

# **NOISE STUDY REPORT Design Addendum**

**WIDENING FLORIDA'S TURNPIKE (SR 91)  
FROM MINNEOLA INTERCHANGE TO US 27  
(LEESBURG INTERCHANGE)  
Lake County, Florida**

Financial Project ID Number: 435786-1-52-01



**Prepared For:  
FLORIDA'S TURNPIKE ENTERPRISE**

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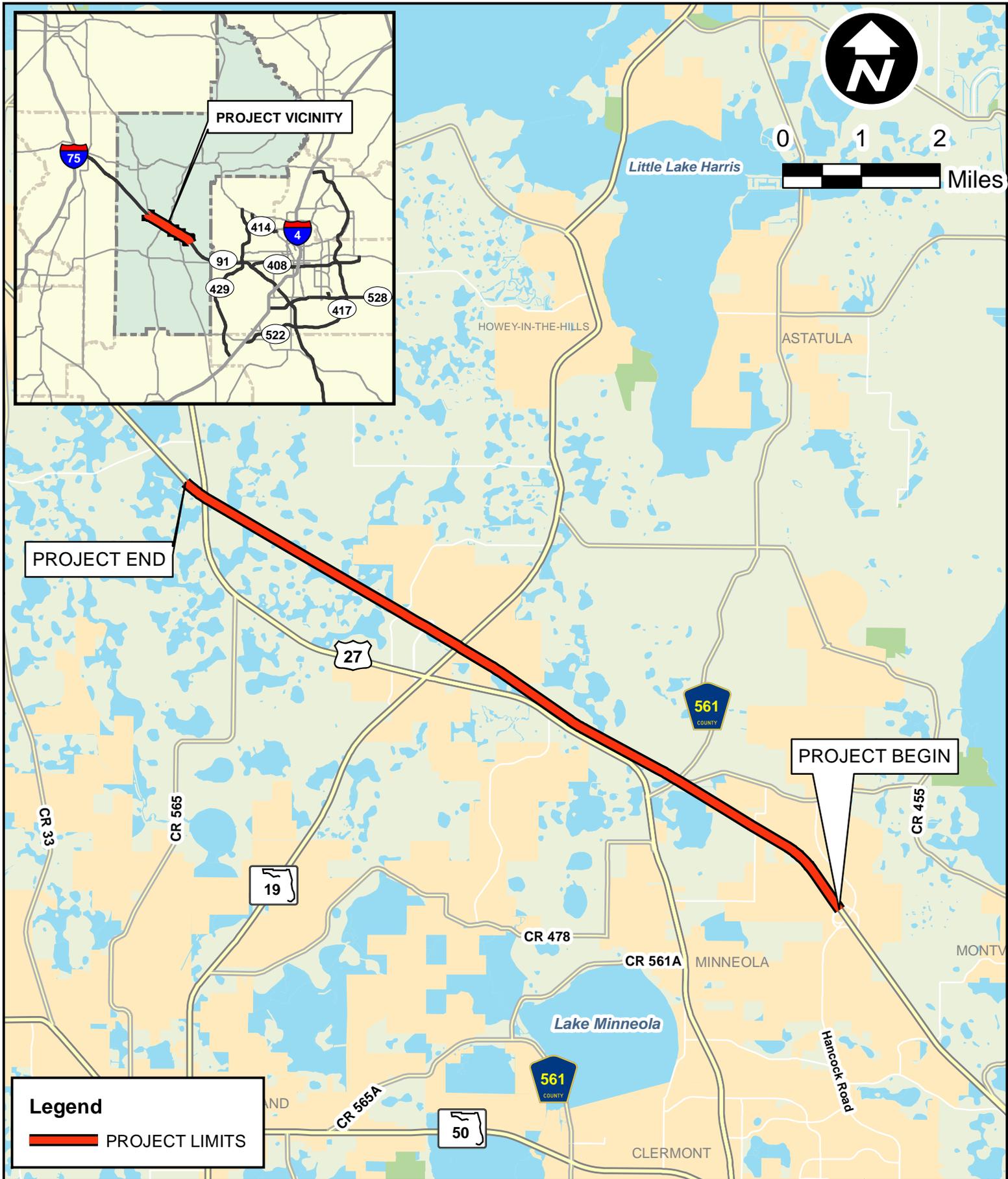
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## 1.0 INTRODUCTION

Florida's Turnpike Enterprise (FTE) evaluated improvements for the portion of Florida's Turnpike (SR 91) from SR 50 (MP 273.0) to Interstate 75 (MP 309.0) as part of a Project Development and Environment (PD&E) Study completed in 2016 (FPID 423375-1). The improvements evaluated in this study included widening Florida's Turnpike from four lanes to eight lanes. As part of the PD&E Study, a Noise Study Report was prepared to evaluate potential impacts associated with roadway-related noise. The State Environmental Impact Report (SEIR) for this PD&E Study was approved July 7, 2016, making that date the Date of Public Knowledge (DPK) for this project.

