues to operate at LOS F during the PM peak hour and changes from a LOS D operation to LOS E during the AM peak hour.

Design Year (2040)

- The ramp terminal intersection for SR 804/Boynton Beach Boulevard at SR 9/I-95 southbound continues to operate at LOS F during the AM peak hour and changes from a LOS D operation to LOS E during the PM peak hour.
- The ramp terminal intersection for SR 804/Boynton Beach Boulevard at SR 9/I-95 northbound will change into LOS F operation for both AM and PM peak hours.

Other Project Intersections:

Open Year (2020)

- During the PM peak hour, the intersection for SR 804/Boynton Beach Boulevard at NW 8th Street/Old Boynton Road operates at LOS E.
- During the AM peak hour, the intersection for SR 804/Boynton Beach Boulevard at Seacrest Boulevard operates at LOS E.

Interim Year (2030)

- The intersection for SR 804/Boynton Beach Boulevard at NW 8th Street/Old Boynton Road continues to operation at LOS E during the PM peak hour and changes from LOS D operation to LOS E during the AM peak hour.
- The intersection for SR 804/Boynton Beach Boulevard at Seacrest Boulevard will change into LOS F operation for both AM and PM peak hours.

Design Year (2040)

- The intersection for SR 804/Boynton Beach Boulevard at NW 8th Street/Old Boynton Road continues to operate at LOS E during the PM peak hour and changes from LOS E operation to LOS F during the AM peak hour.

- During the AM and PM peak hours, the intersection for SR 804/Boynton Beach Boulevard at Seacrest Boulevard continues to operate at LOS F.

Volumes exceeding capacity were observed for several movements along SR 804/Boynton Beach Boulevard and these V/C ratios become progressively worse over the three analysis years without any improvements. Intersections with overall intersection volumes exceeding capacity are summarized below:

Ramp Terminal Intersections:

Open Year (2020)
- SR 804/Boynton Beach Boulevard at SR 9/I-95 Southbound Ramps observed a V/C ratio of 1.00 in the AM peak hour.
- SR 804/Boynton Beach Boulevard at SR 9/I-95 Northbound Ramps observed a V/C ratio of 1.07 in the PM peak hour.

Interim Year (2030)
- SR 804/Boynton Beach Boulevard at SR 9/I-95 Southbound Ramps observed a V/C ratio of 1.20 in the AM peak hour.
- SR 804/Boynton Beach Boulevard at SR 9/I-95 Northbound Ramps observed a V/C ratio of 1.15 and 1.12 in the AM and PM peak hours, respectively.

Design Year (2040)
- SR 804/Boynton Beach Boulevard at SR 9/I-95 Southbound Ramps observed V/C ratios of 1.44 and 1.01 in the AM and PM peak hours, respectively.
- SR 804/Boynton Beach Boulevard at SR 9/I-95 Northbound Ramps observed V/C ratios of 1.38 and 1.23 in the AM and PM peak hours, respectively.

Other Project Intersections:

Open Year (2020)
- SR 804/Boynton Beach Boulevard at Seacrest Boulevard observed a V/C ratio of 1.03 in the AM peak hour.

Interim Year (2030)
- SR 804/Boynton Beach Boulevard at Seacrest Boulevard observed V/C ratios of 1.18 and 1.55 during the AM and PM peak hours, respectively.

Design Year (2040)
- SR 804/Boynton Beach Boulevard at NW 8th Street/Old Boynton Road observed V/C ratios of 1.25 and 1.08 in the AM and PM peak hours, respectively.
- SR 804/Boynton Beach Boulevard at Industrial Avenue observed a V/C ratio of 1.03 in the AM and PM peak hour.
- SR 804/Boynton Beach Boulevard at Seacrest Boulevard observed V/C ratios of 2.12 and 2.09 in the

AM and PM peak hours, respectively.

A review of the 95th percentile queue lengths indicate that several left and right turning movements along SR 804/Boynton Beach Boulevard, eastbound and westbound through movements near the intersection of SR 804/Boynton Beach Boulevard with Industrial Ave, and eastbound through movement near the intersection of SR 804/Boynton Beach Boulevard with SR 9/I-95 southbound ramps are exceeding available storages. If these deficiencies are not addressed these queues could cause impacts to traffic operations and safety within the SR 804/Boynton Beach Boulevard interchange area.

SR 9/I-95 at Gateway Boulevard Interchange Intersections

Future No-Build approach and overall intersection LOS and delay results for the intersections along Gateway Boulevard interchange limits are summarized in Table 6-14 though Table 6-16 for the Open (2020), Interim (2030), and Design (2040) Years, respectively. Intersection approach and overall V/C ratios are summarized in Table 6-17. The 95th percentile queues are summarized in Table 6-18. Figures 6-10 through 6-12 depict the findings of this intersection analysis along Gateway Boulevard for the Open (2020), Interim (2030), and Design (2040) Years, respectively.

The results indicate that all ramp terminal intersections along SR 9/I-95 and other project intersections are expected to operate at LOS D or better, except for the following:

Ramp Terminal Intersections:

Open Year (2020)
- During the PM peak hour, the ramp terminal intersection for Gateway Boulevard at SR 9/I-95 southbound operates at LOS F.
- During the AM and PM peak hours, the ramp terminal intersection for Gateway Boulevard at SR 9/I-95 northbound operates at LOS E and LOS F, respectively.

Interim Year (2030)
- During the PM peak hour, the ramp terminal intersection for Gateway Boulevard at SR 9/I-95 southbound continues to operate at LOS F.
- The ramp terminal intersection for Gateway Boulevard at SR 9/I-95 northbound continues to operate at LOS F during the PM peak hour and changes from LOS E operation to LOS F during the AM peak hour.

Design Year (2040)
- During the AM and PM peak hours, the ramp terminal intersection for Gateway Boulevard at SR 9/I-95 southbound continues to operate at LOS F.
- During the AM and PM peak hours, the ramp terminal intersection for Gateway Boulevard at SR 9/I-95 northbound continues to operate at LOS F.

Table 6-14: Gateway Boulevard Intersections Delay and LOS Summary – No-Build Conditions – Open Year (2020)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound					
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak		PM Peak	
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Gateway Blvd at Quantum Village	Signalized	A	B	A	B	E	E	E	E	11.9	B	16.3	B
Gateway Blvd at High Ridge Road	Signalized	E	C	D	C	E	F	E	E	59.8	E	39.6	D
Gateway Blvd at I-95 Southbound Ramps	Signalized	D	F	A	A	-	-	F	E	38.8	D	102.4	F
Gateway Blvd at I-95 Northbound Ramps	Signalized	A	A	E	E	F	F	-	-	61.9	E	85.8	F
Gateway Blvd at Seacrest Blvd	Signalized	C	C	F	D	E	E	E	E	60.8	E	44.2	D
TOTAL										**233.2**		**288.3**	

Table 6-15: Gateway Boulevard Intersections Delay and LOS Summary – No-Build Conditions – Interim Year (2030)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound					
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak		PM Peak	
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Gateway Blvd at Quantum Village	Signalized	B	B	B	C	E	E	E	E	13.5	B	20.3	C
Gateway Blvd at High Ridge Road	Signalized	F	D	D	D	E	E	E	E	91.4	F	49.5	D
Gateway Blvd at I-95 Southbound Ramps	Signalized	D	F	A	A	-	-	F	E	45.7	D	116.3	F
Gateway Blvd at I-95 Northbound Ramps	Signalized	A	A	F	E	F	F	-	-	105.4	F	105.7	F
Gateway Blvd at Seacrest Blvd	Signalized	C	D	F	D	F	F	F	E	98.1	F	62.3	E
TOTAL										**354.1**		**354.1**	

Table 6-16: Gateway Boulevard Intersections Delay and LOS Summary – No-Build Conditions – Design Year (2040)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Gateway Blvd at Quantum Village	Signalized	B	B	A	C	E	E	E	E	14.4	B	20.5	C
Gateway Blvd at High Ridge Road	Signalized	F	E	D	F	E	E	E	E	137.7	F	89.7	F
Gateway Blvd at I-95 Southbound Ramps	Signalized	F	F	A	A	-	-	F	F	80.5	F	132.3	F
Gateway Blvd at I-95 Northbound Ramps	Signalized	A	A	F	E	F	F	-	-	170.2	F	138.9	F
Gateway Blvd at Seacrest Blvd	Signalized	D	F	F	D	F	F	F	E	163.7	F	104.0	F
TOTAL										**566.5**		**485.4**	

Table 6-17: Gateway Boulevard Intersections Volume to Capacity Ratio – No-Build Conditions

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Gateway Blvd at Quantum Village	AM Peak	2020	0.44	0.50	-	0.58	0.33	-	0.52	0.01	-	0.33	0.17	-	0.50
			2030	0.43	0.60	-	0.47	0.37	-	0.52	0.01	-	0.33	0.17	-	0.58
			2040	0.43	0.73	-	0.43	0.42	-	0.52	0.01	-	0.33	0.17	-	0.69
		PM Peak	2020	0.58	0.40	-	0.46	0.61	-	0.04	0.01	-	0.59	0.29	-	0.61
			2030	0.43	0.46	-	0.46	0.69	-	0.03	0.01	-	0.57	0.54	-	0.66
			2040	0.40	0.54	-	0.45	0.77	-	0.03	0.01	-	0.57	0.54	-	0.72
2	Gateway Blvd at High Ridge Road	AM Peak	2020	0.47	0.98	0.30	0.49	0.61	0.64	0.50	0.10	0.85	0.78	0.28	0.23	0.83
			2030	0.48	1.21	0.38	0.50	0.72	0.73	0.52	0.10	0.85	0.78	0.30	0.24	0.92
			2040	0.48	1.50	0.46	0.53	0.87	0.84	0.53	0.11	0.85	0.79	0.32	0.25	1.03
		PM Peak	2020	0.51	0.55	0.09	0.59	0.78	0.49	0.60	0.20	0.85	0.71	0.13	0.47	0.78
			2030	0.49	0.72	0.14	0.55	0.95	0.59	0.65	0.20	0.84	0.72	0.12	0.43	0.86
			2040	0.50	0.97	0.21	0.55	1.20	0.72	0.68	0.19	0.83	0.72	0.12	0.41	0.95

Table 6-17: Gateway Boulevard Intersections Volume to Capacity Ratio – No-Build Conditions – continued

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Intersection
3	Gateway Blvd at I-95 Southbound Ramps	AM Peak	2020	-	0.93	0.85	0.36	0.47	-	-	-	-	0.87	-	1.06	0.81
			2030	-	1.07	1.07	0.46	0.54	-	-	-	-	0.97	-	1.09	0.89
			2040	-	1.29	1.27	0.60	0.63	-	-	-	-	1.07	-	1.09	1.03
		PM Peak	2020	-	1.42	1.05	0.14	0.75	-	-	-	-	0.61	-	0.72	0.94
			2030	-	1.52	1.12	0.16	0.81	-	-	-	-	0.77	-	0.80	1.02
			2040	-	1.62	1.15	0.20	0.89	-	-	-	-	0.98	-	0.92	1.15
4	Gateway Blvd at I-95 Northbound Ramps	AM Peak	2020	0.46	0.30	-	-	0.96	1.07	1.22	-	0.47	-	-	-	0.75
			2030	0.49	0.33	-	-	1.16	1.22	1.44	-	0.61	-	-	-	0.84
			2040	0.53	0.37	-	-	1.42	1.41	1.69	-	0.81	-	-	-	0.95
		PM Peak	2020	0.35	0.40	-	-	0.85	0.64	1.36	-	0.69	-	-	-	0.77
			2030	0.39	0.45	-	-	0.89	0.69	1.51	-	0.86	-	-	-	0.86
			2040	0.43	0.51	-	-	0.97	0.77	1.71	-	1.08	-	-	-	0.99
5	Gateway Blvd at Seacrest Blvd	AM Peak	2020	0.82	0.59	0.40	0.18	1.03	-	1.04	0.28	-	0.16	0.84	-	1.04
			2030	0.86	0.58	0.50	0.26	1.23	-	1.32	0.29	-	0.20	0.96	-	1.26
			2040	0.90	0.69	0.65	0.42	1.56	-	1.65	0.32	-	0.21	1.08	-	1.56
		PM Peak	2020	0.60	0.89	0.29	0.35	0.63	-	0.90	0.57	-	0.28	0.81	-	0.92
			2030	0.66	1.04	0.37	0.67	0.63	-	1.10	0.53	-	0.32	0.81	-	1.10
			2040	0.73	1.27	0.48	0.66	0.67	-	1.37	0.53	-	0.33	0.81	-	1.35

= Movements volume to capacity ratios exceeding 1.00.

Table 6-18: Gateway Boulevard Intersections 95th Percentile Queue Length Summary – No-Build Conditions

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Gateway Blvd and Quantum Village	AM Peak	2020	53	354	-	m130	6	0	71	0	-	52	61	-	Signalized Intersection
			2030	53	464	-	m99	502	0	71	0	-	52	61	-	
			2040	53	646	-	m89	615	0	71	0	-	52	61	-	
		PM Peak	2020	131	251	-	m51	850	m0	12	0	-	104	91	-	
			2030	131	316	-	m44	943	m0	12	0	-	103	124	-	
			2040	131	406	-	m40	m889	m2	12	0	-	103	124	-	
		Existing Storage Length (ft)		125	1,000		125	850	265	150	150		130	130		
2	Gateway Blvd and High Ridge Rd	AM Peak	2020	119	#682	215	m#181	m471	m484	81	60	351	216	157	116	Signalized Intersection
			2030	128	#936	275	m#216	m529	m#519	85	62	358	220	169	119	
			2040	m#148	#1,198	308	m#247	m#651	m#599	87	65	362	224	183	126	
		PM Peak	2020	123	345	74	m144	#790	319	112	91	302	159	71	187	
			2030	141	490	124	m162	#982	m421	130	103	342	160	72	187	
			2040	170	#755	157	m180	#1,072	m430	149	108	380	161	75	188	
		Existing Storage Length (ft)		300	850		425	725		250		500	400		400	
3	Gateway Blvd and I-95 SB Ramps	AM Peak	2020	-	m306	m140	m0	m15	-	-	-	-	#413	-	#446	Signalized Intersection
			2030	-	m183	m132	m0	m13	-	-	-	-	#483	-	#463	
			2040	-	m164	m160	m0	m6	-	-	-	-	#565	-	#476	
		PM Peak	2020	-	#715	#572	m0	m60	-	-	-	-	390	-	376	
			2030	-	#798	m#630	m0	m86	-	-	-	-	471	-	403	
			2040	-	m#900	m#523	m0	m109	-	-	-	-	#652	-	#479	
		Existing Storage Length (ft)			700	700	100	100					650		**2,560**	

Table 6-18: Gateway Boulevard Intersections 95th Percentile Queue Length Summary – No-Build Condition – continued

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4	Gateway Blvd and I-95 NB Ramps	AM Peak	2020	m11	m4	-	-	m304	m#334	#552	-	189	-	-	-	Signalized Intersection
			2030	m12	m4	-	-	m306	m243	#689	-	243	-	-	-	
			2040	m11	m4	-	-	m304	m188	#837	-	#366	-	-	-	
		PM Peak	2020	m2	m2	-	-	m279	m207	#875	-	344	-	-	-	
			2030	m3	m2	-	-	m284	m207	#1,048	-	#522	-	-	-	
			2040	m3	m3	-	-	m297	m213	#1,255	-	#730	-	-	-	
		Existing Storage Length (ft)		100	100			650	160	1,600		**2,600**				
5	Gateway Blvd and Seacrest Blvd	AM Peak	2020	182	558	291	52	#1,125	-	#500	153	-	51	291	-	Signalized Intersection
			2030	m#224	502	348	67	#1,376	-	#755	162	-	55	#380	-	
			2040	m#249	m650	m648	91	#1,791	-	#1,070	184	-	56	#447	-	
		PM Peak	2020	m91	#1,117	m183	44	586	-	#425	311	-	70	255	-	
			2030	m193	m#1,337	m317	#84	539	-	#635	301	-	71	#258	-	
			2040	m186	m#1,634	m409	#92	576	-	#887	305	-	71	#261	-	
		Existing Storage Length (ft)		300	650		350	1,000		1,000	1,000		1,000	1,000		

1) The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. This traffic was simulated for two complete cycles to account for the effects of spillover between cycles. If the reported v/c<1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue. In practice, 95th percentile queue shown will rarely be exceeded and the queues shown with the # footnote are acceptable for the design of storage bay (Trafficware 2012).
2) The m footnote indicates that the volume for the 95th percentile queue is metered by an upstream signal (Trafficware 2012).
3) The storage length values were calculated from aerials or design drawings.
4) To calculate reasonable queuing in the model, all terminal links were extended to 1,000 feet from the last node
5) For ramp terminals, the storage distance proved reflects the entire length of the ramp (**XXX feet**)
= Movements with queues exceeding available storage.

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FDOT

SR 9/I-95 at Gateway Boulevard Interchange
No-Build Lane Configuration, Intersection LOS and Delay - Open Year (2020)

Figure 6-10

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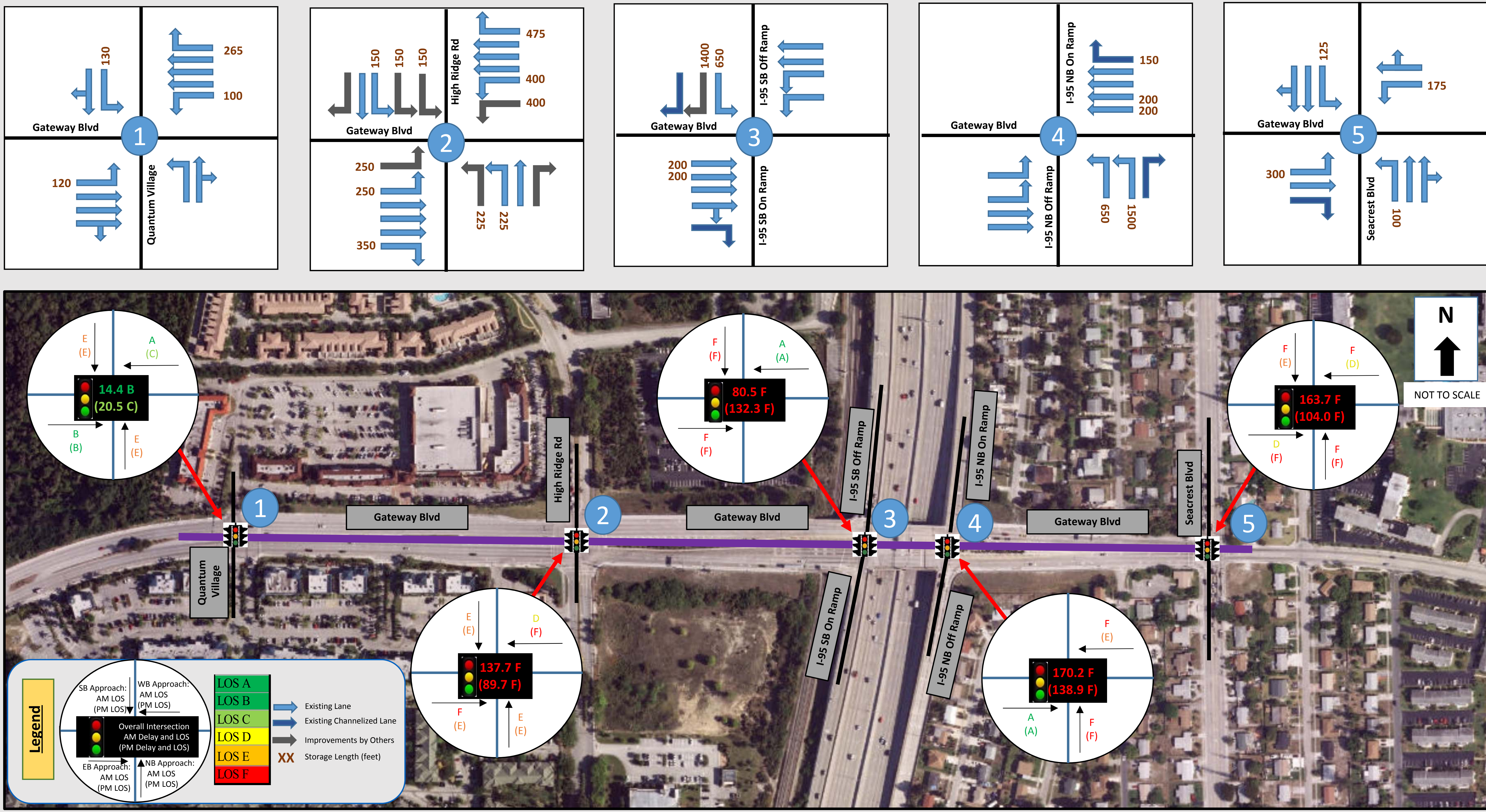
SR 9/I-95 at Gateway Boulevard Interchange
No-Build Lane Configuration, Intersection LOS and Delay - Interim Year (2030)

Figure 6-11



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SR 9/I-95 at Gateway Boulevard Interchange
No-Build Lane Configuration, Intersection LOS and Delay - Design Year (2040)

Figure 6-12

Other Project Intersections:

Open Year (2020)

- During the AM peak hour, the intersection for Gateway Boulevard at High Ridge Road operates at LOS E.
- During the AM peak hour, the intersection for Gateway Boulevard at Seacrest Boulevard operates at LOS E.

Interim Year (2030)

- The intersection for Gateway Boulevard at High Ridge Road changes from an LOS E operation to LOS F during the AM peak hour.
- During the PM peak hour, the intersection for Gateway Boulevard at Seacrest Boulevard operates at LOS E and changes from an LOS E operation to an LOS F during the AM peak hour.

Design Year (2040)

- During the AM and PM peak hours, the intersection for Gateway Boulevard at High Ridge Road further deteriorates to operate at LOS F.
- During the AM and PM peak hours, the intersection for Gateway Boulevard at Seacrest Boulevard further deteriorates to operates at LOS F.

Volumes exceeding capacity were observed for several movements along Gateway Boulevard intersections and these V/C ratios become progressively worse over the three analysis years without any improvements. Intersections with overall intersection volumes exceeding capacity are summarized below:

Ramp Terminal Intersections:

Interim Year (2030)

- Gateway Boulevard at SR 9/I-95 Southbound Ramps observed V/C ratios of 1.02 in the PM peak hour.

Design Year (2040)

- Gateway Boulevard at SR 9/I-95 Southbound Ramps observed V/C ratios of 1.03 and 1.15 in the AM and PM peak hours, respectively.

Other Project Intersections:

Open Year (2020)

- Gateway Boulevard at Seacrest Boulevard operates at 1.04 in the AM peak hour.

Interim Year (2030)

- Gateway Boulevard at Seacrest Boulevard operates at V/C ratios of 1.26 and 1.10 in the AM and PM peak hours, respectively.

Design Year (2040)

- Gateway Boulevard at High Ridge Road operates at a V/C ratio of 1.03 in the AM peak hour.
- Gateway Boulevard at Seacrest Boulevard operates at V/C ratios of 1.56 and 1.35 in the AM and PM peak hours, respectively.

A review of the 95th percentile queue lengths indicate that several left and right turning movements along Gateway Boulevard and eastbound and westbound through movements near the intersections of Gateway Boulevard with High Ridge Road, SR 9/I-95 northbound ramps, and Seacrest Boulevard are exceeding available storages. If these deficiencies are not addressed these queues could cause impacts to traffic operations and safety within the Gateway Boulevard interchange area.

SR 9/I-95 at Hypoluxo Road Interchange Intersections

Future No-Build approach and overall intersection LOS and delay results for the Hypoluxo Road interchange limits are summarized in Table 6-19 through Table 6-21 for Open (2020), Interim (2030), and Design (2040) Years, respectively. Intersection approach and overall V/C ratios are summarized in Table 6-22. The 95th percentile queues are summarized in Table 6-23. Figures 6-13 through 6-15 depict the findings of this intersection analysis along Hypoluxo Road for the Open (2020), Interim (2030), and Design (2040) Years, respectively.

The results indicate that all ramp terminal intersections along SR 9/I-95 and other project intersections are expected to operate at LOS D or better, except for the following:

Ramp Terminal Intersections:

Open Year (2020)

- During the PM peak hour, the ramp terminal intersection for Hypoluxo Road at SR 9/I-95 southbound operates at LOS E.
- During the PM peak hour, the ramp terminal intersection for Hypoluxo Road at SR 9/I-95 northbound operates at LOS E.

Interim Year (2030)

- During the PM peak hour, the ramp terminal intersection for Hypoluxo Road at SR 9/I-95 southbound continues to operate at LOS E and changes from a LOS D operation to LOS E during the AM peak hour.
- The ramp terminal intersection for Hypoluxo Road at SR 9/I-95 northbound will deteriorate to LOS F operations from LOS E during the PM peak hour.

Table 6-19: Hypoluxo Road Intersections Delay and LOS Summary – No-Build Conditions – Open Year (2020)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Hypoluxo Rd at High Ridge Rd	Signalized	B	B	B	B	E	E	F	E	23.2	C	21.1	C
Hypoluxo Rd at I-95 Southbound Ramps	Signalized	C	F	D	A	-	-	E	E	41.1	D	57.5	E
Hypoluxo Rd at I-95 Northbound Ramps	Signalized	A	A	D	D	E	F	-	-	33.4	C	69.1	E
Hypoluxo Rd at Seacrest Blvd	Signalized	C	D	C	C	E	E	E	F	39.0	D	44.7	D
TOTAL										**121.6**		**186.4**	

Table 6-20: Hypoluxo Road Intersections Delay and LOS Summary – No-Build Conditions – Interim Year (2030)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Hypoluxo Rd at High Ridge Rd	Signalized	C	B	C	C	E	F	F	E	37.8	D	27.3	C
Hypoluxo Rd at I-95 Southbound Ramps	Signalized	E	F	C	A	-	-	F	F	63.3	E	75.0	E
Hypoluxo Rd at I-95 Northbound Ramps	Signalized	A	B	E	E	F	F	-	-	49.1	D	81.3	F
Hypoluxo Rd at Seacrest Blvd	Signalized	D	D	C	D	E	E	E	F	48.1	D	49.8	D
TOTAL										**198.3**		**233.4**	

Table 6-21: Hypoluxo Road Intersections Delay and LOS Summary – No-Build Conditions – Design Year (2040)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Hypoluxo Rd at High Ridge Rd	Signalized	F	C	E	C	D	F	F	F	88.2	F	37.5	D
Hypoluxo Rd at I-95 Southbound Ramps	Signalized	F	F	C	A	-	-	F	F	88.4	F	105.9	F
Hypoluxo Rd at I-95 Northbound Ramps	Signalized	B	B	E	E	F	F	-	-	66.6	E	91.8	F
Hypoluxo Rd at Seacrest Blvd	Signalized	F	D	D	D	E	E	F	F	75.0	E	56.5	E
TOTAL										**318.2**		**291.7**	

Table 6-22: Hypoluxo Road Intersections Volume to Capacity Ratio – No-Build Conditions

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Hypoluxo Rd at High Ridge Rd	AM Peak	2020	0.07	0.69	-	0.72	0.24	-	0.44	0.36	-	0.96	0.44	-	0.76
			2030	0.15	0.89	-	0.82	0.30	-	0.52	0.61	-	1.24	0.47	-	0.94
			2040	0.30	1.15	-	1.18	0.44	-	0.48	0.65	-	1.07	0.40	-	1.17
		PM Peak	2020	0.44	0.41	-	0.53	0.66	-	0.75	0.71	-	0.50	0.35	-	0.68
			2030	0.53	0.47	-	0.66	0.75	-	0.76	0.82	-	0.72	0.34	-	0.78
			2040	0.55	0.56	-	0.75	0.88	-	0.77	0.90	-	1.00	0.31	-	0.93
2	Hypoluxo Rd at I-95 Southbound Ramps	AM Peak	2020	-	0.70	0.71	1.17	0.25	-	-	-	-	0.83	0.90	0.52	0.95
			2030	-	0.95	0.95	1.02	0.30	-	-	-	-	1.13	1.21	0.68	1.12
			2040	-	1.07	1.10	1.11	0.40	-	-	-	-	1.14	1.22	0.67	1.24
		PM Peak	2020	-	1.12	0.37	0.40	0.75	-	-	-	-	0.92	1.07	0.66	1.02
			2030	-	1.21	0.41	0.42	0.83	-	-	-	-	1.02	1.15	0.71	1.11
			2040	-	1.36	0.45	0.41	0.89	-	-	-	-	1.20	1.30	0.80	1.22

Table 6-22: Hypoluxo Road Intersections Volume to Capacity Ratio – No-Build Conditions – continued

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Intersection
3	Hypoluxo Rd at I-95 Northbound Ramps	AM Peak	2020	0.66	0.55	-	-	0.74	0.87	0.85	-	0.49	-	-	-	0.79
			2030	0.87	0.65	-	-	0.64	0.87	1.30	-	0.63	-	-	-	0.97
			2040	1.06	0.76	-	-	0.72	0.94	1.54	-	0.76	-	-	-	1.13
		PM Peak	2020	0.53	0.72	-	-	0.79	0.67	1.35	-	0.67	-	-	-	0.93
			2030	0.59	0.79	-	-	0.83	0.68	1.44	-	0.78	-	-	-	1.01
			2040	0.84	0.75	-	-	0.87	0.68	1.50	-	0.88	-	-	-	1.09
4	Hypoluxo Rd at Seacrest Blvd	AM Peak	2020	0.15	0.37	0.22	0.17	0.45	-	0.75	0.76	0.29	-	0.25	0.69	0.53
			2030	0.37	0.48	0.52	0.43	0.64	-	0.82	0.81	0.31	-	0.42	0.79	0.71
			2040	0.74	0.66	1.14	0.86	0.87	-	0.91	0.91	0.35	-	0.69	0.92	1.00
		PM Peak	2020	0.50	0.63	0.37	0.48	0.57	-	0.80	0.81	0.40	-	0.59	0.66	0.67
			2030	0.63	0.71	0.53	0.59	0.64	-	0.85	0.85	0.42	-	0.71	0.70	0.75
			2040	0.78	0.81	0.76	0.77	0.75	-	0.91	0.91	0.48	-	0.82	0.68	0.87

= Movements volume to capacity ratios exceeding 1.00..

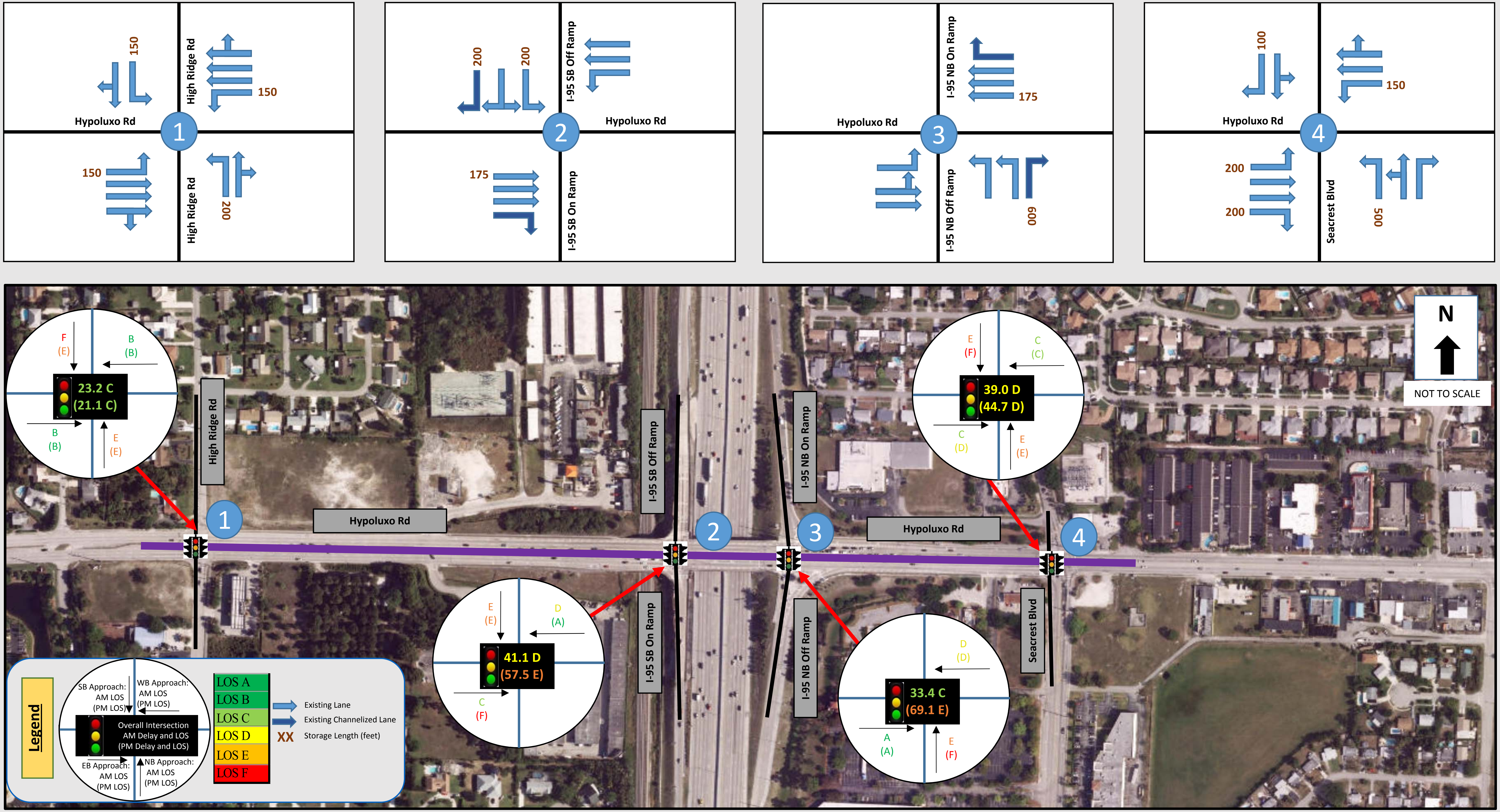
Table 6-23: Hypoluxo Road Intersections 95th Percentile Queue Length Summary – No-Build Conditions

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Hypoluxo Rd and High Ridge Road	AM Peak	2020	13	676	-	m181	279	-	88	111	-	#117	112	-	Signalized Intersection
			2030	30	#1,017	-	m#318	m35	-	124	199	-	#175	159	-	
			2040	47	#1,253	-	m#500	m426	-	170	328	-	#249	212	-	
		PM Peak	2020	46	328	-	m65	m793	-	192	233	-	71	128	-	
			2030	70	419	-	m90	m863	-	227	321	-	#96	146	-	
			2040	83	494	-	m159	m933	-	280	#478	-	#147	162	-	
		Existing Storage Length (ft)		170	1,000		175	1,450		250	1,000		170	1,000		

Table 6-23 Hypoluxo Road Intersections 95th Percentile Queue Length Summary – No-Build Conditions – continued

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2	Hypoluxo Rd and I-95 SB Ramps	AM Peak	2020	-	517	355	#728	28	-	-	-	-	323	#356	198	Signalized Intersection
			2030	-	#761	m#696	#819	m1	-	-	-	-	#432	#449	122	
			2040	-	m628	m554	#986	m14	-	-	-	-	#492	#510	243	
		PM Peak	2020	-	#584	98	m10	m25	-	-	-	-	#689	#826	382	
			2030	-	#678	108	m43	m69	-	-	-	-	#838	#943	432	
			2040	-	#757	m163	m9	m52	-	-	-	-	#1,045	#1,098	505	
		Existing Storage Length (ft)			1,450	1,450	160	160					**1,780**		450	
3	Hypoluxo Rd and I-95 NB Ramps	AM Peak	2020	589	206	-	-	305	250	181	-	211	-	-	-	Signalized Intersection
			2030	m789	m602	-	-	409	656	#279	-	282	-	-	-	
			2040	m780	m#778	-	-	m516	m#763	#394	-	#377	-	-	-	
		PM Peak	2020	m3	m579	-	-	417	257	#694	-	385	-	-	-	
			2030	m3	m614	-	-	437	295	#804	-	479	-	-	-	
			2040	m500	m140	-	-	454	m318	#922	-	#660	-	-	-	
		Existing Storage Length (ft)		160	160			800	800	**1,200**		750				
4	Hypoluxo Rd and Seacrest Blvd	AM Peak	2020	m56	341	193	65	402	-	264	271	107	-	84	180	Signalized Intersection
			2030	m67	m345	m314	139	522	-	380	376	134	-	147	#258	
			2040	m97	m332	m#683	#329	#679	-	#558	#568	174	-	#245	#355	
		PM Peak	2020	m141	m629	m289	100	519	-	367	374	170	-	149	#163	
			2030	m157	m620	m366	112	552	-	458	466	204	-	184	#182	
			2040	m174	m702	m534	#200	591	-	#606	#615	250	-	#260	#200	
		Existing Storage Length (ft)		210	800	250	1,000	1,000		1,000		1,000	500		150	

1) The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. This traffic was simulated for two complete cycles to account for the effects of spillover between cycles. If the reported v/c<1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue. In practice, 95th percentile queue shown will rarely be exceeded and the queues shown with the # footnote are acceptable for the design of storage bay (Trafficware 2012).
2) The m footnote indicates that the volume for the 95th percentile queue is metered by an upstream signal (Trafficware 2012).
3) The storage length values were calculated from aerials or design drawings.
4) To calculate reasonable queuing in the model, all terminal links were extended to 1,000 feet from the last node
5) For ramp terminals, the storage distance proved reflects the entire length of the ramp (**XXX feet**)
= Movements with queues exceeding available storage.



