Noise Study Report

SR 9/I-95 @ SR 842/Broward Boulevard (Broward Boulevard from West of SW 24th Avenue to East of NW/SW 18th Avenue)
Project Development & Environment (PD&E) Study

Efficient Transportation Decision Making (ETDM) No.: 14226

Broward County, Florida
Financial Project ID Number: 435513-1-22-02

Prepared for:
Florida Department of Transportation, District Four
3400 West Commercial Boulevard
Fort Lauderdale, FL 33309

April 2019

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

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

TECHNICAL REPORT COVERSHEET

650-050-38
ENVIRONMENTAL
MANAGEMENT
06/17

Noise Study Report

Florida Department of Transportation

District 4

SR-9/I-95 @ SR-842/Broward Boulevard

Limits of Project: Broward Boulevard from West of SR 24th Avenue to East of NW/SW 18th Avenue

Broward County, Florida

Financial Management Number: 435513-1-22-02

ETDM Number: 14226

Date: April 2019

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

Table of Contents

List of Tables

List of Appendices

Abbreviations

CFR	Code of Federal Regulation
CD	Collector-Distributor
dB	Decibel
dB(A)	A-weighted decibels
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
HOV	High Occupancy Vehicles
LDCA	Location and Design Concept Acceptance
Leq(h)	Hourly Equivalent Sound Level
LOS	Level of Service
LRTP	Long Range Transportation Plan
mph	miles per hour
MPO	Metropolitan Planning Organization
NAC	Noise Abatement Criteria
PD&E	Project Development and Environment Study
SFRC	South Florida Rail Corridor
SIS	Strategic Intermodal System
TIP	Transportation Improvement Program
TNM	Traffic Noise Model

[*page blank for two-sided printing*]

1.0 Introduction

The Florida Department of Transportation (FDOT), District Four, is currently conducting a Project Development and Environment (PD&E) Study that is evaluating potential improvements to the SR-9/I-95 and SR-842/Broward Boulevard Interchange in the City of Fort Lauderdale, Broward County, Florida. The primary purpose of this study is to develop and evaluate design concepts that will improve traffic flow to and from I-95, as well as along Broward Boulevard, increase connectivity between the 95 Express Lanes and Broward Boulevard, and improve intermodal connectivity. Improved connectivity and traffic flow will be achieved via widening along Broward Boulevard and I-95, new ramps to connect the 95 Express Lanes, and the re-alignment of existing ramps. As part of this PD&E Study, a traffic noise study was performed. The traffic noise study was performed in accordance with the Federal Highway Administration's (FHWA) Noise Standard, Title 23 of the Code of Federal Regulations, Part 772 (23 CFR 772), Procedures for Abatement of Highway Traffic Noise and Construction Noise (July 13, 2010), the FDOT's PD&E Manual, Part 2, Chapter 18, Highway Traffic Noise (January 14, 2019), and FDOT's Traffic Noise Modeling and Analysis Practitioners Handbook (January 1, 2016).

The primary objectives of this noise study were to:

- Describe the existing site conditions including noise sensitive land uses within the project limits;
- Document the methodology used to conduct the noise assessment;
- Assess the significance of traffic noise levels on noise sensitive sites for the No Action and Build Alternatives; and
- Evaluate abatement measures for those noise sensitive sites that, under the Build Alternative, approach or exceed the Noise Abatement Criteria (NAC) set forth by the FDOT and FHWA or where a substantial increase occurs.

Secondary objectives of this study included the consideration of construction noise and vibration impacts as well as the development of noise contours, which can be used in the future by local municipal and county government agencies to identify compatible land uses along the project roadways.

The purpose of this Noise Study Report is to present the findings of the traffic noise analysis. This report also provides technical documentation for the findings described in the project's Preliminary Engineering Report and Type 2 Categorical Exclusion Environmental Determination Form.

2.0 Project Description

2.1 Project Location

The Interchange of I-95 at Broward Boulevard is located in central Broward County in the City of Fort Lauderdale, in Sections 4, 5, 8, and 9 of Township 50 South, Range 42 East. The PD&E study limits extend along SR 9/I-95, from just south of Davie Boulevard to just south of Sunrise Boulevard, a distance of approximately two miles, and along Broward Boulevard from NW 24th Avenue to east of NW/SW 18th Avenue, a distance of approximately one half mile. The study area includes the median ramp connections to the Park-and-Ride lots from I-95 north and south of Broward Boulevard. The South Florida Rail Corridor (SFRC)/CSX Railroad is adjacent to and runs parallel along the west side of I-95 in this area. The study limits are shown in **Figure 1** in **Appendix A**.

2.2 Description of Existing Facilities

The typical section of I-95 within the study area varies. From the Davie Boulevard interchange to SW 5th Place the typical section of I-95 is an eight-lane facility comprised of three General Purpose Lanes in each direction and one Special Use Lane (previously designated for High Occupancy Vehicle (HOV) use and in transition to managed toll lanes under the 95 Express Project) in each direction. From the vicinity of SW 5th Place, where the northbound Collector-Distributor (CD) road ramp system merges traffic from I-595 into the General Purpose Lanes, and through to the Sunrise Boulevard interchange, I-95 is a 10-lane facility comprised of four General Purpose Lanes in each direction and one Special Use Lane in each direction (same condition as noted above). Southbound ingress to I-95 from Broward Boulevard is provided at the western terminal intersection by a single lane access right turn lane from eastbound Broward Boulevard and a double left turn lane from westbound Broward Boulevard. Egress from southbound I-95 to Broward Boulevard is provided by a ramp with a single right turn lane for traffic heading west on Broward Boulevard and a double left turn lane for traffic heading east on Broward Boulevard.

Currently, northbound ingress to I-95 from Broward Boulevard is provided by a single lane access ramp from westbound Broward Boulevard at the eastern terminal intersection and a single lane flyover from eastbound Broward Boulevard west of the western terminal intersection. Egress to Broward Boulevard from northbound I-95 is provided by a ramp, which is part of the northbound CD road ramp system that was recently reconstructed to include triple right turn lanes for traffic heading eastbound on Broward Boulevard and double left turn lanes for traffic heading westbound on Broward Boulevard. Additional ingress and egress to I-95 is provided through the Park-and-Ride lot. For both directions of travel along I-95 ingress and egress is

provided by single lane ramps that cross over the southbound lanes of I-95 and connect with the Special Use Lanes (conversion of single HOV to dual Express Lanes under construction) located in the inside roadway of northbound and southbound I-95.

Broward Boulevard is a six-lane urban divided roadway with a raised median within the vicinity of the I-95 Interchange. In its current configuration there are no provisions for dedicated bicycle traffic within these limits outside of the general travel lanes. Seven-foot wide sidewalks are provided on both sides of Broward Boulevard between NW/SW 22nd Avenue and NW/SW 18th Avenue west of NW/SW 22nd Avenue. Westbound Broward Boulevard to the west of NW/SW 22nd Avenue the sidewalk is seven feet wide, and in the eastbound direction the sidewalk is six feet wide. Broward Boulevard provides the main entry way to the downtown Fort Lauderdale Central Business District from I-95 and the east-west connection between US-1 and SR-817/University Drive in the City of Plantation.

There are a number of transit options within the operating area of the I-95 at Broward Boulevard Interchange that provide direct service and transfer connections along the north-south and east-west corridors. These include passenger rail services (Tri-Rail and Amtrak) and bus services (Broward County Transit, Breeze, Sun Trolley, 95 Express Bus, and Tri-Rail Commuter Connector). There is a Park-and-Ride lot located within the interchange area on the southwest and northwest quadrants. The existing conditions at the Park-and-Ride lot include the provision of 794 parking spaces throughout five parking lots, shown in **Figure 2** in **Appendix B**. Spaces in Lot 5 are designated for Amtrak and Tri-Rail parking only while the spaces in Lots 1-4 are available for any purpose, including car pools and 95 Express Bus. There are no designated bicycle facilities within the Park-and-Ride lot and minimal sidewalk facilities. Access to the Park-and-Ride lots is provided via Broward Boulevard and I-95. Ingress from eastbound Broward Boulevard is provided via a left turn lane at NW 24th Avenue (Lots 1-3) and via right turn lane at SW 22nd Avenue / SW 1st Street (Lots 4-5). Ingress from westbound Broward Boulevard is provided via right turn lanes at NW 22nd Avenue and NW 24th Avenue. Egress to westbound Broward Boulevard is provided via the intersections with NW 22nd Avenue and NW 24th Avenue, requiring drivers coming from the south to circulate through the northern parking areas. Egress to eastbound Broward Boulevard is provided via SW 22nd Avenue / SW 1st Street and NW 24th Avenue. Ingress from both northbound and southbound I-95 are provided in a similar manner with northbound vehicles exiting on the south side of Broward Boulevard and merging into SW 21st Terrace and southbound vehicles existing on the north side of Broward Boulevard with connections to NW 22nd Avenue and SW 22nd Avenue / SW 1st Street provided via access roads within the parking areas. Egress to southbound I-95 is provided on the south side of Broward Boulevard via a ramp that crosses over the southbound General Use Lanes of I-95 and connects to the southbound HOV lane. Egress to northbound I-95 is provided by a direct connect flyover ramp on the north side of Broward Boulevard, accessed from the northern parking area, which

crosses over the southbound General Use Lanes of I-95 and connects to the northbound HOV lane.

2.3 Purpose and Need

The primary purpose of this project is to improve system linkage, traffic operations, and modal interrelationships at the I-95 and Broward Boulevard Interchange. Additional goals of this project are to address Capacity, Safety, Travel Demands, and Emergency Evacuation.

Broward Boulevard is a State Road (SR 842) that provides the main entryway to the downtown Fort Lauderdale Central Business District from I-95. The sections of Broward Boulevard from I-95 to NE 3rd Avenue and north and south of Broward Boulevard on I-95 are part of the state's Strategic Intermodal System (SIS), which consists of high-priority transportation facilities and services of statewide and interregional significance and are critical to the movement of people and goods in Florida. The existing links throughout the system in the study area need improvements based on forecasted traffic demands resulting from regional population growth and employment growth. Currently, the 95 Express Lanes do not directly connect to Broward Boulevard.

The improvements proposed as part of the interchange project will complement the 95 Express Lanes improvements by enhancing existing connectivity within the Park-and-Ride lots, improve existing I-95/Broward Boulevard terminal intersections, and provide improved Express Lane access to Broward Boulevard.

Transit services along Broward Boulevard, 95 Express, and within the Park and Ride Lot/Transit Station areas are currently experiencing recurring congestion that reduces transit vehicle speeds, increases operating costs, and makes scheduling of buses from a system level challenging. The existing geometry and operational features are not allowing optimal bus travel times, multimodal connectivity, or access to bus stops and transfers. The purpose of this study is to address these transit needs.

I-95 within the project limits currently operates at Level of Service (LOS) F. Broward Boulevard within the project limits also operates at LOS F. Without improvements, the driving conditions will continue to operate well below acceptable LOS targets into the future. Congestion on these routes also impacts emergency evacuations.

This study will also propose improvements to address multimodal and safety needs such as the lack of sufficient bicycle and pedestrian facilities on Broward Boulevard and along SW 1st Street and it will address safety concerns that are generated by the at grade weave condition that currently exists between the Sunrise Boulevard and Broward Boulevard interchanges from 95

Express traffic. 95 Express traffic will also be circulating through a low speed Park and Ride lot which poses potential pedestrian conflicts.

2.4 Description of the Proposed Action

This project proposes improvements to the I-95 at Broward Boulevard Interchange complementing the surrounding multimodal facilities. The proposed interchange improvements will be compatible with the proposed 95 Express Phase 3 program, which will introduce two tolled, express lanes each direction, in place of the existing former HOV lanes, from Stirling Road in Broward County to Linton Boulevard in Palm Beach County. 95 Express Phase 3A, which extends from Broward Boulevard to south of SW 10th Street, and includes the limits of the proposed interchange improvements, began construction in mid-2016. Functionality of the I-95 median ramps and Park-and-Ride road network is to be improved for the intermodal services within the interchange area.

The proposed improvements evaluated for the I-95 at Broward Boulevard Interchange consisted of four elements:

- Improvements to the mainline of I-95 to accommodate ingress and egress ramps for 95 Express and the existing Broward Boulevard Interchange ramps;
- Three alternatives for the Broward Boulevard east and west terminal intersections to improve interchange operations;
- Two options for the eastbound Broward Boulevard to southbound 95 Express movement; and
- Conceptual plans for the Park-and-Ride lot to improve circulation and conditions for all users.

The mainline improvements are consistent across each of the three interchange alternatives. Each of the Park-and-Ride concepts was designed to work with the proposed mainline and interchange improvements.

The Build Alternatives under consideration are described in **Sections 2.4.1, 2.4.2, 2.4.3, 2.4.4, and 2.4.5**. Also, under consideration is the No Action Alternative. The No Action Alternative assumes no proposed improvements and serves as a baseline for comparison against the Build Alternatives.

2.4.1 Mainline I-95 Build Alternative

The proposed improvements to the I-95 mainline account for the programmed implementation of 95 Express (under construction at the time of this PD&E Study), which adds one additional Special Use Lane in each direction and modifies the use of these lanes to include managed toll

lanes. The resulting typical section becomes a 12-lane facility comprised of four General Purpose Lanes and two Special Use Lanes in each direction.

The ingress and egress ramps connecting to Broward Boulevard are proposed to be modified in a similar manner for each of the Interchange Build Alternatives. For northbound ingress to I-95 there are no proposed modifications to the existing single lane ramps that provide access from westbound and eastbound Broward Boulevard. For northbound egress from I-95, the existing ramp is proposed to be widened to allow for additional storage, however the turn lane configuration remains the same with dual left-turn and triple right-turn lanes. Southbound ingress to I-95 differs based on the Interchange Build Alternative and is addressed in those sections that follow. Southbound egress from I-95 is proposed to be widened for each of the Interchange Build Alternatives to accommodate one additional turn lane for left turns and two additional turn lanes for right turns, resulting in triple left and triple right turn lanes.

The primary proposed improvements for the mainline, which are shown in **Figures 3A and 3B** in **Appendix B**, are for new braided ramps providing direct ingress and egress between the 95 Express lanes and the existing Broward Boulevard service interchange ramps without requiring drivers to weave through the General Use Lanes. For southbound 95 Express egress, the proposed improvements include a braided ramp (in the vicinity of NW 6th Street/Sistrunk Boulevard) over the southbound I-95 General Use Lanes with a connection to the west terminal intersection of the Broward Boulevard service interchange. Similarly, ingress to southbound 95 Express includes a braided ramp over the southbound I-95 General Use Lanes located just south of Broward Boulevard.

For the northbound direction, egress from 95 Express near Davie Boulevard is proposed through the use of a braided ramp over the northbound I-95 General Use Lanes with a connection to the northbound CD road ramp system that terminates at the east terminal intersection of the Broward Boulevard service interchange. Ingress from the Broward Boulevard service interchange to the northbound 95 Express lanes is proposed through a braided ramp over the northbound I-95 General Use Lanes in the vicinity of NW 6th Street/Sistrunk Boulevard.

2.4.2 Broward Boulevard Interchange Build Alternatives

The proposed improvements to Broward Boulevard include the replacement of the bridge that spans I-95 and the SFRC with a wider and higher bridge span, the provision of three through lanes of traffic with six-foot wide sidewalks and seven-foot wide bicycle lanes in each direction, and three interchange alternatives, which are further described below. The replacement of this bridge span is common to all three interchange alternatives and is being proposed to accommodate necessary turn lanes at the intersections as well as to provide an envelope for a future premium transit stop with connectivity between East-West service along Broward

Boulevard, and the many multimodal transit services provided in the Broward Boulevard Park-and-Ride Lot/Transit Station on the north and south sides of Broward Boulevard. In each of the interchange alternatives, the service interchange ramps are proposed for reconstruction to accommodate the wider and higher proposed bridge span. Most of the ingress and egress ramps are also proposed to include additional lanes to accommodate the forecasted 2040-year traffic.

The proposed interchange alternatives include Tight Diamond, Displaced Left Turn, and Modified Displaced Left Turn. Each of these alternatives is described below. For each of these alternatives the northbound ingress to I-95 remains as a single lane flyover access ramp.

Interchange Build Alternative 1 – Tight Diamond

The Tight Diamond Interchange is a compressed version of the diamond interchange designed to accommodate right-of-way constraints. The interchange consists of two closely spaced signalized intersections at the crossing of the ramp terminals. The key operational aspect of a Tight Diamond Interchange is signal coordination to ensure efficient progression of traffic and minimum storage of vehicles between the terminals. The existing interchange is a Tight Diamond Interchange and this alternative will improve the existing operation through the addition of turn lanes at the ramp terminal locations and optimization of the intersection signal timings. Specifically, one additional left turn lane is proposed for southbound ingress from Broward Boulevard to I-95 resulting in triple left turn lanes for traffic traveling westbound. An additional right turn lane is also proposed resulting in double right turn lanes for eastbound traffic on Broward Boulevard. There are no proposed improvements to the northbound ingress ramps from Broward Boulevard. These improvements are illustrated in **Figure 4** in **Appendix B**.

Interchange Build Alternative 2A – Displaced Left

The Displaced Left Turn Interchange is also known as the Continuous Flow Interchange. The main geometric feature of the Displaced Left Turn Interchange is the removal of left turn movements from the main intersection to an upstream signalized location to reduce the number of traffic signal phases and conflict points. For this alternative, the westbound left turn movements are displaced at the east ramp terminal intersection to a new roadway that is south and runs parallel to the eastbound through lanes where it combines with the displaced left turn lanes from the northbound ramp. This configuration enables the westbound left turn lanes to execute the left turn simultaneously with the westbound through traffic and, under a different signal phase, transition the traffic from the northbound ramp on to the westbound at the west ramp terminal intersection. This proposed alternative increases the number of right turn lanes for the southbound ingress to I-95 from eastbound Broward Boulevard, resulting in dual right turn lanes. Although displaced as previously described, the left turn lanes for southbound ingress remain as dual left turn lanes as is currently provided. These improvements are illustrated in **Figure 5** in **Appendix B**.

Interchange Build Alternative 2B – Modified Displaced Left

The Modified Displaced Left Turn Interchange provides for the displacement of the northbound exit ramp onto a new roadway (bridge structure) over I-95 that is on the south side of Broward Boulevard, and runs south of and parallel to the eastbound Broward Boulevard through lanes. The northbound ramp left-turn traffic is then transitioned on to westbound Broward Boulevard at the west ramp terminal intersection. There are three westbound left-turn lanes at the east ramp terminal intersection. The inner left-turn lane is a buffer left turn lane providing direct connection to southbound 95 Express and the outer two left-turn lanes are for general use that feed into southbound I-95 and the CD road. This alternative involves partial right-of-way acquisitions along Broward Boulevard near NW/SW 18th Avenue. These improvements are illustrated in **Figure 6** in **Appendix B**. Interchange Build Alternative 2B – Modified Displaced Left is the Preferred interchange build alternative for having the best operational results.

2.4.3 Eastbound Broward Boulevard to Southbound 95 Express Alternatives

In the Preferred Broward Boulevard Build Alternative (Build Alternative 2B – Modified Displaced Left), there is a barrier separation on the southbound entrance ramp that restricts Broward Boulevard eastbound right turn traffic from entering the express lanes via the new braided ramp for westbound to southbound 95 Express. Thus, the eastbound traffic on Broward Boulevard destined to the southbound 95 Express lanes must use an alternative route. For eastbound motorists seeking access to southbound 95 Express, there are two options as follows:

- Option 1 (via SW 1st St) – This option directs eastbound Broward Boulevard traffic seeking southbound 95 Express to use SW 1st Street, from SW 22nd Avenue, to access the existing former HOV southbound entrance ramp at the south side of the Park and Ride Lot just south of Broward Boulevard.
    - Alternative 1: No Action
    - Alternative 2 – T-Intersection at SW 21st Terrace and Roundabout at Access Road
    - Alternative 3 – Double Roundabout
    - Alternative 4 – Combined Roundabout
- Option 2 (via Flyover) – This option provides a free flow flyover ramp to provide ingress access for the eastbound Broward Boulevard traffic. The flyover ramp spurs off of the existing Broward Boulevard eastbound to northbound on-ramp and connects to the existing former HOV southbound entrance ramp prior to merging on 95 Express.

Of these, Option 1, Alternative 4 (Combined Roundabout) was selected as the Preferred Alternative. These improvements are illustrated in **Figure 6** in **Appendix B**. This alternative also

calls for the modification to SW 1st Street eastbound at SW 22nd Avenue, converting the access point to allow for eastbound Right-In/Right-Out traffic movements only, at this local street connection point Further description and evaluation of each alternative is in the Preliminary Engineering Report.

2.4.4 Park-and-Ride Lot Build Alternatives

Three concept alternatives were developed to address vehicular circulation through the northern lots. Each of the alternatives includes a realignment of Access Road to provide for a straighter geometry and adjusts the parking areas and other roadway connections as necessary. Specifically, the parking spaces provided in Lot 3 will be shifted west and accommodated in the area currently identified as Lots 1 and 2. Each alternative also provides additional sidewalk throughout the northern parking areas, identifies crosswalks, and proposes a canopy for the sidewalks connecting the train station to the newly created area underneath the expanded Broward Boulevard bridge structure.

The primary difference between these alternatives is the proposed location of the 95 Express Bus stops and the use of the newly created space underneath the expanded Broward Boulevard bridge structure. These alternatives are concepts and the details of the improvements will be determined as part of the Design phase of the project.

Park-and-Ride Alternative 1

The 95 Express Bus stop in the northern parking area is retained in its current location and a Park-and-Ride facility is provided on the opposite side of the existing bus stop. The 95 Express Bus stops currently located on Access Road just south of the Broward Boulevard bridge structure are relocated north to allow for passenger loading underneath the expanded bridge structure. A traffic signal is proposed at the intersection of Access Road with the roadway that provides ingress and egress from I-95 on the north side of the parking area to accommodate left turns by transit vehicles. The additional space provided underneath the bridge is not identified for any specific use aside from being reserved to accommodate an elevator and other access features to allow for a transfer between the possible future transit station in the median of Broward Boulevard and this lower level. These concepts are illustrated in **Figure 7** in **Appendix B**.

Park-and-Ride Alternative 2

In this alternative the 95 Express Bus stop in the northern parking area is shifted south and a Park-and-Ride facility is provided on the east-west access road that becomes the I-95 ingress and egress ramps. At the terminus of the I-95 ramps in the northern lot, a roundabout is proposed in lieu of the existing three-sided interchange. The area underneath the expanded bridge structure is proposed to be used for the 95 Express Bus stops currently located just south of the

bridge structure. This concept provides for a more formal transit boarding and alighting area. These concepts are illustrated in **Figure 8** in **Appendix B**.

Park-and-Ride Alternative 3

This alternative builds on the previous Alternative 2 with the addition of a roundabout to access the formal transit station area created underneath the expanded bridge structure. These concepts are illustrated in **Figure 9** in **Appendix B**.

2.4.5 Preferred Alternative

The Preferred Alternative for this study is a combination of the Mainline I-95 Build Alternative; Interchange Build Alternative 2B; Eastbound Broward Boulevard to Southbound 95 Express Option 1, Sub-Alternative 4, Combined Roundabout Sub-Alternative; and Park-and-Ride Alternative 3. This alternative meets the purpose and need for the project and was selected for having the best operational results at the I-95 ramps' intersections with Broward Boulevard. A typical section package for the Preferred Alternative is provided in Preliminary Engineering Report.

The Preferred Alternative includes the following improvements.

Mainline I-95 Improvements

- The construction of single-lane elevated braided ramps over the General Use Lanes to provide access to and from the southbound and northbound 95 Express Lanes (**Figure 6 in Appendix B**).
    - **Southbound 95 Express Egress**: New braided ramp over the southbound I-95 General Use Lanes with a connection to the west ramp terminal intersection of the Broward Boulevard service interchange to provide egress from 95 Express near NW 6th Street/Sistrunk Boulevard.
    - **Southbound 95 Express Ingress**: New braided ramp over the southbound I-95 General Use Lanes located just south of Broward Boulevard that provides ingress access for the westbound traffic on Broward Boulevard via the west ramp terminal intersection of the Broward Boulevard service interchange.
    - **Northbound 95 Express Egress**: New braided ramp from 95 Express near Davie Boulevard over the northbound I-95 General Use Lanes with a connection to the northbound CD road ramp system that terminates at the east terminal intersection of the Broward Boulevard service interchange.
    - **Northbound 95 Express Ingress**: New braided ramp over the northbound I-95 General Use Lanes in the vicinity of NW 6th Street/Sistrunk Boulevard. This

elevated braided ramp provides direct access between Broward Boulevard and the northbound 95 Express Lanes, using the existing eastbound to northbound flyover, and westbound to northbound ramp, for access to northbound 95 Express.

Broward Boulevard Interchange Improvements

- The addition of triple left and triple right turn lanes for the southbound I-95 exit ramp to Broward Boulevard.
- Replacement of the Broward Boulevard bridge structures over I-95 and the SFRC to accommodate additional turn lanes, a minimum of six-foot sidewalks and seven-foot bike lanes in each direction, and a future premium transit stop in the median.
- Provide three westbound left-turn lanes at the east ramp terminal intersection. The inner left-turn lane is a buffer left turn lane providing direct connection to southbound 95 Express and the outer two left-turn lanes are for general use that feed into southbound I-95 and the CD road.
- Displacement of northbound exit ramp traffic heading west onto a new two-lane roadway (bridge structure) that is on the south of Broward Boulevard over I-95, and runs south of and parallel to the eastbound Broward Boulevard through lanes. The northbound ramp left-turn traffic is transitioned on to the westbound Broward Boulevard roadway at the west ramp terminal intersection (**Figure 6** in **Appendix B**).

Broward Boulevard Eastbound to 95 Express Southbound Improvements

- Barrier separation on the southbound entrance ramp that restricts Broward Boulevard eastbound right turn traffic from entering the express lanes via the new braided ramp for westbound to southbound 95 Express. Eastbound to southbound express lane traffic must continue to use the existing former HOV ramps via SW 22nd Avenue and SW 1st Street.
- Modification to SW 1st Street eastbound at SW 22nd Avenue, converting the access point to allow for eastbound Right-In/Right-Out traffic movements only.
- Construct a combined dual intersection roundabout along SW 1st Street at SW 21st Terrace and the Connector Ramps to and from southbound 95 Express (**Figure 6** in **Appendix B**).

Park and Ride Lot Improvements

Improvements to the Park-and-Ride facility that provide additional sidewalks for pedestrians, a covered waiting area for Express Bus users and improved circulation for vehicles by constructing roundabouts (**Figure 9** in **Appendix B)**.

3.0 Methodology

This study was conducted based on the methodology described in the *FDOT PD&E Manual, Part 2, Chapter 18, Highway Traffic Noise* (January 14, 2019), *FDOT's Traffic Noise Modeling and Analysis Practitioners Handbook* (January 1, 2016), and in accordance with *23 CFR 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise* (July 13, 2010). The noise study involved the following procedures:

- Field Measurement of Noise Levels and Noise Model Validation (see **Section 4.1**);
- Identification of Noise Sensitive Receptor Sites (see **Section 4.2**);
- Prediction of Existing and Future Noise Levels and Assessment of Traffic Noise Impacts (see **Section 4.2**); and
- Consideration of Noise Barriers as a Noise Abatement Measure (see **Section 5.0**).

This study was also performed to facilitate comparisons between, and to be consistent with, the previous traffic noise analysis completed within the project limits. The previous noise studies include one completed for the I-95 PD&E Study from Stirling Road to North of Oakland Park Boulevard (FDID: 429804-1-22-01) to convert the existing former HOV lanes to tolled Express Lanes and adding one additional tolled express lanes to the median of I-95 in each direction. The methodology and results of this study is documented in the 2013 PD&E Noise Study Report dated September 2013. A second noise study was performed following the 2013 PD&E Study, as part of a Reevaluation for the I-95 Express Phase 3A Design Build Project (FPID: 433108-4-52-01), which included a reassessment of the noise barriers ped during the 2013 PD&E Noise Study. The methodology and results of the reassessment of the recommended noise barriers are documented in a Noise Study Report Addendum dated September 2014. As warranted, data from these prior studies were incorporated into the current study. Currently, the proposed improvements including the recommended noise barriers associated with the 2013 PD&E Study and subsequent Reevaluations are under construction as part of the 95 Express Phase 3A Project.

As in the previous traffic noise studies, FHWA's Traffic Noise Model (TNM) Version 2.5 (February 2004) was used to predict future traffic noise levels and to analyze the effectiveness of noise barriers, where warranted. TNM 2.5 is FHWA's latest approved noise model. This model estimates the acoustic intensity at noise sensitive receptor sites from a series of roadway segments (the source). Model-predicted noise levels are influenced by several factors, such as vehicle speed and distribution of vehicle types. Noise levels are also affected by characteristics of the source-to-receptor site path, including the effects of intervening barriers, structures (houses, trees, etc.), ground surface type (hard or soft), and topography.

Representative receptor sites were used as inputs to TNM 2.5 to estimate noise levels associated with existing and future conditions within the project limits. These sites were chosen based on noise sensitivity, roadway proximity, anticipated impacts from the proposed project, and homogeneity (i.e., the site is representative of other nearby sites). For single-family residences, traffic noise levels were predicted at the edge of the dwelling unit closest to the nearest primary roadway. For other noise sensitive sites that may be impacted, traffic noise levels were predicted where the exterior activity occurs. For the prediction of interior noise levels, receptor sites were placed ten feet inside the building at the edge closest to the roadway. Building noise reduction factors identified in Table 18.2 in Part 2, Chapter 18, Highway Traffic Noise (January 14, 2019) of the PD&E Manual and window conditions were used to estimate noise reduction due to the physical structure.

The following sections describe the noise metrics and noise abatement criteria used in this study, as well as the existing and future land uses within the project area.

3.1 Noise Metrics

Noise levels documented in this report represent the hourly equivalent sound level [Leq(h)]. Leq(h) is the steady-state sound level, which contains the same amount of acoustic energy as the actual time-varying sound level over a 1-hour period. Leq(h) is measured in A-weighted decibels [dB(A)], which closely approximate the human frequency response. See **Table 3.1.1** for sound levels of typical noise sources and environments.

3.2 Traffic Data

Similar to the previous traffic noise studies, Level of Service (LOS) traffic volumes that were obtained from the generalized tables of FDOT's Quality/Level of Service Handbook (updated 2012) were used as inputs to TNM 2.5 to predict noise levels for the existing and future design year (2040) No Action and Build conditions. LOS C traffic volumes can be expected to produce the noisiest traffic conditions likely to occur during the 2040 design year. Since LOS C volumes were used, the existing noise levels are representative of the No Action conditions. For consistency, the same percentage of trucks used in the previous studies were also used in the current study.

Table 3.1.1: Sound Levels of Typical Noise Sources and Environments

COMMON OUTDOOR ACTIVITIES	NOISE LEVEL dB(A)	COMMON INDOOR ACTIVITIES
	---110---	Rock Band
Jet Fly-over at 1000 ft		
	---100---	
Gas Lawn Mower at 3 ft		
	---90---	
Diesel Truck at 50 ft, at 50 mph		Food Blender at 1 m (3 ft)
	---80---	Garbage Disposal at 1 m (3 ft)
Noise Urban Area (Daytime)		
Gas Lawn Mower at 100 ft	---70---	Vacuum Cleaner at 10 ft
Commercial Area		Normal Speech at 3 ft
Heavy Traffic at 300 ft	---60---	
		Large Business Office
Quiet Urban Daytime	---50---	Dishwasher Next Room
Quiet Urban Nighttime	---40---	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime		
	---30---	Library
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (Background)
	---20---	
	---10---	
Lowest Threshold of Human Hearing	---0---	
		Lowest Threshold of Human Hearing

Source: California Dept. of Transportation Technical Noise Supplement, Oct. 1998, Page 18.

3.3 Noise Abatement Criteria

The FHWA has established NAC for land use activity categories, which are presented in **Table 3.3.1**. Maximum noise threshold levels, or criteria levels, have been established for five of the seven activity categories. These criteria determine when an impact occurs and when consideration of noise abatement is required. Noise abatement measures must be considered when predicted noise levels approach or exceed the NAC levels or when a substantial noise increase occurs. A substantial noise increase occurs when the existing noise level is predicted to be exceeded by 15 dB(A) or more as a result of the transportation improvement project. The FDOT defines “approach” as within 1.0 dB(A) of the FHWA criteria.

Noise sensitive receptor sites include properties where frequent exterior human use occurs and where a lowered noise level would be of benefit. This includes residential land use (Activity Category B); a variety of nonresidential land uses not specifically covered in Category A or B including parks and recreational areas, medical facilities, schools, and places of worship (Activity Category C); and commercial and developed properties including offices, hotels, and restaurants with exterior areas of use (Activity Category E). Noise sensitive sites also include interior use areas where no exterior activities occur for facilities such as auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, recording studios,

schools, and television studios (Activity Category D). Categories F and G, which include commercial and developed properties without exterior areas of use, do not have noise abatement criteria levels. Category F includes land uses such as industrial and retail facilities that are not considered noise sensitive. Category G includes undeveloped lands.

Table 3.3.1: 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 is essential if the area is to continue to serve its intended purpose.
B[2]	67	66	Exterior	Residential
C[2]	67	66	Exterior	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care 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, day care 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[2]	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.

(Based on Table 1 of 23 CFR Part 772)

[1] The Leq(h) Activity Criteria values are for impact determination only, and are not a design standard for noise abatement measures.

[2] Includes undeveloped lands permitted for this activity category.

Note: FDOT defines that a substantial noise increase occurs when the existing noise level is predicted to be exceeded by 15 decibels or more as a result of the transportation improvement project. When this occurs, the requirement for abatement consideration will be followed.

3.4 Noise Abatement Measures

When traffic noise associated with a proposed project is predicted to approach or exceed the NAC at a noise sensitive site, noise abatement measures must be considered in accordance with 23 CFR Part 772. The most common and effective noise abatement measure for projects such as this is the construction of noise barriers. Noise barriers reduce noise by blocking the sound path between a roadway and a noise sensitive area. To be effective, noise barriers must be long, continuous (i.e., no intermittent openings), and have sufficient height to block the path between the noise source and the receptor site. The FHWA's Analysis and Abatement Guidance (January 2011) indicates the ends of the noise barriers should, in general, extend in each direction four times as far as the distance from the receptor site to the noise barrier.

Other abatement measures that were considered but were determined not to be feasible or reasonable for this project include traffic management, alignment modification, and property acquisition. Traffic management measures such as traffic control devices, prohibition of certain vehicle types, time-use restriction for certain vehicle types, modified speed limits, and exclusive lane designation applied for the purpose of reducing traffic noise levels would impede the operational characteristics of this facility. The project corridor includes existing commercial and residential development on both sides of I-95. Shifting the alignments or modifications to the proposed alignments would directly impact these areas and result in substantial socio-economic effects and additional project costs. Acquisition of right-of-way from the noise sensitive properties impacted by the project would be more expensive and disruptive than the other noise abatement measures.

For noise abatement measures to be recommended for further consideration in the design phase of the project, they must be determined to be both feasible and reasonable. A wide range of factors are used to evaluate the feasibility and reasonableness of noise abatement measures. Feasibility deals with engineering considerations, including the ability to construct a noise barrier using standard construction methods and techniques as well as with the ability to provide a reduction of at least 5 dB(A) to the impacted receptor sites. For example, given the topography of a particular location, can the minimum noise reduction [5.0 dB(A)] be achieved given certain access, drainage, utility, safety, and maintenance requirements? In addition, for a noise barrier to be considered acoustically feasible, at least two impacted receptor sites must achieve at least a 5 dB(A) reduction.