Subsequent to the PD&E Study and Noise Study Report, FTE is in the final design phase for the portion of Florida's Turnpike from north of the Minneola (Hancock Road) Interchange (MP 279.0) to U.S. 27 (Leesburg North) Interchange (MP 289.3). The original Noise Study Report for the PD&E Study included residential communities located adjacent to both sides of Florida's Turnpike within the current design project limits. For neighborhoods located within the current design segment, the original Noise Study Report, determined that noise barriers were not a potentially feasible and reasonable method to abate roadway-related noise for any of the residential communities within the project area. The goal of this noise evaluation is to model the final roadway design and determine if any modifications to the findings of the PD&E Noise Study are necessary. A project location map is provided in **Figure 1** of this report.



**Legend**

 PROJECT LIMITS



*Turnpike Mainline - Minneola to Leesburg  
 Noise Study Report - Design Addendum  
 From Minneola Interchange to US 27  
 Lake County, Florida*  
 Financial Project ID: 435786-1-52-01

**PROJECT  
 LOCATION MAP**

*Figure*  
**1**

## 1.1 Project Description

Florida's Turnpike within Lake County is to be reconstructed from the existing four-lane facility to accommodate an eight-lane facility from north of the Minneola (Hancock Road) Interchange (MP 279.0) to U.S. 27 (Leesburg North) Interchange (MP 289.3).

New All-Electronic Tolling (AET) gantries will be constructed at the US 27 north interchange ramps, and a new mainline AET Gantry will be constructed between the Scrub Jay Lane bridge and the CR 561 bridge. The existing AET Leesburg mainline toll gantry will remain while the existing tolling gantry and infrastructure at the US 27 south interchange will be removed as part of this project. Three medium-span bridges over the Turnpike mainline, and three mainline medium span bridges over local roads will be replaced as part of this project. New ramp movements at the US 27 South interchange will be constructed to include a northbound on and southbound off ramp.

Florida's Turnpike is classified as an Urban Principal Arterial – Expressway and is part of the National Highway System (NHS) and the State Highway System (SHS). Florida's Turnpike is also a part of the Strategic Intermodal System (SIS) with a Limited Access Right-of-Way (ROW) of 300 feet. The corridor has a posted and design speed of 70 mph. For an adjacent project south of the Minneola interchange (FPID# 435785-1), the existing typical section, currently in final design, contains four 12-foot lanes in each direction, a 26-foot median with median barrier wall, and 12-foot paved inside and outside shoulders. Outside of the roadway are grassed drainage swales typically contained within a 300-foot ROW. The existing Florida's Turnpike typical section north of the Minneola Interchange contains two 12-foot lanes in each direction, a 40-foot median with double face guardrail and rub rail, 8-foot inside shoulder (4 feet paved) and 12-foot outside shoulders (10 feet paved). North of the Minneola Interchange, the proposed typical section is to reconstruct Florida's Turnpike to allow for four (4) 12-foot through lanes, a 26-foot median with median barrier wall, and 12-foot paved inside and outside shoulders. Outside of the roadway are grassed drainage swales typically contained within a 300-foot ROW.

## 2.0 METHODOLOGY

The traffic noise study was performed in accordance with *Code of Federal Regulations, Title 23, Part 772 (23 CFR 772) Procedures for Abatement of Highway Traffic Noise and Construction Noise*<sup>1</sup> using methodology established by the Florida Department of Transportation (FDOT) in the *Project Development and Environment Manual*<sup>2</sup>, Part 2, Chapter 18 (FDOT, January 14, 2019) and FDOT's *Traffic Noise Modeling and Analysis Practitioners Handbook*<sup>3</sup>. Predicted noise levels were produced using the Federal Highway Administration (FHWA) Traffic Noise Model (TNM), version 2.5.

### 2.1 Noise Metrics

Noise levels developed for this analysis are expressed in decibels (dB) using an "A"-scale [dB(A)] weighting. This scale most closely approximates the response characteristics of the human ear. All noise levels are reported as hourly equivalent noise levels (LAeq1h). The LAeq1h is defined as the equivalent

steady-state sound level that, in a given hourly period, contains the same acoustic energy as the time-varying sound level for the same hourly period. Use of the dB(A) and LAeq1h metrics to evaluate traffic noise is consistent with 23 CFR 772.

## 2.2 Traffic Data

Traffic noise is heavily dependent on both traffic speed and traffic volume with the amount of noise generated by traffic increasing as the vehicle speed and number of vehicles increases. The traffic conditions that result in the highest noise levels for roadways are the hourly traffic volumes that represent Level of Service (LOS) C traffic conditions because they represent maximized traffic volumes that continue to travel at free flow speed.

Traffic volumes and vehicle mix (e.g., cars, medium trucks, heavy trucks, motorcycles, and buses) were predicted for the design year (2045) under the Build condition. For Florida's Turnpike roadway segments, LOS C hourly traffic was utilized. For ramps, hourly traffic demand volumes were utilized. Traffic volumes and speeds used in the analysis are provided in Appendix A.