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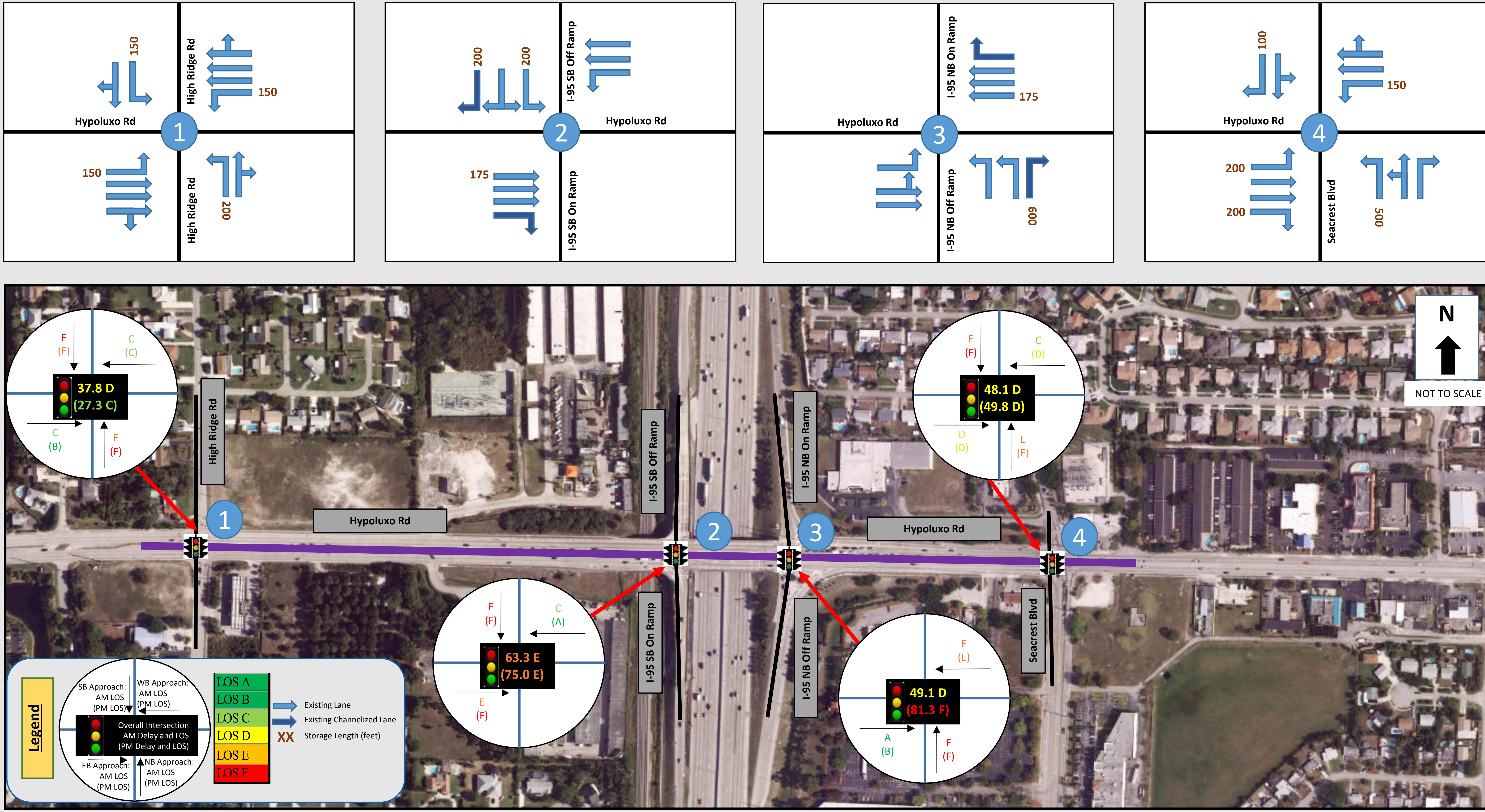
SR 9/I-95 at Hypoluxo Road Interchange
No-Build Lane Configuration, Intersection LOS and Delay - Open Year (2020)

Figure 6-13



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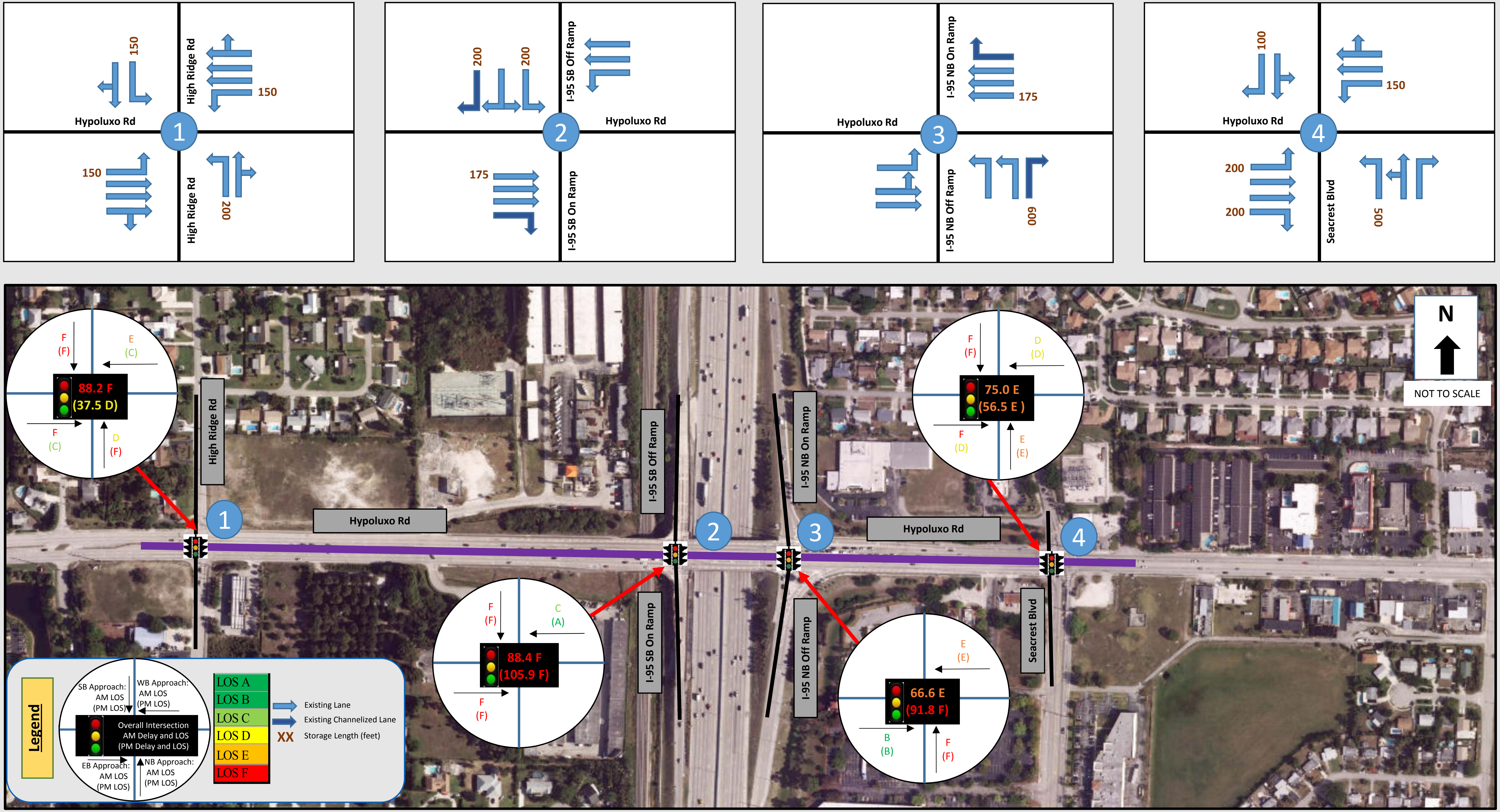
SR 9/I-95 at Hypoluxo Road Interchange
No-Build Lane Configuration, Intersection LOS and Delay - Interim Year (2030)

Figure 6-14



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SR 9/I-95 at Hypoluxo Road Interchange
No-Build Lane Configuration, Intersection LOS and Delay - Design Year (2040)

Figure 6-15

Design Year (2040)

- During the AM and PM peak hours, the ramp terminal intersection for Hypoluxo Road at SR 9/I-95 southbound will deteriorate to LOS F operations from LOS E.
- During the PM peak hour, the ramp terminal intersection for Hypoluxo Road at SR 9/I-95 northbound continues to operate at F and changes from LOS D operation to LOS E during the AM peak hour..

Other Project Intersections:

No adjacent project intersections operate at failing LOS (E or F) during the Open (2020) and Interim (2030) Years.

Design Year (2040)

- During the AM peak hour, the intersection for Hypoluxo Road at High Ridge Road operates at LOS F.
- During the AM and PM peak hours, the intersection for Hypoluxo Road at Seacrest Boulevard operates at LOS E.

Volumes exceeding capacities were observed for several movements along Hypoluxo Road intersections and these V/C ratios become progressively worse over the three analysis years without any improvements. Intersections with overall intersection volumes exceeding capacity are summarized below:

Ramp Terminal Intersections:

Open Year (2020)

- Hypoluxo Road at SR 9/I-95 Southbound Ramps operates at a V/C ratio of 1.02 in the PM peak hour.

Interim Year (2030)

- Hypoluxo Road at SR 9/I-95 Southbound Ramps operates at V/C ratios of 1.12 and 1.11 in the AM and PM peak hours, respectively.
- Hypoluxo Road at SR 9/I-95 Northbound Ramps operates at a V/C ratio of 1.01 in the PM peak hour.

Design Year (2040)

- Hypoluxo Road at SR 9/I-95 Southbound Ramps operates at V/C ratios of 1.24 and 1.22 in the AM and PM peak hours, respectively.
- Hypoluxo Road at SR 9/I-95 Northbound Ramps operates at V/C ratios of 1.13 and 1.09 in the AM and PM peak hours, respectively.

Other Project Intersections:

No adjacent project intersections operate at V/C ratios that exceed capacity during the Open (2020) and Interim (2030) Years.

Design Year (2040)

- Hypoluxo Road at High Ridge Road operates at a V/C ratio of 1.17 in the PM peak hour.
- Hypoluxo Road at Seacrest Boulevard operates at a V/C ratio of 1.00 in the AM peak hour.

A review of the 95th percentile queue lengths indicate that several left and right turning movements along Hypoluxo Road and eastbound through movements near the intersections of Hypoluxo Road with High Ridge Road and SR 9/I-95 northbound ramps are exceeding available storages.

6.4 TSM&O Alternative Operational Analysis

The TSM&O Alternative analyzed for this project included the efficient use of existing roadway system through

1. signal timing optimization
2. coordinated signal systems
3. optimization of splits and offsets for signals

The TSM&O Alternative replicates the roadway network of the No-Build Alternative.

The No Build roadway network is replicated for the TSM&O Alternative for all interchanges except the Gateway Boulevard interchange. Near the intersection of Gateway Boulevard with High Ridge Road, the intersection improvements proposed by Palm Beach County were not considered as they require extensive right-of-way for implementation and defies the purpose of TSM&O.

6.4.1 Operational Analysis

Future conditions operational analyses were performed for the TSM&O Alternative based on traffic forecasts and network conditions expected in years 2020, 2030 and 2040. LOS calculations for freeway segments (basic, merge and diverge areas) and analyses of freeway weaving segments were performed using the Highway Capacity Software (HCS). Synchro 9 models were developed for computing the LOS of ramp terminal intersections and other intersections within the study area.

TSM&O Alternative operational analyses LOS calculations and output reports for years 2020, 2030, and 2040 are provided in Appendix J.

6.4.1.1 SR 9/I-95 Freeway Segments

No TSM&O improvements are considered along the freeway within the project study area and therefore, it is assumed operations under the TSM&O Alternative reflect the operations of the No-Build Alternative along the freeway segments as discussed in Section 6.3.

6.4.1.2 Intersections

TSM&O improvements such as signal timing optimization, coordinate signal systems and optimized splits and offsets for signals were considered at the SR 9/I-95 interchanges with SR 804/Boynton Beach Boulevard and Gateway Boulevard only. The traffic operations near the SR 9/I-95 interchanges with Woolbright Road and Hypoluxo Road reflected No-Build Conditions as discussed in Section 6.3.

The TSM&O operational analyses for the SR 9/I-95 interchanges with SR 804/ Boynton Beach Boulevard and Gateway Boulevard are presented below:

SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange Intersections

TSM&O Alternative approach and overall intersection LOS and delay results for the intersections along SR 804/Boynton Beach Boulevard interchange limits are summarized in Table 6-24 through Table 6-26 for the Open (2020), Interim (2030), and Design (2040) Years, respectively. Intersection approach and overall V/C ratios are summarized in Table 6-27. The 95th percentile queues are summarized in Table 6-28. Figures 6-16 through 6-18 depict the findings of this intersection analysis along SR 804/Boynton Beach Boulevard for the Open (2020), Interim (2030), and Design (2040) Years, respectively.

The results indicate that all ramp terminal intersections along SR 9/I-95 and other project intersections are expected to operate at LOS D or better, except for the following:

Ramp Terminal Intersections:

Open Year (2020)
- During the PM peak hour, the ramp terminal intersection for SR 804/Boynton Beach Boulevard at SR 9/I-95 northbound operates at LOS E.

Interim Year (2030)
- During the AM peak hour, the ramp terminal intersection for SR 804/Boynton Beach Boulevard at SR 9/I-95 southbound operates at LOS E.
- The ramp terminal intersection for SR 804/Boynton Beach Boulevard at SR 9/I-95 northbound deteriorates to LOS F operations from LOS E in the PM peak hour.

Design Year (2040)
- During the AM peak hour, the ramp terminal intersection for SR 804/Boynton Beach Boulevard at SR 9/I-95 southbound operates at LOS F.
- During the PM peak hour, the ramp terminal intersection for SR 804/Boynton Beach Boulevard at SR 9/I-95 northbound continues to operate at LOS F and changes from a LOS D operation to LOS F during the AM peak hour.

Table 6-24: SR 804/Boynton Beach Boulevard Intersections Delay and LOS Summary – TSM&O Alternative – Open Year (2020)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	Signalized	D	C	D	D	E	E	E	E	45.3	D	40.5	D
SR 804/Boynton Beach Blvd at Industrial Ave	Signalized	B	B	A	A	E	E	E	F	13.4	B	14.2	B
SR 804/Boynton Beach Blvd at I-95 Southbound Ramps	Signalized	C	B	A	A	-	-	E	C	30.9	C	16.5	B
SR 804/Boynton Beach Blvd at I-95 Northbound Ramps	Signalized	B	D	D	E	E	E	-	-	34.4	C	58.3	E
SR 804/Boynton Beach Blvd at Seacrest Blvd	Signalized	C	D	C	D	F	E	E	E	47.4	D	56.1	E
TOTAL										**171.4**		**185.6**	

Table 6-25: SR 804/Boynton Beach Boulevard Intersections Delay and LOS Summary – TSM&O Alternative – Interim Year (2030)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	Signalized	E	D	D	E	E	D	F	E	63.1	E	61.8	E
SR 804/Boynton Beach Blvd at Industrial Ave	Signalized	B	B	A	C	E	E	E	F	17.5	B	23.7	C
SR 804/Boynton Beach Blvd at I-95 Southbound Ramps	Signalized	E	C	A	B	-	-	F	C	55.0	E	20.6	C
SR 804/Boynton Beach Blvd at I-95 Northbound Ramps	Signalized	C	F	E	F	F	E	-	-	53.3	D	82.6	F
SR 804/Boynton Beach Blvd at Seacrest Blvd	Signalized	E	D	E	F	F	F	F	F	76.0	E	105.1	F
TOTAL										**264.9**		**293.8**	

Table 6-26: SR 804/Boynton Beach Boulevard Intersections Delay and LOS Summary – TSM&O Alternative – Design Year (2040)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	Signalized	F	D	E	F	F	E	F	F	104.6	F	87.8	F
SR 804/Boynton Beach Blvd at Industrial Ave	Signalized	C	C	B	D	E	E	E	F	24.2	C	37.7	D
SR 804/Boynton Beach Blvd at I-95 Southbound Ramps	Signalized	F	C	E	B	-	-	F	C	95.1	F	23.3	C
SR 804/Boynton Beach Blvd at I-95 Northbound Ramps	Signalized	E	F	F	F	F	E	-	-	113.8	F	98.3	F
SR 804/Boynton Beach Blvd at Seacrest Blvd	Signalized	F	F	F	F	F	F	F	F	170.3	F	189.0	F
TOTAL										**508.0**		**436.1**	

Table 6-27: SR 804/Boynton Beach Boulevard Intersections Volume to Capacity Ratio – TSM&O Alternative

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	AM Peak	2020	0.17	0.77	-	0.72	0.60	0.32	0.22	0.57	-	0.86	0.16	-	0.74
			2030	0.24	0.95	-	0.91	0.62	0.42	0.27	0.82	-	1.12	0.22	-	0.95
			2040	0.51	1.13	-	1.19	0.63	0.53	0.36	1.16	-	1.28	0.28	-	1.23
		PM Peak	2020	0.47	0.66	-	0.55	0.71	1.02	0.69	0.90	-	0.93	0.32	-	0.98
			2030	0.55	0.85	-	0.77	0.90	1.24	0.36	0.86	-	0.98	0.28	-	1.08
			2040	0.67	0.93	-	1.04	1.02	1.36	0.42	1.02	-	1.10	0.26	-	1.23
2	Boynton Beach Blvd and Industrial Ave	AM Peak	2020	0.34	0.67	-	0.14	0.59	-	-	0.03	0.01	-	0.72	0.15	0.68
			2030	0.57	0.77	-	0.16	0.70	-	-	0.06	0.01	-	0.81	0.21	0.78
			2040	0.79	0.87	-	0.22	0.84	-	-	0.11	0.02	-	0.90	0.26	0.89
		PM Peak	2020	0.49	0.50	-	0.03	0.79	-	-	0.05	0.01	-	0.83	0.22	0.80
			2030	0.49	0.54	-	0.06	0.96	-	-	0.08	0.02	-	0.91	0.22	0.92
			2040	0.83	0.57	-	0.10	1.03	-	-	0.19	0.02	-	1.06	0.31	1.02

Table 6-27 SR 804/Boynton Beach Boulevard Intersections Volume to Capacity Ratio – TSM&O Alternative – continued

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
3	SR 804/Boynton Beach Blvd and I-95 Southbound Ramps	AM Peak	2020	-	0.85	0.57	0.87	0.35	-	-	-	-	1.19	-	0.57	0.91
			2030	-	1.12	0.66	1.02	0.41	-	-	-	-	1.31	-	0.60	1.12
			2040	-	1.26	0.74	1.39	0.49	-	-	-	-	1.44	-	0.63	1.34
		PM Peak	2020	-	0.62	0.30	0.59	0.63	-	-	-	-	0.82	-	0.58	0.68
			2030	-	0.76	0.29	0.63	0.68	-	-	-	-	0.86	-	0.61	0.76
			2040	-	0.84	0.32	0.76	0.73	-	-	-	-	0.90	-	0.66	0.83
4	SR 804/Boynton Beach Blvd and I-95 Northbound Ramps	AM Peak	2020	1.00	0.57	-	-	0.72	0.46	0.86	-	0.66	-	-	-	0.89
			2030	1.16	0.61	-	-	1.04	0.65	0.92	-	0.75	-	-	-	1.09
			2040	1.31	0.65	-	-	1.41	0.88	1.00	-	0.89	-	-	-	1.30
		PM Peak	2020	1.09	0.64	-	-	1.08	0.27	0.74	-	0.95	-	-	-	1.03
			2030	1.29	0.73	-	-	1.11	0.33	0.73	-	0.99	-	-	-	1.11
			2040	1.41	0.79	-	-	1.19	0.44	0.76	-	1.06	-	-	-	1.20
5	SR 804/Boynton Beach Blvd and Seacrest Blvd	AM Peak	2020	0.49	0.69	-	0.34	0.43	-	1.11	0.34	-	0.29	0.87	-	0.88
			2030	1.03	0.81	-	0.64	0.85	-	1.42	0.43	-	0.44	1.02	-	1.20
			2040	1.78	0.91	-	1.06	1.16	-	1.69	0.62	-	0.72	1.39	-	1.73
		PM Peak	2020	0.90	0.65	-	0.70	0.74	-	0.94	0.54	-	0.43	0.84	-	0.93
			2030	1.01	0.66	-	0.51	0.99	-	1.35	0.83	-	0.57	1.38	-	1.17
			2040	1.36	0.74	-	0.64	1.13	-	1.46	0.94	-	0.84	2.16	-	1.51

= Movements volume to capacity ratios exceeding 1.00.

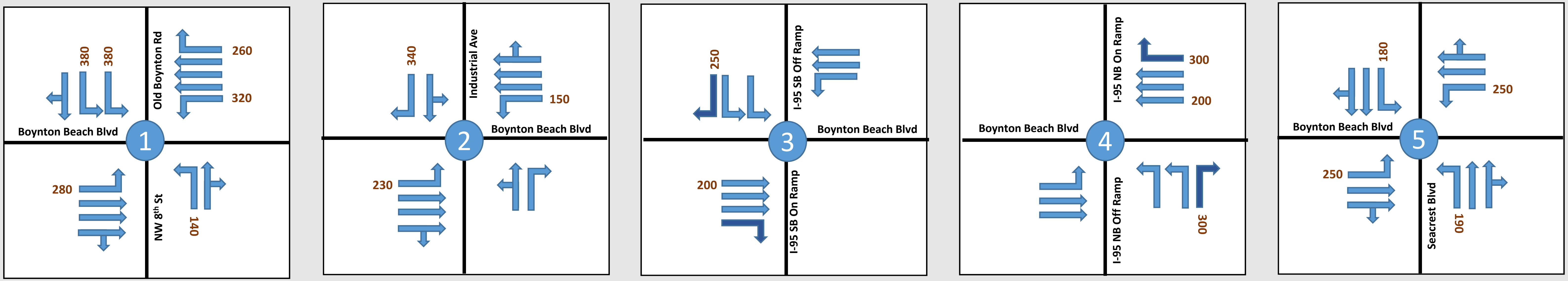
Table 6-28: SR 804/Boynton Beach Boulevard Intersections 95th Percentile Queue Length Summary – TSM&O Alternative

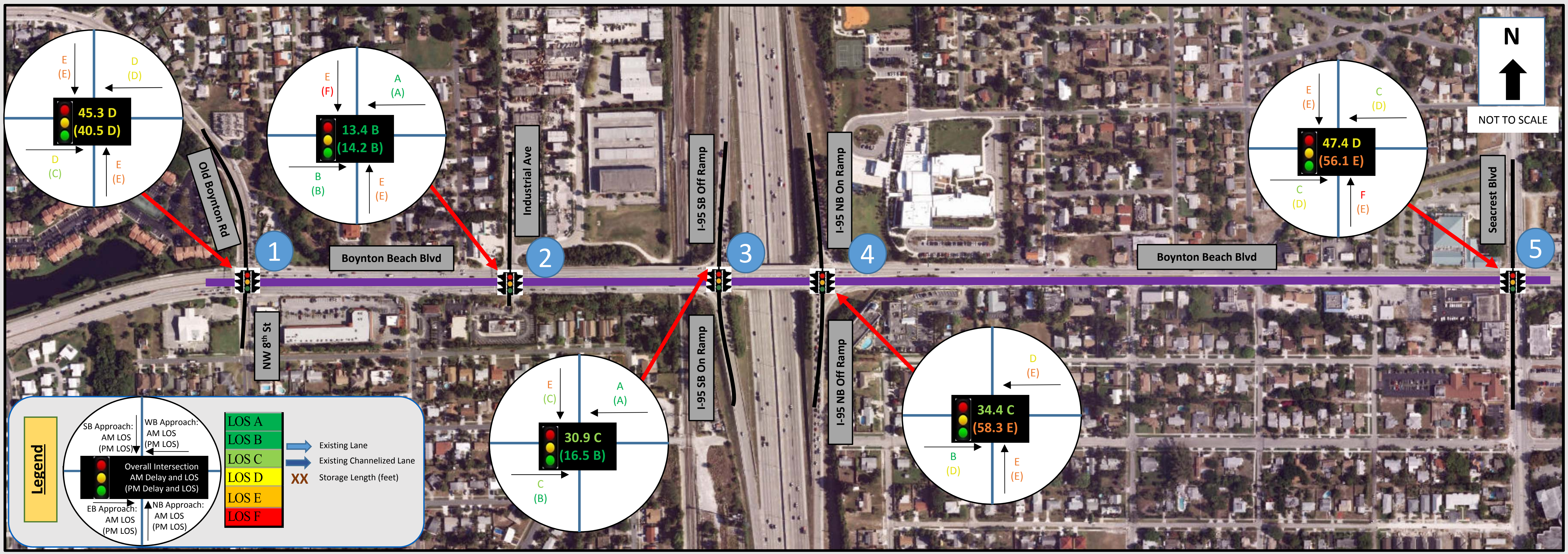
	Intersection	Time Period	Year	Queues (feet)													Remarks
				Eastbound			Westbound			Northbound			Southbound				
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
1	SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	AM Peak	2020	49	539	-	179	402	194	72	255	-	#358	117	-		Signalized Intersection
			2030	62	#670	-	#354	423	258	89	#426	-	#490	149	-		
			2040	59	#797	-	#626	437	345	105	#686	-	#587	186	-		
		PM Peak	2020	39	293	-	82	350	#710	#145	#318	-	#225	125	-		
			2030	#63	#369	-	#187	#480	#805	101	#345	-	#244	117	-		
			2040	#89	#375	-	#291	#522	#840	125	#498	-	#284	118	-		
		Existing Storage Length (ft)		280	1,000		320	1,045	260	140	1,000		380	1,000			
2	SR 804/Boynton Beach Blvd and Industrial Ave	AM Peak	2020	66	636	-	m3	236	-	-	16	11	-	185	89		Signalized Intersection
			2030	180	810	-	m2	322	-	-	24	14	-	244	120		
			2040	#328	973	-	m3	444	-	-	34	20	-	#351	158		
		PM Peak	2020	71	420	-	m2	400	-	-	22	15	-	277	105		
			2030	137	448	-	m2	664	-	-	29	18	-	#416	150		
			2040	#303	473	-	m4	#1,434	-	-	45	23	-	#558	204		
		Existing Storage Length (ft)		230	1,045		150	840		1,000		1,000	1,000		340		
3	SR 804/Boynton Beach Blvd and I-95 Southbound Ramps	AM Peak	2020	-	#929	621	25	0	-	-	-	-	#525	-	0		Signalized Intersection
			2030	-	#1,184	1,042	m15	m0	-	-	-	-	#596	-	0		
			2040	-	#1,420	1,190	m17	m0	-	-	-	-	#675	-	0		
		PM Peak	2020	-	313	0	m282	m99	-	-	-	-	319	-	0		
			2030	-	463	m0	m340	m68	-	-	-	-	358	-	0		
			2040	-	m515	m0	m384	m93	-	-	-	-	#411	-	0		
		Existing Storage Length (ft)			840	840	370	370					**1,560**		250		

Table 6-28: SR 804/Boynton Beach Boulevard Intersections 95th Percentile Queue Length Summary – TSM&O Alternative – continued

	Intersections	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4	SR 804/Boynton Beach Blvd and I-95 Northbound Ramps	AM Peak	2020	#979	m41	-	-	453	271	278	-	230	-	-	-	Signalized Intersection
			2030	m866	m28	-	-	#793	433	#330	-	#293	-	-	-	
			2040	m864	m24	-	-	#1,281	717	#391		#377	-	-	-	
		PM Peak	2020	#1,102	406		-	m#627	m0	559	-	#958	-	-	-	
			2030	#1,287	329	-	-	m#484	m0	618	-	#1,094	-	-	-	
			2040	#1,414	446	-	-	m429	m0	655	-	#1,236	-	-	-	
		Existing Storage Length (ft)		370	370			2,730	300	**1,630**		300				
5	SR 804/Boynton Beach Blvd and Seacrest Blvd	AM Peak	2020	155	482	-	65	281	-	#345	159	-	105	381	-	Signalized Intersection
			2030	#500	551	-	91	455	-	#469	220	-	154	#604	-	
			2040	#1,057	645	-	#261	#763	-	#567	296	-	221	#911	-	
		PM Peak	2020	m#381	m456	-	#241	618	-	#467	339	-	103	355	-	
			2030	m#685	m500	-	101	#816	-	#717	#471	-	155	#695	-	
			2040	m#1,087	m586	-	133	#996	-	#793	#531	-	#265	#1,076	-	
		Existing Storage Length (ft)		250	2,730		250	1,000		190	1,000		180	1,000		

1) The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. This traffic was simulated for two complete cycles to account for the effects of spillover between cycles. If the reported v/c<1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue. In practice, 95th percentile queue shown will rarely be exceeded and the queues shown with the # footnote are acceptable for the design of storage bay (Trafficware 2012).
2) The m footnote indicates that the volume for the 95th percentile queue is metered by an upstream signal (Trafficware 2012).
3) The storage length values were calculated from aerials or design drawings.
4) To calculate reasonable queuing in the model, all terminal links were extended to 1,000 feet from the last node
5) For ramp terminals, the storage distance proved reflects the entire length of the ramp (**XXX feet**)
= Movements with queues exceeding available storage.



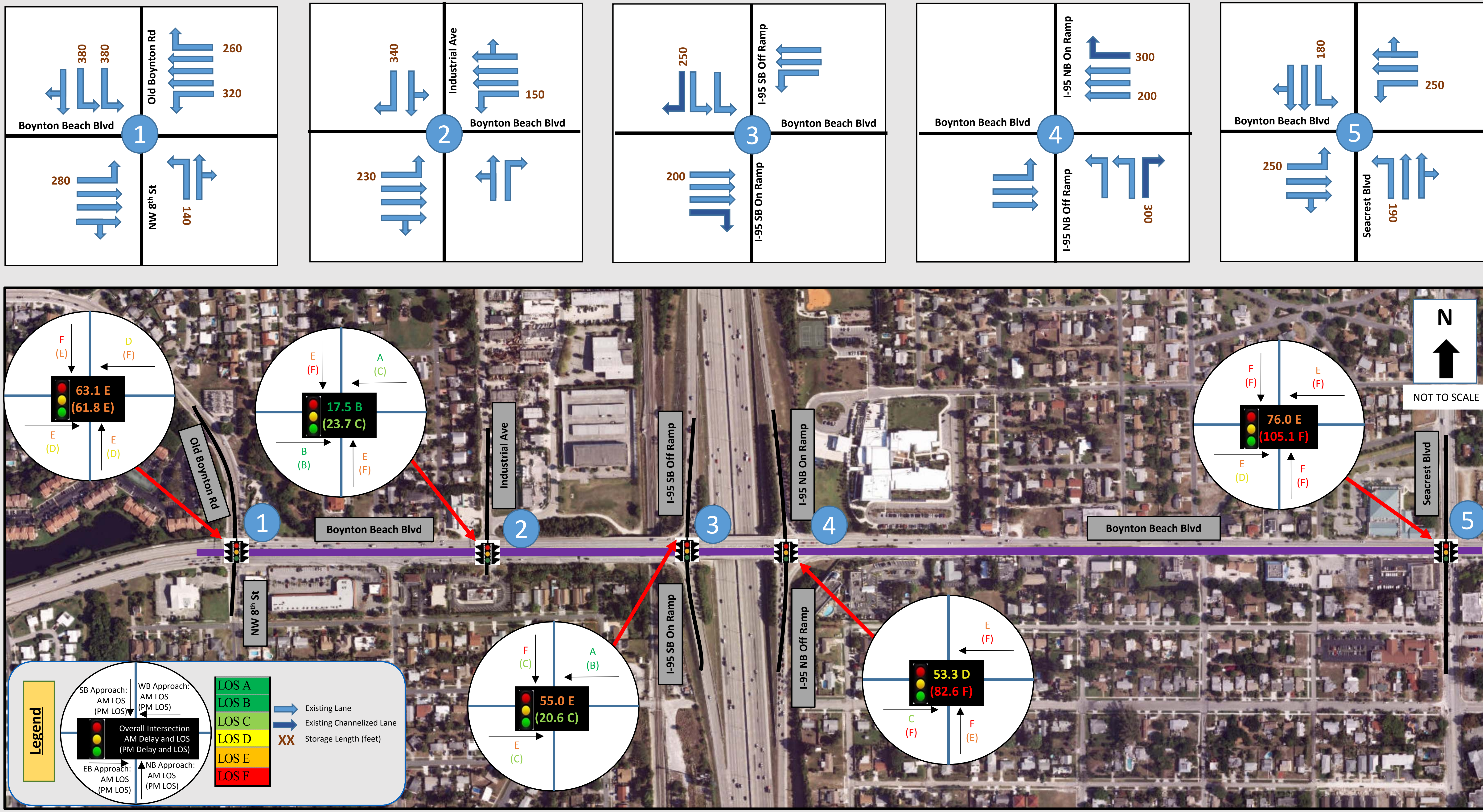


PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
TSM&O Lane Configuration, Intersection LOS and Delay - Open Year (2020)

Figure 6-16



PD&E Study
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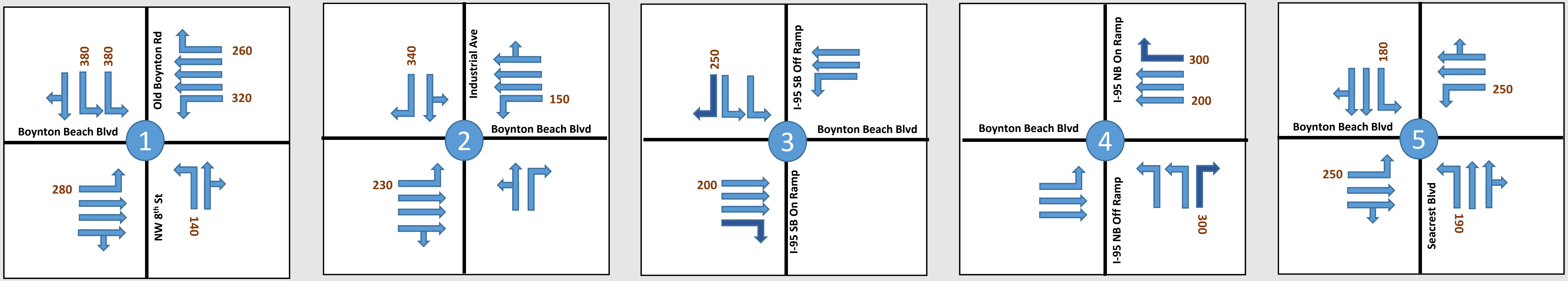
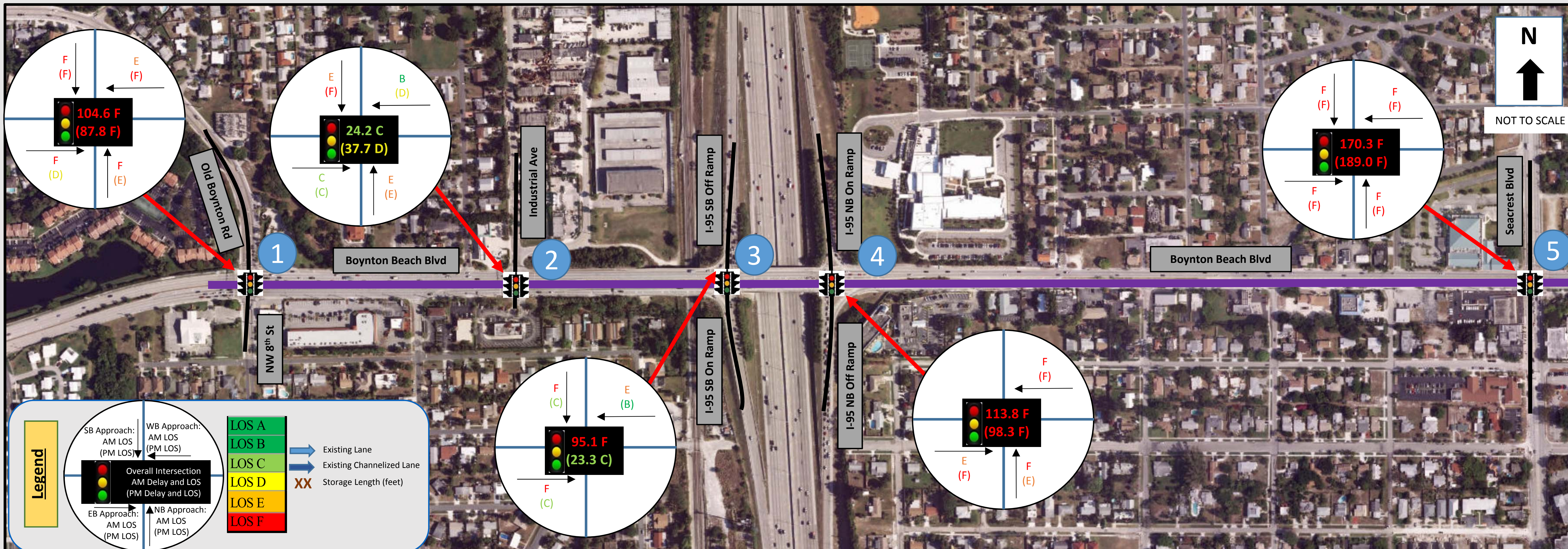
FDOT

SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
TSM&O Lane Configuration, Intersection LOS and Delay - Interim Year (2030)

Figure 6-17





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SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
TSM&O Lane Configuration, Intersection LOS and Delay - Design Year (2040)

Figure 6-18

Other Project Intersections:

Open Year (2020)

- During the PM peak hour, the intersection for SR 804/Boynton Beach Boulevard at Seacrest Boulevard operates at LOS E.

Interim Year (2030)

- During the AM and PM peak hours, the intersection for SR 804/Boynton Beach Boulevard NW 8th Street/Old Boynton Road operates at LOS E.
- During the PM peak hour, the intersection for SR 804/Boynton Beach Boulevard at Seacrest Boulevard deteriorates to LOS F from LOS E and changes from LOS D operation to LOS E during the AM and PM peak hours, respectively.

Design Year (2040)

- During the AM and PM peak hours, the intersection for SR 804/Boynton Beach Boulevard NW 8th Street/Old Boynton Road deteriorates to LOS F from LOS E.
- During the PM peak hour, the intersection for SR 804/Boynton Beach Boulevard at Seacrest Boulevard continues to operate at LOS F and changes from LOS E operation to LOS F during the AM peak hour.

Volumes exceeding capacity were observed for several movements along SR 804/Boynton Beach Boulevard similar to the No-Build Alternative as TSM&O Alternative did not implement any capacity intersection improvements. Intersections with overall intersection volumes exceeding capacity are summarized below:

Ramp Terminal Intersections:

Open Year (2020)

- SR 804/Boynton Beach Boulevard at SR 9/I-95 Northbound Ramps operates at a V/C ratio of 1.03 in the PM peak hour.

Interim Year (2030)

- SR 804/Boynton Beach Boulevard at SR 9/I-95 Southbound Ramps operates at a V/C ratio of 1.12 in the AM peak hour.
- SR 804/Boynton Beach Boulevard at SR 9/I-95 Northbound Ramps operates at V/C ratios of 1.09 and 1.11 in the AM and PM peak hours, respectively.

Design Year (2040)

- SR 804/Boynton Beach Boulevard at SR 9/I-95 Southbound Ramps operates at a V/C ratio of 1.34 in the AM peak hour.
- SR 804/Boynton Beach Boulevard at SR 9/I-95 Northbound Ramps operates at V/C ratios of 1.30 and 1.20 in the AM and PM peak hours, respectively.

Other Project Intersections:

No adjacent project intersections operate with volumes exceeding capacity during the Open Year (2020).

Interim Year (2030)
- SR 804/Boynton Beach Boulevard at NW 8th Street/Old Boynton Road operates at a V/C ratio of 1.08 in the PM peak hour.
- SR 804/Boynton Beach Boulevard at Seacrest Boulevard operates at V/C ratios of 1.20 and 1.17 in the AM and PM peak hours, respectively.

Design Year (2040)
- SR 804/Boynton Beach Boulevard at NW 8th Street/Old Boynton Road operates at a V/C ratio of 1.23 in the AM and PM peak hours.
- SR 804/Boynton Beach Boulevard at Industrial Avenue operates at a V/C ratio of 1.02 in the PM peak hour.
- SR 804/Boynton Beach Boulevard at Seacrest Boulevard operates at V/C ratios of 1.73 and 1.51 in the AM and PM peak hours, respectively.

A review of the 95th percentile queue lengths indicate that queue spillback from several left, right, and through movements exist even with the TSM&O Alternative. These queue spillbacks indicate the need for capacity intersection improvements at this interchange to improve traffic operations and safety.

SR 9/I-95 at Gateway Boulevard Interchange Intersections

TSM&O Alternative approach and overall intersection LOS and delay results for the intersections along Gateway Boulevard within the interchange limits are summarized in Table 6-29 through Table 6-31 for the Open (2020), Interim (2030) and Design (2040) Years, respectively. Intersection approach and overall V/C ratios are summarized in Table 6-32. The 95th percentile queues are summarized in Table 6-33. Figures 6-19 through 6-21 depict the findings of this intersection analysis along Gateway Boulevard for the Open (2020), Interim (2030), and Design (2040) Years, respectively.

The results indicate that all ramp terminal intersections along I- 95 and other project intersections are expected to operate at LOS D or better, except for the following:

Ramp Terminal Intersections:

Both ramp terminal intersections operate at LOS D or better during the Open Year (2020).

Interim Year (2030)
- During the PM peak hour, the ramp terminal intersection for Gateway Boulevard at SR 9/I-95 southbound operates at LOS F.
- During the AM and PM peak hours, the ramp terminal intersection for Gateway Boulevard at SR 9/I-95 northbound operates at LOS E.