Reasonableness implies that common sense and good judgment were applied in a decision related to noise abatement. Reasonableness includes the consideration of the cost of abatement, the amount of noise abatement benefit, and the consideration of the viewpoints of the impacted and benefited property owners and tenants. To be deemed reasonable, the noise

barrier, or other noise abatement measure, needs to be below FDOT's reasonable cost criteria (described below), must attain FDOT's noise reduction design goal of 7 dB(A) at one or more impacted receptor sites, and must be supported by a majority of the property owners and tenants benefited by the proposed abatement measure.

The evaluation of noise barriers for impacted residential (Activity Category B) and non-residential areas (Activity Categories A, C, D, and E) are based on different methods and are evaluated separately. When determining the cost reasonableness of a conceptual noise barrier design for a residential area, $42,000 per benefited receptor is looked upon as the upper limit using the standard construction cost of $30.00 per square foot. A benefited receptor site is defined as a noise sensitive site that will obtain a minimum of 5.0 dB(A) of noise reduction as a result of a specific noise abatement measure regardless of whether or not they are identified as impacted. Only benefited receptor sites are included in the calculation of reasonable cost for a particular noise abatement measure.

Noise barriers for non-residential areas are assessed using FDOT's "A Method to Determine Reasonableness and Feasibility of Noise Abatement at Special Use Locations (July 22, 2009)". The cost reasonableness of this method is based on the number of people (i.e., person-hours per day) benefited by a noise barrier under consideration. Using this methodology, to be considered cost reasonable, the cost of the noise barrier must have an Abatement Cost Factor less than $995,935 per person-hour per square foot. The Abatement Cost Factor represents the upper limit of the cost per person-hour per square foot of noise barrier and does not represent any direct relation to real barrier construction costs such as dollar per square foot of a barrier. The derivation of the Abatement Cost Factor is based on the FDOT's reasonable cost criteria of $42,000 per benefited receptor site.

If the noise abatement measure has been determined to be reasonable and feasible, the viewpoint of the impacted and benefited property owners must be considered. During a PD&E Study, the view of benefited receptors (property owners/tenants) regarding noise abatement is gathered during workshops and at the Public Hearing. During the Final Design phase of the project, a more detailed process is implemented to include noise abatement workshops and/or public surveys, to determine the wishes of the benefited receptor sites. Each benefited receptor, including both the owner and resident, is given the opportunity to provide input regarding their desires to have the proposed noise abatement measure constructed. The goal of this process is to obtain a response for or against the noise barrier from a majority of benefited receptors (property owners and tenants) that respond to the survey. If not supported by a majority of the survey respondents, a noise barrier or abatement measure will not be deemed reasonable.

3.5 Existing and Future Land Use

Existing and future land uses were reviewed to identify the potential noise sensitive receptor sites in the project area. The area surrounding the interchange consists of developed parcels and properties, such as residential, institutional, commercial, industrial and light industrial, and transportation, as well as recreational areas (**Figure 2** in **Appendix A**).

The Broward County Future Land Use Map (**Figure 3** in **Appendix A**) shows only minor changes in land use. Residential areas south of Davie Boulevard are shown as being converted from residential to commercial land uses. Additionally, the area on both sides of I-95 between Broward Boulevard and Sunrise Boulevard are shown as changing from residential, commercial, light industrial, institutional, or open land to “Activity Center”.

4.0 Traffic Noise Analysis

4.1 Model Validation

Due to the ongoing construction activities within the project area associated with the 95 Express Phase 3A, new noise measurements were not performed to verify that TNM-predicted existing levels are representative of the actual levels along I-95 or to confirm that traffic noise is the dominant source. Noise measurements obtained while construction activities are ongoing in the area, including shifts in travel lanes and the presence of workers, would not be representative of the roadway conditions that were used in the modeling of the existing conditions. Therefore, the noise measurements and model validation performed during the 2013 PD&E Noise Study were adopted for use in this study. The previous model validation is still considered applicable and valid because the same model is being used and the existing highway and traffic conditions have not significantly changed in the project area since the completion of the 2013 PD&E Study and the start of the construction activities. In addition, the 2013 PD&E Study noise measurements were performed in accordance with the latest version of the methodology established by the FHWA and documented in Report No. DP-96-046, *Measurement of Highway-Related Noise: Final Report*, May 1996.

The results of the model validation performed during the 2013 PD&E Noise Study indicated that the use of the TNM model was supported based on a comparison of the measured noise levels to the model predicted levels. All five locations monitored along I-95 were within the acceptable level of accuracy of +/- 3.0 dB(A) (see **Table 6-4** in **Appendix C**). In addition, the results of the previous noise measurements indicate that I-95 is the dominant noise source at nearby noise sensitive sites and that railway noise from the SFRC is also a dominant noise source. Relevant pages from the 2013 PD&E Noise Study Report summarizing the location of the field

measurements, the data collected, and noise model validation are included in **Appendix C**. Of the five model validation sites and three field measurement sites, Sites FR-B and FM-C were located within the current project study limits (see **Figures C-10 and C-11** in **Appendix C**).

4.2 Predicted Noise Levels and Abatement Analysis

The project area includes noise sensitive land uses that will be potentially impacted by traffic noise associated with the project. These noise sensitive land uses include single and multi-family residences, places of worship, and recreational areas. Existing land uses categorized by FHWA's Noise Activity Categories within the project area and the locations of the representative sites are depicted in **Figure 4** in **Appendix A**. **Table 4.2.1** lists and describes the representative noise sensitive receptors by general area, approximate location, and number of sites represented. **Table 4.2.1** also includes the predicted noise levels for the Existing/No Action Alternative and for the Build Alternative. Each of the representative receptor sites were given a unique designation, for example, DE-SB1(FR). The first letter typically represents the roadway segment where the receptor is located (i.e., Segment D, E, or F). The second letter identifies whether the site is located east or west of I-95. To facilitate the noise impact analysis, the project was divided into the same three segments used in the 2013 PD&E Noise Study. Each of the segments have similar existing and/or proposed typical sections and peak hour traffic volumes and include:

- Segment D - South Fork of the New River to SR 736/Davie Boulevard;
- Segment E - SR 736/Davie Boulevard to SR 842/Broward Boulevard; and
- Segment F - SR 842/Broward Boulevard to SR 838/Sunrise Boulevard.

The following section summarizes the predicted noise levels and impacts by each of the project segments and noise sensitive areas. Predicted design year (2040) noise levels for the Build Alternative were compared to the NAC and to existing conditions predicted levels to assess potential noise impacts associated with the proposed project (see **Table 4.2.1**). In addition, the range of predicted noise levels for the Existing/No Action Alternative and for the Build Alternative and the number of impacted receptor sites per noise sensitive area/site are summarized in **Table 4.2.2**. As presented below, although a number of sites approach or exceed the NAC, the proposed improvements do not result in any substantial noise increases (i.e., greater than 15 dB(A) over existing levels).

Table 4.2.1: Modeled Noise Receptor Locations and Noise Analysis Results (Sheet 1 of 5)

General Location	Name of Noise Sensitive Area/Site	Representative Noise Receptor Site Designation	Description and Noise Abatement Activity Category	Number of Noise Sensitive Sites Represented	Station	Distance to Nearest Travel Lane - Existing /Proposed (Feet)	Predicted Traffic Noise Levels [LAeq1h, dB(A)]			
							Existing (2017) and No Action (Design Year 2040)	Build (Design Year 2040)	Difference Between Existing Conditions/No Action and Build Alternative dB(A)	Noise Abatement Criteria Status
North of the South Fork of the New River to SR 736/Davie Boulevard (Segment D)										
East of I-95	Shady Banks	DE-SB1(FR)	Single Family Residential (B) NAC 66 dB(A)	7	1969+52	135/135	65.2	64.5	-0.7	Below
		DE-SB2(FR)	Single Family Residential (B) NAC 66 dB(A)	1	1973+59	190/190	63.5	62.6	-0.9	Below
		DE-SB4(FR)	Single Family Residential (B) NAC 66 dB(A)	3	1977+67	220/220	62.3	61.4	-0.9	Below
		DE-SB5(FR)	Single Family Residential (B) NAC 66 dB(A)	8	1980+68	205/205	61.9	61.1	-0.8	Below
		DE-SB6(FR)	Single Family Residential (B) NAC 66 dB(A)	6	1984+18	120/120	61.9	61.1	-0.8	Below
		DE-SB7(FR)	Single Family Residential (B) NAC 66 dB(A)	3	1987+67	70/70	66.0	63.8	-2.2	Below
		DE-SB1(SR)	Single Family Residential (B) NAC 66 dB(A)	4	1969+83	275/275	66.3	65.1	-1.2	Below
		DE-SB2(SR)	Single Family Residential (B) NAC 66 dB(A)	3	1972+65	305/305	65.6	64.4	-1.2	Below
		DE-SB3(SR)	Single Family Residential (B) NAC 66 dB(A)	5	1976+08	300/300	63.3	62.3	-1.0	Below
		DE-SB4(SR)	Single Family Residential (B) NAC 66 dB(A)	2	1978+33	420/420	63.2	62.1	-1.1	Below
		DE-SB5(SR)	Single Family Residential (B) NAC 66 dB(A)	4	1981+44	355/355	62.0	61.2	-0.8	Below
		DE-SB6(SR)	Single Family Residential (B) NAC 66 dB(A)	5	1984+74	285/285	61.4	60.5	-0.9	Below
		DE-SB7(SR)	Single Family Residential (B) NAC 66 dB(A)	2	1986+73	240/240	62.2	60.7	-1.5	Below
		DE-SB2(TR)	Single Family Residential (B) NAC 66 dB(A)	3	1973+12	380/380	64.4	63.2	-1.2	Below
		DE-SB3(TR)	Single Family Residential (B) NAC 66 dB(A)	4	1975+72	480/480	63.4	62.3	-1.1	Below
		DE-SB4(TR)	Single Family Residential (B) NAC 66 dB(A)	5	1979+78	520/520	61.3	60.4	-0.9	Below
		DE-SB6(TR)	Single Family Residential (B) NAC 66 dB(A)	6	1983+78	430/430	60.1	59.3	-0.8	Below
West of I-95	Flamingo Park	DW-FP1(FR)	Single Family Residential (B) NAC 66 dB(A)	10	1972+43	370/370	61.7	61.4	-0.3	Below
		DW-FP1(SR)	Single Family Residential (B) NAC 66 dB(A)	8	1972+41	505/505	59.8	59.4	-0.4	Below
	Holland Mobile Home Park	DW-HMHP1(FR)	Single Family Residential (B) NAC 66 dB(A)	8	1978+41	125/125	63.2	62.7	-0.5	Below
		DW-HMHP2(FR)	Single Family Residential (B) NAC 66 dB(A)	11	1982+41	130/130	65.8	65.5	-0.3	Below
		DW-HMHP3(FR)	Single Family Residential (B) NAC 66 dB(A)	4	1986+40	135/135	66.6	65.8	-0.8	Below
		DW-HMHP1(SR)	Single Family Residential (B) NAC 66 dB(A)	7	1978+38	215/215	63.4	62.9	-0.5	Below
		DW-HMHP2(SR)	Single Family Residential (B) NAC 66 dB(A)	9	1982+38	215/215	65.1	64.8	-0.3	Below
		DW-HMHP3(SR)	Single Family Residential (B) NAC 66 dB(A)	4	1986+37	225/225	64.7	64.0	-0.7	Below

Table 4.2.1: Modeled Noise Receptor Locations and Noise Analysis Results (Sheet 2 of 5)

General Location	Name of Noise Sensitive Area/Site	Representative Noise Receptor Site Designation	Description and Noise Abatement Activity Category	Number of Noise Sensitive Sites Represented	Station	Distance to Nearest Travel Lane - Existing /Proposed (Feet)	Predicted Traffic Noise Levels [LAeq1h, dB(A)]		Difference Between Existing Conditions/No Action and Build Alternative dB(A)	Noise Abatement Criteria Status
							Existing (2017) and No Action (Design Year 2040)	Build (Design Year 2040)		
SR 736/Davie Boulevard to SR 842/Broward Boulevard (Segment E)										
East of I-95	Riverside Park, Riverside Manor Apartments, Hazewood Acres, Community Acres, and Kingdom Hall of Jehovah's Witnesses	EE-SFH1(FR)	Single Family Residential (B) NAC 66 dB(A)	2	1992+64	75/75	61.0	60.2	-0.8	Below
		EE-MF1(FR)	Multi-Family Residential (B) NAC 66 dB(A)	16	1995+17	175/175	61.8	60.9	-0.9	Below
		EE-SFH2(FR)	Single Family Residential (B) NAC 66 dB(A)	9	1998+19	45/45	62.1	61.2	-0.9	Below
		EE-SFH3(FR)	Single Family Residential (B) NAC 66 dB(A)	8	1998+86	115/115	62.5	61.1	-1.4	Below
		EE-SFH4(FR)	Single Family Residential (B) NAC 66 dB(A)	9	1999+89	280/280	61.2	59.3	-1.9	Below
		EE-SFH5(FR)	Single Family Residential (B) NAC 66 dB(A)	4	2001+32	340/340	60.7	58.4	-2.3	Below
		EE-MFH2(FR)	Multi-Family Residential (B) NAC 66 dB(A)	2	2003+01	225/225	61.8	59.0	-2.8	Below
		E-RMPool	Riverside Manor Apartments Pool Residential (B) NAC 66 dB(A)	Special Land Use	2005+54	135/135	57.6	55.2	-2.4	Below
		EE-SFH6(FR)	Single Family Residential (B) NAC 66 dB(A)	13	2010+36	45/45	62.6	62.2	-0.4	Below
		EE-SFH7(FR)	Single and Multi-Family Residential (B) NAC 66 dB(A)	13	2018+50	85/85	65.9	65.2	-0.7	Below
		E-RSPool	Riverside Apartments Pool Residential (B) NAC 66 dB(A)	Special Land Use	2022+31	105/105	61.2	60.5	-0.7	Below
		EE-SFH8(FR)	Single Family Residential (B) NAC 66 dB(A)	2	2025+28	75/75	65.8	65.0	-0.8	Below
		E-KingHall	Kingdom Hall of Jehovah's Witnesses (Interior) Place of Worship (D) NAC 51 dB(A)	Special Land Use	2028+18	75/75	63.8	63.2	-0.6	Below
		EE-SFH9(FR)	Single and Multi-Family Residential (B) NAC 66 dB(A)	10	2030+70	215/215	63.4	62.2	-1.2	Below
		EE-MFH3(FR)	Multi-Family Residential (B) NAC 66 dB(A)	21	2035+60	155/155	62.7	61.3	-1.4	Below
		EE-MFH4(FR)	Multi-Family Residential (B) NAC 66 dB(A)	10	2039+35	120/120	61.8	60.6	-1.2	Below
		EE-MFH1(SR)	Multi-Family Residential (B) NAC 66 dB(A)	3	1992+66	150/150	62.9	61.1	-1.8	Below
		EE-SFH1(SR)	Single Family Residential (B) NAC 66 dB(A)	8	2009+25	205/205	61.6	60.8	-0.8	Below
		EE-MFH2(SR)	Single and Multi-Family Residential (B) NAC 66 dB(A)	22	2018+99	255/255	62.5	61.8	-0.7	Below
		EE-MFH3(SR)	Multi-Family Residential (B) NAC 66 dB(A)	11	2025+91	255/255	62.8	61.9	-0.9	Below
		EE-MFH4(SR)	Multi-Family Residential (B) NAC 66 dB(A)	9	2030+12	295/295	62.8	61.7	-1.1	Below
		EE-MFH5(SR)	Multi-Family Residential (B) NAC 66 dB(A)	14	2036+72	295/295	61.9	60.3	-1.6	Below
		EE-MFH6(SR)	Multi-Family Residential (B) NAC 66 dB(A)	9	2040+04	275/275	62.2	62.8	0.6	Below
West of I-95	Riverland	EW-RL1(FR)	Single Family Residential (B) NAC 66 dB(A)	3	2030+49	545/545	64.6	62.4	-2.2	Below
		EW-RL2(FR)	Single Family Residential (B) NAC 66 dB(A)	3	2031+61	505/505	65.9	63.6	-2.3	Below
		EW-RL3(FR)	Single Family Residential (B) NAC 66 dB(A)	4	2033+89	530/525	64.4	62.8	-1.6	Below

Table 4.2.1: Modeled Noise Receptor Locations and Noise Analysis Results (Sheet 3 of 5)

General Location	Name of Noise Sensitive Area/Site	Representative Noise Receptor Site Designation	Description and Noise Abatement Activity Category	Number of Noise Sensitive Sites Represented	Station	Distance to Nearest Travel Lane - Existing /Proposed (Feet)	Predicted Traffic Noise Levels [LAeq1h, dB(A)]		Difference Between Existing Conditions/No Action and Build Alternative dB(A)	Noise Abatement Criteria Status
							Existing (2017) and No Action (Design Year 2040)	Build (Design Year 2040)		
SR 736/Davie Boulevard to SR 842/Broward Boulevard (Segment E) (Continued)										
West of I-95	Riverland	EW-RL4(FR)	Single Family Residential (B) NAC 66 dB(A)	5	2037+30	445/445	61.6	61.7	0.1	Below
		EW-RL5(FR)	Single Family Residential (B) NAC 66 dB(A)	1	2039+71	545/533	63.6	63.3	-0.3	Below
		EW-RL6(FR)	Single Family Residential (B) NAC 66 dB(A)	1	2039+60	630/618	63.3	63.1	-0.2	Below
		EW-RL7(FR)	Single Family Residential (B) NAC 66 dB(A)	1	2039+33	695/683	62.9	62.8	-0.1	Below
SR 842/Broward Boulevard to SR 838/Sunrise Boulevard (Segment F)										
East of I-95	Riverbend	FE-DR1(FR)	Single Family Residential (B) NAC 66 dB(A)	1	2055+45	50/50	65.2	**70.5**	5.3	**Exceeds**
		FE-DR1(SR)	Single Family Residential (B) NAC 66 dB(A)	1	2055+27	130/130	65.0	**69.0**	4.0	**Exceeds**
		FE-DR1(TR)	Single Family Residential (B) NAC 66 dB(A)	1	2055+07	220/22	63.8	**66.4**	2.6	**Approaches**
		FE-DR1(4R)	Single Family Residential (B) NAC 66 dB(A)	1	2054+79	280/280	63.0	65.3	2.3	Below
		FE-DR1(5R)	Single Family Residential (B) NAC 66 dB(A)	1	2054+57	380/380	61.7	62.4	0.7	Below
		FE-DR1A(FR)	Single Family Residential (B) NAC 66 dB(A)	6	2057+92	130/116	65.9	71.0	5.1	Exceeds
		FE-DR1A(SR)	Single Family Residential (B) NAC 66 dB(A)	4	2057+81	305/290	63.3	**66.5**	3.2	**Approaches**
		FE-DR1A(TR)	Single Family Residential (B) NAC 66 dB(A)	5	2057+73	448/436	61.8	63.4	1.6	Below
		FE-DR2(FR)	Single Family Residential (B) NAC 66 dB(A)	2	2059+39	152/124	65.8	**67.8**	2.0	**Exceeds**
		FE-DR2(SR)	Single Family Residential (B) NAC 66 dB(A)	3	2059+85	320/286	63.1	64.2	1.1	Below
		FE-DR2(TR)	Single Family Residential (B) NAC 66 dB(A)	2	2059+92	472/434	61.9	62.4	0.5	Below
		FE-DR2A(FR)	Single Family Residential (B) NAC 66 dB(A)	5	2062+60	192/134	65.6	63.2	-2.4	Below
		FE-DR2A(SR)	Single Family Residential (B) NAC 66 dB(A)	6	2062+97	336/272	63.5	61.5	-2.0	Below
		FE-DR2A(TR)	Single Family Residential (B) NAC 66 dB(A)	6	2062+88	504/442	62.1	61.3	-0.8	Below
		FE-DR3(FR)	Single Family Residential (B) NAC 66 dB(A)	6	2065+26	195/122	65.4	62.2	-3.2	Below
		FE-DR3(2R)	Single Family Residential (B) NAC 66 dB(A)	4	2065+22	368/300	63.7	62.3	-1.4	Below
		FE-DR1(FR)	Single Family Residential (B) NAC 66 dB(A)	7	2065+78	515/450	62.6	62.4	-0.2	Below
		FE-DR4(FR)	Single Family Residential (B) NAC 66 dB(A)	4	2068+63	215/162	65.7	**67.6**	1.9	**Exceeds**
		FE-DR1(FR)	Single Family Residential (B) NAC 66 dB(A)	4	2068+66	360/315	64.2	65.5	1.3	Below
		FE-DR4(TR)	Single Family Residential (B) NAC 66 dB(A)	3	2068+42	495/445	63.1	63.8	0.7	Below

Table 4.2.1: Modeled Noise Receptor Locations and Noise Analysis Results (Sheet 4 of 5)

General Location	Name of Noise Sensitive Area/Site	Representative Noise Receptor Site Designation	Description and Noise Abatement Activity Category	Number of Noise Sensitive Sites Represented	Station	Distance to Nearest Travel Lane - Existing /Proposed (Feet)	Predicted Traffic Noise Levels [LAeq1h, dB(A)]		Difference Between Existing Conditions/No Action and Build Alternative dB(A)	Noise Abatement Criteria Status
							Existing (2017) and No Action (Design Year 2040)	Build (Design Year 2040)		
SR 842/Broward Boulevard to SR 838/Sunrise Boulevard (Segment F) (Continued)										
East of I-95	Liberty Park	FE-SFH1(FR)	Single Family Residential (B) NAC 66 dB(A)	1	2080+57	74/66	69.6	**70.2**	0.6	**Exceeds**
		FE-SFH2(FR)	Single Family Residential (B) NAC 66 dB(A)	1	2085+05	60/65	69.2	**69.8**	0.6	**Exceeds**
		FE-SFH1(SR)	Single and Multi-Family Residential (B) NAC 66 dB(A)	4	2079+40	180/188	68.9	**69.1**	0.2	**Exceeds**
		FE-SFH2(SR)	Single Family Residential (B) NAC 66 dB(A)	2	2082+28	180/188	66.7	**68.3**	1.6	**Exceeds**
		FE-SFH3(SR)	Single and Multi-Family Residential (B) NAC 66 dB(A)	5	2077+34	310/302	66.9	**67.2**	0.3	**Exceeds**
		FE-SFH1(TR)	Single and Multi-Family Residential (B) NAC 66 dB(A)	5	2079+70	298/290	64.8	65.7	0.9	Below
		FE-SFH2(TR)	Single and Multi-Family Residential (B) NAC 66 dB(A)	3	2083+21	296/290	66.3	**66.7**	0.4	**Approaches**
		FE-SFH3(TR)	Single Family Residential (B) NAC 66 dB(A)	3	2077+44	426/416	63.9	64.5	0.6	Below
		FE-SFH2(4R)	Single Family Residential (B) NAC 66 dB(A)	2	2080+64	414/406	62.0	61.6	-0.4	Below
		FE-SFH2(4R)	Single Family Residential (B) NAC 66 dB(A)	1	2083+03	426/420	64.3	64.8	0.5	Below
	Woodlawn Cemetery	FE-WLCem(FR)	Cemetery (C) NAC 66 dBA	Special Land Use	2091+64	70/65	79.7	**80.4**	0.7	**Exceeds**
		FE-WLCem(SR)	Cemetery (C) NAC 66 dBA	Special Land Use	2091+61	320/315	69.9	**70.2**	0.3	**Exceeds**
		FE-WLCem(TR)	Cemetery (C) NAC 66 dBA	Special Land Use	2091+68	570/565	64.7	64.9	0.2	Below
West of I-95	River Gardens/ Sweeting Estates	FW-RG1(FR)	Single Family Residential (B) NAC 66 dB(A)	1	2056+46	255/235	63.7	**67.4**	3.7	**Exceeds**
		FW-RG2(SR)	Single Family Residential (B) NAC 66 dB(A)	1	2056+33	305/285	62.7	65.9	3.2	Below
		FW-RG3(TR)	Single Family Residential (B) NAC 66 dB(A)	1	2056+99	320/300	61.4	64.1	2.7	Below
		FW-RG4(4R)	Single Family Residential (B) NAC 66 dB(A)	1	2056+68	390/370	59.9	63.1	3.2	Below
		FW-RG5(4R)	Single Family Residential (B) NAC 66 dB(A)	1	2056+86	500/480	59.2	62.4	3.2	Below
		FW-RG6(4R)	Single Family Residential (B) NAC 66 dB(A)	1	2056+88	555/535	58.6	61.9	3.3	Below
		FW-RG7(FR)	Single Family Residential (B) NAC 66 dB(A)	4	2058+18	600/580	60.0	63.8	3.8	Below
		FW-RG8(FR)	Single Family Residential (B) NAC 66 dB(A)	5	2061+44	225/200	57.6	62.7	5.1	Below
		FW-RG9(FR)	Single Family Residential (B) NAC 66 dB(A)	1	2062+13	210/185	57.6	62.8	5.2	Below
		FW-RG10(FR)	Single Family Residential (B) NAC 66 dB(A)	3	2062+93	190/165	57.5	62.7	5.2	Below
		FW-RG11(FR)	Single Family Residential (B) NAC 66 dB(A)	8	2065+28	205/185	57.0	63.2	6.2	Below
		FW-RG12(FR)	Single Family Residential (B) NAC 66 dB(A)	2	2067+68	185/160	58.3	62.9	4.6	Below
		FW-RG13(SR)	Single Family Residential (B) NAC 66 dB(A)	7	2060+77	215/180	59.7	62.9	3.2	Below

Table 4.2.1: Modeled Noise Receptor Locations and Noise Analysis Results (Sheet 5 of 5)

General Location	Name of Noise Sensitive Area/Site	Representative Noise Receptor Site Designation	Description and Noise Abatement Activity Category	Number of Noise Sensitive Sites Represented	Station	Distance to Nearest Travel Lane - Existing /Proposed (Feet)	Predicted Traffic Noise Levels [LAeq1h, dB(A)]		Difference Between Existing Conditions/No Action and Build Alternative dB(A)	Noise Abatement Criteria Status
							Existing (2017) and No Action (Design Year 2040)	Build (Design Year 2040)		
SR 842/Broward Boulevard to SR 838/Sunrise Boulevard (Segment F) (Continued)										
West of I-95	River Gardens/ Sweeting Estates (Continued)	FW-RG14(SR)	Single Family Residential (B) NAC 66 dB(A)	5	2062+99	385/365	60.2	63.3	3.1	Below
		FW-RG15(SR)	Single Family Residential (B) NAC 66 dB(A)	3	2064+85	360/335	60.5	63.6	3.1	Below
		FW-RG16(SR)	Single Family Residential (B) NAC 66 dB(A)	1	2065+70	355/335	60.5	63.7	3.2	Below
		FW-RG17(SR)	Single Family Residential (B) NAC 66 dB(A)	9	2067+64	360/335	61.3	64.3	3.0	Below
		FW-RG18(SR)	Single Family Residential (B) NAC 66 dB(A)	2	2068+66	365/330	61.6	64.9	3.3	Below
		FW-RG19(TR)	Single Family Residential (B) NAC 66 dB(A)	4	2060+43	370/330	57.9	61.4	3.5	Below
		FW-RG20(TR)	Single Family Residential (B) NAC 66 dB(A)	11	2063+76	620/595	58.5	62.7	4.2	Below
		FW-RG21(TR)	Single Family Residential (B) NAC 66 dB(A)	5	2065+29	515/495	58.6	62.8	4.2	Below
		FW-RG22(TR)	Single Family Residential (B) NAC 66 dB(A)	2	2066+55	520/500	58.6	62.9	4.3	Below
		FW-RG23(TR)	Single Family Residential (B) NAC 66 dB(A)	3	2068+09	535/520	59.0	63.2	4.2	Below
	Washington Park	FW-WP1(FR)	Single Family Residential (B) NAC 66 dB(A)	1	2072+25	225/190	62.6	**68.4**	5.8	**Exceeds**
		FW-WP2(FR)	Single Family Residential (B) NAC 66 dB(A)	1	2072+63	260/230	62.4	**68.0**	5.6	**Exceeds**
		FW-WP3(FR)	Single Family Residential (B) NAC 66 dB(A)	1	2074+78	235/210	63.4	**68.1**	4.7	**Exceeds**
		FW-WP4(SR)	Single Family Residential (B) NAC 66 dB(A)	1	2074+26	330/305	62.3	**67.0**	4.7	**Exceeds**
		FW-WP5(SR)	Single Family Residential (B) NAC 66 dB(A)	1	2073+75	360/335	61.8	**66.7**	4.9	**Approaches**

X:\Noise_Studies\I-95_Broward_PD&E\NSR\Tables\[I-95 at Broward_Tables_NSR_11292017.xlsx]Table4.2.1_RecSites

Note: Bold numbers and criteria status labels indicate noise levels above FDOT's Noise Abatement Criteria

Table 4.2.2: Noise Impact Summary

General Location (Project Segment)		Noise Sensitive Areas/Sites	Range of Predicted Existing/ No Action Design Year (2040) Noise Levels dB(A)		Range of Predicted Design Year (2040) Build Alternative Noise Levels dB(A)		Maximum Change in Noise Level Between Existing/ No Action and Build Alternative dB(A)	Impacted Noise Receptor Sites	
			Minimum	Maximum	Minimum	Maximum		Residential	Special Land Use Sites (Non-Residential)
South of SR 736/Davie Boulevard (Project Segment D)	East of I-95	Shady Banks	60.1	66.3	59.3	65.1	-0.7	0	---
	West of I-95	Flamingo Park Subdivision	59.8	61.7	59.4	61.4	-0.3	0	---
		Holand Mobile Home Park	63.2	66.6	62.7	65.8	-0.3	0	---
SR 736/Davie Boulevard to SR 842/Broward Boulevard (Segment E)	East of I-95	Riverside Park, Riverside Manor Apartments, Hazewood Acres, Community Acres, and Kingdom Hall of Jehovah's Witnesses	57.6	65.9	55.2	65.2	0.6	0	---
	West of I-95	Riverland	61.6	65.9	61.7	63.6	0.1	0	---
SR 842 / Broward Boulevard to SR 838/ Sunrise Boulevard (Segment F)	East of I-95	Riverbend	61.7	65.9	61.3	71.0	5.3	19	---
		Liberty Park	62.0	69.6	61.6	70.2	1.6	16	---
		Woodlawn Cemetery	64.7	79.7	64.9	80.4	0.7	---	1 (Woodlawn Cemetery)
	West of I-95	River Gardens/Sweeting Estates	57.0	63.7	61.4	67.4	6.2	1	---
		Washington Park	61.8	63.4	66.7	68.4	5.8	5	---

X:\Noise_Studies\I-95_Broward_PD&E\NSR\Tables\[I-95 at Broward_Tables_NSR_11292017.xlsx]Table4.2.1_RecSites

4.2.1 South Fork of the New River to SR 736/Davie Boulevard (Segment D)

The project area south of Davie Boulevard is referred to as Segment D and is depicted on **Figure 4 Sheet 1** i**n Appendix A**. Noise sensitive sites are found along both sides of this project segment and include single-family homes in the Shady Banks and Flamingo Park neighborhoods, and the Holland mobile home community. This segment of the project also includes office buildings, warehouses, storage facilities and industrial/light industrial enterprises that are not considered noise sensitive (i.e., Activity Category F).

The proposed improvements in the vicinity of Davie Boulevard are shown in **Figure 3A** in **Appendix B** and described in **Section 2.4**. The improvements include new ramps providing a northbound egress from I-95's General Use Lanes and from 95 Express Lanes to the northbound CD road system. For the elevated roadway segments, including bridge structures, 32-inch-tall concrete barrier walls are proposed along the outside and inside shoulders. The locations of the proposed concrete barrier walls are depicted as orange lines in **Figure 3A** in **Appendix B**.

There are three existing noise barriers located on the east side of I-95 in this project segment (see **Figure 4 Sheet 1** in **Appendix A).** Single-family homes in the Shady Banks community along the east side of I-95 are located behind these noise barriers. The noise barriers providing noise abatement to Shady Banks community include:

- Shoulder mounted noise barrier located along the east side of the northbound on ramp from I-595, Starlight Landing Drive to SW 16th Street, 650 feet long, 6 feet tall [FDOT Barrier Number: 86070-3507 (3463A-1)];
- Ground mounted noise barrier along the eastern limited access right-of-way line, SW 16th Street to Davie Boulevard, 2,010 feet long, 17 feet tall [FDOT Barrier Number: 86070-3507 (3463A-2)]; and
- 6-foot-tall ground mounted noise barrier located along the southern right-of-way of Davie Boulevard.

On the west side of I-95, a transit-related 6-foot-tall structure mounted noise barrier is located along the west side of the SFRC tracks. This noise barrier provides some noise abatement to the residences within the Flamingo Park Subdivision and Holland Mobile Home Park. None of the existing noise barriers will be directly impacted by the Build Alternative.

As indicated in **Table 4.2.1**, none of the predicted design year noise levels in these three communities exceed the NAC and these communities will not be impacted by the project. The range of predicted noise levels for the Existing/No Action Alternative and for the Build Alternative are summarized in **Table 4.2.2**. With the Build Alternative, the residences in these communities

are not predicted to experience an increase in design year noise levels. The results of the noise analysis indicate that the residences in these communities will experience at least a 0.3 dB(A) decrease in design year (2040) noise levels with the Build Alternative. The decreases in noise levels are attributed to the noise reduction from the proposed 32-inch concrete barrier walls associated with the two new ramps and from the shift of the I-95 northbound lanes to the east in this area (see **Figure 4 Sheet 1** in **Appendix A** and **Figure 3A** in **Appendix B**).

4.2.2 SR 736/Davie Boulevard to SR 842/Broward Boulevard (Segment E)

The project area between Davie Boulevard and Broward Boulevard is referred to as Segment E and is depicted on **Figure 4 Sheets 1** and **2** i**n Appendix A**. Noise sensitive sites are found along the east side and the northern portion of the west side of this project segment. These noise sensitive sites include single and multi-family residences associated with apartment complexes, including Riverside and Riverside Manor Apartments, and multiple residential subdivisions, including Riverside Park, Community Acres, and Riverland. A Jehovah's Witness Kingdom Hall is located east of I-95 and south of Broward Boulevard. This segment of the project also includes retail stores, office buildings, industrial/light industrial enterprises, and a Tri-Rail facility that are not considered noise sensitive (i.e., Activity Category F).

The proposed improvements between Davie Boulevard and Broward Boulevard are shown in **Figure 3A** in **Appendix B** and described in **Section 2.4**. The improvements include new ramps providing a northbound egress from I-95's General Use Lanes and from the 95 Express Lanes to the northbound CD road system and one that provide ingress to the 95 Express Lanes from the southbound CD road system south of Broward Boulevard. For the elevated roadway segments, including bridge structures, 32-inch-tall concrete barrier walls are proposed along the outside and inside shoulders. The locations of the proposed concrete barrier walls are depicted as orange lines in **Figure 3A** in **Appendix B**.

There are three existing noise barriers located in this project segment (see **Figure 4 Sheets 2** and **3** in **Appendix A).** These noise barriers provide noise abatement to the noise sensitive sites located along the eastern side of I-95 and include:

- Ground mounted noise barrier along the eastern limited access right-of-way line, Davie Boulevard to SW 11th Street, 460 feet long, 15 feet tall [FDOT Barrier Number: 86070-3506 (3463B-1)];
- Shoulder mounted noise barrier along the east side of the northbound on ramp from Davie Boulevard, SW 11th Street to SW 4th Court, 2,970 feet long, 8 feet tall [FDOT Barrier Number: 86070-3506 (3463B-2)]; and

- Ground mounted noise barrier along the eastern limited access right-of-way line, SW 4th Court to Broward Boulevard, 1,420 feet long, 15 feet tall [FDOT Barrier Number: 86070-3506 (3463B-3)].