## 2.3 Noise Abatement Criteria and Considerations

Noise sensitive sites are any property where frequent exterior and/or interior human use occurs and where a lowered noise level would provide a benefit. FHWA has established noise levels at which noise abatement must be considered for various types of noise sensitive sites. These levels, which are used by the Florida's Turnpike Enterprise for the purpose of evaluating traffic noise, are referred to as the Noise Abatement Criteria (NAC). As shown in **Table 2-1**, the NAC vary by activity category. Noise abatement measures are considered when predicted traffic noise levels approach or exceed the NAC. FDOT defines "approach" as within one dB(A) of the applicable FHWA criterion. For comparison purposes, typical noise levels for common indoor and outdoor activities are provided in **Figure 2**.

Noise abatement measures must also be considered when a substantial increase in traffic noise will occur as a direct result of the transportation project. FDOT defines a substantial increase as 15 or more dB(A) above existing conditions. A substantial increase typically occurs in areas where traffic noise is a minor component of the existing noise environment but would become a major component after the project is constructed (e.g., new roadway on a new alignment). The proposed design for this project follows the existing alignment of Florida's Turnpike and the results from the PD&E noise analysis indicated that a substantial increase in traffic noise will not occur.

**Table 2-1 – FHWA & FDOT Noise Abatement Criteria**

NOISE ABATEMENT CRITERIA (NAC) [Hourly A-Weighted Sound Level-decibels (dB(A))]				
Activity Category	Activity Leq(h) <sup>1</sup>		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 <sup>2</sup>	67	66	Exterior	Residential
C <sup>2</sup>	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 <sup>2</sup>	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)*  
<sup>1</sup> The Leq(h) Activity Criteria values are for impact determination only and are not design standards for noise abatement measures.  
<sup>2</sup> 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.

**Figure 2 – Typical Noise Levels**

Common Outdoor Activities	Noise Level dB(A)	Common Indoor Activities
Jet Fly-Over 1000 ft.	---110---	Rock Band
Gas Lawn Mower at 3 ft.	---100---	
Diesel Truck at 50 ft., at 50 mph	---90---	Food Blender at 3 ft.
Noise Urban Area (Daytime)	---80---	Garbage Disposal at 3 ft.
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		Library
Quiet Rural Nighttime	---30---	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.		

## 3.0 TRAFFIC NOISE ANALYSIS AND ABATEMENT ASSESSMENT

### 3.1 Noise Sensitive Sites and Abatement Analysis

Within the project limits, all potential residential and non-residential noise sensitive sites were evaluated, and no non-residential noise sensitive sites were identified for this project. Receptor points representing these noise sensitive sites are located in accordance with the FDOT PD&E Manual, Part 2, Chapter 18 as follows:

- Residential receptor points are located at an area of frequent exterior use (i.e. patio or lanai) or the corner of a residential building closest to the major traffic noise source.
- Where residences are clustered together, single receptor points are analyzed as representative of a group of sites with similar characteristics.
- Ground floor receptor points are assumed to be 5 feet above the ground elevation.
- Predicted traffic noise levels, NAC classification, and impact criteria for all noise sensitive sites in this project are documented in Appendix B, and the locations of the receptor points are depicted on the project aerials found in Appendix C. The alphanumeric identification for each receptor point associated with a noise sensitive site is formulated as follows:
  - All receptor point names begin with the letter “R”, indicating the receptors are representing residential noise-sensitive sites.
  - Following the “type” code, receptors are assigned a Common Noise Environment (CNE) identifier which labels receptors according to the CNE within which they are located.
    - The first two letters (i.e., NB, SB) describe on which side of the roadway the CNE is located (e.g., “NB” indicates the receptor is located in a CNE on the northbound side of the travel lanes).
    - The number following the first two letters is a numeric sequencing number (e.g., CNE NB02 is the 2<sup>nd</sup> CNE on the northbound side of the roadway).
  - The number following the CNE identifier is the receptor number and is separated from the first string of characters with a dash (e.g., RSB03-005 is the 5<sup>th</sup> receptor, of “type” Residential, in the 3<sup>rd</sup> CNE on the southbound side of the roadway).
- The project aerials in Appendix C show the locations of all impacted and/or benefited receptors.

For the proposed design, 97 receptor points were utilized to represent 97 residences. Noise levels at 34 residences are predicted to approach or exceed the NAC [i.e., 66 dB(A) for Activity Category B] established by FHWA for the Build condition. Predicted noise levels for the design year 2045 Build condition are included in Appendix B for residential receptors. The receptors are shown on the project aerials located in Appendix C.

The noise sensitive sites are grouped into CNEs to evaluate the potential feasibility and reasonableness of providing noise barriers to reduce traffic noise. Noise barriers reduce traffic noise by blocking the

sound path between a traffic noise source and noise sensitive receptor. To effectively reduce traffic noise, a noise barrier must be relatively long, continuous (with no intermittent openings), and of sufficient height. For a noise barrier to be considered feasible and reasonable, the following conditions must be met.

