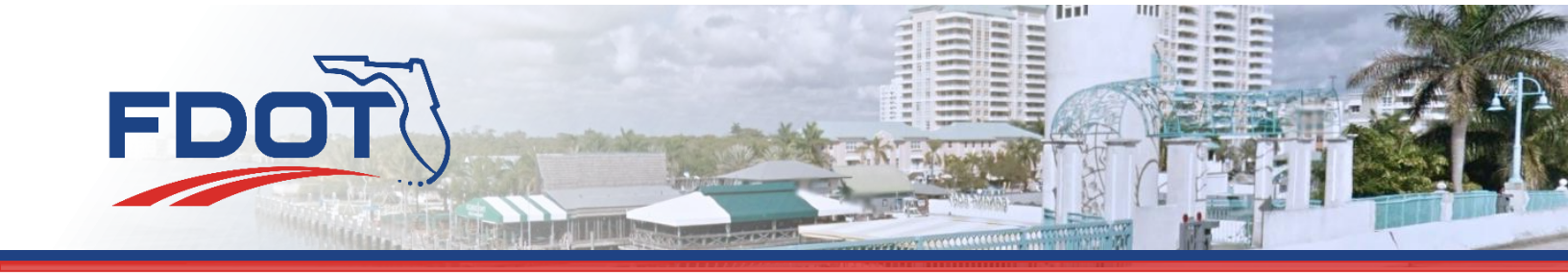

NOISE STUDY REPORT (NSR)

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

May 2017

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Prepared for
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EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT), District Four, is conducting a Project Development and Environmental (PD&E) Study to identify traffic operational improvements for the existing interchanges of SR 9/I-95 at SR 804/Boynton Beach Boulevard and Gateway Boulevard. Improvements are needed to achieve acceptable Levels of Service (LOS) in future conditions (Design Year (2040)) and support redevelopment efforts in the vicinity of the interchanges, thereby meeting the overall vision of the City of Boynton Beach. In addition, project objectives include improving safety conditions and enhancing emergency evacuation and response times.

The Noise Study Report (NSR) is prepared as a part of the PD&E Study. This NSR identifies the impacts to noise-sensitive sites adjacent to the project corridor including a traffic noise impact analysis of SR 9/I-95 1,000 feet south of the SR 804/Boynton Beach Boulevard interchange to 1,000 feet north of the Gateway Boulevard interchange. The traffic noise impact analysis was performed following the noise guidelines in the FDOT PD&E Manual, Part 2, Chapter 17. The NSR describes the noise modeling results for the Existing Conditions, No-Build Alternative, and Preferred Build Alternative, compares the noise levels to the Federal Highway Administration (FHWA) Noise Abatement Criteria (NAC), and describes potential noise-abatement considerations for Preferred Build Alternatives.

For the purposes of this NSR, the Existing Year is 2015 and the Design Year is 2040. Existing Year (2015) volumes were used for evaluating existing conditions while predicted Design Year (2040) volumes were used for the No-Build and Preferred Build Alternatives. Existing Year (2015) roadway conditions were used for evaluating conditions with the Existing Year (2015). The No- Build (2040) Alternative utilized the Existing Year (2015) roadway geometry enhanced with the planned or programmed FDOT projects within the project study limits. The Preferred Build (2040) Alternative evaluated noise impacts with the proposed roadway improvements.

Existing and No-Build Alternative Noise Conditions

Existing noise levels along the corridor are approximately 69.1 dB(A) for noise-sensitive sites within 500 feet of the roadway as indicated by the Traffic Noise Model (TNM) results. Likewise, noise levels for noise-sensitive sites near the arterial corridors of SR 804/Boynton Beach Boulevard and Gateway Boulevard average approximately 68.2 dB(A). These noise levels exceed the NAC set forth by FDOT and FHWA for residential areas, sports complex, schools, and commercial spaces. Thus, noise abatement must be considered.

Preferred Build Alternative Impact and Abatement Summary

With the improvements proposed by the Preferred Build Alternatives, predicted noise levels in the

Design Year (2040) change very little throughout the corridor when compared to the No-Build Alternative. The noise levels are estimated to be above the FDOT and FHWA NAC with an average of approximately 68.7 dB(A). Therefore, 528 sites are considered for abatement measures in this study, although further analysis must be conducted in the Design Phase of the project to confirm the necessity of abatement measures. Due to limited right-of-way in the project corridor, sound barriers are the only abatement measures analyzed for this project.

FHWA and FDOT require that noise-abatement measures be evaluated when noise levels of a proposed roadway project approach or exceed NAC. A noise barrier analysis was conducted for locations with impacted receivers and a feasible environment for a noise barrier. The following noise-sensitive sites were evaluated with TNM barrier analysis for the feasibility and reasonability of constructing a noise barrier:

- SR 9/I-95 Northbound – SR 804/Boynton Beach Boulevard to C. Stanley Weaver Canal
- SR 9/I-95 Northbound – C. Stanley Weaver Canal to Gateway Boulevard

The NSR concludes that construction of a noise barrier is not reasonable. Further analysis for noise abatement maybe required during the Design Phase of the project.

Table of Contents

List of Appendices

List of Figures

List of Tables

1.0 Introduction

1.1 General

The Florida Department of Transportation (FDOT), District Four, is conducting a Project Development and Environmental (PD&E) Study to identify improvements to enhance overall traffic operations at the existing interchanges of State Road (SR) 9/Interstate-95 (I-95) at SR 804/Boynton Beach Boulevard and at Gateway Boulevard in Palm Beach County, Florida. A project location map is provided as Figure 1-1.

The objective of the PD&E Study is to provide documentation of environmental and engineering analyses to assist FDOT and the Federal Highway Administration (FHWA) in reaching a decision regarding the conceptual design for roadway improvements to SR 804/Boynton Beach Boulevard and Gateway Boulevard. The PD&E Study complies with the National Environmental Policy Act (NEPA), which requires the evaluation of the potential impacts (both positive and negative) of a project on its physical, natural, social, and cultural environment.

As a part of the PD&E Study for the SR 9/I-95 at SR 804/Boynton Beach Boulevard and Gateway Boulevard interchanges in Palm Beach County, a traffic noise study was conducted in accordance with the FDOT PD&E Manual, Part 2, Chapter 17, Highway Traffic Noise (2016) and Title 23 Code of Federal Regulations (CFR) Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise. The primary objectives of the noise study were to determine the existing site conditions including noise-sensitive land uses within the project study area, document the methodology used to conduct the noise assessment, assess the significance of traffic noise levels on noise-sensitive sites for the Existing Conditions, No-Build and Preferred Build Alternatives, and evaluate the abatement measures for the noise sensitive sites, that approach or exceed the Noise Abatement Criteria (NAC) set forth by the FDOT and FHWA. Traffic Noise Model version 2.5 (TNM) was used for this evaluation.

1.2 Efficient Transportation Decision-Making (ETDM) Report

A program-level Efficient Transportation Decision-Making (ETDM) screening was completed in May 2015 for the improvements proposed to the SR 9/I-95 at SR 804/Boynton Beach Boulevard and Gateway Boulevard interchanges. A copy of the ETDM reports for these interchanges are provided in Appendix A and a summary is provided in Table 1-1 and Table 1-2.

The ETDM screening completed for SR 9/I-95 at SR 804/Boynton Beach Boulevard included moderate ratings for impacts including social, potential Section 4(f), historic and archaeological sites, recreation areas, and contamination. Noise impact was rated minimal and a Noise Study Report (NSR) for the project corridor was requested.

A substantial rating was given to the impact of potential relocations for the SR 9/I-95 at Gateway Boulevard ETDM screening. Moderate ratings were given to impacts including land use changes

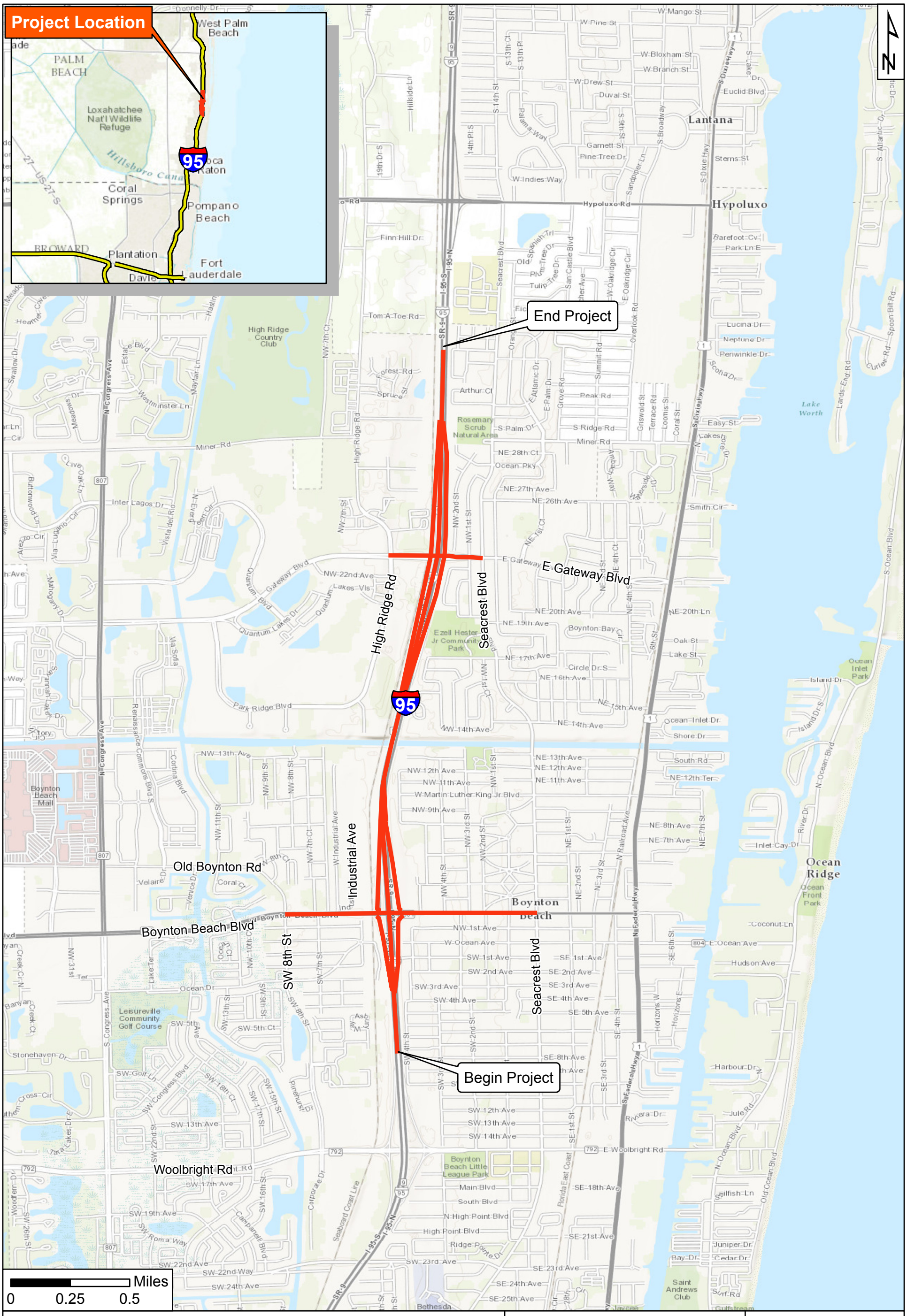
and impact to historic and archaeological sites from the ETDM screening for this interchange. Noise impact is rated minimal and a NSR was requested for the project corridor.

Table 1-1: 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 1-2: 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



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

FDOT

Project Location Map

Figure 1-1

2.0 Project Description

2.1 Background

In the 1990s and 2000s, 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. Minor interchange improvements were also made to eight of the existing 18 interchanges along this section of the corridor. At the time of that project, FDOT committed to reevaluating 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 reevaluate 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 since development of the Master Plan a decade ago.

In June 2014, FDOT prepared an Interchange Master Plan (IMP) for the interchanges along SR 9/I- 95 in Palm Beach County. The IMP identifies short-term and long-term needs and developed design concepts to address traffic spillback onto SR 9/I-95, improve interchange operations, reduce congestion, and increase safety at the 18 interchanges within Palm Beach County through the Design Year (2040). The study interchanges of SR 804/Boynton Beach Boulevard and Gateway Boulevard were included in this study. The study also considered Strategic Intermodal System (SIS) connector improvements 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 the SR 9/I-95 at Woolbright Road interchange, and an IOAR was approved in March 2011 for the SR 9/I-95 at Hypoluxo Road interchange. A Non-IAR was completed and approved by FDOT in May 2014 for interim improvements near the SR 9/I-95 at Gateway Boulevard interchange. These interim improvements are considered as part of the No-Build conditions for the study.

This NSR was prepared as a part of the PD&E Study. This NSR identifies noise-sensitive sites adjacent to the project corridor and presents the results of traffic noise impact analysis of the interchanges of SR 9/I-95 from south of SR 804/Boynton Beach Boulevard to north of Gateway Boulevard. The traffic noise impact analysis was performed following the noise guidelines in the FDOT PD&E Manual, Part 2, Chapter 17. The NSR describes the noise modeling results for Existing Condition, No-Build and Preferred Build Alternatives, compares the noise levels to the NAC and describes abatement measures for Preferred Build Alternatives

2.2 Project Study Limits

The project is located in eastern Palm Beach County within the City of Boynton Beach. The project

study limits for the traffic noise impact assessment is based on the limits of the operational improvements. The limits for the receivers to be included in the noise study surrounding the PD&E project site is recommended to be set at 500 feet (lateral/offset distance) from the proposed edge of pavement for all roadways within the construction limits. The modeled receiver locations will be restricted to "exterior areas of frequent human use" including patios, decks, picnic areas, ball fields, and other exterior common areas not including parking lots. Therefore, based on the proposed concept, the noise study limits on SR 9/I-95 will begin 1,000 feet south of the SR 804/Boynton Beach Boulevard interchange and will end 1,000 feet north of the Gateway Boulevard interchange. The proposed study limits on Boynton Beach Boulevard will begin 1,000 feet west of Old Boynton Road/NW 8th Street and extend 1,000 feet east of Seacrest Boulevard. Similarly, the proposed limits on Gateway Boulevard will begin 1,000 feet west of NW 22nd Ave and extend 1,000 feet east of Seacrest Boulevard.

This NSR addresses two service interchanges along SR 9/I-95: SR 804/Boynton Beach Boulevard (MP 14.75) and Gateway Boulevard (MP 16.26) as previously shown in Figure 1-1.

2.3 Purpose and Need

The primary purpose of this project is to enhance overall traffic operations through the 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.

Based on the traffic operations analysis documented in the SR 9/I-95 IMP for the two study interchanges and adjacent signalized intersections, the existing operational capacity and overall traffic operations LOS are deficient. These deficiencies were determined based on Existing Year (2015) and Design Year (2040) a.m. and p.m. peak hour traffic conditions for ramp terminal intersection delay. Without improvements, the ramp terminal intersections will continue to experience excessive delays and queue lengths and operate below acceptable LOS standards, and the two study interchanges will have insufficient capacity to accommodate the projected travel demand.

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 were intended to be redeveloped through implementation of 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 uses to the west as part of the Quantum Park Development of Regional Impact (DRI). In addition, population and employment are expected to increase within the vicinity of study area.

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

The study interchanges are an important connection for commuters and freight traffic in the region. If no operational and safety improvements are implemented within the project limits, traffic operations in the areas of the interchanges will progressively worsen, resulting in an increased number of crashes and deterioration in access to and from SR 9/I-95.

Based on FHWA's Highway Traffic Noise Policy and Guidance, issued in July 2010 (revised January 2011), the proposed improvements to SR 9/I-95 at SR 804/Boynton Beach Boulevard and Gateway Boulevard would be classified as a Type I project. This guidance defines a Type I project as follows.

- The construction of a highway on new location; or,
- The physical alteration of an existing highway where there is either:
    - Substantial Horizontal Alteration. A project that halves the distance between the traffic noise source and the closest receptor between the existing condition to the future build condition; or,
    - Substantial Vertical Alteration. A project that removes shielding therefore exposes the line-of-sight between the receptor and the traffic noise source. This is done by either altering the vertical alignment of the highway or by altering the topography between the highway traffic noise source and the receptor; or,
- The addition of a through-traffic lane(s). This includes the addition of a through-traffic lane that functions as a High-Occupancy Vehicle (HOV) lane, High-Occupancy Toll (HOT) lane, bus lane, or truck climbing lane; or,
- The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane; or,
- The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange; or,
- Restriping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane, except for when the auxiliary lane is a turn lane; or,
- The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot or toll plaza.

The proposed SR 9/I-95 at SR 804/Boynton Beach Boulevard and Gateway Boulevard interchange improvements would involve physical alteration of the existing roadway to accommodate the proposed Preferred Build Alternatives. Therefore, a noise analysis must be performed to identify potential impacts that may require abatement measures for future evaluation in the Design Phase of the project. This NSR identifies noise impacts, locations where abatement measures may be considered reasonable and feasible, and locations where abatement measures will not reduce noise impacts.

2.4 Land Use

The project corridor encompasses several land use categories identified by the Palm Beach County Department of Planning and Zoning and the City of Boynton Beach Planning and Zoning Department. Figure 2-1 illustrates the existing land uses within the study area limits. The project area is partially located within the City's CRA and primarily consists of transportation land use. The project study area is urbanized and encompasses the following mixture of land use classifications:

- Residential
- Industrial
- Commercial
- Sports complex
- School
- Open land/vacant/parcels with no value

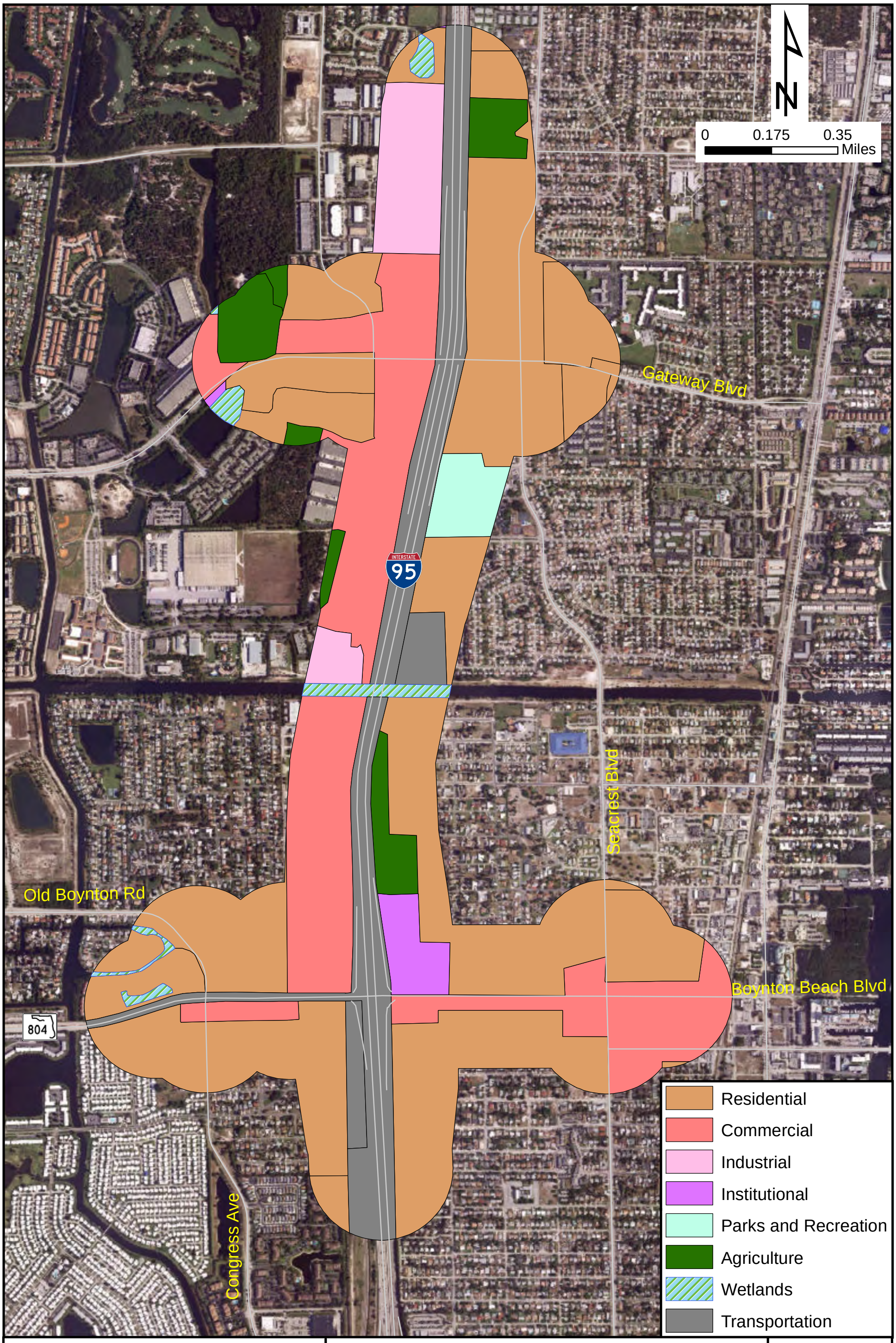
Along SR 804/Boynton Beach Boulevard, between Old Boynton Road and Seacrest Boulevard, the adjacent land use is a mix of residential types, primarily medium-density residential. Both sides of SR 804/Boynton Beach Boulevard also have commercial business/office areas with a mixture of various light industrial land uses. Along with the afore mentioned land use, SR 804/ Boynton Beach Boulevard also has a school 330 feet to the east of SR 9/ I-95 and Palm Beach Podiatry hospital 1,510 feet to the west of SR 9/I-95 which were classified as institutions, and hospitals. The land use to the north of the SR 804/ Boynton Beach Boulevard interchange with SR 9/I-95 is mainly comprised of rental and office complexes and municipality-owned recreational properties.