These three existing noise barriers will not be directly impacted by the improvements associated with the Build Alternative.

As indicated in **Table 4.2.1**, none of the predicted design year noise levels in these communities exceed the NAC and they will not be impacted by the project. The range of predicted noise levels for the Existing/No Action Alternative and for the Build Alternative are summarized in **Table 4.2.2**. With the Build Alternative, the noise sensitive sites on the east side of I-95 are not predicted to experience an increase in design year noise levels of more than 0.6 dB(A) and no more than 0.1 dB(A) on the west side of I-95 within the Riverland community. The proposed 32-inch concrete barrier walls associated with the new ramps and the ramp improvement in this area help minimize the traffic noise levels at these noise sensitive sites (see **Figure 3B** in **Appendix B**).

4.2.3 SR 842/Broward Boulevard to SR 838/Sunrise Boulevard (Segment F)

The project area between Broward Boulevard and Sunrise Boulevard is referred to as Segment F and is depicted on **Figure 4 Sheets 2** and **3** i**n Appendix A**. Noise sensitive sites are found on both sides of this project segment. These noise sensitive sites include primarily single-family homes in the Riverbend, Liberty Park, River Garden/Sweeting Estates, and Washington Park. The City of Ft. Lauderdale's Woodlawn Cemetery is located east of I-95 and south of Sunrise Boulevard at 1936 NW 9th Street. This segment of the project also includes office buildings, warehouses, industrial/light industrial enterprises, and institutional facilities that are not considered noise sensitive (i.e., Activity Category F).

The proposed improvements between Broward Boulevard and Sunrise Boulevard are shown in **Figure 3B** in **Appendix B** and are described in **Section 2.4**. The improvements include two new ramps providing a northbound ingress to the 95 Express Lanes from the northbound on ramp from Broward Boulevard and a southbound egress from the 95 Express Lanes to the southbound off ramp to Broward Boulevard. In the vicinity of NW 6th Street/Sistrunk Boulevard, the I-95 travel lanes will need to shift towards the outside to accommodate these new egress and ingress ramps to and from the 95 Express Lanes. For the elevated roadway segments including bridge structures, 32-inch-tall concrete barrier walls are proposed along the outside and inside shoulders. The locations of the proposed concrete barrier walls are depicted as orange lines in **Figure 3B** in **Appendix B**.

There are two existing noise barriers and two planned noise barriers in this project segment (see **Figure 4 Sheet 3** in **Appendix A).** The following describes the existing noise barrier that provides abatement to the Riverbend community:

- Shoulder mounted noise barrier located along the east side of the northbound on ramp from Broward Boulevard, NW 2nd Street to NW 6th Street/Sistrunk Boulevard, 1,830 feet long, 8 feet tall [FDOT Barrier Number: 86070-3507 (3464A)].

The following describes the existing noise barrier that provides abatement to the Liberty Park community:

- Ground mounted noise barrier located along the eastern limited access right-of-way line, NW 7th Place to NW 8th Court, 530 feet long, 14 to 17 feet tall [FDOT Barrier Number: 86070-3506 (3472A)].

The following describes the two noise barriers that are planned for construction for the River Garden/Sweeting Estates community as part of the 95 Express Phase 3A Project:

- Ground mounted noise barrier located along the western right-of-way line of the SFRC, 1,300 feet long, 22 feet tall and extends essentially the entire length of this community from north of the North Fork of the New River to NW 6th Street/Sistrunk Boulevard. This ground mounted noise barrier is currently under construction; and
- Shoulder mounted noise barrier located along the outside shoulder of I-95 southbound lanes, 1,966 feet long, 8 feet tall and extends from south of the North Fork of the New River to north of NW 6th Street/Sistrunk Boulevard. This shoulder mounted noise barrier is currently under design and will be constructed with the improvements associated with the 95 Express Phase 3A Project.

The existing ground mounted noise barriers that provide abatement to Liberty Park and the ground mounted noise barrier being constructed to provide abatement to River Garden/Sweeting Estates will not be affected by the proposed improvements associated with the Build Alternative. However, the proposed improvements will directly impact the existing 8-foot-tall shoulder mounted noise barrier that provides abatement to the Riverbend community as well as the planned shoulder mounted noise barrier for the River Garden/Sweeting Estates community.

The majority of the existing 8-foot-tall shoulder mounted noise barrier providing abatement to the Riverbend community will be directly impacted and will need to be replaced to accommodate the proposed ramp improvements described above. Approximately 300 feet of the southern end of the existing noise barrier that is located in the vicinity of the North Fork of the New River will not be affected and will remain in place. Portions of the new northbound ramp (i.e., Ramp D)

proposed in this area will be elevated to provide the roadway elevation and clearance necessary to cross over the I-95 northbound lanes and will be constructed on a Mechanically Stabilized Earth (MSE) wall and on a bridge structure.

The planned 8-foot-tall shoulder mounted noise barrier designed to provide abatement to River Garden/Sweeting Estates will also be directly impacted and will need to be replaced to accommodate the proposed improvements. As described above, a new ramp (i.e., Ramp E) is proposed in this area which will provide access to Broward Boulevard from the I-95 southbound express lanes.

The range of predicted noise levels for the Existing/No Action Alternative and for the Build Alternative for the noise sensitive areas/sites within this segment are summarized in **Table 4.2.2**. The residential communities are expected to experience an increase in design year (2040) noise levels ranging from 1.6 dB(A) at Liberty Park to 6.2 dB(A) at River Garden/Sweeting Estates and experience traffic noise levels above the NAC and will be impacted by the project. The number of residences predicted to experience design year (2040) noise levels that exceed the NAC of 66 dB(A) for Activity Category B and impacted by the project include:

- 19 Residences in the Riverbend Community;
- 16 Residences in the Liberty Park Community;
- One Residence in River Garden/Sweeting Estates; and
- Five Residences in the Washington Park Community.

Woodlawn Cemetery would also be impacted by the project and experience a 0.7 dB(A) increase in design year (2040) noise levels with the Build Alternative.

The noise level increase associated with the Riverbend and River Garden/Sweeting Estates are attributed to the removal of the existing and planned 8-foot-tall shoulder mounted noise barriers in these areas due to the proposed improvements associated with the Build Alternative.

4.2.4 Summary of Noise Impacts

As described in **Sections 4.2.1** through **4.2.3** and summarized in **Table 4.2.2**, predicted design year noise levels for the Build Alternative will approach or exceed the NAC at 19 residences in the Riverbend community; 16 residences in the Liberty Park community; one residence in River Garden/Sweeting Estates; five residences in the Washington Park community; and at the Woodlawn Cemetery. Therefore, the feasibility and reasonableness of noise barriers have been evaluated for these impacted noise sensitive sites that include 41 residences and the Woodlawn Cemetery (considered a special land use). Predicted noise levels for the other noise sensitive sites were below the NAC and do not require the consideration of noise abatement measures.

5.0 Noise Barrier Analysis

Per 23 CFR Part 772 and FDOT's policies, the reasonableness and feasibility of noise abatement measures must be considered at all noise sensitive sites where design year (2040) noise levels would approach or exceed the NAC with the Build Alternative. As described in **Sections 4.2.1** through **4.2.4**, predicted design year noise levels for the Build Alternative will approach or exceed the NAC at 41 residences within four residential communities including Riverbend, Liberty Park, River Garden/Sweeting Estates, and Washington Park, as well as at the Woodlawn Cemetery. Therefore, the feasibility and reasonableness of noise barriers were evaluated for these impacted noise sensitive sites.

To facilitate the noise barrier analysis, contiguous noise sensitive areas were grouped together into common noise environments (CNEs). A CNE represents a group of impacted receptor sites of the same Activity Category that are exposed to similar noise sources and levels, traffic volumes, traffic mix, speeds, and topographic features, that would benefit from the same noise barrier or noise barrier system (i.e., overlapping/continuous noise barriers). Generally, CNEs occur between two secondary noise sources, such as interchanges, intersections, and/or cross-roads, or where defined by ground features such as canals or rivers. In addition, the primary method for determining the cost of noise abatement involves a review of the cost per benefited receptor site for the construction of a noise barrier benefiting a single location or CNE (e.g., a subdivision or contiguous impact area).

Four separate CNEs were used to assess noise barriers for the noise sensitive sites that are predicted to approach or exceed the NAC. The noise barrier analyses and recommendations are summarized in separate report sections by CNE to facilitate the review of the locations where noise barriers were considered (see **Sections 5.1** through **5.4**). The following lists the four CNEs and describes the type and number of impacted sites, the location, and the sections where the noise barrier analysis is presented.

- E4S - Represents the 19 impacted residences in the Riverbend Community (see **Section 5.1**);
- E4N - Represents the 16 impacted residences in the Liberty Park Community (see **Section 5.2**);
- E5 - Represents the Woodlawn Cemetery (see **Section 5.3**); and
- W4 - Represents the six impacted residence in River Garden/Sweeting Estates and Washington Park (see **Section 5.4**).

5.1 Common Noise Environment E4S

Common Noise Environment E4S includes the residences in the community of Riverbend located east of I-95 between the North Fork of the New River and NW 6th Street/Sistrunk Boulevard. As mentioned in **Section 4.2.3**, the majority of the existing 8-foot-tall shoulder mounted noise barrier currently providing abatement to the Riverbend community will be directly impacted and will need to be replaced to accommodate the proposed improvements (see **Figure 4 Sheet 3** and **Figure 5** in **Appendix A**). Approximately 300 feet of the southern end of the existing noise barrier that is located in the vicinity of the North Fork of the New River will not be affected and will remain in place.

With the Build Alternative and the remaining 300-foot-long segment of the existing noise barrier, 19 residences within this community are predicted to be impacted by design year (2040) noise levels. Therefore, consideration of noise abatement for these residences was warranted. The results of the noise barrier analysis for these residences are summarized in **Table 5.1.1**. Only 8-foot-tall shoulder mounted noise barrier designs were evaluated. The proposed Ramp D and the I-95 northbound lanes will need to be constructed on MSE walls and/or on bridge structures, which would limit the shoulder mounted barrier height to 8-feet. With the Build Alternative, the MSE wall for Ramp D will end at Station ~2067+00 and the bridge structure over the I-95 northbound lanes would begin. An alternative design was considered for Ramp D that ends the MSE wall and begins the bridge at Station ~2064+00. To address potential questions, the following addresses the impacts and consideration of noise abatement for both Ramp D options.

Five conceptual noise barrier designs of various lengths were evaluated for the impacted residences for the Build Alternative. Although the northern and central portion of this community would no longer be impacted by design year (2040) traffic noise with the Build Alternative, this community currently has an existing noise barrier that will need to be replaced. Therefore, a replacement noise barrier was also evaluated at this location. The initial noise barrier analysis evaluated conceptual designs that would supplement the existing noise barrier (i.e., E4S-CD1S) to provide benefit to the 19 receptors impacted behind and in the vicinity of the existing noise barrier segment. If, as in this case, the supplemental conceptual noise barrier design considered did not meet FDOT's reasonable cost and/or the noise reduction design goal criteria, additional design options were also evaluated that incorporated the remaining 300-foot segment of the existing noise barrier (i.e., E4S-CD1 through E4S-CD4). For these four conceptual noise barrier designs, the number of sites considered for noise abatement is 21 and represents those that would exceed the NAC without the existing noise barrier.

Table 5.1.1: Noise Barrier Analyses for Common Noise Environment E4S (Riverbend Community) (Sheet 1 of 2)

Noise Sensitive Area (General Location/ Station Range)	Conceptual Barrier Design Number	Barrier Type - Segment Name	Barrier Location	Height (feet)	Length (feet)	Begin Station Number	End Station Number	Number of Impacted Receptor Sites	Number of Sites Considered for Noise Abatement	Average (Maximum) Noise Reduction for Sites Considered for Abatement dB(A)	Number of Impacted/ Benefited Receptor Sites	Number of Benefited Receptor Sites for those Considered for Abatement	Number of Benefited Receptor Sites for those Not Considered for Abatement	Total Number of Benefited Receptor Sites for those Considered for Abatement	Average Noise Reduction for all Benefited Receptor Sites Considered for Abatement dB(A)	Average Cost/Site Benefited for those Considered for Abatement	Average Cost/Site Benefited	Meets FDOT's Reasonableness Cost Criteria of $42,000 per Benefited Receptor and 7.0 dB(A) Noise Reduction Design Goal?	Noise Barrier Recommended for Further Consideration in the Design Phase and Community Input	Comments
Riverbend/CNE-E4S (East of I-95 and North of the North Fork of the New River to South of NW 6th Street/ Station 2055+00 to Station 2070+00)	**Conceptual Noise Barrier Design that Supplements the Remaining 300 foot Segment of the Existing Noise Barrier (For Proposed Ramp D - MSE Wall Ends/Begin Bridge Station ~2067+00)**																			
	E4S-CD1S	Shoulder Mounted - Ramp D	Extending Entire Length of Community Along Outside Shoulder of Ramp D (Northbound On Ramp from Broward Boulevard to Express Lanes)	8	1,330	2055+87	2069+24	19	19	4.9 (6.3)	10	10	3	13	5.6	$544,800	$41,908	No	No	Assumes the existing shoulder barrier will remain in place with the Build Alternative; Conceptual barrier design does not meet either the 7.0 dB(A) noise reduction design goal
		Shoulder Mounted - I-95 Northbound	Northern End of Residential Community Along Outside Shoulder of I-95 Northbound Lanes	8	940	2066+69	2076+15													
	Conceptual Noise Barrier Designs that Incorporate the Remaining 300 foot Segment of the Existing Noise Barrier (For Proposed Ramp D - MSE Wall Ends/Begin Bridge Station ~2067+00)																			
	E4S-CD1	Existing Shoulder Mounted	Southern End of Residential Community Along Outside Shoulder of the Northbound On Ramp from Broward Boulevard across the Bridge over the North Fork of the New River	8	300	2052+94	2055+87	19	21*	0.5 (2.2)	0	0	0	0	0.0	---	---	No	Not Applicable (Existing Noise Barrier)	Represents an 300-foot segment of the existing 8-foot tall shoulder mounted noise barrier; With Build Alternative, does not meet the 7.0 dB(A) noise reduction design goal
	E4S-CD2	Shoulder Mounted - Ramp D	Extending Entire Length of Community Along Outside Shoulder of Ramp D (Northbound On Ramp from Broward Boulevard to Express Lanes)	8	1,775	2055+87	2073+52	19	21*	4.1 (6.8)	7	7	0	7	6.2	$426,000	$60,857	No	No	Cost incudes only the 8-foot tall shoulder mounted noise barriers; With Build Alternative, does not meet the 7.0 dB(A) noise reduction design goal
		Existing Shoulder Mounted	Southern End of Residential Community Along Outside Shoulder of the Northbound On Ramp from Broward Boulevard across the Bridge over the North Fork of the New River	8	300	2052+94	2055+87													
	E4S-CD3	Shoulder Mounted - I-95 Northbound	Northern End of Residential Community Along Outside Shoulder of I-95 Northbound Lanes	8	1,240	2062+69	2075+13	19	21*	1.4 (5.0)	0	0	0	0	0.0	$297,600	---	No	No	Cost incudes only the 8-foot tall shoulder mounted noise barriers; With Build Alternative, does not meet the 7.0 dB(A) noise reduction design goal or the reasonable cost criteria of $42,000 per benefited site
		Existing Shoulder Mounted	Southern End of Residential Community Along Outside Shoulder of the Northbound On Ramp from Broward Boulevard across the Bridge over the North Fork of the New River	8	300	2052+94	2055+87													
	E4S-CD4	Shoulder Mounted - Ramp D	Extending Entire Length of Community Along Outside Shoulder of Ramp D (Northbound On Ramp from Broward Boulevard to Express Lanes)	8	1,330	2055+87	2069+24	19	21*	5.2 (6.8)	12	12	3	15	5.9	$544,800	$36,320	No	Yes (Replacement Noise Barrier)	Cost incudes only the two 8-foot tall shoulder mounted noise barriers; Assumes the existing shoulder barrier will remain in place with the Build Alternative; Conceptual barrier design does not meet either the 7.0 dB(A) noise reduction design goal; Represents optimal replacement noise barrier design and is recommended for further consideration in the design phase and community input
		Shoulder Mounted - I-95 Northbound	Northern End of Residential Community Along Outside Shoulder of I-95 Northbound Lanes	8	940	2066+69	2076+15													
		Existing Shoulder Mounted	Southern End of Residential Community Along Outside Shoulder of the Northbound On Ramp from Broward Boulevard across the Bridge over the North Fork of the New River	8	300	2052+94	2055+87													

X:\Noise Studies\I-95 Broward PD&E\NSR Tables\I-95ABroward NoiseBarrierAnalysis 4-11-2018 SM\Summary1.xlsm

Represents the optimal replacement noise barrier conceptual design and is recommended for further consideration and public input.

Note: * The number of sites considered for noise abatement includes those that would exceed the NAC without the existing noise barrier.

Table 5.1.1: Noise Barrier Analyses for Common Noise Environment E4S (Riverbend Community) (Sheet 2 of 2)

Noise Sensitive Area (General Location/ Station Range)	Conceptual Barrier Design Number	Barrier Type - Segment Name	Barrier Location	Height (feet)	Length (feet)	Begin Station Number	End Station Number	Number of Impacted Receptor Sites	Number of Sites Considered for Noise Abatement	Average (Maximum) Noise Reduction for Impacted Receptor Sites dB(A)	Number of Impacted/ Benefited Receptor Sites	Number of Benefited Receptor Sites for those Considered for Abatement	Number of Benefited Receptor Sites for those Not Considered for Abatement	Total Number of Benefited Receptor Sites for those Considered for Abatement	Average Noise Reduction for all Benefited Receptor Sites Considered for Abatement dB(A)	Average Cost/Site Benefited for those Considered for Abatement	Average Cost/Site Benefited	Meets FDOT's Reasonableness Cost Criteria of $42,000 per Benefited Receptor and 7.0 dB(A) Noise Reduction Design Goal?	Noise Barrier Recommended for Further Consideration in the Design Phase and Community Input	Comments
Riverbend/CNE-E4S (East of I-95 and North of the North Fork of the New River to South of NW 6th Street/ Station 2055+00 to Station 2070+00)	**Conceptual Noise Barrier Design that Supplements the Remaining 300 foot Segment of the Existing Noise Barrier (Alternative Design for Proposed Ramp D - MSE Wall Ends/Begin Bridge Station ~2064+00)**																			
	E4S-CD1SA	Shoulder Mounted - Ramp D	Extending Entire Length of Community Along Outside Shoulder of Ramp D (Northbound On Ramp from Broward Boulevard to Express Lanes)	8	1,330	2055+87	2069+24	37	37	5.0 (6.3)	22	22	8	30	5.6	$664,800	$22,160	No	No	Assumes the existing shoulder barrier will remain in place with the Build Alternative; Conceptual barrier design does not meet either the 7.0 dB(A) noise reduction design goal
		Shoulder Mounted - I-95 Northbound	Northern End of Residential Community Along Outside Shoulder of I-95 Northbound Lanes	8	1,440	2062+69	2077+16													
	Conceptual Noise Barrier Designs that Incorporate the Remaining 300 foot Segment of the Existing Noise Barrier (Alternative Design for Proposed Ramp D - MSE Wall Ends/Begin Bridge Station ~2064+00)																			
	E4S-CD1A	Existing Shoulder Mounted	Southern End of Residential Community Along Outside Shoulder of the Northbound On Ramp from Broward Boulevard across the Bridge over the North Fork of the New River	8	300	2052+94	2055+87	37	38*	0.3 (2.2)	0	0	0	0	0.0	---	---	No	Not Applicable (Existing Noise Barrier)	Represents an 300-foot segment of the existing 8-foot tall shoulder mounted noise barrier; With Build Alternative, does not meet the 7.0 dB(A) noise reduction design goal
	E4S-CD2A	Shoulder Mounted - Ramp D	Extending Entire Length of Community Along Outside Shoulder of Ramp D (Northbound On Ramp from Broward Boulevard to Express Lanes)	8	1,775	2055+87	2073+52	37	38*	2.4 (6.8)	7	7	0	7	6.2	$426,000	$60,857	No	No	Cost incudes only the 8-foot tall shoulder mounted noise barriers; With Build Alternative, does not meet the 7.0 dB(A) noise reduction design goal
		Existing Shoulder Mounted	Southern End of Residential Community Along Outside Shoulder of the Northbound On Ramp from Broward Boulevard across the Bridge over the North Fork of the New River	8	300	2052+94	2055+87													
	E4S-CD3A	Shoulder Mounted - I-95 Northbound	Northern End of Residential Community Along Outside Shoulder of I-95 Northbound Lanes	8	1,390	2062+69	2076+66	37	38*	2.7 (5.2)	8	8	0	8	0.0	$333,600	$41,700	No	No	Cost incudes only the 8-foot tall shoulder mounted noise barriers; With Build Alternative, does not meet the 7.0 dB(A) noise reduction design goal
		Existing Shoulder Mounted	Southern End of Residential Community Along Outside Shoulder of the Northbound On Ramp from Broward Boulevard across the Bridge over the North Fork of the New River	8	300	2052+94	2055+87													
	E4S-CD4A	Shoulder Mounted - Ramp D	Extending Entire Length of Community Along Outside Shoulder of Ramp D (Northbound On Ramp from Broward Boulevard to Express Lanes)	8	1,280	2055+87	2068+77	37	38*	5.2 (6.8)	24	24	7	31	5.6	$604,800	$19,510	No	No	Cost incudes only the two 8-foot tall shoulder mounted noise barriers; Assumes the existing shoulder barrier will remain in place with the Build Alternative; Conceptual barrier design does not meet either the 7.0 dB(A) noise reduction design goal
		Shoulder Mounted - I-95 Northbound	Northern End of Residential Community Along Outside Shoulder of I-95 Northbound Lanes	8	1,240	2062+69	2075+13													
		Existing Shoulder Mounted	Southern End of Residential Community Along Outside Shoulder of the Northbound On Ramp from Broward Boulevard across the Bridge over the North Fork of the New River	8	300	2052+94	2055+87													

Represents the optimal replacement noise barrier conceptual design and is recommended for further consideration and public input.

Note: * The number of sites considered for noise abatement includes those that would exceed the NAC without the existing noise barrier.

As indicated in **Table 5.1.1 (Sheet 1 of 2)**, none of the conceptual designs met both FDOT's $42,000 per benefitted receptor site cost criteria and noise reduction design goal requirement of 7 dB(A). Normally, a noise barrier would not be recommended for further consideration at this location because it does not meet FDOT's noise barrier reasonableness and feasibility criteria. However, since the community has an existing noise barrier that is being directly impacted by the project, it is recommended that it be replaced in kind to maximize the traffic noise reduction in this community. The optimal replacement noise barrier conceptual design is E4S-CD4. This design represents two new 8-foot-tall shoulder mounted noise barriers. One would be located along Ramp D and tie into the existing noise barrier that is to remain to the south and extend 1,330 feet. The second noise barrier would be located along the outside shoulder of the I-95 northbound lanes and extend 940 feet (see **Figure 5** in **Appendix A**). Fifteen of the residences in this community, including 12 of the 21 residences considered for noise abatement, would be benefited by this noise barrier. The estimated construction cost of this conceptual noise barrier design is $544,800 or $36,320 per benefited receptor. Noise Barrier E4S-CD4 is recommended for further consideration in the design phase and for public input.

Five conceptual noise barrier designs of various lengths were also evaluated for the impacted residences from the alternative Ramp D design that ends the proposed MSE wall and begins the bridge structure at Station ~2064+00 versus ~2067+00). With this alternative and the remaining 300-foot-long segment of the existing noise barrier, 37 residences within this community are predicted to be impacted by design year (2040) noise levels. The supplemental conceptual noise barrier design considered (i.e., E4S-CD1SA) did not meet FDOT's noise reduction design goal criteria; therefore, additional design options were also evaluated that incorporated the remaining 300-foot segment of the existing noise barrier (i.e., E4S-CD1A through E4S-CD4A). For these four conceptual noise barrier designs, the number of sites considered for noise abatement is 38 and represents those that would exceed the NAC without the existing noise barrier.

As indicated in **Table 5.1.1 (Sheet 2 of 2)**, none of the conceptual designs met both FDOT's $42,000 per benefitted receptor site cost criteria and noise reduction design goal requirement of 7 dB(A). The optimal replacement noise barrier conceptual design is E4S-CD4A that would be recommended for further consideration if the alternative Ramp D design is incorporated into the Build Alternative. This design represents two new 8-foot-tall shoulder mounted noise barriers. One would be located along Ramp D and tie into the existing noise barrier that is to remain to the south and extend 1,280 feet. The second noise barrier would be located along the outside shoulder of the I-95 northbound lanes and extend 1,240 feet. Thirty-one of the residences in this community, including 24 of the 38 residences considered for noise abatement, would be benefited by this noise barrier. The estimated construction cost of this conceptual noise barrier design is $604,800 or $19,510 per benefited receptor.

5.2 Common Noise Environment E4N

Common Noise Environment E4N includes the residences of Liberty Park community, located east of I-95, between NW 6th Street/Sistrunk Boulevard and Sunrise Boulevard. Sixteen residences within this community are predicted to be impacted by design year (2040) noise levels with the Build Alternative. Therefore, consideration of noise abatement for these homes was warranted.

The results of the noise barrier analysis for these residences are summarized in **Table 5.2.1**. As described in **Section 4.2.3**, an existing ground mounted noise barrier, with a height of 14 feet to 17 feet, is providing some noise abatement to the residences within this community (see **Figure 4 Sheet 3** in **Appendix A**). Ten conceptual noise barrier designs of various heights and lengths were evaluated for the impacted residences. Both ground mounted and shoulder mounted noise barrier options were evaluated with and without the existing noise barrier. The existing noise barrier may need to be removed for the construction of the proposed improvements. Due to the limited available right-of-way and closeness of the proposed roadway improvements, construction of a replacement ground mounted noise barrier at this location may not be possible. This segment of I-95 will be on a MSE wall, which will limit the shoulder mounted noise barrier height to 8 feet since it represents the maximum height on a structure.

The initial noise barrier analysis evaluated three conceptual designs that would supplement the existing noise barrier to provide benefit to the 16 receptors impacted behind and in the vicinity of this existing noise barrier (i.e., E4N-CD1S through E4N-CD3S). If, as in this case, the supplemental conceptual noise barrier designs considered do not meet FDOT's reasonable cost and/or the noise reduction design goal criteria, five other design options were also evaluated that incorporated the existing noise barrier (i.e., E4N-CD1 through E4N-CD5). For these five and the two following conceptual noise barrier designs, the number of sites considered for noise abatement is 21 and represents those that would exceed the NAC without the existing noise barrier. The remaining two conceptual designs (i.e., E4N-CD6 and E4N-CD7) represent shoulder mounted conceptual noise barrier designs that assumes that the existing ground mounted noise barrier will be removed and not replaced due to insufficient right-of-way.

As indicated in **Table 5.2.1**, the conceptual design (i.e., E4N-CD4) that benefitted all of the impacted receptor sites does not meet FDOT's $42,000 per benefitted receptor site cost criteria. Of the conceptual designs evaluated, E4N-CD5 benefits the highest number of receptors (i.e., 19) without exceeding FDOT's reasonable cost criteria of $42,000 per benefited receptor site. In addition, E4N-CD5 meets FDOT's noise reduction design goal requirement of 7 dB(A) and represents the optimal noise barrier for this location. This design includes three new noise

Table 5.2.1: Noise Barrier Analyses for Common Noise Environment E4N (Liberty Park Community)

Noise Sensitive Area (General Location/ Station Range)	Conceptual Barrier Design Number	Barrier Type - Segment Name	Barrier Location	Height (feet)	Length (feet)	Begin Station Number	End Station Number	Number of Impacted Receptor Sites	Number of Sites Considered for Noise Abatement	Average (Maximum) Noise Reduction for Impacted Receptor Sites dB(A)	Number of Impacted/ Benefited Receptor Sites	Number of Benefited Receptor Sites for those Considered for Abatement	Number of Benefited Receptor Sites for those Not Considered for Abatement	Total Number of Benefited Receptor Sites for those Considered for Abatement	Average Noise Reduction for all Benefited Receptor Sites Considered for Abatement dB(A)	Average Cost/Site Benefited for those Considered for Abatement	Average Cost/Site Benefited	Meets FDOT's Reasonableness Cost Criteria of $42,000 per Benefited Receptor and 7.0 dB(A) Noise Reduction Design Goal?	Noise Barrier Recommended for Further Consideration in the Design Phase and Community Input	Comments
Liberty Park/CNE-E4N (East of I-95 and North of NW 6th Street to South of Sunrise Boulevard/ Station 2076+50 to Station 2085+50)	**Conceptual Noise Barrier Designs that Supplement the Existing 14-Foot to 17-Foot Tall Ground Mounted Noise Barrier**																			
	E4N-CD1S	Shoulder Mounted - I-95 Northbound	Extending Entire Length of Community Along Outside Shoulder of I-95 Northbound Lanes on MSE Wall	8	2,200	2068+20	2090+14	16	16	3.9 (6.4)	1	1	0	1	6.4	$528,000	$528,000	No	No	Assumes the existing ground mounted noise barrier will remain in place with the Build Alternative; Conceptual barrier design does not meet either the 7.0 dB(A) noise reduction design goal or the reasonable cost criteria of $42,000 per benefited site
	E4N-CD2S	Ground Mounted - South Segment	Extending South of Existing Ground Mounted Noise Barrier Along I-95 Eastern Right of Way Line	22	540	2075+06	2080+43	16	16	3.6 (6.0)	3	3	0	3	6.4	$838,200	$279,400	No	No	Assumes the existing ground mounted noise barrier will remain in place with the Build Alternative; Conceptual barrier design does not meet either the 7.0 dB(A) noise reduction design goal or the reasonable cost criteria of $42,000 per benefited site
		Ground Mounted - North Segment	Extending North of Existing Ground Mounted Noise Barrier Along I-95 Eastern Right of Way Line	22	730	2085+75	2093+09													
	E4N-CD3S	Shoulder Mounted - I-95 Northbound	Extending South of Existing Noise Barrier Along Outside Shoulder of I-95 Northbound Lanes on MSE Wall	8	1,760	2068+59	2086+19	16	16	4.8 (9.1)	5	5	0	5	6.4	$1,042,200	$208,440	No	No	Assumes the existing ground mounted noise barrier will remain in place with the Build Alternative; Conceptual barrier design does not meet the reasonable cost criteria of $42,000 per benefited site
		Ground Mounted - South Segment	Extending South of Existing Ground Mounted Noise Barrier Along I-95 Eastern Right of Way Line	20	230	2078+09	2080+43													
		Ground Mounted - North Segment	Extending North of Existing Ground Mounted Noise Barrier Along I-95 Eastern Right of Way Line	22	730	2085+75	2093+09													
	Conceptual Noise Barrier Designs that Incorporate the Existing 14-Foot to 17-Foot Tall Ground Mounted Noise Barrier																			
	E4N-CD1	Existing Ground Mounted	I-95 Eastern Right of Way Line	14 to 17	530	2080+40	2085+75	16	21*	2.3 (5.8)	1	1	0	1	5.8	---	---	No	Not Applicable (Existing Noise Barrier)	Existing 14-foot to17-foot tall ground mounted noise barrier with Build Alternative, does not meet the 7.0 dB(A) noise reduction design goal
	E4N-CD2	Shoulder Mounted - I-95 Northbound Segment 1	Extending South of Existing Noise Barrier Along Outside Shoulder of I-95 Northbound Lanes on MSE Wall	8	1,000	2071+19	2081+14	16	21*	5.6 (9.0)	9	12	1	13	7.4	$384,000	$29,538	Yes	No	Cost incudes only the new two 8-foot tall shoulder mounted noise barrier segments; Assumes the existing ground mounted noise barrier will remain in place with the Build Alternative
		Shoulder Mounted - I-95 Northbound Segment 2	Extending North of Existing Noise Barrier Along Outside Shoulder of I-95 Northbound Lanes on MSE Wall	8	600	2084+17	2090+14													
		Existing Ground Mounted	I-95 Eastern Right of Way Line	14 to 17	530	2080+40	2085+75													
	E4N-CD3	Ground Mounted - South Segment	Extending South of Existing Ground Mounted Noise Barrier Along I-95 Eastern Right of Way Line	22	500	2075+56	2080+43	16	21*	5.4 (9.1)	9	12	1	13	6.4	$567,600	$43,662	No	No	Cost incudes only the two new ground mounted noise barriers; Assumes the existing ground mounted noise barrier will remain in place with the Build Alternative
		Ground Mounted - North Segment	Extending North of Existing Ground Mounted Noise Barrier Along I-95 Eastern Right of Way Line	18	440	2085+75	2090+14													
		Existing Ground Mounted	I-95 Eastern Right of Way Line	14 to 17	530	2080+40	2085+75													
	E4N-CD4	Shoulder Mounted - I-95 Northbound	Extending South of Existing Noise Barrier Along Outside Shoulder of I-95 Northbound Lanes on MSE Wall	8	1,620	2068+98	2085+20	16	21*	6.6 (11.9)	16	21	1	22	6.8	$957,600	$43,527	No	No	Cost incudes only the new shoulder and ground mounted noise barriers; Assumes the existing ground mounted noise barrier will remain in place with the Build Alternative
		Ground Mounted - South Segment	Extending South of Existing Ground Mounted Noise Barrier Along I-95 Eastern Right of Way Line	22	280	2077+57	2080+43													
		Ground Mounted - North Segment	Extending North of Existing Ground Mounted Noise Barrier Along I-95 Eastern Right of Way Line	20	640	2085+75	2092+60													
		Existing Ground Mounted	I-95 Eastern Right of Way Line	14 to 17	530	2080+40	2085+75													
	E4N-CD5	Shoulder Mounted - I-95 Northbound	Extending South of Existing Noise Barrier Along Outside Shoulder of I-95 Northbound Lanes on MSE Wall	8	1,010	2068+98	2079+10	16	21*	6.3 (9.4)	14	18	1	19	6.4	$718,800	$37,832	Yes	Yes	Cost incudes only the new shoulder mounted and ground mounted noise barriers; Assumes the existing ground mounted noise barrier will remain in place with the Build Alternative; Represents optimal noise barrier design and is recommended for further consideration in the design phase and community input
		Ground Mounted - South Segment	Extending South of Existing Ground Mounted Noise Barrier Along I-95 Eastern Right of Way Line	22	280	2077+57	2080+43													
		Ground Mounted - North Segment	Extending North of Existing Ground Mounted Noise Barrier Along I-95 Eastern Right of Way Line	18	540	2085+75	2091+18													
		Existing Ground Mounted	I-95 Eastern Right of Way Line	14 to 17	530	2080+40	2085+75													
	Conceptual Shoulder Mounted Noise Barrier Designs without the Existing 14-Foot to 17-Foot Tall Ground Mounted Noise Barrier that might be Removed to Construct the Proposed Roadway Improvements																			
	E4N-CD6	Shoulder Mounted - I-95 Northbound	Along Outside Shoulder of I-95 Northbound Lanes on MSE Wall	8	1,552	2074+15	2089+66	16	21*	5.4 (6.2)	9	12	0	12	7.9	$372,480	$31,040	Yes	No	Represents an optional recommended noise barrier design if the existing ground mounted noise barrier will not remain in place and can't be reconstructed due to insufficient right-of-way
	E4N-CD7	Shoulder Mounted - I-95 Northbound	Along Outside Shoulder of I-95 Northbound Lanes on MSE Wall	14	1,352	2074+15	2087+66	16	21*	7.4 (7.4)	16	21	0	21	10.3	$567,840	$27,040	Yes	No	This conceptual noise barrier design exceeds the maximum height of 8 feet on a MSE Wall; Therefore, it is not recommended for further consideration but will reevaluated in the Final Design Phase because it maximizes the number of impacted and benefited residences in this location

X:\P-N\Noise Studies\I-95 Broward FDOT-NSR-Tables\I-95Broward NoiseBarrierAnalysis 12-2-2018.xlsx\SummaryTable

Represents the optimal conceptual noise barrier design and is recommended for further consideration and public input.