Table 6-29: Gateway Boulevard Intersections Delay and LOS Summary – TSM&O Alternative – Open Year (2020)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Gateway Blvd at Quantum Village	Signalized	A	B	A	A	E	E	E	E	11.1	B	12.7	B
Gateway Blvd at High Ridge Road	Signalized	F	D	D	D	F	E	E	E	66.8	E	43.9	D
Gateway Blvd at I-95 Southbound Ramps	Signalized	C	E	A	C	-	-	D	E	27.4	C	51.4	D
Gateway Blvd at I-95 Northbound Ramps	Signalized	A	A	E	E	F	F	-	-	41.3	D	46.1	D
Gateway Blvd at Seacrest Blvd	Signalized	C	C	E	D	E	E	F	E	60.5	E	42.6	D
TOTAL										**207.1**		**196.7**	

Table 6-30: Gateway Boulevard Intersections Delay and LOS Summary – TSM&O Alternative – Interim Year (2030)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Gateway Blvd at Quantum Village	Signalized	B	B	A	B	E	E	E	E	11.4	B	13.1	B
Gateway Blvd at High Ridge Road	Signalized	F	D	D	E	F	F	E	E	103.3	F	57.0	E
Gateway Blvd at I-95 Southbound Ramps	Signalized	E	F	B	E	-	-	E	F	49.0	D	84.5	F
Gateway Blvd at I-95 Northbound Ramps	Signalized	A	A	F	E	F	F	-	-	63.3	E	71.7	E
Gateway Blvd at Seacrest Blvd	Signalized	C	D	F	D	F	F	F	E	96.0	F	56.7	E
TOTAL										**323.0**		**283.0**	

Table 6-31: Gateway Boulevard Intersections Delay and LOS Summary – TSM&O Alternative – Design Year (2040)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Gateway Blvd at Quantum Village	Signalized	B	B	B	B	E	E	E	E	14.2	B	15.2	B
Gateway Blvd at High Ridge Road	Signalized	F	E	C	F	E	E	E	E	113.2	F	71.3	E
Gateway Blvd at I-95 Southbound Ramps	Signalized	F	F	D	F	-	-	F	F	112.6	F	135.8	F
Gateway Blvd at I-95 Northbound Ramps	Signalized	A	A	F	F	F	F	-	-	103.5	F	110.8	F
Gateway Blvd at Seacrest Blvd	Signalized	D	F	F	D	F	F	F	E	162.2	F	98.8	F
TOTAL										**505.7**		**431.9**	

Table 6-32: Gateway Boulevard Intersections Volume to Capacity Ratio – TSM&O Alternative

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Gateway Blvd at Quantum Village	AM	2020	0.44	0.49	-	0.61	0.33	0.00	0.52	0.01	-	0.33	0.17	-	0.50
			2030	0.44	0.58	-	0.61	0.37	0.00	0.52	0.01	-	0.33	0.17	-	0.58
			2040	0.44	0.70	-	0.58	0.42	0.00	0.52	0.01	-	0.33	0.17	-	0.68
		PM	2020	0.61	0.40	-	0.46	0.61	0.01	0.04	0.01	-	0.59	0.17	-	0.61
			2030	0.61	0.45	-	0.46	0.66	0.01	0.04	0.01	-	0.58	0.48	-	0.66
			2040	0.59	0.54	-	0.46	0.74	0.01	0.04	0.01	-	0.57	0.50	-	0.72
2	Gateway Blvd at High Ridge Road	AM	2020	0.60	1.05	0.32	0.62	0.67	0.70	0.30	0.11	0.91	0.81	0.78		0.90
			2030	0.56	1.29	0.40	0.65	0.81	0.82	0.32	0.11	0.92	0.82	0.79		0.99
			2040	0.49	1.38	0.42	0.49	0.78	0.76	0.68	0.25	0.65	0.82	0.79		1.00
		PM	2020	0.52	0.60	0.10	0.67	0.87	0.54	0.53	0.20	0.86	0.80	0.54		0.84
			2030	0.52	0.75	0.15	0.69	1.05	0.64	0.57	0.22	0.90	0.81	0.53		0.93
			2040	0.51	0.94	0.20	0.54	1.14	0.69	0.81	0.30	0.60	0.80	0.55	-	0.95

Table 6-32: Gateway Boulevard Intersections Volume to Capacity Ratio – TSM&O Alternative – continued

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
3	Gateway Blvd at I-95 Southbound Ramps	AM	2020	-	0.97	0.87	0.33	0.87	-	-	-	-	1.03	-	0.39	0.98
			2030	-	1.21	1.07	0.41	0.97	-	-	-	-	1.20	-	0.41	1.10
			2040	-	1.55	1.35	0.53	1.12	-	-	-	-	1.26	-	0.43	1.28
		PM	2020	-	1.03	0.77	0.12	1.02	-	-	-	-	1.08	-	0.49	1.08
			2030	-	1.11	0.83	0.15	1.16	-	-	-	-	1.24	-	0.50	1.21
			2040	-	1.25	0.90	0.20	1.34	-	-	-	-	1.38	-	0.51	1.38
4	Gateway Blvd at I-95 Northbound Ramps	AM	2020	0.49	0.45	-	-	0.96	0.49	1.01	-	0.23	-	-	-	0.73
			2030	0.53	0.49	-	-	1.11	0.54	1.15	-	0.29	-	-	-	0.82
			2040	0.57	0.57	-	-	1.26	0.61	1.39	-	0.37	-	-	-	0.95
		PM	2020	0.39	0.61	-	-	0.89	0.23	1.06	-	0.40	-	-	-	0.84
			2030	0.41	0.66	-	-	0.98	0.26	1.26	-	0.53	-	-	-	0.95
			2040	0.43	0.74	-	-	1.09	0.31	1.53	-	0.69	-	-	-	1.09
5	Gateway Blvd at Seacrest Blvd	AM	2020	0.83	0.56	0.38	0.18	1.01	-	1.01	0.27	-	0.19	0.91	-	1.02
			2030	0.86	0.58	0.50	0.26	1.22	-	1.31	0.29	-	0.20	0.95	-	1.25
			2040	0.90	0.68	0.65	0.41	1.54	-	1.65	0.32	-	0.21	1.08	-	1.55
		PM	2020	0.62	0.87	0.28	0.37	0.59	-	0.87	0.54	-	0.31	0.81	-	0.90
			2030	0.65	1.03	0.37	0.65	0.62	-	1.09	0.52	-	0.32	0.81	-	1.09
			2040	0.73	1.26	0.48	0.65	0.66	-	1.37	0.53	-	0.33	0.81	-	1.34

= Movements volume to capacity ratios exceeding 1.00.

Table 6-33: Gateway Boulevard Intersections 95th Percentile Queue Length Summary – TSM&O Alternative

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				L	T	R	L	T	R	L	T	R	L	T	R	
1	Gateway Blvd and Quantum Village	AM	2020	53	354	-	m122	16	0	71	0	-	52	61	-	Signalized Intersection
			2030	53	465	-	m97	15	0	71	0	-	52	61	-	
			2040	53	647	-	m94	608	0	71	0	-	52	61	-	
		PM	2020	131	251	-	m48	841	m0	12	0	-	104	75	-	
			2030	131	310	-	m44	m858	m0	12	0	-	104	116	-	
			2040	131	402	-	m41	m890	m0	12	0	-	104	119	-	
		Existing Storage Length (ft)		125	1,000		125	850	265	150	150		130	130		
2	Gateway Blvd and High Ridge Road	AM	2020	#169	#707	215	m#259	456	m#297	140	65	#410	368	307	-	Signalized Intersection
			2030	#202	#915	262	m#267	m500	m447	147	67	#423	383	319	-	
			2040	140	#1,251	314	m145	m529	m386	168	78	176	392	328	-	
		PM	2020	126	301	62	m113	m#821	m304	204	94	312	303	174	-	
			2030	147	#615	99	m128	m#802	m280	243	110	#398	309	173	-	
			2040	#185	#743	138	m140	m#795	m234	287	122	206	309	180	-	
		Existing Storage Length (ft)		300	850		425	725		250		500	400		400	
3	Gateway Blvd and I-95 SB Ramps	AM	2020	-	m279	m118	m0	m57	-	-	-	-	#461	-	157	Signalized Intersection
			2030	-	m235	m112	m0	m58	-	-	-	-	#542	-	225	
			2040	-	m#633	m#232	m0	m58	-	-	-	-	#613	-	238	
		PM	2020	-	#607	#488	m0	m#440	-	-	-	-	#561	-	283	
			2030	-	#699	m#549	m0	m#456	-	-	-	-	#667	-	289	
			2040	-	#845	m#487	m0	m437	-	-	-	-	#783	-	300	
		Existing Storage Length (ft)			700	700	100	100					650		**2,560**	

Table 6-33: Gateway Boulevard Intersections 95th Percentile Queue Length Summary – TSM&O Alternative – continued

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				L	T	R	L	T	R	L	T	R	L	T	R	
4	Gateway Blvd and I-95 NB Ramps	AM	2020	m5	m34	-	-	m306	m174	#493	-	130	-	-	-	Signalized Intersection
			2030	m5	m34	-	-	m305	m138	#614	-	162	-	-	-	
			2040	m5	m32	-	-	m295	m94	#775	-	211	-	-	-	
		PM	2020	m0	m31	-	-	#301	m112	#751	-	224	-	-	-	
			2030	m0	m32	-	-	m#309	m113	#959	-	319	-	-	-	
			2040	m0	m32	-	-	m#323	m128	#1,203	-	481	-	-	-	
		Existing Storage Length (ft)		100	100			650	160	1,600		**2,600**				
5	Gateway Blvd and Seacrest Blvd	AM	2020	#196	470	312	49	#1,069	-	#496	150	-	53	#344	-	Signalized Intersection
			2030	#225	483	513	67	#1,368	-	#750	162	-	55	#377	-	
			2040	#267	598	687	91	#1,783	-	#1,070	184	-	56	#447	-	
		PM	2020	150	#1,052	239	45	523	-	#404	296	-	69	256	-	
			2030	169	#1,334	291	#83	536	-	#629	300	-	70	257	-	
			2040	m198	#1,747	425	#91	573	-	#887	305	-	71	#261	-	
		Existing Storage Length (ft)		300	650		350	1,000		1,000	1,000		1,000	1,000		

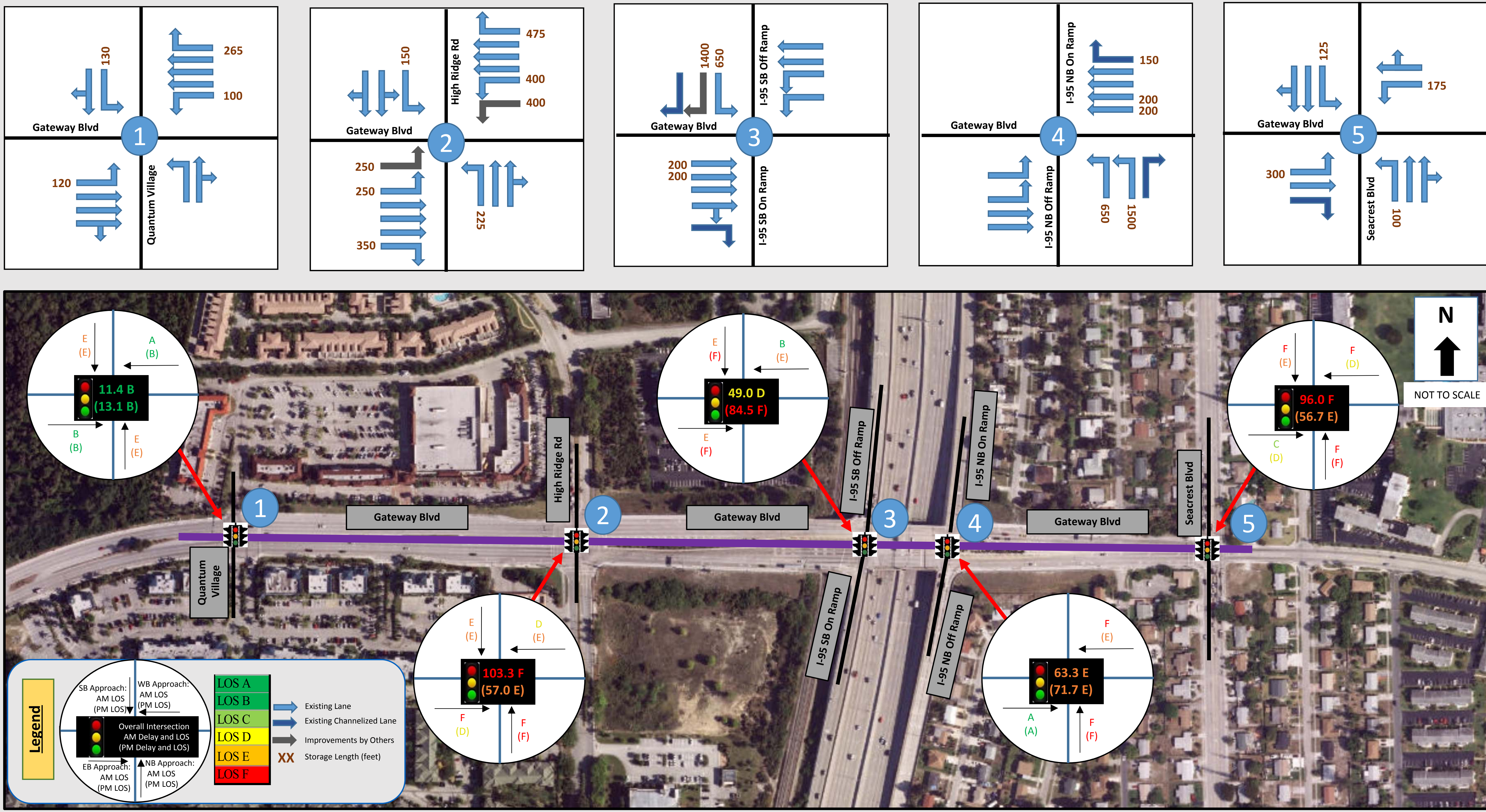
1) The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. This traffic was simulated for two complete cycles to account for the effects of spillover between cycles. If the reported v/c<1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue. In practice, 95th percentile queue shown will rarely be exceeded and the queues shown with the # footnote are acceptable for the design of storage bay (Trafficware 2012).
2) The m footnote indicates that the volume for the 95th percentile queue is metered by an upstream signal (Trafficware 2012).
3) The storage length values were calculated from aerials or design drawings.
4) To calculate reasonable queuing in the model, all terminal links were extended to 1,000 feet from the last node
5) For ramp terminals, the storage distance proved reflects the entire length of the ramp (**XXX feet**)
= Movements with queues exceeding available storage.

PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at Gateway Boulevard Interchange
TSM&O Lane Configuration, Intersection LOS and Delay - Open Year (2020)

Figure 6-19



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SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
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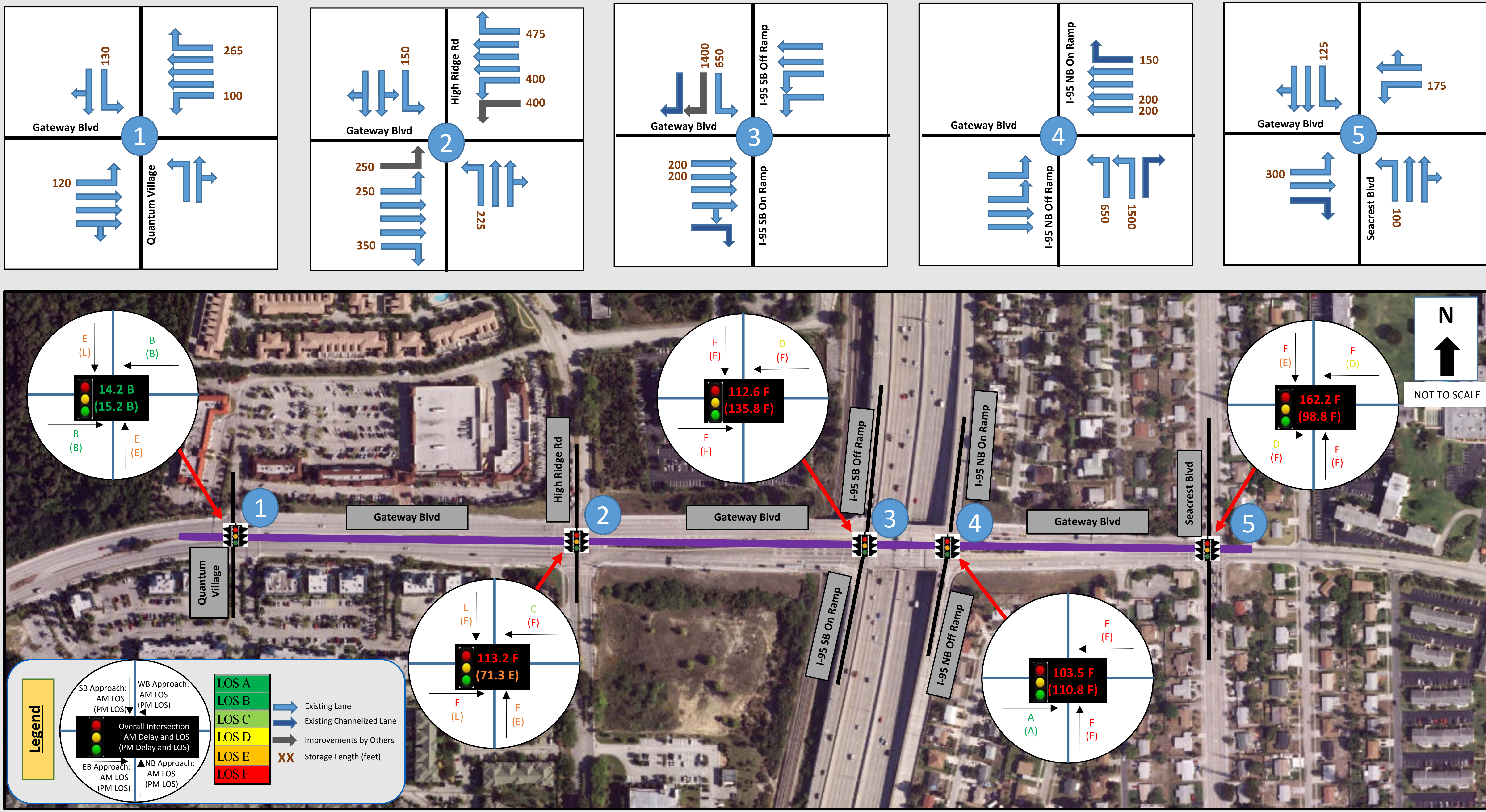
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at Gateway Boulevard Interchange
TSM&O Lane Configuration, Intersection LOS and Delay - Interim Year (2030)

Figure 6-20



PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at Gateway Boulevard Interchange
TSM&O Lane Configuration, Intersection LOS and Delay - Design Year (2040)

Figure 6-21

Design Year (2040)

- During the PM peak hour, the ramp terminal intersection for Gateway Boulevard at SR 9/I-95 southbound continues to operate at LOS F and changes from LOS D operations to LOS F during the AM peak hour.
- During the AM and PM peak hours, the ramp terminal intersection for Gateway Boulevard at SR 9/I-95 northbound deteriorates to operate at LOS F.

Other Project Intersections:

Open Year (2020)

- During the AM peak hour, the intersection for Gateway Boulevard at High Ridge Road operates at LOS E.
- During the AM peak hour, the intersection for Gateway Boulevard at Seacrest Boulevard operates at LOS E.

Interim Year (2030)

- During the AM peak hour, the intersection for Gateway Boulevard at High Ridge Road deteriorates to operate at LOS F from LOS E and changes from LOS D operations to LOS E during the PM peak hour.
- During the AM peak hour, the intersection for Gateway Boulevard at Seacrest Boulevard deteriorates to operate at LOS F from LOS E and changes from LOS D operations to LOS E during the PM peak hour.

Design Year (2040)

- The intersection for Gateway Boulevard at High Ridge Road continues to operate at LOS F and LOS E during the AM and PM peak hours, respectively.
- The intersection for Gateway Boulevard at Seacrest Boulevard deteriorates to operate at LOS F during both peak hours.

Volumes exceeding capacity were observed for several movements along Gateway Boulevard similar to the No-Build Alternative as TSM&O Alternative did not implement any capacity or intersection improvements. Intersections with overall intersection volumes exceeding capacity are summarized below:

Ramp Terminal Intersections:

Open Year (2020)

- Gateway Boulevard at SR 9/I-95 Southbound Ramps operates at a V/C ratio of 1.08 in the PM peak hour.

Interim Year (2030)

- Gateway Boulevard at SR 9/I-95 Southbound Ramps operates at V/C ratios of 1.10 and 1.21 in the AM and PM peak hours, respectively.

Design Year (2040)

- Gateway Boulevard at SR 9/I-95 Southbound Ramps operates at V/C ratios of 1.28 and 1.38 in the AM and PM peak hours, respectively.

- Gateway Boulevard at SR 9/I-95 Northbound Ramps operates at a V/C ratio of 1.09 in the PM peak hour.

Other Project Intersections:

Open Year (2020)
- Gateway Boulevard at Seacrest Boulevard operates at a V/C ratio of 1.02 in the AM peak hour.

Interim Year (2030)
- Gateway Boulevard at Seacrest Boulevard operates at V/C ratios of 1.25 and 1.09 in the AM and PM peak hours, respectively.

Design Year (2040)
- Gateway Boulevard at High Ridge Road operates at a V/C ratio of 1.00 in the AM peak hour.
- Gateway Boulevard at Seacrest Boulevard operates at V/C ratios of 1.55 and 1.34 in the AM and PM peak hours, respectively.

A review of the 95th percentile queue lengths indicate that queue spillback from several left, right, and through movements exist even with the TSM&O Alternative. These queue spillbacks indicate the need for capacity and intersection improvements at this interchange to improve traffic operations and safety.

6.5 Build Alternatives Operational Analyses

Several Build Alternatives have been considered for the interchanges of SR 804/Boynton Beach Boulevard and Gateway Boulevard along SR 9/I-95 and are described in detail in Section 5.

The No-Build and TSM&O Alternative Operational analyses presented in Section 6.3 and Section 6.4 of this SIMR, demonstrated that failing conditions are expected at the two study interchanges of SR 804/Boynton Beach Boulevard and Gateway Boulevard with SR 9/I-95 by Design Year 2040 if no infrastructure improvements are considered. To address these operational deficiencies, several design options were developed and evaluated for these interchanges. Operation analyses were performed for the various interchange options using HCM procedures and are discussed in the below sections.

6.5.1 Operational Analysis

Future conditions operational analyses were performed for three Build Alternatives based on traffic forecasts and network conditions expected in years 2020, 2030, and 2040. LOS calculations for freeway segments (basic, merge, and diverge areas) and analyses of freeway weaving segments were performed using HCS. Synchro 9 models were developed for computing the LOS of ramp terminal intersections and other intersections within the study area.

Build conditions operational analysis LOS calculations and output reports for years 2020, 2030, and 2040 are provided in Appendix K.

6.5.1.1 SR 9/I-95 Freeway Segments

FDOT is currently evaluating the feasibility of deploying express lanes along SR 9/I-95 within the current project study area. Detailed analysis is currently underway to evaluate traffic operations along SR 9/I-95 between Linton Boulevard and Indiantown Road. The study is currently in Planning phase and no PD&E, Design, or Construction phases of any improvements from this study are programmed by FDOT. The preferred typical section for express lanes from this study included the installation of two express lanes in both the northbound and southbound direction along the study area. For the purposes of consistency between the no-build and build condition operations along the SR 9/I-95 freeway segments, it is assumed that two express lanes will be present along SR 9/I-95 within the study area and would serve up to 1,650 vehicles per hour per lane (3,300 vehicles per hour) through these express lanes. This volume of 3,300 vehicles per hour is deducted from the mainline volume to conduct the freeway segment HCS analysis owing to the limitations of HCS software. Along with the express lanes, the below assessed freeway improvements are considered with the Build Alternatives:

- Northbound SR 9/I-95 – Convert the existing single lane off ramp to Gateway Boulevard into a two lane off ramp with an option lane from SR 9/I-95 mainline in the northbound direction
- Southbound SR 9/I-95 – Convert the existing single lane on ramp from Hypoluxo Road to a two lane on ramp that adds two lanes along SR 9/I-95 in the southbound direction, one lane from this on ramp is dropped onto Gateway Boulevard off ramp as an auxiliary lane and the second lane is carried south of the Gateway Boulevard off ramp gore point and merged into SR 9/I-95 at this location.

These proposed improvement roll plots are provided in Appendix L. The results from the HCS LOS analysis of the freeway segments, ramp merge or diverge sections, and weaving segments along SR 9/I-95 northbound and southbound directions are summarized in Tables 6-34 through 6-36 for Open (2020), Interim (2030), and Design (2040) Years, respectively. Figures 6-22 through 6-24 depict the build conditions results from this analysis along the freeway for the Open (2020), Interim (2030), and Design (2040) Years, respectively.

The HCS results for the basic freeway segments indicated all locations operate at LOS D or better except the following:

Open Year (2020)

- Northbound SR 9/I-95
    - During the PM peak hour, the weave section, from the Woolbright on ramp to the SR 804/Boynton Beach Boulevard off ramp, operates at LOS F.
    - During the PM peak hour, the weave section, between the SR 804/Boynton Beach Boulevard on ramp and the Gateway Boulevard off ramp, operates at LOS F.
- Southbound SR 9/I-95
    - During the AM peak hour, the weave section, between the Gateway Boulevard on ramp and the SR 804/Boynton Beach Boulevard off ramp, operates at LOS F.

A total of three locations, out of 22, with failing LOS (E or F) were observed in the Open Year (2020).

Interim Year (2030)

- Northbound SR 9/I-95
    - During the PM peak hour, the freeway segment, from the beginning of the project limits to Woolbright Road off ramp, operates at LOS E.
    - During the PM peak hour, the weave section, between the Woolbright Road on ramp and the SR 804/Boynton Beach Boulevard off ramp, operates at LOS F.
    - During the PM peak hour, the weave section, between the SR 804/Boynton Beach Boulevard on ramp and the Gateway Boulevard off ramp, operates at LOS F.

Table 6-34: Freeway Segment LOS Summary – Build Alternative – Open Year (2020)

ID	Freeway	From	To	Type	AM Peak					PM Peak				
					Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS	Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS
NORTHBOUND														
1	I-95	Project Beginning	Woolbright Rd	BFS	2,773			10.6	A	7,138			30.2	D
2			Woolbright Rd Off-Ramp	Diverge	2,773		768	2.7	A	7,183		1,352	13.8	B
3		Woolbright Rd Off-Ramp	Woolbright Rd On-Ramp	BFS	2,005			7.7	A	5,831			22.9	C
4		Woolbright Rd On-Ramp	SR 804/Boynton Beach Blvd Off-Ramp	Weave	3,459	1,454	597	12.4	B	7,472	1,641	1,866	*	F
5		SR 804/Boynton Beach Blvd Off-Ramp	SR 804/Boynton Beach Blvd On-Ramp	BFS	2,862			11.0	A	5,606			21.8	C
6		SR 804/Boynton Beach Blvd On-Ramp	Gateway Blvd Off-Ramp	Weave	3,909	1,047	798	13.7	B	6,646	1,040	1,422	*	F
7		Gateway Blvd Off-Ramp	Gateway Blvd On-Ramp	BFS	3,111			11.9	B	5,224			20.2	C
8		Gateway Blvd On-Ramp		Merge	3,111	1,122		21.6	C	5,224	785		26.0	C
9		Gateway Blvd On-Ramp	Hypoluxo Rd Off-Ramp	BFS	4,233			16.2	B	6,009			23.7	C
10			Hypoluxo Rd Off-Ramp	Diverge	4,233		500	< 1.0	A	6,009		1,298	< 1.0	A
11		Hypoluxo Rd Off-Ramp	Hypoluxo Rd On-Ramp	BFS	3,733			14.3	B	4,711			18.1	C
12		Hypoluxo Rd On-Ramp	Project End	BFS	5,236			16.1	B	5,731			17.6	B

pc/mi/ln – passenger car per mile per lane
* Volumes exceed available capacity leading to LOS F operations
Note:
1) As discussed in Section 2.7, an express lane maximum capacity of 1,650 vehicles per hour per lane was assumed. Future conditions for this project assumes two express lanes in either direction; these vehicles are excluded from the mainline I-95 general purpose traffic volumes and therefore, not included in this analysis.
2) Densities recorded as 0 pc/mi/ln are attributed to relatively low traffic demand volumes and long acceleration/deceleration lane lengths as provided by HCM 2010.

Table 6-34: Freeway Segment LOS Summary – Build Alternative – Open Year (2020) – continued

ID	Freeway	From	To	Type	AM Peak					PM Peak				
					Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS	Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS
SOUTHBOUND														
13	I-95	Project End	Hypoluxo Rd Off-Ramp	BFS	6,889			21.4	C	5,100			15.6	B
14		Hypoluxo Rd Off-Ramp	Hypoluxo Rd On-Ramp	BFS	6,289			25.1	C	3,705			14.2	B
16		Hypoluxo Rd On-Ramp	Gateway Blvd Off-Ramp	Weave	7,493	1,204	844	22.0	C	4,305	600	1,013	11.4	B
18		Gateway Blvd Off-Ramp	Gateway Blvd On-Ramp	BFS	6,649			27.0	D	3,292			12.6	B
19		Gateway Blvd On-Ramp	SR 804/Boynton Beach Blvd Off-Ramp	Weave	7,969	1,320	1,346	*	F	4,023	731	1,315	13.7	B
20		SR 804/Boynton Beach Blvd Off-Ramp	SR 804/Boynton Beach Blvd On-Ramp	BFS	6,623			26.9	D	2,708			10.4	A
21		SR 804/Boynton Beach Blvd On-Ramp	Woolbright Rd Off-Ramp	Weave	7,808	1,185	1,593	26.5	C	3,404	696	1,411	9.7	A
22		Woolbright Rd Off-Ramp	Woolbright Rd On-Ramp	BFS	6,215			24.7	C	1,993			7.6	A
23		Woolbright Rd On-Ramp		Merge	6,215	1,159		26.0	C	1,993	798		11.2	B
24		Woolbright Rd On-Ramp	Project Beginning	BFS	7,374			31.4	D	2,791			10.7	A

pc/mi/ln – passenger car per mile per lane
* Volumes exceed available capacity leading to LOS F operations
Note:
1) As discussed in Section 2.7, an express lane maximum capacity of 1,650 vehicles per hour per lane was assumed. Future conditions for this project assumes two express lanes in either direction; these vehicles are excluded from the mainline I-95 general purpose traffic volumes and therefore, not included in this analysis.
2) Densities recorded as 0 pc/mi/ln are attributed to relatively low traffic demand volumes and long acceleration/deceleration lane lengths as provided by HCM 2010.

Table 6-35: Freeway Segment LOS Summary – Build Alternative – Interim Year (2030)

ID	Freeway	From	To	Type	AM Peak					PM Peak				
					Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS	Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS
NORTHBOUND														
1	I-95	Project Beginning	Woolbright Rd	BFS	3,122			12.0	B	8,223			37.9	E
2	I-95		Woolbright Rd Off-Ramp	Diverge	3,122		901	4.4	A	8,223		1,516	16.9	B
3	I-95	Woolbright Rd Off-Ramp	Woolbright Rd On-Ramp	BFS	2,221			8.5	A	6,707			27.3	D
4	I-95	Woolbright Rd On-Ramp	SR 804/Boynton Beach Blvd Off-Ramp	Weave	3,894	1,673	679	14.2	B	8,451	1,744	2,005	*	F
5	I-95	SR 804/Boynton Beach Blvd Off-Ramp	SR 804/Boynton Beach Blvd On-Ramp	BFS	3,215			12.3	B	6,446			25.9	C
6	I-95	SR 804/Boynton Beach Blvd On-Ramp	Gateway Blvd Off-Ramp	Weave	4,517	1,302	968	16.2	B	7,674	1,228	1,716	*	F
7	I-95	Gateway Blvd Off-Ramp	Gateway Blvd On-Ramp	BFS	3,549			13.6	B	5,958			23.5	C
8	I-95	Gateway Blvd On-Ramp		Merge	3,549	1,220		23.8	C	5,958	843		28.9	D
9	I-95	Gateway Blvd On-Ramp	Hypoluxo Rd Off-Ramp	BFS	4,769			18.3	C	6,801			27.9	D
10	I-95		Hypoluxo Rd Off-Ramp	Diverge	4,769		667	< 1.0	A	6,801		1,493	< 1.0	A
11	I-95	Hypoluxo Rd Off-Ramp	Hypoluxo Rd On-Ramp	BFS	4,102			15.7	B	5,308			20.5	C
12	I-95	Hypoluxo Rd On-Ramp	Project End	BFS	5,843			17.9	B	6,388			19.7	C

pc/mi/ln – passenger car per mile per lane
* Volumes exceed available capacity leading to LOS F operations
Note:
1) As discussed in Section 2.7, an express lane maximum capacity of 1,650 vehicles per hour per lane was assumed. Future conditions for this project assumes two express lanes in either direction; these vehicles are excluded from the mainline I-95 general purpose traffic volumes and therefore, not included in this analysis.
2) Densities recorded as 0 pc/mi/ln are attributed to relatively low traffic demand volumes and long acceleration/deceleration lane lengths as provided by HCM 2010.

Table 6-35: Freeway Segment LOS Summary – Build Alternative – Interim Year (2030) – continued

ID	Freeway	From	To	Type	AM Peak					PM Peak				
					Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS	Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS
	SOUTHBOUND													
13	I-95	Project End	Hypoluxo Rd Off-Ramp	BFS	7,007			21.8	C	5,660			17.4	B
14		Hypoluxo Rd Off-Ramp	Hypoluxo Rd On-Ramp	BFS	6,361			25.5	C	4,106			15.7	B
16		Hypoluxo Rd On-Ramp	Gateway Blvd Off-Ramp	Weave	7,800	1,439	888	23.6	C	4,752	646	1,076	12.6	B
18		Gateway Blvd Off-Ramp	Gateway Blvd On-Ramp	BFS	6,912			28.5	D	3,676			14.1	B
19		Gateway Blvd On-Ramp	SR 804/Boynton Beach Blvd Off-Ramp	Weave	8,551	1,639	1,440	*	F	4,554	878	1,420	15.8	B
20		SR 804/Boynton Beach Blvd Off-Ramp	SR 804/Boynton Beach Blvd On-Ramp	BFS	7,111			29.7	D	3,134			12.0	B
21		SR 804/Boynton Beach Blvd On-Ramp	Woolbright Rd Off-Ramp	Weave	8,595	1,484	1,775	31.2	D	3,907	773	1,553	11.4	B
22		Woolbright Rd Off-Ramp	Woolbright Rd On-Ramp	BFS	6,820			28.0	D	2,354			9.0	A
23		Woolbright Rd On-Ramp		Merge	6,820	1,396		29.9	D	2,354	860		13.1	B
24		Woolbright Rd On-Ramp	Project Beginning	BFS	8,216			37.8	E	3,214			12.3	B

pc/mi/ln – passenger car per mile per lane
* Volumes exceed available capacity leading to LOS F operations
Note:
1) As discussed in Section 2.7, an express lane maximum capacity of 1,650 vehicles per hour per lane was assumed. Future conditions for this project assumes two express lanes in either direction; these vehicles are excluded from the mainline I-95 general purpose traffic volumes and therefore, not included in this analysis.
2) Densities recorded as 0 pc/mi/ln are attributed to relatively low traffic demand volumes and long acceleration/deceleration lane lengths as provided by HCM 2010.

Table 6-36: Basic Freeway Segment LOS Summary – Build Alternative – Design Year (2040)

ID	Freeway	From	To	Type	AM Peak					PM Peak				
					Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS	Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS
NORTHBOUND														
1	I-95	Project Beginning	Woolbright Rd	BFS	3,495			13.4	B	9,030			46.1	F
2			Woolbright Rd Off-Ramp	Diverge	3,495		1,062	6.4	A	9,030		1,718	19.8	B
3		Woolbright Rd Off-Ramp	Woolbright Rd On-Ramp	BFS	2,433			9.3	A	7,312			31.0	D
4		Woolbright Rd On-Ramp	SR 804/Boynton Beach Blvd Off-Ramp	Weave	4,316	1,883	780	*	F	9,223	1,911	2,139	*	F
5		SR 804/Boynton Beach Blvd Off-Ramp	SR 804/Boynton Beach Blvd On-Ramp	BFS	3,536			13.6	B	7,084			29.6	D
6		SR 804/Boynton Beach Blvd On-Ramp	Gateway Blvd Off-Ramp	Weave	5,108	1,572	1,170	*	F	8,500	1,416	2,063	*	F
7		Gateway Blvd Off-Ramp	Gateway Blvd On-Ramp	BFS	3,938			15.1	B	6,437			25.9	C
8		Gateway Blvd On-Ramp		Merge	3,938	1,336		26.1	C	6,437	926		31.2	D
9		Gateway Blvd On-Ramp	Hypoluxo Rd Off-Ramp	BFS	5,274			20.4	C	7,363			31.4	D
10			Hypoluxo Rd Off-Ramp	Diverge	5,274		880	< 1.0	A	7,363		1,727	< 1.0	A
11		Hypoluxo Rd Off-Ramp	Hypoluxo Rd On-Ramp	BFS	4,394			16.8	B	5,636			22.0	C
12		Hypoluxo Rd On-Ramp	Project End	BFS	6,325			19.5	C	6,775			21.0	C

pc/mi/ln – passenger car per mile per lane
* Volumes exceed available capacity leading to LOS F operations
Note:
1) As discussed in Section 2.7, an express lane maximum capacity of 1,650 vehicles per hour per lane was assumed. Future conditions for this project assumes two express lanes in either direction; these vehicles are excluded from the mainline I-95 general purpose traffic volumes and therefore, not included in this analysis.
2) Densities recorded as 0 pc/mi/ln are attributed to relatively low traffic demand volumes and long acceleration/deceleration lane lengths as provided by HCM 2010.