To be considered feasible it must:

- Demonstrate that it will benefit at least two impacted receptors by providing a reduction in traffic related noise of at least 5 dB(A).
- Take into consideration a number of additional feasibility factors including: design and construction, safety, access, right of way (ROW), maintenance, drainage, and utility factors.

To be considered reasonable it must:

- Take into consideration the viewpoints of the benefitted property owners and residents.
- The cost of the noise barrier must not exceed \$42,000 per benefitted receptors for residences. A benefitted receptor is defined as a receptor that would experience at least a 5 dB(A) reduction in noise levels as a result of providing a noise barrier. The current unit cost used to evaluate cost reasonableness is \$30 per square foot for all noise barriers. This cost covers barrier materials and labor.
- Satisfy the FDOT's Noise Reduction Design Goal of 7 dB(A). Therefore, a noise barrier must provide a noise reduction of at least 7 dB(A) for at least one benefitted receptor.

Within the project limits, noise barrier locations were evaluated for the project as follows:

- Non-shoulder noise barriers located outside the clear recovery zone, but within the ROW, are initially considered at heights ranging from 8 feet to 22 feet in 2-foot increments.
- If a non-shoulder noise barrier cannot provide feasible and reasonable abatement to an impacted receptor, then a shoulder noise barrier is evaluated. When on structure (e.g., bridge, retaining wall), a shoulder noise barrier is limited to a maximum height of 8 feet. If on embankment or ground mounted, a shoulder noise barrier is limited to a maximum height of 14 feet.

This project has MSE walls with jersey barriers at a number of locations along the roadway shoulder. These jersey barriers were included in the noise model as part of the baseline condition. Shoulder noise barrier were also restricted to a height of 8 feet in these locations as they are considered "on-structure" barriers.

Using the evaluation process, noise barriers for each CNE are evaluated to determine the maximum number of impacted receptors that could potentially be provided at least a 5 dB(A) reduction in traffic related noise. These noise barriers may be constrained by specific conditions, such as overhead utilities. As a result of the site-specific conditions, noise barriers may not provide a 5 dB(A) reduction in traffic related noise to all impacted receptors. Specific details about all the receptors are provided in the subsequent sections.

At some locations, noise barriers may benefit receptors that are not impacted. Since abatement consideration at these receptors is not required, noise barrier lengths or heights are not increased to benefit non-impacted receptors. However, if benefited because of the proximity to an impacted receptor, these receptors are included when determining the cost reasonableness of the noise barrier based on cost per benefited receptor. This methodology is consistent with FHWA policy and guidance.

## 3.2 Residences on Northbound Side of Florida's Turnpike

### 3.2.1 Lake Shepherd Shores (CNE NB01)

The Lake Shepherd Shores (CNE NB01) neighborhood is located on the northbound side of Florida's Turnpike approximately between stations 1120+00 and 1132+00. There were 13 NAC B receptor points added to the model to represent 13 residential units. Of these 13 receptors, noise levels at eight receptors, representing eight residential units, are predicted to approach or exceed the NAC for the Build condition in the design year (2045). Due to changes in the vertical profile of the road, as well as the construction of jersey barriers at numerous locations along the project, noise levels at nine receptors are predicted to decrease. In NB01 the maximum predicted increase is 0.7 dB(A); therefore, no NB01 receptors are impacted by a substantial increase.

Noise barriers were evaluated for the residences in Lake Shepherd Shores to abate traffic related noise. Based on this evaluation, a potential noise barrier system located along the northbound shoulder could provide a 7 dB(A) reduction at one or more receptors and a 5 dB(A) reduction at two or more impacted receptors. However, the evaluated noise barrier will exceed the allowable \$42,000 per benefited receptor. Therefore, noise barriers are not a cost reasonable method to abate roadway-related noise impacts for residences within the neighborhood of Lake Shepherd Shores. **Table 3-1** summarizes the various barrier configurations that were evaluated for CNE NB01.

**Table 3-1– Noise Barrier Analysis Summary for CNE NB01**

Height (feet)	Length <sup>1</sup> (feet)	Location	No. of Impacts	Noise Reduction at Impacted Residences			Number of Benefited Residences				Impacted Res. Not Benefited <sup>4</sup>	Total Estimated Cost <sup>5</sup>	Cost per Benefited Residence
				5-5.9 dB(A)	6.0-6.9 dB(A)	> 7 dB(A)	Impacted <sup>2</sup>	Not Impacted <sup>3</sup>	Total	Average Reduction dB(A)			
12	520	SH <sup>6</sup>	8	0	1	0	1	0	1	6.8	7	N/A <sup>8,9</sup>	N/A <sup>8,9</sup>
14	400	SH <sup>6</sup>	8	0	1	0	1	0	1	6.1	7	N/A <sup>8,9</sup>	N/A <sup>8,9</sup>
14	520	SH <sup>6</sup>	8	1	0	1	2	0	2	6.1	6	\$218,400 <sup>10</sup>	\$109,200 <sup>10</sup>
14	520	SH <sup>6</sup>	8	0	0	2	2	0	2	11.2	6	\$422,400 <sup>10</sup>	\$211,200 <sup>10</sup>
8	850	SH <sup>6</sup>											
22	500	ROW <sup>7</sup>	8	0	0	1	1	0	1	7.3	7	N/A <sup>9</sup>	N/A <sup>9</sup>
22	500	ROW <sup>7</sup>	8	0	0	1	1	0	1	7.8	7	N/A <sup>9</sup>	N/A <sup>9</sup>
22	1000	ROW <sup>7</sup>											

<sup>1</sup> Full height is for the length indicated. If a shoulder noise barrier location is indicated, the length of vertical height tapers at the shoulder barrier's terminus (See FDOT Standard Plans) would be in addition to the length indicated.