Note: * The number of sites considered for noise abatement includes those that would exceed the NAC without the existing noise barrier.

barriers, including a shoulder mounted noise barrier and two ground mounted noise barriers (see **Figure 6** in **Appendix A**). The shoulder mounted noise barrier would be 8 feet tall and located south of the existing noise barrier along the outside shoulder of I-95 northbound lanes and extend 1,010 feet. The two ground mound noise barriers would be located on either side (i.e., north and south) of and connect to the existing noise barrier. The ground mounted noise barrier south of the existing noise barrier would be 22 feet tall and extend 280 feet. The ground mounted noise barrier north of the existing noise barrier would be 18 feet tall and extend 540 feet. Nineteen residences in this community, including 18 of the 21 sites considered for noise abatement, would be benefited by this noise barrier. The estimated construction cost of this conceptual noise barrier design is $718,800 or $37,832 per benefited receptor. Noise Barrier E4N-CD5 is recommended for further consideration in the design phase and for public input assuming that the existing ground mounted noise barrier does not need to be removed to construct the proposed improvements.

If the existing noise wall is required to be removed and can't be reconstructed due to insufficient right-of-way, conceptual design E4N-CD6 is recommended for further consideration and public input. This design represents an 8-foot-tall shoulder mounted noise barrier located along the outside shoulder of the I-95 northbound lanes and extend 1,552 feet. Twelve of the residences in this community, including 12 of the 21 residences considered for noise abatement, would be benefited by this noise barrier. The estimated construction cost of this conceptual noise barrier design is $372,480 or $31,040 per benefited receptor.

Since conceptual design E4N-CD6 does not benefit all of the impacted sites, a 14-foot tall shoulder mounted noise barrier was also evaluated at this location (i.e., E4N-CD6). However, conceptual barrier design E4N-CD6 is provided only for comparative purposes. As previously mentioned, based on the current design standards, the maximum height of shoulder mounted noise barriers on structures such as a MSE wall is 8 feet. Since design standards could change in the future, it is recommended that this conceptual design be reevaluated in the Final Design Phase because it provides benefit to all of the impacted residences in this area.

5.3 Common Noise Environment E5

Common Noise Environment E5 represents the Woodlawn Cemetery located east of I-95 and south of Sunrise Boulevard. Other than a few park benches, there are no facilities where people would congregate for extended periods of time. The majority of the cemetery is exposed to noise levels above the NAC of 66 dB(A) for Activity Category C and will be impacted by the project. Therefore, consideration of noise abatement at this cemetery, which represents a special land use (i.e., non-residential), was warranted.

Three conceptual noise barrier designs of various heights and lengths were evaluated. The results of the noise barrier analysis for this cemetery are summarized in **Table 5.3.1**. All three of the conceptual noise barrier designs (i.e., E5-CD2 and E5-CD3) meet the minimum requirements for a noise barrier to achieve the noise reduction design goal at this location. Of these two conceptual designs, E5-CD3 represents the optimal noise barrier design for this location and would provide benefit to the entire cemetery. E5-CD3 represents a 22-foot-tall ground mounted noise barrier located along the I-95 eastern right-of-way line extending 500 feet (see **Figure 6** in **Appendix A**).

The FDOT's special land use methodology was used to determine if the cost of E5-CD3 would be reasonable based on the level of activity expected at this cemetery. The results of this analysis are presented in **Table 5.3.2**. The required daily usage rate (i.e., person-hours per day) for E5-CD3 is 380 persons per day, each spending a minimum of one hour at this park. Due to the small size of the cemetery (i.e., approximately 4 acres) and the lack of areas where large groups of people would congregate on a daily basis, it is not reasonable to assume that this area would experience 380 person-hours of usage on a typical day. Therefore, since the expected cemetery usage is lower than the usage required to meet the FDOT's Special Land Use criteria, a noise barrier is not considered reasonable at this location. Therefore, based on this requirement and likely usage of this cemetery per day, Conceptual Barrier Design E5-CD3 is not recommended for further consideration or public input.

Table 5.3.1: Noise Barrier Analyses for Common Environment E5 (Woodlawn Cemetery)

Noise Barrier Descriptions						Total Estimated Cost	Maximum Noise Reduction dB(A)	Average Noise Reduction dB(A)	Percent of Impacted Area Benefited	Does Barrier Design Meet 7 dB(A) Reduction Goal At Any Site?	Does Barrier Design Provide 5 dB(A) Reduction For Entire Exterior Area of Use Impacted?	Usage Required to be Cost Reasonable (Person Hours per Day)	Actual Usage Likely to Exceed Required Usage to be Cost Reasonable	Does Barrier Design Meet FDOT's Noise Reduction and Cost Reasonableness Criteria?	Conceptual Noise Barrier Design Recommended for further Consideration and Public Input?
Noise Barrier Conceptual Design	Type	Height (Feet)	Length (feet)	Begin Station	End Station										
E5-CD1	Ground Mounted	14	1,030	2085+75	2095+16	$432,600	12.9	8.0	75%	Yes	No	608	No	No	No
E5-CD2	Ground Mounted	16	650	2087+63	2093+88	$312,000	13.7	8.3	100%	Yes	Yes	439	No	No	No
E5-CD3	Ground Mounted	18	500	2089+15	2093+88	$270,000	13.7	8.5	100%	Yes	Yes	380	No	No	No

X:\Noise_Studies\I-95_Broward_PD&E\NSR\Tables\[I-95&Broward_NoiseBarrierAnalysis_3-1-2018.xlsx]SummaryTable

Table 5.3.2: Conceptual Noise Barrier Design - Usage Analysis for Woodlawn Cemetery

Item	Criteria	Actual Usage	Needed Usage to Meet FDOT's Cost Reasonableness Criteria (Input Data)			Units
			Conceptual Noise Barrier Design Number			
			E5-CD1	E5-CD2	E5-CD3	
1	Enter Length of Proposed Noise Barrier (Begin Station 1707+20/End Station 1714+20)	---	1,030	650	500	feet
2	Enter Height of Proposed Noise Barrier	---	14	16	18	feet
3	Total Square Feet of Proposed Noise Barrier (Multiply item 1 by Item 2)	---	14,420	10,400	9,000	$feet^2$
4	Enter the average amount of time that a person stays at the site per visit	**Unknown**	1	1	1	hours
5	Enter the average number of people that use this site per day that will receive at least 5 dB(A) benefit from abatement at the site	**Unknown**	**608**	**439**	**380**	persons
6	Total Person Hours per Day Benefited by Noise Barrier (Multiply Item 4 by Item 5)	---	608	439	380	person-hours
7	Average Square Foot of Noise Barrier per Person Hour (Divide Item 3 by Item 6)	---	23.71	23.71	23.71	$feet^2$/person-hours
8	Cost per Person Hour per Square Foot of Noise Barrier (Multiply Item 7 by $42,000)	N/A	$995,935	$995,935	$995,935	$/person-hours/$ft^2$
9	Does item 8 exceed the "abatement cost factor" of: $995,935/person-hour/$ft^2$?	N/A	No	No	No	Yes/No
10	If item 9 is no, abatement is cost reasonable.	N/A	N/A	N/A	N/A	---
11	If item 9 is yes, abatement is not cost reasonable.	N/A	N/A	N/A	N/A	---

X:\Noise_Studies\I-95_Broward_PD&E\NSR\Tables\[Table_5_3_2_SLU Worksheet_I-95&SR80_4-25-2017.xlsx]Woodland Cemetery

Source: FDOT Report - A Method to Determine Reasonableness and Feasibility of Noise Abatement at Special Use Locations (2009)

5.4 Common Noise Environment W4

Common Noise Environment W4 includes residences in the communities of River Garden/Sweeting Estates and Washington Park, located west of I-95 and north of the North Fork of the New River to north of NW 6th Street/Sistrunk Boulevard. As mentioned in **Section 4.2.3** and shown in **Figure 4 Sheet 3** in **Appendix A**, the planned 8-foot-tall shoulder mounted noise barrier along the outside shoulder of I-95 southbound lanes will be directly impacted and will need to be replaced to accommodate the proposed improvements (i.e., Ramp E). The 22-foot-tall ground mounted noise barrier that is under construction and located on the west side of the SFRC will not be affected and will remain in place with the Build Alternative.

With the Build Alternative and 22-foot-tall ground mounted noise barrier under construction, six residences within this community are predicted to be impacted by design year (2040) noise levels. Therefore, consideration of noise abatement for these residences was warranted. The results of the noise barrier analysis for these residences are summarized in **Table 5.4.1**. Only 8-foot-tall shoulder mounted noise barrier designs were evaluated. The proposed Ramp E and the I-95 southbound lanes will need to be constructed on MSE walls and/or on a bridge structures, which limit the shoulder mounted barrier height to 8 feet.

Six conceptual noise barrier designs of various lengths were evaluated for the impacted residences and for the entire length of these communities. Although the majority of River Garden/Sweeting Estates community would no longer be impacted by design year (2040) traffic noise, this community and the Washington Park community would have received noise reduction benefit from the planned 8-foot-tall shoulder mounted noise barrier associated with the 95 Express Phase 3A Project. Since this planned shoulder mounted noise barrier would need to be replaced with the Build Alternative, a replacement noise barrier was also evaluated at this location. The initial noise barrier analysis evaluated conceptual designs that would supplement the 22-foot-tall ground mounted noise barrier under construction (i.e., W4-CD1S) to provide benefit to the six receptors impacted in this area. If, as in this case, the supplemental conceptual noise barrier design considered did not meet FDOT's reasonable cost and/or the noise reduction design goal criteria (i.e., W4-CD1S), additional design options were also evaluated that incorporated the ground mounted noise barrier under construction (i.e., W4-CD1 through W4-CD5). For these five conceptual noise barrier designs, the number of sites considered for noise abatement is 46 and represents those that would exceed the NAC without the 22-foot-tall ground mounted noise barrier under construction.

Table 5.4.1: Noise Barrier Analyses for Common Noise Environment W4 (River Garden/Sweeting Estates and Washington Park Communities)

Noise Sensitive Area (General Location/ Station Range)	Conceptual Barrier Design Number	Barrier Type - Segment Name	Barrier Location	Height (feet)	Length (feet)	Begin Station Number	End Station Number	Number of Impacted Receptor Sites	Number of Sites Considered for Noise Abatement	Average (Maximum) Noise Reduction for Sites Considered for Abatement dB(A)	Number of Impacted/ Benefited Receptor Sites	Number of Benefited Receptor Sites for those Considered for Abatement	Number of Benefited Receptor Sites for those Not Considered for Abatement	Total Number of Benefited Receptor Sites for those Considered for Abatement	Average Noise Reduction for all Benefited Receptor Sites Considered for Abatement dB(A)	Average Cost/Site Benefited for those Considered for Abatement	Average Cost/Site Benefited	Meets FDOT's Reasonableness Cost Criteria of $42,000 per Benefited Receptor and 7.0 dB(A) Noise Reduction Design Goal?	Noise Barrier Recommended for Further Consideration in the Design Phase and Community Input	Comments
River Garden/ Sweeting Estates / CNE-W4 (West of I-95 and North of the North Fork of the New River to North of NW 6th Street/Station 2055+00 to Station 2070+00)	**Conceptual Noise Barrier Design that Supplements the 22-foot Tall Ground Mounted Noise Barrier Under Construction as part of the I-95 Express Phase 3A Project**																			
	W4-CD1S	Shoulder Mounted - Ramp E	Extending Entire Length of Community Along Outside Shoulder of Ramp E (Southbound Off Ramp to Broward Boulevard form Express Lanes)	8	2,455	2050+96	2075+20	6	6	4.4 (4.9)	0	0	6	6	5.5	$906,000	$151,000	No	No	Cost incudes only the two 8-foot tall shoulder mounted noise barriers; Assumes the planned ground mounted noise wall has been constructed as part of I-95 Express Phase 3A-1 Project; Conceptual barrier design does not meet either the 7.0 dB(A) noise reduction design goal or the reasonable cost criteria of $42,000 per benefited site
		Shoulder Mounted - I-95 Southbound	Northern End of Residential Community Along Outside Shoulder of I-95 Southbound Lanes	8	1,320	2067+95	2081+13													
	Conceptual Noise Barrier Designs that Incorporate the 22-foot Tall Ground Mounted Noise Barrier Under Construction as part of the I-95 Express Phase 3A Project																			
	W4-CD1	Ground Mounted (Existing)	South Florida Rail Corridor - Western Right of Way Line	22	1,300	2057+00	2069+78	6	46*	3.8 (6.8)	0	15	0	15	6.1	---	---	No	Not Applicable (Planned Noise Barrier - Under Construction)	Represents the planned ground mounted noise barrier that is under construction as part of I-95 Express Phase 3A-1 Project; With Build Alternative, does not meet the 7.0 dB(A) noise reduction design goal
	W4-CD2	Shoulder Mounted - Ramp E	Southern End of Residential Community Along Outside Shoulder of Ramp E (Southbound Off Ramp to Broward Boulevard for Express Lanes)	8	600	2052+00	2058+00	6	46*	4.2 (7.8)	1	16	0	16	6.1	$144,000	$9,000	Yes	No	Cost incudes only the 8-foot tall shoulder mounted noise barriers; Assumes the planned ground mounted noise under construction as part of I-95 Express Phase 3A-1 Project has been constructed
		Ground Mounted (Under Construction)	South Florida Rail Corridor - West Right of Way Line	22	1,300	2057+00	2069+78													
	W4-CD3	Shoulder Mounted - Ramp E Segment 1	Southern End of Residential Community Along Outside Shoulder of Ramp E (Southbound Off Ramp to Broward Boulevard from Express Lanes)	8	550	2052+50	2058+00	6	46*	6.5 (10.3)	1	37	0	37	7.9	$132,000	$3,568	Yes	No	Cost incudes only the two 8-foot tall shoulder mounted noise barriers; Assumes the planned ground mounted noise under construction as part of I-95 Express Phase 3A-1 Project has been constructed
		Ground Mounted (Under Construction)	South Florida Rail Corridor - West Right of Way Line	22	1,300	2057+00	2069+78													
	W4-CD4	Shoulder Mounted - Ramp E	Extending Entire Length of Community Along Outside Shoulder of Ramp E (Southbound Off Ramp to Broward Boulevard form Express Lanes)	8	1,900	2052+50	2071+30	6	46*	6.9 (10.9)	1	39	0	39	8.2	$456,000	$11,692	Yes	No	Cost incudes only the 8-foot tall shoulder mounted noise barriers; Assumes the planned ground mounted noise under construction as part of I-95 Express Phase 3A-1 Project has been constructed
		Ground Mounted (Under Construction)	South Florida Rail Corridor - West Right of Way Line	22	1,300	2057+00	2069+78													
	W4-CD5	Shoulder Mounted - Ramp E	Extending Entire Length of Community Along Outside Shoulder of Ramp E	8	1,900	2052+50	2071+30	6	46*	7.6 (11.0)	1	42	0	42	8.1	$672,000	$16,000	Yes	Yes	Cost incudes only the two 8-foot tall shoulder mounted noise barriers; Assumes the planned ground mounted noise under construction as part of I-95 Express Phase 3A Project has been constructed; Represents optimal replacement shoulder mounted noise barrier design and is recommended for further consideration in the design phase and community input
		Shoulder Mounted - I-95 Southbound	Northern End of Residential Community Along Outside Shoulder of I-95 Southbound Lanes	8	900	2068+00	2077+00													
		Ground Mounted (Under Construction)	South Florida Rail Corridor - West Right of Way Line	22	1,300	2057+00	2069+78													

X:\Noise Studies\I-95 Broward PD&E\NSR\Tables\I-95&Broward NoiseBarrierAnalysis 3-13-2018.xlsx]E4S CNE A

Represents the optimal replacement shoulder mounted noise barrier conceptual design and is recommended for further consideration and public input.

Note: * The number of sites considered for noise abatement includes those that would exceed the NAC without the existing noise barrier.

As indicated in **Table 5.4.1**, none of the conceptual designs benefit all of the impacted receptor sites. Normally, the noise barrier analysis would focus on only the six impacted residences not being benefited by the 22-foot-tall ground mounted noise barrier that is under construction. However, the communities in this area will have a shoulder mounted noise barrier constructed along I-95 southbound outside shoulder as part of the 95 Express Lane Phase 3A Project that will need to be replaced to accommodate the Build Alternative. Therefore, it is recommended that the shoulder mounted noise barrier be replaced to maximize the reduction of traffic noise in these communities. Conceptual design W4-CD5 benefits the highest number of receptors (i.e., 42) and represents the optimal noise barrier for this location that meets both FDOT's reasonable cost criteria and noise reduction design goal requirement of 7 dB(A). This design represents two 8-foot-tall shoulder mounted noise barriers. One would be located along Ramp E and extend 1,900 feet. The second noise barrier would be located along the outside shoulder of the I-95 southbound lanes and extend 900 feet (see **Figure 7** in **Appendix A**). Forty two of the 46 sites considered for noise abatement in these communities would be benefited by this noise barrier design. The estimated construction cost of this conceptual noise barrier design is $672,000 or $16,000 per benefited receptor. Noise Barrier W4-CD5 is recommended for further consideration in the design phase and for public input.

6.0 Conclusion

A traffic noise study was performed in accordance with 23 CFR 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise (July 13, 2010), the FDOT's PD&E Manual, Part 2, Chapter 18, Highway Traffic Noise (January 14, 2019), and FDOT's Traffic Noise Modeling and Analysis Practitioners Handbook (January 1, 2016). Design year traffic noise levels (2040) for the Build Alternative will approach or exceed the NAC at 41 residences and at one special land use within the project limits. Consequently, the feasibility and reasonableness of noise barriers were considered for those noise sensitive sites predicted to be impacted.

Four separate CNEs were used to assess noise barriers for the noise sensitive sites that approach or exceed the NAC:

- E4S - Represents the 19 impacted residences in the Riverbend Community;
- E4N - Represents the 16 residences in the Liberty Park Community;
- E5 - Represents the Woodlawn Cemetery; and
- W4 - Represents the six residence in River Garden/Sweeting Estates and Washington Park.

Table 6.1.1 summarizes the results of the noise barrier analyses and recommendations for each of the locations where noise barriers were evaluated. Noise barriers at three of CNEs (E4S, E4N, and W4) were determined to be feasible and cost reasonable and/or represent replacement noise barriers and are recommended for further consideration during the design phase and for public input. The location of the recommended noise barriers are depicted on **Figures 5**, **6**, and **7** in **Appendix A**). Noise barriers recommended for CNE-E4S and -W4 represent replacement noise barriers for the existing and planned shoulder mounted noise barriers that are required to be replaced to construct the improvements associated with the Build Alternative. The recommended noise barriers benefit 27 of the 41 residences with reduction from the existing noise barrier impacted by the Build Alternative. The elevated roadways in the vicinity of these communities and the 8-foot-tall height limitation on bridge and MSE walls limit the ability to provide benefits to all of the impacted residences in these communities. The estimated cost of the recommended nose barriers is $1,935,600.

It should be noted that for the Liberty Park community, an optional recommended noise barrier design is also presented in **Table 6.1.1**. There is a potential that the existing ground mounted noise barrier will not remain in place due to the proposed roadway improvements in this area and can't be reconstructed due to insufficient right-of-way.

Noise barriers were not found to be cost reasonable at the Woodlawn Cemetery (CNE-E5). The usage of the cemetery was less than required to be cost reasonable; therefore, a noise barrier is not recommended for further consideration or construction at this location. Based on the noise analyses performed to date, there appears to be no apparent solutions available to mitigate the noise impacts at this cemetery or the 14 impacted residences in the vicinity of the existing and proposed noise barriers. The traffic noise impacts to these noise sensitive sites are an unavoidable consequence of the project.

Statement of Likelihood

FDOT is committed to the construction of feasible noise abatement measures at the noise impacted locations identified in **Table 6.1.1** and **Figures 5**, **6**, and **7** in **Appendix A** contingent upon the following conditions:

- Final recommendations on the construction of abatement measures is determined during the project's Final Design and through the public involvement process;
- Detailed noise analyses during the Final Design process support the need, feasibility and reasonableness of providing abatement;
- Cost analysis indicates that the cost of the noise barrier(s) will not exceed the cost reasonable criterion;
- Community input supporting types, heights, and locations of the noise barrier(s) is provided to the District Office; and

Table 6.1.1: Noise Barrier Evaluation Summary and Recommendations

Common Noise Environment (Noise Sensitive Area/Site)	General Location (Station Range)	Conceptual Barrier Design Number	Barrier Type - Segment Name	Barrier Location	Height (feet)	Length (feet)	Begin Station Number	End Station Number	Number of Impacted Receptor Sites	Number of Sites Considered for Noise Abatement	Average (Maximum) Noise Reduction for Sites Considered for Abatement dB(A)	Number of Impacted/ Benefited Receptor Sites	Number of Benefited Receptor Sites for those Considered for Abatement	Number of Benefited Receptor Sites for those Not Considered for Abatement	Total Number of Benefited Receptor Sites for those Considered for Abatement	Average Noise Reduction for all Benefited Receptor Sites Considered for Abatement dB(A)	Cost ($30 per square foot)	Average Cost/Site Benefited for those Considered for Abatement	Meets FDOT's Reasonableness Cost Criteria of $42,000 per Benefited Receptor and 7.0 dB(A) Noise Reduction Design Goal?	Noise Barrier Recommended for Further Consideration in the Design Phase and Community Input	Comments
CNE-E4S (Riverbend Community)	East of I-95 and North of the North Fork of the New River to NW 6th Street (Station 2055+00 to Station 2070+00)	**Conceptual Noise Barrier Design that Incorporate the Remaining 300 foot Segment of the Existing Noise Barrier (For Proposed Ramp D - MSE Wall Ends/Begin Bridge Station ~2067+00)**																			
		E4S-CD4	Shoulder Mounted - Ramp D	Extending Entire Length of Community Along Outside Shoulder of Ramp D (Northbound On Ramp from Broward Boulevard to Express Lanes)	8	1,330	2055+87	2069+24	19	21*	5.0 (6.8)	12	12	3	15	5.9	$544,800	$36,320	No	Yes (Replacement Noise Barrier)	Cost incudes only the two 8-foot tall shoulder mounted noise barriers; Assumes the existing shoulder barrier will remain in place with the Build Alternative; Conceptual barrier design does not meet the 7.0 dB(A) noise reduction design goal; Represents optimal replacement noise barrier design and is recommended for further consideration in the design phase and community input
			Shoulder Mounted I-95 Northbound	Northern End of Residential Community Along Outside Shoulder of I-95 Northbound Lanes	8	940	2066+69	2076+15													
			Existing Shoulder Mounted	Southern End of Residential Community Along Outside Shoulder of the Northbound On Ramp from Broward Boulevard across the Bridge over the North Fork of the New River	8	300	2052+94	2055+87													
CNE-E4N (Liberty Park)	East of I-95 and North of NW 6th Street to South of Sunrise Boulevard (Station 2076+50 to Station 2085+50)	**Conceptual Noise Barrier Design that Incorporates the Existing 14-Foot to 17-Foot Tall Ground Mounted Noise Barrier**																			
		E4N-CD5	Shoulder Mounted I-95 Northbound	Extending South of Existing Noise Barrier Along Outside Shoulder of I-95 Northbound Lanes	8	1,010	2068+98	2079+10	16	21	6.3 (9.4)	14	18	1	19	6.4	$718,800	$37,832	Yes	Yes	Cost incudes only the new shoulder mounted and ground mounted noise barriers; Assumes the existing ground mounted noise barrier will remain in place with the Build Alternative; Represents optimal noise barrier design and is recommended for further consideration in the design phase and community input
			Ground Mounted - South Segment	Extending South of Existing Ground Mounted Noise Barrier Along I-95 Eastern Right of Way Line	22	280	2077+57	2080+43													
			Ground Mounted - North Segment	Extending North of Existing Ground Mounted Noise Barrier Along I-95 Eastern Right of Way Line	18	540	2085+75	2091+18													
			Existing Ground Mounted	I-95 Eastern Right of Way Line	14 to 17	530	2080+40	2085+75													
		Conceptual Shoulder Mounted Noise Barrier Designs without the Existing 14-Foot to 17-Foot Tall Ground Mounted Noise Barrier that might be Removed to Construct the Proposed Roadway Improvements																			
		E4N-CD6	Shoulder Mounted I-95 Northbound	Along Outside Shoulder of I-95 Northbound Lanes on MSE Wall	8	1,552	2074+15	2089+66	16	21*	5.4 (6.2)	9	12	0	12	7.9	$372,480	$31,040	Yes	No (Represents Optional Conceptual Noise Barrier Design)	Represents an optional recommended noise barrier design if the existing ground mounted noise barrier will not remain in place and can't be reconstructed due to insufficient right-of-way (i.e., if E4N-CD5 is not found feasible during the Final Design Phase)
CNE-E5 (Woodlawn Cemetery	East of I-95 and South of Sunrise Boulevard (Station 2090+00 to Sation2093+00)	E5-CD3	Ground Mounted	I-95 Eastern Right of Way Line	18	500	2089+15	2093+88	Special Land Use	Special Land Use	8.5 (13.7)	---	- - -	- - -	- - -	8.5	$270,000	- - -	No (Usage of Cemetery Less Than Required to be Cost Reasonable)	No	100% of the impacted area is benefited from the conceptual design; The conceptual design meets FDOT's 7.0 dB(A) Nosie Reduction Design Goal, but does not meet the Reasonableness Cost Criteria for Special Land Uses
CNE-W4 (River Gardens/ Sweeting Estates and Washington Park)	West of I-95 and North of the North Fork of the New River to North of NW 6th Street (Station 2055+00 to Station 2070+00)	**Conceptual Noise Barrier Design that Incorporates the 22-foot Tall Ground Mounted Noise Barrier Under Construction as part of the I-95 Express Phase 3A Project**																			
		W4-CD5	Shoulder Mounted - Ramp E	Extending Entire Length of Community Along Outside Shoulder of Ramp E	8	1,900	2052+50	2071+30	6	46	7.6 (11.0)	1	42	0	42	8.1	$672,000	$16,000	Yes	Yes (Replacement Noise Barrier)	Cost incudes only the two 8-foot tall shoulder mounted noise barriers; Assumes the planned ground mounted noise under construction as part of I-95 Express Phase 3A Project has been constructed; Represents optimal replacement shoulder mounted noise barrier design and is recommended for further consideration in the design phase and community input
			Shoulder Mounted I-95 Southbound	Northern End of Residential Community Along Outside Shoulder of I-95 Southbound Lanes	8	900	2068+00	2077+00													
			Ground Mounted (Under Construction)	South Florida Rail Corridor - West Right of Way Line	22	1,300	2057+00	2069+78													

K:\Noise Studies\I-95 Revised PD&E Noise Tables\[I-95Revised NoiseBarrierAnalysis 12.2.2019.xlsx]Summary1table

Conceptual noise barrier design t recommended for further consideration and public input during the design phase of the project.

- Safety and engineering aspects as related to the roadway user and the adjacent property owner have been reviewed and any conflicts or issues resolved.

It is likely that the noise abatement measures for the identified locations will be constructed if found feasible based on the contingencies listed above. If, during the Final Design phase, any of the contingency conditions listed above cause abatement to no longer be considered reasonable or feasible for a given location(s), such determination(s) will be made prior to requesting approval for construction advertisement. Commitments regarding the exact abatement measure locations, heights, and type (or approved alternatives) will be made during project reevaluation and at a time before the construction advertisement is approved.

7.0 Construction Noise and Vibration

During construction of the project, there is the potential for noise impacts to be substantially greater than those resulting from normal traffic operations because heavy equipment is typically used to build roadways. In addition, construction activities may result in vibration impacts. Therefore, early identification of potential noise/vibration sensitive sites along the project corridor is important in minimizing noise and vibration impacts. The project area does include residential, commercial, and institutional land uses including places of worship. Construction noise and vibration impacts to these sites will be minimized by adherence to the controls listed in the latest edition of the FDOT's Standard Specifications for Road and Bridge Construction. A reassessment of the project corridor for additional sites particularly sensitive to construction noise and/or vibration will be performed during design to ensure that impacts to such sites are minimized.

8.0 Community Coordination

Coordination with local agencies and officials has been accomplished during the development of this project. In addition, local and community officials have had the opportunity to comment on the proposed project at the public meetings.

To aid in promoting land use compatibility, a copy of the Noise Study Report, which provides information that can be used to protect future land development from becoming incompatible with anticipated traffic noise levels, will be provided to the City of Fort Lauderdale and Broward County. In addition, generalized future noise impact contours for the properties in the immediate vicinity of the project have been developed for Noise Abatement Activity Categories B/C and E (i.e., residential and other sensitive land uses, and sensitive commercial land uses, respectively). These contours represent the approximate distance from the edge of the nearest proposed travel lane of I-95 to the limits of the area predicted to approach [i.e., within 1 dB(A)] or exceed the

NAC in the design year 2040. The contours do not consider any shielding of noise provided by structures between the receptor and the proposed travel lanes. Within the project corridor, the distance between the proposed edge of the outside travel lane and the contour at various locations are presented in **Table 8.1.1**. To minimize the potential for incompatible land use, noise sensitive land uses should be located beyond this distance.

Table 8.1.1: Design Year (2040) Noise Impact Contour Distances

Location	Distance From Proposed Nearest Travel Lane to Noise Contour (Feet)	
	66 dB(A) - Activity Category B/C	71 dB(A) - Activity Category E
I-95 - North of Davie Boulevard to Broward Boulevard	370	195
I-95 - Broward Boulevard to Sunrise Boulevard	475	280

9.0 References

23 CFR Part 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise", Federal Register, Vol. 75, No. 133, Tuesday, July 13, 2010; pages 39834-39839.

Federal Highway Administration Report FHWA-HEP-10-025, “Highway Traffic Noise: Analysis and Abatement Guidance”, June 2010 (revised December 2010); 76 pages.

Federal Highway Administration Report FHWA-PD-96-009, “FHWA Traffic Noise Model, Version 1.0 User’s Guide”, January 1998; 192 pages + supplements.

Federal Highway Administration Report Number FHWA-PD-96-046, “Measurement of Highway-Related Noise”, Cynthia S.Y. Lee and Gregg Fleming, May 1996; 206 pages.

Federal Highway Administration Report FHWA-HEP-06-015, “FHWA Highway Construction Noise Handbook: Final Report”, August 2006; 185 pages.

Florida Department of Transportation. "Highway Traffic Noise", Part 2, Chapter 18. Project Development and Environment Manual, Florida Department of Transportation, Tallahassee, January 14, 2019.

Florida Department of Transportation Plans Preparation (Topic No. 625-000-007) Manual Volume 1, Chapter 32, “Sound Barrier Walls”, January 2017; 16 pages.

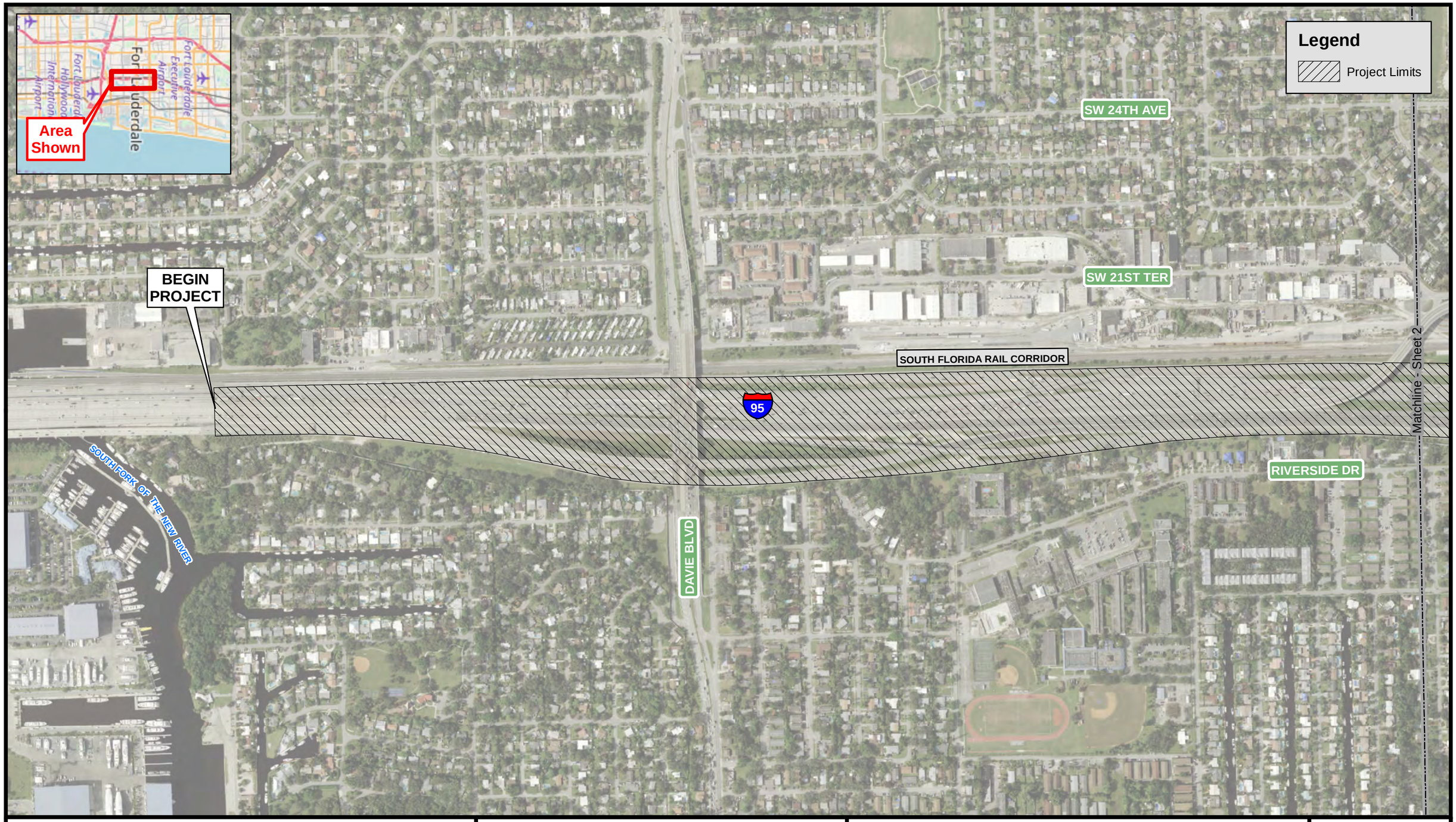
Florida Department of Transportation "Standard Specifications for Road and Bridge Construction", January 2017.

Florida Department of Transportation "Traffic Noise Modeling and Analysis Practitioners Handbook", January 2016.