Table 6-36: Basic Freeway Segment LOS Summary – Build Alternative – Design Year (2040) – continued

ID	Freeway	From	To	Type	AM Peak					PM Peak				
					Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS	Freeway Volume	On-Ramp Volume	Off-Ramp Volume	Density (pc/mi/ln)	LOS
SOUTHBOUND														
13	I-95	Project End	Hypoluxo Rd Off-Ramp	BFS	7,161			22.4	C	6,200			19.1	C
14		Hypoluxo Rd Off-Ramp	Hypoluxo Rd On-Ramp	BFS	6,415			25.8	C	4,459			17.1	B
16		Hypoluxo Rd On-Ramp	Gateway Blvd Off-Ramp	Weave	8,064	1,649	948	*	F	5,147	688	1,162	13.8	B
18		Gateway Blvd Off-Ramp	Gateway Blvd On-Ramp	BFS	7,116			29.8	D	3,985			15.3	B
19		Gateway Blvd On-Ramp	SR 804/Boynton Beach Blvd Off-Ramp	Weave	9,136	2,020	1,545	*	F	5,042	1,057	1,545	*	F
20		SR 804/Boynton Beach Blvd Off-Ramp	SR 804/Boynton Beach Blvd On-Ramp	BFS	7,591			32.9	D	3,497			13.4	B
21		SR 804/Boynton Beach Blvd On-Ramp	Woolbright Rd Off-Ramp	Weave	9,395	1,804	1,984	*	F	4,352	855	1,717	12.9	B
22		Woolbright Rd Off-Ramp	Woolbright Rd On-Ramp	BFS	7,411			31.7	D	2,635			10.1	A
23		Woolbright Rd On-Ramp		Merge	7,411	1,654		*	F	2,635	965		14.9	B
24		Woolbright Rd On-Ramp	Project Beginning	BFS	9,065			46.5	F	3,600			13.8	B

pc/mi/ln – passenger car per mile per lane
* Volumes exceed available capacity leading to LOS F operations
Note:
1) As discussed in Section 2.7, an express lane maximum capacity of 1,650 vehicles per hour per lane was assumed. Future conditions for this project assumes two express lanes in either direction; these vehicles are excluded from the mainline I-95 general purpose traffic volumes and therefore, not included in this analysis.
2) Densities recorded as 0 pc/mi/ln are attributed to relatively low traffic demand volumes and long acceleration/deceleration lane lengths as provided by HCM 2010.
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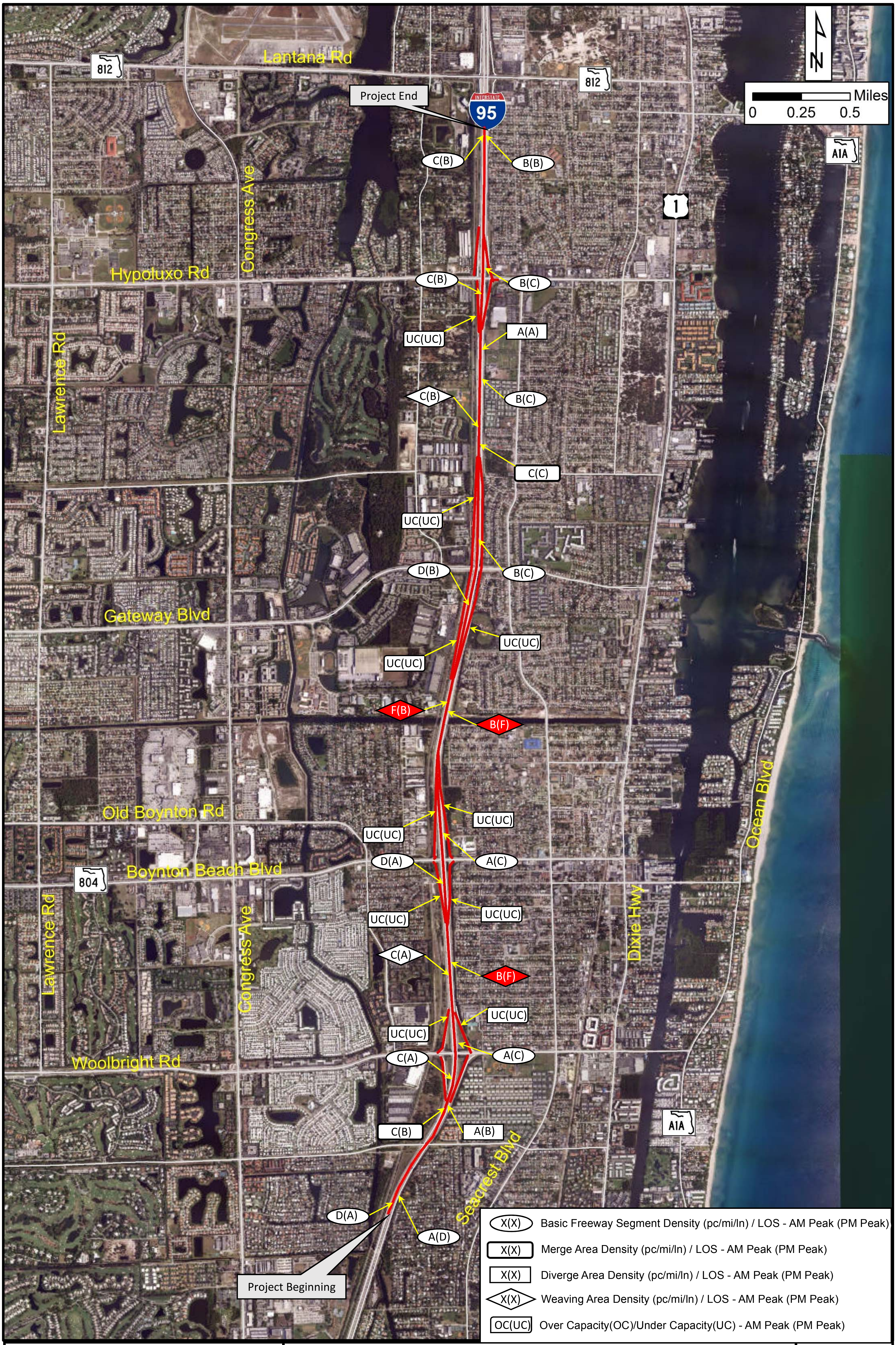
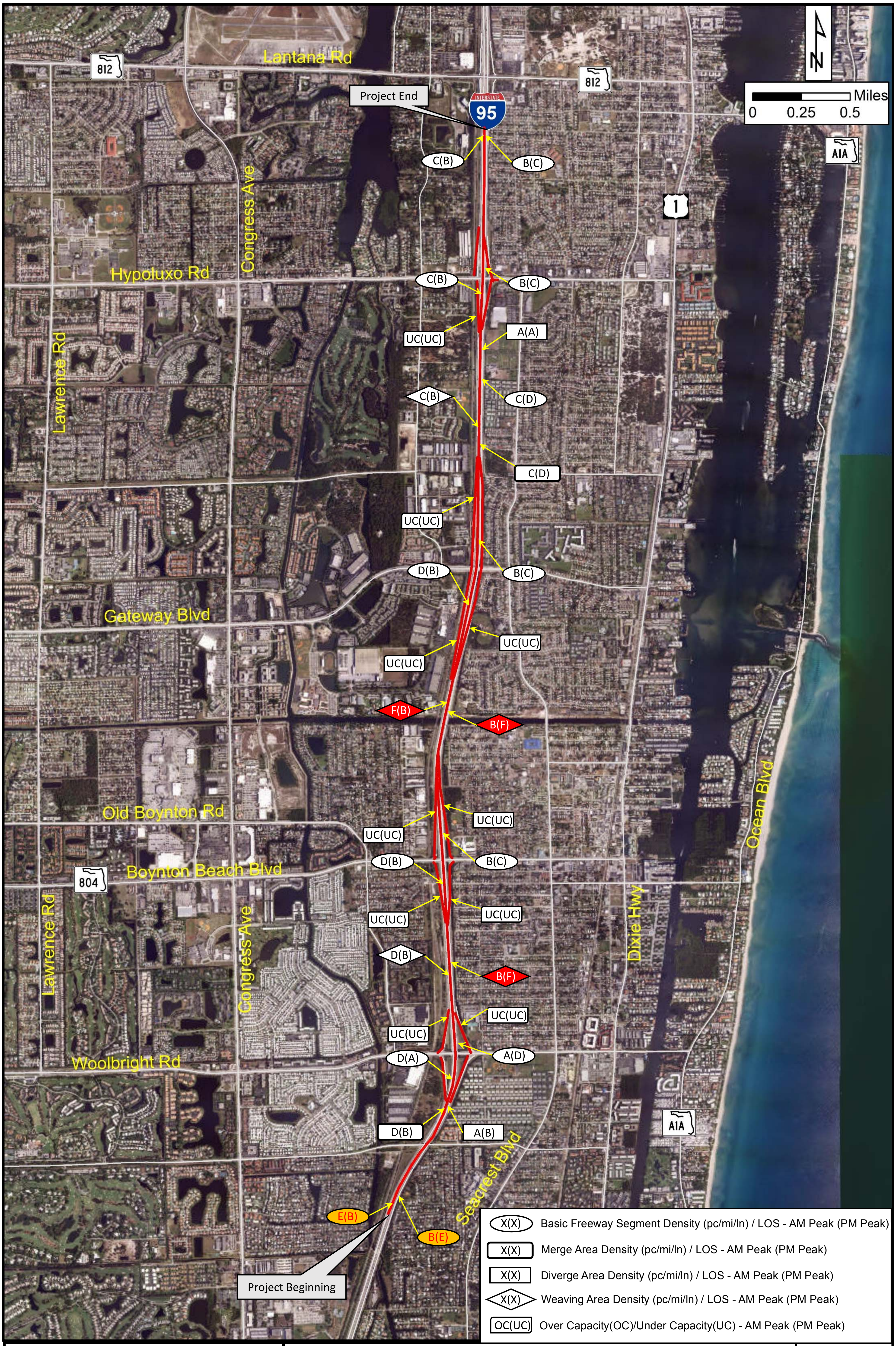


PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

Build Alternative
Freeway Facilities Level Of Service
Open Year (2020)

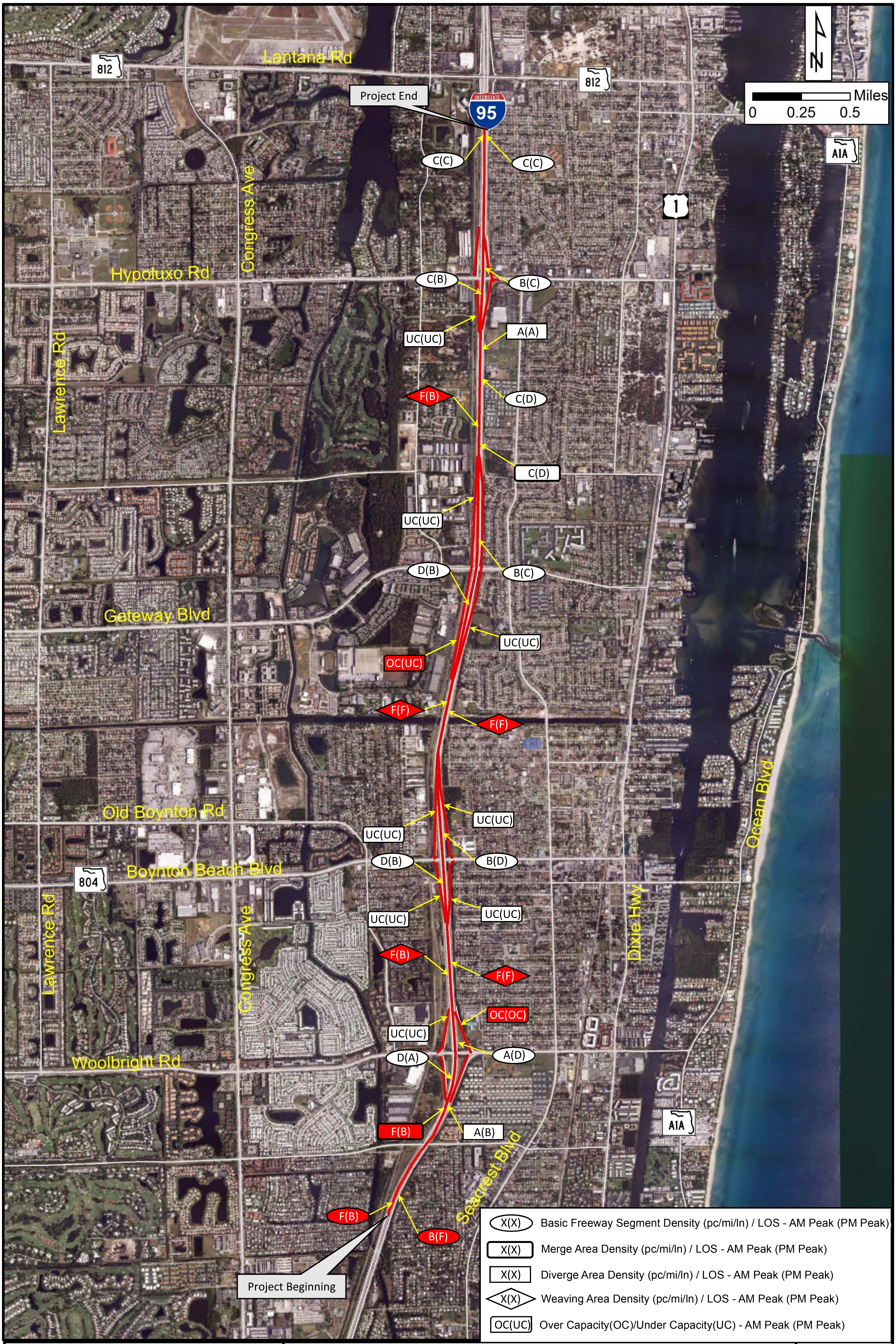
Figure 6-22



PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

Build Alternative
Freeway Facilities Level Of Service
Interim Year (2030)

Figure 6-23



PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

Build Alternative
Freeway Facilities Level Of Service
Design Year (2040)

Figure 6-24

- Southbound SR 9/I-95
  - During the AM peak hour, the freeway segment, between the Gateway Boulevard on ramp and the SR 804/Boynton Beach Boulevard off ramp, operates at LOS F.
  - During the AM peak hour, the freeway segment, between the Woolbright Road on ramp and the end of the project limits, operates at LOS E.

A total of five locations, out of 22, with failing LOS (E or F) were observed in the Interim Year (2030).

Design Year (2040)

- Northbound SR 9/I-95
  - During the PM peak hour, the freeway segment, from the beginning of the project limits to Woolbright Road off ramp, operates at LOS F.
  - During the AM and PM peak hours, the weave section, between the Woolbright Road on ramp and the SR 804/Boynton Beach Boulevard off ramp, operates at LOS F.
  - During the AM and PM peak hours, the weave section, between the SR 804/Boynton Beach Boulevard on ramp and the Gateway Boulevard off ramp, operates at LOS F.
- Southbound SR 9/I-95
  - During the AM peak hour, the weave section, between the Hypoluxo Road on ramp and the Gateway Boulevard off ramp, operates at LOS F.
  - During the AM and PM peak hours, the weave section, between the Gateway Boulevard on ramp and the SR 804/Boynton Beach Boulevard off ramp, operates at LOS F.
  - During the AM peak hour, the weave section, between the SR 804/Boynton Beach Boulevard on ramp and the Woolbright Road off ramp, operates at LOS F.
  - During the AM peak hour, the merge from Woolbright Road operates at LOS F.
  - During the AM peak hour, the freeway segment, between the Woolbright Road on ramp and the end of the project limits, operates at LOS F.

A total of 8 locations, out of 22, with failing LOS (E or F) were observed in the Design Year (2040).

The primary reason for the failure (LOS E or worse) of these above listed weave, merge, or diverge freeway segments is due to their presence along SR 9/I-95 freeway segments that are handling high traffic volumes and are experiencing volumes that exceed available general purpose lane capacity. This situation can be handled better with the presence of the express lane system that can operate with varying demand to balance traffic operations both on the express and general purpose lanes. The SR 9/I-95 Express Lanes Master Plan Study currently underway between Linton Boulevard and Indian Town Road in Palm Beach County, Florida will address these mainline needs.

6.5.1.2 Intersections

Build Alternative improvements such as traditional turn lane and storage improvements, additional through lanes, etc. along with TSM&PO improvements such as signal timing optimization, coordinated signal systems, and optimized splits and offsets for signals were considered at SR 9/I-95 interchanges with SR 804/Boynton Beach Boulevard and Gateway Boulevard to address the purpose and need. The traffic operations near adjacent interchanges of SR 9/I-95 with Woolbright Road and Hypoluxo Road reflected No-Build Conditions as discussed in Section 6.3 under all Build Alternative scenarios.

SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange Intersections

Three interchange alternatives were considered for the SR 9/I-95 at SR 804/Boynton Beach Boulevard interchange listed below and are describe in Section 5:

- Alternative 1: CDA
- Alternative 2: Streamlined CDA
- Alternative 3: SPUI

Intersection analyses of these Build Alternatives are provided in subsequent sections.

Alternative 1: CDA

Build Alternative 1 (CDA) at SR 9/I-95 and SR 804/Boynton Beach Boulevard is the alternative recommended in the SR 9/I-95 Master Plan and is described in Section 5.4.

Future conditions operational analyses were performed for Build Alternative 1 (CDA) based on traffic forecast and network conditions expected in years 2020, 2030, and 2040.

Approach and overall intersection LOS and delay results for the study intersections along SR 804/Boynton Beach Boulevard for Build Alternative 1 (CDA) are summarized in Table 6-37 through 6-39 for the Open (2020), Interim (2030), and Design (2040) Years, respectively. Intersection approach and overall V/C ratios are summarized in Table 6-40. Traffic operational analysis also evaluated 95th percentile queue lengths as summarized in Table 6-41. Figures 6-25 through 6-27 depict the findings of this intersection analysis along SR 804/Boynton Beach Boulevard for the Open (2020), Interim (2030), and Design (2040) Years, respectively.

The results indicate that all ramp terminal intersections along SR 9/I-95 and other project intersections are expected to operate at LOS D or better except for the following:

Ramp Terminal Intersections:

Both ramp terminal intersections operate at LOS D or better during the Open Year (2020), Interim (2030), and Design (2040) Years.

Table 6-37: SR 804/Boynton Beach Boulevard Intersections Delay and LOS Summary –Build Alternative 1 – Open Year (2020)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound					
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak		PM Peak	
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	Signalized	E	C	C	D	D	D	E	E	45.7	D	47.0	D
SR 804/Boynton Beach Blvd at Industrial Ave	Signalized	A	A	A	B	E	E	E	F	7.2	A	18.4	B
SR 804/Boynton Beach Blvd at I-95 Southbound Ramps	Signalized	B	A	C	C	-	-	C	C	20.9	C	19.0	B
SR 804/Boynton Beach Blvd at I-95 Northbound Ramps	Signalized	B	C	B	D	C	D	-	-	20.8	C	37.7	D
SR 804/Boynton Beach Blvd at Seacrest Blvd	Signalized	C	D	D	E	F	E	E	F	46.7	D	61.3	E
TOTAL										**141.3**		**183.4**	

Table 6-38: SR 804/Boynton Beach Boulevard Intersections Delay and LOS Summary –Build Alternative 1 – Interim Year (2030)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound					
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak		PM Peak	
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	Signalized	E	E	C	C	E	F	F	F	58.3	E	49.2	D
SR 804/Boynton Beach Blvd at Industrial Ave	Signalized	A	B	B	C	D	E	E	E	9.0	A	21.9	C
SR 804/Boynton Beach Blvd at I-95 Southbound Ramps	Signalized	C	B	C	B	-	-	C	C	24.7	C	18.8	B
SR 804/Boynton Beach Blvd at I-95 Northbound Ramps	Signalized	C	C	C	D	D	E	-	-	23.3	C	45.8	D
SR 804/Boynton Beach Blvd at Seacrest Blvd	Signalized	D	E	D	F	F	F	E	E	57.3	E	102.4	F
TOTAL										**172.6**		**238.1**	

Table 6-39: SR 804/Boynton Beach Boulevard Intersections Delay and LOS Summary –Build Alternative 1 – Design Year (2040)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	Signalized	F	D	D	D	F	F	F	F	91.4	F	58.0	E
SR 804/Boynton Beach Blvd at Industrial Ave	Signalized	A	A	B	D	D	C	E	D	12.7	B	25.8	C
SR 804/Boynton Beach Blvd at I-95 Southbound Ramps	Signalized	C	B	C	B	-	-	D	D	30.7	C	18.0	B
SR 804/Boynton Beach Blvd at I-95 Northbound Ramps	Signalized	C	D	D	C	D	D	-	-	33.3	C	42.2	D
SR 804/Boynton Beach Blvd at Seacrest Blvd	Signalized	F	F	F	F	F	F	F	F	124.8	F	231.9	F
TOTAL										**292.9**		**375.9**	

Table 6-40: SR 804/Boynton Beach Boulevard Intersections Volume to Capacity Ratio –Build Alternative 1

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	AM Peak	2020	0.29	0.91	-	0.53	0.60	0.23	0.19	0.50	-	0.87	0.15	-	0.74
			2030	0.40	1.00	-	0.84	0.61	0.30	0.26	0.80	-	1.05	0.21	-	0.93
			2040	0.58	1.12	-	1.17	0.61	0.37	0.36	1.18	-	1.20	0.28	-	1.21
		PM Peak	2020	0.42	0.71	-	0.68	0.81	1.14	0.34	0.79	-	0.95	0.30	-	1.01
			2030	0.96	0.71	-	0.52	0.65	0.93	0.40	0.90	-	1.05	0.29	-	0.94
			2040	0.73	0.79	-	0.92	0.84	1.15	0.46	1.17	-	1.21	0.31	-	1.18
2	SR 804/Boynton Beach Blvd and Industrial Ave	AM Peak	2020	0.26	0.61	-	0.10	0.40	0.13	-	0.03	0.01	-	0.69	0.14	0.62
			2030	0.43	0.70	-	0.12	0.46	0.18	-	0.06	0.01	-	0.76	0.19	0.71
			2040	0.64	0.80	-	0.17	0.54	0.25	-	0.10	0.02	-	0.83	0.24	0.81
		PM Peak	2020	0.49	0.50	-	0.03	0.61	0.07	-	0.05	0.01	-	0.80	0.22	0.66
			2030	0.68	0.55	-	0.05	0.69	0.12	-	0.07	0.01	-	0.86	0.27	0.74
			2040	0.63	0.70	-	0.10	0.99	0.23	-	0.10	0.02	-	0.86	0.24	0.94

Table 6-40: SR 804/Boynton Beach Boulevard Intersections Volume to Capacity Ratio – Build Alternative 1 – continued

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Intersection
3	SR 804/Boynton Beach Blvd and I-95 Southbound Ramps	AM Peak	2020	-	0.68	0.50	0.63	0.30	-	-	-	-	0.74	-	0.81	0.72
			2030	-	0.80	0.62	0.75	0.35	-	-	-	-	0.80	-	0.83	0.81
			2040	-	0.93	0.69	0.91	0.42	-	-	-	-	0.86	-	0.87	0.91
		PM Peak	2020	-	0.56	0.31	0.40	0.58	-	-	-	-	0.47	-	0.74	0.66
			2030	-	0.61	0.32	0.50	0.63	-	-	-	-	0.49	-	0.75	0.70
			2040	-	0.62	0.33	0.59	0.66	-	-	-	-	0.54	-	0.78	0.72
4	SR 804/Boynton Beach Blvd and I-95 Northbound Ramps	AM Peak	2020	0.76	0.58	-	-	0.30	0.51	0.60	-	0.58	-	-	-	0.67
			2030	0.80	0.62	-	-	0.47	0.79	0.65	-	0.71	-	-	-	0.78
			2040	0.85	0.66	-	-	0.67	1.11	0.72	-	0.85	-	-	-	0.96
		PM Peak	2020	0.94	0.74	-	-	0.58	0.83	0.51	-	1.03	-	-	-	0.95
			2030	1.02	0.80	-	-	0.61	1.10	0.54	-	1.12	-	-	-	1.09
			2040	1.01	0.96	-	-	0.87	0.59	0.48	-	1.08	-	-	-	1.06
5	SR 804/Boynton Beach Blvd and Seacrest Blvd	AM Peak	2020	0.33	0.39	0.24	0.32	0.46	-	1.02	0.28	-	0.26	0.82	-	0.63
			2030	0.82	0.51	0.29	0.57	0.75	-	1.17	0.34	-	0.36	0.94	-	0.90
			2040	1.59	0.58	0.34	0.78	1.06	-	1.37	0.46	-	0.58	1.25	-	1.38
		PM Peak	2020	1.00	0.49	0.18	0.38	0.78	-	0.94	0.49	-	0.45	0.90	-	0.98
			2030	1.24	0.62	0.23	0.46	1.06	-	1.52	0.60	-	0.42	0.96	-	1.16
			2040	3.07	0.82	0.32	0.71	1.12	-	2.79	0.66	-	0.59	1.25	-	2.02

= Movements volume to capacity ratios exceeding 1.00.

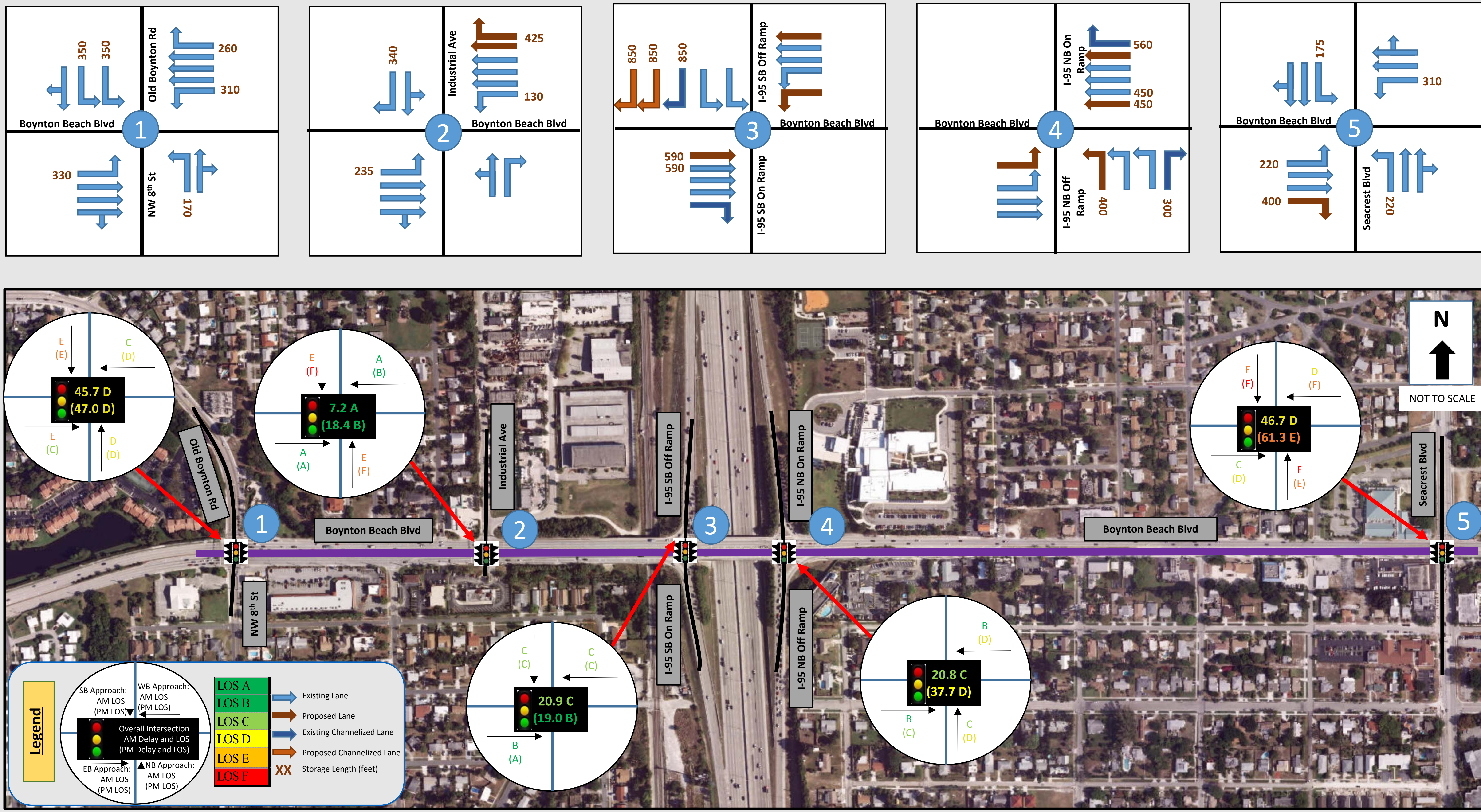
Table 6-41: SR 804/Boynton Beach Boulevard Intersections 95th Percentile Queue Length Summary – Build Alternative 1

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	AM Peak	2020	35	545	-	160	351	17	72	252	-	#364	116	-	Signalized Intersection
			2030	44	#664	-	#339	384	50	88	#431	-	#472	148	-	
			2040	58	#791	-	#642	355	65	105	#692	-	#569	185	-	
		PM Peak	2020	51	272	-	165	546	#871	83	#273	-	#205	112	-	
			2030	#119	524	-	207	178	#1,238	188	#597	-	#404	199	-	
			2040	#121	352	-	m#143	m168	m#715	149	#578	-	322	137	-	
		Proposed Storage Length (ft)		280	1,000		310	1,050	260	140	1,000		380	1,000		
2	SR 804/Boynton Beach Blvd and Industrial Ave	AM Peak	2020	m8	87	-	m4	244	m48	-	15	11	-	167	77	Signalized Intersection
			2030	m51	m115		m5	263	m95	-	20	12	-	216	101	
			2040	m131	m132	-	m7	329	m137	-	31	16	-	272	131	
		PM Peak	2020	m54	m441	-	m4	724	m60	-	22	14	-	270	102	
			2030	m119	m239	-	m5	807	96	-	27	17	-	350	134	
			2040	m77	m139	-	m4	#680	m101	-	28	13	-	#306	116	
		Proposed Storage Length (ft)		240	1,050		130	850	380	1,000		1,000	1,000		340	
3	SR 804/Boynton Beach Blvd and I-95 Southbound Ramps	AM Peak	2020	-	289	12	169	95	-	-	-	-	182	-	#184	Signalized Intersection
			2030	-	367	301	250	125	-	-	-	-	#207	-	#211	
			2040	-	#425	716	#297	156	-	-	-	-	#253	-	230	
		PM Peak	2020	-	302	0	145	520	-	-	-	-	137	-	197	
			2030	-	308	0	144	357	-	-	-	-	153	-	213	
			2040	-	323	0	m171	193	-	-	-	-	207	-	277	
		Proposed Storage Length (ft)			590	850	330	330					**1,560**		660	

Table 6-41: SR 804/Boynton Beach Boulevard Intersections 95th Percentile Queue Length Summary – Build Alternative 1 – continued

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4	SR 804/Boynton Beach Blvd and I-95 Northbound Ramps	AM Peak	2020	230	254	-	-	m123	m236	90	-	#143	-	-	-	Signalized Intersection
			2030	261	285	-	-	m163	m#375	99	-	#182	-	-	-	
			2040	m272	m312	-	-	m208	m#317	109	-	#223	-	-	-	
		PM Peak	2020	#300	162	-	-	m240	m451	187	-	#627	-	-	-	
			2030	#453	305	-	-	m136	m#336	201	-	#698	-	-	-	
			2040	#382	#674	-	-	m145	m12	224	-	#888	-	-	-	
		Proposed Storage Length (ft)		330	330			700	560	**1,630**		720				
5	SR 804/Boynton Beach Blvd and Seacrest Blvd	AM Peak	2020	171	292	159	92	285	-	#389	144	-	97	361	-	Signalized Intersection
			2030	m#411	332	m175	130	432	-	#458	193	-	141	#552	-	
			2040	m#1,014	m368	m167	#200	#714	-	#555	259	-	199	#844	-	
		PM Peak	2020	m#474	m358	m52	101	598	-	#564	335	-	101	#383	-	
			2030	m#770	m475	m51	182	#853	-	#793	399	-	134	#521	-	
			2040	m#754	m264	m167	#163	#641	-	#645	274	-	117	#540	-	
		Proposed Storage Length (ft)		225	2,730		250	1,000		190	1,000		180	1,000		

1) The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. This traffic was simulated for two complete cycles to account for the effects of spillover between cycles. If the reported v/c<1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue. In practice, 95th percentile queue shown will rarely be exceeded and the queues shown with the # footnote are acceptable for the design of storage bay (Trafficware 2012).
2) The m footnote indicates that the volume for the 95th percentile queue is metered by an upstream signal (Trafficware 2012).
3) The storage length values were calculated from aerials or design drawings.
4) To calculate reasonable queuing in the model, all terminal links were extended to 1,000 feet from the last node
5) For ramp terminals, the storage distance proved reflects the entire length of the ramp (**XXX feet**)
= Movements with queues exceeding available storage.

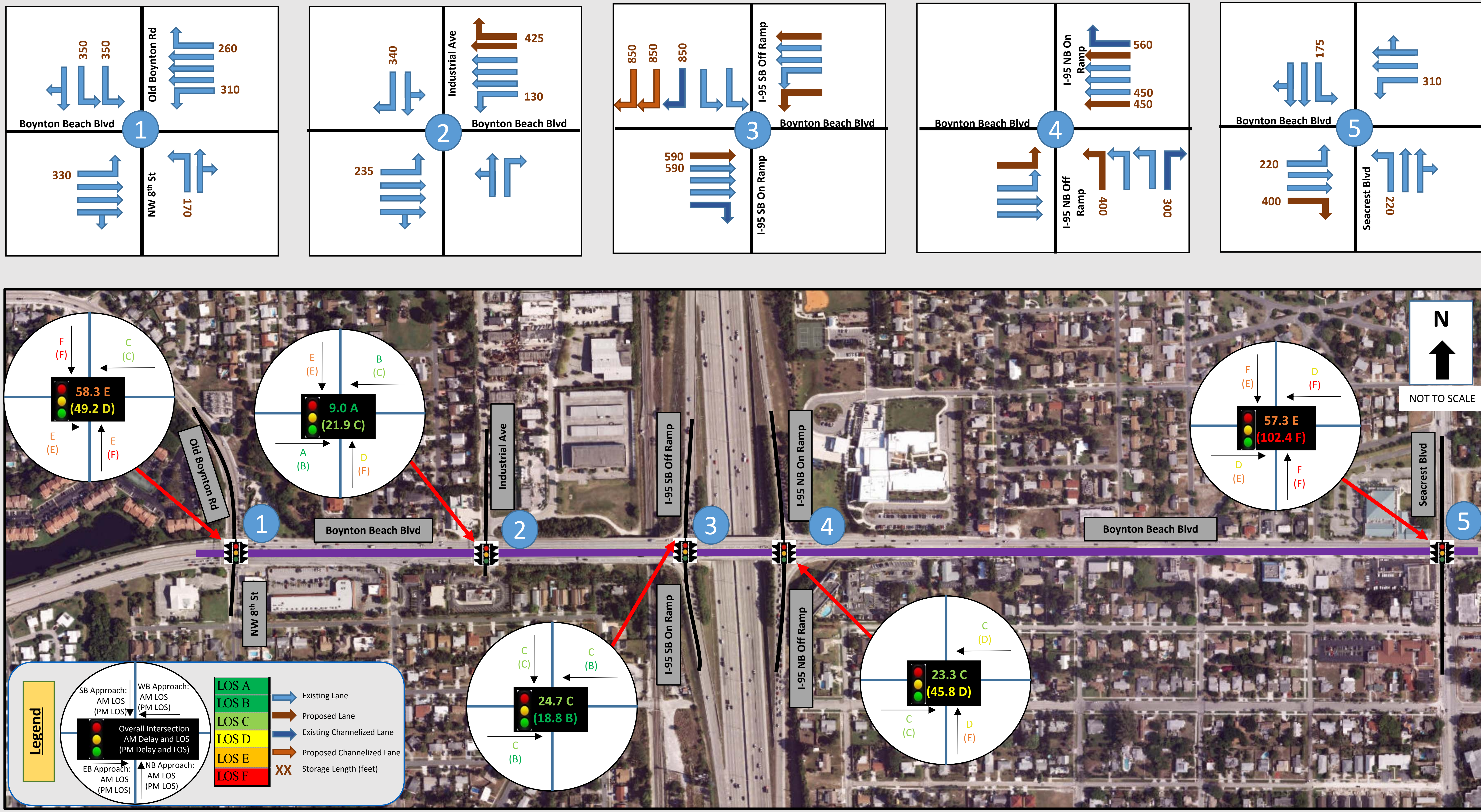


PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at SR 804/Boynton Beach Boulevard - Build Alternative 1 (CDA)
Lane Configuration, Intersection LOS and Delay - Open Year (2020)

Figure 6-25



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SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
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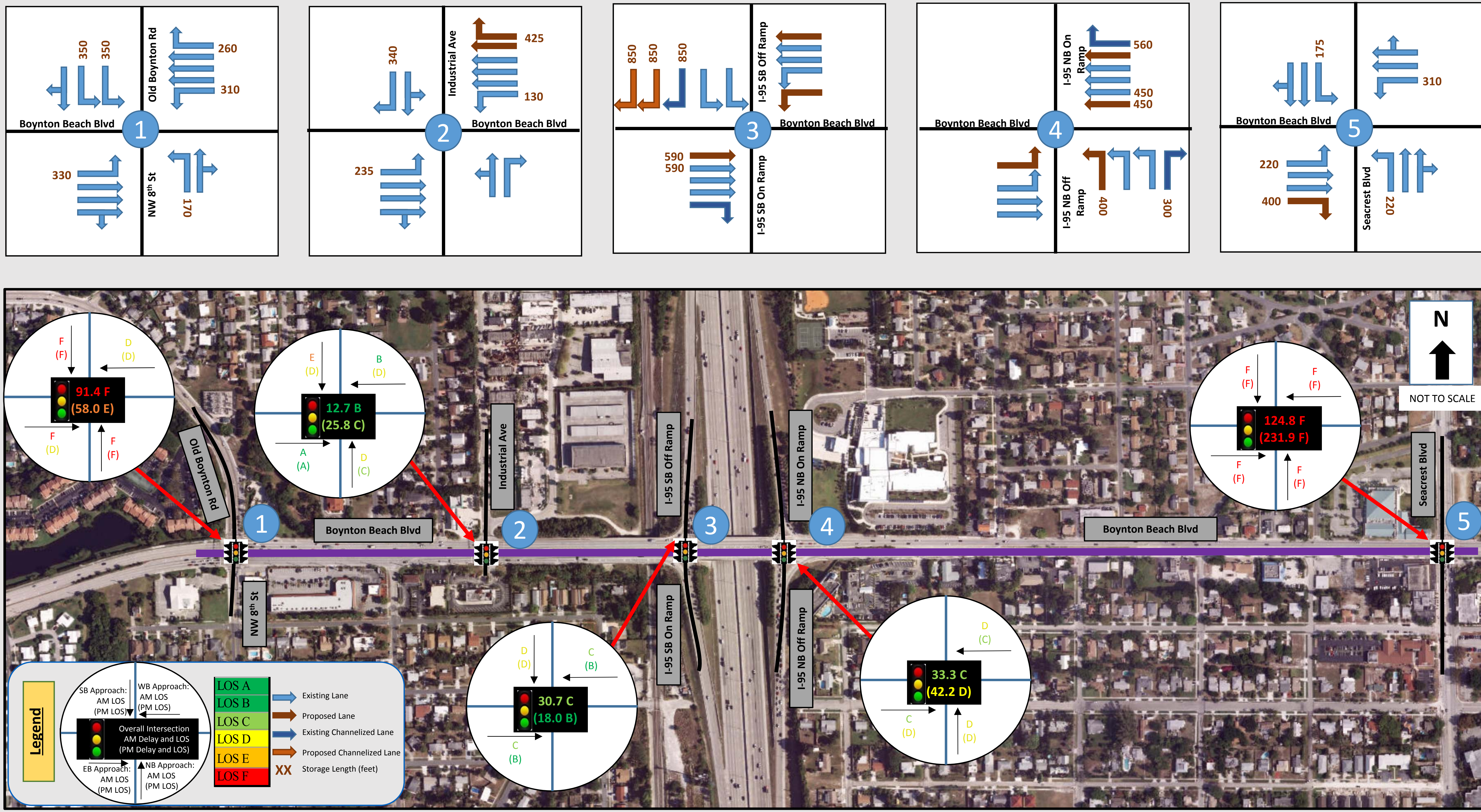
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at SR 804/Boynton Beach Boulevard - Build Alternative 1 (CDA)
Lane Configuration, Intersection LOS and Delay - Interim Year (2030)

Figure 6-26



PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at SR 804/Boynton Beach Boulevard - Build Alternative 1 (CDA)
Lane Configuration, Intersection LOS and Delay - Design Year (2040)

Figure 6-27

Other Project Intersections:

Open Year (2020)

- During the PM peak hours, the intersection for SR 804/Boynton Beach Boulevard at Seacrest Boulevard operates at LOS E.

Interim Year (2030)

- During the AM peak hour, the intersection for SR 804/Boynton Beach Boulevard at NW 8th Street/Old Boynton Road operates LOS E.
- During the AM peak hour, the intersection for SR 804/Boynton Beach Boulevard at Seacrest Boulevard operates at LOS E and changes from LOS E operations to LOS F during the PM peak hour.

Design Year (2040)

- During the PM peak hour, the intersection for SR 804/Boynton Beach Boulevard at NW 8th Street/Old Boynton Road operates at LOS E and changes from LOS E operations to LOS F during the AM peak hour.
- The intersection for SR 804/Boynton Beach Boulevard and Seacrest Boulevard deteriorates to LOS F operations during the AM and PM peak hours.

Volumes exceeding capacity were observed for several movements at the intersections of SR 804/Boynton Beach Boulevard with NW 8th Street/Old Boynton Road and Seacrest Boulevard. The primary reason for these movements' V/C ratios exceeding 1.00 is because of no proposed improvements along the cross streets with SR 804/Boynton Beach Boulevard at these intersections. A summary of the intersections which are experiencing volumes that exceed available capacity is presented below:

Ramp Terminal Intersections:

Neither ramp terminal intersection operates at V/C ratios that exceed capacity during the Open Year (2020).

Interim Year (2030)

- SR 804/Boynton Beach Boulevard at SR 9/I-95 Northbound Ramps operates at a V/C ratio of 1.09 in the PM peak hour.

Design Year (2040)

- SR 804/Boynton Beach Boulevard at SR 9/I-95 Northbound Ramps operates at a V/C ratio of 1.06 in the PM peak hour.

Other Project Intersections:

Open Year (2020)

- SR 804/Boynton Beach Boulevard at NW 8th Street/Old Boynton Road operates at a V/C ratio of 1.01 in the PM peak hour.

Interim Year (2030)

- SR 804/Boynton Beach Boulevard at Seacrest Boulevard operates at a V/C ratio of 1.16 in the PM peak hour.

Design Year (2040)

- SR 804/Boynton Beach Boulevard at NW 8th Street/Old Boynton Road operates at V/C ratios of 1.21 and 1.18 in the AM and PM peak hours, respectively.
- SR 804/Boynton Beach Boulevard at Seacrest Boulevard operates at V/C ratios of 1.38 and 2.02 in the AM and PM peak hours, respectively.

A review of the 95th percentile queue lengths indicate that the northbound and southbound approaches to the intersections of SR 804/Boynton Beach Boulevard with NW 8th Street/Old Boynton Road and Seacrest Boulevard experience several queue lengths that exceed available storages. No improvements were proposed at these locations for these approaches leading to such backups. These queue backups do not impact mainline SR 804/Boynton Beach Boulevard operations. The SR 9/I-95 northbound and southbound off-ramp queues do not exceed available storages and do not impact SR 9/I-95 mainline operations.

Alternative 2: Streamlined CDA

Build Alternative 2 (Streamlined CDA) at SR 9/I-95 and SR 804/Boynton Beach Boulevard interchange is an enhancement of the alternative recommended in the SR 9/I-95 Master Plan (Alternative 1 CDA) and is described in Section 5.4.

Future conditions operational analyses were performed for Build Alternative 2 (Streamlined CDA) based on traffic forecast and network conditions expected in years 2020, 2030, and 2040.

Approach and overall intersection LOS and delay results for the study intersections along SR 804/Boynton Beach Boulevard for Build Alternative 2 (Streamlined CDA) are summarized in Table 6-42 through Table 6-44 for Open (2020), Interim (2030), and Design (2040) Years, respectively. Intersection approach and overall V/C ratios are summarized in Table 6-45. Traffic operation analysis also evaluated 95th percentile queue lengths as summarized in Table 6-46. Figures 6-28 through 6-30 depict the findings of this intersection analysis along SR 804/Boynton Beach Boulevard for the Open (2020), Interim (2030), and Design (2040) Years, respectively.

The results indicate that all ramp terminal intersections along SR 9/I-95 and other project intersections are expected to operate at LOS D or better, except for the following:

Ramp Terminal Intersections:

Both ramp terminal intersections operate at LOS D or better during the Open Year (2020), Interim (2030), and Design (2040) Years.