<sup>2</sup> Benefited residences with predicted noise levels that approach or exceed the NAC.

<sup>3</sup> Benefited residences with predicted noise levels that do not approach the NAC.

<sup>4</sup> Impacted residences that do not receive a minimum 5 dB(A) reduction from proposed noise barrier.

<sup>5</sup> Unit cost of \$30/ft<sup>2</sup>

<sup>6</sup> SH - Shoulder noise barrier on Florida's Turnpike.

<sup>7</sup> ROW – Right of Way noise barrier on Florida's Turnpike.

<sup>8</sup> Noise barrier did not meet the noise reduction design goal of a 7 dB(A) reduction at any receptor, so no cost analysis was conducted.

<sup>9</sup> Noise barrier did not meet the feasibility requirement of a 5 dB(A) reduction at two or more receptors, so no cost analysis was conducted.

<sup>10</sup> Noise barrier exceeded cost reasonableness criteria of \$42,000/benefitted residence.

The predicted noise levels are shown in Appendix B and the receptor locations are shown on sheets 4 and 5 in the project aerials, located in Appendix C.

### 3.2.2 Single-Family Residences on Windjammer Rd, Turnpike Rd and Skyview Lane (CNE NB02)

Individual single-family residences on Windjammer Road, Turnpike Road and Skyview Lane (CNE NB02) are located on the northbound side of Florida's Turnpike approximately between stations 1160+00 and 1177+60. Seven NAC B receptors were added to the model to represent seven residential units. Of these seven receptors, noise levels at three receptors, representing three residential units, are predicted to approach or exceed the NAC for the Build condition in the design year (2045). The maximum predicted increase is 1.4 dB(A); therefore, no NB02 receptors are impacted by a 15 dB(A) substantial increase.

Noise barriers were evaluated for the single-family residences on Windjammer Road and Skyview Lane to abate roadway-related noise. Based on this evaluation, neither a noise barrier system consisting of a 22-foot tall noise barrier located along the northbound ROW, nor a 14-foot tall noise barrier located along the northbound roadway shoulder could meet the noise reduction design goal of over 7 dB(A) reduction for any of the three impacted residences. Therefore, noise barriers are not a reasonable method to abate roadway-related noise impacts for these single-family residences on Windjammer Road, Turnpike Road and Skyview Lane (CNE NB02). **Table 3-2** summarizes the various barrier configurations that were evaluated for CNE NB02.

**Table 3-2 – Noise Barrier Analysis Summary for CNE NB02**

Height (feet)	Length <sup>1</sup> (feet)	Location	No. of Impacts	Noise Reduction at Impacted Residences			Number of Benefited Residences				Impacted Res. Not Benefited <sup>4</sup>	Total Estimated Cost <sup>5</sup>	Cost per Benefited Residence
				5-5.9 dB(A)	6.0-6.9 dB(A)	> 7 dB(A)	Impacted <sup>2</sup>	Not Impacted <sup>3</sup>	Total	Average Reduction dB(A)			
14	2,000	SH <sup>6</sup>	3	0	0	0	0	0	0	N/A	3	N/A <sup>8,9</sup>	N/A <sup>8,9</sup>
22	2,000	ROW <sup>7</sup>	3	0	2	0	2	0	2	6.8	1	N/A <sup>8</sup>	N/A <sup>8</sup>

<sup>1</sup> Full height is for the length indicated. If a shoulder noise barrier location is indicated, the length of vertical height tapers at the shoulder barrier's terminus (See FDOT Standard Plans) would be in addition to the length indicated.

<sup>2</sup> Benefited residences with predicted noise levels that approach or exceed the NAC.

<sup>3</sup> Benefited residences with predicted noise levels that do not approach the NAC.

<sup>4</sup> Impacted residences that do not receive a minimum 5 dB(A) reduction from proposed noise barrier.

<sup>5</sup> Unit cost of \$30/ft<sup>2</sup>

<sup>6</sup> SH - Shoulder noise barrier on Florida's Turnpike.

<sup>7</sup> ROW – Right of Way noise barrier on Florida's Turnpike.

<sup>8</sup> Noise barrier did not meet the noise reduction design goal of a 7 dB(A) reduction at any receptor, so no cost analysis was conducted.

<sup>9</sup> Noise barrier did not meet the feasibility requirement of a 5 dB(A) reduction at two or more receptors, so no cost analysis was conducted.