University of Central Florida “A Method to Determine Reasonableness and Feasibility of Noise Abatement at Special Use Locations”, Roger L. Wayson and John M. MacDonald, Updated July 22, 2009; 64 pp. Available from: Florida Department of Transportation, Environmental Management Office, 605 Suwannee Street, M.S. 37, Tallahassee, FL 32399-0450.

APPENDIX A

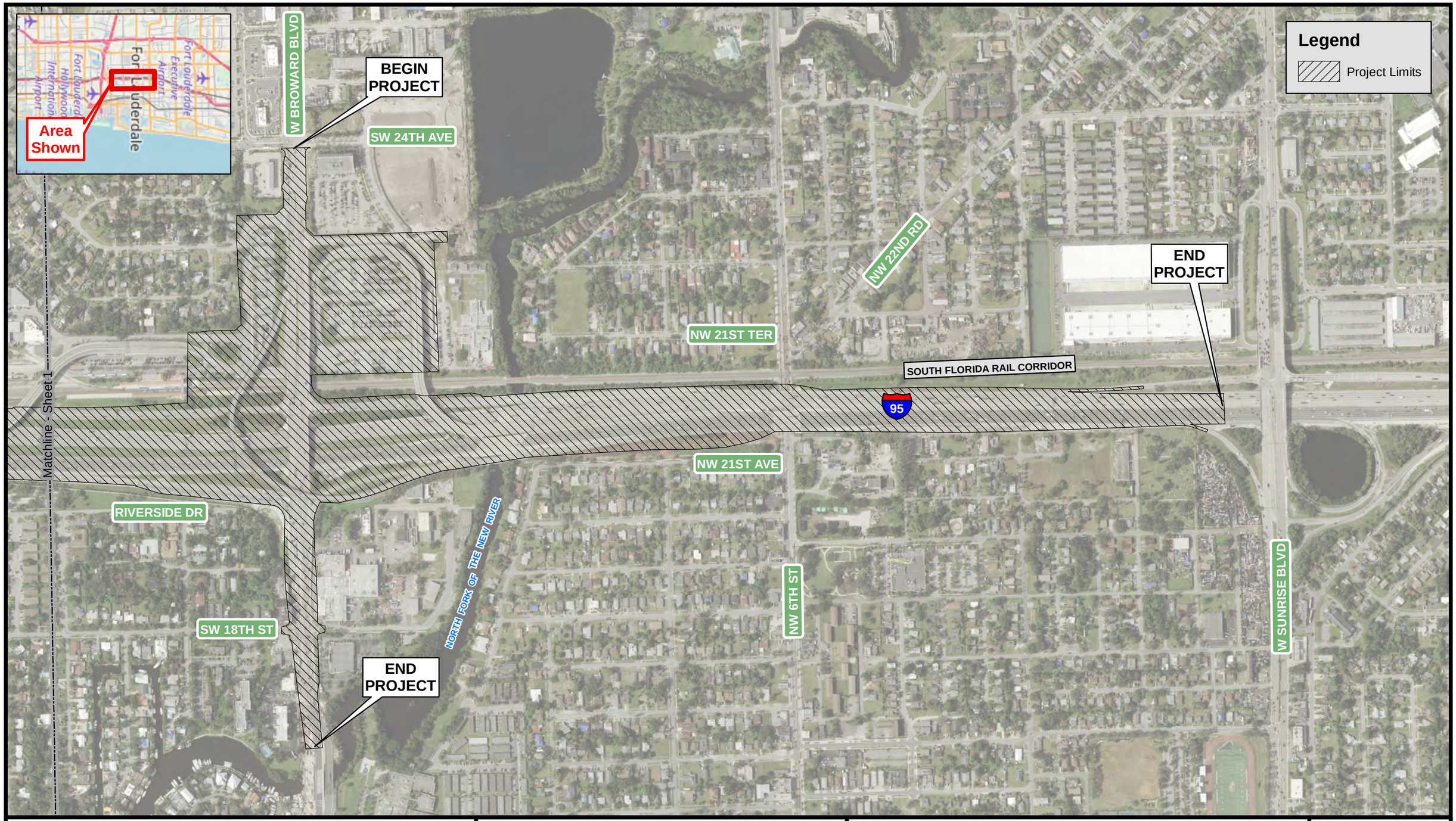
Figures



Florida Department of Transportation
I-95 at Broward Blvd PD&E Study
ETDM # 14226
FM # 435513-1-22-02
Broward County, Florida

0 250 500 1,000 Feet

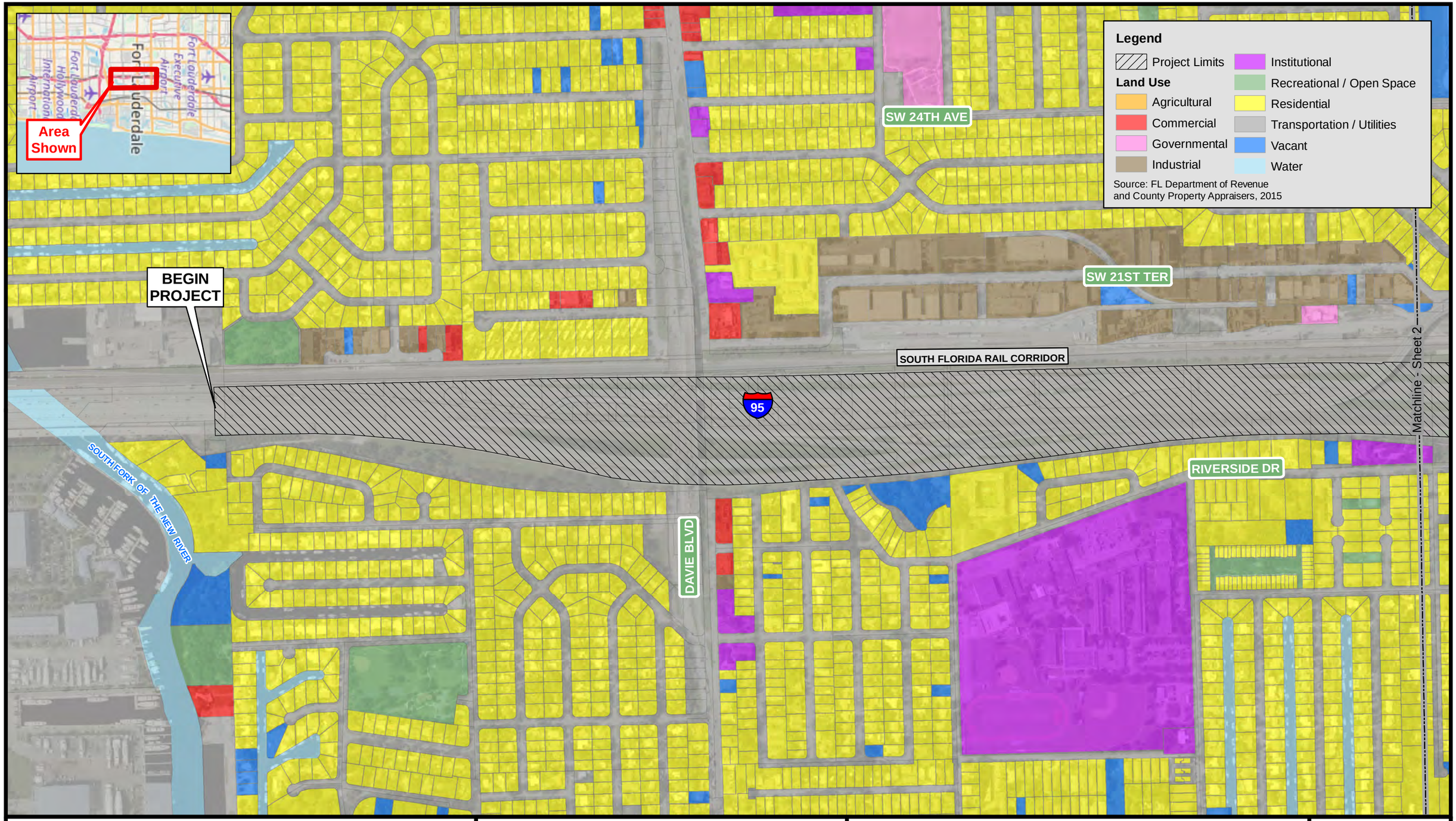
Figure 1
Project Location Map



Florida Department of Transportation
I-95 at Broward Blvd PD&E Study
ETDM # 14226
FM # 435513-1-22-02
Broward County, Florida

0 250 500 1,000 Feet

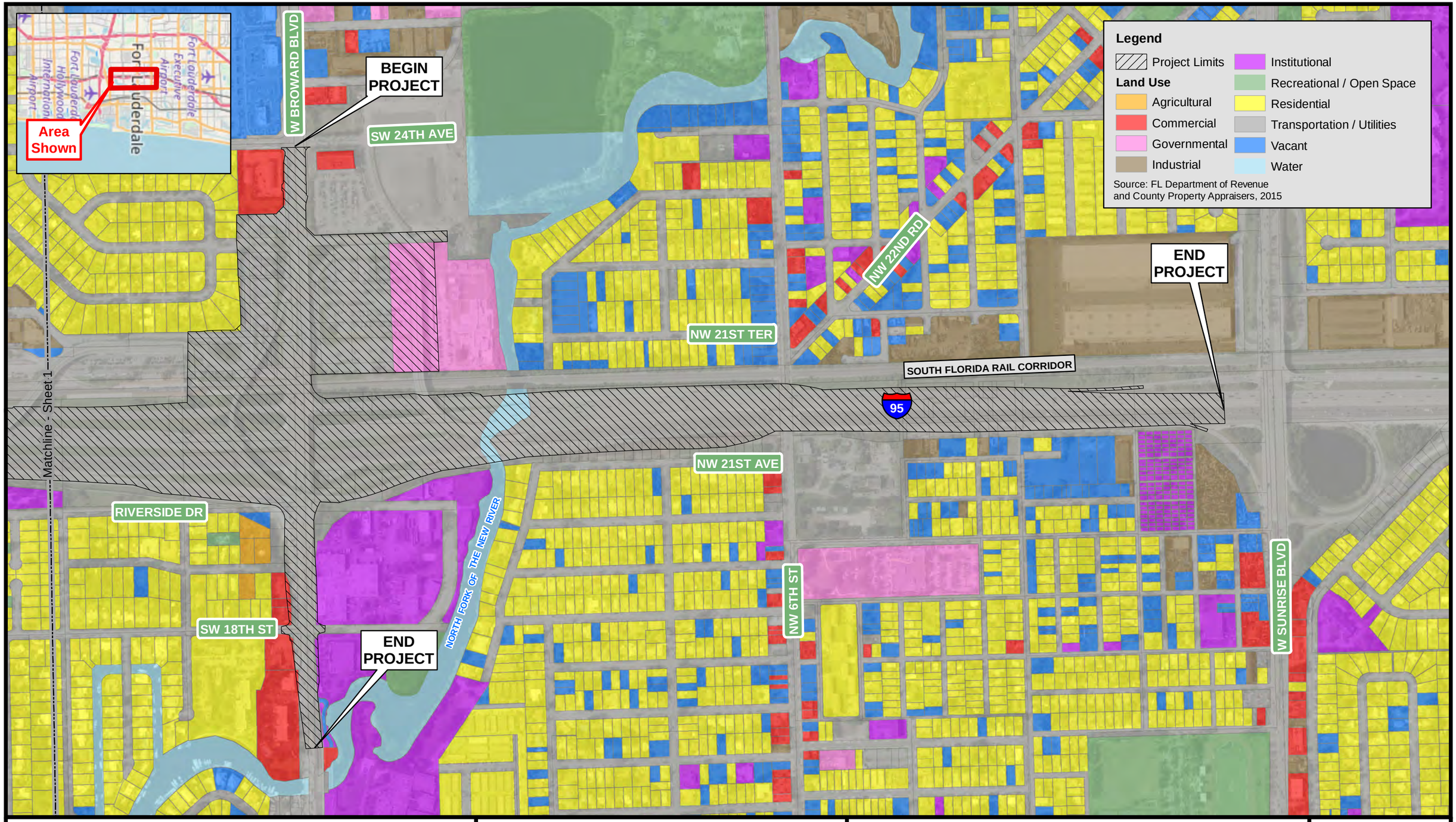
Figure 1
Project Location Map



Florida Department of Transportation
I-95 at Broward Blvd PD&E Study
ETDM # 14226
FM # 435513-1-22-02
Broward County, Florida

0 250 500 1,000 Feet

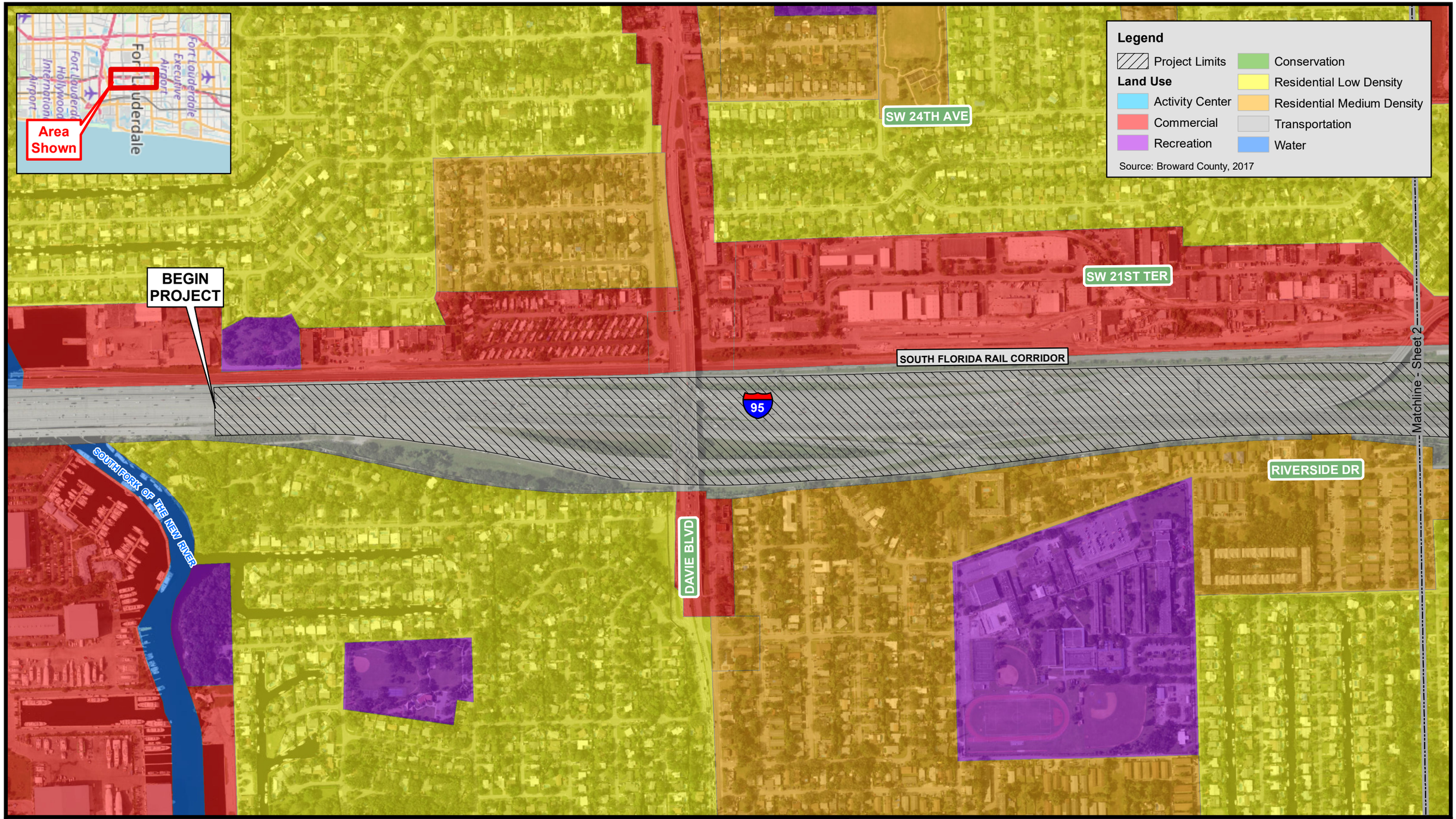
Figure 2
Existing Land Use Map



Florida Department of Transportation
I-95 at Broward Blvd PD&E Study
ETDM # 14226
FM # 435513-1-22-02
Broward County, Florida

0 250 500 1,000 Feet

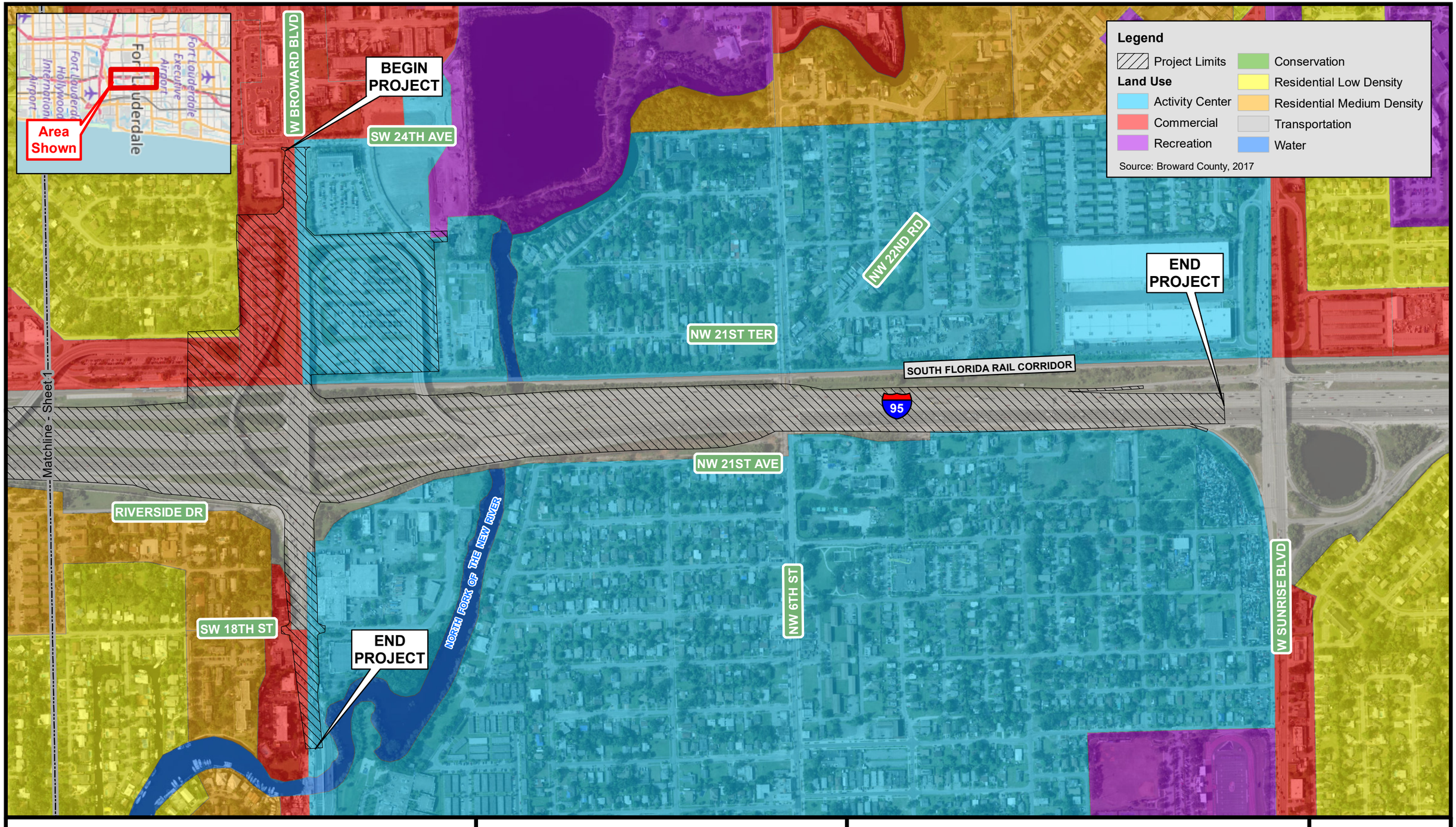
Figure 2
Existing Land Use Map



Florida Department of Transportation
I-95 at Broward Blvd PD&E Study
ETDM # 14226
FM # 435513-1-22-02
Broward County, Florida

0 250 500 1,000 Feet

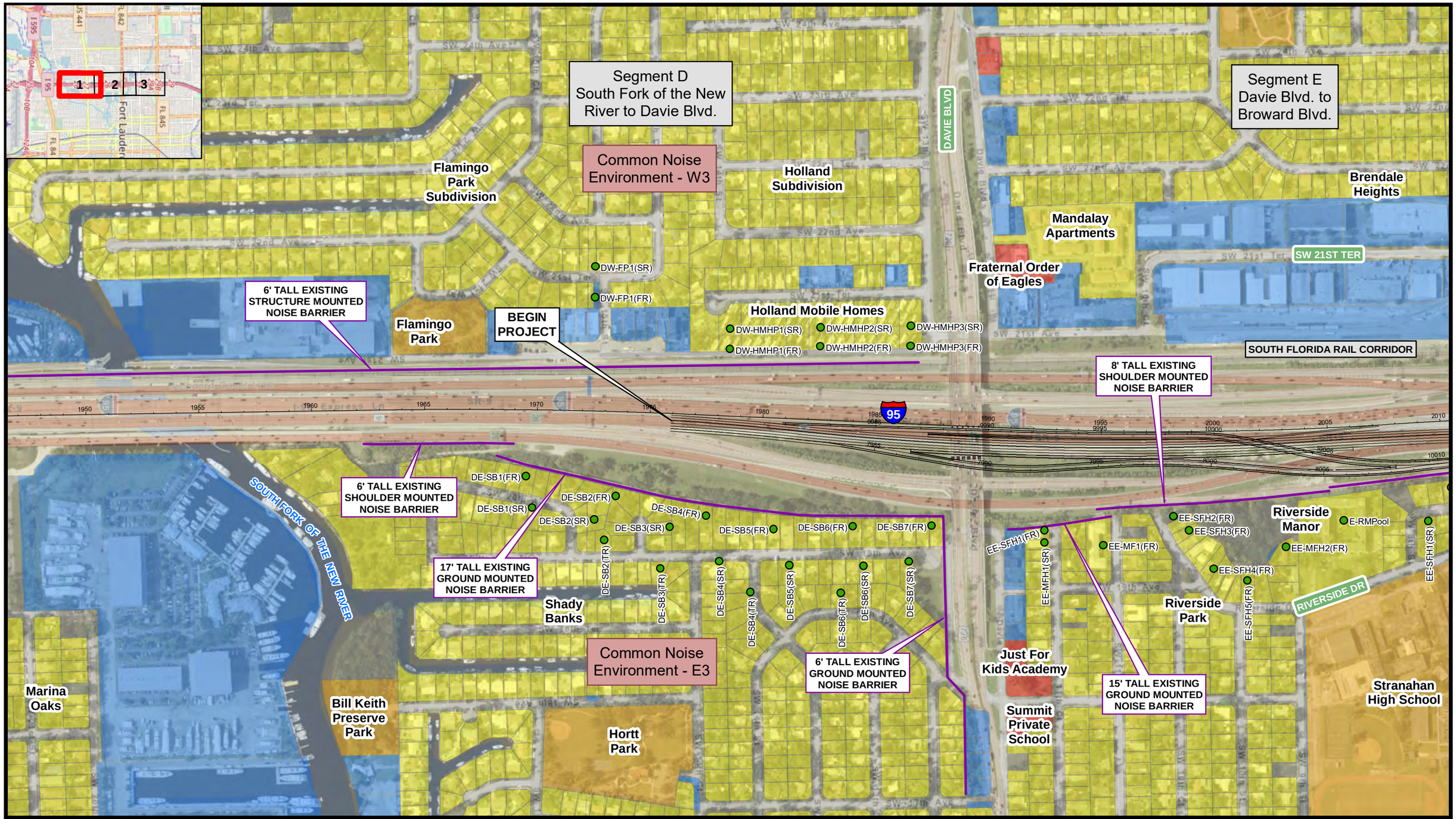
Figure 3
Future Land Use Map



Florida Department of Transportation
I-95 at Broward Blvd PD&E Study
ETDM # 14226
FM # 435513-1-22-02
Broward County, Florida

0 250 500 1,000 Feet

Figure 3
Future Land Use Map



FDOT

Florida Department of Transportation
I-95 at Broward Blvd PD&E Study
ETDM # 14226
FM # 435513-1-22-02
Broward County, Florida

Date: November 2018

Predicted Noise Levels
- < 66.0 dB(A)
- ≥ 66.0 dB(A)
- I-95 Broward Blvd. Design
- Existing Noise Barriers

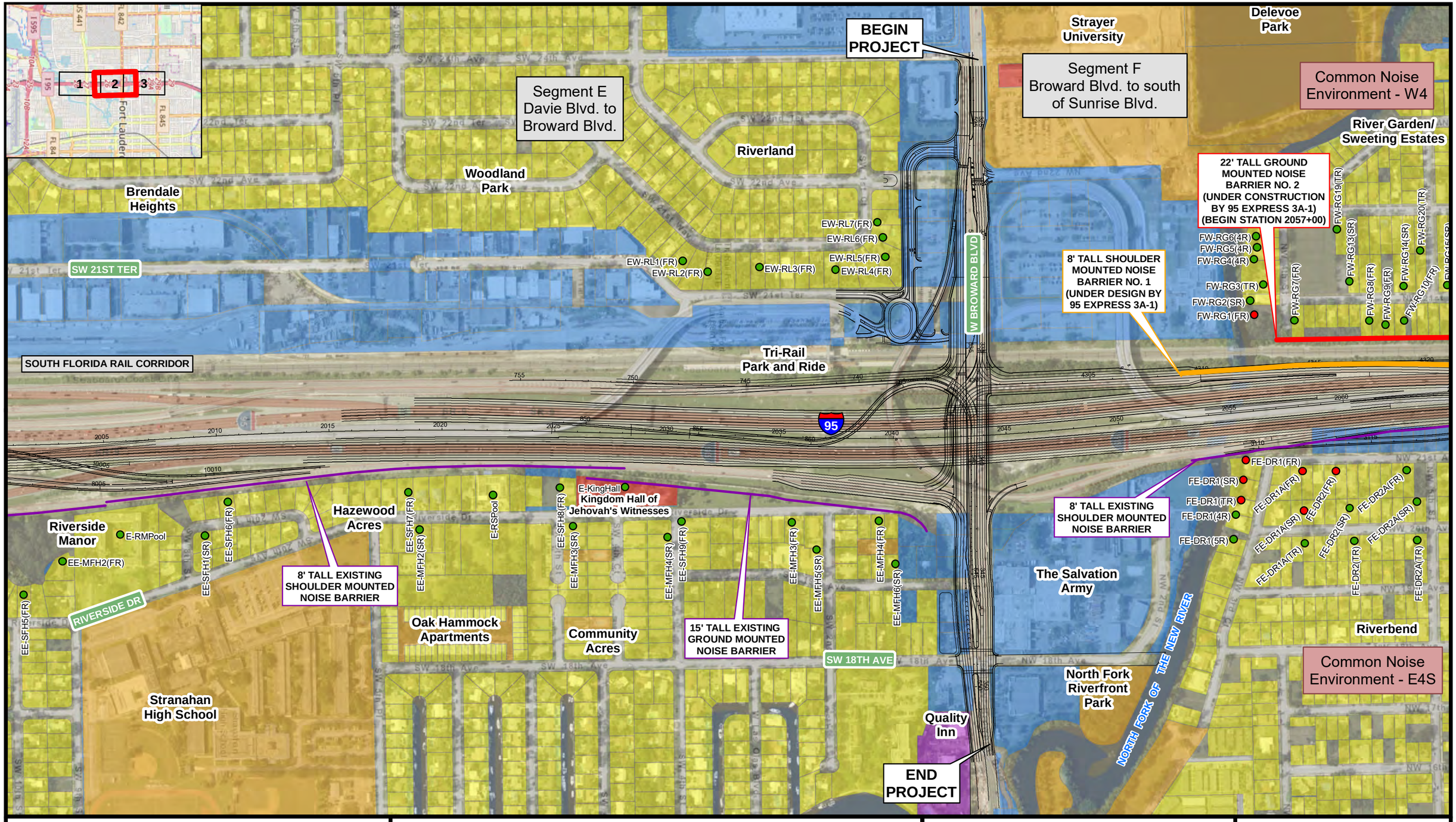
Planned Noise Barriers (Height)
- 8 feet
- 22 feet

Land Use by Noise Activity Category
- B: Residential
- C: Other Sensitive Land Use
- D: Institutional (Interior)
- E: Sensitive Commercial
- F: Non-Sensitive Developed
- G: Vacant

0 125 250 500 Feet

Figure 4
Noise Analysis Map

Sheet No.
1 of 3



Florida Department of Transportation
I-95 at Broward Blvd PD&E Study
ETDM # 14226
FM # 435513-1-22-02
Broward County, Florida

Date: November 2018

Predicted Noise Levels
- < 66.0 dB(A)
- ≥ 66.0 dB(A)
- I-95 Broward Blvd. Design
- Existing Noise Barriers

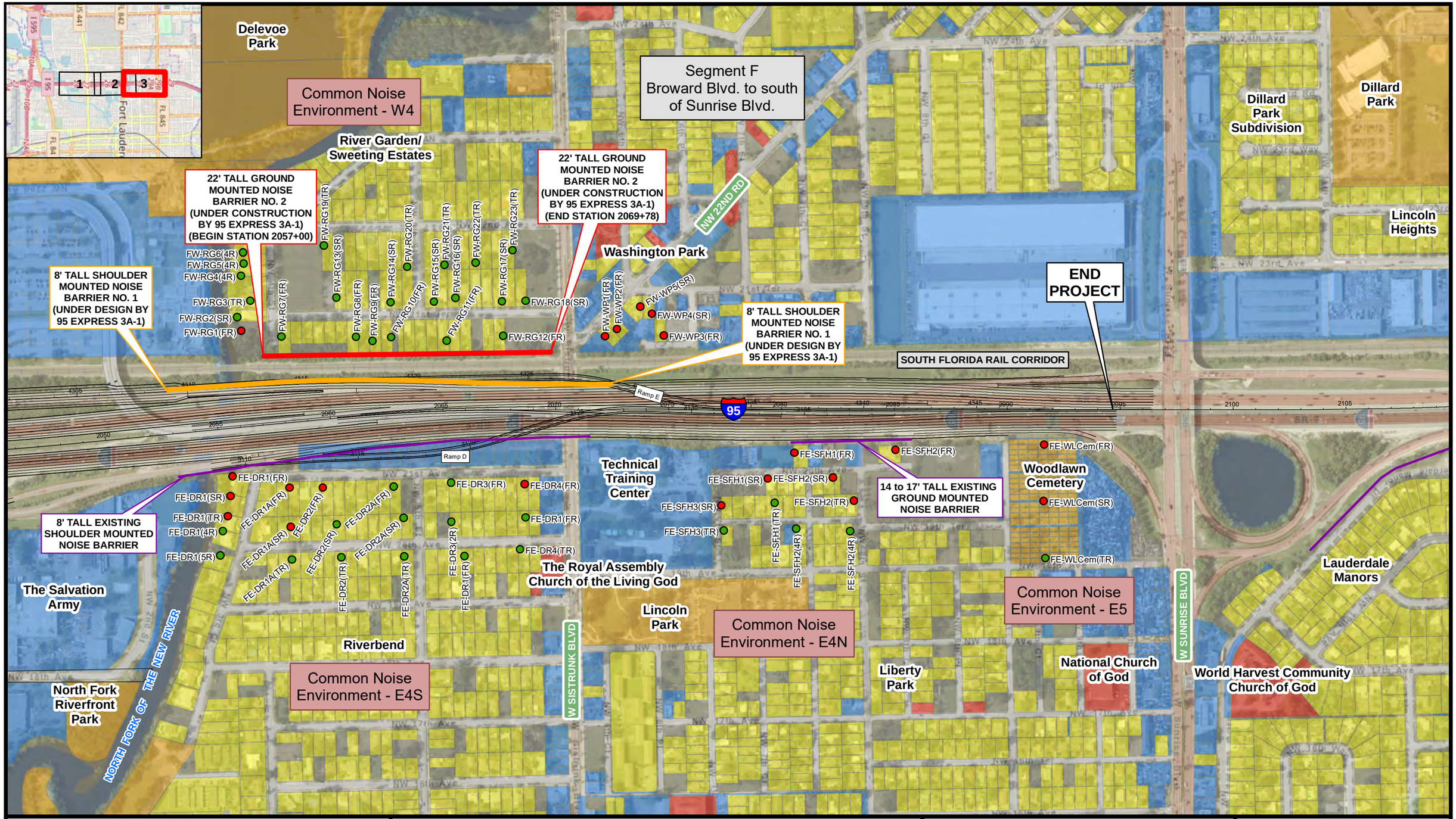
Planned Noise Barriers (Height)
- 8 feet
- 22 feet

Land Use by Noise Activity Category
- B: Residential
- C: Other Sensitive Land Use
- D: Institutional (Interior)
- E: Sensitive Commercial
- F: Non-Sensitive Developed
- G: Vacant

0 125 250 500 Feet

Figure 4
Noise Analysis Map

Sheet No.
2 of 3



FDOT

Florida Department of Transportation
I-95 at Broward Blvd PD&E Study
ETDM # 14226
FM # 435513-1-22-02
Broward County, Florida

Date: November 2018

Predicted Noise Levels
- < 66.0 dB(A)
- ≥ 66.0 dB(A)
- I-95 Broward Blvd. Design
- Existing Noise Barriers

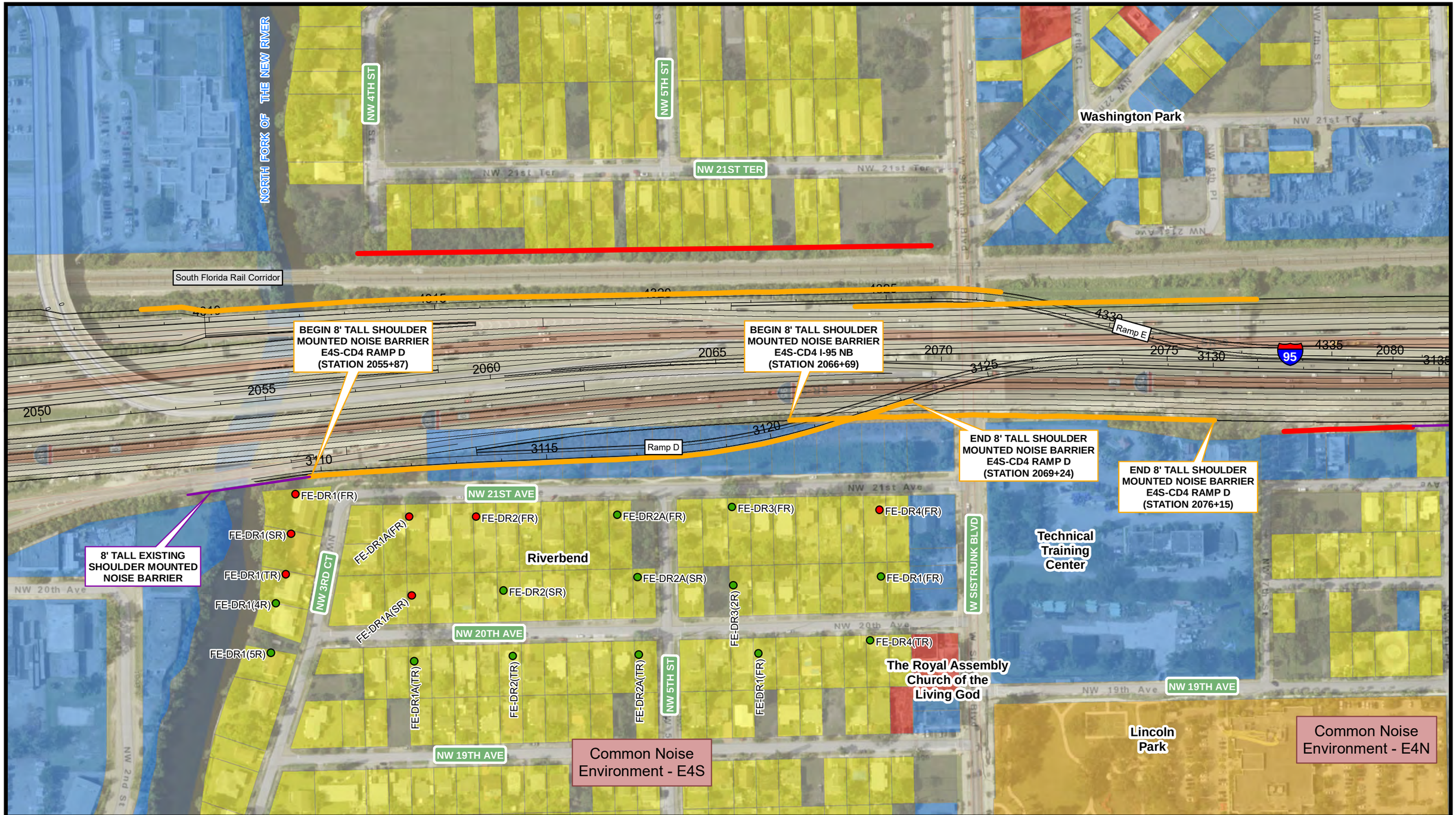
Planned Noise Barriers (Height)
- 8 feet
- 22 feet