Table 6-42: SR 804/Boynton Beach Boulevard Intersections Delay and LOS Summary – Build Alternative 2 – Open Year (2020)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	Signalized	D	C	B	C	E	E	E	E	37.8	D	33.1	C
SR 804/Boynton Beach Blvd at Industrial Ave	Signalized	A	A	B	B	E	D	E	E	8.7	A	13.6	B
SR 804/Boynton Beach Blvd at I-95 Southbound Ramps	Signalized	B	B	A	B	-	-	C	B	18.7	B	14.1	B
SR 804/Boynton Beach Blvd at I-95 Northbound Ramps	Signalized	A	B	B	C	C	C	-	-	12.3	B	20.8	C
SR 804/Boynton Beach Blvd at Seacrest Blvd	Signalized	C	D	C	E	E	E	E	E	42.9	D	56.0	E
TOTAL										**120.4**		**137.6**	

Table 6-43: SR 804/Boynton Beach Boulevard Intersections Delay and LOS Summary – Build Alternative 2 – Interim Year (2030)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	Signalized	E	D	C	C	F	E	F	E	52.1	D	40.8	D
SR 804/Boynton Beach Blvd at Industrial Ave	Signalized	A	A	B	C	D	D	E	E	11.8	B	18.7	B
SR 804/Boynton Beach Blvd at I-95 Southbound Ramps	Signalized	C	B	C	B	-	-	C	B	25.8	C	14.4	B
SR 804/Boynton Beach Blvd at I-95 Northbound Ramps	Signalized	A	C	B	B	C	D	-	-	14.6	B	27.9	C
SR 804/Boynton Beach Blvd at Seacrest Blvd	Signalized	E	E	E	F	E	F	E	E	60.3	E	90.1	F
TOTAL										**164.6**		**191.9**	

Table 6-44: SR 804/Boynton Beach Boulevard Intersections Delay and LOS Summary – Build Alternative 2 – Design Year (2040)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Averag e Delay (sec)	LOS
SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	Signalized	F	D	D	C	F	F	F	F	90.7	F	53.4	D
SR 804/Boynton Beach Blvd at Industrial Ave	Signalized	A	A	C	C	D	D	E	E	17.3	B	27.2	C
SR 804/Boynton Beach Blvd at I-95 Southbound Ramps	Signalized	C	B	D	B	-	-	D	B	32.9	C	16.2	B
SR 804/Boynton Beach Blvd at I-95 Northbound Ramps	Signalized	A	C	B	C	C	D	-	-	15.5	B	30.4	C
SR 804/Boynton Beach Blvd at Seacrest Blvd	Signalized	F	F	F	F	F	F	F	F	130.8	F	155.0	F
TOTAL										**287.2**		**282.2**	

Table 6-45: SR 804/Boynton Beach Boulevard Intersections Volume to Capacity Ratio – Build Alternative 2

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	AM Peak	2020	0.27	0.83	-	0.59	0.57	0.31	0.21	0.56	-	0.83	0.16	-	0.73
			2030	0.39	0.92	-	0.90	0.58	0.40	0.29	0.91	-	0.98	0.22	-	0.94
			2040	0.50	1.12	-	1.17	0.62	0.53	0.35	1.14	-	1.25	0.28	-	1.18
		PM Peak	2020	0.45	0.55	-	0.57	0.63	0.92	0.38	0.83	-	0.78	0.28	-	0.88
			2030	0.65	0.66	-	0.74	0.73	1.03	0.42	0.89	-	0.88	0.25	-	0.97
			2040	0.95	0.77	-	0.83	0.77	1.07	0.46	1.06	-	1.05	0.25	-	1.07
2	SR 804/Boynton Beach Blvd and Industrial Ave	AM Peak	2020	0.41	0.62	-	0.09	0.43	0.11	-	0.03	0.01	-	0.69	0.20	0.63
			2030	0.45	0.70	-	0.11	0.56	0.18	-	0.06	0.01	-	0.76	0.20	0.72
			2040	0.61	0.80	-	0.17	0.70	0.26	-	0.10	0.02	-	0.83	0.23	0.81
		PM Peak	2020	0.34	0.50	-	0.03	0.78	0.07	-	0.05	0.01	-	0.79	0.17	0.77
			2030	0.61	0.53	-	0.05	0.85	0.12	-	0.08	0.01	-	0.90	0.24	0.85
			2040	0.78	0.58	-	0.08	0.96	0.18	-	0.15	0.02	-	0.97	0.29	0.95

Table 6-45: SR 804/Boynton Beach Boulevard Intersections Volume to Capacity Ratio – Build Alternative 2 – continued

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
3	SR 804/Boynton Beach Blvd and I-95 Southbound Ramps	AM Peak	2020	-	0.80	0.53	0.68	0.33	-	-	-	-	0.74	-	0.66	0.77
			2030	-	0.88	0.62	0.78	0.37	-	-	-	-	0.85	-	0.77	0.85
			2040	-	0.93	0.69	1.09	0.45	-	-	-	-	0.89	-	0.81	0.96
		PM Peak	2020	-	0.61	0.31	0.64	0.65	-	-	-	-	0.74	-	0.24	0.74
			2030	-	0.66	0.32	0.73	0.69	-	-	-	-	0.80	-	0.24	0.79
			2040	-	0.74	0.33	0.79	0.74	-	-	-	-	0.85	-	0.28	0.85
4	SR 804/Boynton Beach Blvd and I-95 Northbound Ramps	AM Peak	2020	0.59	0.60	-	-	0.42	0.23	0.53	-	0.43	-	-	-	0.64
			2030	0.65	0.62	-	-	0.60	0.33	0.65	-	0.56	-	-	-	0.68
			2040	0.78	0.66	-	-	0.74	0.45	0.72	-	0.66	-	-	-	0.76
		PM Peak	2020	0.87	0.78	-	-	0.85	0.39	0.54	-	0.74	-	-	-	0.83
			2030	0.87	0.71	-	-	0.65	0.52	0.73	-	0.99	-	-	-	0.90
			2040	0.96	0.80	-	-	0.76	0.65	0.71	-	1.00	-	-	-	0.97
5	SR 804/Boynton Beach Blvd and Seacrest Blvd	AM Peak	2020	0.42	0.59	-	0.28	0.39	-	0.81	0.25	-	0.43	0.82	-	0.69
			2030	0.90	0.76	-	0.67	0.81	-	0.90	0.29	-	0.39	0.95	-	0.94
			2040	1.53	0.87	-	0.68	1.06	-	1.37	0.48	-	0.58	1.28	-	1.45
		PM Peak	2020	0.95	0.68	-	0.48	0.88	-	0.91	0.51	-	0.52	0.82	-	0.93
			2030	1.25	0.71	-	0.74	1.04	-	1.39	0.53	-	0.90	0.95	-	1.21
			2040	1.74	0.88	-	0.79	1.18	-	1.57	0.63	-	0.58	1.42	-	1.61

= Movements volume to capacity ratios exceeding 1.00.

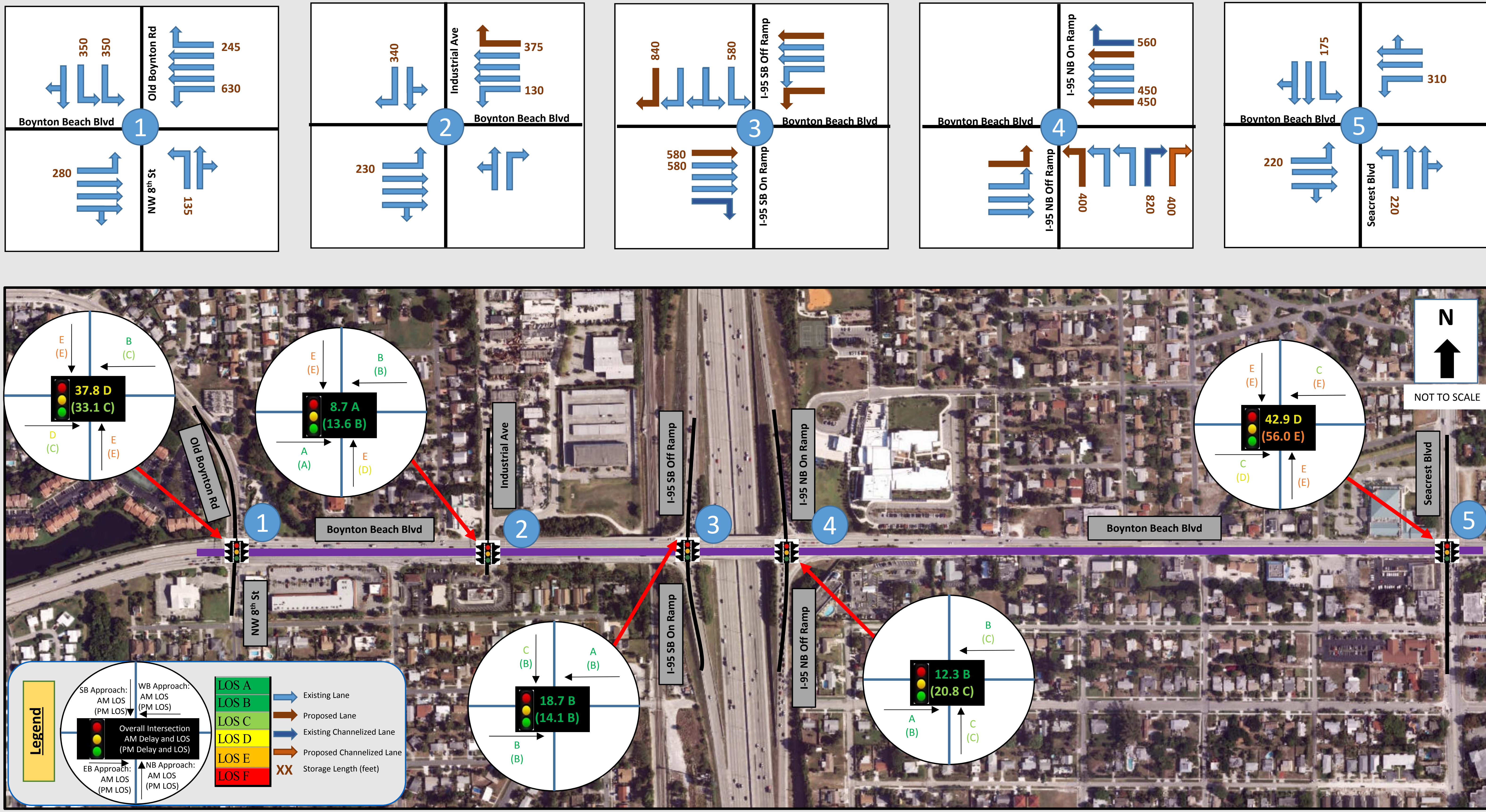
Table 6-46: SR 804/Boynton Beach Boulevard Intersections 95th Percentile Queue Length Summary – Build Alternative 2

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	AM Peak	2020	35	523	-	183	105	8	73	259	-	#333	117	-	Signalized Intersection
			2030	43	599	-	#348	426	180	90	#465	-	#448	150	-	
			2040	82	#791	-	#620	250	134	105	#680	-	#581	185	-	
		PM Peak	2020	54	384	-	m43	370	#915	126	#411	-	248	167	-	
			2030	#104	452	-	m134	371	#989	152	#516	-	#301	161	-	
			2040	#174	467	-	m195	m407	m#914	186	#703	-	#383	161	-	
		Proposed Storage Length (ft)		280	1,000		650	1,050	260	140	1,000		380	1,000		
2	SR 804/Boynton Beach Blvd and Industrial Ave	AM Peak	2020	m11	98	-	m4	294	m83	-	15	11	-	167	92	Signalized Intersection
			2030	m52	m141	-	m8	436	m93	-	20	12	-	216	111	
			2040	m152	m147	-	m7	614	m156	-	31	16	-	272	126	
		PM Peak	2020	m37	185	-	m2	582	m26	-	19	12	-	234	92	
			2030	m#109	129	-	m4	590	m66	-	25	15	-	#354	136	
			2040	m#149	m283	-	m5	1,079	m97	-	38	19	-	#455	171	
		Proposed Storage Length (ft)		240	1,050		130	850	380	1,000		1,000	1,000		340	
3	SR 804/Boynton Beach Blvd and I-95 Southbound Ramps	AM Peak	2020	-	#254	33	24	84	-	-	-	-	254	-	170	Signalized Intersection
			2030	-	#315	72	240	53	-	-	-	-	#333	-	#201	
			2040	-	270	760	#396	54	-	-	-	-	#366	-	#249	
		PM Peak	2020	-	239	0	m0	233	-	-	-	-	228	-	0	
			2030	-	204	m0	123	186	-	-	-	-	264	-	0	
			2040	-	m254	m0	#135	186	-	-	-	-	#337	-	0	
		Proposed Storage Length (ft)			850	850	330	330					**1,550**		860	

Table 6-46: SR 804/Boynton Beach Boulevard Intersections 95th Percentile Queue Length Summary – Build Alternative 2 – continued

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4	SR 804/Boynton Beach Blvd and I-95 Northbound Ramps	AM Peak	2020	0	167	-	-	112	0	85	-	74	-	-	-	Signalized Intersection
			2030	m258	22	-	-	m208	m0	99	-	90	-	-	-	
			2040	m273	m16	-	-	m225	m0	109	-	#118	-	-	-	
		PM Peak	2020	#155	136	-	-	#224	m277	152	-	217	-	-	-	
			2030	243	152	-	-	m108	m283	203	-	#352	-	-	-	
			2040	#312	175	-	-	m112	m273	207	-	#377	-	-	-	
		Proposed Storage Length (ft)		330	330			700	570	**1,630**		400				
5	SR 804/Boynton Beach Blvd and Seacrest Blvd	AM Peak	2020	143	437	-	68	283	-	#317	129	-	125	362	-	Signalized Intersection
			2030	#458	560	-	#102	450	-	#386	170	-	132	#564	-	
			2040	#1,002	610	-	#171	#714	-	#555	267	-	202	#855	-	
		PM Peak	2020	m#494	544	-	92	#581	-	#493	285	-	120	301	-	
			2030	m#667	492	-	#129	#716	-	#672	311	-	#182	#454	-	
			2040	m#1,034	m647	-	#202	#865	-	#732	358	-	155	#761	-	
		Proposed Storage Length (ft)		250	2,730		250	1,000		190	1,000		180	1,000		

1) The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. This traffic was simulated for two complete cycles to account for the effects of spillover between cycles. If the reported v/c<1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue. In practice, 95th percentile queue shown will rarely be exceeded and the queues shown with the # footnote are acceptable for the design of storage bay (Trafficware 2012).
2) The m footnote indicates that the volume for the 95th percentile queue is metered by an upstream signal (Trafficware 2012).
3) The storage length values were calculated from aerials or design drawings.
4) To calculate reasonable queuing in the model, all terminal links were extended to 1,000 feet from the last node
5) For ramp terminals, the storage distance proved reflects the entire length of the ramp (**XXX feet**)
= Movements with queues exceeding available storage.



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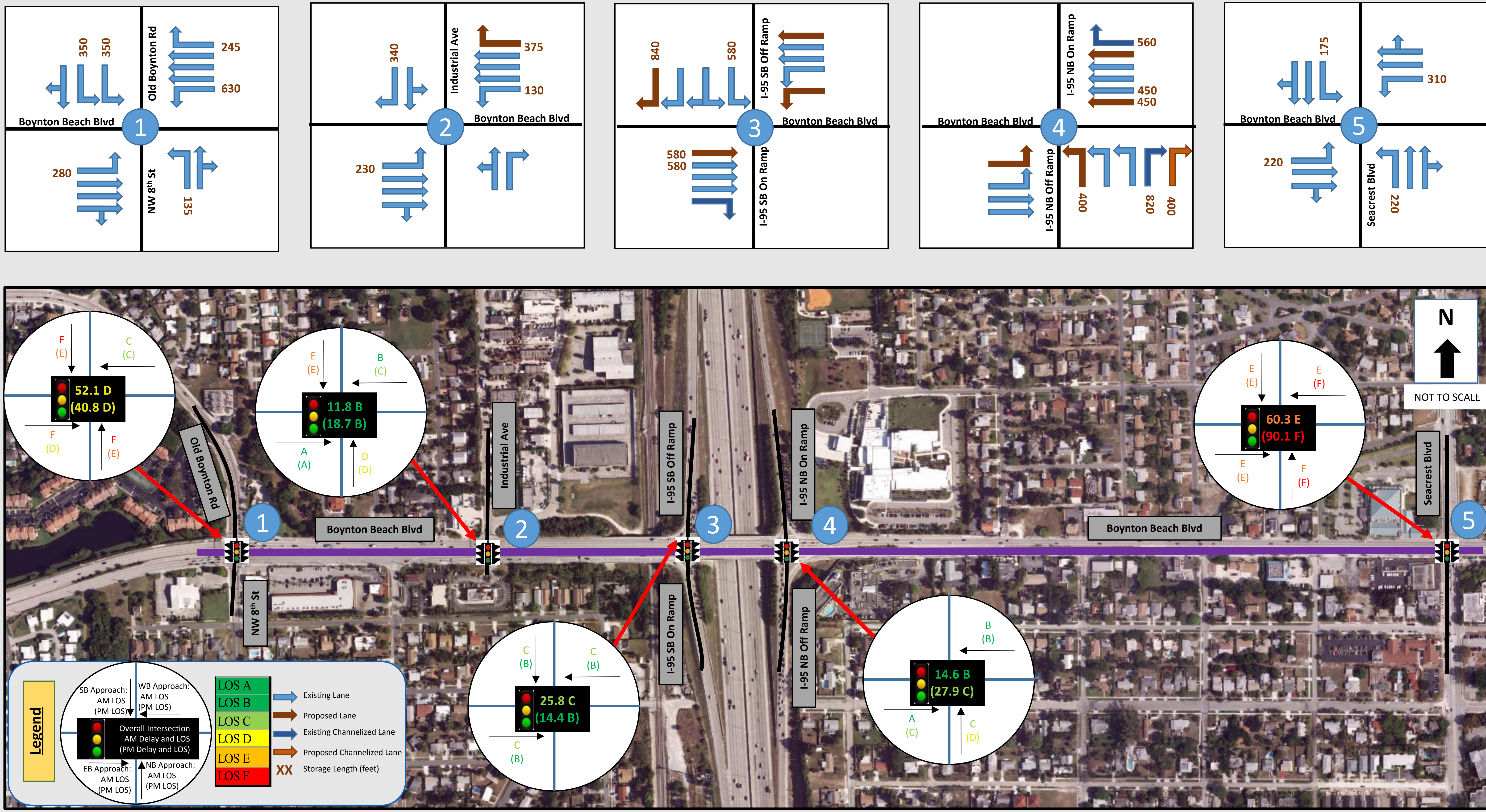
SR 9/I-95 at SR 804/Boynton Beach Boulevard - Build Alternative 2 (Streamlined CDA) Lane Configuration, Intersection LOS and Delay - Open Year (2020)

Figure 6-28



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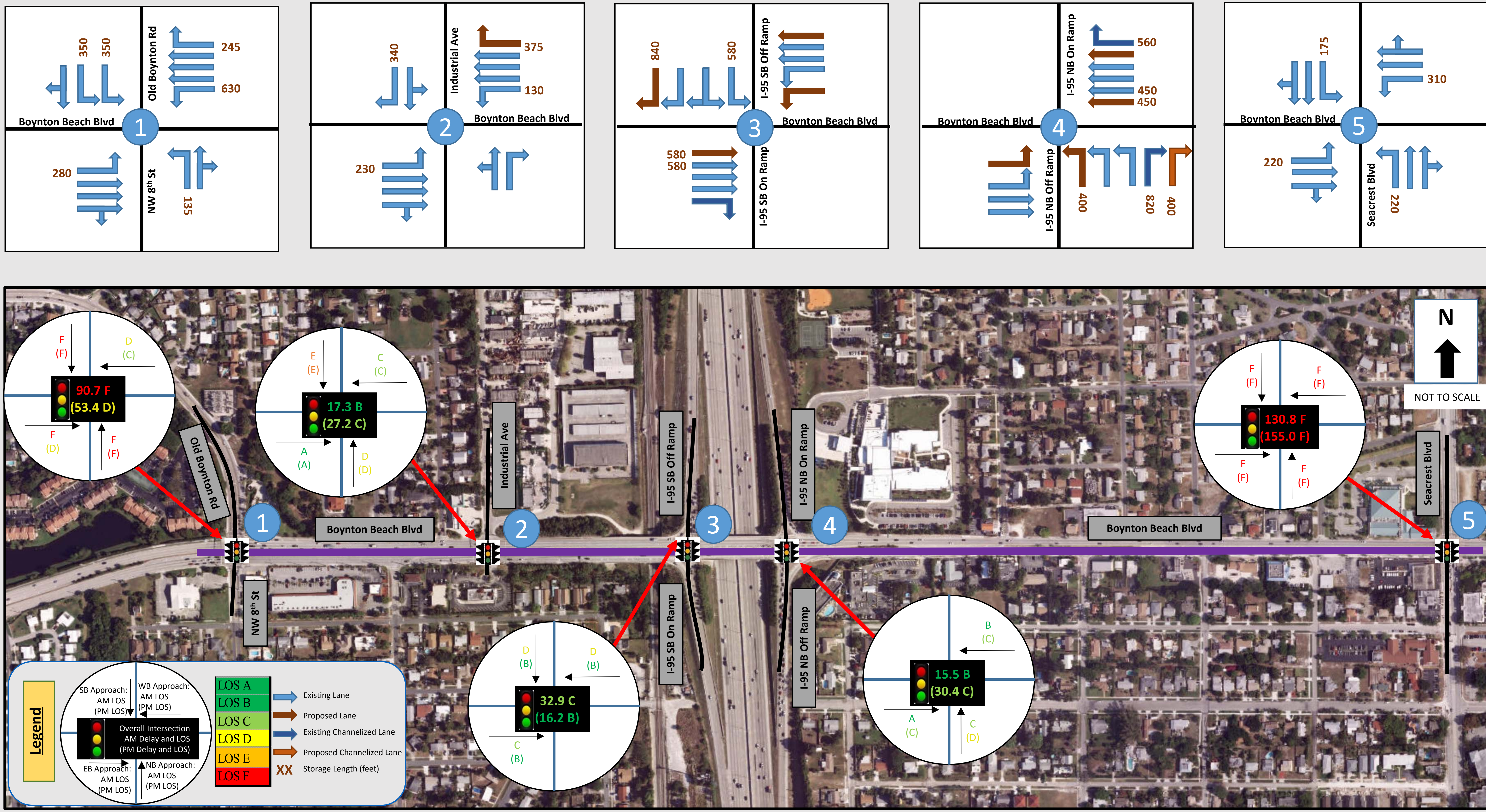
SR 9/I-95 at SR 804/Boynton Beach Boulevard - Build Alternative 2 (Streamlined CDA)
Lane Configuration, Intersection LOS and Delay - Interim Year (2030)

Figure 6-29



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SR 9/I-95 at SR 804/Boynton Beach Boulevard - Build Alternative 2 (Streamlined CDA)
Lane Configuration, Intersection LOS and Delay - Design Year (2040)

Figure 6-30

Other Project Intersections:

Open Year (2020)

- During the PM peak hour, the intersection for SR 804/Boynton Beach Boulevard at Seacrest Boulevard operates at LOS E.

Interim Year (2030)

- During the AM peak hour, the intersection for SR 804/Boynton Beach Boulevard at Seacrest Boulevard operates at LOS E and changes for LOS E operations to LOS F in the PM peak hour.

Design Year (2040)

- During the AM peak hour, the intersection for SR 804/Boynton Beach Boulevard and NW 8th Street/Old Boynton Road operates at LOS F.
- The intersection for SR 804/Boynton Beach Boulevard and Seacrest Boulevard deteriorates to LOS F operations during the AM and PM peak hours.

Volumes exceeding capacity were observed for several movements at the intersections of SR 804/Boynton Beach Boulevard with NW 8th Street/Old Boynton Road and Seacrest Boulevard. The primary reason for theses movements' V/C ratios exceeding 1.00 is because of no proposed improvements along the cross streets with SR 804/Boynton Beach Boulevard at the intersections. A summary of these intersections which are experiencing volumes that exceed available capacity is presented below:

Ramp Terminal Intersections:

Neither ramp terminal intersection operates at V/C ratios that exceed capacity during the Open (2020), Interim (2030), and Design (2040) Years.

Other Project Intersections:

No adjacent project intersections operate at V/C ratios that exceed capacity during the Open Year (2020).

Interim Year (2030)

- SR 804/Boynton Beach Boulevard at Seacrest Boulevard operates at a V/C ratio of 1.21 in the PM peak hour.

Design Year (2040)

- SR 804/Boynton Beach Boulevard at NW 8th Street/Old Boynton Road operates at V/C ratios of 1.18 and 1.07 in the AM and PM peak hours, respectively.
- SR 804/Boynton Beach Boulevard at Seacrest Boulevard operates at V/C ratios of 1.45 and 1.61 in the AM and PM peak hours, respectively.

A review of the 95th percentile queue lengths indicate that several approaches to the intersections of SR 804/Boynton Beach Boulevard with NW 8th Street/Old Boynton Road and Seacrest Boulevard experience queue lengths that exceed available storages. No improvements were proposed at these locations from no-build conditions leading to operations that cause these backups. Intersection improvements with major cross street reconfigurations are required to improve operations at these locations that require significant right-of-way and have other environmental impacts and are not considered for this project as these are adjacent intersections to the project limits. The SR 9/I-95 northbound and southbound off-ramp queues do not exceed available storages and do not impact SR 9/I-95 mainline operations.

Alternative 3: SPUI

Build Alternative 3 (SPUI) at SR 9/I-95 and SR 804/Boynton Beach Boulevard interchange considers the conversion of the existing ramp terminal intersections into a Single-Point Urban Interchange (SPUI) configuration as described in Section 5.4.

Future conditions operational analyses were performed for Build Alternative 3 (SPUI) based on traffic forecast and network conditions expected in years 2020, 2030, and 2040.

Approach and overall intersection LOS and delay results for the study intersections along SR 804/Boynton Beach Boulevard for Build Alternative 3 (SPUI) are summarized in Table 6-47 through Table 6-49 for Open (2020), Interim (2030), and Design (2040) Years, respectively. Intersection approach and overall V/C ratios are summarized in Table 6-50. Traffic operation analysis also evaluated 95th percentile queue lengths as summarized in Table 6-51. Figures 6-31 through 6-33 depict the findings of this intersection analysis along SR 804/Boynton Beach Boulevard for the Open (2020), Interim (2030), and Design (2040) Years, respectively.

The results indicate that all ramp terminal intersections along SR 9/I-95 and other project intersections are expected to operate at LOS D or better, except for the following:

Ramp Terminal Intersections:

The ramp terminal intersection operates at LOS D or better during the Open Year (2020), Interim (2030), and Design (2040) Years.

Other Project Intersections:

Open Year (2020)

- During the PM peak hours, the intersection for SR 804/Boynton Beach Boulevard at Seacrest Boulevard operates at LOS E.

Interim Year (2030)

- During the AM peak hour, the intersection for SR 804/Boynton Beach Boulevard at Seacrest Boulevard operates at LOS E and changes from LOS E operations to LOS F during the PM peak hour.

Design Year (2040)

- During the AM and PM peak hour, the intersection for SR 804/Boynton Beach Boulevard and NW 8th Street/Old Boynton Road operates at LOS E and LOS F, respectively.
    - The intersection for SR 804/Boynton Beach Boulevard and Seacrest Boulevard deteriorates to LOS F operations during the AM and PM peak hours.

Table 6-47: SR 804/Boynton Beach Boulevard Intersections Delay and LOS Summary – Build Alternative 3 – Open Year (2020)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	Signalized	E	D	C	D	E	D	E	E	45.5	D	46.0	D
SR 804/Boynton Beach Blvd at Industrial Ave	Signalized	A	A	A	B	E	D	E	E	8.9	A	13.0	B
SR 804/Boynton Beach Blvd at I-95 Ramps	Signalized	B	B	B	B	C	C	C	B	15.8	B	17.5	B
SR 804/Boynton Beach Blvd at Seacrest Blvd	Signalized	C	D	C	D	E	F	E	E	43.0	D	63.7	E
TOTAL										**113.2**		**140.2**	

Table 6-48: SR 804/Boynton Beach Boulevard Intersections Delay and LOS Summary – Build Alternative 3 – Interim Year (2030)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Pea k	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	Signalized	E	D	B	D	F	E	E	E	50.6	D	52.8	D
SR 804/Boynton Beach Blvd at Industrial Ave	Signalized	A	A	C	C	D	D	E	E	14.3	B	18.9	B
SR 804/Boynton Beach Blvd at I-95 Ramps	Signalized	B	B	B	B	B	C	C	B	19.3	B	17.2	B
SR 804/Boynton Beach Blvd at Seacrest Blvd	Signalized	C	E	D	E	F	F	F	F	66.3	E	90.8	F
TOTAL										**150.5**		**179.7**	

Table 6-49: SR 804/Boynton Beach Boulevard Intersections Delay and LOS Summary – Build Alternative 3 – Design Year (2040)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	Signalized	F	D	C	D	F	F	F	E	84.6	F	60.6	E
SR 804/Boynton Beach Blvd at Industrial Ave	Signalized	A	B	C	C	D	D	E	F	14.7	B	24.3	C
SR 804/Boynton Beach Blvd at I-95 Ramps	Signalized	C	B	C	B	B	C	C	B	24.6	C	18.3	B
SR 804/Boynton Beach Blvd at Seacrest Blvd	Signalized	F	F	F	F	F	F	F	F	136.8	F	163.1	F
TOTAL										**260.7**		**266.3**	

Table 6-50: SR 804/Boynton Beach Boulevard Intersections Volume to Capacity Ratio – Build Alternative 3

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	AM Peak	2020	0.29	0.89	-	0.52	0.58	0.31	0.59	0.52	-	0.89	0.17	-	0.74
			2030	0.40	0.96	-	0.84	0.58	0.40	0.59	0.92	-	0.96	0.25	-	0.93
			2040	0.60	1.07	-	1.17	0.58	0.50	0.66	1.30	-	1.16	0.34	-	1.22
		PM Peak	2020	0.56	0.67	-	0.57	0.73	1.05	0.36	0.60	-	0.81	0.36	-	0.87
			2030	0.68	0.78	-	0.72	0.81	1.12	0.43	0.75	-	0.86	0.37	-	0.96
			2040	0.85	0.79	-	0.98	0.85	1.16	0.54	1.00	-	0.93	0.38	-	1.07
2	SR 804/Boynton Beach Blvd and Industrial Ave	AM Peak	2020	0.42	0.61	-	0.08	0.44	0.11	-	0.03	0.01	-	0.69	0.19	0.63
			2030	0.43	0.70	-	0.12	0.58	0.18	-	0.06	0.01	-	0.77	0.19	0.71
			2040	0.58	0.80	-	0.16	0.71	0.26	-	0.11	0.02	-	0.84	0.22	0.82
		PM Peak	2020	0.31	0.49	-	0.03	0.79	0.07	-	0.05	0.01	-	0.79	0.16	0.76
			2030	0.53	0.53	-	0.05	0.87	0.12	-	0.08	0.01	-	0.90	0.23	0.85
			2040	0.91	0.57	-	0.08	0.92	0.18	-	0.18	0.02	-	1.02	0.32	0.94

Table 6-50: SR 804/Boynton Beach Boulevard Intersections Volume to Capacity Ratio – Build Alternative 3 - continued

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
3	SR 804/Boynton Beach Blvd and I-95 Ramps	AM Peak	2020	0.75	0.64	0.53	0.73	0.39	0.23	0.36	-	0.16	0.79	-	0.36	0.73
			2030	0.86	0.77	0.62	0.84	0.49	0.33	0.38	-	0.17	0.82	-	0.37	0.82
			2040	0.96	0.91	0.69	0.95	0.61	0.45	0.42	-	0.19	0.91	-	0.39	0.94
		PM Peak	2020	0.70	0.65	0.31	0.46	0.65	0.27	0.81	-	0.59	0.54	-	0.39	0.73
			2030	0.81	0.66	0.32	0.67	0.71	0.36	0.82	-	0.65	0.57	-	0.41	0.78
			2040	0.87	0.75	0.33	0.67	0.73	0.45	0.86	-	0.67	0.64	-	0.44	0.83
5	SR 804/Boynton Beach Blvd and Seacrest Blvd	AM Peak	2020	0.41	0.57	-	0.27	0.37	-	0.97	0.29	-	0.61	0.80	-	0.69
			2030	0.82	0.66	-	0.42	0.66	-	1.10	0.43	-	0.71	1.10	-	0.96
			2040	1.33	0.79	-	0.68	1.06	-	1.30	0.69	-	0.78	1.49	-	1.33
		PM Peak	2020	0.85	0.63	-	0.41	0.79	-	1.32	0.64	-	0.57	0.74	-	0.92
			2030	1.09	0.71	-	0.52	1.01	-	1.46	0.73	-	0.67	1.12	-	1.16
			2040	1.47	0.80	-	0.66	1.15	-	1.57	0.85	-	0.81	1.76	-	1.53

= Movements volume to capacity ratios exceeding 1.00.

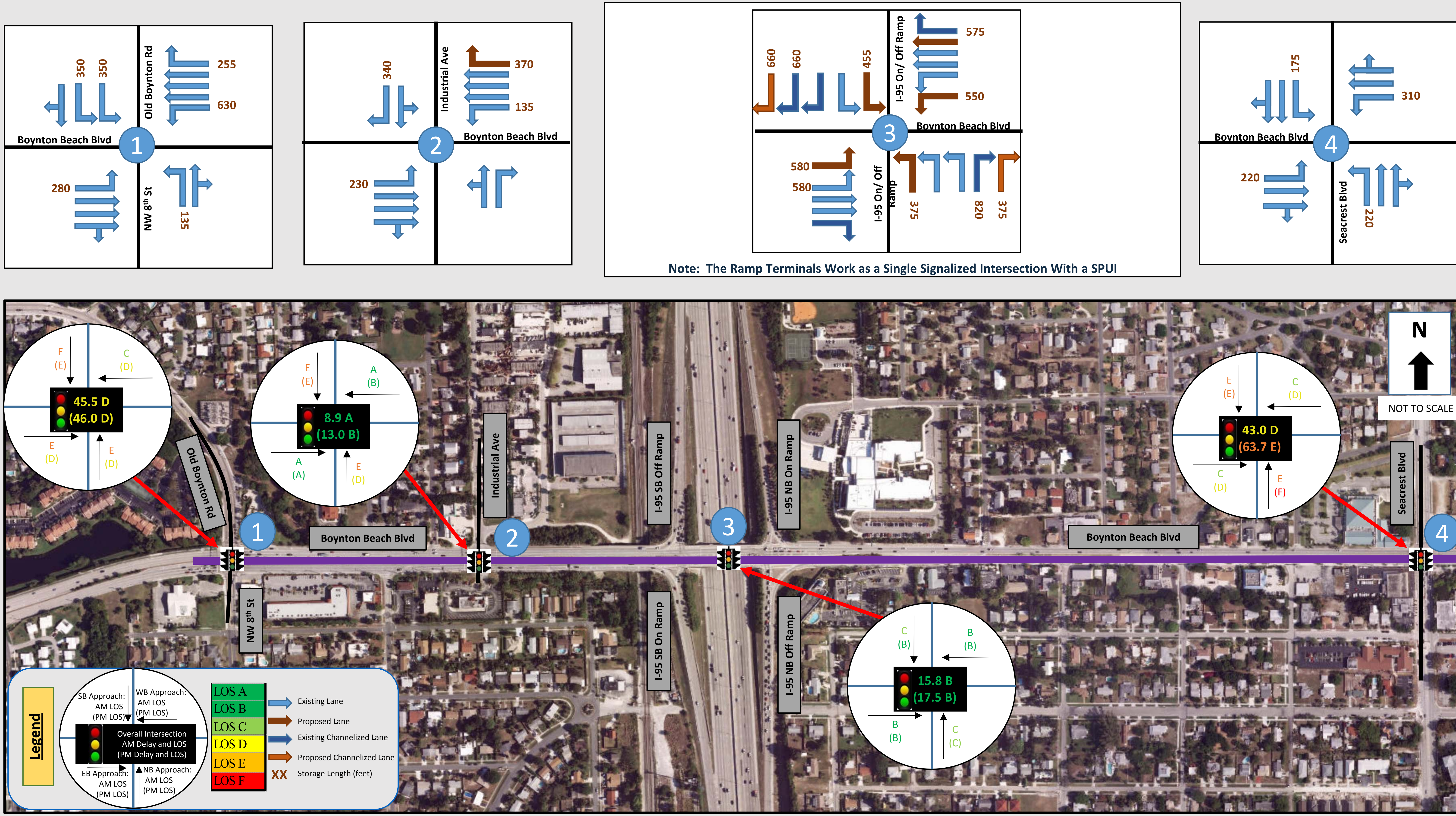
Table 6-51: SR 804/Boynton Beach Boulevard Intersections 95th Percentile Queue Length Summary – Build Alternative 3

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	SR 804/Boynton Beach Blvd at NW 8th St/Old Boynton Rd	AM Peak	2020	34	534	-	175	130	51	115	259	-	#352	130	-	Signalized Intersection
			2030	42	#639	-	#347	51	5	140	#465	-	#460	167	-	
			2040	57	#766	-	#649	209	72	166	#725	-	#557	209	-	
		PM Peak	2020	75	431	-	m80	477	#1,031	167	339	-	253	182	-	
			2030	#102	466	-	m144	515	#1,033	210	446	-	#289	186	-	
			2040	#153	471	-	m#266	536	m#1,042	260	#680	-	#347	188	-	
		Proposed Storage Length (ft)		280	1,000		650	700	260	140	1,000		380	1,000		

Table 6-51: SR 804/Boynton Beach Boulevard Intersections 95th Percentile Queue Length Summary – Build Alternative 3 – continued

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2	SR 804/Boynton Beach Blvd and Industrial Ave	AM Peak	2020	m28	327	-	m7	315	71	-	15	11	-	167	89	Signalized Intersection
			2030	m56	m340	-	m6	540	108	-	20	12	-	216	100	
			2040	m124	m148	-	m11	478	149	-	32	17	-	274	132	
		PM Peak	2020	m38	119	-	m1	691	m30	-	19	12	-	234	90	
			2030	m70	246	-	m3	760	m39	-	25	15	-	#354	133	
			2040	m#189	m264	-	m4	804	m51	-	39	20	-	#474	180	
		Proposed Storage Length (ft)		240	350		130	1,040	380	1,000		1,000	1,000		340	
3	SR 804/Boynton Beach Blvd and I-95 Ramps	AM Peak	2020	238	236	39	m143	m109	m0	79	-	44	186	-	84	Signalized Intersection
			2030	379	404	80	m186	m131	m0	85	-	45	#207	-	85	
			2040	#337	#371	753	m229	m160	m0	96	-	49	#264	-	58	
		PM Peak	2020	210	240	0	m64	m138	m0	201	-	174	138	-	92	
			2030	207	173	m0	m82	m153	m0	212	-	211	151	-	99	
			2040	m234	m237	m0	m86	m140	m0	#231	-	224	171	-	108	
		Proposed Storage Length (ft)		730	1,040	1,040	540	690	560	**1,630**		770	**1,550**		690	
5	SR 804/Boynton Beach Blvd and Seacrest Blvd	AM Peak	2020	m123	278	-	58	247	-	#377	159	-	153	383	-	Signalized Intersection
			2030	m330	416	-	82	432	-	#446	220	-	214	#635	-	
			2040	m#893	m352	-	181	#714	-	#543	#351	-	286	#925	-	
		PM Peak	2020	392	438	-	79	#541	-	#601	338	-	134	303	-	
			2030	#710	503	-	93	#704	-	#672	371	-	175	#524	-	
			2040	#1,089	563	-	148	#853	-	#732	#425	-	#259	#842	-	
		Proposed Storage Length (ft)		250	2,730		250	1,000		190	1,000		180	1,000		

1) The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. This traffic was simulated for two complete cycles to account for the effects of spillover between cycles. If the reported v/c<1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue. In practice, 95th percentile queue shown will rarely be exceeded and the queues shown with the # footnote are acceptable for the design of storage bay (Trafficware 2012).
2) The m footnote indicates that the volume for the 95th percentile queue is metered by an upstream signal (Trafficware 2012).
3) The storage length values were calculated from aerials or design drawings.
4) To calculate reasonable queuing in the model, all terminal links were extended to 1,000 feet from the last node
5) For ramp terminals, the storage distance proved reflects the entire length of the ramp (**XXX feet**)
= Movements with queues exceeding available storage.