The predicted noise levels are shown in Appendix B and the receptor locations are shown on sheet 6 in the project aerials, located in Appendix C.

### 3.2.3 Lake Montgomery Estates & Arrowtree Reserve (CNE NB03)

The Lake Montgomery Estates and Arrowtree Reserve (CNE NB03) neighborhoods as well as three single-family residences are located on the northbound side of Florida's Turnpike approximately between stations 1185+00 and 1245+50. Nine NAC B receptors were added to the model to represent nine residential units. Of these nine receptors, noise levels at three receptors, representing three residential units, are predicted to approach or exceed the NAC for the Build condition in the design year (2045). The maximum predicted increase is 1.2 dB(A); therefore, no NB03 receptors are impacted by a 15 dB(A) substantial increase.

Noise barriers were evaluated for the single-family residences, Montgomery Estates and Arrowtree Reserve to abate traffic related noise. Based on this evaluation, a potential noise barrier system located along the northbound ROW could provide a 7 dB(A) reduction at one or more receptors and a 5 dB(A) reduction at two or more impacted receptors. However, the evaluated noise barrier will exceed the allowable \$42,000 per benefited receptor. Therefore, construction of noise barriers is not a cost reasonable method to abate roadway-related noise impacts for the single-family residences and the residences within the neighborhoods of Montgomery Estates and Arrowtree Reserve (CNE NB03). **Table 3-3** summarizes the various barrier configurations that were evaluated for CNE NB03.

**Table 3-3 – Noise Barrier Analysis Summary for CNE NB03**

Height (feet)	Length <sup>1</sup> (feet)	Location	No. of Impacts	Noise Reduction at Impacted Residences			Number of Benefited Residences				Impacted Res. Not Benefited <sup>4</sup>	Total Estimated Cost <sup>5</sup>	Cost per Benefited Residence
				5-5.9 dB(A)	6.0-6.9 dB(A)	> 7 dB(A)	Impacted <sup>2</sup>	Not Impacted <sup>3</sup>	Total	Average Reduction dB(A)			
14	1600	SH <sup>6</sup>	3	0	0	0	0	0	0	N/A	3	N/A <sup>8,9</sup>	N/A <sup>8,9</sup>
20	1500	ROW <sup>7</sup>	3	1	1	0	2	0	2	6.0	1	N/A <sup>8</sup>	N/A <sup>8</sup>
22	1300	ROW <sup>7</sup>	3	1	1	0	2	0	2	6.3	1	N/A <sup>8</sup>	N/A <sup>8</sup>
22	1500	ROW <sup>7</sup>	3	2	0	1	3	0	3	5.9	0	\$990,000 <sup>10</sup>	\$330,000 <sup>10</sup>

<sup>1</sup> Full height is for the length indicated. If a shoulder noise barrier location is indicated, the length of vertical height tapers at the shoulder barrier's terminus (See FDOT Standard Plans) would be in addition to the length indicated.

<sup>2</sup> Benefited residences with predicted noise levels that approach or exceed the NAC.

<sup>3</sup> Benefited residences with predicted noise levels that do not approach the NAC.

<sup>4</sup> Impacted residences that do not receive a minimum 5 dB(A) reduction from proposed noise barrier.

<sup>5</sup> Unit cost of \$30/ft<sup>2</sup>

<sup>6</sup> SH - Shoulder noise barrier on Florida's Turnpike.

<sup>7</sup> ROW – Right of Way noise barrier on Florida's Turnpike.

<sup>8</sup> Noise barrier did not meet the noise reduction design goal of a 7 dB(A) reduction at any receptor, so no cost analysis was conducted.

<sup>9</sup> Noise barrier did not meet the feasibility requirement of a 5 dB(A) reduction at two or more receptors, so no cost analysis was conducted.

<sup>10</sup> Noise barrier exceeded cost reasonableness criteria of \$42,000/benefitted residence.

The predicted noise levels are shown in Appendix B and the receptor locations are shown on sheets 7 and 8 in the project aerials located, in Appendix C.

### 3.2.4 Blue Spring Reserve and Blue Spring Reserve Townhomes (CNE NB04 & NB05)

The Blue Spring Reserve and Blue Spring Reserve Townhomes neighborhoods are located on the northbound side of Florida's Turnpike approximately between stations 1261+00 and 1313+00. During the PD&E Study noise analysis, receptors were modeled for both of these neighborhoods at parcels that at the time of the study did not have building permits secured, but could have received a building permit between the time of the noise study and the DPK. During the design phase, all parcels in these neighborhoods were reviewed for building permits. None of the parcels within the limits of the noise analysis, which extends approximately 1,000-feet from the edge of the outer travel lane of the Turnpike, met the DPK. There are existing residences in each of these neighborhoods that meet the DPK, but they are all located more than 1,500-feet away from the Turnpike, which are beyond the limits of the methodology for the noise analysis and are not visible in the limits of the aerial mapping.

These neighborhoods are shown on sheets 9 and 10 in the project aerials located, in Appendix C.