Land Use by Noise Activity Category
- B: Residential
- C: Other Sensitive Land Use
- D: Institutional (Interior)
- E: Sensitive Commercial
- F: Non-Sensitive Developed
- G: Vacant

0 125 250 500 Feet

Figure 4
Noise Analysis Map

Sheet No.
3 of 3



Florida Department of Transportation
I-95 at Broward Blvd PD&E Study
ETDM # 14226
FM # 435513-1-22-02
Broward County, Florida

Date: November 2018

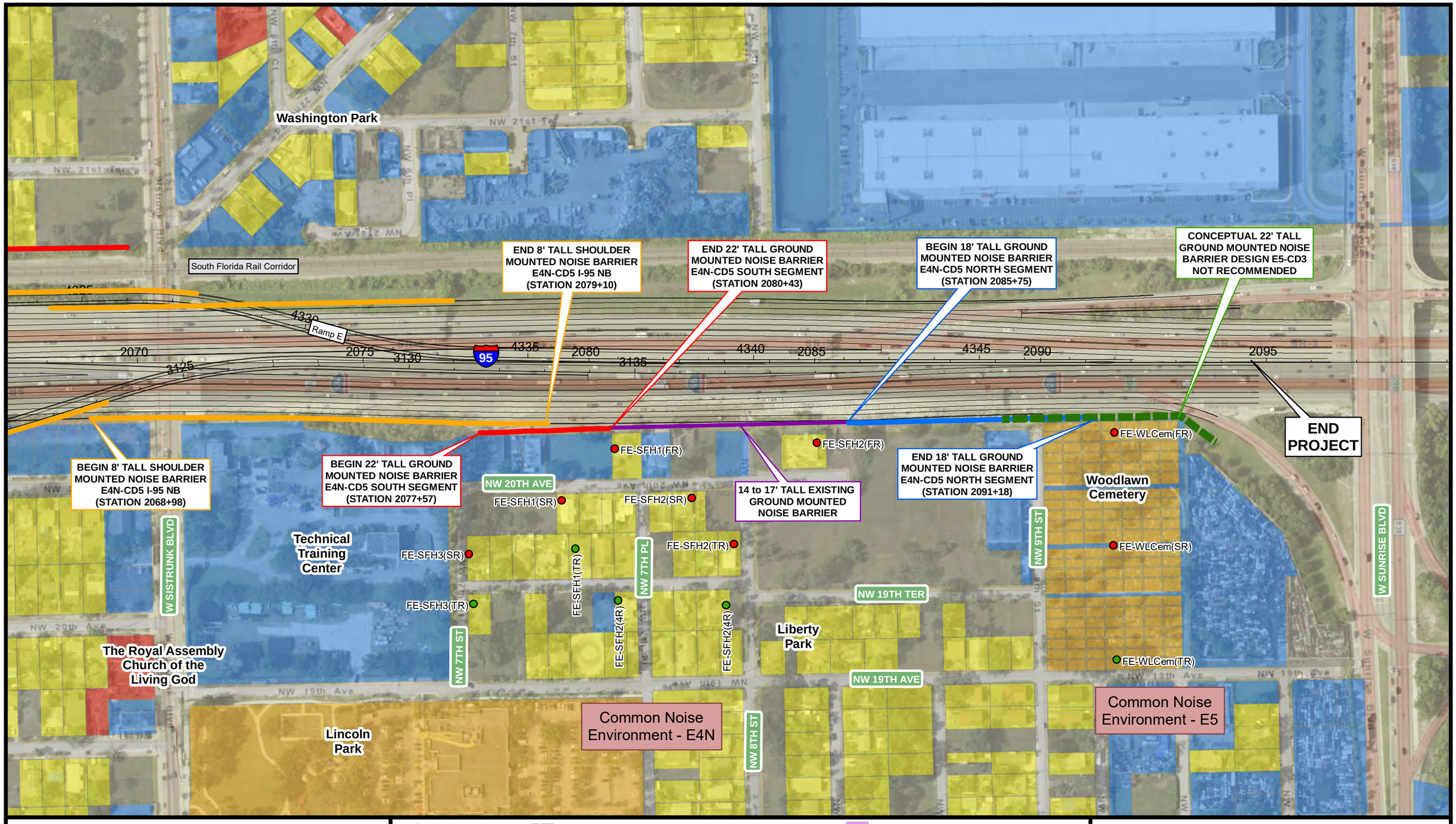
Predicted Noise Levels
- < 66.0 dB(A)
- ≥ 66.0 dB(A)
- I-95 Broward Blvd. Design
- Existing Noise Barriers

Recommended Noise Barriers (Height)
- 8 feet
- 18 feet
- 22 feet

Land Use by Noise Activity Category
- B: Residential
- C: Other Sensitive Land Use
- D: Institutional (Interior)
- E: Sensitive Commercial
- F: Non-Sensitive Developed
- G: Vacant

0 50 100 200 Feet

Figure 5
Riverbend
Recommended Noise Barrier Location Map



Florida Department of Transportation
I-95 at Broward Blvd PD&E Study
ETDM # 14226
FM # 435513-1-22-02
Broward County, Florida

Date: November 2018

Predicted Noise Levels
- < 66.0 dB(A)
- ≥ 66.0 dB(A)
- I-95 Broward Blvd. Design
- Existing Noise Barriers
- Not Recommended Noise Barrier

Recommended Noise Barriers (Height)
- 8 feet
- 18 feet
- 22 feet

Land Use by Noise Activity Category
- B: Residential
- C: Other Sensitive Land Use
- D: Institutional (Interior)
- E: Sensitive Commercial
- F: Non-Sensitive Developed
- G: Vacant

0 50 100 200 Feet

Figure 6
Liberty Park
Recommended Noise Barrier Location Map

Common Noise Environment - W4

NORTH FORK OF THE NEW RIVER

22' TALL GROUND MOUNTED NOISE BARRIER NO. 2 (UNDER CONSTRUCTION BY 95 EXPRESS 3A-1) (BEGIN STATION 2057+00)

22' TALL GROUND MOUNTED NOISE BARRIER NO. 2 (UNDER CONSTRUCTION BY 95 EXPRESS 3A-1) (END STATION 2069+78)

River Garden / Sweeting Estates

Washington Park

Riverbend

Technical Training Center

The Royal Assembly Church of the Living God

NW 23RD AVE
NW 22ND AVE
NW 21ST TER
NW 21ST AVE
NW 20TH AVE
NW 4TH ST
NW 5TH ST
NW 3RD CT
W SISTRUNK BLVD
NW 22ND RD
NW 6th Ct
NW 7th St
NW 21st Ter
NW 21st Ave
NW 20th Ave

FW-RG1(FR)
FW-RG2(SR)
FW-RG3(TR)
FW-RG4(4R)
FW-RG5(4R)
FW-RG6(4R)
FW-RG7(FR)
FW-RG8(FR)
FW-RG9(FR)
FW-RG10(FR)
FW-RG11(FR)
FW-RG12(FR)
FW-RG13(SR)
FW-RG14(SR)
FW-RG15(SR)
FW-RG16(SR)
FW-RG17(SR)
FW-RG18(SR)
FW-RG19(TR)
FW-RG20(TR)
FW-RG21(TR)
FW-RG22(TR)
FW-RG23(TR)

FW-WP1(FR)
FW-WP2(FR)
FW-WP3(FR)
FW-WP4(SR)
FW-WP5(SR)

BEGIN 8' TALL SHOULDER MOUNTED NOISE BARRIER W4-CD5 RAMP E (STATION 2052+50)

END 8' TALL SHOULDER MOUNTED NOISE BARRIER W4-CD5 I95 SB (STATION 2077+00)

END 8' TALL SHOULDER MOUNTED NOISE BARRIER W4-CD5 RAMP E (STATION 2071+30)

BEGIN 8' TALL SHOULDER MOUNTED NOISE BARRIER W4-CD5 I95 SB (STATION 2068+00)

South Florida Rail Corridor

Ramp D

Ramp E

95

2050 2055 2060 2065 2070 2075 2080
3110 3115 3120 3125 3130 3135
4315 4320 4325 4330 4335

FDOT

Florida Department of Transportation
I-95 at Broward Blvd PD&E Study
ETDM # 14226
FM # 435513-1-22-02
Broward County, Florida

Date: November 2018

Predicted Noise Levels
- < 66.0 dB(A);
- ≥ 66.0 dB(A)
- I-95 Broward Blvd. Design
- Existing Noise Barriers

Recommended Noise Barriers (Height)
- 8 feet
- 22 feet

Land Use by Noise Activity Category
- B: Residential
- C: Other Sensitive Land Use
- D: Institutional (Interior)
- E: Sensitive Commercial
- F: Non-Sensitive Developed
- G: Vacant

0 50 100 200 Feet

Figure 7
River Garden / Sweeting Estates
& Washington Park
Recommended Noise Barrier Location Map

APPENDIX B

Figures of Existing Conditions and Build Alternatives from Project's Preliminary Engineering Report and Concept Plans

Figure 2 | Existing Park-and-Ride Condition

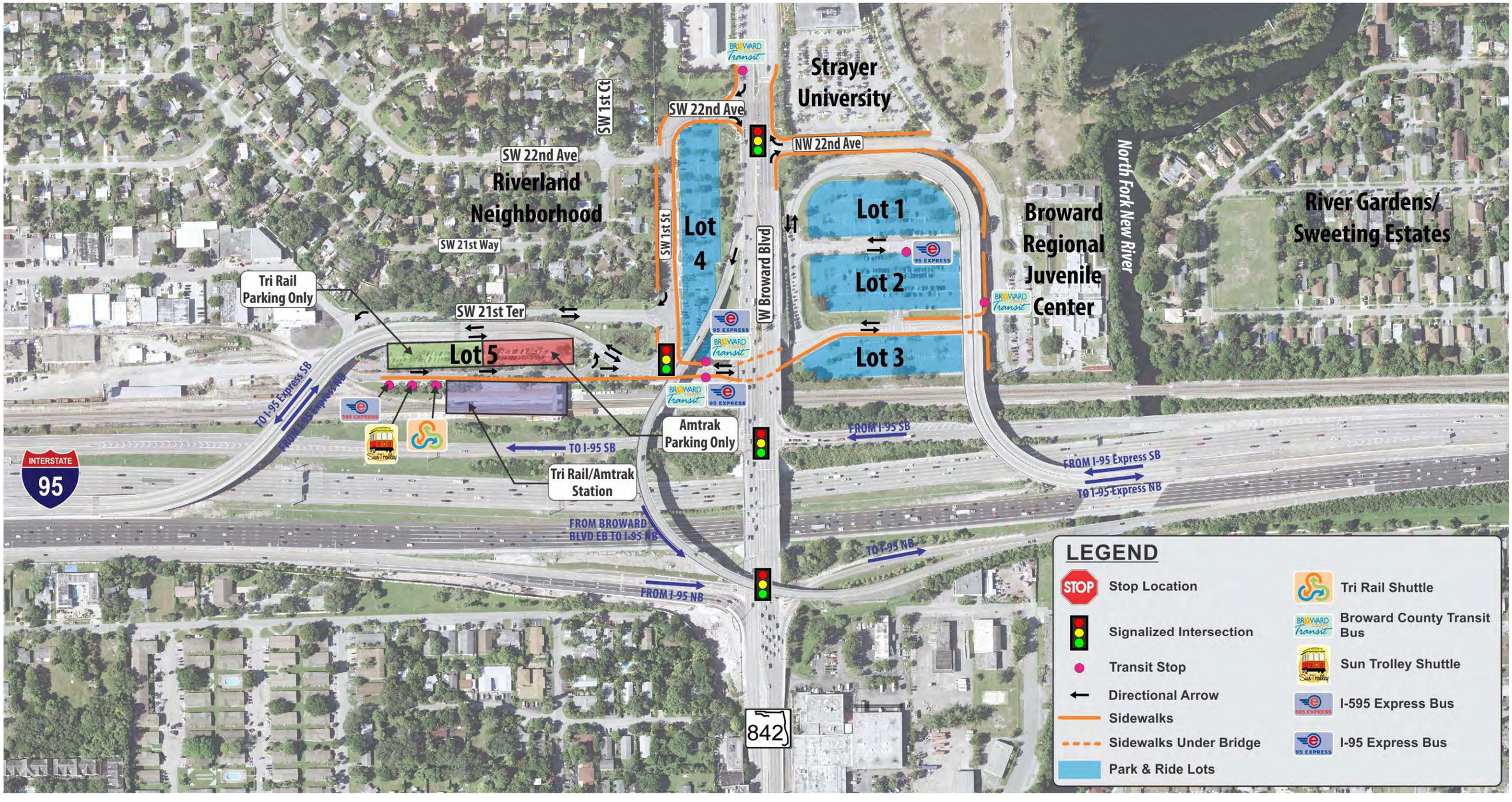


Figure 3A | 95 Express Ingress-Egress Connections with Broward Boulevard Interchange

Figure 3B | 95 Express Ingress-Egress Connections with Broward Boulevard Interchange

Figure 4 | Alternative 1 – Tight Diamond

Figure 5 | Alternative 2A – Displaced Left

Figure 6 | Alternative 2B – Modified Displaced Left

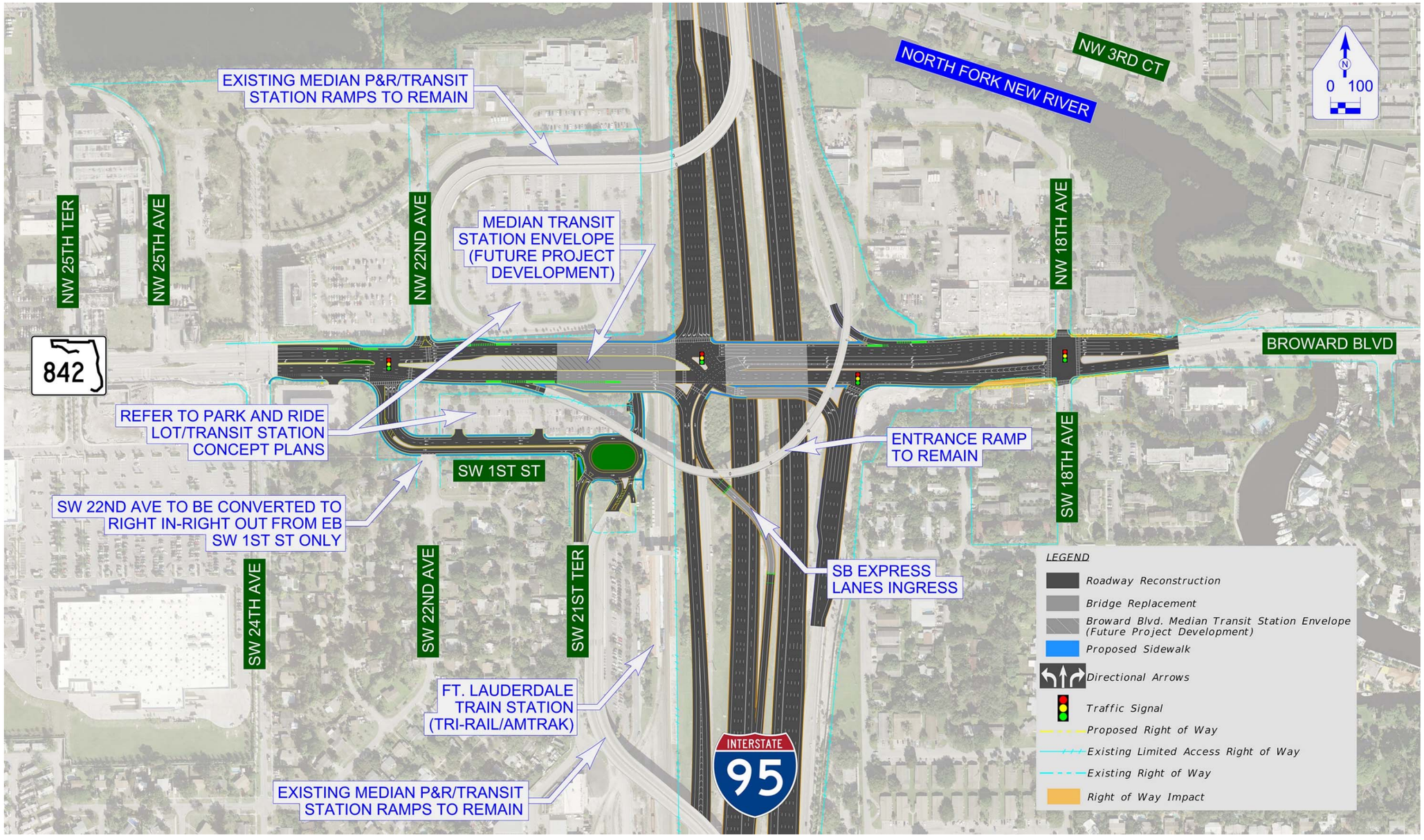


Figure 7 | Alternative 1 – With I-95 at Broward Boulevard Interchange Modified Displaced Left Alternative

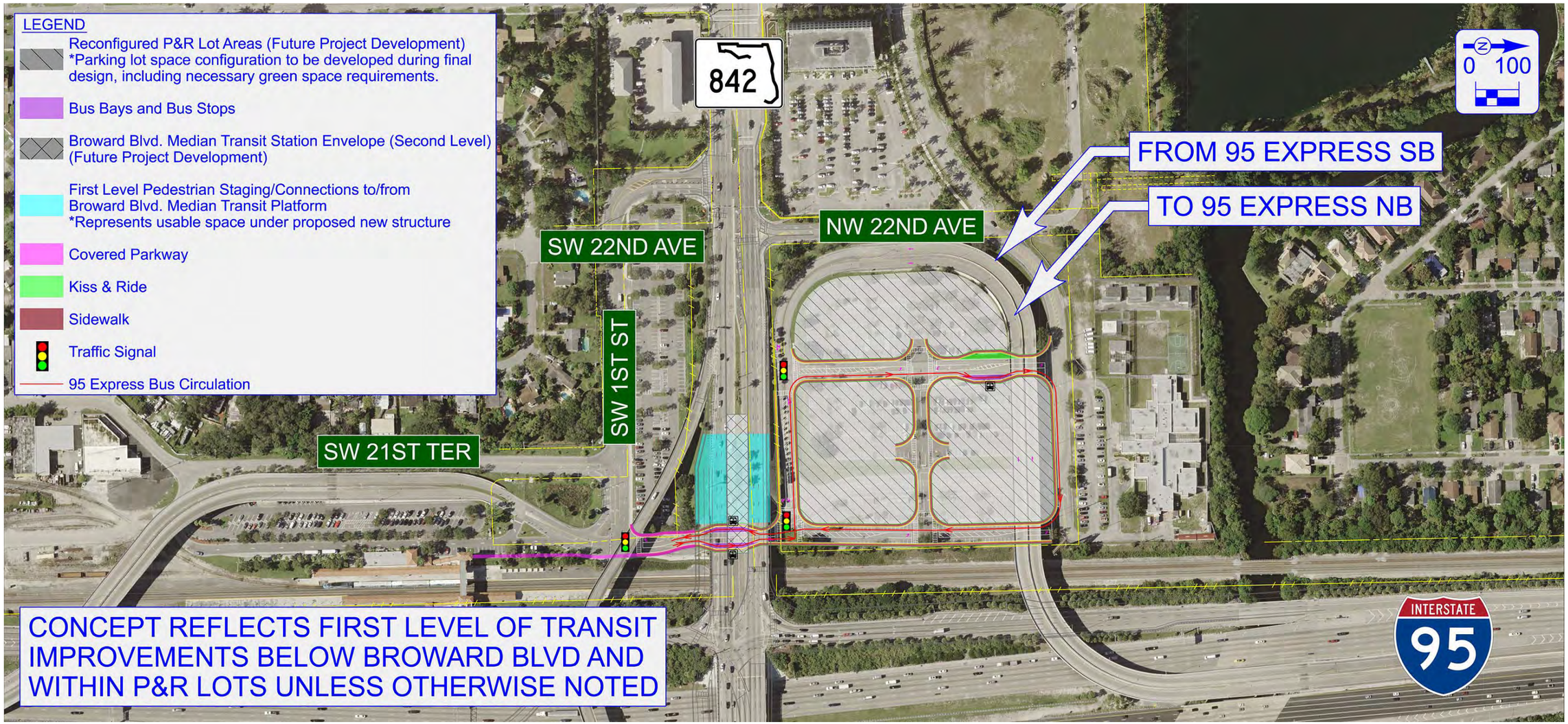


Figure 8 | Alternative 2 – With I-95 at Broward Boulevard Interchange Modified Displaced Left Alternative

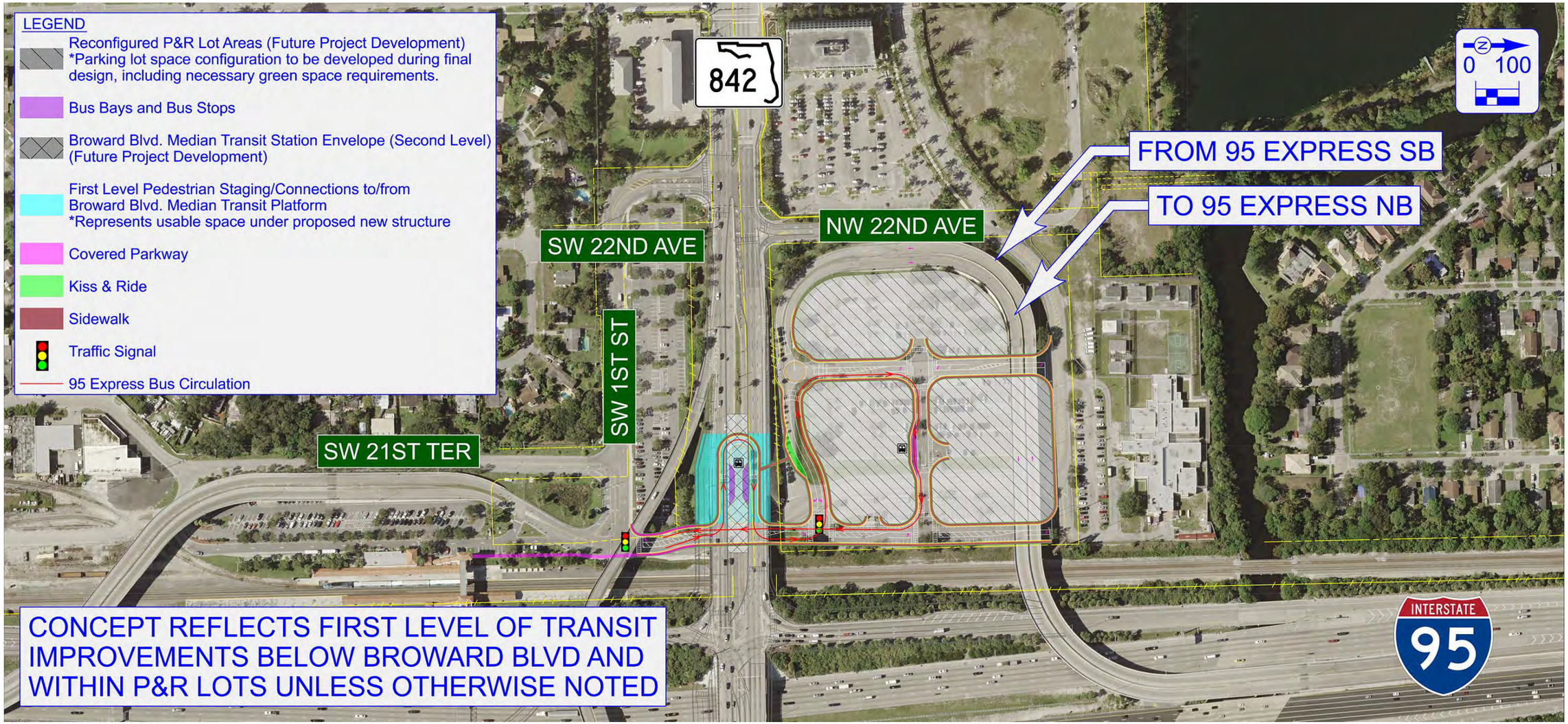
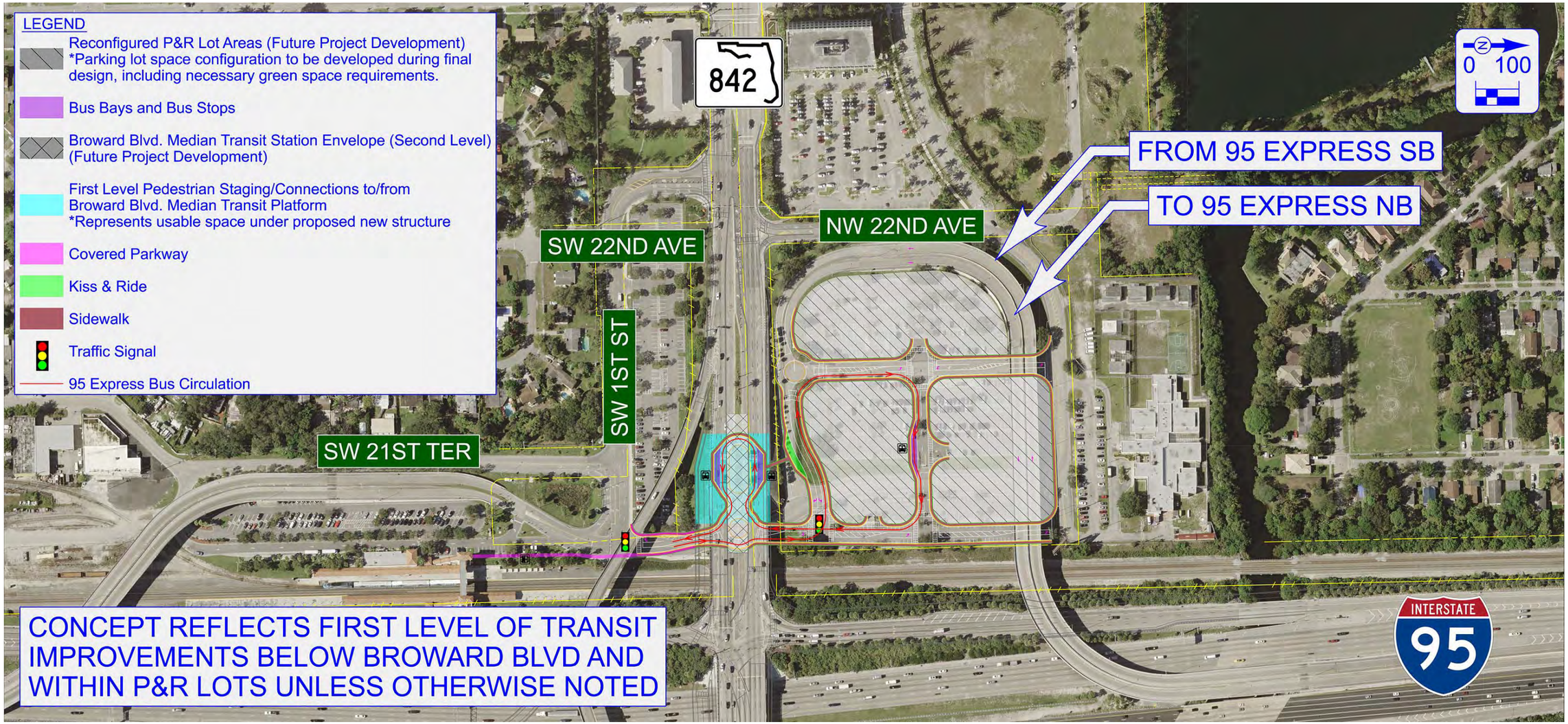


Figure 9 | Alternative 3 – With I-95 at Broward Boulevard Interchange Modified Displaced Left Alternative



CONTRACT PLANS COMPONENTS

STATE OF FLORIDA

DEPARTMENT OF TRANSPORTATION

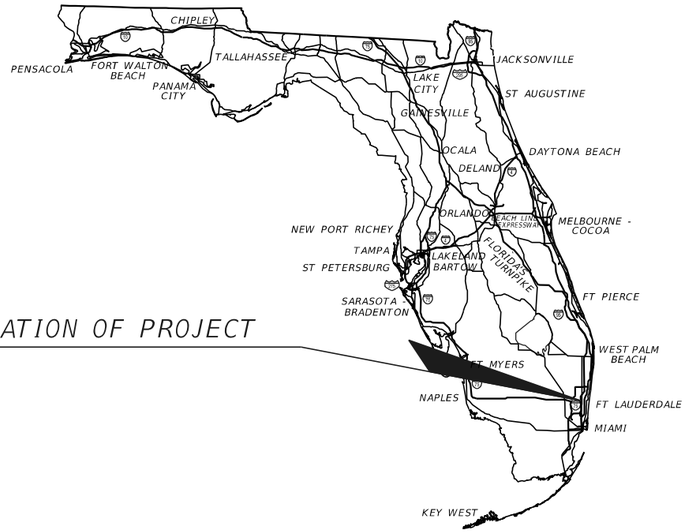
CONTRACT PLANS

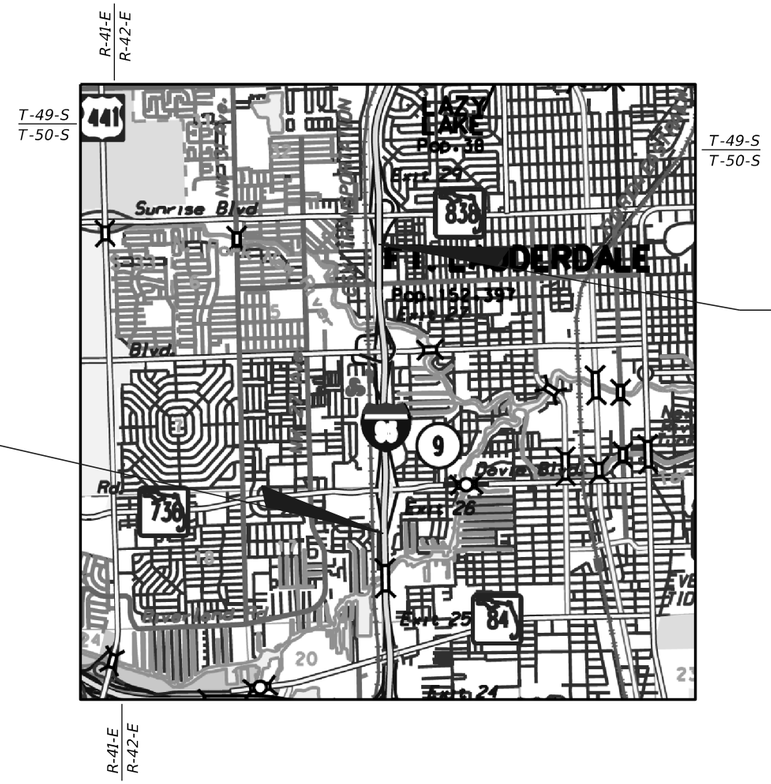
FINANCIAL PROJECT ID 435513-1-22-02

BROWARD COUNTY (86100)

STATE ROAD NO. 9

INDEX OF ROADWAY PLANS





ROADWAY PLANS ENGINEER OF RECORD:

GUILLERMO J. SUERO, P.E.
HDR ENGINEERING, INC.
15450 NEW BARN ROAD, SUITE 304
MIAMI LAKES, FLORIDA 33014

FDOT PROJECT MANAGER:

SCOTT THURMAN, P.E.