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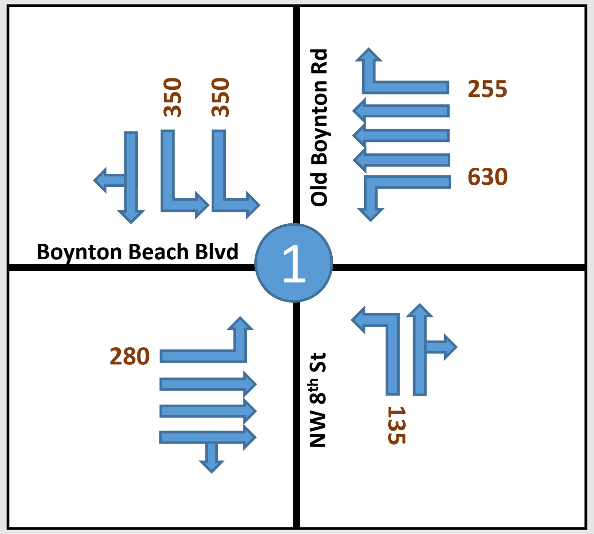
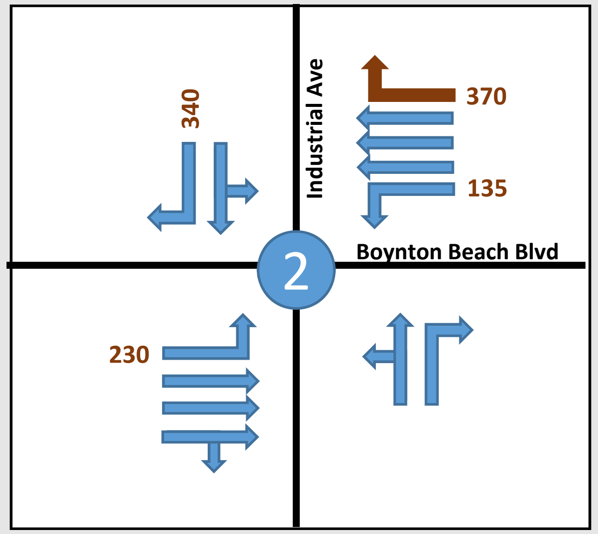
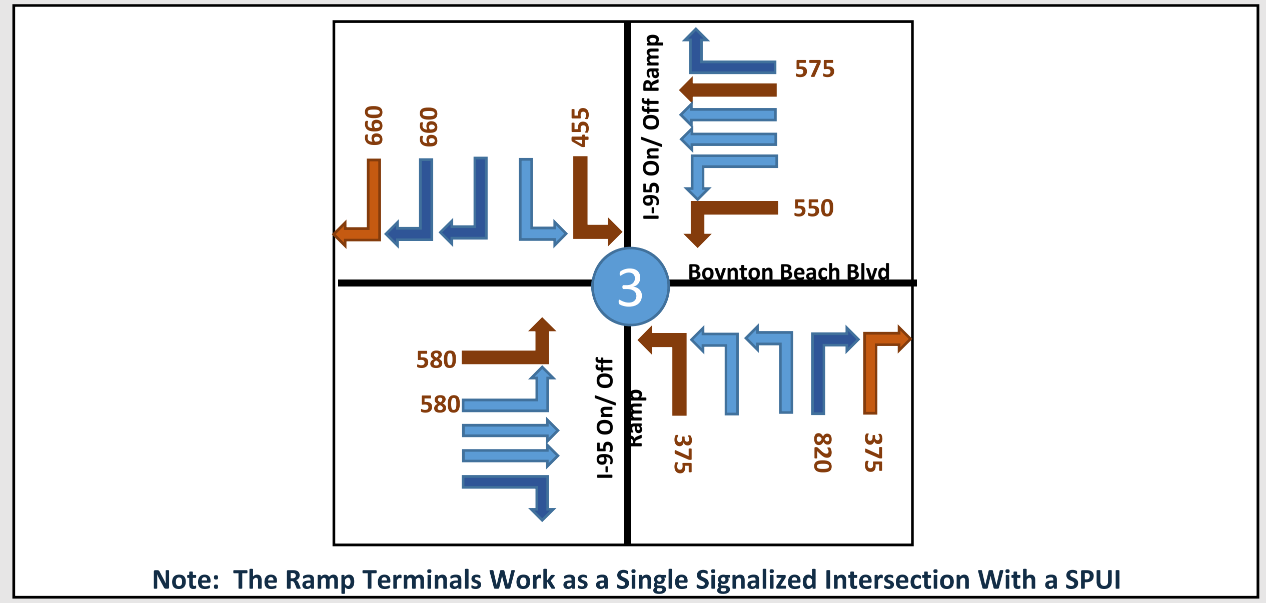
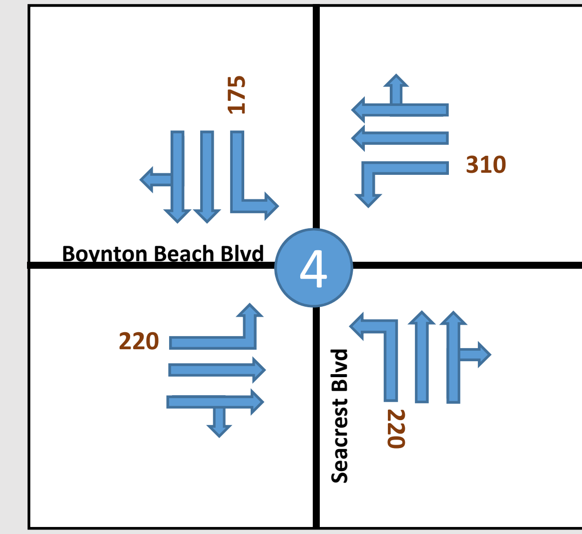
SR 9/I-95 at SR 804/Boynton Beach Boulevard - Build Alternative 3 (SPUI)
Lane Configuration, Intersection LOS and Delay - Open Year (2020)

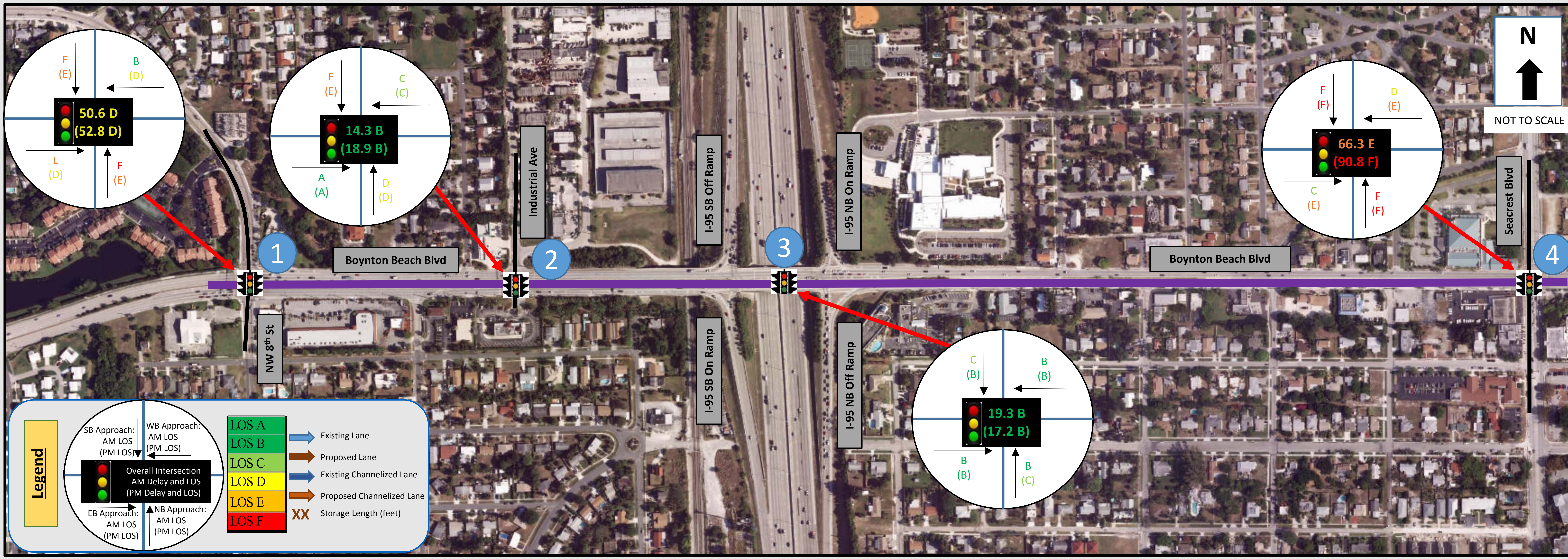
Figure 6-31











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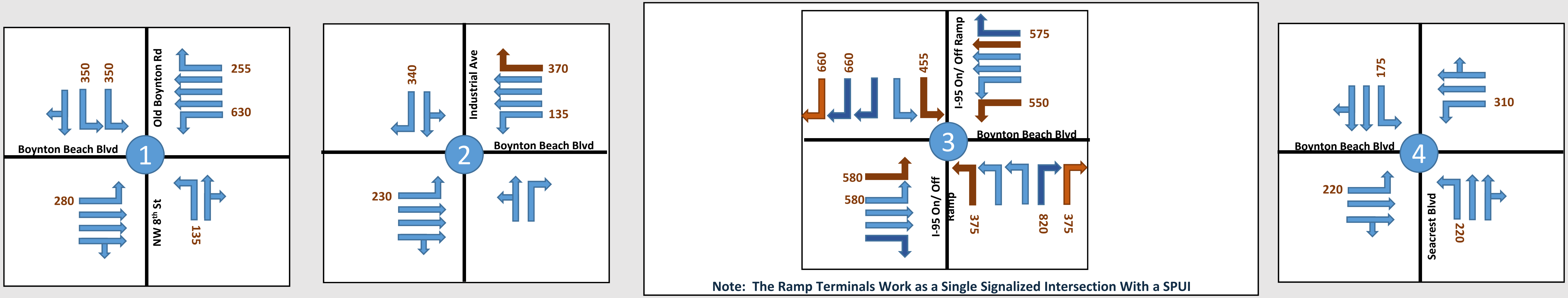

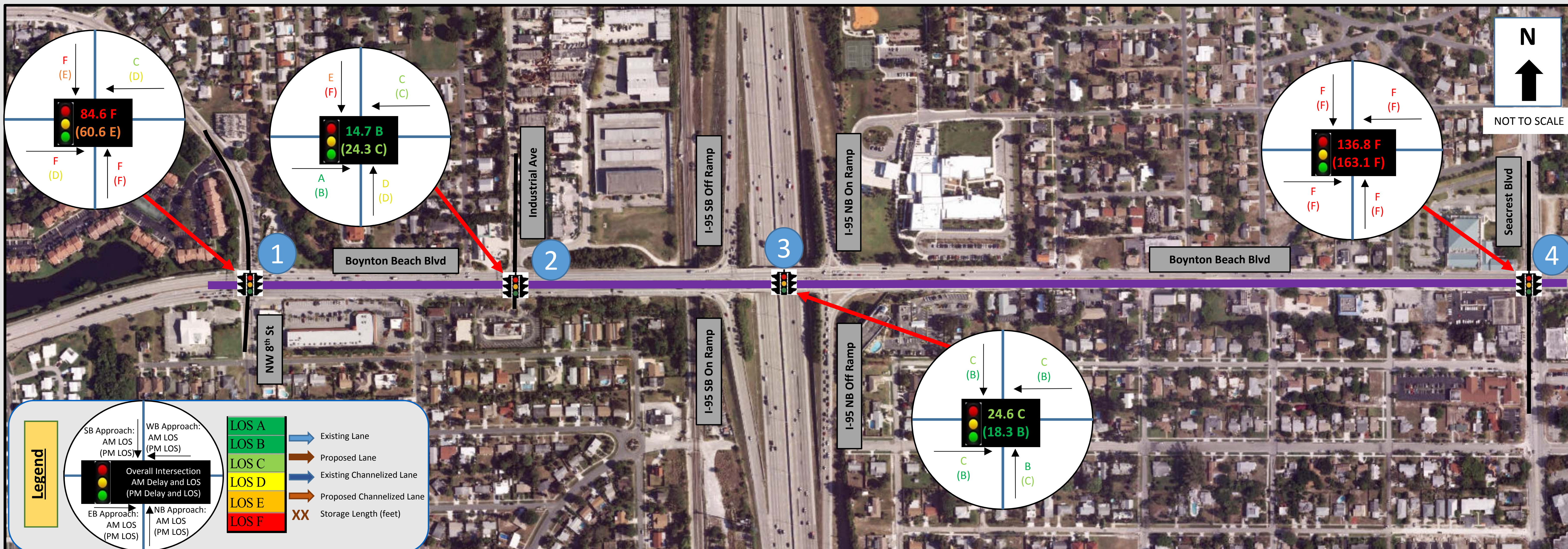

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SR 9/I-95 at SR 804/Boynton Beach Boulevard - Build Alternative 3 (SPUI)
Lane Configuration, Intersection LOS and Delay - Design Year (2040)

Figure 6-33

Volumes exceeding capacity were observed for several movements at the intersections of SR 804/Boynton Beach Boulevard with NW 8th Street/Old Boynton Road and Seacrest Boulevard. The primary reason for these movements' V/C ratios exceeding 1.00 is because of no proposed improvements along the cross streets with SR 804/Boynton Beach Boulevard at the intersections. A summary of these intersections which are experiencing volumes that exceed available capacity is presented below:

Ramp Terminal Intersections:

Neither ramp terminal intersection operates at V/C ratios that exceed capacity during the Open (2020), Interim (2030), and Design (2040) Years.

Other Project Intersections:

No adjacent project intersection operates at V/C ratios that exceed capacity during the Open Year (2020).

Interim Year (2030)

- SR 804/Boynton Beach Boulevard at Seacrest Boulevard operates at a V/C ratio of 1.16 in the PM peak hour.

Design Year (2040)

- SR 804/Boynton Beach Boulevard at NW 8th Street/Old Boynton Road operates with V/C ratios of 1.22 and 1.07 in the AM and PM peak hours, respectively.
- SR 804/Boynton Beach Boulevard at Seacrest Boulevard operates with V/C ratios of 1.33 and 1.53 in the AM and PM peak hours, respectively.

A review of the 95th percentile queue lengths indicate that several approaches to the intersections of SR 804/Boynton Beach Boulevard with NW 8th Street/Old Boynton Road and Seacrest Boulevard experience queue lengths that exceed available storages. No improvements were proposed at these locations from no-build conditions leading to operations that cause these backups. Intersection improvements with major cross street reconfigurations are required to improve operations at these locations that require significant right-of-way and have other environmental impacts and are not considered for this project as these are adjacent intersections to the project limits. The SR 9/I-95 northbound and southbound off-ramp queues do not exceed available storages and do not impact SR 9/I-95 mainline operations.

SR 9/I-95 at Gateway Boulevard Interchange Intersections

Three interchange alternatives were considered for SR 9/I-95 at Gateway Boulevard interchange listed below and are described in Section 6.4:

- Alternative 1 – CDA
- Alternative 2 – Streamlined CDA
- Alternative 3 – SPUI

Intersection analyses of these Build Alternatives are provided in the subsequent sections.

Alternative 1: CDA

Build Alternative 1 (CDA) at SR 9/I-95 and Gateway Boulevard is the alternative recommended in the SR 9/I-95 Master Plan and is described in Section 5.4.

Future conditions operational analyses were performed for Build Alternative 1 (CDA) based on traffic forecast and network conditions expected in years 2020, 2030, and 2040.

Approach and overall intersection LOS and delay results for the study intersections along Gateway Boulevard are summarized for Build Alternative 1 (CDA) in Table 6-52 through Table 6-54 for Open (2020), Interim (2030), and Design (2040) Years, respectively. Intersection approach and overall V/C ratios are summarized in Table 6-55. Traffic operational analysis also evaluated 95th percentile queue lengths as summarized in Table 6-56. Figures 6-34 through 6-36 depict the findings of this intersection analysis along Gateway Boulevard for the Open (2020), Interim (2030), and Design (2040) Years, respectively.

The results indicate that all ramp terminal intersections along SR 9/I-95 and other project intersections are expected to operate at LOS D or better with Build Alternative 1 for all three analysis time periods.

One intersection with overall intersection volumes exceeding capacity was observed for the intersection along Gateway Boulevard and is described below:

Ramp Terminal Intersections:

Neither ramp terminal intersection operates at V/C ratios that exceed capacity during the Open (2020) and Interim (2030) Years.

Design Year (2040)

- Gateway Boulevard at SR 9/I-95 Southbound Ramps operates at a V/C ratio of 1.05 in the AM peak hour.

Other Project Intersections:

No adjacent project intersections operate at V/C ratios that exceed capacity during the Open (2020), Interim (2030), and Design (2040) Years.

A review of the 95th percentile queue lengths indicated no major queue backups that exceed available storages were observed for the intersections along Gateway Boulevard. The SR 9/I-95 northbound and southbound off-ramp queues do not exceed available storages and do not impact SR 9/I-95 mainline operations.

Table 6-52: Gateway Boulevard Intersections Delay and LOS Summary – Build Alternative 1 – Open Year (2020)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound					
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak		PM Peak	
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Gateway Blvd at Quantum Village	Signalized	A	B	B	C	E	E	E	E	15.3	B	19.9	B
Gateway Blvd at High Ridge Road	Signalized	D	C	B	B	E	E	E	E	40.5	D	32.0	C
Gateway Blvd at I-95 Southbound Ramps	Signalized	D	D	A	A	-	-	D	D	24.9	C	31.0	C
Gateway Blvd at I-95 Northbound Ramps	Signalized	A	A	D	E	E	D	-	-	33.7	C	34.6	C
Gateway Blvd at Seacrest Blvd	Signalized	C	C	C	C	E	E	E	E	41.7	D	43.4	D
TOTAL										**156.1**		**160.9**	

Table 6-53: Gateway Boulevard Intersections Delay and LOS Summary – Build Alternative 1 – Interim Year (2030)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound					
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak		PM Peak	
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Gateway Blvd at Quantum Village	Signalized	B	B	B	C	E	E	E	E	16.0	B	19.6	B
Gateway Blvd at High Ridge Road	Signalized	D	C	B	C	E	E	E	E	42.6	D	34.2	C
Gateway Blvd at I-95 Southbound Ramps	Signalized	D	E	A	A	-	-	D	D	31.6	C	33.4	C
Gateway Blvd at I-95 Northbound Ramps	Signalized	A	A	E	E	E	D	-	-	36.2	D	34.6	C
Gateway Blvd at Seacrest Blvd	Signalized	C	C	D	C	E	E	E	E	44.8	D	46.2	D
TOTAL										**171.2**		**168.0**	

Table 6-54: Gateway Boulevard Intersections Delay and LOS Summary – Build Alternative 1 – Design Year (2040)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Gateway Blvd at Quantum Village	Signalized	B	B	C	C	E	E	E	E	17.6	B	19.5	B
Gateway Blvd at High Ridge Road	Signalized	E	C	C	C	E	E	E	E	46.2	D	37.0	D
Gateway Blvd at I-95 Southbound Ramps	Signalized	F	E	A	A	-	-	D	E	53.3	D	36.8	D
Gateway Blvd at I-95 Northbound Ramps	Signalized	A	A	F	E	E	E	-	-	52.3	D	40.6	D
Gateway Blvd at Seacrest Blvd	Signalized	D	D	D	D	E	E	E	E	51.3	D	48.7	D
TOTAL										**220.7**		**182.6**	

Table 6-55: Gateway Boulevard Intersections Volume to Capacity Ratio – Build Alternative 1

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Gateway Blvd at Quantum Village	AM Peak	2020	0.44	0.49	-	0.61	0.33	0.00	0.52	0.01	-	0.33	0.17	-	0.50
			2030	0.44	0.58	-	0.61	0.37	0.00	0.52	0.01	-	0.33	0.17	-	0.58
			2040	0.44	0.70	-	0.58	0.42	0.00	0.52	0.01	-	0.33	0.17	-	0.68
		PM Peak	2020	0.61	0.40	-	0.46	0.61	0.01	0.04	0.01	-	0.59	0.18	-	0.61
			2030	0.61	0.45	-	0.46	0.66	0.01	0.04	0.01	-	0.59	0.18	-	0.66
			2040	0.61	0.54	-	0.46	0.73	0.01	0.04	0.01	-	0.59	0.20	-	0.72
2	Gateway Blvd at High Ridge Road	AM Peak	2020	0.60	0.53	0.17	0.57	0.35	0.40	0.50	0.36	0.84	0.68	0.50	0.28	0.63
			2030	0.50	0.66	0.27	0.49	0.41	0.55	0.52	0.36	0.74	0.75	0.59	0.27	0.70
			2040	0.49	0.84	0.34	0.47	0.49	0.62	0.53	0.38	0.70	0.76	0.64	0.27	0.79
		PM Peak	2020	0.59	0.36	0.07	0.65	0.51	0.37	0.60	0.46	0.81	0.65	0.23	0.47	0.61
			2030	0.61	0.43	0.09	0.69	0.58	0.41	0.65	0.48	0.84	0.64	0.23	0.45	0.66
			2040	0.54	0.53	0.12	0.69	0.71	0.47	0.68	0.48	0.83	0.61	0.23	0.39	0.73

Table 6-55: Gateway Boulevard Intersections Volume to Capacity Ratio – Build Alternative 1 – continued

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
3	Gateway Blvd at I-95 Southbound Ramps	AM Peak	2020	-	0.49	0.84	0.33	0.61	-	-	-	-	0.74	-	0.34	0.75
			2030	-	0.54	1.06	0.42	0.68	-	-	-	-	0.81	-	0.41	0.89
			2040	-	0.61	1.30	0.53	0.78	-	-	-	-	0.93	-	0.43	1.05
		PM Peak	2020	-	0.58	0.61	0.12	0.72	-	-	-	-	0.72	-	0.48	0.71
			2030	-	0.67	0.77	0.15	0.77	-	-	-	-	0.83	-	0.52	0.81
			2040	-	0.76	0.93	0.18	0.86	-	-	-	-	0.96	-	0.55	0.94
4	Gateway Blvd at I-95 Northbound Ramps	AM Peak	2020	0.49	0.31	-	-	0.73	0.49	0.80	-	0.23	-	-	-	0.63
			2030	0.54	0.35	-	-	0.88	0.54	0.86	-	0.29	-	-	-	0.71
			2040	0.58	0.40	-	-	1.08	0.62	0.97	-	0.38	-	-	-	0.81
		PM Peak	2020	0.39	0.42	-	-	0.69	0.24	0.79	-	0.41	-	-	-	0.61
			2030	0.43	0.49	-	-	0.76	0.26	0.86	-	0.52	-	-	-	0.69
			2040	0.47	0.57	-	-	0.86	0.29	0.98	-	0.66	-	-	-	0.79
5	Gateway Blvd at Seacrest Blvd	AM Peak	2020	0.56	0.27	0.38	0.62	0.45	-	0.78	0.40	-	0.51	0.68	0.78	0.58
			2030	0.56	0.30	0.50	0.63	0.58	-	0.82	0.37	-	0.54	0.68	0.80	0.68
			2040	0.61	0.38	0.65	0.72	0.77	-	0.89	0.37	-	0.57	0.70	0.85	0.82
		PM Peak	2020	0.74	0.42	0.29	0.57	0.27	-	0.76	0.79	-	0.63	0.58	0.48	0.59
			2030	0.74	0.51	0.37	0.62	0.28	-	0.81	0.75	-	0.62	0.66	0.51	0.65
			2040	0.75	0.66	0.48	0.60	0.33	-	0.85	0.66	-	0.65	0.67	0.51	0.74

= Movements volume to capacity ratios exceeding 1.00.

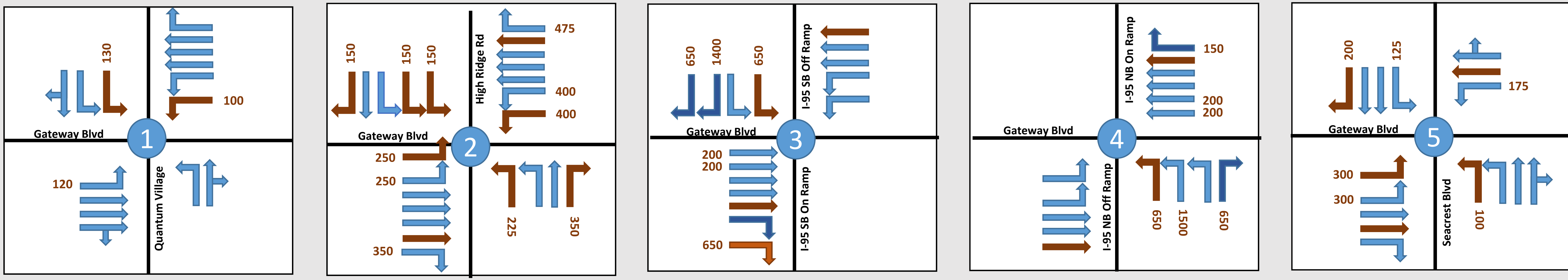
Table 6-56: Gateway Boulevard Intersections 95th Percentile Queue Length Summary – Build Alternative 1

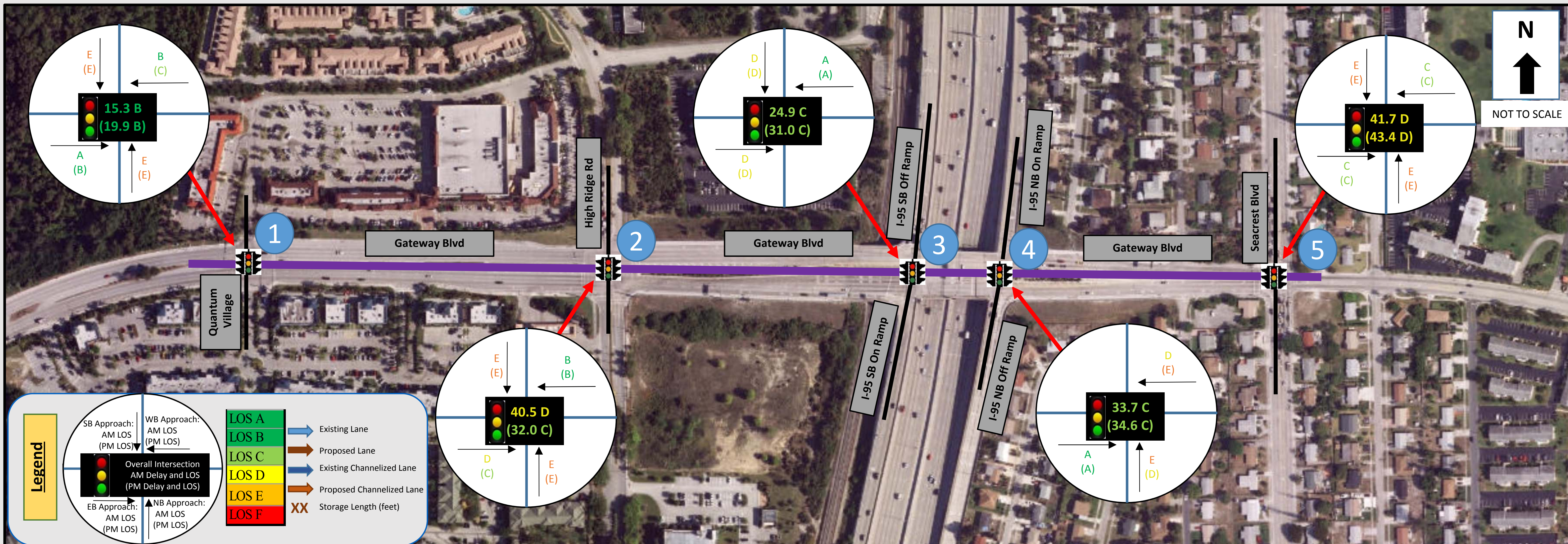
	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Gateway Blvd and Quantum Village	AM Peak	2020	53	354	-	106	431	0	71	0	-	52	61	-	Signalized Intersection
			2030	53	465	-	98	519	0	71	0	-	52	61	-	
			2040	53	647	-	102	614	0	71	0	-	52	61	-	
		PM Peak	2020	131	251	-	m58	820	m12	12	0	-	104	76	-	
			2030	131	305	-	m54	946	m8	12	0	-	104	76	-	
			2040	131	392	-	m55	1,052	m4	12	0	-	104	80	-	
		Proposed Storage Length (ft)		240	1,000		210	850	850	150	150		130	130		
2	Gateway Blvd and High Ridge Road	AM Peak	2020	115	467	141	166	181	199	81	77	209	207	197	118	Signalized Intersection
			2030	125	554	258	172	245	450	85	80	212	217	218	124	
			2040	140	#719	307	m171	352	498	87	83	214	221	238	130	
		PM Peak	2020	121	247	46	151	331	75	112	108	203	156	83	179	
			2030	139	302	57	m162	384	127	130	124	219	155	85	178	
			2040	161	384	68	m171	643	m205	148	133	227	152	89	174	
		Proposed Storage Length (ft)		280	850	340	445	725	420	250	1,000		325	1,000	260	
3	Gateway Blvd and I-95 SB Ramps	AM Peak	2020	-	191	#192	0	8	-	-	-	-	181	-	221	Signalized Intersection
			2030	-	174	#832	m6	51	-	-	-	-	#218	-	227	
			2040	-	189	#1,106	m23	m54	-	-	-	-	#266	-	238	
		PM Peak	2020	-	333	254	0	13	-	-	-	-	218	-	296	
			2030	-	377	375	m0	45	-	-	-	-	#265	-	306	
			2040	-	433	#201	m0	m59	-	-	-	-	#331	-	323	
		Proposed Storage Length (ft)			725	485	100	100					**2,560**		**2,560**	

Table 6-56: Gateway Boulevard Intersections 95th Percentile Queue Length Summary – Build Alternative 1 – continued

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4	Gateway Blvd and I-95 NB Ramps	AM Peak	2020	70	35	-	-	297	315	273	-	126	-	-	-	Signalized Intersection
			2030	58	39	-	-	327	300	327	-	161	-	-	-	
			2040	59	m44	-	-	#491	m376	#424	-	212	-	-	-	
		PM Peak	2020	19	30	-	-	248	141	402	-	215	-	-	-	
			2030	12	37	-	-	223	160	485	-	302	-	-	-	
			2040	5	m42	-	-	271	187	#624	-	448	-	-	-	
		Proposed Storage Length (ft)		100	100			650	285	**2,600**		**2,600**				
5	Gateway Blvd and Seacrest Blvd	AM Peak	2020	95	227	324	106	373	-	216	164	-	79	184	295	Signalized Intersection
			2030	115	227	511	139	500	-	278	166	-	82	187	310	
			2040	136	257	727	180	628	-	373	184	-	87	194	350	
		PM Peak	2020	163	392	95	98	215	-	206	325	-	102	174	209	
			2030	199	531	381	109	228	-	259	324	-	105	178	215	
			2040	192	667	469	124	260	-	325	316	-	108	179	214	
		Proposed Storage Length (ft)		275	650	650	1,000	1,000		1,000	1,000		1,000	1,000	275	

1) The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. This traffic was simulated for two complete cycles to account for the effects of spillover between cycles. If the reported v/c<1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue. In practice, 95th percentile queue shown will rarely be exceeded and the queues shown with the # footnote are acceptable for the design of storage bay (Trafficware 2012).
2) The m footnote indicates that the volume for the 95th percentile queue is metered by an upstream signal (Trafficware 2012).
3) The storage length values were calculated from aerials or design drawings.
4) To calculate reasonable queuing in the model, all terminal links were extended to 1,000 feet from the last node
5) For ramp terminals, the storage distance proved reflects the entire length of the ramp (**XXX feet**)
= Movements with queues exceeding available storage.





PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at Gateway Boulevard - Build Alternative 1 (CDA)
Lane Configuration, Intersection LOS and Delay - Open Year (2020)

Figure 6-34

PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at Gateway Boulevard - Build Alternative 1 (CDA)
Lane Configuration, Intersection LOS and Delay - Interim Year (2030)

Figure 6-35

PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at Gateway Boulevard - Build Alternative 1 (CDA)
Lane Configuration, Intersection LOS and Delay - Design Year (2040)

Figure 6-36

Alternative 2: Streamlined CDA

Build Alternative 2 (Streamlined CDA) at SR 9/I-95 and Gateway Boulevard interchange is an enhancement of the alternative recommended in the SR 9/I-95 Master Plan (Alternative 1 CDA) and is described in Section 5.4.

Future conditions operational analyses were performed for Build Alternative 2 (Streamlined CDA) based on traffic forecast and network conditions expected in years 2020, 2030, and 2040.

Approach and overall intersection LOS and delay results for the study intersections along Gateway Boulevard are summarized for Build Alternative 2 (Streamlined CDA) in Table 6-57 through Table 6-59 for Open (2020), Interim (2030), and Design (2040) Years. Intersection approach and overall V/C ratios are summarized in Table 6-60. Traffic operation analysis also evaluated 95th percentile queue lengths as summarized in Table 6-61. Figures 6-37 through 6-39 depict the findings of this intersection analysis along Gateway Boulevard for the Open (2020), Interim (2030), and Design (2040) Years, respectively.

The results indicate that all ramp terminal intersections along SR 9/I-95 and other project intersections are expected to operate at LOS D or better, except for the following:

Ramp Terminal Intersections:

Both ramp terminal intersections operate at LOS D or better during the Open Year (2020), Interim (2030), and Design (2040) Years.

Other Project Intersections:

Adjacent project intersections operate at LOS D or better during the Open (2020) and Interim (2030) Years.

Design Year (2040)

- During the AM peak hour, the intersection for Gateway Boulevard at Seacrest Boulevard operates at LOS E.

Two intersections with overall intersection volumes exceeding capacity were observed for the intersections along Gateway Boulevard and are described below:

Ramp Terminal Intersections:

Neither ramp terminal intersection operates at V/C ratios that exceed capacity during the Open (2020) and Interim (2030) Years.

Design Year (2040)

- Gateway Boulevard at SR 9/I-95 Southbound Ramps operate at a V/C ratio of 1.02 and 1.03 in the AM and PM peak hours, respectively.

Table 6-57: Gateway Boulevard Intersections Delay and LOS Summary – Build Alternative 2 – Open Year (2020)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Gateway Blvd at Quantum Village	Signalized	A	B	B	C	E	E	E	E	14.3	B	19.2	B
Gateway Blvd at High Ridge Road	Signalized	D	C	C	C	F	F	E	E	43.5	D	35.7	D
Gateway Blvd at I-95 Southbound Ramps	Signalized	D	D	A	A	-	-	D	D	29.6	C	28.0	C
Gateway Blvd at I-95 Northbound Ramps	Signalized	A	A	D	E	E	D	-	-	31.1	C	34.0	C
Gateway Blvd at Seacrest Blvd	Signalized	C	C	D	D	D	D	E	E	43.3	D	43.2	D
TOTAL										**161.8**		**160.1**	

Table 6-58: Gateway Boulevard Intersections Delay and LOS Summary – Build Alternative 2 – Interim Year (2030)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Gateway Blvd at Quantum Village	Signalized	B	B	B	C	E	E	E	E	15.2	B	18.6	B
Gateway Blvd at High Ridge Road	Signalized	D	C	C	C	E	F	E	E	45.9	D	38.9	D
Gateway Blvd at I-95 Southbound Ramps	Signalized	D	D	A	A	-	-	D	D	33.4	C	32.0	C
Gateway Blvd at I-95 Northbound Ramps	Signalized	A	A	D	E	E	D	-	-	34.5	C	36.8	D
Gateway Blvd at Seacrest Blvd	Signalized	C	D	E	D	D	D	E	E	50.6	D	45.9	D
TOTAL										**179.6**		**172.2**	

Table 6-59: Gateway Boulevard Intersections Delay and LOS Summary – Build Alternative 2 – Design Year (2040)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Averag e Delay (sec)	LOS
Gateway Blvd at Quantum Village	Signalized	B	B	B	C	E	E	E	E	16.3	B	19.6	B
Gateway Blvd at High Ridge Road	Signalized	E	C	C	C	E	F	E	E	49.2	D	42.9	D
Gateway Blvd at I-95 Southbound Ramps	Signalized	F	E	B	A	-	-	D	E	50.3	D	42.0	D
Gateway Blvd at I-95 Northbound Ramps	Signalized	A	A	E	E	F	E	-	-	53.2	D	48.3	D
Gateway Blvd at Seacrest Blvd	Signalized	D	D	F	D	F	D	F	E	75.7	E	50.9	D
TOTAL										**244.7**		**203.7**	

Table 6-60: Gateway Boulevard Intersections Volume to Capacity Ratio – Build Alternative 2

	Intersection	Time Period	Year	Volume to Capacity Ratio												Overall Intersection
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Gateway Blvd at Quantum Village	AM Peak	2020	0.44	0.49	-	0.61	0.33	0.00	0.52	0.01	-	0.33	0.17	-	0.50
			2030	0.44	0.58	-	0.61	0.37	0.00	0.52	0.01	-	0.33	0.17	-	0.58
			2040	0.44	0.70	-	0.58	0.42	0.00	0.52	0.01	-	0.33	0.17	-	0.68
		PM Peak	2020	0.61	0.40	-	0.46	0.61	0.01	0.04	0.01	-	0.58	0.46	-	0.61
			2030	0.61	0.45	-	0.46	0.66	0.01	0.04	0.01	-	0.58	0.48	-	0.66
			2040	0.59	0.54	-	0.46	0.74	0.01	0.04	0.01	-	0.57	0.50	-	0.72
2	Gateway Blvd at High Ridge Road	AM Peak	2020	0.60	0.54	0.17	0.57	0.52	-	0.66	0.47	0.91	0.84	0.35	-	0.69
			2030	0.63	0.68	0.21	0.55	0.59	-	0.68	0.49	0.85	0.84	0.38	-	0.76
			2040	0.64	0.84	0.26	0.54	0.69	-	0.68	0.49	0.82	0.83	0.42	-	0.84
		PM Peak	2020	0.51	0.37	0.06	0.65	0.69	-	0.75	0.61	0.90	0.72	0.23	-	0.74
			2030	0.49	0.43	0.09	0.74	0.78	-	0.78	0.58	0.92	0.79	0.28	-	0.80
			2040	0.48	0.53	0.11	0.72	0.92	-	0.81	0.60	0.91	0.79	0.34	-	0.90

Table 6-60: Gateway Boulevard Intersections Volume to Capacity Ratio – Build Alternative 2 – continued

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
3	Gateway Blvd at I-95 Southbound Ramps	AM Peak	2020	-	0.83	0.76	0.34	0.63	-	-	-	-	0.74	-	0.38	0.77
			2030	-	1.05	0.95	0.43	0.71	-	-	-	-	0.81	-	0.40	0.86
			2040	-	1.26	1.14	0.56	0.83	-	-	-	-	0.93	-	0.41	1.02
		PM Peak	2020	-	0.78	0.60	0.13	0.76	-	-	-	-	0.81	-	0.46	0.81
			2030	-	0.89	0.69	0.16	0.83	-	-	-	-	0.92	-	0.48	0.90
			2040	-	1.02	0.76	0.20	0.94	-	-	-	-	1.07	-	0.51	1.03
4	Gateway Blvd at I-95 Northbound Ramps	AM Peak	2020	0.47	0.30	-	-	0.72	0.50	0.85	-	0.16	-	-	-	0.62
			2030	0.51	0.33	-	-	0.88	0.56	0.94	-	0.20	-	-	-	0.70
			2040	0.55	0.38	-	-	1.07	0.65	1.11	-	0.27	-	-	-	0.80
		PM Peak	2020	0.36	0.40	-	-	0.76	0.25	0.82	-	0.28	-	-	-	0.60
			2030	0.39	0.45	-	-	0.83	0.27	0.91	-	0.36	-	-	-	0.68
			2040	0.43	0.51	-	-	0.94	0.31	1.06	-	0.47	-	-	-	0.78
5	Gateway Blvd at Seacrest Blvd	AM Peak	2020	0.63	0.36	0.40	0.65	0.60	-	0.79	0.22	-	0.18	0.82	-	0.71
			2030	0.65	0.44	0.53	0.65	0.82	-	0.90	0.22	-	0.19	0.87	-	0.87
			2040	0.69	0.54	0.68	0.73	1.05	-	1.11	0.24	-	0.21	1.00	-	1.08
		PM Peak	2020	0.74	0.50	0.29	0.58	0.33	-	0.81	0.50	-	0.29	0.76	-	0.68
			2030	0.77	0.65	0.38	0.72	0.38	-	0.85	0.43	-	0.31	0.78	-	0.79
			2040	0.77	0.89	0.49	0.77	0.47	-	0.93	0.39	-	0.32	0.81	-	0.95

= Movements volume to capacity ratios exceeding 1.00.