### 3.2.5 Single-Family Residence on State Road 19 (CNE NB06)

An isolated single-family residence on State Road 19 (SR 19) is located on the northbound side of Florida's Turnpike at approximately station 1315+40. One NAC B receptor was added to the model to represent one isolated residential unit. Noise levels at this isolated residence are not predicted to approach or exceed the NAC for the Build condition. The predicted change at the single receptor is -0.8 dB(A); therefore, no NB06 receptors are impacted by a 15 dB(A) substantial increase. Therefore, noise abatement was not considered for the isolated single-family residence on SR 19.

The predicted noise level is shown in Appendix B and the receptor location is shown on sheet 11 in the project aerials, located in Appendix C.

### 3.3 Residences on Southbound Side of Florida's Turnpike

#### 3.3.1 Single-Family Residences on CR 561 and Rhoden Road (CNE SB03)

Individual single-family residences on CR 561 and Rhoden Road (CNE SB03) are located on the southbound side of Florida's Turnpike approximately between stations 1136+00 and 1147+00. There were 11 NAC B receptors added to the model to represent 11 residential units. Of these 11 receptors, noise levels at eight of these receptors, representing eight residences, are expected to approach or exceed the NAC for the Build condition in the design year (2045). Noise levels are expected to decrease for all receptors in SB03. This decrease is likely due to a change in the vertical profile of the roadway and the construction of jersey barriers in this area, which will shield tire-pavement noise. Therefore, no SB03 receptors are impacted by a 15 dB(A) substantial increase.

Noise barriers were evaluated for the single-family residences on CR 561 and Rhoden Road to abate traffic related noise. Based on this evaluation, noise barriers could provide a 7 dB(A) reduction at one or more receptors and a 5 dB(A) reduction at two or more impacted receptors. However, the most cost-effective noise barrier evaluated will exceed the allowable \$42,000 per benefited receptor. Therefore, construction of noise barriers is not a cost reasonable method to abate roadway-related noise impacts for the single-family residences on CR 561 and Rhoden Road (CNE SB03). **Table 3-4** summarizes the various barrier configurations that were evaluated for CNE SB03.

**Table 3-4 – Noise Barrier Analysis Summary for CNE SB03**

Height (feet)	Length <sup>1</sup> (feet)	Location	No. of Impacts	Noise Reduction at Impacted Residences			Number of Benefited Residences				Impacted Res. Not Benefited <sup>4</sup>	Total Estimated Cost <sup>5</sup>	Cost per Benefited Residence
				5-5.9 dB(A)	6.0-6.9 dB(A)	> 7 dB(A)	Impacted <sup>2</sup>	Not Impacted <sup>3</sup>	Total	Average Reduction dB(A)			
12	1400	SH <sup>6</sup>	8	1	1	0	2	0	2	6.0	6	N/A <sup>8</sup>	N/A <sup>8</sup>
8	800												
14	1400	SH <sup>6</sup>	8	1	0	1	2	0	2	6.4	6	\$780,000 <sup>10</sup>	\$390,000 <sup>10</sup>
8	800	SH <sup>6</sup>											
20	600	ROW <sup>7</sup>	8	1	1	0	2	0	2	6.0	6	N/A <sup>8</sup>	N/A <sup>8</sup>
22	400	ROW <sup>7</sup>	8	1	0	0	1	0	1	5.4	7	N/A <sup>8,9</sup>	N/A <sup>8,9</sup>
22	600	ROW <sup>7</sup>	8	1	0	1	2	0	2	6.5	6	\$396,000 <sup>10</sup>	\$198,000 <sup>10</sup>
22	1230	ROW <sup>7</sup>	8	0	1	1	2	0	2	6.0	6	\$1,273,800 <sup>10</sup>	\$636,900 <sup>10</sup>
22	700	ROW <sup>7</sup>											

<sup>1</sup> Full height is for the length indicated. If a shoulder noise barrier location is indicated, the length of vertical height tapers at the shoulder barrier's terminus (See FDOT Standard Plans) would be in addition to the length indicated.

<sup>2</sup> Benefited residences with predicted noise levels that approach or exceed the NAC.

<sup>3</sup> Benefited residences with predicted noise levels that do not approach the NAC.

<sup>4</sup> Impacted residences that do not receive a minimum 5 dB(A) reduction from proposed noise barrier.

<sup>5</sup> Unit cost of \$30/ft<sup>2</sup>

<sup>6</sup> SH - Shoulder noise barrier on Florida's Turnpike.

<sup>7</sup> ROW – Right of Way noise barrier on Florida's Turnpike.

<sup>8</sup> Noise barrier did not meet the noise reduction design goal of a 7 dB(A) reduction at any receptor, so no cost analysis was conducted.

<sup>9</sup> Noise barrier did not meet the feasibility requirement of a 5 dB(A) reduction at two or more receptors, so no cost analysis was conducted.

<sup>10</sup> Noise barrier exceeded cost reasonableness criteria of \$42,000/benefitted residence.