The land use along the SR 9/I-95 corridor between SR 804/Boynton Beach Boulevard and Gateway Boulevard is primarily classified as industrial and offices, with the exception of two baseball fields to the east of SR 9/I-95 which are classified as parks and recreation and sports complexes. The land to west of SR 9/I-95 is mostly industrial and commercial. The land to east is a mixed residential area with Ezell Hester Jr. Community Park. SR 9/I-95 crosses C. Stanley Weaver Canal approximately 3,770 feet from the SR 804/ Boynton Beach Boulevard interchange and 4,190 feet from the Gateway Boulevard interchange.

The land use for the Gateway Boulevard interchange region between Quantum Village Road and Seacrest Boulevard is predominantly residential. Gateway Boulevard west of SR 9/I-95 has commercial business and office areas, restaurants and a Publix Super Market.

2.5 Existing Roadway Characteristics

The general characteristics of the roadway facilities within this NSR's study limits are provided in Table 2-1. 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



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

Existing Land Use

Figure 2-1

reviews conducted for this NSR. The existing intersection typical section are depicted in Figure 2- 2 and Figure 2-3.

The SR 9/I-95 interchanges at SR 804/Boynton Beach Boulevard and Gateway Boulevard were the primary focus of this NSR. SR 9/I-95 is a limited-access highway and a designated SIS facility that provides regional connectivity along the east coast of Florida. The existing typical section consists of four general-purpose lanes and one HOV lane in each travel direction (northbound/southbound). One auxiliary lane is provided along SR 9/I-95 in each travel direction between the SR 804/Boynton Beach Boulevard and Gateway Boulevard interchanges. Between the SR 804/Boynton Beach Boulevard and Woolbright Road interchanges with SR 9/I-95, two auxiliary lanes are present in the southbound direction and one auxiliary lane is present in the northbound direction.

Table 2-1: Existing Roadway Characteristics

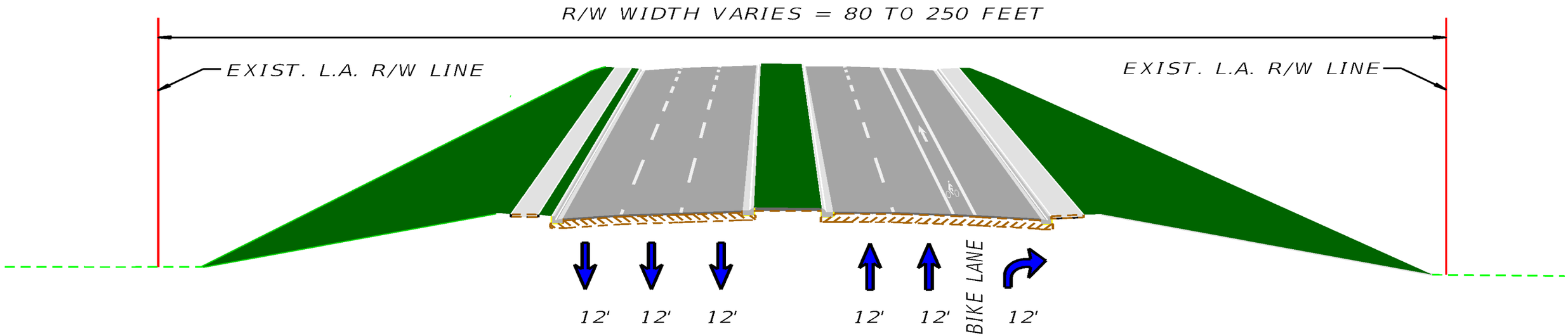
Roadway	Facility Type	Functional Classification	Access Class	Typical Section	Posted Speed Limit (mph)
SR 9/I-95	Interstate, Limited Access, SIS Facility	Urban Principal Arterial - Interstate	Class 1	4 NB GP lanes + 1 NB HOV lane + 4 SB GP lanes + 1 SB HOV lane + barrier wall	65
SR 804/Boynton Beach Boulevard, 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

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

2.6 Alternatives

2.6.1 No-Build Alternative

The No-Build Alternative refers to the conditions that would occur if the PD&E Study results in a recommendation not to construct any improvements proposed by Preferred Build Alternatives. The future No-Build Alternative includes the Existing Year (2015) roadway network as well as



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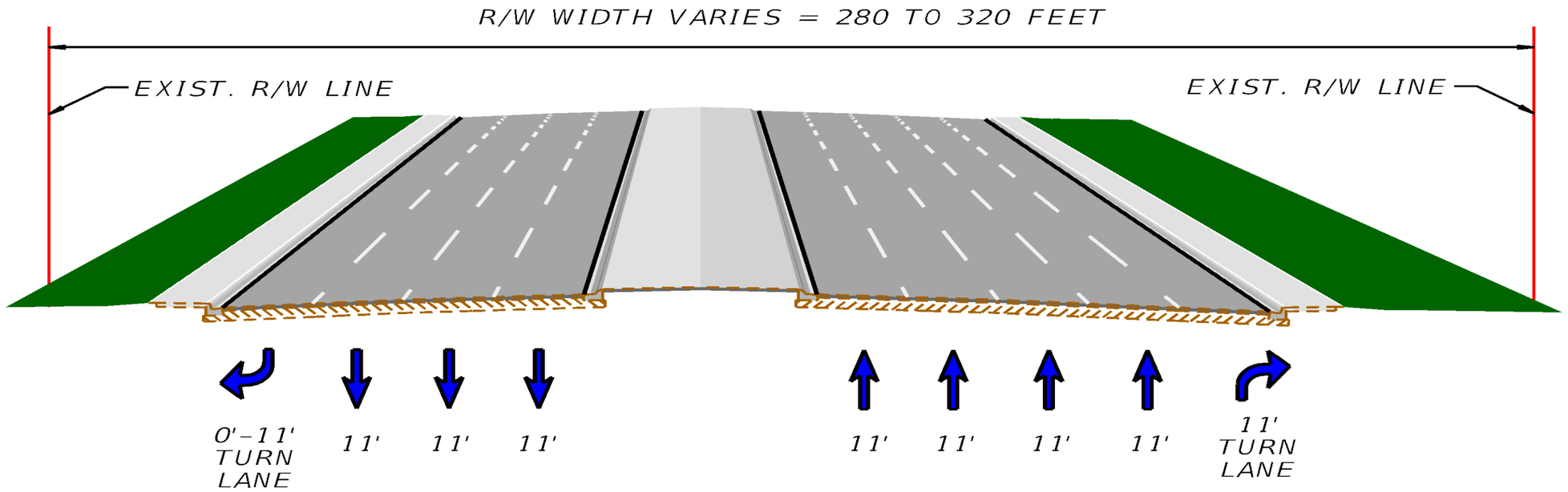
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

Existing Typical Section at Boynton Beach Boulevard (between Industrial Avenue and SR 9/I-95 Southbound Ramps)

Figure 2-2



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Existing Typical Section at Gateway Boulevard
(West of SR 9/I-95 Southbound Ramps)

Figure 2-3

funded and committed projects within the study area limits per the FDOT 5-Year Work Program. It also incorporates 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 open years for various planned projects and any additional road improvements to be incorporated in the No-Build Alternative. Based on coordination with these agencies and reviews of the FDOT's 5-Year Work Program and LRTP, the following notable road improvement projects were identified for inclusion in the No-Build Transportation Network:

- Improvements of High Ridge Road at Gateway Boulevard, County of Palm Beach, State of Florida, Project No. 2015511.

The No-Build Alternative provides several benefits. The requirement for expenditure of public funds for design, right-of-way acquisition, utility relocation, or roadway construction activities would be obsolete. Traffic would not be disrupted due to construction, thereby avoiding inconveniences to residents and businesses. Also, no direct or indirect impacts to the environment, socio-economic characteristics, community cohesion, or system linkage would occur in the area.

However, the No-Build Alternative does not fulfill the current or future needs of the project area. If no long-term improvements are made, SR 9/I-95 at SR 804/Boynton Beach Boulevard and at Gateway Boulevard, and the associated crossroads, will experience heavy congestion during the peak travel hours, resulting in undesirable levels of service. The congestion will cause excessive delays in travel time, a significant reduction in average travel speed, excess fuel consumption from idling vehicles, increased emissions of air pollutants (hydrocarbons and carbon monoxide), and a potential increase in the occurrence of rear-end and sideswipe collisions. An increase in travel demand within the study area is expected over the next couple of years, given the continued growth expected in Palm Beach County. This increased travel demand will intensify the current operational issues associated with the study area.

2.6.2 Preferred Build Alternatives

The Build Alternatives were developed to address the corridor's traffic operational deficiencies with minimal right-of-way acquisition, environmental impacts, and socioeconomic impacts, with consideration given to general public perception. The development and evaluation of these concepts were based on established design controls for the various elements of the project, such as roadway width, median width, shoulder width, design speed, horizontal and vertical alignment, drainage considerations, intersecting roads, and environmental impacts. Selection of appropriate standards or criteria was influenced by safety features, traffic volumes and composition, levels of service, functional classification, community issues, and environmental considerations.

Multimodal facilities such as transit routes currently exist within the proposed project limits. These existing modes were incorporated into the Build Alternatives using current design standards. The

selected Build Alternative for this project will include bicycle lanes and sidewalks that 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 selected Build Alternative. Alternate travel modes are not anticipated to reduce future demand near the study interchanges.

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 were prepared in 2014 for the SR 804/Boynton Beach Boulevard and Gateway Boulevard interchanges as part of the SR 9/I-95 Master Plan project.

The recommended improvements from these reports resulted in the selection of a Conceptual Design Alternative (CDA) that has been retained for evaluation as a Build Alternative in this PD&E Study. In addition, a Tier 1 Alternatives Evaluation Technical Memorandum prepared in March 2016 identified preliminary alternatives to improve traffic operations and safety in the areas of the study interchanges. The Tier I evaluations resulted in the development of eight conceptual alternatives for the SR 804/Boynton Beach Boulevard interchange and three for the 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 socioeconomic impacts.

Of the preliminary alternatives developed, the following Build Alternatives were retained for full evaluation for each interchange. All Build Alternatives incorporate Transportation System Management and Operation (TSM&O) improvements and were developed further as the PD&E Study progressed:

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

After FDOT review and concurrence on the final evaluation of all concepts evaluated during the early phases of the PD&E Study, revisions and design changes were implemented to identify Preferred Build Alternatives for the PD&E Study. Alternative 2 - Streamlined CDA was selected as the Preferred Build Alternative for the SR 804/Boynton Beach Boulevard interchange.

Alternative 3 - Single-point Urban Interchange (SPUI) was selected as the Preferred Build Alternative for the Gateway Boulevard interchange.

The Streamlined CDA Build Alternative for the SR 804/Boynton Beach Boulevard interchange retained all the improvements proposed by the Concept Development Reports previously prepared and enhanced to avoid reconstruction of the SR 804/Boynton Beach Boulevard bridge over the CSX Transportation/South Florida Rail Corridor (SFRC) railroad (Bridge Number 930289) and

the bridge over SR 9/I-95 (Bridge Number 930285). 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-cost (B/C) ratio without negatively impacting traffic operations and safety.

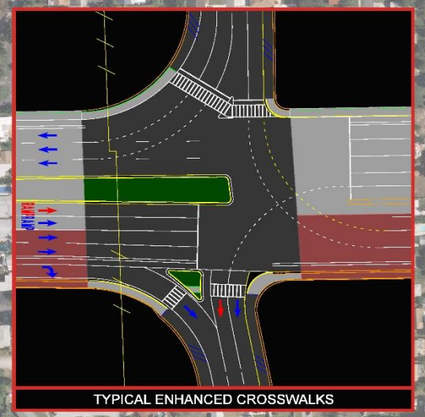
Proposed improvements for the Preferred Build Alternative are described below and are shown on Figure 2-4:

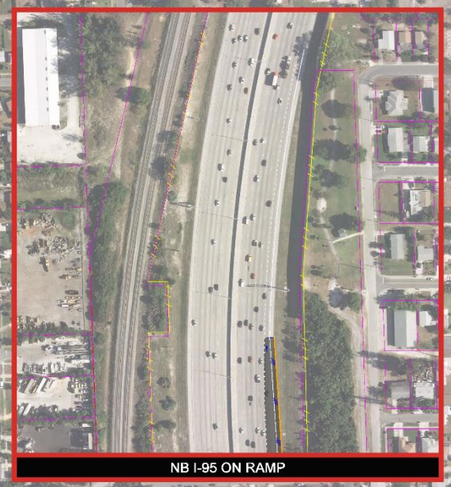
1. A closed median between 7th Street and NW 8th Street/Old Boynton Road.
2. A new westbound right turn lane to Industrial Avenue.
3. Dual right turn lanes, a single left turn lane, and a shared left/right turn lane in the southbound direction at the SR 9/I-95 southbound ramp terminal intersection.
4. 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 merges south of the ramp terminal intersection from the left side to tie into the existing dual lane on-ramp.
5. Dual left turn lanes in the eastbound and westbound directions along SR 804/Boynton Beach Boulevard at ramp terminal intersections.
6. Triple left and dual channelized right turn lanes in the northbound direction at the SR 9/I- 95 northbound ramp terminal intersection.
7. Dual left turn lanes with extended storage lengths, single channelized right turn lane, and additional through lane in the westbound direction along SR 804/Boynton Beach Boulevard at SR 9/I-95 northbound ramp terminal intersection.
8. 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 merges north of the ramp terminal intersection from the right to tie into the existing auxiliary lane between SR 804/Boynton Beach Boulevard and Gateway Boulevard.
9. Increased right turn storage lane along westbound SR 804/Boynton Beach Boulevard at the northbound SR 9/I-95 ramp terminal intersection.

The Preferred Build Alternative for Gateway Boulevard proposes construction of a new Single-Point Urban Interchange (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 Preferred Build Alternative also retains the improvements proposed by the Concept Development Report previously prepared and enhances traffic operations and safety.

The following improvements are proposed for the SPUI Build Alternative and are shown on Figure 2-5.





LEGEND
PROPERTY LINE
EXISTING R/W
PROPOSED R/W
EXISTING LIMITED ACCESS R/W
PROPOSED LIMITED ACCESS R/W
EXISTING ROADWAY
PROPOSED ROADWAY
EXISTING BRIDGE
PROPOSED BRIDGE
EXISTING LANES
PROPOSED LANES

SEE INSET FOR NB I-95 ON RAMP

1
2
3
4
5
6
7
8
9

BEGIN PROJECT
END PROJECT
OLD BOYNTON ROAD
BOYNTON BEACH BOULEVARD
NW 7TH COURT
NW 7TH STREET
NW 8TH STREET
W INDUSTRIAL AVENUE
INDUSTRIAL AVENUE
South Florida Rail Corridor/CSX Railroad
NW 4TH AVENUE
NW 1ST AVENUE
W OCEAN AVENUE
SW 1ST COURT
SW 1ST AVENUE
W OCEAN DRIVE
NW 4TH STREET
NW 3RD STREET
NW 2ND STREET
NW 3RD COURT
NW 1ST STREET
SEACREST BOULEVARD
GALAXY ELEMENTARY SCHOOL
FIRST BAPTIST CHURCH OF BOYNTON BEACH
LLOYD'S PLAZA
MARATHON GAS
US POST OFFICE
THE INN AT BOYNTON BEACH
MEDICAL OFFICES
GATEWAY CENTRE
7-ELEVEN
WENDYS
BP
804
95

N
NOT TO SCALE

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

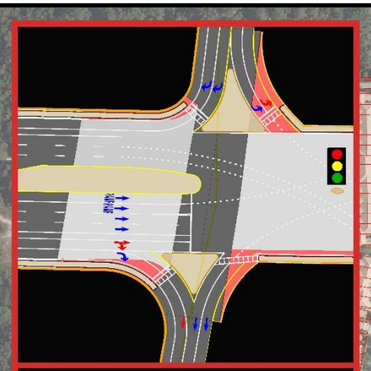
SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
Preferred Build Alternative– Streamlined CDA

Figure 2-4

1. Conversion of existing dual ramp terminal signalized intersections into a single signalized intersection to serve both southbound and northbound ramp terminals.
2. Dual left turn lanes and a single right turn lane in the eastbound direction at the Gateway Boulevard and High Ridge Road intersection.
3. Single left and right turn lane in the northbound direction at the Gateway Boulevard and High Ridge Road intersection.
4. Dual left turn lanes from southbound High Ridge Road to eastbound Gateway Boulevard.
5. Dual left and right turn lanes in the southbound direction at the SR 9/I-95 southbound ramp terminal intersection.
6. Single right turn lane and shared through/right turn lane from eastbound Gateway Boulevard to southbound SR 9/I-95.
7. Triple left and single right turn lanes in the northbound direction at the SR 9/I-95 northbound ramp terminal intersection.
8. Dual left turn lanes from eastbound Gateway Boulevard to northbound Seacrest Boulevard.

An additional through lane is also provided in the eastbound and westbound directions to create an eight-lane typical section along Gateway Boulevard within the project limits between Quantum Boulevard and NE 1st Way with this Build Alternative

The Typical Sections for SR 804/Boynton Beach Boulevard and Gateway Boulevard for Existing Conditions (2015), Design Year (2040) are provided in Appendix B



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
Preferred Build Alternative – Single Point Urban Interchange (SPUI)

Figure 2-5

3.0 Noise Study Methodology

3.1 Noise Metrics

The noise analysis for this study was conducted in accordance with the following guidelines:

- Procedures for Abatement of Highway Traffic Noise and Construction Noise (23 CFR 772, 2011).
- Florida Statute 335.17 (1989)
- Project Development and Environmental Manual Part 2, Chapter 17 Highway Traffic Noise (FDOT, 2016)

The noise levels in this analysis were measured in decibels (dB) using an "A-weighted" scale (dB(A)). The "A-scale" closely approximates the response characteristics of the human ear to traffic-related noise. The A-weighted equivalent steady-state sound level (LAeq) is the noise level that in a stated period contains the same acoustic energy as the time-varying sound level during the same period. All noise levels were reported as hourly equivalent noise levels (LAeq1h) to the nearest 0.1 dB(A). Use of the dB(A) and LAeq1h metrics to evaluate traffic noise is consistent with 23 CFR 772 and FDOT procedures.

Typically, public reaction to noise levels is a function of location (urban, suburban, rural), time of day, fluctuation of noise levels, duration, and individual judgment of the listener. Under normal conditions, a change in noise level of 3 dB(A) is required for the average person to perceive a difference. Examples of the magnitude of an individual change in traffic volume, travel speed, or distance from the noise source to the receptor necessary to result in a 3 dB(A) increase include:

- A 100 percent increase in hourly automobile traffic volumes with no decrease in speed
- An increase in vehicular speeds of 15 miles per hour
- A reduction in distance by half between the receptor and the highway (assuming pavement is located between the receptor and the highway)

A decrease of 10 dB(A) is typically perceived by listeners as half of the noise level, while an increase of 10 dB(A) is perceived as doubling the noise level. Common noise sources and their associated sound levels are shown on Figure 3-1.

3.2 Alternatives and Years Considered

For this study, the Existing Year is 2015 and is defined by the traffic data that was prepared in Design Traffic Technical Memorandum (DTTM) (provided in Appendix C). Design Year (2040) was evaluated for the future conditions for the Build and No-Build scenarios. The alternatives evaluated include the following:

- Existing Condition
- No-Build Alternative
- Build Alternatives – Preferred

Noise Scale: Common Sound Levels

Common Outdoor Sound Levels	Noise Level dB (A)	Common Indoor Sound Levels
	110	Rock Band
B-747-200 Takeoff at 2 mi. Gas Lawn Mower at 3 ft. Diesel Truck at 150 ft.	100	Inside Subway Train (New York)
DC-9-30 Takeoff at 2 mi.	90	Food Blender at 3 ft
Noisy Urban Daytime	80	Garbage Disposal at 3 ft. Shouting at 3 ft.
B-757 Takeoff at 2 mi.	70	Vacuum Cleaner at 10 ft Four lane road at 50 feet
Commercial Area	60	Normal Speech
Quiet Urban Daytime	50	Large Business Office Dishwasher Next Room
Quiet Urban Nighttime Quiet Suburban Nighttime	40	Small Theatre, Large Conference Room (Background)
Quiet Rural Nighttime	30	Library, Bedroom at night, Concert Hall (Background)
	20	
	10	Broadcast & Recording Studio
	0	Threshold of Hearing

SOURCE:
Draft EIS/EIR LAX Proposed Master Plan Improvements, Los Angeles, CA
U.S. Dept. of Transportation, FAA
January 2001

3.3 Noise Abatement Criteria

FHWA has established NAC, which outline noise levels at which receivers are considered impacted and therefore, noise abatement measures must be considered for various types of noise-sensitive sites. These criteria vary according to the property's land use category and are listed in Table 3-1.