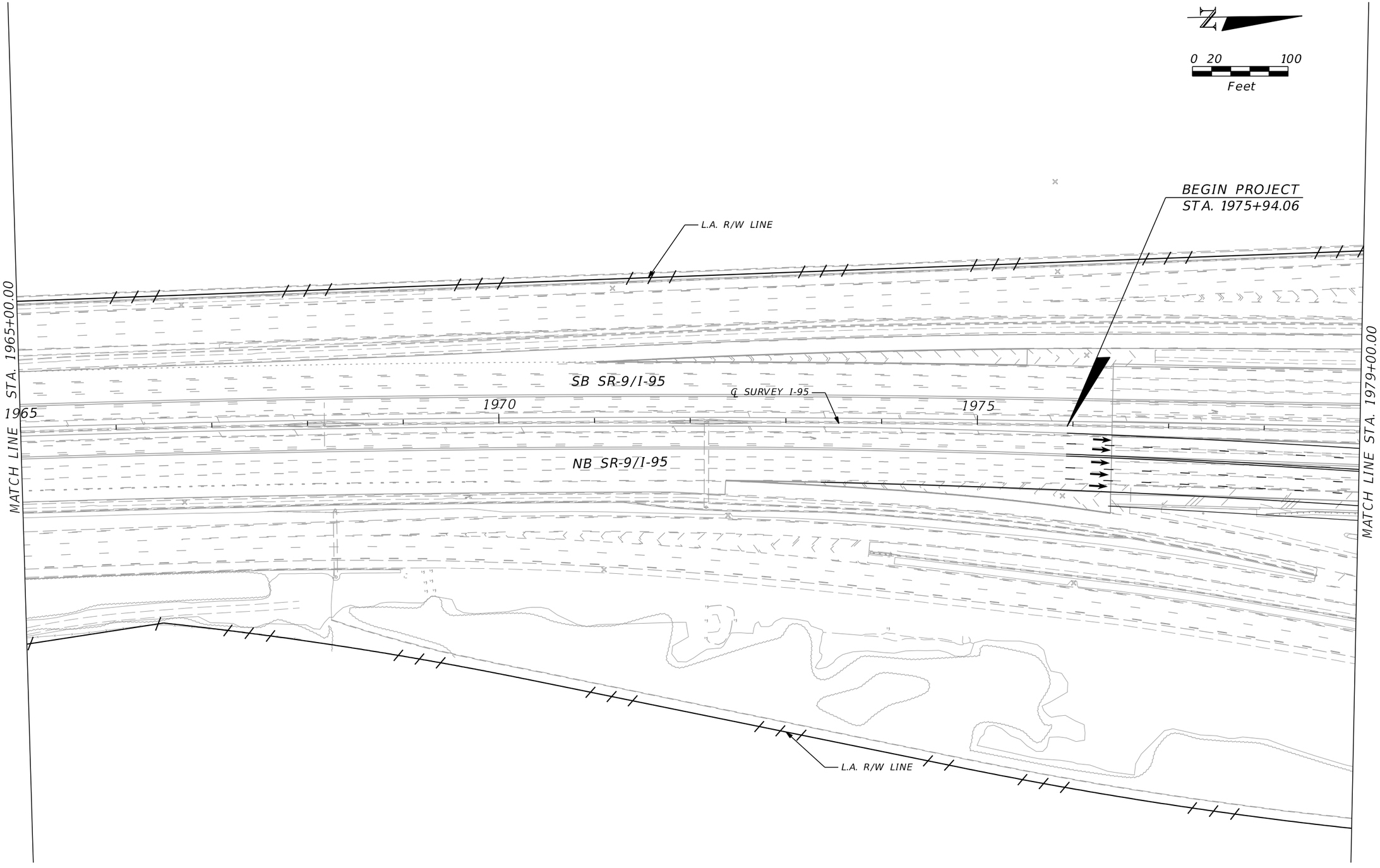
GOVERNING DESIGN STANDARDS:

Florida Department of Transportation, FY Design Standards eBook (DSeB) and applicable Design Standards Revisions (DSRs) at the following website: http://www.fdot.gov/roadway/DesignStandards/Standards.shtm

GOVERNING STANDARD SPECIFICATIONS:

Florida Department of Transportation, Standard Specifications for Road and Bridge Construction at the following website: http://www.fdot.gov/programmanagement/Implemented/SpecBooks

CONSTRUCTION CONTRACT NO.	FISCAL YEAR	SHEET NO.
		1



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HDR Engineering, Inc.
15450 New Barn Road, Suite 304
Miami Lakes, FL 33014-2169
CERTIFICATE OF AUTHORIZATION 4213

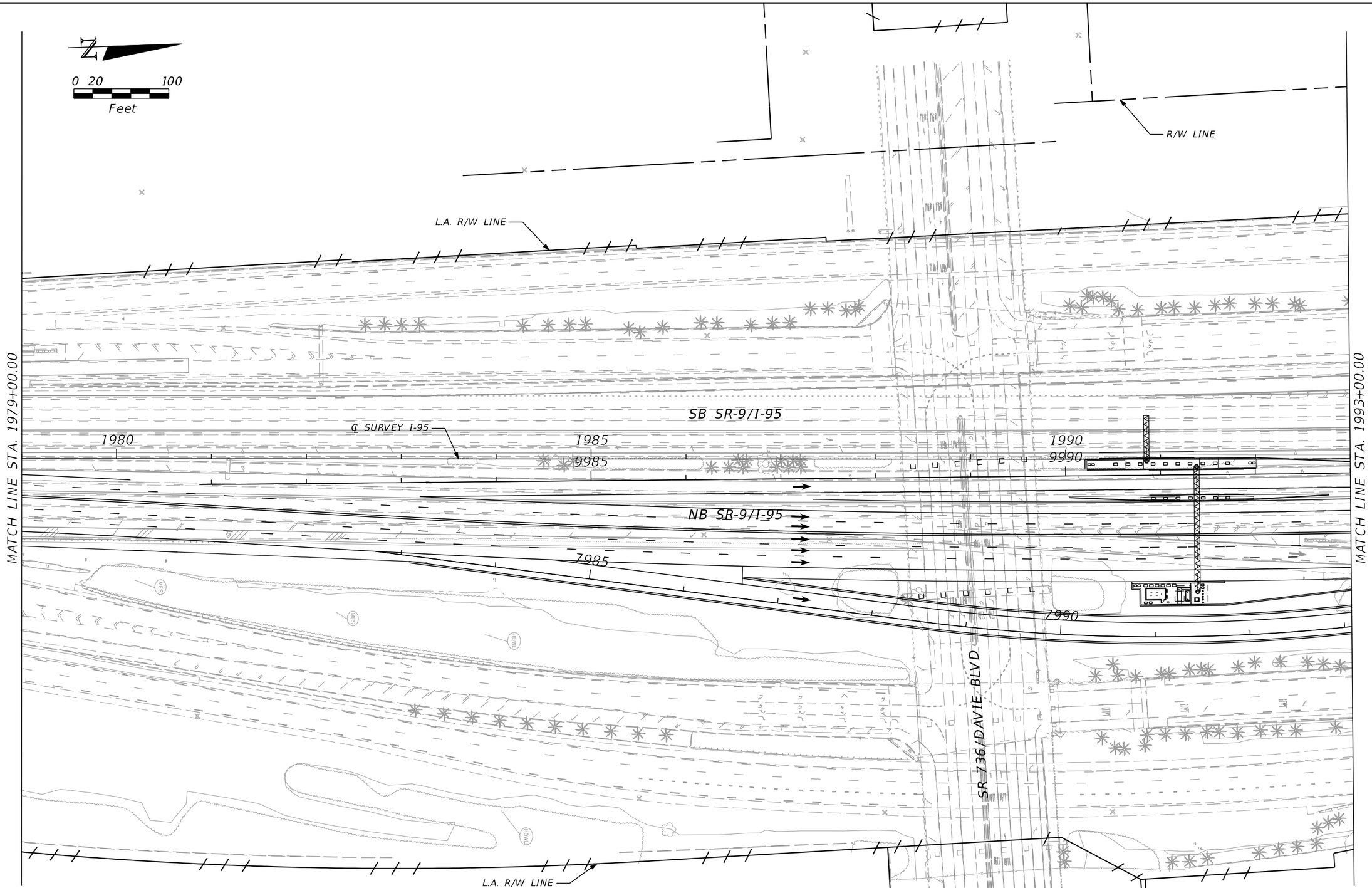
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	435513-1-22-02

CONCEPT PLANS

SHEET NO. 2

mhenriqu 9/28/2017 5:55:47 PM PW:/3207\10036962\6.0_CAD_BIM\6.2_Work_In_Progress\43551212202\roadway\PLANRD01



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HDR Engineering, Inc.
15450 New Barn Road, Suite 304
Miami Lakes, FL 33014-2169
CERTIFICATE OF AUTHORIZATION 4213

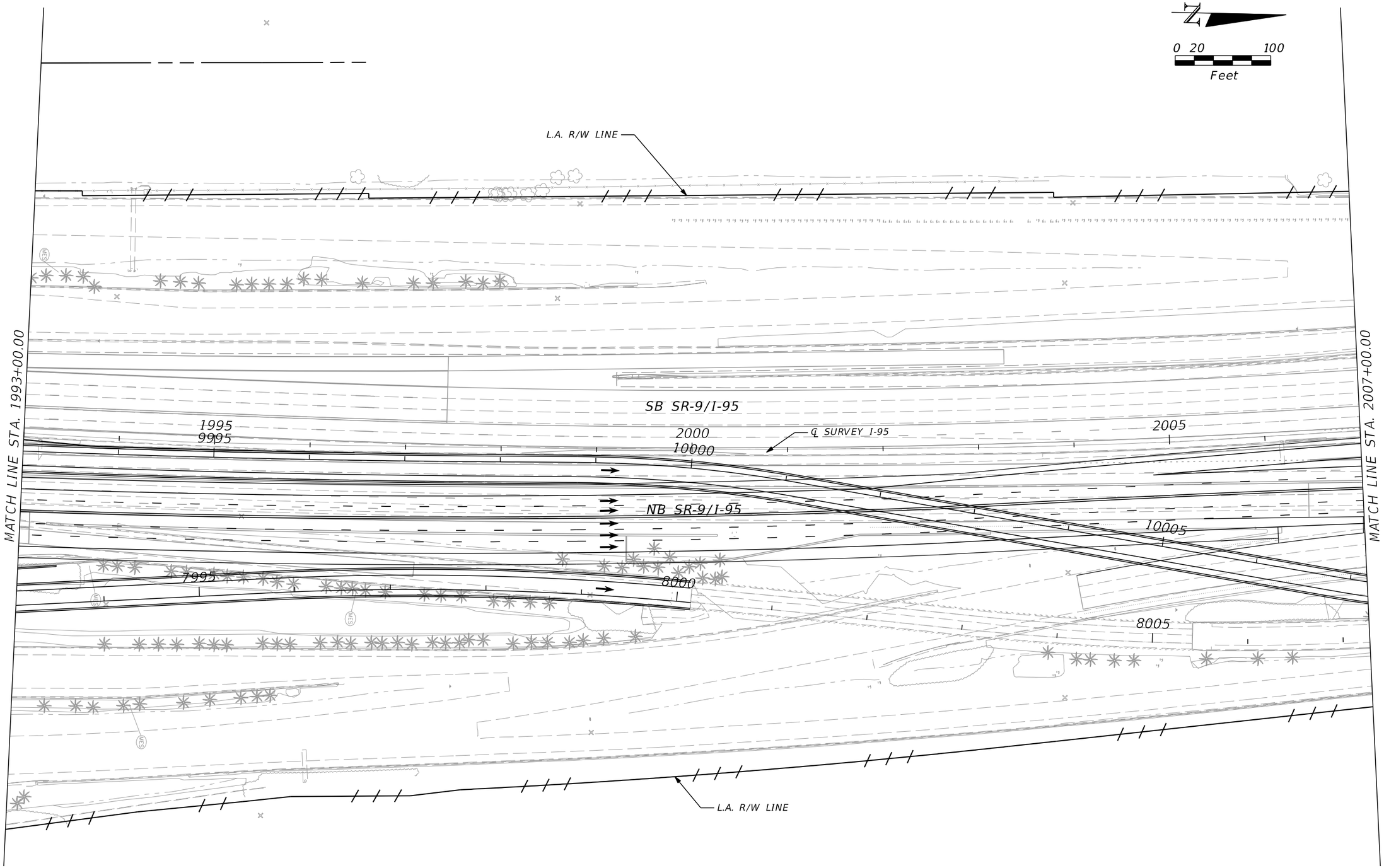
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	435513-1-22-02

CONCEPT PLANS

SHEET NO. 3

mhenriqu 9/28/2017 5:55:59 PM PW:\3207\10036962\6.0_CAD_BIM\6.2_Work_In_Progress\43551212202\roadway\PLANRD02



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HDR Engineering, Inc.
15450 New Barn Road, Suite 304
Miami Lakes, FL 33014-2169
CERTIFICATE OF AUTHORIZATION 4213

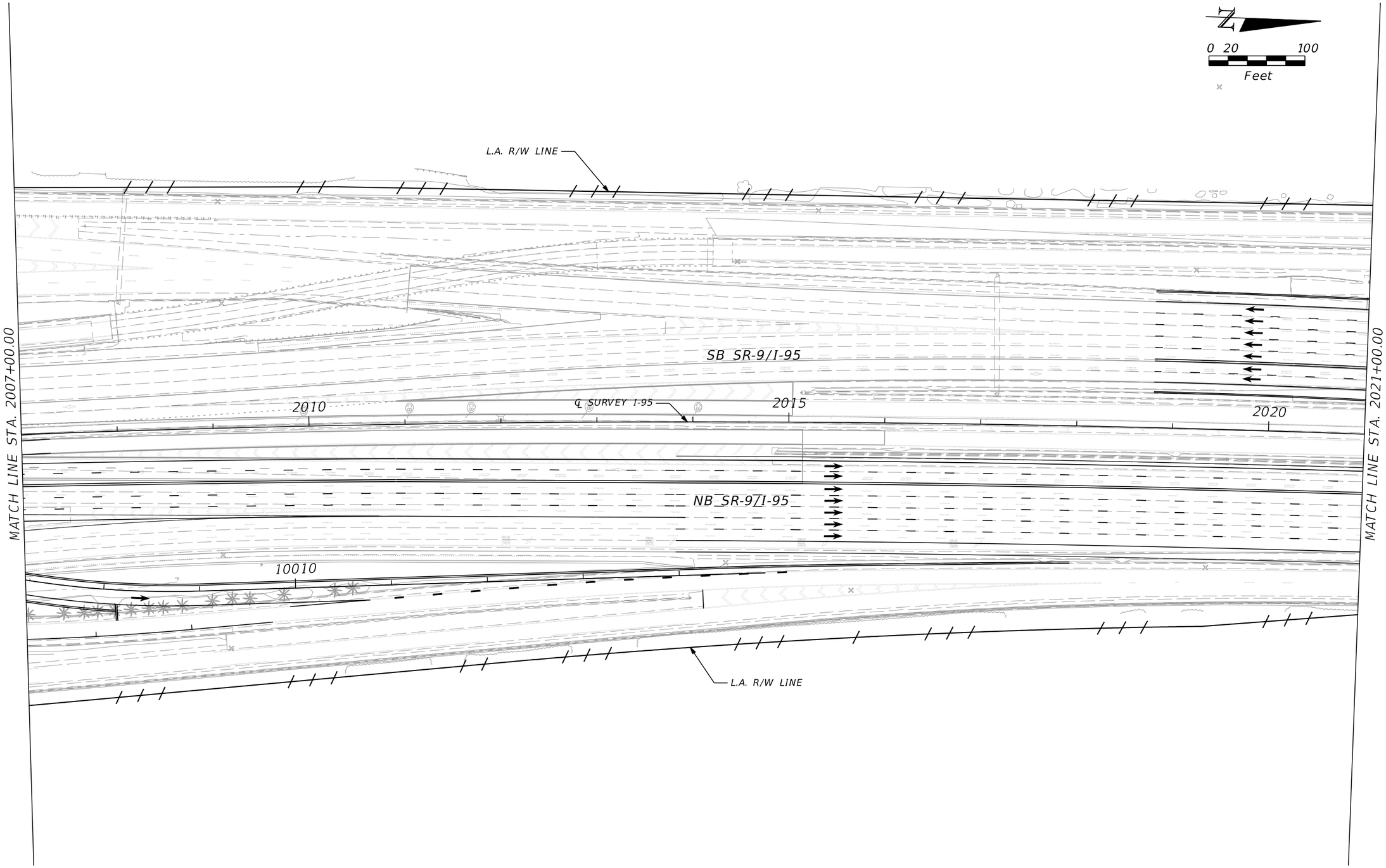
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	435513-1-22-02

CONCEPT PLANS

SHEET NO. 4

mhenriqu 9/28/2017 5:56:13 PM PW:\3207\10036962\6.0_CAD_BIM\6.2_Work_In_Progress\43551212202\roadway\PLANRD03



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

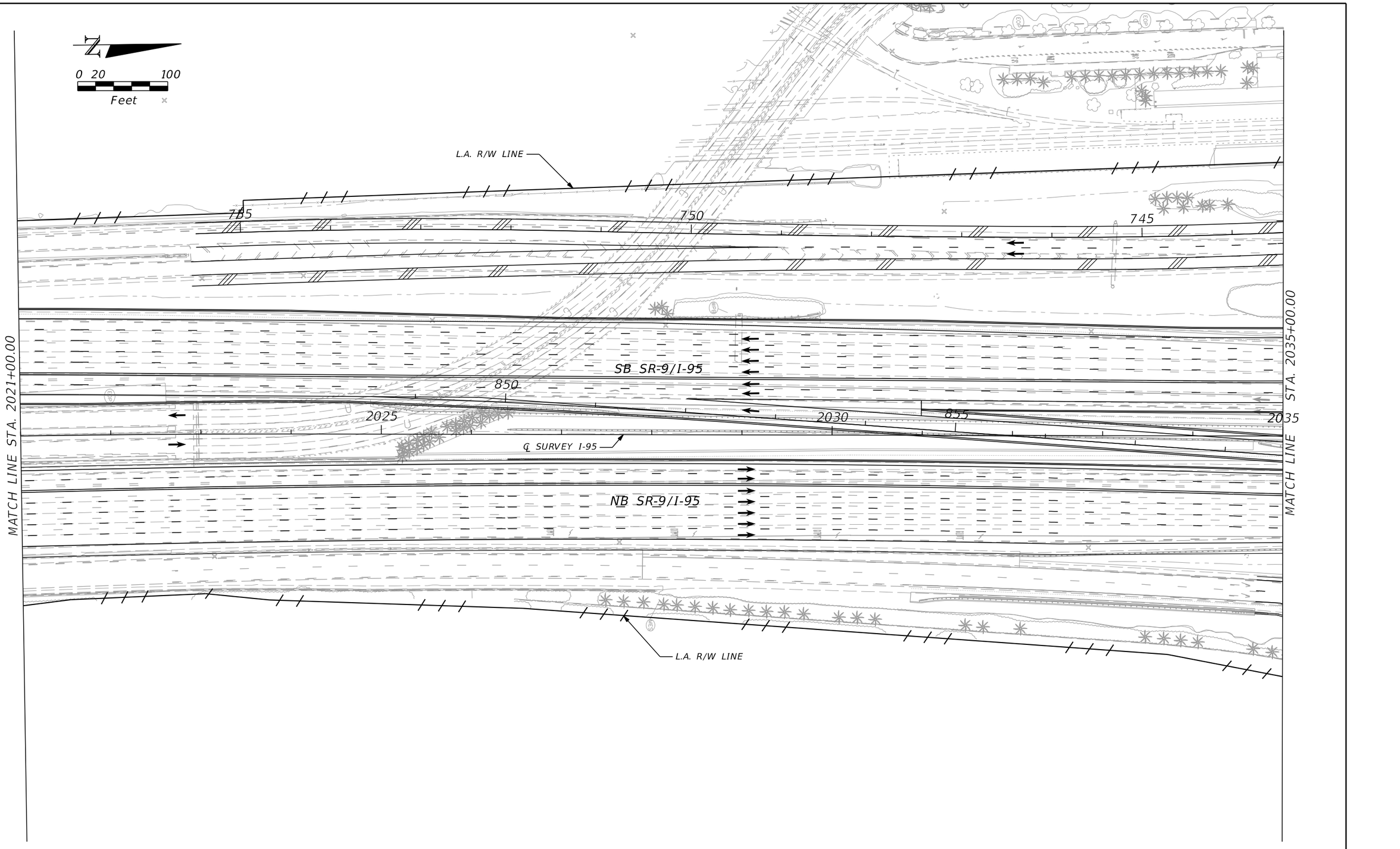
HDR Engineering, Inc.
15450 New Barn Road, Suite 304
Miami Lakes, FL 33014-2169
CERTIFICATE OF AUTHORIZATION 4213

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

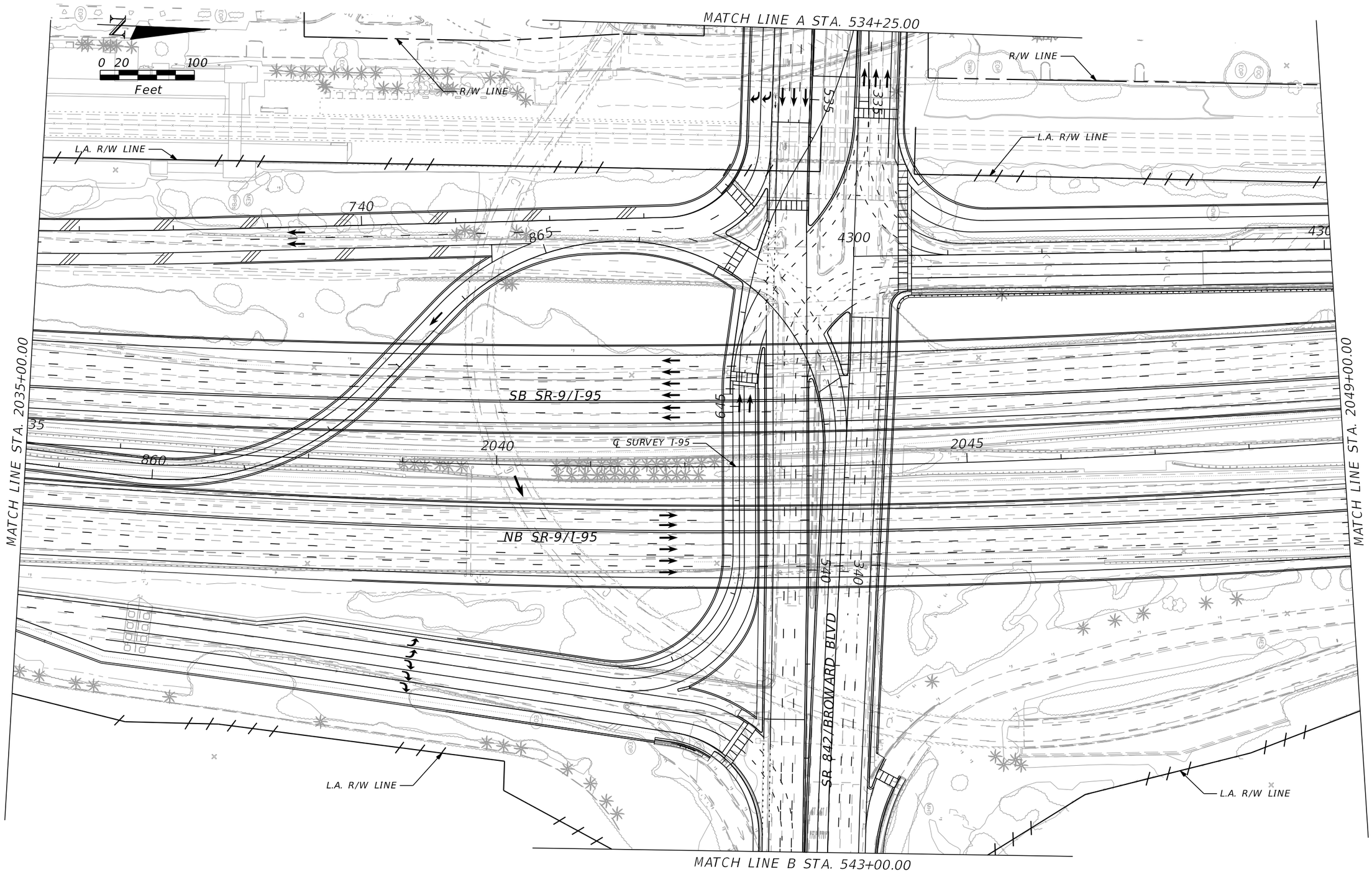
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	435513-1-22-02

CONCEPT PLANS

SHEET NO. 5



REVISIONS				HDR Engineering, Inc. 15450 New Barn Road, Suite 304 Miami Lakes, FL 33014-2169 CERTIFICATE OF AUTHORIZATION 4213	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			CONCEPT PLANS	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
					9	BROWARD	435513-1-22-02		6



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HDR Engineering, Inc.
15450 New Barn Road, Suite 304
Miami Lakes, FL 33014-2169
CERTIFICATE OF AUTHORIZATION 4213

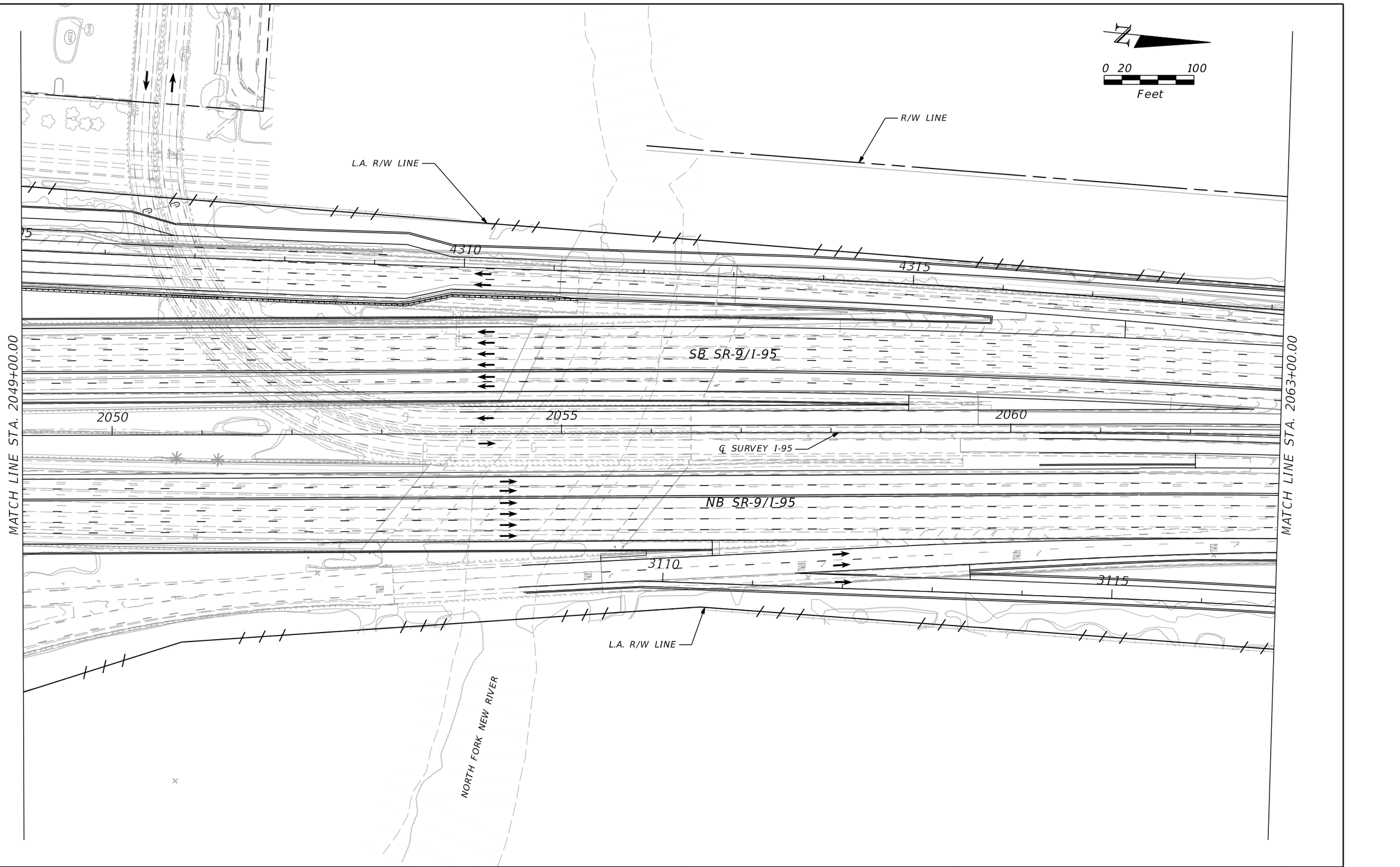
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	435513-1-22-02

CONCEPT PLANS

SHEET NO. 7

mhenriqu 9/28/2017 5:56:49 PM PW:/3207\10036962\6.0_CAD_BIM\6.2_Work_In_Progress\43551212202\roadway\PLANRD06



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HDR Engineering, Inc.
15450 New Barn Road, Suite 304
Miami Lakes, FL 33014-2169
CERTIFICATE OF AUTHORIZATION 4213

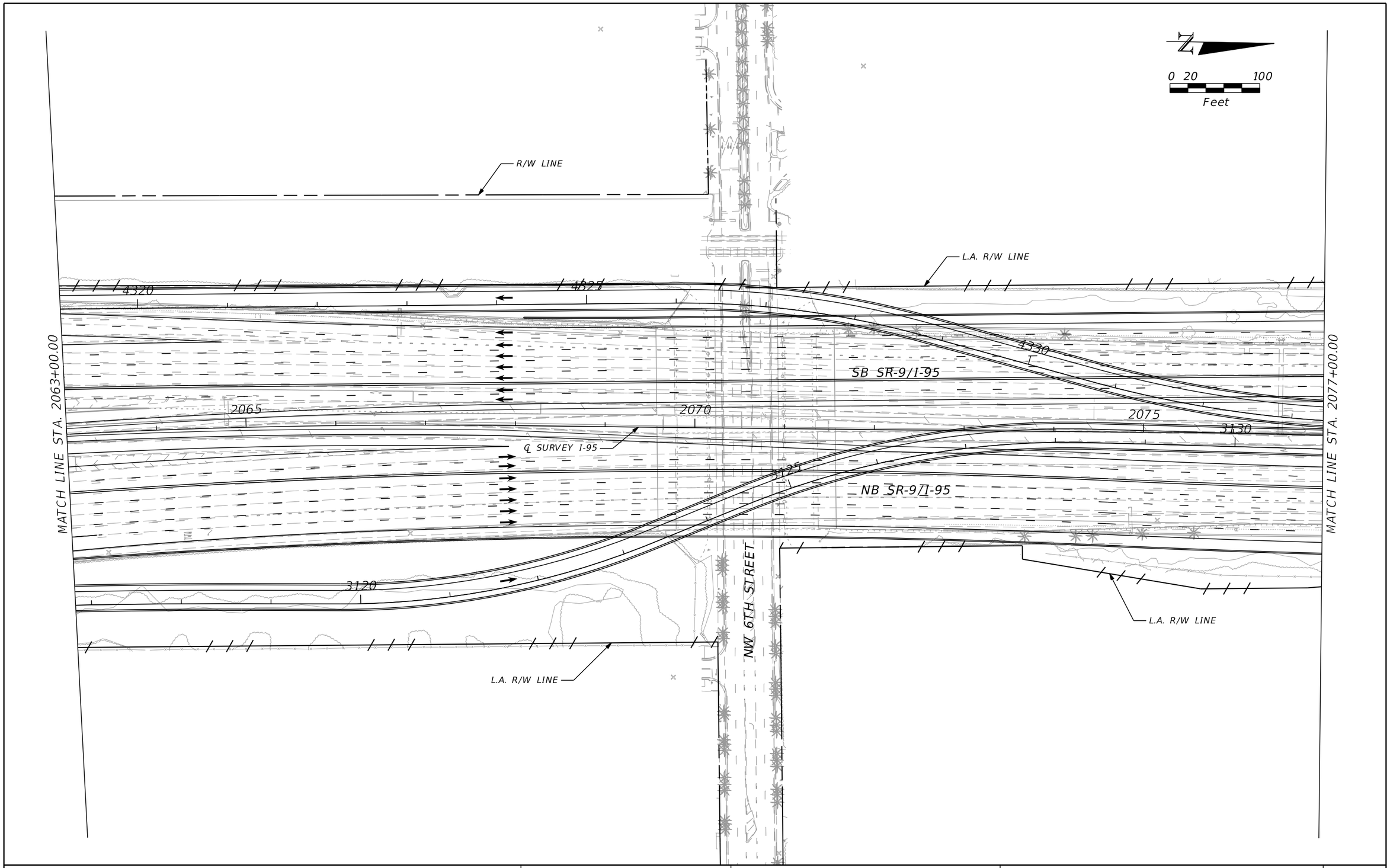
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	435513-1-22-02

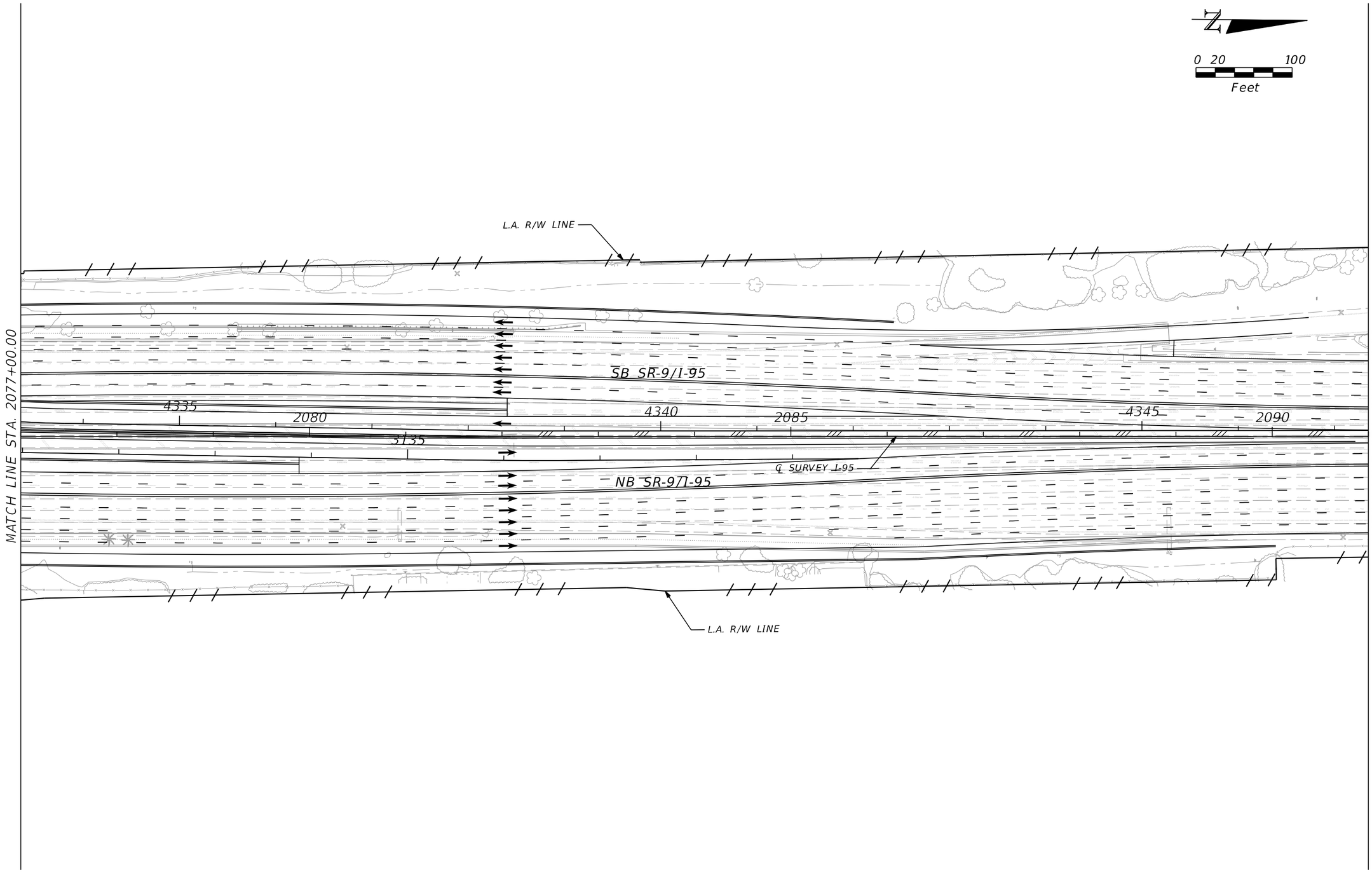
CONCEPT PLANS

SHEET NO. 8

mhenriqu 9/28/2017 5:57:01 PM PW:/3207\10036962\6.0_CAD_BIM\6.2_Work_In_Progress\43551212202\roadway\PLANRD07



REVISIONS				HDR Engineering, Inc. 15450 New Barn Road, Suite 304 Miami Lakes, FL 33014-2169 CERTIFICATE OF AUTHORIZATION 4213	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			CONCEPT PLANS	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
					9	BROWARD	435513-1-22-02		9