Table 6-61: Gateway Boulevard Intersections 95th Percentile Queue Length Summary – Build Alternative 2

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Gateway Blvd and Quantum Village	AM Peak	2020	53	354	-	107	447	0	71	0	-	52	61	-	Signalized Intersection
			2030	53	465	-	m111	521	0	71	0	-	52	61	-	
			2040	53	647	-	m98	609	0	71	0	-	52	61	-	
		PM Peak	2020	131	254	-	m48	832	m7	12	0	-	104	114	-	
			2030	131	310	-	m46	924	m5	12	0	-	104	116	-	
			2040	131	402	-	m40	1,060	m5	12	0	-	104	119	-	
		Proposed Storage Length (ft)		240	1,000		210	850	850	150	150		130	130		
2	Gateway Blvd and High Ridge Road	AM Peak	2020	115	468	115	164	364	-	158	77	327	311	112	-	Signalized Intersection
			2030	125	585	170	170	486	-	164	80	333	317	121	-	
			2040	140	#800	216	m152	586	-	168	83	335	323	133	-	
		PM Peak	2020	121	259	40	m155	439	-	218	109	289	229	67	-	
			2030	139	319	48	m162	708	-	252	125	327	231	70	-	
			2040	161	416	58	m164	#910	-	287	136	364	232	73	-	
		Proposed Storage Length (ft)		280	850	340	445	725		250	1,000	1,000	280	1,000		
3	Gateway Blvd and I-95 SB Ramps	AM Peak	2020	-	625	209	0	47	-	-	-	-	181	-	208	Signalized Intersection
			2030	-	#716	#902	m9	m57	-	-	-	-	#218	-	214	
			2040	-	#886	#1,161	m27	m57	-	-	-	-	#266	-	224	
		PM Peak	2020	-	492	272	m0	16	-	-	-	-	#234	-	273	
			2030	-	546	411	m0	56	-	-	-	-	#289	-	282	
			2040	-	#714	512	m0	m75	-	-	-	-	#355	-	297	
		Proposed Storage Length (ft)			725	725	100	100					**2,560**		**2,560**	

Table 6-61: Gateway Boulevard Intersections 95th Percentile Queue Length Summary – Build Alternative 2 – continued

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4	Gateway Blvd and I-95 NB Ramps	AM Peak	2020	5	35	-	-	255	356	282	-	87	-	-	-	Signalized Intersection
			2030	m6	m37	-	-	318	m364	#367	-	110	-	-	-	
			2040	m5	m38	-	-	m#363	m243	#469	-	142	-	-	-	
		PM Peak	2020	0	36	-	-	202	112	415	-	152	-	-	-	
			2030	m0	m41	-	-	237	m134	#502	-	201	-	-	-	
			2040	m0	m42	-	-	m#308	m141	#666	-	270	-	-	-	
		Proposed Storage Length (ft)		100	100			650	300	**2,600**		**2,600**				
5	Gateway Blvd and Seacrest Blvd	AM Peak	2020	114	236	313	107	444	-	359	122	-	43	284	-	Signalized Intersection
			2030	123	250	493	140	#575	-	#560	131	-	44	#324	-	
			2040	135	281	728	182	#774	-	#874	153	-	46	#403	-	
		PM Peak	2020	187	455	307	98	262	-	330	260	-	59	243	-	
			2030	191	545	371	#120	269	-	456	254	-	59	251	-	
			2040	191	669	447	#174	296	-	#678	256	-	59	#261	-	
		Proposed Storage Length (ft)		275	650	650	420	1,000		1,000	1,000		1,000	1,000		

1) The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. This traffic was simulated for two complete cycles to account for the effects of spillover between cycles. If the reported v/c<1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue. In practice, 95th percentile queue shown will rarely be exceeded and the queues shown with the # footnote are acceptable for the design of storage bay (Trafficware 2012).
2) The m footnote indicates that the volume for the 95th percentile queue is metered by an upstream signal (Trafficware 2012).
3) The storage length values were calculated from aerials or design drawings.
4) To calculate reasonable queuing in the model, all terminal links were extended to 1,000 feet from the last node
5) For ramp terminals, the storage distance proved reflects the entire length of the ramp (**XXX feet**)
= Movements with queues exceeding available storage.

PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at Gateway Boulevard - Build Alternative 2 (Streamlined CDA)
Lane Configuration, Intersection LOS and Delay - Open Year (2020)

Figure 6-37

PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
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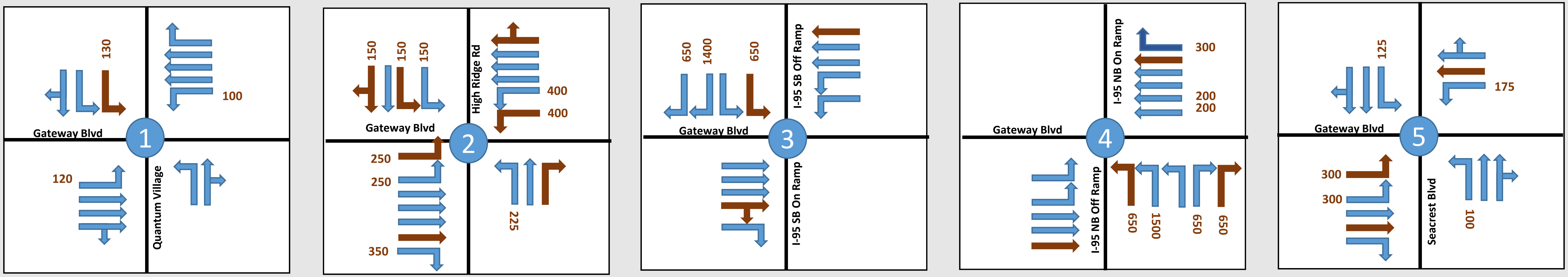
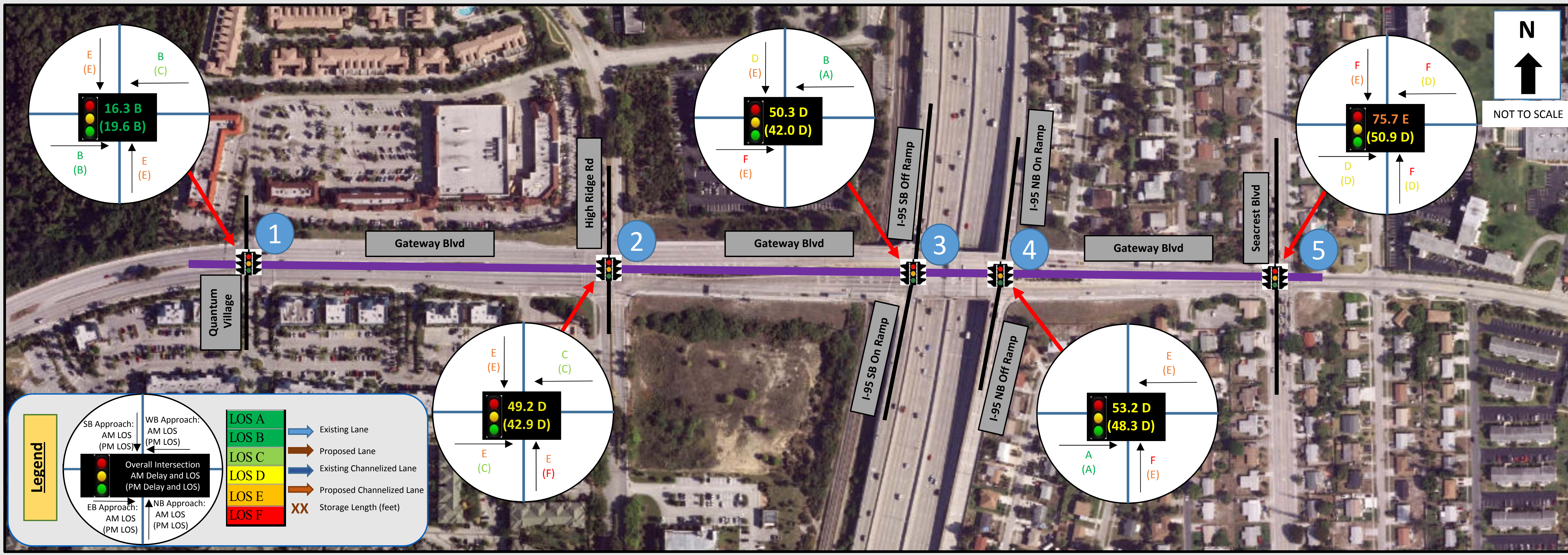
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at Gateway Boulevard - Build Alternative 2 (Streamlined CDA)
Lane Configuration, Intersection LOS and Delay - Interim Year (2030)

Figure 6-38





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SR 9/I-95 at Gateway Boulevard - Build Alternative 2 (Streamlined CDA)
Lane Configuration, Intersection LOS and Delay - Design Year (2040)

Figure 6-39

Other Project Intersections:

No adjacent project intersections operate at V/C ratios that exceed capacity during the Open (2020) and Interim (2030) Years.

Design Year (2040)

- Gateway Boulevard at Seacrest Boulevard operates at a V/C ratio of 1.08 in the PM peak hour.

A review of the 95th percentile queue lengths indicate no major queue backups that exceed available storages were observed for the intersections along Gateway Boulevard. The SR 9/I-95 northbound and southbound off-ramp queues do not exceed available storages and do not impact SR 9/I-95 mainline operations.

Alternative 3: SPUI

Build Alternative 3 (SPUI) at SR 9/I-95 and Gateway Boulevard interchange considers the conversion of the existing ramp terminal intersections into a Single-Point Urban Interchange (SPUI) configuration as described in Section 5.4.

Future conditions operational analyses were performed for Build Alternative 3 (SPUI) based on traffic forecast and network conditions expected in years 2020, 2030, and 2040.

Approach and overall intersection LOS and delay results for the study intersections along Gateway Boulevard for Build Alternative 3 (SPUI) are summarized in Table 6-62 through Table 6-64 for Open (2020), Interim (2030), and Design (2040) Years, respectively. Intersection approach and overall V/C ratios are summarized in Table 6-65. Traffic operational analysis also evaluated 95th percentile queue lengths as summarized in Table 6-66. Figures 6-40 through 6-42 depict the findings of this intersection analysis along Gateway Boulevard for the Open (2020), Interim (2030), and Design (2040) Years, respectively.

The results indicate that all ramp terminal intersections along SR 9/I-95 and other project intersections are expected to operate at LOS D or better, except for the following:

Ramp Terminal Intersections:

Both ramp terminal intersections operate at LOS D or better during the Open Year (2020), Interim (2030), and Design (2040) Years.

Other Project Intersections:

Adjacent project intersections operate at LOS D or better during the Open (2020) and Interim (2030) Years.

Design Year (2040)

- During the AM and PM peak hours, the intersection for Gateway Boulevard at Seacrest Boulevard operates at LOS E.

Table 6-62: Gateway Boulevard Intersections Delay and LOS Summary – Build Alternative 3 – Open Year (2020)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound					
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak		PM Peak	
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Gateway Blvd at Quantum Village	Signalized	A	B	B	C	E	E	E	E	12.7	B	19.2	B
Gateway Blvd at High Ridge Road	Signalized	D	C	B	C	F	F	E	E	42.7	D	35.4	D
Gateway Blvd at I-95 Ramps	Signalized	D	E	D	D	E	C	D	B	42.4	D	42.1	D
Gateway Blvd at Seacrest Blvd	Signalized	C	C	D	D	D	D	E	E	45.4	D	46.0	D
TOTAL										**143.2**		**142.7**	

Table 6-63: Gateway Boulevard Intersections Delay and LOS Summary – Build Alternative 3 – Interim Year (2030)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound					
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak		PM Peak	
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Gateway Blvd at Quantum Village	Signalized	B	B	B	B	E	E	E	E	12.8	B	18.3	B
Gateway Blvd at High Ridge Road	Signalized	D	C	C	C	E	F	E	E	44.3	D	40.3	D
Gateway Blvd at I-95 Ramps	Signalized	D	E	D	E	E	C	C	B	47.0	D	43.2	D
Gateway Blvd at Seacrest Blvd	Signalized	D	D	E	D	D	D	E	E	53.0	D	50.1	D
TOTAL										**157.1**		**151.9**	

Table 6-64: Gateway Boulevard Intersections Delay and LOS Summary – Build Alternative 3 – Design Year (2040)

Location	Type	Approach LOS								Overall Intersection			
		Eastbound		Westbound		Northbound		Southbound		AM Peak		PM Peak	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak				
		LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
Gateway Blvd at Quantum Village	Signalized	B	B	B	C	E	E	E	E	14.3	B	18.7	B
Gateway Blvd at High Ridge Road	Signalized	E	D	C	D	E	E	E	E	50.3	D	50.6	D
Gateway Blvd at I-95 Ramps	Signalized	E	D	D	D	E	D	C	B	53.5	D	42.1	D
Gateway Blvd at Seacrest Blvd	Signalized	D	E	F	E	F	D	F	E	77.4	E	59.0	E
TOTAL										**195.5**		**170.4**	

Table 6-65: Gateway Boulevard Intersections Volume to Capacity Ratio – Build Alternative 3

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Gateway Blvd at Quantum Village	AM Peak	2020	0.44	0.49	-	0.61	0.33	0.00	0.52	0.01	-	0.33	0.17	-	0.50
			2030	0.44	0.58	-	0.61	0.37	0.00	0.52	0.01	-	0.33	0.17	-	0.58
			2040	0.44	0.70	-	0.58	0.42	0.00	0.52	0.01	-	0.33	0.17	-	0.68
		PM Peak	2020	0.61	0.40	-	0.46	0.61	0.01	0.04	0.01	-	0.58	0.46	-	0.61
			2030	0.61	0.45	-	0.46	0.66	0.01	0.04	0.01	-	0.58	0.48	-	0.66
			2040	0.59	0.54	-	0.46	0.74	0.01	0.01	0.01	-	0.57	0.50	-	0.72
2	Gateway Blvd at High Ridge Road	AM Peak	2020	0.60	0.55	0.17	0.57	0.52	-	0.66	0.47	0.91	0.81	0.53	0.29	0.69
			2030	0.50	0.71	0.22	0.50	0.62	-	0.68	0.49	0.79	0.81	0.57	0.26	0.76
			2040	0.49	0.91	0.27	0.48	0.74	-	0.68	0.49	0.75	0.81	0.62	0.27	0.86
		PM Peak	2020	0.51	0.36	0.06	0.65	0.67	-	0.71	0.61	0.90	0.78	0.36	0.55	0.74
			2030	0.49	0.44	0.09	0.74	0.79	-	0.67	0.50	0.87	0.78	0.43	0.52	0.80
			2040	0.48	0.54	0.11	0.72	0.94	-	0.72	0.52	0.87	0.79	0.54	0.49	0.90

Table 6-65: Gateway Boulevard Intersections Volume to Capacity Ratio – Build Alternative 3 – continued

	Intersection	Time Period	Year	Volume to Capacity Ratio												
				Eastbound			Westbound			Northbound			Southbound			Overall Intersection
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
3	Gateway Blvd at I-95 Ramps	AM Peak	2020	0.80	0.41	0.46	0.78	0.27	0.32	0.79	-	0.22	0.45	-	0.38	0.68
			2030	0.83	0.53	0.72	0.81	0.33	0.37	0.81	-	0.26	0.43	-	0.37	0.79
			2040	0.86	1.08	0.96	0.89	0.41	0.44	0.86	-	0.31	0.45	-	0.37	0.93
		PM Peak	2020	0.78	0.70	0.53	0.62	0.77	0.18	0.44	-	0.34	0.19	-	0.33	0.59
			2030	0.79	0.78	0.63	0.65	0.77	0.20	0.53	-	0.45	0.22	-	0.34	0.67
			2040	0.84	0.80	0.67	0.68	0.63	0.23	0.71	-	0.60	0.30	-	0.38	0.78
5	Gateway Blvd at Seacrest Blvd	AM Peak	2020	0.63	0.36	0.40	0.65	0.60	-	0.79	0.22	-	0.18	0.82	-	0.71
			2030	0.65	0.44	0.53	0.65	0.82	-	0.90	0.22	-	0.19	0.87	-	0.87
			2040	0.69	0.54	0.68	0.73	1.05	-	1.11	0.24	-	0.21	1.00	-	1.08
		PM Peak	2020	0.78	0.49	0.29	0.61	0.61	-	0.82	0.50	-	0.30	0.78	-	0.73
			2030	0.83	0.65	0.38	0.71	0.70	-	0.86	0.44	-	0.31	0.79	-	0.81
			2040	0.88	0.89	0.49	0.77	0.86	-	0.93	0.39	-	0.32	0.81	-	0.96

= Movements volume to capacity ratios exceeding 1.00.

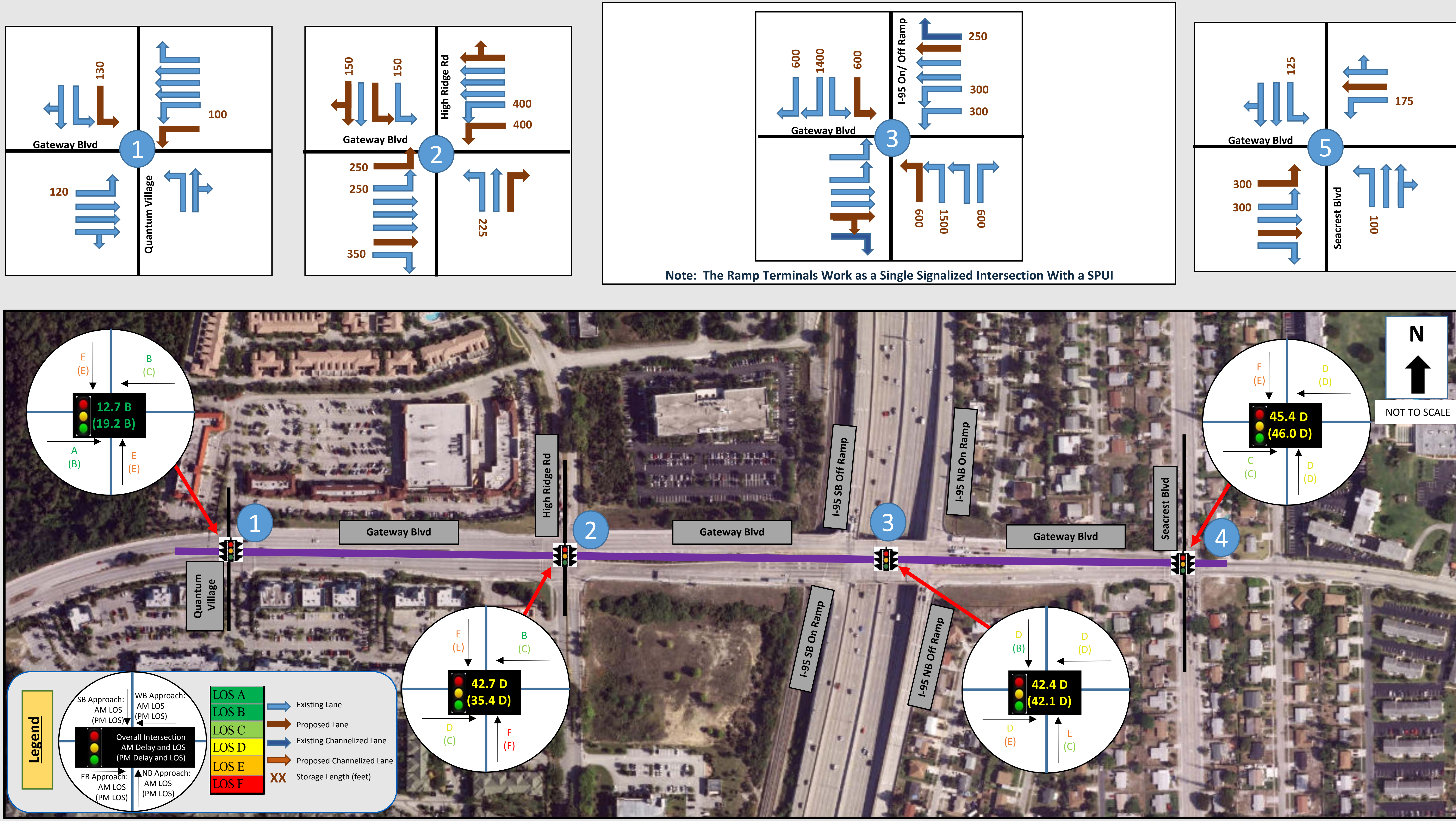
Table 6-66: Gateway Boulevard Intersections 95th Percentile Queue Length Summary – Build Alternative 3

	Intersection	Time Period	Year	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Gateway Blvd and Quantum Village	AM Peak	2020	53	354	-	112	240	0	71	0	-	52	61	-	Signalized Intersection
			2030	53	465	-	m106	336	0	71	0	-	52	61	-	
			2040	53	647	-	m92	609	0	71	0	-	52	61	-	
		PM Peak	2020	131	254	-	m50	816	m7	12	0	-	104	114	-	
			2030	131	310	-	m47	915	m5	12	0	-	104	116	-	
			2040	131	402	-	m40	1,052	m4	12	0	-	104	119	-	
		Proposed Storage Length (ft)		240	1,000		210	850	850	150	150		130	130		

Table 6-66: Gateway Boulevard Intersections 95th Percentile Queue Length Summary – Build Alternative 3 – continued

	Intersection	Time Period	Years	Queues (feet)												Remarks
				Eastbound			Westbound			Northbound			Southbound			
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2	Gateway Blvd and High Ridge Road	AM Peak	2020	115	467	115	151	236	-	158	77	327	311	203	122	Signalized Intersection
			2030	125	554	155	156	278	-	164	80	333	317	219	125	
			2040	140	#781	208	m167	373	-	168	83	337	322	239	131	
		PM Peak	2020	121	259	40	162	319	-	218	109	289	229	87	190	
			2030	139	319	48	194	618	-	252	125	327	231	91	195	
			2040	161	416	58	222	#881	-	287	136	364	232	98	199	
		Proposed Storage Length (ft)		280	850	330	445	715		250	1,000	1,000	280	1,000		
3	Gateway Blvd and I-95 Ramps	AM Peak	2020	421	410	575	301	200	268	259	-	112	158	-	165	Signalized Intersection
			2030	474	491	#717	m343	m234	m269	300	-	121	169	-	156	
			2040	m537	585	m#990	m358	m204	m194	356	-	158	192	-	172	
		PM Peak	2020	388	391	303	m155	281	m65	342	-	187	147	-	132	
			2030	407	356	284	m166	284	m100	428	-	259	174	-	143	
			2040	449	379	305	m179	m265	m93	559	-	405	216	-	192	
		Proposed Storage Length (ft)		715	715	715	310	680	285	**2,600**		830	**2,560**		645	
5	Gateway Blvd and Seacrest Blvd	AM Peak	2020	125	260	189	107	444	-	359	122	-	43	284	-	Signalized Intersection
			2030	134	309	247	140	#575	-	#560	131	-	44	#324	-	
			2040	145	341	321	182	#774	-	#874	153	-	46	#403	-	
		PM Peak	2020	197	367	150	99	557	-	343	271	-	62	247	-	
			2030	#220	565	223	112	584	-	467	263	-	61	254	-	
			2040	m#237	718	320	#174	#702	-	#678	256	-	59	#261	-	
		Proposed Storage Length (ft)		275	680	680	420	1,000		1,000	1,000		1,000	1,000		

1) The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. This traffic was simulated for two complete cycles to account for the effects of spillover between cycles. If the reported v/c<1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue. In practice, 95th percentile queue shown will rarely be exceeded and the queues shown with the # footnote are acceptable for the design of storage bay (Trafficware 2012).
2) The m footnote indicates that the volume for the 95th percentile queue is metered by an upstream signal (Trafficware 2012).
3) The storage length values were calculated from aerials or design drawings.
4) To calculate reasonable queuing in the model, all terminal links were extended to 1,000 feet from the last node
5) For ramp terminals, the storage distance proved reflects the entire length of the ramp (**XXX feet**)
= Movements with queues exceeding available storage.

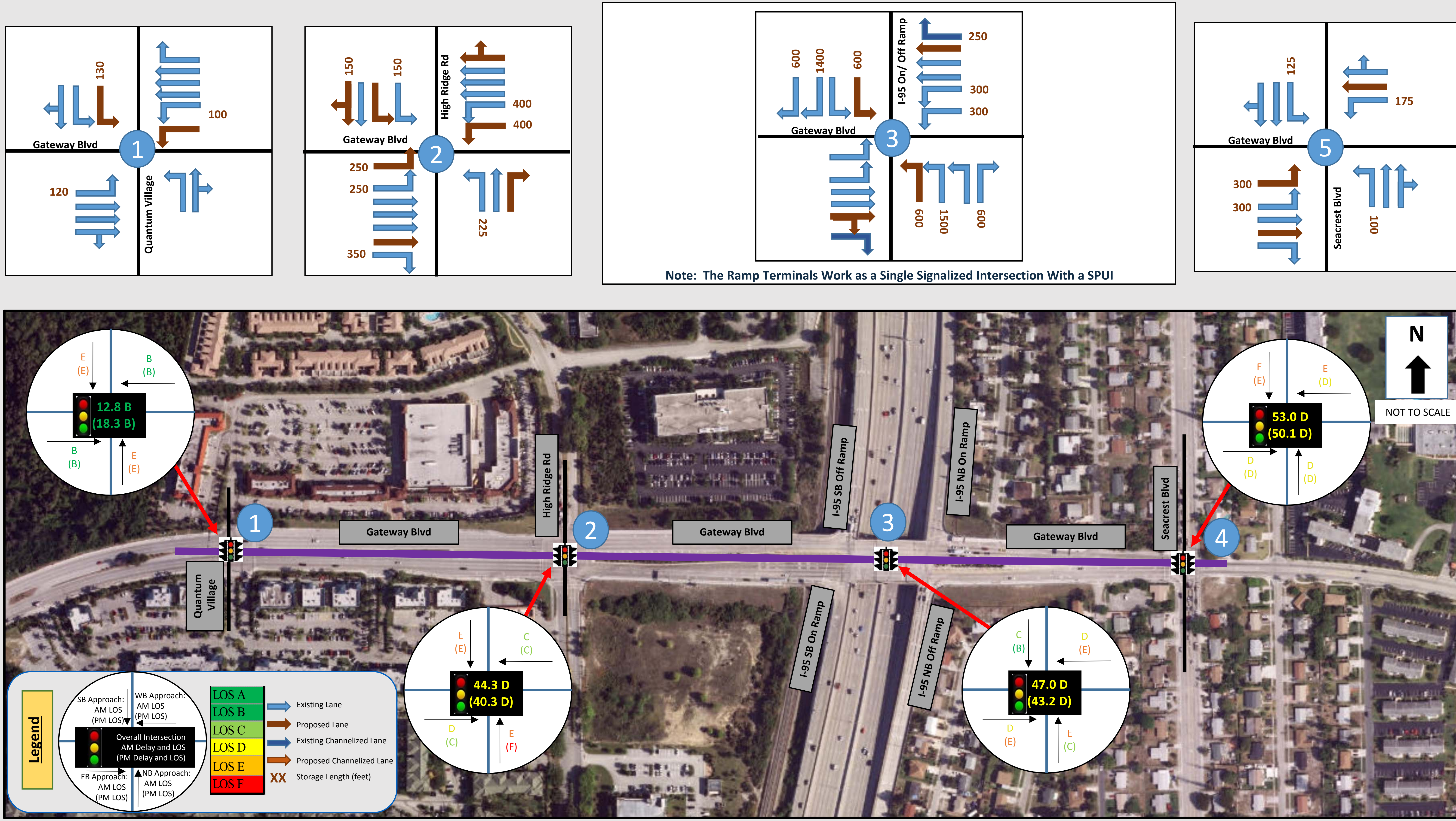


PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at Gateway Boulevard - Build Alternative 3 (SPUI)
Lane Configuration, Intersection LOS and Delay - Open Year (2020)

Figure 6-40

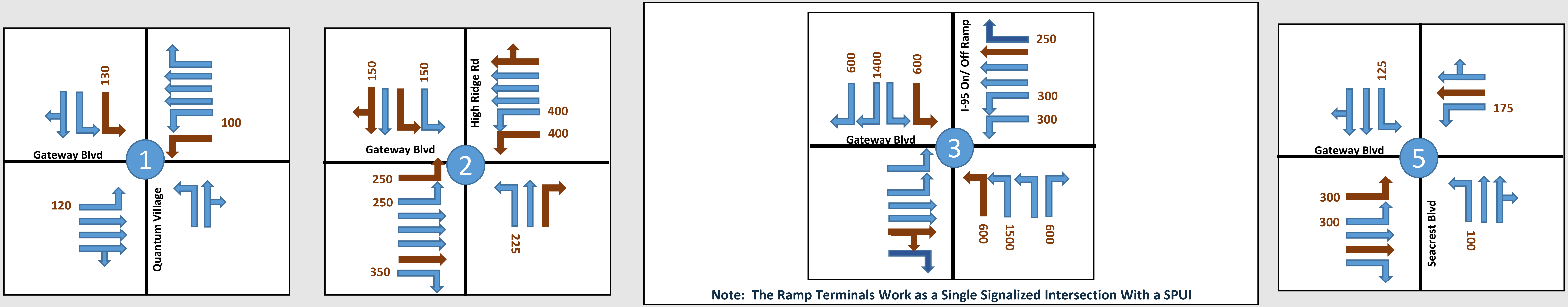


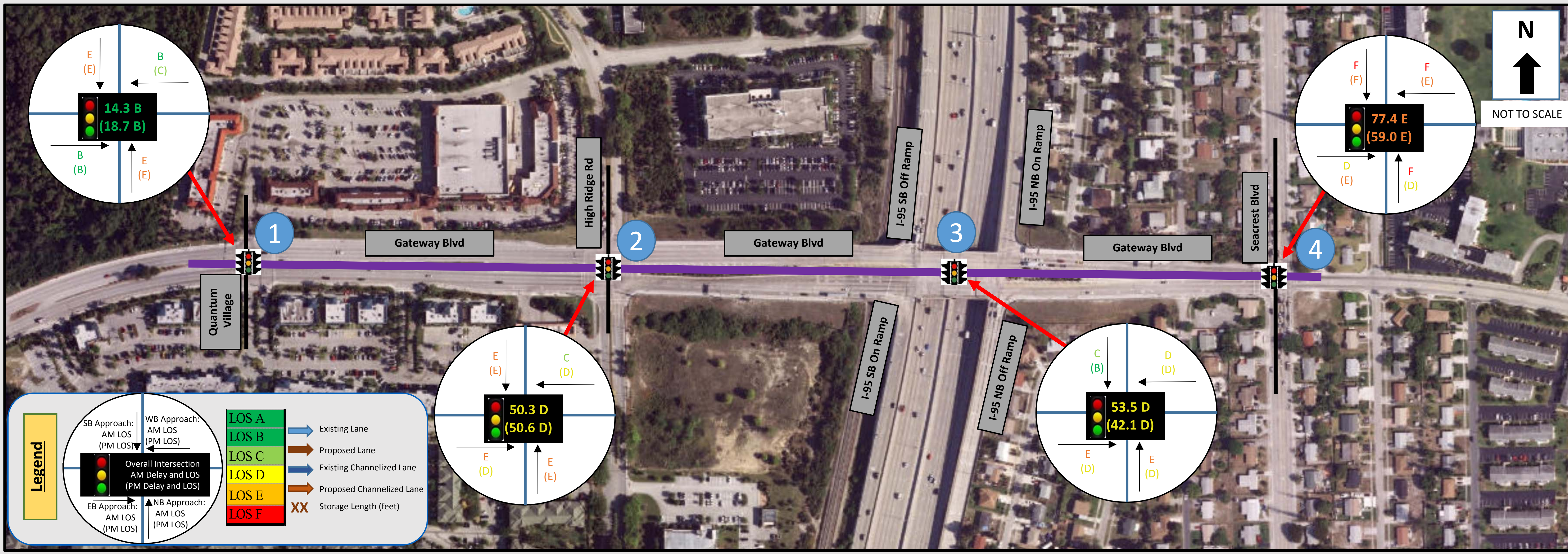
PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at Gateway Boulevard - Build Alternative 3 (SPUI)
Lane Configuration, Intersection LOS and Delay - Interim Year (2030)

Figure 6-41





PD&E Study
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at Gateway Boulevard - Build Alternative 3 (SPUI)
Lane Configuration, Intersection LOS and Delay - Design Year (2040)

Figure 6-42

One intersection with overall intersection volumes exceeding capacity was observed for the intersections along Gateway Boulevard and is described below:

Ramp Terminal Intersections:

Neither ramp terminal intersection operates at V/C ratios that exceed capacity during the Open (2020), Interim (2030), Design (2040) Years.

Other Project Intersections:

No adjacent project intersections operate at V/C ratios that exceed capacity during the Open (2020) and Interim (2030) Years.

Design Year (2040)

- Gateway Boulevard at Seacrest Boulevard operates at a V/C ratio of 1.08 in the AM peak hour.

A review of the 95th percentile queue lengths indicate no major queue backups that exceed available storages were observed for the intersections along Gateway Boulevard. The SR 9/I-95 northbound and southbound off-ramp queues do not exceed available storages and do not impact SR 9/I-95 mainline operations.

6.6 No-Build, TSM&O, and Build Alternatives Comparison

6.6.1 SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange Intersections

The SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange No-Build, TSM&O, and Build Alternatives' Synchro operational analyses have been quantitatively compared in Table 6-67 for the Open (2020), Interim (2030), and Design (2040) Years. The study intersections' anticipated delays per vehicle were summed for the AM and PM peak hours for these scenarios and are compared to each other.

When compared to the No-Build Alternative, the TSM&O Alternative provides approximately 34 percent reduction in corridor delay (minutes per vehicle) by the Open Year (2020). However, the benefit observed from this alternative diminishes to approximately 20 percent by the Design Year (2040). This can be attributed to the increase in traffic volumes over this 20-year period. As the traffic increases over time, the benefits realized from signal timing optimization and signal coordination are reduced as indicated by the reduction in the delay percentage.

All three Build Alternatives offer varying benefits in traffic operations for the Open Year (2020) with an approximate 40 percent, 52 percent, and 53 percent reduction of delay for Alternative 1 (CDA), Alternative 2 (Streamline CDA), and Alternative 3 (SPUI), respectively, when compared to the No-Build Alternative. The deviation between the Build Alternatives is more prominent by the Design Year (2040) when the reduction in delays are approximately 43 percent, 51 percent, and 55 percent for Alternative 1, Alternative 2, and Alternative 3, respectively.

Table 6-67: SR 804/Boynton Beach Boulevard Alternatives Operational Analysis Comparison

		No-Build	TSM&O	BUILD ALTERNATIVES		
				Alternative 1: CDA	**Alternative 2: Streamlined CDA**	**Alternative 3: SPUI**
2020	Total Delay Per Vehicle (seconds) (AM +PM Peaks)	542.6	357.0	324.7	258.0	253.4
	Total Delay Per Vehicle (minutes) (AM +PM Peaks)	9.0	6.0	5.4	4.3	4.2
	Reduction in Delay from No-Build	-	**34%**	**40%**	**52%**	**53%**
2030	Total Delay Per Vehicle (seconds) (AM +PM Peaks)	759.4	558.7	410.7	356.5	330.2
	Total Delay Per Vehicle (minutes) (AM +PM Peaks)	12.7	9.3	6.8	5.9	5.5
	Reduction in Delay from No-Build	-	**26%**	**46%**	**53%**	**57%**
2040	Total Delay Per Vehicle (seconds) (AM +PM Peaks)	1,173.4	944.1	668.8	569.4	527.0
	Total Delay Per Vehicle (minutes) (AM +PM Peaks)	19.6	15.7	11.1	9.5	8.8
	Reduction in Delay from No-Build	-	**20%**	**43%**	**51%**	**55%**

6.6.2 SR 9/I-95 at Gateway Boulevard Interchange Intersections

The SR 9/I-95 at Gateway Boulevard interchange No-Build, TSM&O, and Build Alternatives' Synchro operational analyses have been quantitatively compared in Table 6-68 for the Open (2020), Interim (2030), and Design (2040) Years. The study intersections' anticipated delays per vehicle were summed for the AM and PM peak hours for these scenarios and are compared to each other.

When compared to the No-Build Alternative, the TSM&O Alternative provides approximately 23 percent reduction in corridor delay (minutes per vehicle) by the Open Year (2020). However, the benefits observed from this alternative diminishes to approximately 11 percent by the Design Year (2040). This can be attributed to the increase in traffic volumes over this 20-year period. As the traffic increases over time, the benefits realized from signal timing optimization and signal coordination are reduced as indicated by the reduction in the delay percentage.

All three Build Alternatives offer varying benefits in traffic operations for the Open Year (2020) with an approximate 39 percent, 38 percent, and 45 percent reduction of delay for Alternative 1 (CDA), Alternative 2 (Streamline CDA), and Alternative 3 (SPUI), respectively, when compared to the No-Build Alternative. The varying benefits observed between the Build Alternatives when compared with the No-Build Alternative is more prominent by the Design Year (2040) when the reduction in delays are approximately 62 percent, 57 percent, and 65 percent for Alternative 1 (CDA), Alternative 2 (Streamlined CDA), and Alternative 3 (SPUI), respectively.

Table 6-68: Gateway Boulevard Alternatives Operational Analysis Comparison

		No-Build	TSM&O	BUILD ALTERNATIVES		
				Alternative 1: CDA	Alternative 2: Streamlined CDA	Alternative 3: SPUI
2020	Total Delay Per Vehicle (seconds) (AM +PM Peaks)	521.5	403.8	317.0	321.9	285.9
	Total Delay Per Vehicle (minutes) (AM +PM Peaks)	8.7	6.7	5.3	5.4	4.8
	Reduction in Delay from No-Build	-	**23%**	**39%**	**38%**	**45%**
2030	Total Delay Per Vehicle (seconds) (AM +PM Peaks)	708.2	606.0	339.2	351.8	309.0
	Total Delay Per Vehicle (minutes) (AM +PM Peaks)	11.8	10.1	5.7	5.9	5.2
	Reduction in Delay from No-Build	-	**14%**	**52%**	**50%**	**56%**
2040	Total Delay Per Vehicle (seconds) (AM +PM Peaks)	1,051.9	937.6	403.3	448.4	365.9
	Total Delay Per Vehicle (minutes) (AM +PM Peaks)	17.5	15.6	6.7	7.5	6.1
	Reduction in Delay from No-Build	-	**11%**	**62%**	**57%**	**65%**

The summaries from the operational analysis suggests that the Build Alternatives perform better than the No-Build and TSM&O Alternatives for both the SR 804/Boynton Beach Boulevard and Gateway Boulevard interchanges with SR 9/I-95.

7. Other Considerations

7.1 Alternatives Comparison

The No-Build, TSM&O, and all Build Alternatives and all Build Alternatives were compared and a summary is provided in the sections below:

7.1.1 Traffic Operational Comparison

The traffic operations were compared between the No-Build, TSM&O, and Build Alternatives for the SR 804/Boynton Beach Boulevard and Gateway Boulevard interchanges and a summary of the results was provided in Section 6.6.

For both, SR 804/Boynton Beach Boulevard, and Gateway Boulevard interchanges, when compared to the No-Build Alternative, the TSM&O Alternative provides some improvement in traffic operations. However, the benefits observed from this alternative diminishes over time as the traffic volumes increase over this 20-year period.

SR 804/Boynton Beach Boulevard Interchange

All three Build Alternatives offer varying benefits in traffic operations for the Open Year (2020) with an approximate 40 percent, 52 percent, and 53 percent reduction of delay for Alternative 1 (CDA), Alternative 2 (Streamline CDA), and Alternative 3 (SPUI), respectively, when compared to the No-Build Alternative. The deviation between the Build Alternatives is more prominent by the Design Year (2040) when the reduction in delays are approximately 43 percent, 51 percent, and 55 percent for Alternative 1, Alternative 2, and Alternative 3, respectively.

Alternative 2 (Streamlined CDA) and Alternative 3 (SPUI) provide similar operational benefit when compared among each other, but offer better traffic operational improvements than Alternative 1 (CDA) for this interchange.

Gateway Boulevard Interchange

All three Build Alternatives offer varying benefits in traffic operations for the Open Year (2020) with an approximate 39 percent, 38 percent, and 45 percent reduction of delay for Alternative 1 (CDA), Alternative 2 (Streamline CDA), and Alternative 3 (SPUI), respectively, when compared to the No-Build Alternative. The varying benefits observed between the Build Alternatives when compared with the No-Build Alternative is more prominent by the Design Year (2040) when the reduction in delays are approximately 62 percent, 57 percent, and 65 percent for Alternative 1 (CDA), Alternative 2 (Streamlined CDA), and Alternative 3 (SPUI), respectively.