For this study, noise-abatement measures are considered to address predicted traffic noise levels in Design Year (2040) Build conditions that exceed or approach the NAC FDOT and FHWA abatement criteria.

Abatement measures must also be considered when a substantial increase in traffic noise occurs as a direct result of a transportation improvement project. A substantial increase will typically occur only for new roadway alignment projects. The FDOT PD&E Manual, Part 2, Chapter 17 indicates that the existing noise levels would be substantially exceeded if the Design Year (2040) Build Alternative sound levels increase by 15.0 dB(A) or more over Existing Conditions.

Activity categories were assigned based on how land is being used. This means if the land is being used as a residence, business, church, etc, it is matched with the corresponding activity category as defined in Table 3-1. Current land use in this project area consists of mostly single family residential lots.

This NSR evaluated a total of 528 receivers representing 528 receptors within the study area limits.

For purposes of noise analysis modeling, study area noise receptors were assigned one of seven different land use or activity categories - Activity Category A through G as discussed below:

Activity Category A includes exterior activities and relates to lands, as stated in 23 CFR Part 772, "on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities are essential for the area to continue to serve its intended purpose." Examples of land uses designated as Activity Category A include the Tomb of the Unknown Soldier and a monastery.

No receptors of this activity category are located within the study area.

Activity Category B includes exterior activities for single-family and multi-family residences.

Within the study area, 287 receivers in the vicinity of the SR 804/Boynton Beach Boulevard interchange and 157 receivers in the vicinity of the Gateway Boulevard interchange, totaling to 444 receptors, are assigned this activity category.

Activity Category C includes exterior activities for Section 4(f) sites and nonresidential public and private facilities that tolerate less noise (e.g., school, playground, recording studios, amphitheaters, libraries) than Activity Category E (see below).

Activity Category C receivers in the vicinity of the SR 804/Boynton Beach Boulevard interchange include Galaxy Elementary School, a baseball field, and a tennis court. Ezell Hester Jr. Community Park (two playgrounds) and International Pentecostal City Church in the vicinity of the Gateway Boulevard interchange are assigned to Activity Category C well. In total, six receivers representing six receptors of this activity category are located within the study area.

Table 3-1: Noise Abatement Criteria

NOISE ABATEMENT CRITERIA [Hourly A-Weighted Sound Level-decibels (dB(A))]				
Activity Category	Activity Leq(h)1		Evaluation Location	Description of Activity Category
	FHWA	FDOT		
A	57	56	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities are essential if the area is to continue to serve its intended purpose.
B	67	66	Exterior	Residential
C	67	66	Exterior	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	51	Interior	Auditoriums, daycare centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E	72	71	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	_	_	_	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	_	_	_	Undeveloped lands that are not permitted.

Activity Category D includes interior impacts for Activity Category C facilities that may have a noise-sensitive interior use. An indoor analysis is typically conducted only after exhausting all outdoor analysis options. In situations where no exterior activities would be affected by the traffic noise or where the exterior activities are far from or physically shielded from the roadway in a manner that prevents an impact on exterior activities, Activity Category D is typically used as the basis for determining noise impacts.

No receivers of this activity category are located within the study area.

Activity Category E includes exterior activities for certain commercial and developed lands (e.g., restaurants, offices, hotels) that are less sensitive to highway noise.

There are 46 receivers in the vicinity of the SR 804/Boynton Beach Boulevard interchange and 21 receivers in the vicinity of the Gateway Boulevard interchange of this activity category within the study area representing a total of 67 receptors.

Activity Category F includes land use activities that generally are not sensitive to highway noise.

The study area includes 11 receivers representing 11 receptors with this activity category.

Activity Category G addresses future noise levels on undeveloped lands without a building permit. For undeveloped lands without a building permit in the study area, noise contours were developed using the Traffic Noise Model (TNM).

Noise study vehicle distribution and volumes data for Existing (2015), No-Build (2040) and Build (2040) conditions are included in Appendix D.

3.4 Traffic Data

As stipulated in the FDOT Noise Policy (Part 2, Chapter 17, Section 17-4.2 of the PD&E Manual), to ensure that "worst case" traffic noise conditions are used in the analysis, the following traffic volumes and speed conditions were applied.

- For roadways (interstate mainlines, collector-distributor roads, frontage roads, arterial roads, etc.), the traffic volume will represent one of the following:
    - The directional planning analysis hour Level-of-Service (LOS) "C" peak hour, peak direction volume as specified by the most recent FDOT Quality/Level of Service Handbook Tables for Project Traffic volumes operating worse than LOS C.
    - The Project Traffic peak hour directional demand volume if the facility operates at LOS A, B or C.
- The LOS "C" peak direction hourly volume for project-specific conditions shall be determined from Table 7, 8, or 9 (as appropriate) of the current FDOT Quality/LOS Handbook Tables. Of note, the same LOS C volume shall be applied to both directions of travel to ensure the highest noise-generating conditions are represented. For interchange

ramps, the traffic volume is the peak hour demand volume for the specific ramp being analyzed, even if the demand volumes represent a LOS greater than LOS C (e.g., LOS D, E, or F).

- The vehicle speeds to be used in the TNM are the posted speeds for Existing Year (2015), No- Build conditions, and the proposed posted speeds for the future Build conditions. If the proposed posted speeds are unknown, the design speeds are to be used. The motor vehicle speeds used for ramps will be the posted speeds and will be applied along the entire ramp unless modified by the flow condition.

Traffic noise is considered the loudest when vehicles traverse at a free-flow rate. Therefore, to evaluate the worst-case traffic noise, traffic volumes that exhibit the free-flow movement were used for analysis. Thus, peak hour volumes and LOS C volumes determined from FDOT's Generalized Peak Hour Directional Volume Tables are considered. Traffic factors used for this NSR, obtained from the DTTM, included the K-factor, the directional (D) factor, 24-hour truck percentage (T_{24}), and the peak hour truck percentage (T_{peak}). The Directional Design Hourly Volumes (DDHV) for the Existing, No-Build, and Build Alternatives were also obtained from the DTTM. In addition, Table 3-2 summarizes these traffic factors within the study limits. The DTTM is provided in Appendix C.

Table 3-2: Traffic Factors

Roadway	K[(1)]	D[(2)]	T_{24}[(1)]	T_f[(1)]
SR 9/I-95	8.00%	59.00% (AM-SB/PM-NB)	7.00%	3.50%
SR 804/Boynton Beach Blvd (West of SR 9/I-95)	9.00%	58.00% (AM-EB/PM-WB)	3.60%	1.80%
SR 804/Boynton Beach Blvd (East of SR 9/I-95)		53.60% (AM-EB/PM-WB)	3.90%	2.00%
Gateway Blvd (West of SR 9/I-95)	9.00%	56.50% (AM-EB/PM-WB)	5.10%	2.50%
Gateway Blvd (East of SR 9/I-95)		60.30% (AM-WB/PM-EB)	4.40%	2.20%
Other Cross Streets (West of SR 9/I-95)	9.00%	60.90%	6.10%	3.10%
Other Cross Streets (East of SR 9/I-95)		58.20%	3.60%	1.80%

NB – northbound, SB – southbound, EB – eastbound, WB – westbound

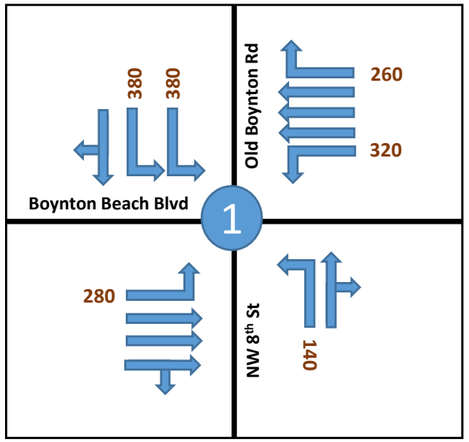
The Generalized Peak Hour Directional Volumes Table (Table 7) from the Quality/Level of

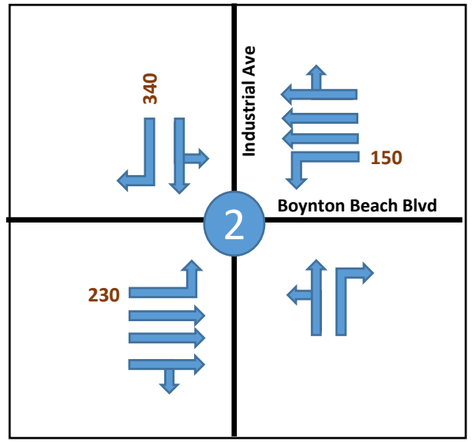
Service Handbook Tables (FDOT, 2012) was used to determine appropriate traffic volumes under LOS Conditions within the study area. This information is provided in Appendix C.

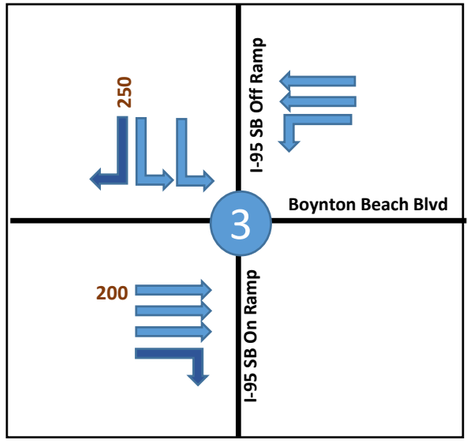
The volumes determined under LOS C conditions from the FDOT Quality/Level of Service handbook were used in the analysis for the arterial and freeway road networks, while the projected DDHVs were used for the ramps. The number of heavy trucks (HTs), medium trucks (MTs), buses, and motorcycles used in the TNM was considered consistent with field collected data. The field observed vehicle classification percentages were applied to the vehicular volumes used for this analysis.

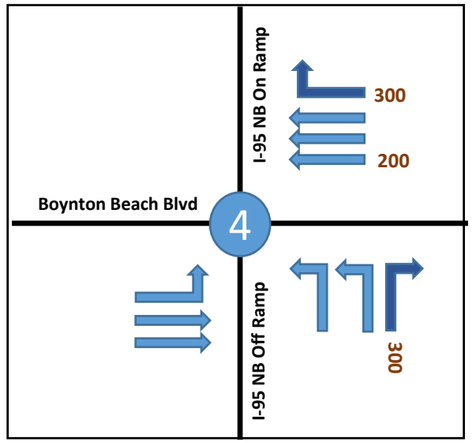
FDOT approved Noise Traffic Data Forms for Existing Year (2015), and Design Year (2040) No-Build and Build conditions are provided in Appendix D.

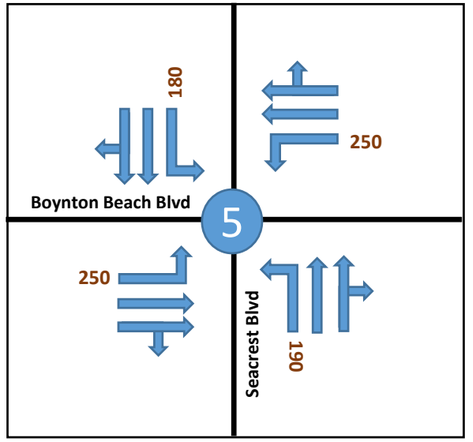
Traffic count and speed data that were measured in the field during data collection and sound monitoring activities were used for validation of the TNM. Hourly traffic volumes along SR 9/I-95 for validation purposes were obtained from Florida Traffic Online during daytime hours (10 a.m. to 2 p.m.). Traffic data were applied consistently in the alternatives analysis to ensure use of the traffic characteristics that would yield the worst traffic noise impact, and are shown in Figure 3-2 to Figure 3-7.











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

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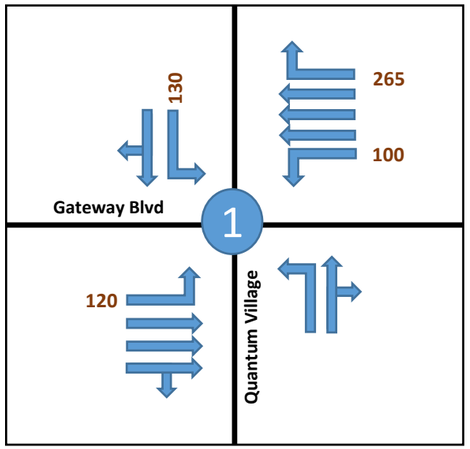
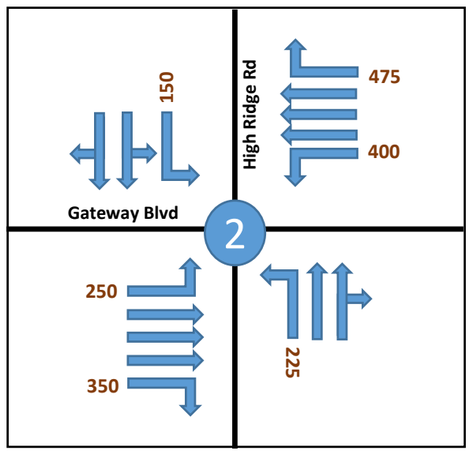
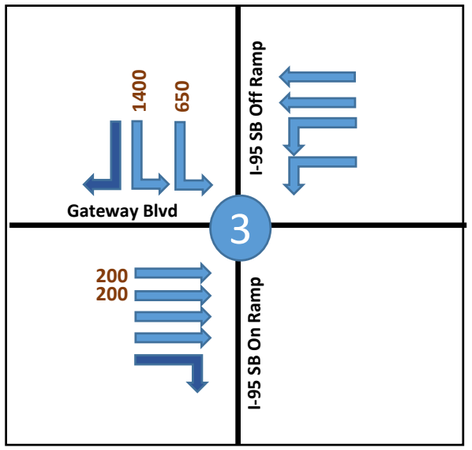
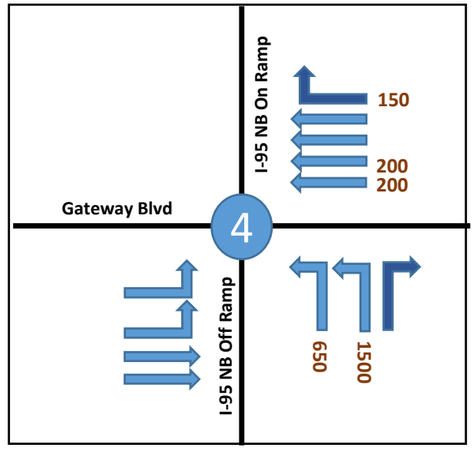
SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
Existing Lane Configuration and TNM Inputs - Existing Year (2015)

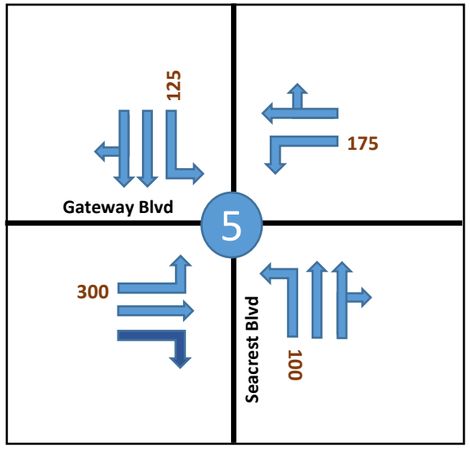
Figure 3-2

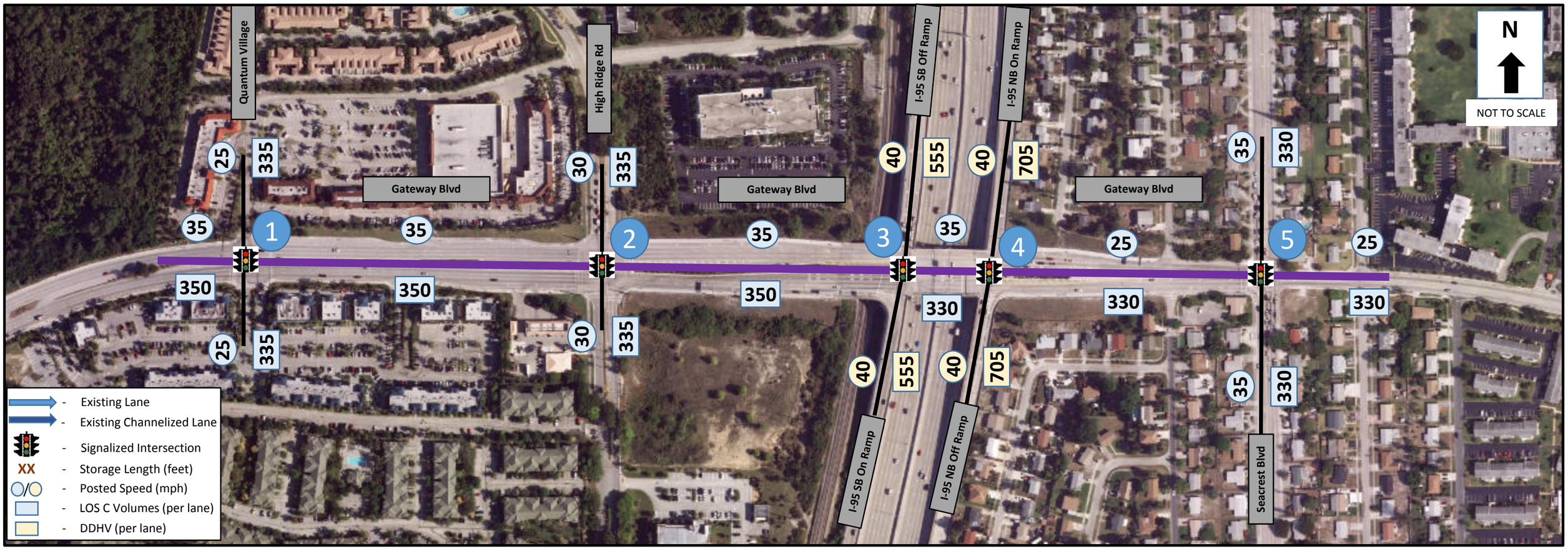












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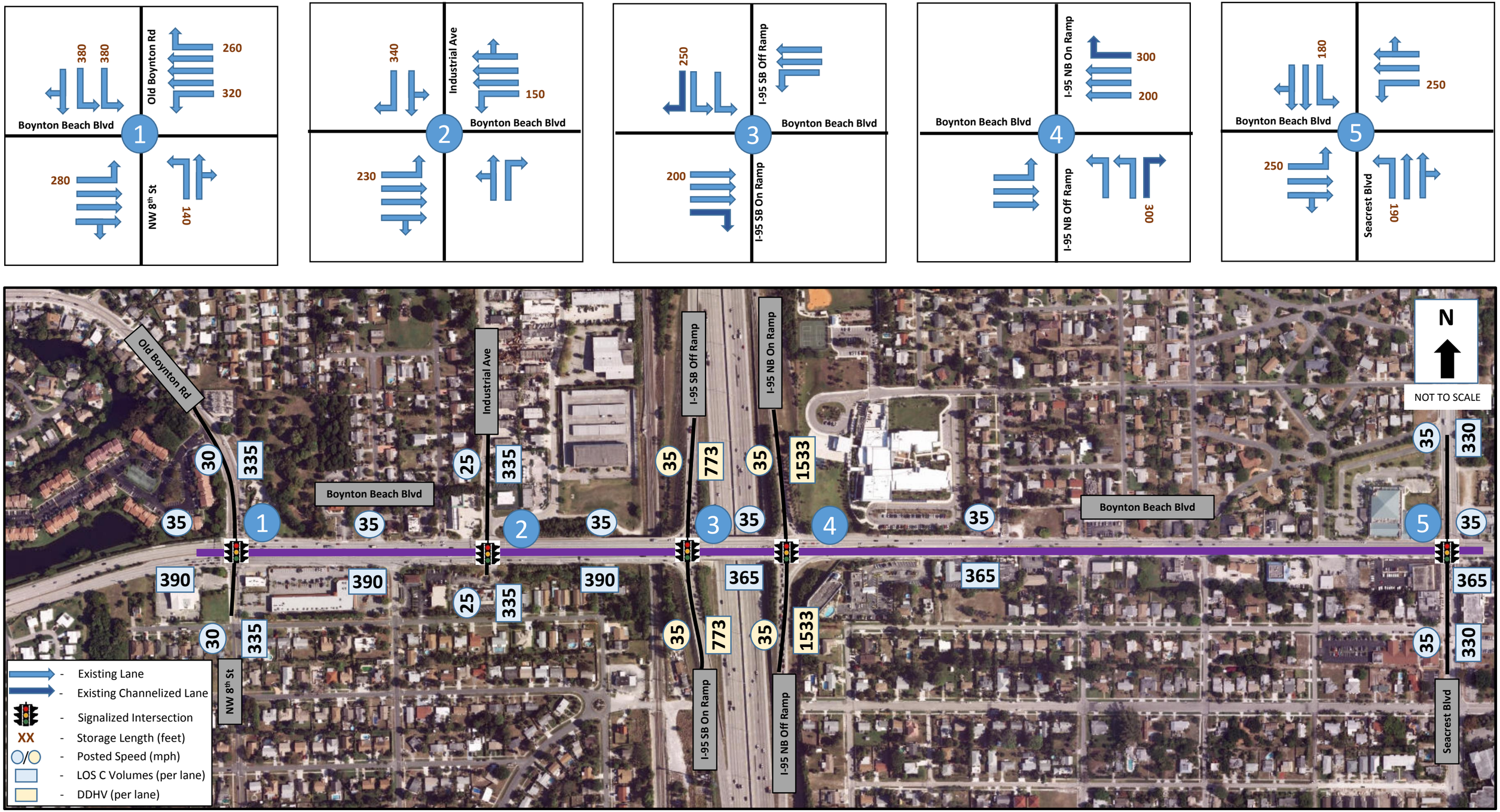
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