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

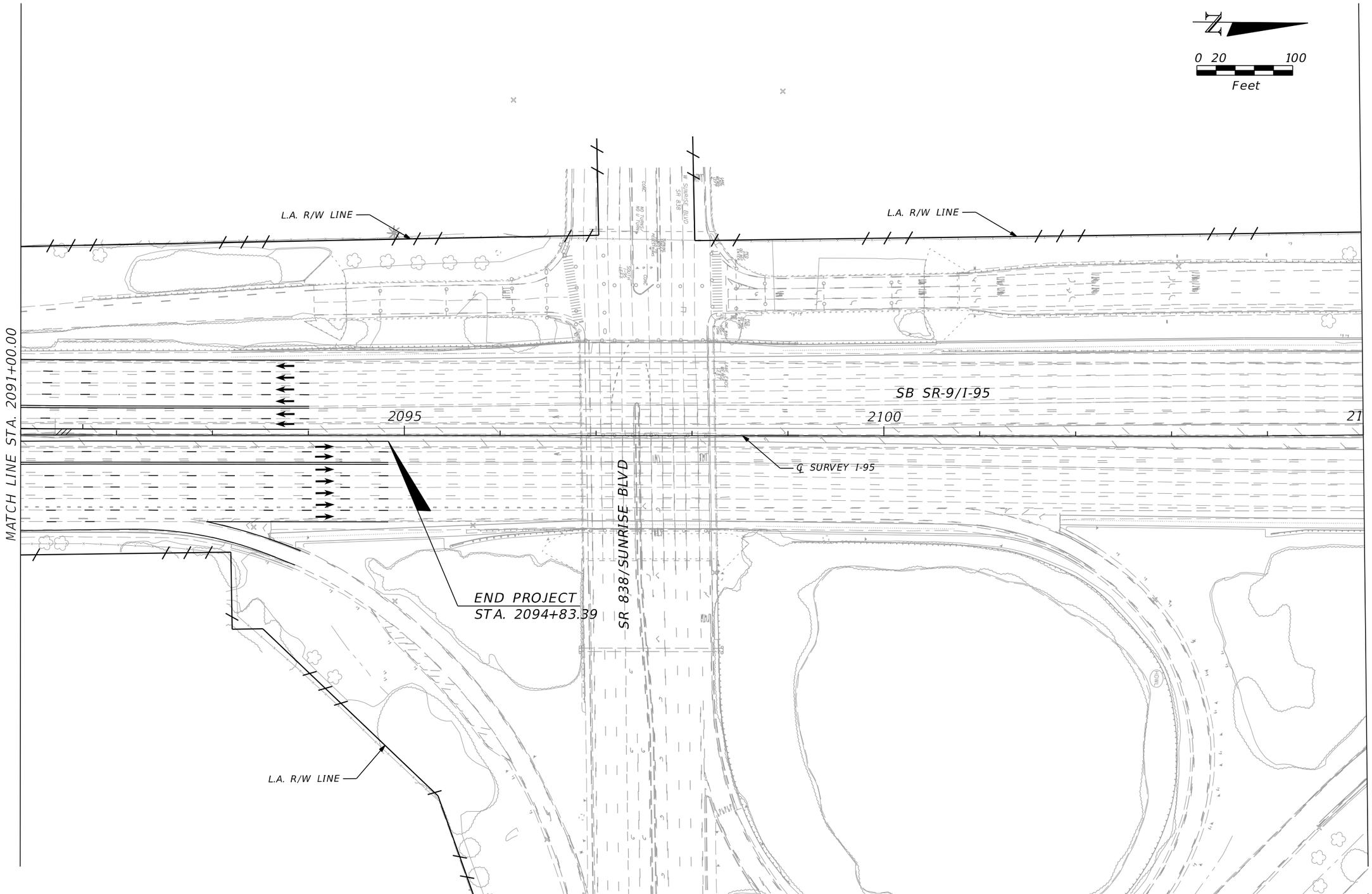
HDR Engineering, Inc.
15450 New Barn Road, Suite 304
Miami Lakes, FL 33014-2169
CERTIFICATE OF AUTHORIZATION 4213

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	435513-1-22-02

CONCEPT PLANS

SHEET NO. 10



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HDR Engineering, Inc.
15450 New Barn Road, Suite 304
Miami Lakes, FL 33014-2169
CERTIFICATE OF AUTHORIZATION 4213

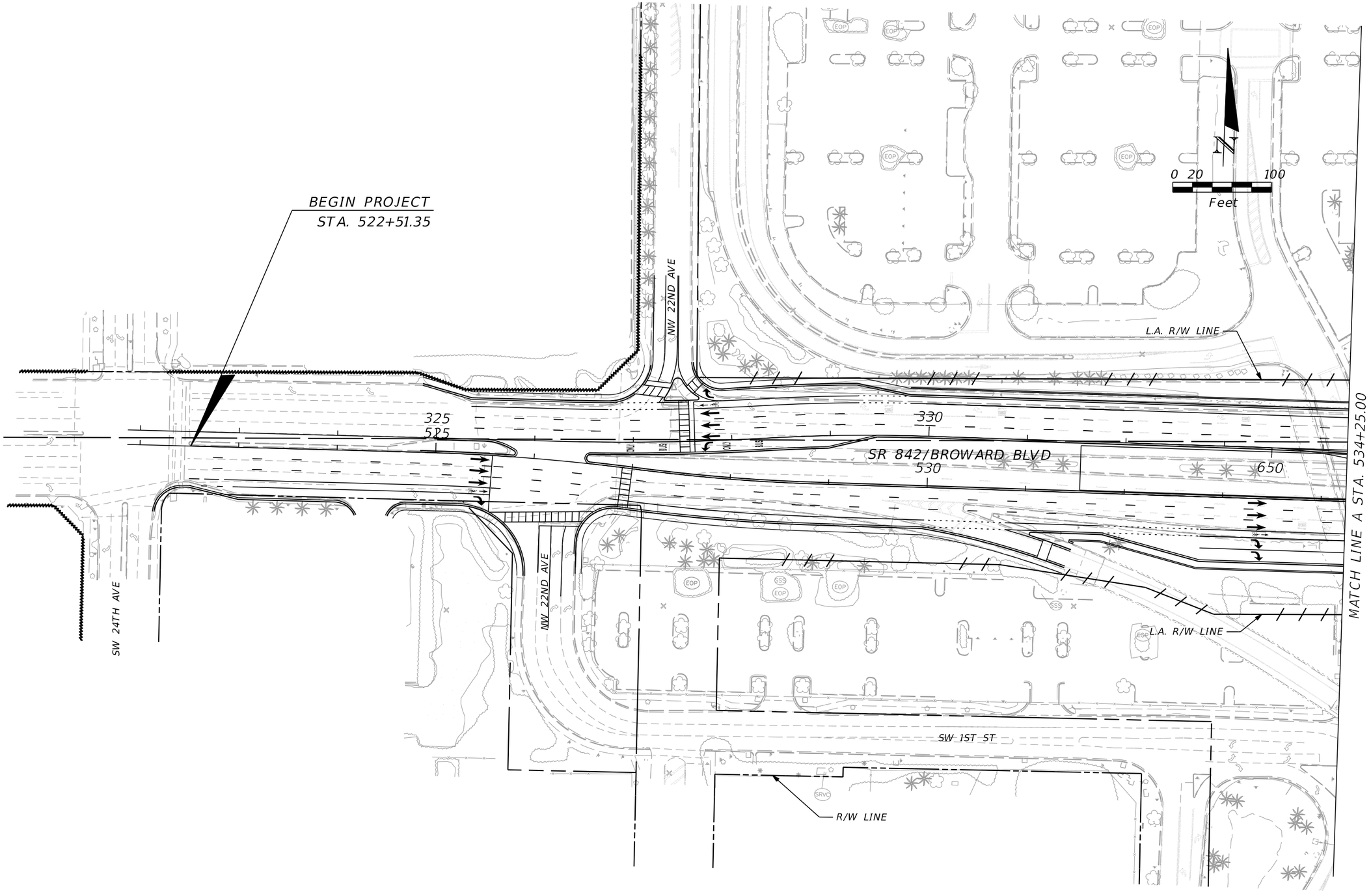
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	435513-1-22-02

CONCEPT PLANS

SHEET NO. 11

mhenriqu 9/28/2017 5:57:37 PM PW:\3207\10036962\6.0_CAD_BIM\6.2_Work_In_Progress\43551212202\roadway\PLANRD1C



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

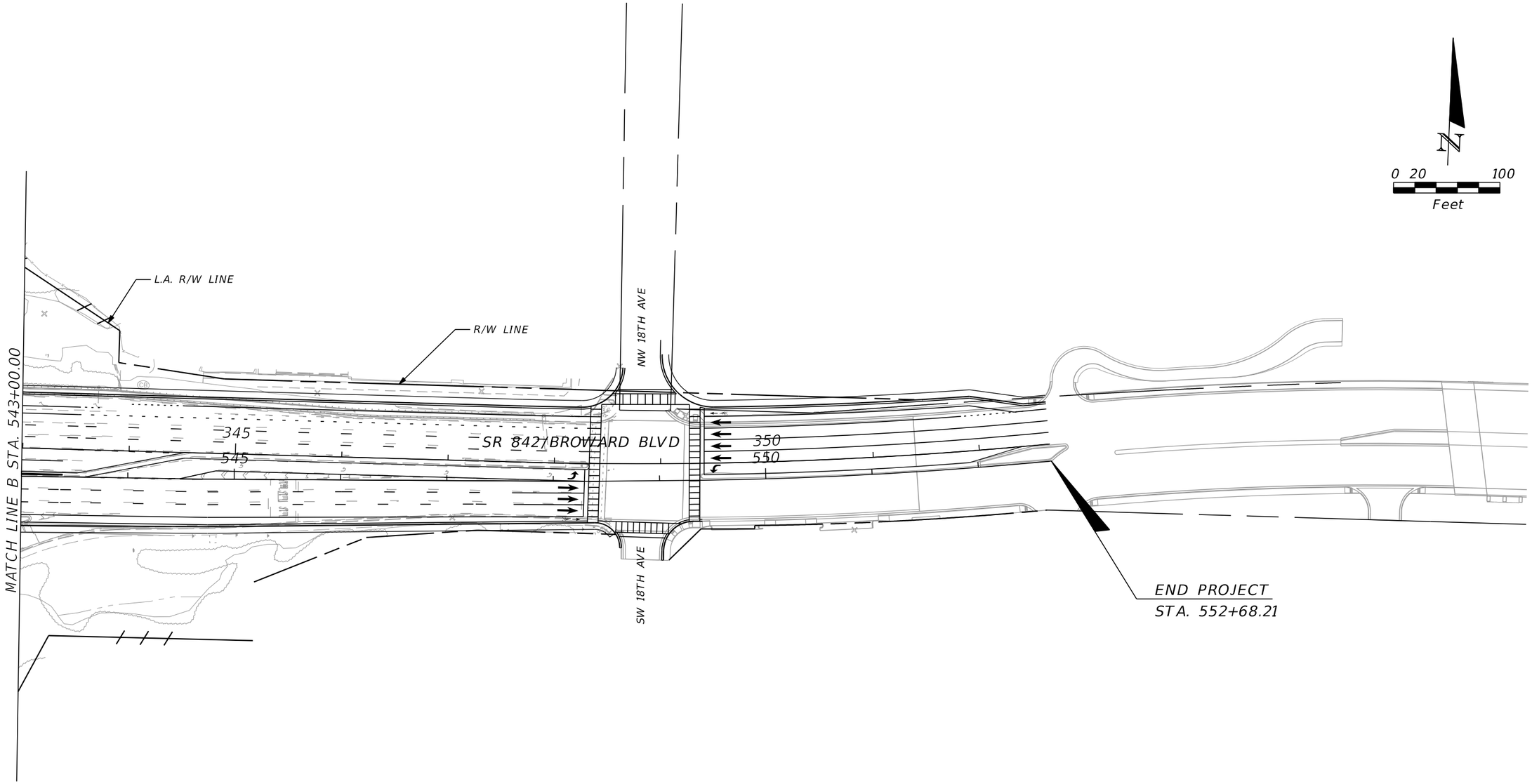
HDR Engineering, Inc.
15450 New Barn Road, Suite 304
Miami Lakes, FL 33014-2169
CERTIFICATE OF AUTHORIZATION 4213

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	435513-1-22-02

CONCEPT PLANS

SHEET NO. 12



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

HDR Engineering, Inc.
15450 New Barn Road, Suite 304
Miami Lakes, FL 33014-2169
CERTIFICATE OF AUTHORIZATION 4213

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	BROWARD	435513-1-22-02

CONCEPT PLANS

SHEET NO. 13

mhenriqu 9/28/2017 5:58:13 PM PW:/3207\10036962\6.0_CAD_BIM\6.2_Work_In_Progress\43551212202\roadway\PLANRD12

APPENDIX C

Referenced Pages from SR 9/I-95 PD&E Noise Study Report from Stirling Road to North of Oakland Park Boulevard September 2013

SR 9 / I-95

PD&E STUDY

FROM STIRLING ROAD (MP 5.093) TO NORTH OF OAKLAND PARK BOULEVARD (MP 13.742)

FM 429804-1-22-01 / ETDM 13168

BROWARD COUNTY, FLORIDA

NOISE STUDY REPORT

September, 2013

PREPARED FOR:
FDOT - District 4
3400 West Commercial Blvd
Fort Lauderdale, FL. 33309

- 86070-3506 (3472A) – Ground-mounted noise barrier along the eastern limited-access right of way line, NW 7th Place to NW 8th Court, 530 feet long, 16 to 19 feet tall.

6.2.1.7 Segment G - SR 838/Sunrise Boulevard to SR 816/Oakland Park Boulevard

This segment of the I-95 project corridor is depicted on **Sheets B-6, B-7** and **B-8** in **Appendix B**. Noise sensitive sites are found only on the east side of this project segment. These noise sensitive sites include approximately 188 single-family homes in the Lauderdale Manors neighborhood and in the Jenada Isles community located south of Oakland Park Boulevard. Two City of Ft Lauderdale parks are located along this project segment. Mills Pond Park is located at 2201 NW 9th Avenue, east of the corridor and Osswald Park is located at 2220 NW 21st Avenue, to the west. In addition, one apartment complex pool is also located east of the corridor. This segment of the project also includes office buildings, warehouses, industrial/light industrial enterprises and institutional facilities that are not considered noise sensitive (i.e., Activity Category F).

One noise barrier is located along this segment of I-95. One-hundred fifty-two (152) single-family homes along the east side of I-95 are located behind this noise barrier. Fifteen (15) of the single-family homes, the two parks and the apartment complex pool are not located behind the noise barrier. This noise barrier is as follows:

- 86070-3506 (3472B) – Ground-mounted noise barrier along the eastern limited-access right of way line, NW 17th Avenue to NW 19th Street, 5,000 feet long, 14 to 21 feet tall.
- An approximately 14-foot tall, 825-foot long privacy barrier is located along the shoulder of the northbound off-ramp to Oakland Park Boulevard. This privacy barrier reduces traffic noise from I-95 for 11 single-family homes and the pool at the Wilton Shores Apartments.

6.2.1.8 Segment H - SR 816/Oakland Park Boulevard to Northern Project Terminus

This segment of the I-95 project corridor is depicted on **Sheet B-8** in **Appendix B**. One Broward County park is located along this project segment. Easterlin Park is located at 1000 NW 38th Street, west of the corridor. This segment of the project also includes office buildings, warehouses, industrial/light industrial enterprises and institutional facilities that are not considered noise sensitive (i.e., Activity Category F).

6.3 Field Measurement of Noise and Model Validation

Measurements of sample existing noise levels along the project corridor were performed using procedures defined in the FHWA report *Measurement of Highway-Related Noise* (FHWA-PD-96-046). Existing traffic noise levels were measured on May 8, 9 and 10, 2012 at eight locations along I-95. Traffic data was collected simultaneously at five of these sites in order to allow validation of model inputs. Only noise level data was collected at the remaining three sites in order to characterize traffic noise levels at those locations. The locations of the field

measurement sites are depicted on **Sheets C-1 through C-16** in **Appendix C** and described in **Table 6-3**.

Table 6-3
Field Measured Traffic Noise Data

FIELD RECEPTOR	LOCATION	SAMPLE RUN	TIME	MEASURED 10-MINUTE TRAFFIC VOLUME (Auto/MT/HT/B/Mcy)	DISTANCE FROM ROADWAY (Feet)	MEASURED NOISE LEVEL (dBA)	MODELLED NOISE LEVEL (dBA)	DIFFERENCE (Measured - Modeled) (dBA)
FR-A	Closed amusement park south of NW 1st Street. East side of corridor. No nearby noise barrier. Near Sta. 994+00.	A1	9:55AM 5/9/12	NB 983/41/45/4/2 SB 1,070/39/64/3/4	70	76.6	76.8	-0.2
					175	71.0	71.9	-0.9
		A2	10:08AM 5/9/12	NB 1,039/36/48/3/3 SB 1,020/47/70/11/1	70	76.6	76.2	0.4
					175	71.0	71.4	-0.4
		A3	10:22AM 5/9/12	NB 1,050/34/54/0/0 SB 1,090/ 52/66/16/3	70	76.5	76.1	0.4
					175	70.8	71.1	-0.3
		A4	10:36AM 5/9/12	NB 1,040/30/59/3/1 SB 1,080/42/67/9/1	70	76.1	75.9	0.2
					175	70.7	71.1	-0.4
FR-B	NW 20th Avenue south of NW 8th Street. East side of corridor. Nearby noise barrier. Near Sta. 1287+50.	B1	11:16AM 5/9/12	NB 1,175/30/77/1/3 SB 1,110/51/73/9/5	100	65.7	64.2	1.5
					220	64.6	65.1	-0.5
		B2	11:30AM 5/9/12	NB 1,050/40/70/1/1 SB 1,110/49/53/15/3	100	66.0	64.1	1.9
					220	65.4	65.0	0.4
		B3	11:45AM 5/9/12	NB 1,325/35/60/1/5 SB 1,080/49/63/8/1	100	65.2	64.2	1.0
					220	64.4	65.2	-0.6
		B4	11:59AM 5/9/12	NB 1,200/13/67/1/1 SB 1,070/47/60/15/6	100	65.4	64.3	1.1
					220	64.9	65.2	-0.3
FR-C	End of NW 19th Avenue. East side of corridor. Nearby noise barrier. Near Sta. 1330+00	C1	9:46AM 5/10/12	NB 1,243/40/45/3/2 SB 1,140/59/64/10/5	115	67.8	64.9	2.9
					225	64.8	63.0	1.8
		C2	10:00AM 5/10/12	NB 1,218/55/32/1/1 SB 1,120/52/58/15/1	115	67.7	64.5	3.2
					225	64.8	62.7	2.1
		C3	10:14AM 5/10/12	NB 1,187/25/55/4/2 SB 1,120/42/58/8/3	115	67.1	64.5	2.6
					225	63.9	62.6	1.3
FR-D	Osswald Park Golf Course. West side of corridor. No nearby noise barrier. Near Sta. 1383+00.	E1	3:25PM 5/9/12	NB 1,318/18/48/2/1 SB 1,270/45/57/7/1	585	65.3	65.3	0.0
					1005	65.3	62.3	3.0
		E2	3:40PM 5/9/12	NB 1,406/39/48/3/2 SB 1,360/41/40/9/3	585	65.2	65.0	0.2
					1005	65.4	62.1	3.3
		E3	3:55PM 5/9/12	NB 1,431/37/41/5/2 SB 1,240/44/48/10/1	585	64.0	65.1	-1.1
					1005	63.6	62.1	1.5
		E4	4:10PM 5/9/12	NB 1,580/36/28/7/2 SB 1,300/26/27/17/2	585	64.4	64.7	-0.3
					1005	64.2	61.6	2.6
FR-E	North of Best Western Hotel at Stirling Road. West side of corridor. No nearby noise barrier. Near Sta. 989+50.	F1	11:41AM 5/10/12	NB 1,245/26/51/0/3 SB 1,110/53/66/15/2	105	71.9	74.2	-2.3
		F2	11:57AM 5/10/12	NB 1,087/18/63/4/2 SB 1,100/52/69/13/6	105	71.5	74.3	-2.8
		F3	12:11PM 5/10/12	NB 1,189/19/62/8/4 SB 1,130/48/50/13/2	105	71.4	73.9	-2.5
		F4	12:25PM 5/10/12	NB 1,212/28/66/2/4 SB 1,160/44/53/20/6	105	70.6	74.2	-3.6

Notes: dB(A) = A-weighted decibels, MT = Medium Trucks, HT = Heavy Trucks, B = Bus, Mcy = Motorcycles

6.3.1 Field Measurement Sites

6.3.1.1 Site FR-A

Measurement site FR-A is located east of I-95, in the parking area of a closed amusement park south of NW 1st Street near I-95 Station (Sta.) 994+00. This site is within the City of Dania Beach. This site is representative of noise sensitive sites along the east side of I-95 between Stirling Road and Griffin Road. Traffic noise levels at this site were measured at distances of

approximately 70 and 175 feet from the edge-of-pavement of the nearest northbound mainline lane of I-95. These distances are representative of the distances the nearby hotels are from the northbound lanes. Noise level readings were taken between 9:55 AM and 10:46 AM on May 9, 2012. Existing traffic noise levels were found to range from 76.1 to 76.6 dB(A) at the near location and 70.7 to 71.0 dB(A) at the far location.

6.3.1.2 Site FR-B

Measurement site FR-B is located east of I-95 near Sta. 1287+50, along NW 20th Avenue and south of NW 8th Street. This site is within the City of Ft Lauderdale. This site is representative of noise sensitive sites along the east side of I-95 between Broward Boulevard and Sunrise Boulevard. Homes in this neighborhood are located behind a 16 to 19-foot tall noise barrier along the eastern limited-access right of way line of I-95. Traffic noise levels at this site were measured at distances of approximately 100 and 220 feet from the edge-of-pavement of the nearest northbound mainline lane of I-95. These distances are representative of the distances the first and second row homes are from the northbound lanes. Noise level readings were taken between 11:16 AM and 12:09 PM on May 9, 2012. Existing traffic noise levels were found to range from 65.2 to 66.0 dB(A) at the near location and 64.4 to 65.5 dB(A) at the far location.

6.3.1.3 Site FR-C

Measurement site FR-C is located east of I-95 near Sta. 1330+00, at the west end of NW 19th Avenue in the City of Ft Lauderdale. This site is representative of noise sensitive sites along the east side of I-95 between Sunrise Boulevard and NW 19th Street. Homes in this neighborhood are located behind a 16 to 21-foot tall noise barrier along the eastern limited-access right of way line of I-95. Traffic noise levels at this site were measured at a distances of approximately 115 and 225 feet from the edge-of-pavement of the nearest northbound mainline lane of I-95. These distances are representative of the distances the first and second row homes are from the northbound lanes. Noise level readings were taken between 9:46 AM and 10:24 AM on May 10, 2012. Existing traffic noise levels were found to range from 67.1 to 67.8 dB(A) at the near location and 63.9 and 64.8 dB(A) at the far location.

6.3.1.4 Site FR-D

Measurement site FR-D is located west of I-95 near Sta. 1383+00, in the golf course at the City of Ft Lauderdale's Osswald Park. This site is representative of noise sensitive areas within the park. There is no nearby noise barrier along this segment of I-95. Traffic noise levels at this site were measured at a distance of approximately 585 feet from the edge-of-pavement of the nearest southbound mainline lane of I-95. This distance is representative of areas where activities take place on the park's golf course. Noise level readings were taken between 3:25 PM and 4:20 PM on May 9, 2012. Existing traffic noise levels were found to range from 64.0 to 65.3 dB(A).

6.3.1.5 Site FR-E

Measurement site FR-E is located west of I-95 near Sta. 989+50, near a vacant parcel north of the Best Western Inn along Stirling Road. This site is within the City of Dania Beach. This site is

representative of noise sensitive sites along the west side of I-95 between Stirling Road and Griffin Road. Traffic noise levels at this site were measured at a distance of approximately 105 feet from the edge-of-pavement of the nearest southbound mainline lane of I-95. This distance is representative of the distance a nearby hotel is from I-95. Noise level readings were taken between 11:41 AM and 12:35 PM on May 10, 2012. Existing traffic noise levels were found to range from 70.6 to 71.9 dB(A).

6.3.2 Field Monitoring Sites

Noise measurements were conducted at three additional sites in order to characterize noise levels in areas where it was not possible to simultaneously count traffic due to the roadway or site configuration. Thirty (30) minutes of noise level data were collected at each site.

6.3.2.1 FM-A

This field monitoring site is located in Ft Lauderdale on the property of the Marina Oaks Condominiums at 2445 SW 18th Terrace, north of SR 84. This location is east of I-95 near Sta. 1144+50. Noise levels were monitored at a distance of 100 feet from the edge-of-pavement of the nearest northbound collector-distributor roadway lane of I-95. I-95 near this community includes at-grade mainline lanes, elevated access ramps from the SR 84 interchange and collector–distributor roadways. Noise measurements at this site occurred on May 9, 2012 between 7:57 and 8:27 AM. The existing noise level during this period was 71.5 dB(A).

6.3.2.2 FM-B

This field monitoring site is located along NW 20th Avenue south of NW 16th Street in Ft Lauderdale in a neighborhood of single-family homes. This location is east of I-95 near Sta. 1169+50. Noise levels were monitored at distances of 185 and 270 feet from the edge-of-pavement of the nearest northbound collector-distributor roadway lane of I-95. I-95 near these homes includes elevated mainline lanes for the mid-level bridge over the South Fork of the New River, and elevated access ramps and collector–distributor roadways. There is a 6 to 17 foot tall noise barrier along the outside shoulder of the northbound collector-distributor roadway. Noise measurements at this site occurred on May 10, 2012 between 7:40 and 8:10 AM. The existing noise level during this period was 64.0 dB(A) at the near location and 63.1 dB(A) at the far location.

6.3.2.3 FM-C

This field monitoring site is located at the intersection of NW 21st Terrace and NW 4th Street in Ft Lauderdale in a neighborhood of single-family homes. This location is west of I-95 near Sta. 1265+50. Noise levels were monitored at a distance of 310 feet from the edge-of-pavement of the nearest southbound collector-distributor roadway lane of I-95. I-95 near this neighborhood includes at-grade mainline lanes, several access ramps, collector–distributor roadways and elevated direct access ramps into the Ft Lauderdale – Broward Tri-Rail station. The Tri-Rail corridor runs between these homes and I-95. Noise measurements at this site occurred on May 8, 2012 between 2:57 and 3:27 PM. Two Tri-Rail trains passed by the site during this time,

resulting in peak noise levels of approximately 76 dB(A). The existing noise level during the 30-minute measurement period was 65.4 dB(A).

6.3.3 Field Measurement Summary

Existing noise levels were measured at five field validation sites along the I-95 project corridor during 19 ten-minute sampling periods. Traffic noise levels were found to range from 63.6 to 76.6 dB(A) at far meter locations. In all cases, traffic noise from I-95 was the predominant source of noise at the nearby noise sensitive sites.

6.4 Computer Noise Model Validation

Site conditions and traffic data gathered during the field measurements were used to develop inputs to the FHWA's TNM 2.5 for computer models representative of the existing conditions. Additional geometric information necessary for these models was developed from aerial photographs and/or MicroStation files of the existing conditions in the project study area. The TNM results were then compared to the noise level data collected for each field measurement sample. The results of this analysis are shown in **Table 6-4**.

Table 6-4
Noise Model Validation Results

Field Receptor	Average Difference (Measured – Modeled) [dB(A)]
FR-A	0.2
	-0.5
FR-B	1.4
	-0.2
FR-C	2.9
	1.7
FR-D	-0.3
	2.6
FR-E	-2.8

The model inputs for the field conditions are deemed to be within an acceptable level of accuracy if the predicted noise levels are within ±3.0 dB(A) of the measured noise levels. These model inputs are then used as a basis for additional model runs used to predict existing and future noise levels at representative nearby noise sensitive locations. The average difference for each of the field measurement sites is shown in the table above. As presented in this table, each location falls within the ±3.0 dB(A) verification limit using TNM in accordance with the FDOT PD&E Manual, *Chapter 17 – Noise* (dated May 24, 2011). Thus, further use of the TNM model on this project is supported.

6.5 Noise Model Development

After verification of the prediction methodology, computer models were developed for the existing year (2011) conditions and the viable Design Year (2040) No Action and Build alternatives. The TNM models for all alternatives were developed using geometric information from the project master plans. Traffic data used in the TNM models was Level of Service C data taken from the FDOT's *2009 Level of Service Handbook*.

Figure C-7

Measured and Modeled Noise Receptor Locations

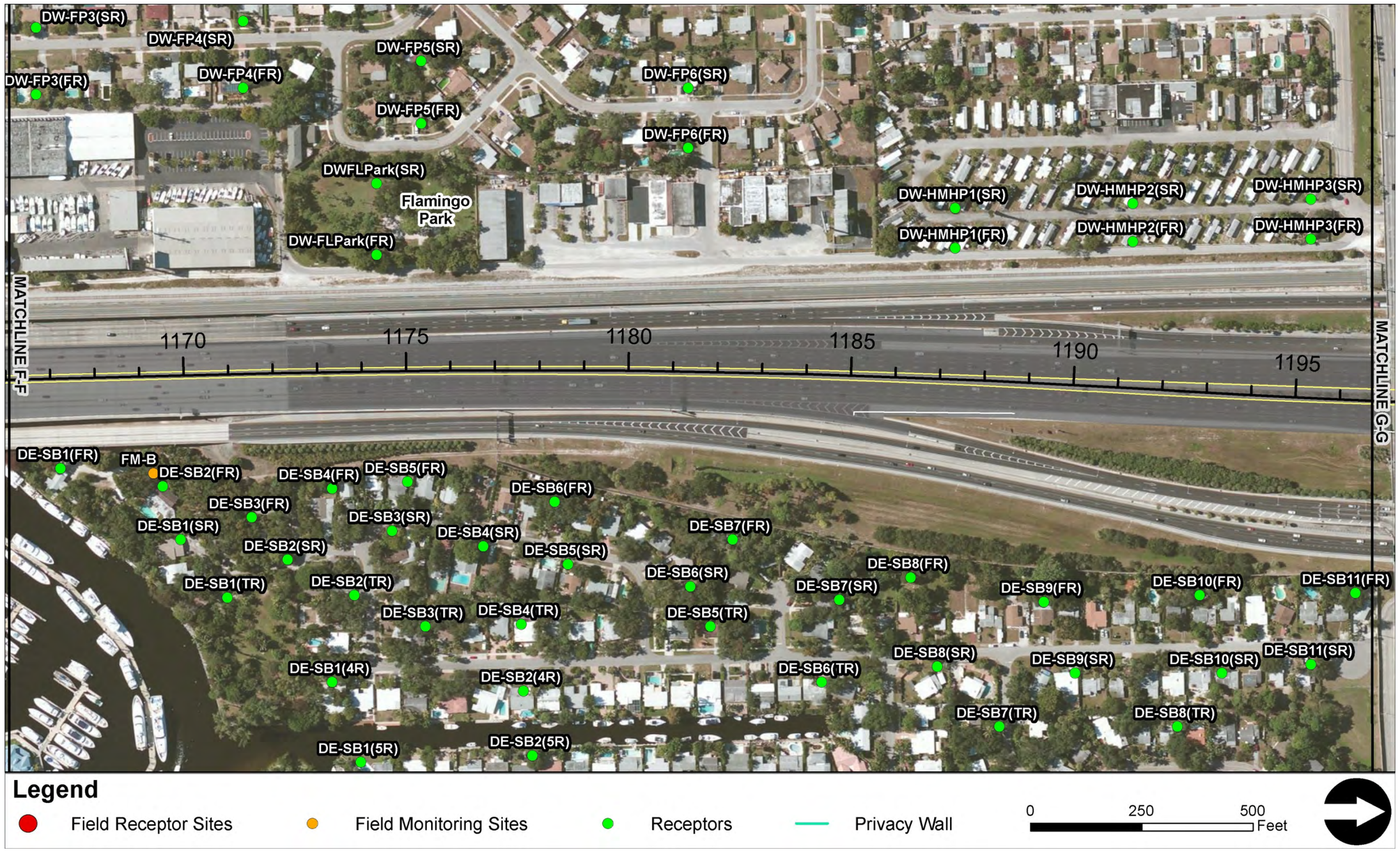


Figure C-10

Measured and Modeled Noise Receptor Locations

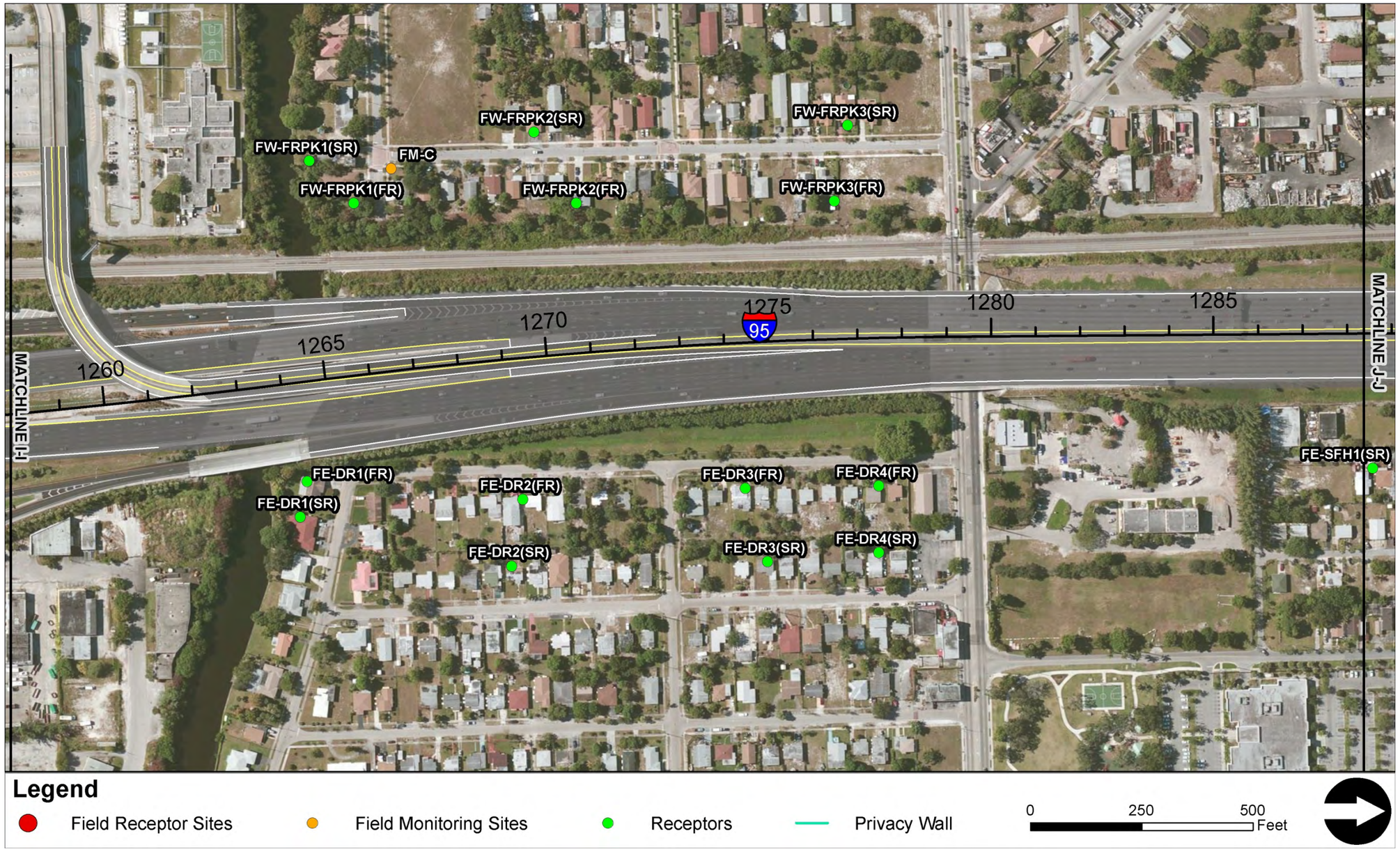


Figure C-11

Measured and Modeled Noise Receptor Locations