Alternative 3 (SPUI) offers better traffic operational benefit when compared with Alternative 1 (CDA) or Alternative 2 (Streamlined CDA) for this interchange.

7.1.2 Cost Estimates Comparison

Engineering, construction, and Right-of-Way (ROW) cost estimates were developed for all Build Alternatives proposed in this SIMR. Construction cost estimates were developed using the Long Range Estimating (LRE) program. Engineering

(10 percent of construction) and Construction Engineering Inspection (CEI) (15 percent of construction) costs are estimated based on an assumed percentage of construction costs. ROW costs are estimated and provided by the FDOT.

SR 804/Boynton Beach Boulevard Interchange

Table 7-1 presents the cost estimates for all the alternatives considered for this interchange.

Table 7-1: SR 804/Boynton Beach Boulevard Interchange – Cost Estimates

Evaluation Factors	No-Build Alternative	TSM&O Alternative	Alternative 1 (CDA)	Alternative 2 (Streamlined CDA)	Alternative 3 (SPUI)
Roadway Construction (LRE Cost)	N/A	N/A	$32,914,899	$20,377,866	$47,478,774
Engineering/Design (10% of Construction)	N/A	N/A	$3,291,490	$2,037,787	$4,747,877
CEI (15% of Construction)	N/A	N/A	$4,937,235	$3,056,680	$7,121,816
ROW Acquisition	N/A	N/A	$18,600,000	$13,600,000	$13,600,000
Total Cost	**N/A**	**N/A**	**$59,743,624**	**$39,072,333**	**$72,948,467**

Build Alternative 1 (CDA) and Alternative 3 (SPUI) calls for the replacement of both bridges along SR 804/Boynton Beach Boulevard (over CSX Rail Road and SR 9/I-95). However, Alternative 2 (Streamlined CDA) proposed widening of the existing bridges along SR 804/Boynton Beach Boulevard resulting in lower costs for this alternative.

Gateway Boulevard Interchange

Table 7-2 presents the cost estimates for all the alternatives considered for this interchange.

Table 7-2: Gateway Boulevard Interchange – Cost Estimates

Evaluation Factors	No-Build Alternative	TSM&O Alternative	Alternative 1 (CDA)	Alternative 2 (Streamlined CDA)	Alternative 3 (SPUI)
Roadway Construction (LRE Cost)	N/A	N/A	$19,946,597	$18,109,969	$20,545,855
Engineering/Design (10% of Construction)	N/A	N/A	$1,994,660	$1,810,997	$2,054,586
CEI (15% of Construction)	N/A	N/A	$2,991,990	$2,716,495	$3,081,878
ROW Acquisition	N/A	N/A	$13,000,000	$10,700,000	$10,100,000
Total Cost	**N/A**	**N/A**	**$37,933,247**	**$33,337,461**	**$35,782,319**

All Build Alternatives considered for this interchange propose to widen both existing bridges along Gateway Boulevard (over CSX Rail Road and SR 9/I-95) producing relatively similar costs for these three alternatives.

7.1.3 Right-of-Way Comparison

Right-of-Way (ROW) impacts and associated relocations based on total parcel takes were evaluated for both interchanges.

SR 804/Boynton Beach Boulevard Interchange

Table 7-3 presents the ROW comparison for all the alternatives considered for this interchange.

Table 7-3: SR 804/Boynton Beach Boulevard Interchange – Right-of-Way Impacts

Evaluation Factors	No-Build Alternative	TSM&O Alternative	Alternative 1 (CDA)	Alternative 2 (Streamlined CDA)	Alternative 3 (SPUI)
Residential Properties Impacted – Single Family	0	0	0	0	0
Residential Properties Impacted – Multifamily	0	0	1	1	1
Schools Impacted	0	0	1	1	1
Business Properties Impacted	0	0	21	14	14
Total Properties Impacted	**0**	**0**	**23**	**16**	**16**
Potential Relocations – Residential	0	0	1	1	1
Potential Relocations – Commercial	0	0	1	0	0
Contamination Sites Impacted	0	0	1	0	0
Required Right of Way (Acres)	0	0	1.207	0.644	0.644

A total of 23 parcels were impacted by Alternative 1 (CDA) that would result in one residential and one commercial relocations. This alternative proposes the widening of SR 804/Boynton Beach Boulevard along both sides of the arterial resulting in higher parcel impacts. Alternative 2 (Streamlined CDA) and Alternative 3 (SPUI) both restrict the widening along SR 804/Boynton Beach Boulevard to the south (one side of the arterial) resulting in seven fewer parcel impacts and one less relocation (commercial property).

Gateway Boulevard Interchange

Table 7-4 presents the ROW comparison for all of the alternatives considered for this interchange.

Table 7-4: Gateway Boulevard Interchange – Right-of-Way Impacts

Evaluation Factors	No-Build Alternative	TSM&O Alternative	Alternative 1 (CDA)	Alternative 2 (Streamlined CDA)	Alternative 3 (SPUI)
Residential Properties Impacted – Single Family	0	0	41	25	25
Residential Properties Impacted – Multifamily	0	0	1	1	1
Schools Impacted	0	0	0	0	0
Business Properties Impacted	0	0	11	7	7
Total Properties Impacted	**0**	**0**	**53**	**33**	**33**
Potential Relocations – Residential	0	0	5	5	6
Potential Relocations – Commercial	0	0	1	1	1
Contamination Sites Impacted	0	0	5	3	3
Required Right of Way (Acres)	0	0	2.370	2.270	2.070

A total of 53 parcels were impacted by Alternative 1 (CDA) that would result in five residential and one commercial relocations. This alternative proposes the widening of Gateway Boulevard along both sides of the arterial resulting in higher parcel impacts. Alternative 2 (Streamlined CDA) and Alternative 3 (SPUI) both restrict the widening along SR 804/Boynton Beach Boulevard to the south (one side of the arterial) resulting in 20 fewer parcel impacts.

7.1.4 Environmental Features and Other Criteria Comparison

Environmental feature impacts and other subjective evaluation criteria were compared between the No-Build, TSM&O, and Build Alternatives for the SR 804/Boynton Beach Boulevard and Gateway Boulevard interchanges.

SR 804/Boynton Beach Boulevard Interchange

Table 7-5 presents the environmental feature impacts and other subjective evaluation criteria comparisons for all the alternatives considered for this interchange.

Table 7-5: SR 804/Boynton Beach Boulevard Interchange – Environmental and Other Subjective Impacts

Evaluation Factors	No-Build Alternative	TSM&O Alternative	Alternative 1 (CDA)	Alternative 2 (Streamlined CDA)	Alternative 3 (SPUI)
Engineering					
Meets Geometric Design Criteria	No	No	Yes	Some	Yes
Provides Current FDOT Standards for Bicycle Facilities	No	No	Yes	Yes	Yes
Provides Pedestrian Facilities	Yes	Yes	Yes	Yes	Yes
Improves Mobility	No	Some	Yes	Yes	Yes
Improves Traffic Operations	No	Some	Yes	Yes	Yes
Improves Safety	No	Some	Yes	Yes	Yes
Meets Purpose & Need	No	No	Yes	Yes	Yes
Cultural and Natural Resource Impacts					
Improves Air Quality	No	Some	Yes	Yes	Yes
Wetlands (acres)	0	0	0	0	0
Wildlife and Habitat	0	0	0	0	0
Archaeological Sites	0	0	0	0	0
Previously Recorded Historic Structures	0	0	2	2	2
Parks / Recreation (Section 4f)	0	0	0	0	0

A list of all anticipated exceptions and variations required for the proposed design modifications that deviate from AASHTO or FDOT design standards are outlined in Section 5.5.

All Build Alternatives show similar environmental feature impacts and meet several subjective criteria.

Gateway Boulevard Interchange

Table 7-6 presents the environmental feature impacts and other subjective evaluation criteria comparisons for all the alternatives considered for this interchange.

Table 7-6: Gateway Boulevard Interchange – Environmental and Other Subjective Impacts

Evaluation Factors	No-Build Alternative	TSM&O Alternative	Alternative 1 (CDA)	Alternative 2 (Streamlined CDA)	Alternative 3 (SPUI)
Engineering					
Meets Geometric Design Criteria	No	No	Yes	Some	Some
Provides Current FDOT Standards for Bicycle Facilities	No	No	Yes	Yes	Yes
Provides Pedestrian Facilities	Yes	Yes	Yes	Yes	Yes
Improves Mobility	No	Some	Yes	Yes	Yes
Improves Traffic Operations	No	Some	Yes	Yes	Yes
Improves Safety	No	Some	Yes	Yes	Yes
Meets Purpose & Need	No	No	Yes	Yes	Yes
Cultural and Natural Resource Impacts					
Improves Air Quality	No	Some	Yes	Yes	Yes
Wetlands (acres)	0	0	0	0	0
Wildlife and Habitat	0	0	0	0	0
Archaeological Sites	0	0	0	0	0
Previously Recorded Historic Structures	0	0	1	1	1
Parks / Recreation (Section 4f)	0	0	0	0	0

A list of all anticipated exceptions and variations required for the proposed design modifications that deviate from AASHTO and FDOT design standards are outlined in Section 5.5.

All Build Alternatives show similar environmental feature impacts and meet several subjective criteria.

7.1.5 Public Perception

An Alternatives Public Workshop was conducted on July 28, 2016 for this PD&E Study and all of the alternatives developed for the SR 804/Boynton Beach Boulevard and Gateway Boulevard interchanges were presented to the public in an open house format. A poll was conducted during this meeting to capture the input from the public on the alternative they like for each interchange. Table 7-7 summarizes the results obtained from the audience polling conducted in the Alternatives Public Workshop.

Table 7-7: Build Alternatives: Survey Results

Alternative	SR 804/Boynton Beach Boulevard	Gateway Boulevard
Do Nothing (No-Build)	0	1
Alternative 1 – CDA	5	6
Alternative 2 – Streamlined CDA	6	4
Alternative 3 – SPUI	14	12

7.2 Safety

The conceptual design plans for the proposed interchange improvements along SR 9/I-95 at SR 804/Boynton Beach Boulevard and Gateway Boulevard interchanges were developed in accordance with the FDOT's Design Standards, Plans Preparation Manual and FHWA's Policy on Geometric Design of Highways and Streets. Adherence to these standards will foster enhancements in safety and efficient traffic operations along these corridors. As discussed under Section 3 of the report, a large proportion of the crashes experienced at the two study interchanges were associated with congested traffic operational conditions. In addition, it was determined that several high crash spots/segments along the corridor were concentrated at or near the interchanges. The improvements proposed for the study interchanges in conjunction with the improvements envisioned as part of the SR 9/I-95 Express Lanes project between Linton Boulevard and Indian Town Road will increase capacity along the mainline and at the interchanges. These capacity improvements will enhance traffic flow and reduce congestion related crashes along the corridor.

The proposed Build Alternatives for this PD&E Study will adequately address the predominant crash types observed within the study area and will reduce them significantly. Table 7-8 summarized the potential countermeasures identified for the study area crash types in Section 3.6.6 and identifies the Build Alternatives that address them.

Table 7-8: Potential Countermeasures Addressed by Build Alternatives

Crash Type	Potential Countermeasures	Build Alternatives
Rear-End	Decrease distance between interchange ramps along the arterial	Build Alternative 3 (SPUI)
	Improve signal visibility (e.g. replace signal bulbs, install advanced warning signs/flashers, etc.)	This should be incorporated into the preferred alternative during the design stage
	Improve roadway surface	This should be incorporated into the preferred alternative during the design stage
	Modify signal timing patterns (e.g. phasing, all red and clearance interval timings, etc.)	All three alternatives.
Angle	Decrease distance between interchange ramps along the arterial	Build Alternative 3 (SPUI)
	Improve signal visibility (e.g. replace signal bulbs, install advanced warning signs/flashers, etc.)	This should be incorporated into the preferred alternative during the design stage
	Increase capacity and enhance intersection operations	All three alternatives.
Left Turn	Remove permissive left turn phase (protected only)	All three alternatives
	Improve signal visibility (e.g. replace signal bulbs, install advanced warning signs/flashers, etc.)	This should be incorporated into the preferred alternative during the design stage
	Increase capacity and enhance intersection operations	All three alternatives.
Sideswipe	Improve lane alignment and markings	All three alternatives.
	Increase capacity and enhance intersection operations	All three alternatives.

Crash Reduction Analysis System Hub (CRASH) provided by the FDOT Safety Office summarizes anticipated Crash Reduction Factors (CRF) for specific roadway improvements based on the benefit-cost analysis (provided in Appendix M). The improvements proposed for SR 804/Boynton Beach Boulevard and Gateway Boulevard interchanges possess similar characteristics and therefore, similar CRFs are assumed. A summary of anticipated CRFs is provided in Table 7-9.

Table 7-9: Build Alternatives: Crash Reduction Factors

Improvement	Crash Reduction Factor (percent)							
	Fatal	Injury	PDO*	Rear-End	Angle	Left-Turn	Sideswipe	Total**
Add turn lane(s) & pavement resurfacing	3	47	21	49	20	53	-15	35
Modify both signal and channelization	50	33	13	6	30	66	4	24
Add turn bay	52	16	-1	5	6	21	20	10
Total	**77**	**70**	**31**	**54**	**47**	**87**	**12**	**56**

*Property Damage Only
**CRF = CRF1 + (1-CRF1)CRF2 + (1-CRF1)(1-CRF2)CRF3 + …

The Build Alternatives may reduce rear-end crashes by approximately 54 percent, angle crashes by approximately 47 percent, left-turn crashes by approximately 87 percent, and sideswipe crashes by approximately 12 percent.

A high-level safety Benefit-Cost (B/C) analysis was prepared for each Build Alternative utilizing the FDOT Roadway

Design Benefit-Cost analyses spreadsheets. A summary of this analysis is provided in Table 7-10.

Table 7-10: Build Alternatives: Safety Benefit-Cost Analysis

Build Alternative	Total Project Cost	Annual Project Cost	Total CRF	Annual Safety Benefit	B/C Ratio*
SR 804/Boynton Beach Boulevard near SR 9/I-95					
Alternative 1 – CDA	$59,743,624	$3,867,500	55.54%	$3,260,100	0.84
Alternative 2 – Streamlined CDA	$39,072,333	$2,479,500	55.54%	$3,260,100	**1.31**
Alternative 3 – SPUI	$72,948,467	$5,039,000	55.54%	$3,260,100	0.65
Gateway Boulevard near SR 9/I-95					
Alternative 1 – CDA	$37,933,247	$2,414,300	55.54%	$6,166,600	**2.55**
Alternative 2 – Streamlined CDA	$33,337,461	$2,147,000	55.54%	$6,166,600	**2.87**
Alternative 3 – SPUI	$35,782,319	$2,352,500	55.54%	$6,166,600	**2.62**

*Refer to Benefit-Cost Spreadsheets

For the SR 804/Boynton Beach Boulevard interchange, Alternative 2 (Streamlined CDA) resulted a B/C ratio greater than 1.00 indicative that the safety benefits perceived are greater than the cost of the project. Similarly, for the Gateway Boulevard interchange, all three Build Alternatives (1, 2, and 3) resulted a B/C ratio that is greater than 1.00. Each Build Alternative's spreadsheet detailing the analysis performed are provided in Appendix N.

7.3 Project Constructability and Maintenance of Traffic

A Traffic Control Plan will be developed during the Final Design Phase and implemented in consultation with local jurisdictions and the FDOT.

Construction of the proposed improvements will temporarily impact traffic movements. The extent of construction phase impacts will vary, depending upon whether the construction is at-grade along mainline SR 9/I-95 or on the bridge structures at the overpasses/cross streets near the ramp terminal interchanges.

Measures to be considered for implementation in the Traffic Control Plan will include, but not be limited to:

- Advance public notification to motorists of the nature, extent, and duration of any street closing and possible detour routes, if needed
- Detour signing placed in advance at strategic locations to notify motorists of alternate routing
- Use of warning signs and pavement markings
- Construction during off-peak times, whenever feasible, to minimize disruption to mainline SR 9/I-95, interchange ramps, intersecting roadways, access driveways, and business entrances
- Maintenance of at least one entrance to adjacent properties along the side streets
- Coordination of construction activities with other proposed roadway improvements in the area
- Concurrent utility relocations whenever possible to minimize disruptions
- Inclusion of measures within the construction contract specifications and plans to encourage responsible construction practices by contractors to avoid or minimize unforeseen impacts during construction
- Use of temporary pavement for potential temporary shift of lanes, if necessary

7.4 Anticipated Design Exceptions and Variations

SR 804/Boynton Beach Boulevard Interchange

All the Build Alternatives proposed modifications are designed with the ultimate goal to meet current standards for federal-aid projects and conform to AASHTO design standards, but some design exceptions and variations are unavoidable considering the vicinity and project needs. Table 7-11 summarizes the anticipated design exceptions and variations for each Build Alternative.

Table 7-11: SR 804/Boynton Beach Boulevard Interchange – Design Exceptions and Variations

No.	Design Element	Alternative 1 (CDA)		Alternative 2 (Streamlined CDA)		Alternative 3 (SPUI)	
		Variation	Exception	Variation	Exception	Variation	Exception
1	Border Width	X		X		X	
2	Design Speed						
3	Lane Width						
4	Shoulder Width						
5	Bridge Width						
6	Structural Capacity						
7	Vertical Clearance			(*)			
8	Grade						
9	Cross Slope						
10	Superelevation						
11	Horizontal Alignment						
12	Vertical Alignment	X		X		X	
13	Stopping Sight Distance	X		X		X	
14	Horizontal Clearance (Lateral offset to Obstruction)	X		X		X	

(*) Alternative 2 (Streamlined CDA) proposes to widen the existing bridges along the arterial and will maintain existing deficient vertical clearance.

As indicated most of these design deficiencies identified are a result of existing conditions and are being maintained with the proposed designs. The designs proposed for this project do not deteriorate these existing deficiencies.

Gateway Boulevard Interchange

All the Build Alternatives proposed modifications are designed with the ultimate goal to meet current standards for federal-aid projects and conform to AASHTO design standards, but some design exceptions and variations are unavoidable considering the vicinity and project needs. Table 7-12 summarizes the anticipated design exceptions and variations for each Build Alternative.

Table 7-12: Gateway Boulevard Interchange – Design Exceptions and Variations

No.	Design Element	Alternative 1 (CDA)		Alternative 2 (Streamlined CDA)		Alternative 3 (SPUI)	
		Variation	Exception	Variation	Exception	Variation	Exception
1	Border Width	X		X		X	
2	Design Speed						
3	Lane Width						
4	Shoulder Width						
5	Bridge Width						
6	Structural Capacity						
7	Vertical Clearance	(*)		(*)		(*)	
8	Grade						
9	Cross Slope						
10	Superelevation						
11	Horizontal Alignment						
12	Vertical Alignment	X		X		X	
13	Stopping Sight Distance	X		X		X	
14	Horizontal Clearance (Lateral offset to Obstruction)	X		X		X	

(*) All Build Alternatives propose to widen the existing bridges along the arterial and will maintain existing deficient vertical clearance.

As indicated most of these design deficiencies identified are a result of existing conditions and are being maintained with the proposed designs. The designs proposed for this project do not deteriorate these existing deficiencies.

7.5 Conceptual Signing Plan

Conceptual signing and marking plans in accordance with FHWA guidelines was prepared for the three Build Alternatives considered at the SR 9/I-95 at SR 804/Boynton Beach Boulevard and Gateway Boulevard interchanges and are provided in Appendix O.

The signing plans provided in the SIMR are conceptual in nature and will be subject to final design for construction. The purpose of the signing plans provided are to demonstrate their ability to provide adequate advance signing and directions to drivers entering and/or exiting the study interchanges under the proposed Build Alternative improvements.

7.6 Recommended Preferred Alternatives

Based on the evaluations of the No-Build and Build Alternatives, and in coordination with the FDOT District 4, the District Interchange Review Committee, affected stakeholders, and public comments, the below Build Alternatives are recommended as the Preferred Alternatives for approval in this study:

- The recommended Preferred Alternative for SR 804/Boynton Beach Boulevard interchange is Build Alternative 2 – Streamlined CDA.
- The recommended Preferred Alternative for Gateway Boulevard interchange is Build Alternative 3 – Single-Point Urban Interchange (SPUI).

7.6.1 SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange

Alternative 2 (Streamlined CDA) is recommended as the Preferred Build Alternative for the SR 804/Boynton Beach Boulevard interchange.

When traffic operations are compared, Alternative 2 (Streamlined CDA) and Alternative 3 (SPUI) provided superior operations to Alternative 1 (CDA). Overall benefits realized from safety and impacts to ROW are similar between Alternative 2 (Streamlined CDA) and Alternative 3 (SPUI). However, Alternative 2 (Streamline CDA) is much cheaper to build than Alternative 3 (SPUI) and this low cost provides a better safety B/C ratio as indicated in Section 7.2. Therefore, selection of Alternative 2 (Streamlined CDA) as the Preferred Build Alternative is justified based on traffic operational and safety evaluations.

7.6.2 SR 9/I-95 at Gateway Boulevard Interchange

Alternative 3 (SPUI) is recommended as the Preferred Build Alternative for the Gateway Boulevard interchange.

Overall benefits realized from safety are similar between all three Build Alternatives. However, Alternative 2 (Streamlined CDA) and Alternative 3 (SPUI) result in fewer ROW impacts compared with Alternative 1 (CDA). The cost estimates for all three Build Alternatives are also similar. Alternative 3 (SPUI) provides superior traffic operational improvement when compared to the other two Build Alternatives. Therefore, selection of Alternative 3 (SPUI) as the Preferred Build Alternative is justified based on traffic operational and safety evaluations.

7.7 Coordination

A Draft SIMR was prepared for this project and was submitted to FDOT District 4 for review on October 2016. The FDOT District 4 completed two rounds of reviews of the Draft SIMR in November 2016 and February 2017. Comments were provided to the PD&E team and following a comment resolution meeting responses were developed and necessary changes in the analysis and documentation was performed and updated SIMR reports were prepared. The series of comments provided and the responses developed are documented in Appendix P.

An Alternatives Operational Analysis and Recommendation of Preferred Alternative meeting was conducted with the FDOT District 4 DIRC members and the Central Office representatives. The meeting minutes from this meeting documenting the selection of the Preferred Alternative are provided in Appendix P.

8. Justification

The FHWA's Policy on Access to the Interstate System provides the requirements for the justification and documentation necessary to substantiate any proposed changes in access to the Interstate System. This policy is published under the Federal Register, Volume 74, Number 43743, dated May 22, 2017. The responses provided herein for each of the two policy statements demonstrate compliance with these requirements and provides justification for the proposed interchange modifications to the SR 9/I-95 at SR 804/Boynton Beach Boulevard and Gateway Boulevard interchanges in Palm Beach County Florida.

8.1 Policy

It is in the national interest to preserve and enhance the Interstate System to meet the needs of the 21st Century by assuring that it provides the highest level of service in terms of safety and mobility. Full control of access along the Interstate mainline and ramps, along with control of access on the crossroad at interchanges, is critical to providing such service. Therefore, FHWA's decision to approve new or revised access points to the Interstate System under Title 23, United States Code (U.S.C.), Section 111, must be supported by substantiated information justifying and documenting that decision. The FHWA's decision to approve a request is dependent on the proposal satisfying and documenting the following requirements.

<u>Point #1: Proposal does not adversely impact operational safety of the existing freeway</u>

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

An in-depth operational and safety analysis was conducted to study the impacts of the proposed improvements on the existing freeway. The area of influence of the study included one interchange on either side of the proposed access points along the mainline and the first major intersection on either side of the proposed change in access along the arterials.

Several performance measures were used to compare the operations of the existing system under No-Build and Build conditions. Key measures included freeway densities, intersection delays, and safety under existing and proposed conditions.

Three Build Alternatives were considered to address the needs identified for the corridor at each interchange location. The Build Alternatives performed better than the No-Build Alternative for all intersections within the study area for the above-identified performance measures. The Build Alternatives also alleviate the congestion points in the existing system and thus, will be able to serve a significantly higher number of vehicles that would have been delayed by these bottlenecks under the No-Build conditions. A summary of the traffic operational analyses performed for the No-Build, TSM&O, and Build Alternatives for SR 804/Boynton Beach Boulevard study area is provided in Table 8-1. A summary of the traffic operational analyses performed for the No-Build, TSM&O, and Build Alternatives for the Gateway Boulevard study area is provided in Table 8-2.

Table 8-1: SR 804/Boynton Beach Boulevard Alternatives Operational Analysis Comparison

				BUILD ALTERNATIVES		
		No-Build	**TSM&O**	**Alternative 1: CDA**	**Alternative 2: Streamlined CDA**	**Alternative 3: SPUI**
2020	Total Delay Per Vehicle (seconds) (AM +PM Peaks)	542.6	357.0	324.7	258.0	253.4
	Total Delay Per Vehicle (minutes) (AM +PM Peaks)	9.0	6.0	5.4	4.3	4.2
	Reduction in Delay from No-Build	-	**34%**	**40%**	**52%**	**53%**
2030	Total Delay Per Vehicle (seconds) (AM +PM Peaks)	759.4	558.7	410.7	356.5	330.2
	Total Delay Per Vehicle (minutes) (AM +PM Peaks)	12.7	9.3	6.8	5.9	5.5
	Reduction in Delay from No-Build	-	**26%**	**46%**	**53%**	**57%**
2040	Total Delay Per Vehicle (seconds) (AM +PM Peaks)	1,173.4	944.1	668.8	569.4	527.0
	Total Delay Per Vehicle (minutes) (AM +PM Peaks)	19.6	15.7	11.1	9.5	8.8
	Reduction in Delay from No-Build	-	**20%**	**43%**	**51%**	**55%**

Table 8-2: Gateway Boulevard Alternatives Operational Analysis Comparison

		No-Build	TSM&O	BUILD ALTERNATIVES		
				Alternative 1: CDA	Alternative 2: Streamlined CDA	Alternative 3: SPUI
2020	Total Delay Per Vehicle (seconds) (AM +PM Peaks)	521.5	403.8	317.0	321.9	285.9
	Total Delay Per Vehicle (minutes) (AM +PM Peaks)	8.7	6.7	5.3	5.4	4.8
	Reduction in Delay from No-Build	-	**23%**	**39%**	**38%**	**45%**
2030	Total Delay Per Vehicle (seconds) (AM +PM Peaks)	708.2	606.0	339.2	351.8	309.0
	Total Delay Per Vehicle (minutes) (AM +PM Peaks)	11.8	10.1	5.7	5.9	5.2
	Reduction in Delay from No-Build	-	**14%**	**52%**	**50%**	**56%**
2040	Total Delay Per Vehicle (seconds) (AM +PM Peaks)	1,051.9	937.6	403.3	448.4	365.9
	Total Delay Per Vehicle (minutes) (AM +PM Peaks)	17.5	15.6	6.7	7.5	6.1
	Reduction in Delay from No-Build	-	**11%**	**62%**	**57%**	**65%**

A Conceptual Signing Plan was prepared for all Build Alternatives and are provided as part of this SIMR in Appendix O.

In summary, the proposed improvements will not adversely impact the operational safety of the existing freeway. In fact, the improvements will result in reduced delays of approximately 50 percent at SR 804/Boynton Beach Boulevard and 65 percent at Gateway Boulevard by Design Year 2040. Queue lengths under No-Build conditions that cause spillback onto the SR 9/I-95 mainline by Design Year 2040 are eliminated under Build conditions. In addition, reduced driver frustration will result in crash rate reduction of approximately 56 percent of total crashes at SR 804/Boynton Beach Boulevard and Gateway Boulevard (review Section 6 and 7 for more detail).

Point #2: A full interchange with all traffic movements at a public road is provided

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.

SR 9/I-95 is a public facility and all interchanges within the study area provide full access and will continue to do so with the proposed interchange improvements.

The interchange improvements will occur at the interchanges of SR 9/I-95 at SR 804/Boynton Beach Boulevard and SR 9/I-95 at Gateway Boulevard. The proposed access is designed to meet or exceed current standards for federal-aid projects on the interstate system and conform to American Association of State Highway and Transportation Officials (AASHTO) and the FDOT design standards.

All basic movements are provided by the proposed design.

9. Conceptual Funding Plan

A conceptual funding plan for the proposed project will be developed based on the results from the analyses, costs and recommendations from the SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange and SR 9/I-95 at Gateway Boulevard Interchange PD&E Study. Currently the project is fully funded for design and construction in the FDOT Strategic Intermodal System (SIS) Cost Feasible Plan. As a FDOT led project, FDOT's SIS funds are expected to be used for this SIS priority interchange and associated corridor improvements.

Table 9-1 shows the tentative funding plan for the SR 9/I-95 at SR 804/Boynton Beach Boulevard interchange and Table 9-2 shows the tentative funding plan for the SR 9/I-95 at Gateway Boulevard interchange as reflected in the current FDOT 5 Year SIS Cost Feasible Plan.

Table 9.1: SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange Funding Plan

	2016	2017	2018	2019	2020
PD&E		$362,000			
R/W Acquisition					
Design					5,150,000
Construction					
Total		$362,000			5,150,000

Table 9.2: SR 9/I-95 at Gateway Boulevard Interchange Funding Plan

	2016	2017	2018	2019	2020
PD&E		$365,000			
R/W Acquisition					50,000
Design					6,000,000
Construction					
Total		$365,000			6,050,000

10. References

1) AASHTO. 2011. A Policy on Geometric Design of Highways and Streets 6th Edition.
2) FDOT. 2002. The Interchange Handbook. 2nd ed. "Interchange Justification."
3) FDOT. 2009. Florida Department of Transportation Population Projections. April 1, 2009. Web.
4) FDOT. 2013. Manual of Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highways.
5) FDOT. 2013. Policy 000-525-015. December 16, 2013. Web.
6) FDOT. 2014. Project Traffic Forecasting Handbook. January 2014. Web.
7) FDOT. 2015a. Roadway Plans Preparation Manual Volumes 1 and 2.
8) FDOT. 2015b. Drainage Manual. Web.
9) FHWA. 2017. Federal Register, Volume 74 Issue 43743. May 22, 2017. Web.
10) Trafficware. 2012. SYNCHRO Studio 9 User Guide 9. September 1, 2012. Web.
11) Office of Economic & Demographic Research: The Florida Legislature. 2016. Palm Beach County, Florida Projections of Florida Population by County, 2015-2040, with Estimates for 2014. Web.
12) U.S. Fish &Wildlife Service. 2016. Endangered Species. January 2016. Web.

Appendix A

Approved Methodology Letter of Understanding

Appendix B

Traffic Data Collection and
Traffic Projections for
SR 9/I-95 Interchange PD&E
Studies Report

Appendix C

Final Traffic Forecasting
Technical Memorandum

Appendix D

Existing Signal Timing Information from SR 9/I-95 Master Plan

Appendix E

Existing Conditions
Operational Analysis Output
Reports

Appendix E1

HCS Analysis Output Reports – AM Peak Hour

Appendix E2

HCS Analysis Output Reports – PM Peak Hour

Appendix E3

Synchro Analysis Output Reports – AM Peak Hour

Appendix E4

Synchro Analysis Output Reports – PM Peak Hour

Appendix F

Safety Analysis Technical Memorandum

Appendix G

ETDM Summary Reports

Appendix H

Tier I Alternatives Evaluation
Technical Memorandum

Appendix I

No-Build Conditions
Operational Analysis Output
Reports

Appendix I1

Open Year (2020)
HCS Analysis Output Reports -
AM Peak

Appendix I2

Open Year (2020)
HCS Analysis Output Reports - PM Peak

Appendix I3

Interim Year (2030)
HCS Analysis Output Reports -
AM Peak

Appendix I4

Interim Year (2030)
HCS Analysis Output Reports -
PM Peak

Appendix I5

Design Year (2040)
HCS Analysis Output Reports -
AM Peak

Appendix I6

Design Year (2040)
HCS Analysis Output Reports - PM Peak

Appendix I7

Open Year (2020)
Synchro Analysis Output
Reports – AM Peak

Appendix I8

Open Year (2020)
Synchro Analysis Output
Reports – PM Peak

Appendix I9

Interim Year (2030)
Synchro Analysis Output
Reports – AM Peak

Appendix I10

Interim Year (2030)
Synchro Analysis Output
Reports – PM Peak

Appendix I11

Design Year (2040)
Synchro Analysis Output
Reports – AM Peak

Appendix I12

Design Year (2040)
Synchro Analysis Output
Reports – PM Peak

Appendix J

TSM&O Conditions Operational Analysis Output Reports

Appendix J1

Open Year (2020)
Synchro Analysis Output
Reports – AM Peak

Appendix J2

Open Year (2020)
Synchro Analysis Output
Reports – PM Peak

Appendix J3

Interim Year (2030)
Synchro Analysis Output
Reports – AM Peak

Appendix J4

Interim Year (2030)
Synchro Analysis Output
Reports – PM Peak

Appendix J5

Design Year (2040)
Synchro Analysis Output
Reports – AM Peak

Appendix J6

Design Year (2040)
Synchro Analysis Output
Reports – PM Peak

Appendix K

Build Conditions Operational Analysis Output Reports

Appendix K1

Open Year (2020)
HCS Analysis Output Reports - AM Peak

Appendix K2

Open Year (2020)
HCS Analysis Output Reports - PM Peak

Appendix K3

Interim Year (2030)
HCS Analysis Output Reports -
AM Peak

Appendix K4

Interim Year (2030)
HCS Analysis Output Reports -
PM Peak

Appendix K5

Design Year (2040)
HCS Analysis Output Reports - AM Peak

Appendix K6

Design Year (2040)
HCS Analysis Output Reports -
PM Peak

Appendix K7

SR 9/I-95 at SR 804/Boynton Beach Boulevard
Alternative 1 (CDA)
Open Year (2020)
Synchro Analysis Output Reports – AM Peak

Appendix K8

SR 9/I-95 at SR 804/Boynton
Beach Boulevard
Alternative 1 (CDA)
Open Year (2020)
Synchro Analysis Output
Reports – PM Peak

Appendix K9

SR 9/I-95 at SR 804/Boynton Beach Boulevard
Alternative 1 (CDA)
Interim Year (2030)
Synchro Analysis Output Reports – AM Peak

Appendix K10

SR 9/I-95 at SR 804/Boynton Beach Boulevard
Alternative 1 (CDA)
Interim Year (2030)
Synchro Analysis Output Reports – PM Peak

Appendix K11

SR 9/I-95 at SR 804/Boynton Beach Boulevard
Alternative 1 (CDA)
Design Year (2040)
Synchro Analysis Output Reports – AM Peak

Appendix K12

SR 9/I-95 at SR 804/Boynton
Beach Boulevard
Alternative 1 (CDA)
Design Year (2040)
Synchro Analysis Output
Reports – PM Peak

Appendix K13

SR 9/I-95 at SR 804/Boynton Beach Boulevard
Alternative 2
(Streamlined CDA)
Open Year (2020)
Synchro Analysis Output Reports – AM Peak

Appendix K14

SR 9/I-95 at SR 804/Boynton Beach Boulevard
Alternative 2
(Streamlined CDA)
Open Year (2020)
Synchro Analysis Output Reports – PM Peak

Appendix K15

SR 9/I-95 at SR 804/Boynton Beach Boulevard
Alternative 2
(Streamlined CDA)
Interim Year (2030)
Synchro Analysis Output Reports – AM Peak

Appendix K16

SR 9/I-95 at SR 804/Boynton Beach Boulevard
Alternative 2
(Streamlined CDA)
Interim Year (2030)
Synchro Analysis Output Reports – PM Peak

Appendix K17

SR 9/I-95 at SR 804/Boynton Beach Boulevard
Alternative 2
(Streamlined CDA)
Design Year (2040)
Synchro Analysis Output Reports – AM Peak

Appendix K18

SR 9/I-95 at SR 804/Boynton Beach Boulevard
Alternative 2
(Streamlined CDA)
Design Year (2040)
Synchro Analysis Output Reports – PM Peak

Appendix K19

SR 9/I-95 at SR 804/Boynton Beach Boulevard
Alternative 3 (SPUI)
Open Year (2020)
Synchro Analysis Output Reports – AM Peak

Appendix K20

SR 9/I-95 at SR 804/Boynton Beach Boulevard
Alternative 3 (SPUI)
Open Year (2020)
Synchro Analysis Output Reports – PM Peak

Appendix K21

SR 9/I-95 at SR 804/Boynton Beach Boulevard
Alternative 3 (SPUI)
Interim Year (2030)
Synchro Analysis Output Reports – AM Peak

Appendix K22

SR 9/I-95 at SR 804/Boynton Beach Boulevard
Alternative 3 (SPUI)
Interim Year (2030)
Synchro Analysis Output Reports – PM Peak

Appendix K23

SR 9/I-95 at SR 804/Boynton Beach Boulevard
Alternative 3 (SPUI)
Design Year (2040)
Synchro Analysis Output Reports – AM Peak

Appendix K24

SR 9/I-95 at SR 804/Boynton Beach Boulevard
Alternative 3 (SPUI)
Design Year (2040)
Synchro Analysis Output Reports – PM Peak

Appendix K25

SR 9/I-95 at Gateway
Boulevard
Alternative 1 (CDA)
Open Year (2020)
Synchro Analysis Output
Reports – AM Peak

Appendix K26

SR 9/I-95 at Gateway
Boulevard
Alternative 1 (CDA)
Open Year (2020)
Synchro Analysis Output
Reports – PM Peak

Appendix K27

SR 9/I-95 at Gateway
Boulevard
Alternative 1 (CDA)
Interim Year (2030)
Synchro Analysis Output
Reports – AM Peak

Appendix K28

SR 9/I-95 at Gateway Boulevard
Alternative 1 (CDA)
Interim Year (2030)
Synchro Analysis Output Reports – PM Peak

Appendix K29

SR 9/I-95 at Gateway
Boulevard
Alternative 1 (CDA)
Design Year (2040)
Synchro Analysis Output
Reports – AM Peak

Appendix K30

SR 9/I-95 at Gateway
Boulevard
Alternative 1 (CDA)
Design Year (2040)
Synchro Analysis Output
Reports – PM Peak

Appendix K31

SR 9/I-95 at Gateway Boulevard
Alternative 2
(Streamlined CDA)
Open Year (2020)
Synchro Analysis Output Reports – AM Peak

Appendix K32

SR 9/I-95 at Gateway Boulevard
Alternative 2 (Streamlined CDA)
Open Year (2020)
Synchro Analysis Output Reports – PM Peak

Appendix K33

SR 9/I-95 at Gateway Boulevard
Alternative 2
(Streamlined CDA)
Interim Year (2030)
Synchro Analysis Output Reports – AM Peak

Appendix K34

SR 9/I-95 at Gateway Boulevard
Alternative 2
(Streamlined CDA)
Interim Year (2030)
Synchro Analysis Output Reports – PM Peak

Appendix K35

SR 9/I-95 at Gateway Boulevard
Alternative 2
(Streamlined CDA)
Design Year (2040)
Synchro Analysis Output Reports – AM Peak

Appendix K36

SR 9/I-95 at Gateway Boulevard
Alternative 2 (Streamlined CDA)
Design Year (2040)
Synchro Analysis Output Reports – PM Peak

Appendix K37

SR 9/I-95 at Gateway
Boulevard
Alternative 3 (SPUI)
Open Year (2020)
Synchro Analysis Output
Reports – AM Peak

Appendix K38

SR 9/I-95 at Gateway Boulevard
Alternative 3 (SPUI)
Open Year (2020)
Synchro Analysis Output Reports – PM Peak

Appendix K39

SR 9/I-95 at Gateway Boulevard
Alternative 3 (SPUI)
Interim Year (2030)
Synchro Analysis Output Reports – AM Peak

Appendix K40

SR 9/I-95 at Gateway
Boulevard
Alternative 3 (SPUI)
Interim Year (2030)
Synchro Analysis Output
Reports – PM Peak

Appendix K41

SR 9/I-95 at Gateway Boulevard
Alternative 3 (SPUI)
Design Year (2040)
Synchro Analysis Output Reports – AM Peak

Appendix K42

SR 9/I-95 at Gateway
Boulevard
Alternative 3 (SPUI)
Design Year (2040)
Synchro Analysis Output
Reports – PM Peak

Appendix L

SR 9/I-95 Mainline
Improvement Roll Plots

Appendix M

Florida Department of Transportation Crash Reduction Factors

Appendix N

Safety Benefit-Cost Analysis

Appendix O

Conceptual Signing and Marking Plans

Appendix P

Coordination Documents

Appendix Q

FDOT and Palm Beach MPO Plans