FDOT

SR 9/I-95 at Gateway Boulevard Interchange
Existing Lane Configuration and TNM Inputs - Existing Year (2015)

Figure 3-3



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SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
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SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange
No-Build Alternative Lane Configuration and TNM Inputs - Design Year (2040)

Figure 3-4

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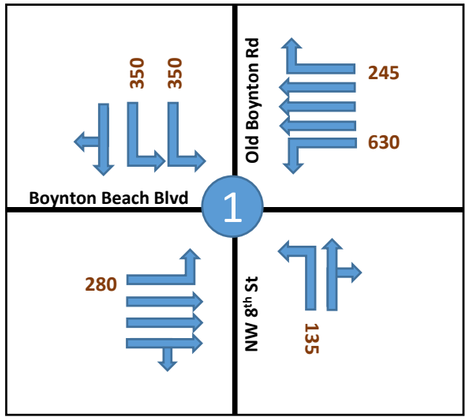
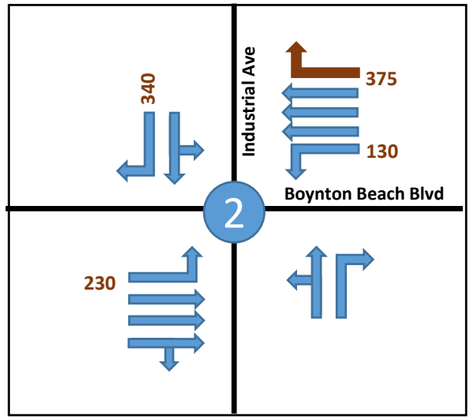
SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange
SR 9/I-95 at Gateway Boulevard Interchange
FM Nos. 435804-1-22-01;231932-1-22-01
ETDM nos. 14180 and 14181

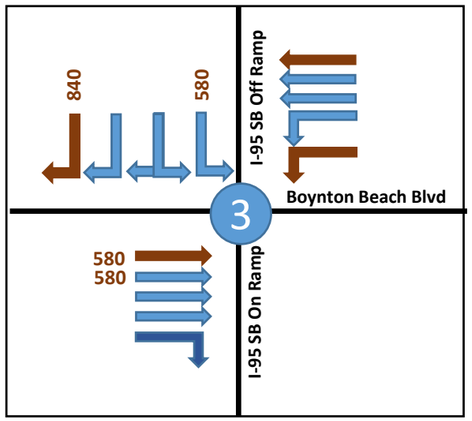
FDOT

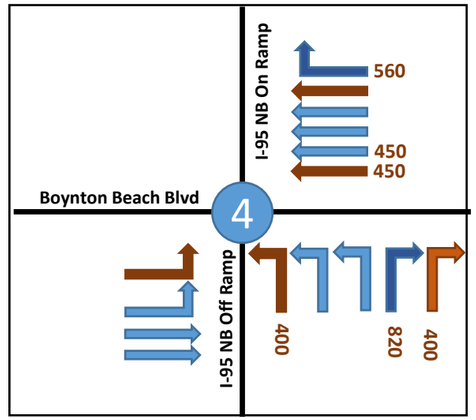
SR 9/I-95 at Gateway Boulevard Interchange
No-Build Alternative Lane Configuration and TNM Inputs - Design Year (2040)

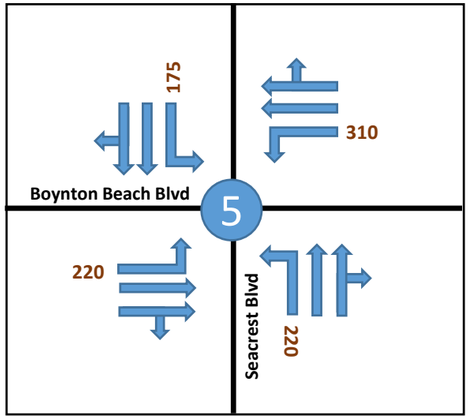
Figure 3-5



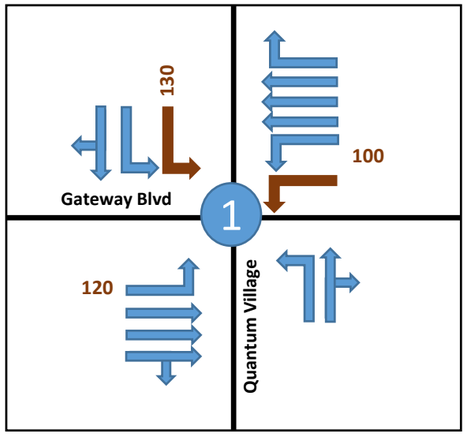


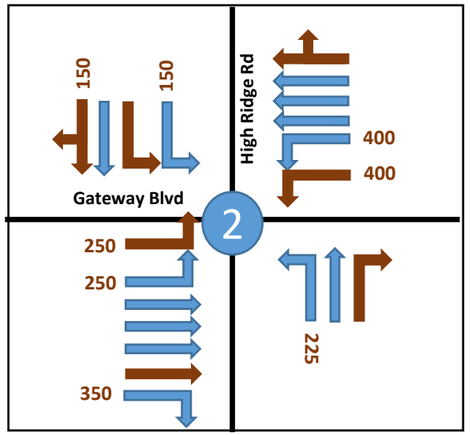


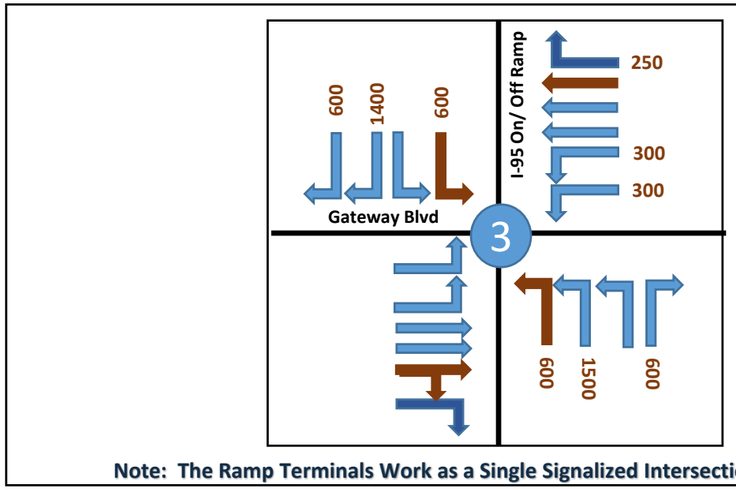




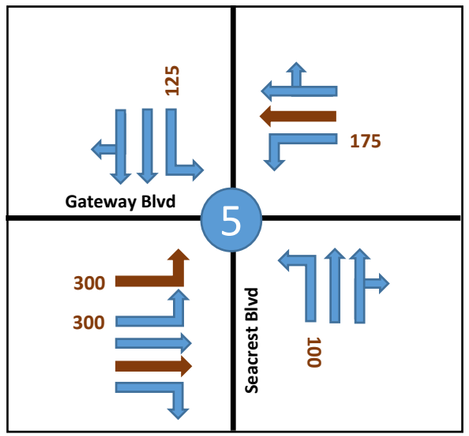
PD&E Study **SR 9/I-95 at SR 804/ Boynton Beach Boulevard Interchange** **SR 9/I-95 at Gateway Boulevard Interchange** **FM Nos. 435804-1-22-01;231932-1-22-01** **ETDM nos. 14180 and 14181**	**SR 9/I-95 at SR 804/Boynton Beach Boulevard Interchange** **Preferred Build Alternative Lane Configuration and TNM Inputs - Design Year (2040)**	**Figure 3-6** **Page 29**

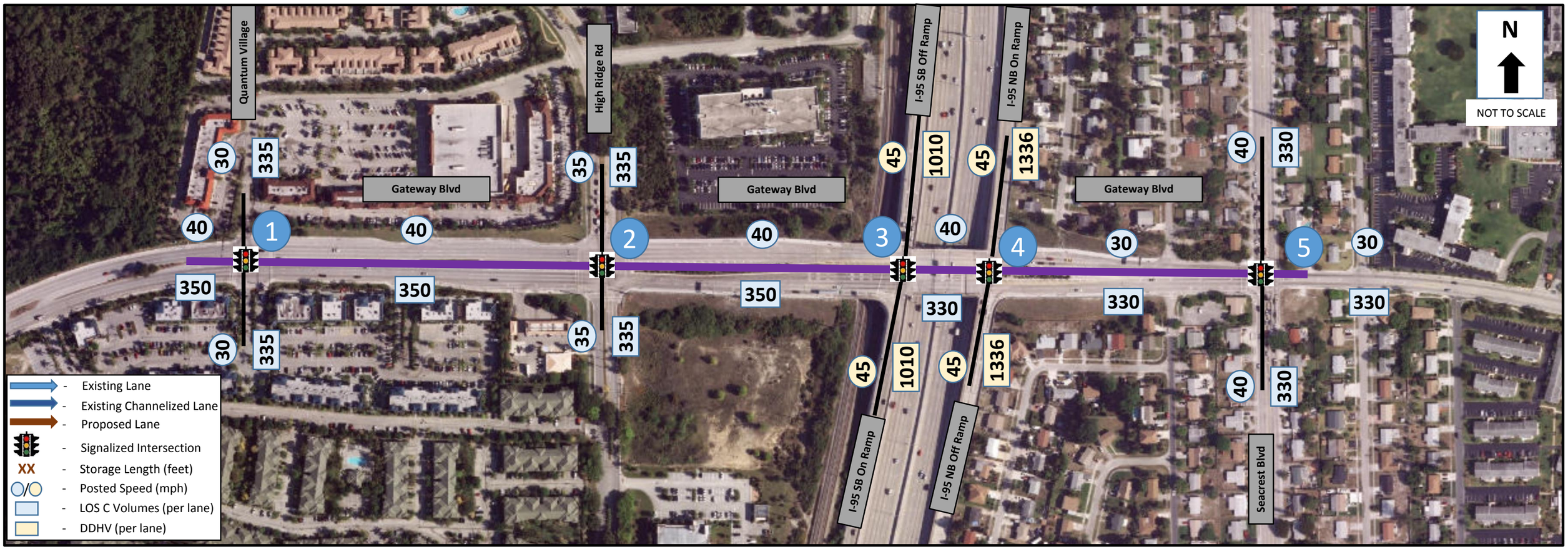






Note: The Ramp Terminals Work as a Single Signalized Intersection With a SPUI





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 Gateway Boulevard Interchange** **Preferred Build Alternative Lane Configuration and TNM Inputs - Design Year (2040)**	**Figure 3-7** **Page 30**

4.0 Traffic Noise Analysis

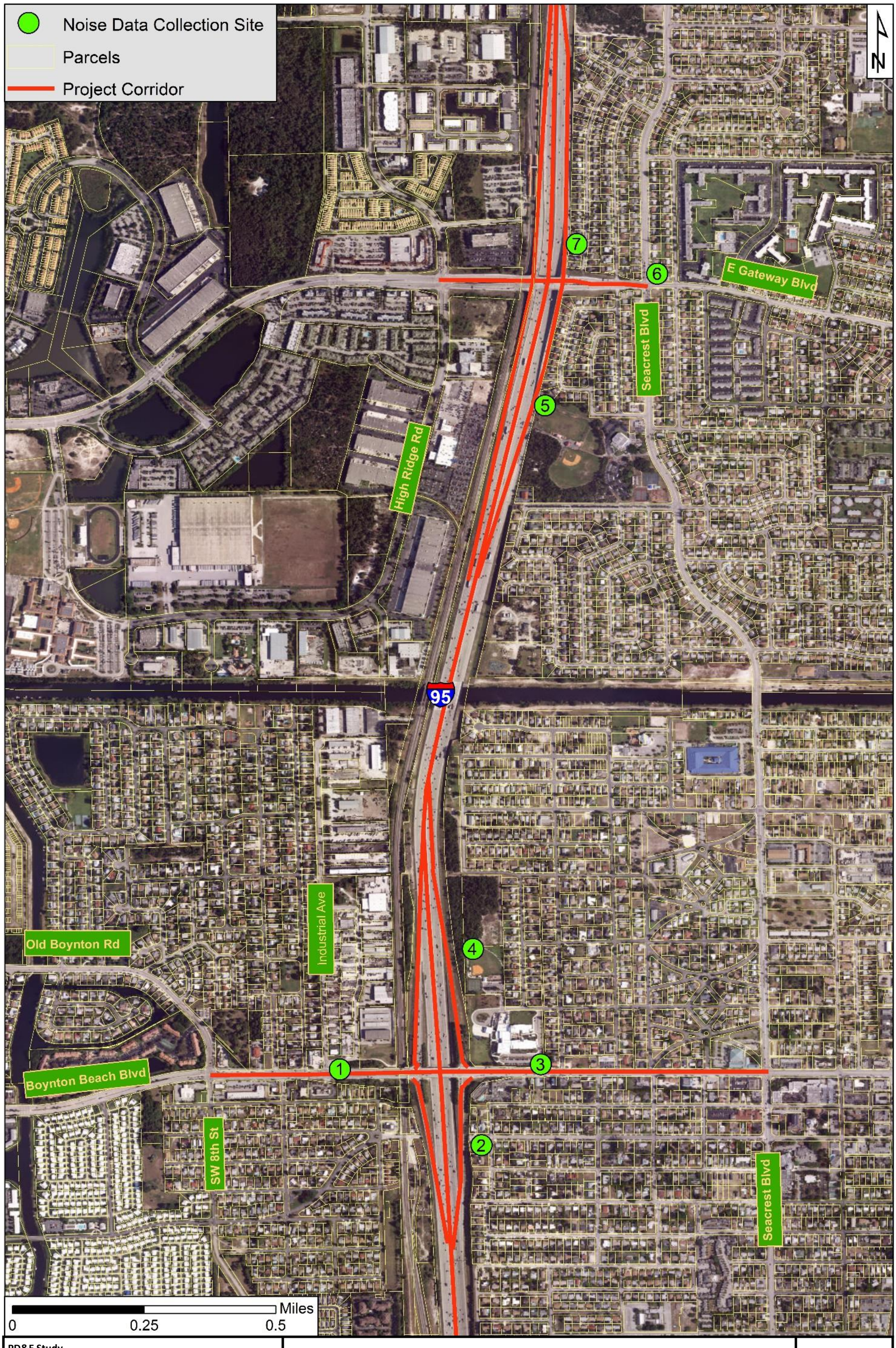
4.1 Measured Noise Levels

Noise monitoring was conducted at seven locations to determine the existing sound levels in the study area and to validate the accuracy of the noise model in predicting traffic noise levels within the study area.

To evaluate the existing noise environment within the vicinity of the study interchanges, 30 minutes of noise data were collected at all sites in 10-minute intervals to obtain the 1-hour equivalent roadway sound level measurement (dB(A) Leq) at each location. Existing traffic noise level measurements of the study receptor locations were collected in May 2016 during the daytime hours (10:00 a.m. to 2:00 p.m.). The equipment used to measure existing noise levels included a laboratory-calibrated Rion NL-42 sound level meter with a tripod. The microphone at all noise measurement locations was placed approximately 5 feet above the existing grade. During each 30 minutes of measurement period, traffic volumes were determined by conducting vehicle counts for motorcycles, cars, medium trucks (double-tires/two axles), and heavy trucks (three or more axles) for the corresponding local road segment(s). In addition to the counts and classifications of vehicles, the speeds of vehicles passing the noise measurement site were also recorded. Start and end times were also recorded along with background noise sources to characterize and quantify the noise environment in the project area. The Field Noise Monitoring (FNM) sites selected for this project are listed in Table 4-1 and shown in Figure 4-1.

Table 4-1: Field Noise Monitoring Sites

Traffic Noise Site ID	Description of Traffic Noise Site	Description of Activity Category	Purpose
FNM 1	Single-Family Home	Residential	Traffic Noise Level
FNM 2	Single-Family Home	Residential	Traffic Noise Level
FNM 3	Single-Family Home	Residential	Traffic Noise Level
FNM 4	Baseball Field	Recreational	Traffic Noise Level
FNM 5	Baseball Field	Recreational	Traffic Noise Level
FNM 6	Single-Family Home (Vacant)	Residential	Traffic Noise Level
FNM 7	Single-Family Home	Residential	Traffic Noise Level



PD&E Study
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ETDM nos. 14180 and 14181

FDOT

Field Noise Monitoring Sites

Figure 4-1

4.2 Traffic Noise Model Validation

To verify the accuracy of the computer noise model for the SR 9/I-95 study corridor, field monitoring was conducted and sound measurements taken following procedures in FHWA's Measurement of Highway-Related Noise guidance document (FHWA 1996). Field measurements were taken primarily to verify that traffic is the primary source of noise in the area. This allowed validation of the TNM based on existing highway conditions.

Consistent with noise sensitive sites in proximity to SR 9/I-95, SR 804/Boynton Beach Boulevard and Gateway Boulevard, seven FNM sites were identified. Traffic volumes by vehicle classification were documented during each monitoring session. Hourly traffic volumes for SR 9/I-95 for validation purposes were obtained from Florida Traffic Online for the same time frame during which the other volume data were collected. The results of field noise monitoring sites from TNM validation are included in Table 4-2 and the validation models are provided in Appendix E. The difference between field-measured and TNM-predicted noise levels are within the 3.0 dB(A) threshold specified in Section 17-5.2 of the FDOT PD&E Manual with the exception of FNM site 2. FNM site 2 does not validate due to misrepresentation of field conditions when data were collected. Traffic volumes for this location were abnormally high during data collection compared to anticipated volumes reported in the DTTM, LOS C predicted values, and Florida Traffic Online values.

Table 4-2: TNM Validation Results

Site Number	Sound Level, Leq (dB(A))		
	Monitored	Modeled	Difference
FNM 1	63.1	63.3	0.2
FNM 2	64.1	56.7	7.4
FNM 3	65.5	67.5	2.0
FNM 4	59.2	61.7	2.5
FNM 5	64.8	66.5	1.7
FNM 6	62.2	64.8	2.6
FNM 7	59.8	57.7	2.1

4.3 Noise-Sensitive Sites

A noise-sensitive site is defined as any property (owner occupied, rented, or leased) where frequent exterior human use occurs and where a lowered noise level would be beneficial, such as residences, churches, schools, hospitals, active sports areas, and recreational areas. FHWA and FDOT have established noise levels at which noise-abatement measures must be considered. The NAC vary according to a property's land use category (discussed in Section 3.3).

Land use adjacent to the project area includes primarily residential developments, playgrounds, and commercial and industrial spaces. These types of land uses are considered Activity Category B, C, E, and F receivers as established by FHWA and FDOT with an hourly average NAC of 66 dB(A), 66 dB(A), 71 dB(A), and 99 dB(A), respectively (as shown in Table 3-1).

Receptor sites in the study area were initially identified using aerial imagery to locate areas that would potentially be noise sensitive. Site visits and field reviews were conducted to confirm receptor site locations. Receiver points representing noise-sensitive sites were identified where exterior use would most likely occur or at the edge of the building closest to the SR 9/I-95 corridor. A total of 528 receivers representing 528 receptors were identified for the noise study. Receptors were modeled as ground-floor receiver points and were positioned 5 feet above the existing ground elevation, with the exception of a few receivers. Receivers R391B, R393B, R396B, R397B, R399B, R400B, R401B, R403B, and R404B were modeled as second-floor receiver points and were positioned 10 feet above the existing receiver location. The noise-sensitive sites identified in the immediate project area are primarily single-family dwelling units near the SR 804/Boynton Beach Boulevard interchange. A few multi-family dwelling units in the area of the Gateway Boulevard interchange were identified. Receivers R391A, R393A, R397A, R399A, R400A, R403A, and R404A have four dwelling units each, and R391B, R393B, R397B, R399B, R400B, and R404B have two dwelling units each. In addition, two baseball fields, one playground, and a tennis court are located in the study area.

Depending on location and noise sensitivity, all receptors were grouped into noise-sensitive areas as follows:

- Noise Sensitive Area 1:SR 804/Boynton Beach Boulevard Eastbound
- Noise Sensitive Area 2: SR 804/Boynton Beach Boulevard Westbound
- Noise Sensitive Area 3: SR 9/I-95 Northbound - Project Limit to SR 804/Boynton Beach Boulevard
- Noise Sensitive Area 4: SR 9/I-95 Northbound - SR 804/Boynton Beach Boulevard to C. Stanley Weaver Canal
- Noise Sensitive Area 5: SR 9/I-95 Southbound - C. Stanley Weaver Canal to SR 804/Boynton Beach Boulevard
- Noise Sensitive Area 6: SR 9/I-95 Southbound - SR 804/Boynton Beach Boulevard to Project Limit
- Noise Sensitive Area 7: Gateway Boulevard Eastbound
- Noise Sensitive Area 8: Gateway Boulevard Westbound
- Noise Sensitive Area 9: SR 9/I-95 Northbound - C. Stanley Weaver Canal to Gateway Boulevard
- Noise Sensitive Area 10: SR 9/I-95 Northbound - Gateway Boulevard to Project Limit
- Noise Sensitive Area 11: SR 9/I-95 Southbound - Project Limit to C. Stanley Weaver Canal

5.0 Noise Analysis Results

5.1 Traffic Noise analysis

Noise analysis is conducted in FHWA's TNM version 2.5. The Existing Condition, No-Build Alternative and Preferred Build Alternative models were developed from the validated Existing Conditions model prepared from field collected data, FDOT Traffic Online, DTTM and aerial imagery for this NSR. Roadways, traffic volumes, speed data, receiver points, existing barrier details, and terrain information was included in all the TNM for this study. A total of 528 receptors were evaluated for the noise impacts. Noise impacts were observed at 136 receiver locations between the SR 804/Boynton Beach Boulevard and Gateway Boulevard project study limits. All the receivers including impacted receivers are shown in Figure 5-1 through Figure 5-12. Table 5-1 summarizes the impacted receptors for the area of SR 804/Boynton Beach Boulevard interchange and Table 5-2 summarizes the impacted receptors for the area of Gateway Boulevard interchange for the three (Existing, No-Build and Build) conditions modeled for the study area. The TNM models for Existing, No-Build and Build scenarios are provided in Appendix E and noise analysis results for all the receivers are provided in Appendix F

Table 5-1: Summary of Impacted Receivers - SR 804/Boynton Beach Boulevard

No.	ID	Site	No of Units	Height (feet)	NAC Category/ dB(A)	Existing (2015) Noise Level dB(A)	No-Build (2040) Noise Level dB(A)	Change From Existing dB(A)	Build (2040) Noise Level dB(A)	Change From Existing dB(A)
1	R2	Commercial	1	5	E/71	**71.8**	**71.8**	0.0	**72.1**	0.3
2	R15	Residential	1	5	B/66	**69.3**	**69.3**	0.0	**69.5**	0.2
3	R25	Residential	1	5	B/66	**66.2**	**66.2**	0.0	**67.2**	1.0
4	R74	Residential	1	5	B/66	65.4	65.5	0.1	**67.3**	1.9
5	R98	Residential	1	5	B/66	**67.2**	**67.2**	0.0	**69.0**	1.8
6	R122	Residential	1	5	B/66	**74.8**	**74.8**	0.0	**74.2**	-0.6
7	R204	Residential	1	5	B/66	**66.4**	**66.4**	0.0	**69.4**	3.0
8	R176	Residential	1	5	B/66	65.0	65.1	0.1	**66.6**	1.6
9	R177	Residential	1	5	B/66	**67.3**	**67.6**	0.3	**69.2**	1.9
10	R182	Residential	1	5	B/66	65.4	**66.0**	0.6	**68.5**	3.1
11	R198	Residential	1	5	B/66	**66.1**	**66.2**	0.1	**69.7**	3.6
12	R37	School	1	5	C/66	63.4	63.8	0.4	**66.4**	3.0
13	R298	Playground	1	5	C/66	**69.2**	**69.3**	0.1	**71.1**	1.9
14	R300	Playground	1	5	C/66	**70.4**	**70.5**	0.1	**71.9**	1.5
15	R301	Residential	1	5	B/66	**71.5**	**71.5**	0.0	**72.7**	1.2
16	R302	Residential	1	5	B/66	**69.8**	**69.8**	0.0	**71.0**	1.2
17	R303	Residential	1	5	B/66	**68.1**	**68.1**	0.0	**69.3**	1.2
18	R304	Residential	1	5	B/66	**67.7**	**67.7**	0.0	**68.8**	1.1
19	R305	Residential	1	5	B/66	**68.7**	**68.7**	0.0	**69.8**	1.1

No.	ID	Site	No of Units	Height (feet)	NAC Category/ dB(A)	Existing (2015) Noise Level dB(A)	No-Build (2040) Noise Level dB(A)	Change From Existing dB(A)	Build (2040) Noise Level dB(A)	Change From Existing dB(A)
20	R306	Residential	1	5	B/66	**70.1**	**70.1**	0.0	**71.1**	1.0
21	R307	Residential	1	5	B/66	**71.3**	**71.3**	0.0	**72.3**	1.0
22	R308	Residential	1	5	B/66	**67.8**	**67.8**	0.0	**68.8**	1.0
23	R309	Residential	1	5	B/66	**68.9**	**68.9**	0.0	**69.9**	1.0
24	R310	Residential	1	5	B/66	**70.1**	**70.2**	0.1	**71.2**	1.1
25	R311	Residential	1	5	B/66	**71.5**	**71.5**	0.0	**72.5**	1.0
26	R312	Residential	1	5	B/66	**67.1**	**67.2**	0.1	**68.2**	1.1
27	R313	Residential	1	5	B/66	**67.9**	**67.9**	0.0	**68.9**	1.0
28	R314	Residential	1	5	B/66	**68.8**	**68.8**	0.0	**69.8**	1.0
29	R315	Residential	1	5	B/66	**69.7**	**69.7**	0.0	**70.7**	1.0
30	R316	Residential	1	5	B/66	65.9	65.9	0.0	**66.9**	1.0
31	R317	Residential	1	5	B/66	**66.6**	**66.6**	0.0	**67.6**	1.0
32	R318	Residential	1	5	B/66	**67.2**	**67.2**	0.0	**68.1**	0.9
33	R319	Residential	1	5	B/66	**67.8**	**67.8**	0.0	**68.8**	1.0
34	R320	Residential	1	5	B/66	**68.1**	**68.1**	0.0	**69.0**	0.9
35	R321	Residential	1	5	B/66	65.3	65.3	0.0	**66.2**	0.9
36	R322	Residential	1	5	B/66	**66.0**	**66.0**	0.0	**67.0**	1.0
37	R323	Residential	1	5	B/66	**66.7**	**66.7**	0.0	**67.6**	0.9
38	R324	Residential	1	5	B/66	**67.7**	**67.7**	0.0	**68.6**	0.9
39	R326	Residential	1	5	B/66	**66.9**	**66.9**	0.0	**67.9**	1.0
40	R327	Residential	1	5	B/66	**67.7**	**67.7**	0.0	**68.7**	1.0
41	R328	Residential	1	5	B/66	**68.4**	**68.4**	0.0	**69.3**	0.9
42	R329	Residential	1	5	B/66	65.6	65.6	0.0	**66.4**	0.8
43	R330	Residential	1	5	B/66	**66.9**	**66.9**	0.0	**67.8**	0.9
44	R332	Residential	1	5	B/66	65.3	65.4	0.1	**66.2**	0.9
45	R333	Residential	1	5	B/66	**66.2**	**66.2**	0.0	**67.1**	0.9
46	R334	Residential	1	5	B/66	**66.8**	**66.8**	0.0	**67.7**	0.9
47	R335	Residential	1	5	B/66	**68.4**	**68.4**	0.0	**69.3**	0.9
48	R336	Residential	1	5	B/66	**68.6**	**68.6**	0.0	**69.4**	0.8
49	R337	Residential	1	5	B/66	65.8	65.8	0.0	**66.7**	0.9
50	R338	Residential	1	5	B/66	**66.4**	**66.4**	0.0	**67.3**	0.9
51	R339	Residential	1	5	B/66	**67.1**	**67.1**	0.0	**68.0**	0.9
52	R340	Residential	1	5	B/66	**67.9**	**67.9**	0.0	**68.9**	1.0
53	R341	Residential	1	5	B/66	**68.4**	**68.4**	0.0	**69.3**	0.9
54	R342	Residential	1	5	B/66	**68.5**	**68.5**	0.0	**69.4**	0.9
55	R343	Residential	1	5	B/66	**68.1**	**68.1**	0.0	**69.0**	0.9
56	R344	Residential	1	5	B/66	**68.6**	**68.6**	0.0	**69.5**	0.9
57	R345	Residential	1	5	B/66	**72.6**	**72.6**	0.0	**73.6**	1.0
58	R346	Residential	1	5	B/66	**70.2**	**70.2**	0.0	**71.1**	0.9
59	R347	Residential	1	5	B/66	**68.8**	**68.9**	0.1	**69.8**	1.0
60	R348	Residential	1	5	B/66	**66.7**	**66.7**	0.0	**67.6**	0.9
61	R349	Residential	1	5	B/66	**66.2**	**66.2**	0.0	**67.1**	0.9

NOT TO SCALE

Boynton Beach Blvd

NW 8th St

NSA 1a

Sheet 1

Boynton Beach Blvd

I-95

I-95 NB Off Ramp

NSA 1b

Boynton Beach Blvd

I-95

I-95 SB On Ramp

Seacrest Blvd

- Noise Sensitive Area
- Un-Impacted Receiver
- Impacted Receiver
- NAC B Receiver
- NAC C Receiver
- NAC E Receiver
- NAC F Receiver
- Existing Barrier

Sheet 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

FDOT

Noise Sensitive Area 1 - SR 804/Boynton Beach Boulevard Eastbound

Figure 5-1

NOT TO SCALE

NSA 2a

NSA 2b

I-95 NB On Ramp

I-95 SB Off Ramp

I-95

Seacrest Blvd

Old Boynton Rd

Boynton Beach Blvd

Boynton Beach Blvd

Sheet 1

Sheet 2

- Noise Sensitive Area
- Un-Impacted Receiver
- Impacted Receiver
- NAC B Receiver
- NAC C Receiver
- NAC E Receiver
- NAC F Receiver
- Existing Barrier

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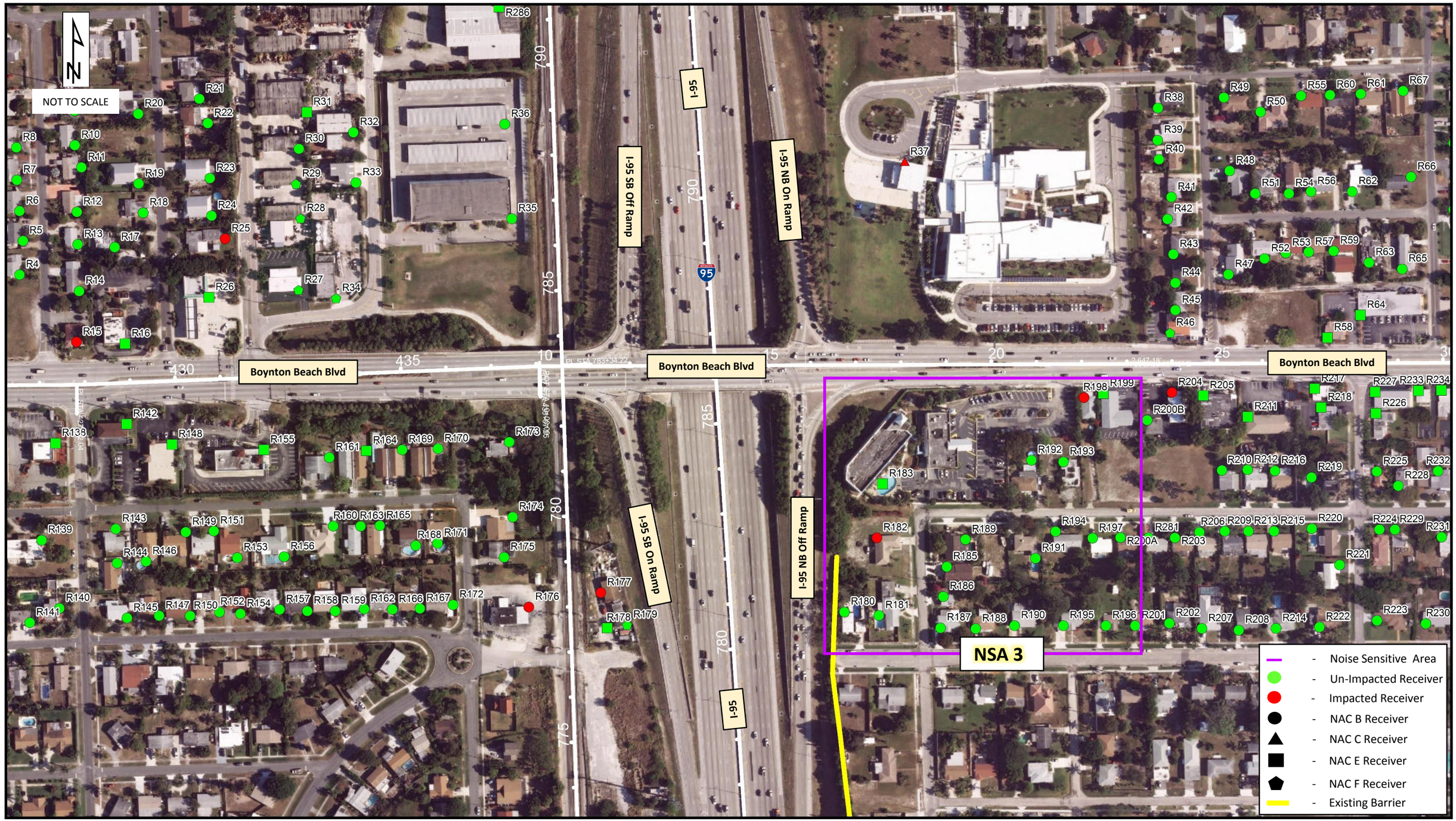
ETDM nos. 14180 and 14181

FDOT

Noise Sensitive Area 2 - SR 804/Boynton Beach Boulevard Westbound

Figure 5-2



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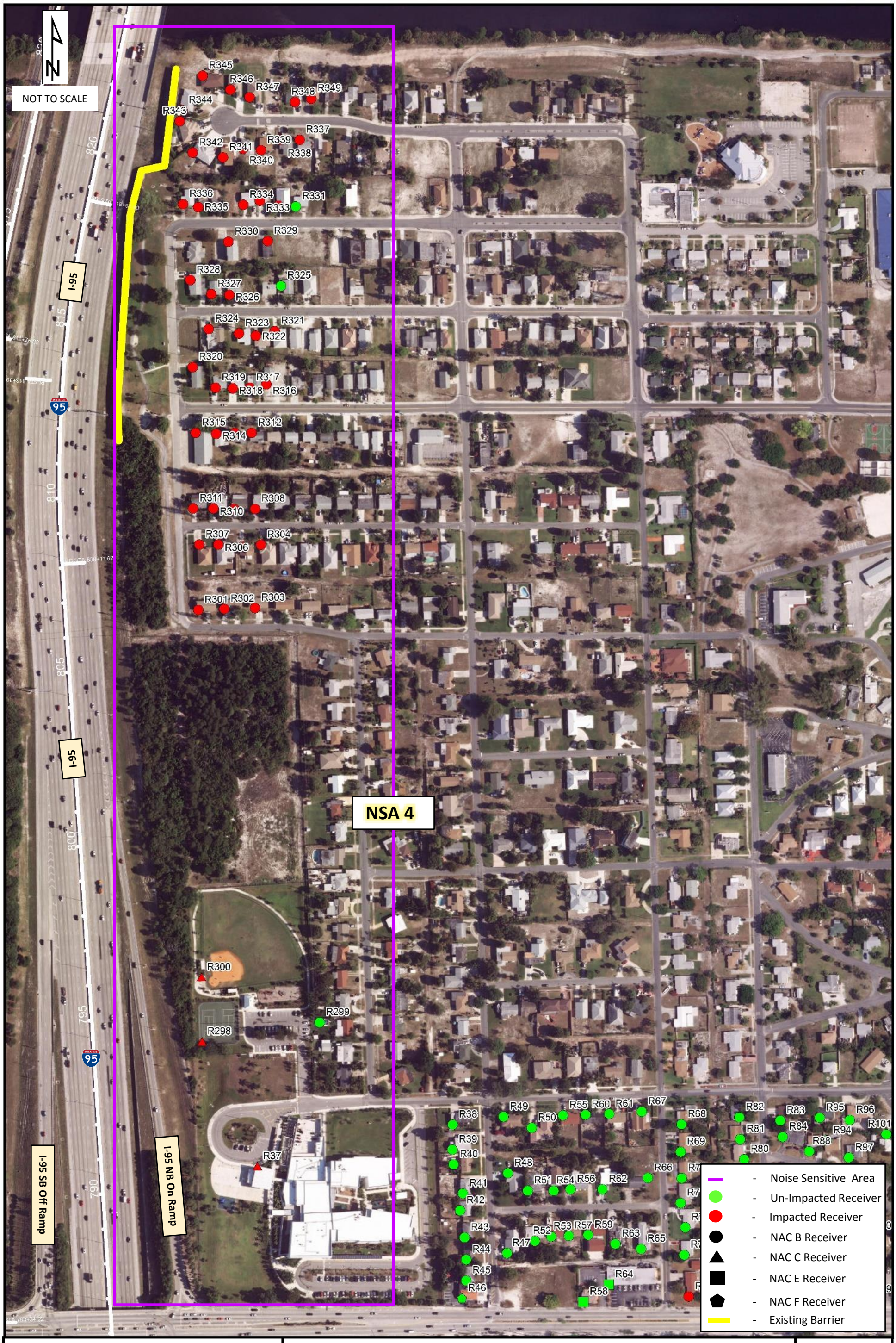
ETDM nos. 14180 and 14181

FDOT

Noise Sensitive Area 3 - SR 9/I-95 Northbound
Project Limit to SR 804/Boynton Beach Boulevard

Figure 5-3



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

Noise Sensitive Area 4 - SR 9/I-95 Northbound
SR 804/Boynton Beach Boulevard to C. Stanley Weaver Canal

Figure 5-4

C. Stanley Weaver Canal

NOT TO SCALE

NSA 5

R297
R296
R295
R294
R293
R292
R291
R290
R289
R288
R287
R286
R1
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R25
R26
R27
R28
R29
R30
R31
R32
R33
R34
R35
R36

820
815
810
805
800
795
790
785

I-95

95

I-95 NB On Ramp

I-95 SB Off Ramp

Boynton Beach Blvd

Boynton Beach Blvd

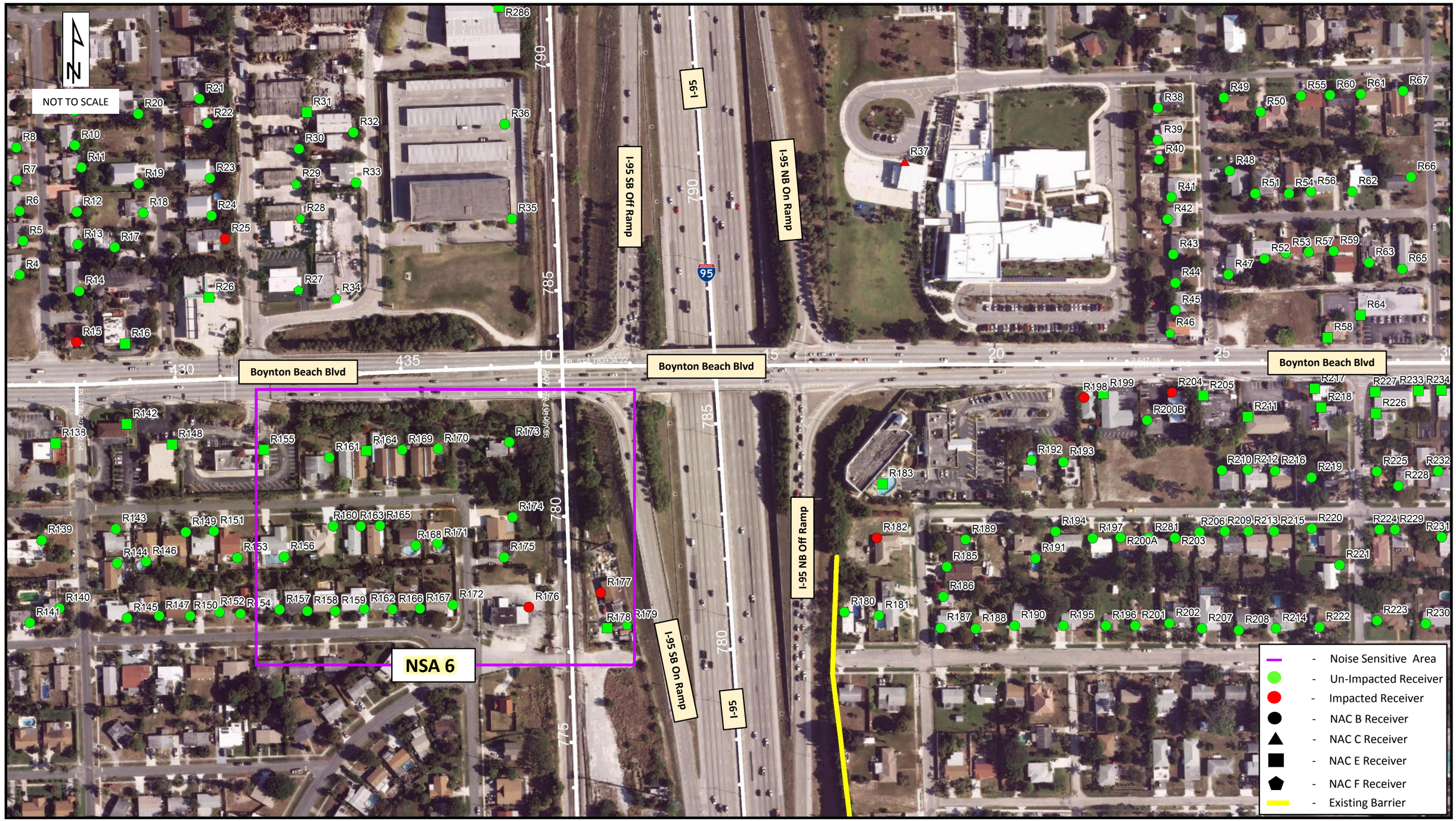
- Noise Sensitive Area
- Un-Impacted Receiver
- Impacted Receiver
- NAC B Receiver
- NAC C Receiver
- NAC E Receiver
- NAC F Receiver
- Existing Barrier

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

Noise Sensitive Area 5 - SR 9/I-95 Southbound
C. Stanley Weaver Canal to SR 804/Boynton Beach Boulevard

Figure 5-5



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

Noise Sensitive Area 6 - SR 9/I-95 Southbound
SR 804/Boynton Beach Boulevard to Project Limit

Figure 5-6

NOT TO SCALE

Gateway Blvd

NSA 3a

R389 R392 R410 R394 R402 R390 R396A R396B R401A R401B R403A R403B R391B R393A R393B R391A R397A R397B R399A R399B R400A R400B R404A R404B R398

High Ridge Rd

I-95 SB On Ramp

I-95

I-95 NB Off Ramp

R452 R421 R424 R430 R435 R441 R445 R446 R456 R458 R462

Sheet 1

Gateway Blvd

R411 R412 R416 R415 R413 R418 R419 R414 R420 R417 R421 R428 R438 R433 R423 R424 R426 R427 R432 R439 R429 R430 R425 R422 R443 R435 R431 R437 R440 R448 R451 R434 R441 R436 R444 R445 R442 R454 R455 R449 R450 R446 R447 R460 R461 R456 R453 R465 R458 R457 R464 R465 R470

I-95

I-95 NB Off Ramp

Seacrest Blvd

NSA 3b

Sheet 2

- Noise Sensitive Area
- Un-Impacted Receiver
- Impacted Receiver
- NAC B Receiver
- NAC C Receiver
- NAC E Receiver
- NAC F Receiver
- Existing Barrier

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

Noise Sensitive Area 7 - Gateway Boulevard Eastbound

Figure 5-7

NSA 4a

NSA 4b

NOT TO SCALE

I-95

I-95 NB On Ramp

I-95 SB Off Ramp

I-95 NB On Ramp

Seacrest Blvd

Gateway Blvd

Gateway Blvd

Quantum Village

High Ridge Rd

R351 R352 R353 R354 R355 R356 R357 R358 R359 R360 R361 R362 R363 R364 R365 R366 R367 R368 R369 R370 R371 R372 R373 R374 R375 R376 R377 R378 R379 R380 R381 R382 R383 R384 R385 R386 R387 R388 R411

Sheet 1

Sheet 2

- Noise Sensitive Area
- Un-Impacted Receiver
- Impacted Receiver
- NAC B Receiver
- NAC C Receiver
- NAC E Receiver
- NAC F Receiver
- Existing Barrier

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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

FDOT

Noise Sensitive Area 8 - Gateway Boulevard Westbound

Figure 5-8

NOT TO SCALE

Gateway Blvd

Gateway Blvd

I-95

I-95 SB On Ramp

I-95 NB Off Ramp

Seacrest Blvd

NSA 9

C. Stanley Weaver Canal

- Noise Sensitive Area
- Un-Impacted Receiver
- Impacted Receiver
- NAC B Receiver
- NAC C Receiver
- NAC E Receiver
- NAC F Receiver
- Existing Barrier

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

Noise Sensitive Area 9 - SR 9/I-95 Northbound
C. Stanley Weaver Canal to Gateway Boulevard

Figure 5-9

NOT TO SCALE

NSA 10

High Ridge Rd

I-95

I-95 SB Off Ramp

I-95 NB On Ramp

I-95 NB Off Ramp

I-95 SB On Ramp

Gateway Blvd

Gateway Blvd

Gateway Blvd

Seacrest Blvd

R353 R354 R355 R356 R357 R358 R359 R360 R361 R362 R363 R364 R365 R366 R367 R368 R369 R370 R371 R372 R373 R374 R375 R376 R377 R378 R379 R380 R381 R382 R383 R384 R385 R386 R387 R388

R399A R399B R400A R400B R401A R401B R402 R403A R403B R404A R404B R411 R412 R413 R414 R415 R416 R417 R418 R419 R420 R421 R422 R423 R424 R425 R426 R427 R428 R429 R430 R431 R432 R433 R434 R435 R436 R437 R438 R439 R440 R441 R442 R443 R444 R445 R446 R447 R448 R451 R450 R449 R454 R455 R460 R461 R453 R456 R457 R458 R462 R459 R464 R465 R470 R466 R467 R452

- Noise Sensitive Area
- Un-Impacted Receiver
- Impacted Receiver
- NAC B Receiver
- NAC C Receiver
- NAC E Receiver
- NAC F Receiver
- Existing Barrier

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

Noise Sensitive Area 10 - SR 9/I-95 Northbound
C. Stanley Weaver Canal to Gateway Boulevard

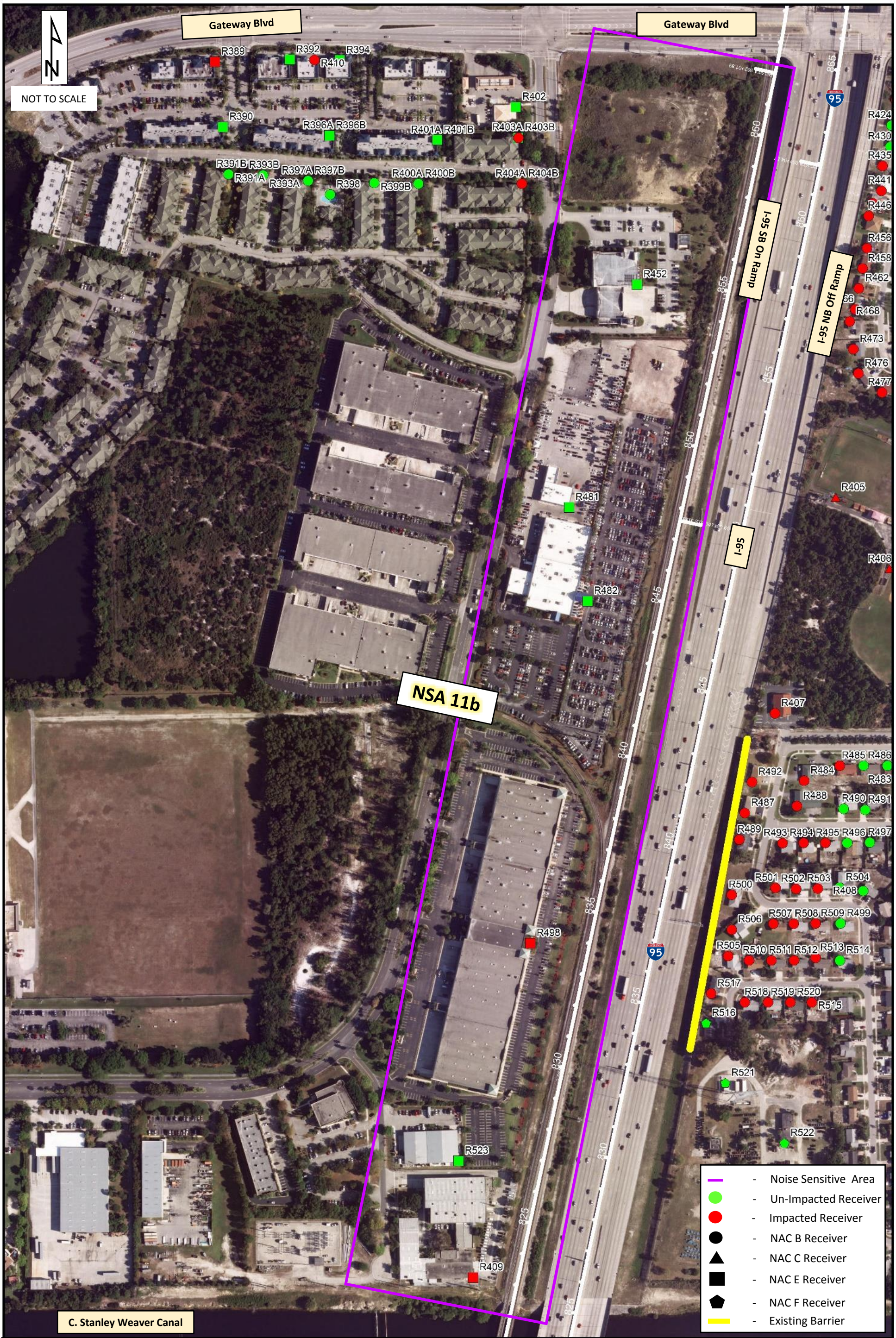
Figure 5-10

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

Noise Sensitive Area 11a - SR 9/I-95 Southbound
Project Limit to C. Stanley Weaver Canal

Figure 5-11



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

Noise Sensitive Area 11b - SR 9/I-95 Southbound
Project Limit to C. Stanley Weaver Canal

Figure 5-12

SR 804/Boynton Beach Boulevard traffic noise analysis reported 52 impacted receptors in the Existing Year (2015), of which 49 are in Activity Category B, two are in Activity Category C, and one in Activity Category E.

In the No-Build Alternative (2040), SR 804/Boynton Beach Boulevard traffic noise analysis reported 53 impacted receptors, of which 50 are residential receptors belonging to Activity Category B, one commercial receptor of Category E, and two are sports areas of Category C.

Under the Preferred Build Alternative (2040), SR 804/Boynton Beach Boulevard traffic noise analysis reported 61 impacted receptors with an average noise level change of 1.18 dB(A) from the Existing Year 2015 is less than the perceived noticeable noise, indicating that the noise impacts of the Preferred Build Alternative for the SR 804/Boynton Beach Boulevard interchange are minimal or negligible. A total of 57 impacted receptors are in Activity Category B, three are in Activity Category E, and three are in Activity Category C in the SR 804/Boynton Beach Boulevard Build Alternative scenario.

All impacted receptors in Existing Year (2015) and the No-Build (2040) conditions reported noise levels ranging from 66.0 dB(A) to 74.8 dB(A), with an average of 68.4 dB(A). Noise levels range from 66.2 dB(A) to 74.2 dB(A), with an average of 69.2 dB(A), for the Design Year (2040) Preferred Build Alternative. Overall, the documented range of noise increase varies but does not indicate a substantial increase (of 15 dB(A) or more) over the existing condition at any location evaluated.

Table 5-2: Summary of Impacted Receivers - Gateway Boulevard

No.	ID	Site	No of Units	Height (feet)	NAC Category/ dB(A)	Existing (2015) Noise Level dB(A)	No-Build (2040) Noise Level dB(A)	Change From Existing dB(A)	Build (2040) Noise Level dB(A)	Change From Existing dB(A)
1	R361	Residential	1	5	B/66	**66.3**	**66.4**	0.1	**67.5**	1.2
2	R366	Residential	1	5	B/66	**66.4**	**66.5**	0.1	**67.5**	1.1
3	R371	Residential	1	5	B/66	**66.7**	**66.8**	0.1	**67.7**	1.0
4	R376	Residential	1	5	B/66	**66.9**	**67.0**	0.1	**67.8**	0.9
5	R383	Residential	1	5	B/66	**67.5**	**67.6**	0.1	**68.3**	0.8
6	R357	Residential	1	5	B/66	65.4	**66.9**	1.5	**66.2**	0.8
7	R362	Residential	1	5	B/66	65.1	**67.0**	1.9	**66.1**	1.0
8	R367	Residential	1	5	B/66	64.8	**66.5**	1.7	**66.1**	1.3
9	R372	Residential	1	5	B/66	64.6	**66.3**	1.7	65.7	1.1
10	R377	Residential	1	5	B/66	64.9	**66.7**	1.8	65.9	1.0
11	R380	Residential	1	5	B/66	**66.0**	**67.7**	1.7	**66.5**	0.5
12	R389	Commercial	1	5	E/71	**71.8**	**71.8**	0.0	70.3	-1.5

No.	ID	Site	No of Units	Height (feet)	NAC Category/ dB(A)	Existing (2015) Noise Level dB(A)	No-Build (2040) Noise Level dB(A)	Change From Existing dB(A)	Build (2040) Noise Level dB(A)	Change From Existing dB(A)
13	R410	Residential	1	5	B/66	**68.2**	**68.2**	0.0	**68.9**	0.7
14	R403A	Residential	4	5	B/66	65.5	65.5	0.0	**66.9**	1.4
15	R404A	Residential	4	5	B/66	65.1	65.3	0.2	**66.4**	1.3
16	R404B	Residential	2	10	B/66	**66.3**	**66.5**	0.2	**67.7**	1.4
17	R416	Residential	1	5	B/66	**69.4**	**69.4**	0.0	**70.7**	1.3
18	R423	Residential	1	5	B/66	**68.4**	**68.4**	0.0	**69.1**	0.7
19	R429	Residential	1	5	B/66	**67.8**	**67.8**	0.0	**68.5**	0.7
20	R434	Residential	1	5	B/66	**67.4**	**67.5**	0.1	**68.7**	1.3
21	R438	Residential	1	5	B/66	**68.4**	**68.5**	0.1	**69.4**	1.0
22	R444	Residential	1	5	B/66	**66.9**	**66.9**	0.0	**68.5**	1.6
23	R405	Playground	1	5	C/66	**73.0**	**73.0**	0.0	**73.8**	0.8
24	R406	Playground	1	5	C/66	**67.8**	**67.8**	0.0	**66.7**	-1.1
25	R407	Residential	1	5	B/66	**75.8**	**75.8**	0.0	**76.8**	1.0
26	R413	Residential	1	5	B/66	65.9	**66.4**	0.5	**66.3**	0.4
27	R417	Residential	1	5	B/66	**66.3**	**67.1**	0.8	**66.0**	-0.3
28	R421	Residential	1	5	B/66	65.5	**66.5**	1.0	64.2	-1.3
29	R435	Residential	1	5	B/66	63.1	65.1	2.0	**66.1**	3.0
30	R441	Residential	1	5	B/66	63.1	65.0	1.9	**66.7**	3.6
31	R445	Residential	1	5	B/66	63.2	65.3	2.1	**66.1**	2.9
32	R446	Residential	1	5	B/66	63.5	65.5	2.0	**66.6**	3.1
33	R453	Residential	1	5	B/66	62.7	63.6	0.9	**66.0**	3.3
34	R456	Residential	1	5	B/66	63.9	65.7	1.8	**68.7**	4.8
35	R457	Residential	1	5	B/66	63.0	63.8	0.8	**66.4**	3.4
36	R458	Residential	1	5	B/66	64.7	**66.3**	1.6	**69.2**	4.5
37	R459	Residential	1	5	B/66	63.8	64.4	0.6	**66.8**	3.0
38	R462	Residential	1	5	B/66	65.3	**66.4**	1.1	**69.5**	4.2
39	R463	Residential	1	5	B/66	64.3	64.6	0.3	**66.6**	2.3
40	R466	Residential	1	5	B/66	65.6	**66.1**	0.5	**69.2**	3.6
41	R468	Residential	1	5	B/66	**66.0**	**66.4**	0.4	**69.0**	3.0
42	R469	Residential	1	5	B/66	64.4	64.6	0.2	**66.3**	1.9
43	R473	Residential	1	5	B/66	**67.6**	**67.7**	0.1	**69.8**	2.2
44	R476	Residential	1	5	B/66	**68.1**	**68.2**	0.1	**69.8**	1.7
45	R477	Residential	1	5	B/66	**66.6**	**66.7**	0.1	**67.7**	1.1
46	R484	Residential	1	5	B/66	**68.1**	**68.1**	0.0	**69.0**	0.9
47	R485	Residential	1	5	B/66	**66.9**	**66.9**	0.0	**67.3**	0.4
48	R487	Residential	1	5	B/66	**67.6**	**67.6**	0.0	**68.5**	0.9
49	R488	Residential	1	5	B/66	**67.4**	**67.4**	0.0	**68.3**	0.9
50	R489	Residential	1	5	B/66	**67.8**	**67.8**	0.0	**68.6**	0.8

No.	ID	Site	No of Units	Height (feet)	NAC Category/ dB(A)	Existing (2015) Noise Level dB(A)	No-Build (2040) Noise Level dB(A)	Change From Existing dB(A)	Build (2040) Noise Level dB(A)	Change From Existing dB(A)
51	R492	Residential	1	5	B/66	**68.6**	**68.6**	0.0	**69.4**	0.8
52	R493	Residential	1	5	B/66	**67.2**	**67.3**	0.1	**68.2**	1.0
53	R494	Residential	1	5	B/66	**66.4**	**66.4**	0.0	**67.2**	0.8
54	R495	Residential	1	5	B/66	65.6	65.6	0.0	**66.2**	0.6
55	R498	Commercial	1	5	E/71	**71.0**	**71.0**	0.0	**72.0**	1.0
56	R500	Residential	1	5	B/66	**68.4**	**68.4**	0.0	**69.3**	0.9
57	R501	Residential	1	5	B/66	**67.3**	**67.3**	0.0	**68.1**	0.8
58	R502	Residential	1	5	B/66	**66.4**	**66.4**	0.0	**67.2**	0.8
59	R503	Residential	1	5	B/66	65.4	65.4	0.0	**66.0**	0.6
60	R505	Residential	1	5	B/66	**67.6**	**67.6**	0.0	**68.4**	0.8
61	R506	Residential	1	5	B/66	**68.5**	**68.5**	0.0	**69.3**	0.8
62	R507	Residential	1	5	B/66	**67.4**	**67.4**	0.0	**68.2**	0.8
63	R508	Residential	1	5	B/66	**66.5**	**66.5**	0.0	**67.3**	0.8
64	R509	Residential	1	5	B/66	65.5	65.5	0.0	**66.2**	0.7
65	R510	Residential	1	5	B/66	**67.9**	**67.9**	0.0	**68.7**	0.8
66	R511	Residential	1	5	B/66	**67.4**	**67.4**	0.0	**68.1**	0.7
67	R512	Residential	1	5	B/66	**66.4**	**66.4**	0.0	**67.1**	0.7
68	R513	Residential	1	5	B/66	65.5	65.5	0.0	**66.2**	0.7
69	R515	Residential	1	5	B/66	65.9	65.9	0.0	**66.5**	0.6
70	R517	Residential	1	5	B/66	**67.3**	**67.3**	0.0	**68.1**	0.8
71	R518	Residential	1	5	B/66	**68.6**	**68.6**	0.0	**69.3**	0.7
72	R519	Residential	1	5	B/66	**67.7**	**67.7**	0.0	**68.5**	0.8
73	R520	Residential	1	5	B/66	**66.9**	**66.9**	0.0	**67.5**	0.6
74	R498	Commercial	1	5	E/71	**71.0**	**71.0**	0.0	**72.0**	1.0
75	R409	Commercial	1	5	E/71	**72.4**	**72.4**	0.0	**73.4**	1.0

Gateway Boulevard traffic noise analysis reported 48 impacted receptors in the Existing Year (2015), of which 42 are in Activity Category B, four is in Activity Category E, and two are in Activity Category C.

In the No-Build Alternative (2040), Gateway Boulevard traffic noise analysis reported 58 impacted receptors, of which 52 are residential receptors belonging to Activity Category B, four commercial receptors of Category E, and two are sports areas of Category C.

Under the Preferred Build Alternative (2040), Gateway Boulevard traffic noise analysis reported 71 impacted receptors with an average noise level change of 1.3 dB(A) from the Existing

Year (2015) is less than the perceived noticeable noise, indicating that the noise impacts of the Preferred Build Alternative for the Gateway Boulevard interchange are minimal or negligible. A total of 66 impacted receptors are in Activity Category B, three are in Activity Category E, and two are in Activity Category C in the SR 804/Boynton Beach Boulevard Build Alternative scenario.

All impacted receptors in Existing Year (2015) and the No-Build (2040) conditions reported noise levels ranging from 66.0 dB(A) to 75.8 dB(A), with an average of 68.0 dB(A) and 67.8 dB(A) respectively. Noise levels range from 66.2 dB(A) to 76.8 dB(A), with an average of 68.2 dB(A), for the Design Year (2040) Preferred Build Alternative. Overall, the documented range of noise increase varies but does not indicate a substantial increase (of 15 dB(A) or more) over the existing condition at any location evaluated.

5.2 Traffic Noise-Abatement Considerations

Following are typical noise-abatement measures used to reduce traffic noise impacts (PD&E Manual, Part 2, Chapter 17 Noise; FDOT 2016):

- Traffic management measures (e.g., traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, and exclusive lane designations)
- Alteration of horizontal and vertical alignments
- Acquisition of property rights (either in fee or lesser interest) for construction of noise barriers
- Construction of noise barriers (including landscaping for aesthetic purposes) whether within or outside the highway right-of-way
- Acquisition of real property or interests therein (predominantly unimproved property) to serve as a buffer zone to preempt development that would be adversely impacted by traffic noise.

Implementing traffic management measures and prohibiting certain vehicle types along SR 9/I-95 is not viable options. Horizontal alignment shifts at the on- and off-ramps are included in the Preferred Build Alternatives for the SR 804/Boynton Beach Boulevard interchange and the Gateway Boulevard interchange, which moves the traffic noise source closer to existing noise-sensitive receptors. While land use planning to avoid impacts would be beneficial for future developments adjacent to ramps and the SR 9/I-95 corridor, it is not applicable for the existing residential developments represented by many of the noise-sensitive sites evaluated in this NSR. Construction of a noise barrier is the most common type of traffic noise-abatement. When considering noise barriers for abatement purposes, feasibility and reasonableness factors are evaluated relative to each alternative. Feasibility focuses on barrier's ability to reduce traffic noise at impacted properties. Noise barriers reduce the sound that enters a community from a busy roadway by reflecting it back across the road and by forcing the noise to take a longer path over

and around the barrier. To be effective, a barrier must block the impacted receptor's line of sight to the noise source.

A barrier analysis was performed using the TNM, with a design goal of a 7 dB(A) noise reduction for at least one impacted receiver. However, the recommended insertion loss for impacted receptors to benefit is 5 dB(A), where both feasibility and reasonableness can be attained. The barrier cannot obstruct safe access to adjacent properties and streets. The barrier must also allow adequate driver visibility from any adjacent driveways or side streets.

The total cost of an economically reasonable barrier may not exceed $42,000 per benefited receptor, including costs associated with acquisition of additional right-of-way and/or easements. For this noise study, estimated barrier costs were calculated using the current FDOT statewide average of $30 per square foot.

Barriers were evaluated at heights ranging from 12 to 22 feet, given that existing barriers are 12 feet high for certain noise sensitive areas in the noise study evaluation. The length is optimized by reducing the wall to a point where the FDOT abatement design goal is attained and the FHWA 5.0 dB(A) minimum reduction requirement is achieved for the maximum number of impacted receptors. The relationship between unit costs and the upper limit for cost reasonableness is based on maintaining a constant upper limit of 1,400 square feet of noise barrier per benefited receiver (PD&E Manual, Part 2, Chapter 17, Noise; FDOT 2016).

5.3 Noise Barrier Analysis

A barrier analysis was conducted utilizing the most recent version of TNM (version 2.5). The barrier analysis was conducted according to the procedures outlined in the PD&E Manual, Part 2, Chapter 17 (FDOT 2016) and used the recommended unit cost of $30 per square foot and a reasonable cost factor of $42,000 per benefited receiver. Additionally, a noise reduction design goal of 7dB(A) was incorporated into the barrier analysis, where at least one or more receivers achieved a 7dB(A) insertion loss. All receivers that achieved a 5dB(A) (or greater) insertion loss were counted as benefited receivers. A noise barrier analysis was conducted for the Preferred Build Alternatives for various Noise Sensitive Areas identified in section.4.3

5.3.1 Noise Sensitive Area 1: SR 804/Boynton Beach Boulevard Eastbound

Noise Sensitive Area 1 is located along the eastbound lanes of SR 804/Boynton Beach Boulevard. There are 113 receivers in this noise sensitive area and 1 of these receivers, representing 1 receptor, is impacted. The impacted receiver is R204. This receiver was reviewed in detail for noise abatement. However, it was determined that the impact could not be mitigated based on factors that include, but are not limited to, the isolated nature of the impacted receiver and a series of intersecting access roads and driveways that resulted in none of the measures being reasonable or feasible. Noise Sensitive Area 1 is depicted on Figure 5-1. The receptors included in this noise sensitive area are summarized in Appendix F.

5.3.2 Noise Sensitive Area 2: SR 804/Boynton Beach Boulevard Westbound

Noise Sensitive Area 2 is located along the westbound lanes of SR 804/Boynton Beach Boulevard. There are 111 receivers in this noise sensitive area and six of these receivers, representing six receptors, are impacted. The impacted receivers are R2, R15, R25, R74, R98, R122. These receivers were reviewed in detail for noise abatement. However, it was determined that the impacts could not be mitigated based on factors that include, but are not limited to, the isolated nature of the impacted receivers and a series of intersecting access roads and driveways that resulted in none of the measures being reasonable or feasible. Noise Sensitive Area 2 is depicted on Figure 5-2. The receptors included in this noise sensitive area are summarized in Appendix F.

5.3.3 Noise Sensitive Area 3: SR 9/I-95 Northbound - Project Limit to SR 804/Boynton Beach Boulevard

Noise Sensitive Area 3 is located along the northbound lanes of SR 9/I-95 from project limit to SR 804/Boynton Beach Boulevard. There are 21 receivers in this noise sensitive area and 2 of these receivers, representing 2 receptors, are impacted. The impacted receivers are R182 and R198. An existing barrier runs along 1,500 feet at this location. These receivers were reviewed in detail for noise abatement. However, it was determined that the impact could not be mitigated based on factors that include, but are not limited to, the isolated nature of the impacted receiver and an existing barrier that resulted in none of the measures being reasonable or feasible. Noise Sensitive Area 3 is depicted on Figure 5-3. The receptors included in this noise sensitive area are summarized in Appendix F.

5.3.4 Noise Sensitive Area 4: SR 9/I-95 Northbound - SR 804/Boynton Beach Boulevard to C. Stanley Weaver Canal

Noise Sensitive Area 4 is located along the northbound lanes of SR 9/I-95 from SR 804/Boynton Beach Boulevard to C. Stanley Weaver Canal. There are 53 receivers in this noise sensitive area and 50 of these receivers, representing 50 receptors, are impacted. The impacted receivers are summarized in Table 5-3. Single family homes account for forty seven of the impact receivers, two playgrounds and one school. These receivers were reviewed in detail for noise abatement. Given the clustered nature of the impacted receivers and the adjacent limited access right-of-way, it was determined that the impacts could potentially be abated by a noise barrier. Noise Barrier 1 was analyzed at this site.

To test the feasibleness of Noise Barrier 1, a 3,493 foot long noise barrier with 22 feet tall panels was analyzed. Of the 50 impacted receivers, 16 were able to achieve the required 7 dB(A) sound level reduction. Noise Barrier 1 was determined to be feasible.

To determine optimum noise barrier height for Noise Barrier 1, a 3,493 feet sound barrier was analyzed with panel heights ranging from 22 feet tall to 16 feet tall. Table 5-3 summarizes the results of these analyses.

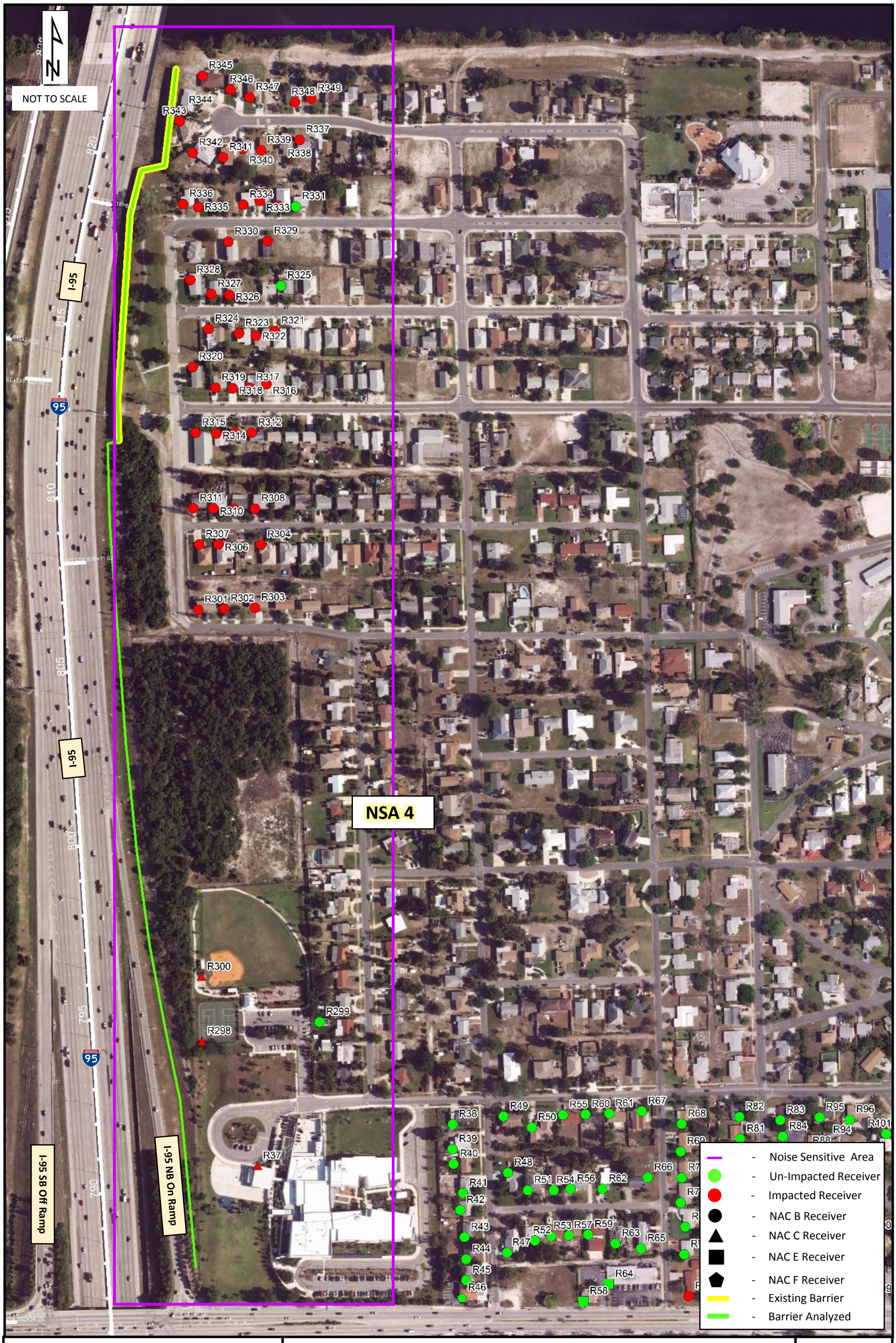
The average noise level reduction ranges from 8.8 dB(A) to 7.2 dB(A) while the number of benefited receptors ranges from 27 to 16. The cost per benefited receptor ranges from $82,335 to $104,790. With no analysis providing cost per benefited receptor lower than or equal to the $42,000 threshold, Noise Barrier 1 is not reasonable and is not recommended to be constructed.

Noise Sensitive Area 4 with Noise Barrier 1 is depicted on Figure 5-13. The receptors included in this noise sensitive area are summarized in Appendix F.

Table 5-3: Noise Barrier 1 Analysis - Noise Sensitive Area 4

No.	ID	Site/Units	Noise level dB(A)	Analyzed Height (feet)			
				16.0	18.0	20.0	22.0
1	R37	Residential/1	67.1	<5.0	<5.0	5.0	5.3
2	R298	Playground/1	71.1	7.1	7.8	8.8	8.9
3	R299	Residential/1	64.6	<5.0	5.1	5.6	5.7
4	R300	Playground/1	71.9	8.2	8.9	9.8	9.9
5	R301	Residential/1	72.7	8.2	9.1	9.8	10.4
6	R302	Residential/1	71.0	7.4	8.2	8.9	9.5
7	R303	Residential/1	69.3	6.8	7.5	8.2	8.7
8	R304	Residential/1	68.8	6.2	7.0	7.6	8.1
9	R305	Residential/1	69.8	6.6	7.4	8.1	8.6
10	R306	Residential/1	71.1	7.3	8.1	8.8	9.3
11	R307	Residential/1	72.3	7.9	8.7	9.4	10.0
12	R308	Residential/1	68.8	5.9	6.7	7.4	7.8
13	R309	Residential/1	69.9	6.4	7.2	7.9	8.4
14	R310	Residential/1	71.2	7.1	7.9	8.6	9.2
15	R311	Residential/1	72.5	7.8	8.6	9.4	10.0
16	R312	Residential/1	68.2	<5.0	5.6	6.3	6.7
17	R313	Residential/1	68.9	5.1	5.8	6.6	7.0
18	R314	Residential/1	69.8	5.5	6.3	7.0	7.5
19	R315	Residential/1	70.7	6.0	6.7	7.5	8.0
20	R316	Residential/1	66.9	<5.0	<5.0	5.2	5.5
21	R317	Residential/1	67.6	<5.0	<5.0	5.4	5.8
22	R318	Residential/1	68.1	<5.0	<5.0	5.6	6.0
23	R319	Residential/1	68.8	<5.0	5.1	5.9	6.2
24	R320	Residential/1	69.0	<5.0	<5.0	5.6	5.9
25	R321	Residential/1	66.2	<5.0	<5.0	<5.0	<5.0
26	R322	Residential/1	67.0	<5.0	<5.0	<5.0	<5.0

No.	ID	Site/Units	Noise level dB(A)	Analyzed Height (feet)			
				16.0	18.0	20.0	22.0
27	R323	Residential/1	67.6	<5.0	<5.0	<5.0	5.0
28	R324	Residential/1	68.6	<5.0	<5.0	5.0	5.3
29	R325	Residential/1	65.8	<5.0	<5.0	<5.0	<5.0
30	R326	Residential/1	67.9	<5.0	<5.0	<5.0	<5.0
31	R327	Residential/1	68.7	<5.0	<5.0	<5.0	5.0
32	R328	Residential/1	69.3	<5.0	<5.0	5.0	5.2
33	R329	Residential/1	66.4	<5.0	<5.0	<5.0	<5.0
34	R330	Residential/1	67.8	<5.0	<5.0	<5.0	<5.0
35	R331	Residential/1	65.6	<5.0	<5.0	<5.0	<5.0
36	R332	Residential/1	66.2	<5.0	<5.0	<5.0	<5.0
37	R333	Residential/1	67.1	<5.0	<5.0	<5.0	<5.0
38	R334	Residential/1	67.7	<5.0	<5.0	<5.0	<5.0
39	R335	Residential/1	69.3	<5.0	<5.0	<5.0	<5.0
40	R336	Residential/1	69.4	<5.0	<5.0	<5.0	<5.0
41	R337	Residential/1	66.7	<5.0	<5.0	<5.0	<5.0
42	R338	Residential/1	67.3	<5.0	<5.0	<5.0	<5.0
43	R339	Residential/1	68.0	<5.0	<5.0	<5.0	<5.0
44	R340	Residential/1	68.9	<5.0	<5.0	<5.0	<5.0
45	R341	Residential/1	69.3	<5.0	<5.0	<5.0	<5.0
46	R342	Residential/1	69.4	<5.0	<5.0	<5.0	<5.0
47	R343	Residential/1	69.0	<5.0	<5.0	<5.0	<5.0
48	R344	Residential/1	69.5	<5.0	<5.0	<5.0	<5.0
49	R345	Residential/1	73.6	<5.0	<5.0	<5.0	<5.0
50	R346	Residential/1	71.1	<5.0	<5.0	<5.0	<5.0
51	R347	Residential/1	69.8	<5.0	<5.0	<5.0	<5.0
52	R348	Residential/1	67.6	<5.0	<5.0	<5.0	<5.0
53	R349	Residential/1	67.1	<5.0	<5.0	<5.0	<5.0
			Average Noise Reduction (dB(A))	7.2	7.7	8.4	8.8
			Impacted But Not Benefited	34.0	32.0	25.0	23.0
			Impacted And Benefited	16.0	18.0	25.0	27.0
			Not Impacted But Benefited	0.0	1.0	1.0	1.0
			Total Benefited Receptors	16.0	19.0	26.0	28.0
			Total Cost	$1,676,640	$1,886,220	$2,095,800	$2,305,380
			Cost/Benefited Receptor	$104,790	$99,275	$80,608	$82,335



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Noise Sensitive Area 4 - SR 9/I-95 Northbound
SR 804/Boynton Beach Boulevard to C. Stanley Weaver Canal

Figure 5-13

5.3.5 Noise Sensitive Area 5: SR 9/I-95 Southbound - C. Stanley Weaver Canal to SR 804/Boynton Beach Boulevard

Noise Sensitive Area 5 is located along the southbound lanes of SR 9/I-95 from C. Stanley Weaver Canal to SR 804/ Boynton Beach Boulevard. There are 22 receivers in this noise sensitive area, most of which are commercial and industrial with not a single impacted receptor. Therefore, a noise barrier analysis was not conducted for this location. Noise Sensitive Area 5 is depicted on Figure 5-5. The receptors included in this noise sensitive area are summarized in Appendix F.

5.3.6 Noise Sensitive Area 6: SR 9/I-95 Southbound - SR 804/Boynton Beach Boulevard to Project Limit

Noise Sensitive Area 6 is located along the southbound lanes of SR 9/I-95 from SR 804/Boynton Beach Boulevard to the project limits. There are 25 receivers in this noise sensitive area, none of which are considered impacted receptors. Therefore, a noise barrier analysis was not conducted for this location. Noise Sensitive Area 6 is depicted on Figure 5-6. The receptors included in this noise sensitive area are summarized in Appendix F.

5.3.7 Noise Sensitive Area 7: Gateway Boulevard Eastbound

Noise Sensitive Area 7 is located along the eastbound lanes of Gateway Boulevard. There are 39 receivers in this noise sensitive area and 11 of these receivers, representing 11 receptors, are impacted. These impacted receivers are R389, R410, R403A, R404A, R404B, R416, R423, R429, R434, R438, and R444. These receivers were reviewed in detail for noise abatement. However, a noise barrier at this location will obstruct the safe access to the properties and streets; thus, a noise barrier would not be considered feasible and reasonable and no further analysis is required for this NSR. Noise Sensitive Area 7 is depicted on Figure 5-7. The receptors included in this noise sensitive area are summarized in Appendix F.

5.3.8 Noise Sensitive Area 8: Gateway Boulevard Westbound

Noise Sensitive Area 8 is located along the westbound lanes of Gateway Boulevard. There are 12 receivers in this noise sensitive area and seven of these receivers, representing seven receptors, are impacted. These impacted receivers are R361, R366, R371, R376, R383, R387, and R388 These receivers were reviewed in detail for noise abatement. However, a noise barrier at this location will obstruct the safe access to the properties and streets; thus, a noise barrier would not be considered feasible and reasonable and no further analysis is required for this NSR. Noise Sensitive Area 8 is depicted on Figure 5-8. The receptors included in this noise sensitive area are summarized in Appendix F.

5.3.9 Noise Sensitive Area 9: SR 9/I-95 Northbound - C. Stanley Weaver Canal to Gateway Boulevard

Noise Sensitive Area 9 is located along the northbound lanes of SR 9/I-95 from Gateway Boulevard to C. Stanley Weaver Canal. There are 98 receivers in this noise sensitive area and 52

of these receivers, representing 52 receptors, are impacted. The impacted receivers are summarized in Table 5-4. These receivers were reviewed in detail for noise abatement. Given the clustered nature of the impacted receivers and the adjacent limited access right-of-way it was determined that the impacts could potentially be abated by a noise barrier. Noise Barrier 2 was analyzed at this site.

To test the feasibleness of Noise Barrier 2, a 3,241 foot long noise barrier with 22 feet tall panels was analyzed. Of the 52 impacted receivers, six were able to achieve the design goal of 7 dB(A) sound level reduction. Noise Barrier 2 was determined to be feasible.

To determine the optimum noise barrier height for Noise Barrier 2, a 3,241 foot long sound barrier was analyzed with panel heights ranging from 22 feet tall to 16 feet tall. Table 5-4 summarizes the results of these analysis. The average noise level reduction ranges from 7.4 dB(A) to 6.5 dB(A) while the number of benefited receptors ranges from 18 to 9. The cost per benefited receptor ranges from $118,837 to $172,853. With no analysis providing cost per benefited receptor lower than or equal to the $42,000 threshold, Noise Barrier 1 is not reasonable and is not recommended to be constructed.

Noise Sensitive Area 9 with Noise Barrier 2 is depicted on Figure 5-14. The receptors included in this noise sensitive area are summarized in Appendix F.

Table 5-4: Noise Barrier 2 Analysis - Noise Sensitive Area 9

No.	ID	Site/Units	Noise level dB(A)	Analyzed Height (feet)			
				16.0	18.0	20.0	22.0
1	R405	Playground/1	73.8	10.0	10.6	11.1	11.6
2	R406	Playground/1	66.7	5.5	5.9	6.3	6.7
3	R407	Residential/1	76.8	<5.0	<5.0	12.7	13.4
4	R412	Residential/1	65.7	<5.0	<5.0	<5.0	<5.0
5	R413	Residential/1	66.3	<5.0	<5.0	<5.0	<5.0
6	R414	Residential/1	63.8	<5.0	<5.0	<5.0	<5.0
7	R417	Residential/1	66.0	<5.0	<5.0	<5.0	<5.0
8	R418	Residential/1	64.8	<5.0	<5.0	<5.0	<5.0
9	R419	Residential/1	63.9	<5.0	<5.0	<5.0	<5.0
10	R420	Residential/1	63.9	<5.0	<5.0	<5.0	<5.0
11	R421	Residential/1	64.2	<5.0	<5.0	<5.0	<5.0
12	R422	Residential/1	62.8	<5.0	<5.0	<5.0	<5.0
13	R424	Residential/1	64.6	<5.0	<5.0	<5.0	<5.0
14	R425	Residential/1	65.0	<5.0	<5.0	<5.0	<5.0

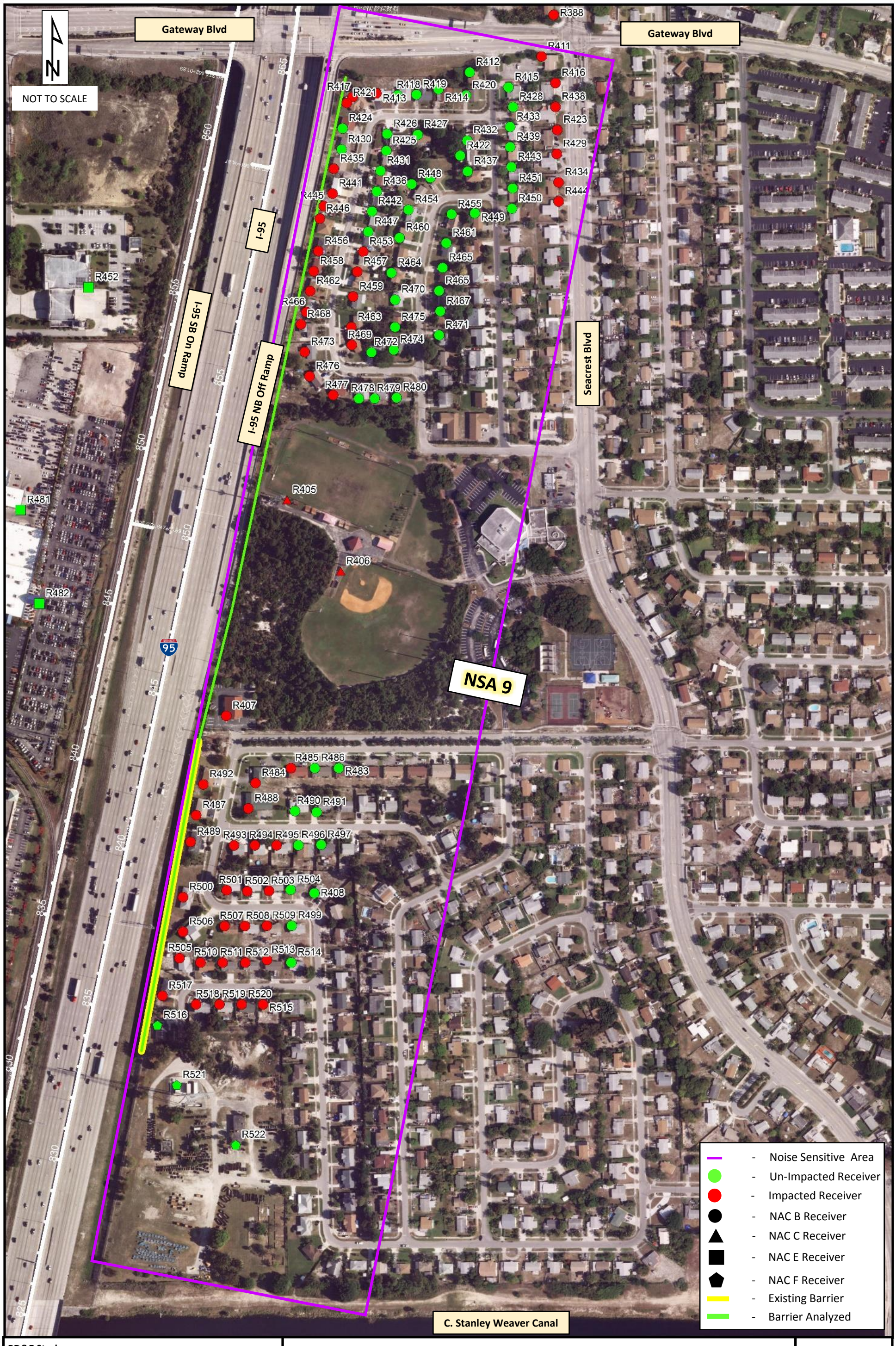
No.	ID	Site/Units	Noise level dB(A)	Analyzed Height (feet)			
				16.0	18.0	20.0	22.0
15	R426	Residential/1	65.0	<5.0	<5.0	<5.0	<5.0
16	R427	Residential/1	63.7	<5.0	<5.0	<5.0	<5.0
17	R430	Residential/1	65.5	<5.0	<5.0	<5.0	<5.0
18	R431	Residential/1	65.3	<5.0	<5.0	<5.0	<5.0
19	R432	Residential/1	62.9	<5.0	<5.0	<5.0	<5.0
20	R435	Residential/1	66.1	<5.0	<5.0	<5.0	<5.0
21	R436	Residential/1	65.3	<5.0	<5.0	<5.0	<5.0
22	R437	Residential/1	62.6	<5.0	<5.0	<5.0	<5.0
23	R440	Residential/1	63.1	<5.0	<5.0	<5.0	<5.0
24	R441	Residential/1	66.7	<5.0	<5.0	<5.0	<5.0
25	R442	Residential/1	65.4	<5.0	<5.0	<5.0	<5.0
26	R445	Residential/1	66.1	<5.0	<5.0	<5.0	<5.0
27	R446	Residential/1	66.6	<5.0	<5.0	5.0	<5.0
28	R447	Residential/1	65.7	<5.0	<5.0	<5.0	<5.0
29	R448	Residential/1	63.9	<5.0	<5.0	<5.0	<5.0
30	R449	Residential/1	62.2	<5.0	<5.0	<5.0	<5.0
31	R453	Residential/1	66.0	<5.0	<5.0	<5.0	<5.0
32	R454	Residential/1	63.6	<5.0	<5.0	<5.0	<5.0
33	R455	Residential/1	62.3	<5.0	<5.0	<5.0	<5.0
34	R456	Residential/1	68.7	<5.0	<5.0	5.2	<5.0
35	R457	Residential/1	66.4	<5.0	<5.0	<5.0	<5.0
36	R458	Residential/1	69.2	<5.0	5.1	5.8	<5.0
37	R459	Residential/1	66.8	<5.0	<5.0	<5.0	<5.0
38	R460	Residential/1	63.8	<5.0	<5.0	<5.0	<5.0
39	R461	Residential/1	62.2	<5.0	<5.0	<5.0	<5.0
40	R462	Residential/1	69.5	5.2	6.0	6.6	6.1
41	R463	Residential/1	66.6	<5.0	<5.0	<5.0	<5.0
42	R464	Residential/1	64.3	<5.0	<5.0	<5.0	<5.0
43	R465	Residential/1	62.2	<5.0	<5.0	<5.0	<5.0
44	R465	Residential/1	62.2	<5.0	<5.0	<5.0	<5.0
45	R466	Residential/1	69.2	5.7	6.1	6.8	6.8
46	R467	Residential/1	62.2	<5.0	<5.0	<5.0	<5.0
47	R468	Residential/1	69.0	6.0	6.4	7.0	7.5
48	R469	Residential/1	66.3	<5.0	<5.0	<5.0	<5.0

No.	ID	Site/Units	Noise level dB(A)	Analyzed Height (feet)			
				16.0	18.0	20.0	22.0
49	R470	Residential/1	63.9	<5.0	<5.0	<5.0	<5.0
50	R471	Residential/1	62.1	<5.0	<5.0	<5.0	<5.0
51	R472	Residential/1	64.9	<5.0	<5.0	<5.0	<5.0
52	R473	Residential/1	69.8	6.0	6.6	7.0	7.3
53	R474	Residential/1	63.6	<5.0	<5.0	<5.0	<5.0
54	R475	Residential/1	63.7	<5.0	<5.0	<5.0	<5.0
55	R476	Residential/1	69.8	6.2	6.7	7.2	7.6
56	R477	Residential/1	67.7	5.1	5.6	6.0	6.3
57	R478	Residential/1	65.7	<5.0	<5.0	<5.0	<5.0
58	R479	Residential/1	64.3	<5.0	<5.0	<5.0	<5.0
59	R480	Residential/1	63.4	<5.0	<5.0	<5.0	<5.0
60	R483	Residential/1	64.7	<5.0	<5.0	<5.0	5.0
61	R484	Residential/1	69.0	5.1	5.7	6.3	6.8
62	R485	Residential/1	67.3	<5.0	5.4	5.8	6.2
63	R486	Residential/1	65.9	<5.0	<5.0	5.2	5.5
64	R487	Residential/1	68.5	<5.0	<5.0	<5.0	5.2
65	R488	Residential/1	68.3	<5.0	<5.0	5.3	5.8
66	R489	Residential/1	68.6	<5.0	<5.0	<5.0	5.1
67	R490	Residential/1	65.8	<5.0	<5.0	<5.0	<5.0
68	R491	Residential/1	64.9	<5.0	<5.0	<5.0	<5.0
69	R492	Residential/1	69.4	<5.0	<5.0	5.3	6.1
70	R493	Residential/1	68.2	<5.0	<5.0	<5.0	5.1
71	R494	Residential/1	67.2	<5.0	<5.0	<5.0	<5.0
72	R495	Residential/1	66.2	<5.0	<5.0	<5.0	<5.0
73	R496	Residential/1	65.1	<5.0	<5.0	<5.0	<5.0
74	R497	Residential/1	64.2	<5.0	<5.0	<5.0	<5.0
75	R499	Residential/1	64.9	<5.0	<5.0	<5.0	<5.0
76	R500	Residential/1	69.3	<5.0	<5.0	<5.0	5.5
77	R501	Residential/1	68.1	<5.0	<5.0	<5.0	<5.0
78	R502	Residential/1	67.2	<5.0	<5.0	<5.0	<5.0
79	R503	Residential/1	66.0	<5.0	<5.0	<5.0	<5.0
80	R504	Residential/1	65.1	<5.0	<5.0	<5.0	<5.0
81	R505	Residential/1	68.4	<5.0	<5.0	<5.0	<5.0
82	R506	Residential/1	69.3	<5.0	<5.0	<5.0	5.1

No.	ID	Site/Units	Noise level dB(A)	Analyzed Height (feet)			
				16.0	18.0	20.0	22.0
83	R507	Residential/1	68.2	<5.0	<5.0	<5.0	<5.0
84	R508	Residential/1	67.3	<5.0	<5.0	<5.0	<5.0
85	R509	Residential/1	66.2	<5.0	<5.0	<5.0	<5.0
86	R510	Residential/1	68.7	<5.0	<5.0	<5.0	<5.0
87	R511	Residential/1	68.1	<5.0	<5.0	<5.0	<5.0
88	R512	Residential/1	67.1	<5.0	<5.0	<5.0	<5.0
89	R513	Residential/1	66.2	<5.0	<5.0	<5.0	<5.0
90	R514	Residential/1	65.1	<5.0	<5.0	<5.0	<5.0
91	R515	Residential/1	66.5	<5.0	<5.0	<5.0	<5.0
92	R516	Industrial/1	69.0	<5.0	<5.0	<5.0	5.1
93	R517	Residential/1	68.1	<5.0	<5.0	<5.0	<5.0
94	R518	Residential/1	69.3	<5.0	<5.0	<5.0	<5.0
95	R519	Residential/1	68.5	<5.0	<5.0	<5.0	<5.0
96	R520	Residential/1	67.5	<5.0	<5.0	<5.0	<5.0
97	R521	Residential/1	67.7	<5.0	<5.0	<5.0	<5.0
98	R522	Residential/1	67.7	<5.0	<5.0	<5.0	<5.0
Average Noise Reduction (dB(A))				6.5	7.0	7.2	7.4
Impacted But Not Benefited				41.0	39.0	34.0	32.0
Impacted And Benefited				9.0	11.0	16.0	18.0
Not Impacted But Benefited				0.0	0.0	0.0	0.0
Total Benefited Receptors				9.0	11.0	16.0	18.0
Total Cost				$1,555,680	$1,750,140	$1,944,600	$2,139,060
Cost/Benefited Receptor				$172,853	$159,104	$121,538	$118,837

5.3.10 Noise Sensitive Area 10: SR 9/I-95 Northbound - Gateway Boulevard to Project Limit

Noise Sensitive Area 10 is located along the northbound lanes of SR 9/I-95 from Gateway Boulevard to project limit. There are 25 receivers in this noise sensitive area and 6 of these receivers, representing 6 receptors, are impacted. The impacted receivers are R357, R362, R367, R372, R377, R380. These receivers were reviewed in detail for noise abatement. However, it was determined that the impacts could not be mitigated based on factors that include, but are not limited to, the isolated nature of the impacted receivers and that the receivers did not meet the 7 dB(A) requirement that resulted in none of the measures being reasonable or feasible. Noise Sensitive Area 10 is depicted on Figure 5-10. The receptors included in this noise sensitive area are summarized in Appendix F.



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Noise Sensitive Area 9 - SR 9/I-95 Northbound
C. Stanley Weaver Canal to Gateway Boulevard

Figure 5-14

5.3.11 Noise Sensitive Area 11: SR 9/I-95 Southbound - Project Limit to C. Stanley Weaver Canal

Noise Sensitive Area 11 is located along the southbound lanes of SR 9/I-95 from project limit to C. Stanley Weaver Canal. There are 7 receivers in this noise sensitive area and 2 of these receivers, representing 2 receptors, are impacted. The impacted receivers are R409 and R498. These receivers were reviewed in detail for noise abatement. However, it was determined that the impacts could not be mitigated based on factors that include, but are not limited to, the isolated nature of the impacted receivers resulted in none of the measures being reasonable or feasible. Noise Sensitive Area 11 is depicted on Figure 5-11a.and Figure 5-11b. The receptors included in this noise sensitive area are summarized in Appendix F.

6.0 Construction Noise and Vibration

Land uses adjacent to SR 9/I-95 are identified on the FDOT listing of noise- and vibration-sensitive sites (i.e., residences). Construction of the proposed roadway improvements is not expected to have any significant noise or vibration impact. If sensitive land uses develop adjacent to the roadway prior to construction, increased potential for noise or vibration impacts could result. It is anticipated that the application of the FDOT Standard Specifications for Road and Bridge Construction will minimize or eliminate potential construction noise and vibration impacts. However, should unanticipated noise or vibration issues arise during the construction process, the Project Engineer, in coordination with the District Noise Specialist and the Contractor, will investigate additional methods of controlling these impacts.

7.0 Summary and Conclusion

The FHWA TNM Version 2.5 computer model and FDOT guidelines were used to conduct a noise analysis for the project area. Future noise levels will increase in the area due to an anticipated increase in future traffic levels regardless of whether the proposed improvements are constructed. Results of the model indicate that predicted noise levels will approach, and in some cases exceed, the Activity Category B and C NAC of 66 dB(A) at sensitive receivers located along the SR 9/I- 95 study area. The predicted noise levels vary according to the location of the receptor and its distance from the roadway. The TNM did not predict that a substantial increase in noise levels (15 dB(A)) above existing conditions will occur at any location as a result of the proposed improvements.

Traffic noise analysis results for the Preferred Build Alternatives for the SR 804/Boynton Beach Boulevard interchange and the Gateway Boulevard interchange indicate that overall, 19 percent and 47 percent of all residential receptors evaluated will be impacted at each interchange, respectively. An impacted commercial receptor is associated with the SR 804/Boynton Beach Boulevard interchange, three impacted commercial receptors are associated with the Gateway Boulevard interchange. The average increase in noise levels over the Existing Year (2015) is approximately 1.3 dB(A) for the SR 804/Boynton Beach Boulevard interchange and approximately 0.9 dB(A) for the Gateway Boulevard interchange.

FHWA and FDOT require that noise-abatement measures be evaluated when noise levels of a proposed roadway project approach or exceed NAC. A noise barrier analysis was conducted for locations with impacted receivers and possess a feasible environment for a noise barrier. The following noise-sensitive sites were evaluated with TNM barrier analysis for the feasibility and reasonability of constructing a noise barrier:

- SR 9/I-95 Northbound - SR 804/Boynton Beach Boulevard to C. Stanley Weaver Canal
- SR 9/I-95 Northbound - C. Stanley Weaver Canal to Gateway Boulevard

The SR 9/I-95 northbound from SR 804/Boynton Beach Boulevard to C. Stanley Weaver Canal was reported to have 50 impacted receptors. Noise barrier heights of 22 feet, 20 feet, 18 feet, and 16 feet with a length of 3,493 feet were analyzed. The 22 feet barrier wall yielded the highest average noise reduction of 8.8 dB(A) among all the barrier wall heights tested. This scenario benefitted 27 receivers with and average reduction greater than 5.0 dB(A) and an additional 1 receiver were benefited with a 5.0 dB(A) or less reduction. Total number of benefited receivers was indicated as 28; thus, the cost of this barrier wall per receptor was identified as $82,335, as summarized in Table 7.1. It is neither feasible nor reasonable to construct a noise barrier in this region.

The SR 9/I-95 northbound from C. Stanley Weaver Canal to Gateway Boulevard was reported to have 52 impacted receptors. Noise barrier heights of 22 feet, 20 feet, 18 feet, and 16 feet with a

length of 3,241 feet were analyzed. The 22 feet barrier wall yielded the highest average noise

Table 7-1-: Noise Barrier 1 Analysis Summary - Noise Sensitive Area 4

Analyzed Height (feet)	16.0	18.0	20.0	22.0
Average Noise Reduction (dB(A))	7.2	7.7	8.4	8.8
Impacted But Not Benefitted	34.0	32.0	25.0	23.0
Impacted And Benefited	16.0	18.0	25.0	27.0
Not Impacted But Benefited	0.0	1.0	1.0	1.0
Total Benefited Receptors	16.0	19.0	26.0	28.0
Total Cost	$1,676,640	$1,886,220	$2,095,800	$2,305,380
Cost/Benefited Receptor	$104,790	$99,275	$80,608	$82,335

reduction of 7.4 dB(A) among all the barrier wall heights tested. This scenario benefitted 18 receivers with and average reduction greater than 5.0 dB(A) and an additional 0 receivers were benefited with a 5.0 dB(A) or less reduction. Total number of benefited receivers was indicated as 18; thus, the cost of this barrier wall per receptor was identified as $118,837, as summarized in Table 7.2 It is neither feasible nor reasonable to construct a noise barrier in this region.

Table 7-2-: Noise Barrier 2 Analysis Summary - Noise Sensitive Area 9

Analyzed Height (feet)	16.0	18.0	20.0	22.0
Average Noise Reduction (dB(A))	6.5	7.0	7.2	7.4
Impacted But Not Benefited	41.0	39.0	34.0	32.0
Impacted And Benefited	9.0	11.0	16.0	18.0
Not Impacted But Benefited	0.0	0.0	0.0	0.0
Total Benefited Receptors	9.0	11.0	16.0	18.0
Total Cost	$1,555,680	$1,750,140	$1,944,600	$2,139,060
Cost/Benefited Receptor	$172,853	$159,104	$121,538	$118,837

The SR 9/I-95 northbound from Gateway Boulevard to project limit was reported to have 25 receivers in this noise sensitive area and 6 of these receivers, representing 6 receptors, are impacted. The impacted receivers were reviewed in detail for noise abatement. However, it was determined that the impacts could not be mitigated based on factors that include, but are not limited

to, the isolated nature of the impacted receivers and that the receivers did not meet the 7 dB(A) requirement that resulted in none of the measures being reasonable or feasible.

This NSR concludes that construction of noise abatement is neither feasible nor reasonable. Further analysis for noise abatement maybe required during the Design Phase of the project.

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Appendix A

Efficient Transportation Decision Making Report

Appendix B

Typical Sections

Appendix C

DTTM and Q/LOS Generalized Service Volume Tables

Appendix D

Traffic Data for Noise Study

Appendix E

Traffic Noise Models

Appendix F

Traffic Noise Modeling Results