The predicted noise levels are shown in Appendix B and the receptor locations are shown on sheet 5 in the project aerials, located in Appendix C.

### 3.3.2 Single-Family Residences on Causey Road (CNE SB04)

Individual single-family residences (CNE SB04) are located on the southbound side of Florida's Turnpike approximately between stations 1159+00 and 1172+00. Four NAC B receptors were added to the model to represent four residential units. Of these four receptors, noise levels at two of these receptors, representing two residences are expected to approach or exceed the NAC for the Build condition in the design year (2045). Noise levels are expected to decrease for all receptors in SB04. This decrease is likely due to changes in the vertical profile of the roadway and the construction of jersey barriers in this area which will shield tire-pavement noise. Therefore, no SB04 receptors are impacted by a 15 dB(A) substantial increase.

Noise barriers were evaluated for these single-family residences on Causey Road to abate roadway-related noise. Based on this evaluation, neither a noise barrier system consisting of a 22-foot tall noise

barrier located along the southbound ROW, nor a 14-foot tall noise barrier located along the southbound roadway shoulder could meet the design goal of over 7 dB(A) reduction for any of the two impacted residences. Therefore, noise barriers are not a reasonable method to abate roadway-related noise impacts for these single-family residences (CNE SB04). **Table 3-5** summarizes the various barrier configurations that were evaluated for CNE SB04.

**Table 3-5 – Noise Barrier Analysis Summary for CNE SB04**

Height (feet)	Length <sup>1</sup> (feet)	Location	No. of Impacts	Noise Reduction at Impacted Residences			Number of Benefited Residences				Impacted Res. Not Benefited <sup>4</sup>	Total Estimated Cost <sup>5</sup>	Cost per Benefited Residence
				5-5.9 dB(A)	6.0-6.9 dB(A)	> 7 dB(A)	Impacted <sup>2</sup>	Not Impacted <sup>3</sup>	Total	Average Reduction dB(A)			
14	2000	SH <sup>6</sup>	2	2	0	0	2	0	2	5.4	0	N/A <sup>8</sup>	N/A <sup>8</sup>
8	1100			0	0	0	0	0	0	0	0	0	N/A <sup>8</sup>
22	2000	ROW <sup>7</sup>	2	0	1	0	1	0	1	6.3	1	N/A <sup>8,9</sup>	N/A <sup>8,9</sup>

<sup>1</sup> Full height is for the length indicated. If a shoulder noise barrier location is indicated, the length of vertical height tapers at the shoulder barrier's terminus (See FDOT Standard Plans) would be in addition to the length indicated.

<sup>2</sup> Benefited residences with predicted noise levels that approach or exceed the NAC.

<sup>3</sup> Benefited residences with predicted noise levels that do not approach the NAC.

<sup>4</sup> Impacted residences that do not receive a minimum 5 dB(A) reduction from proposed noise barrier.

<sup>5</sup> Unit cost of \$30/ft<sup>2</sup>

<sup>6</sup> SH - Shoulder noise barrier on Florida's Turnpike.

<sup>7</sup> ROW – Right of Way noise barrier on Florida's Turnpike.

<sup>8</sup> Noise barrier did not meet the noise reduction design goal of a 7 dB(A) reduction at any receptor, so no cost analysis was conducted.

<sup>9</sup> Noise barrier did not meet the feasibility requirement of a 5 dB(A) reduction at two or more receptors, so no cost analysis was conducted.

The predicted noise levels are shown in Appendix B and the receptor locations are shown on sheet 6 in the project aerials, located in Appendix C.

### 3.3.3 Bee's RV Resort (SB05)

Bee's RV Resort (CNE SB05) is located on the southbound side of Florida's Turnpike approximately between stations 1285+00 and 1295+60. There were 50 NAC B receptors added to the model to represent 50 residential units. Of these 50 receptors, noise levels at nine of these receptors, representing nine residences are expected to approach or exceed the NAC for the Build condition in the design year (2045). Noise levels are expected to remain within a decibel of existing levels or decrease slightly for all receptors in SB05. Predicted decreases are likely due to a change in the vertical profile of the roadway and the construction of jersey barriers in this area which will shield tire-pavement noise. Therefore, no SB05 receptors are impacted by a 15 dB(A) substantial increase.

Noise barriers were evaluated for the residences at Bee's RV Resort to abate roadway-related noise. Based on this evaluation, neither a noise barrier system consisting of a 22-foot tall noise barrier located along the southbound ROW, nor a 14-foot tall noise barrier located along the southbound roadway shoulder could meet the design goal of over 7 dB(A) reduction for any of the nine impacted residences. Therefore, noise barriers are not a reasonable method to abate roadway-related noise impacts for the residences at Bee's RV Resort (CNE SB05). **Table 3-6** summarizes the various barrier configurations that were evaluated for CNE SB05.

**Table 3-6 – Noise Barrier Analysis Summary for CNE SB05**

Height (feet)	Length <sup>1</sup> (feet)	Location	No. of Impacts	Noise Reduction at Impacted Residences			Number of Benefited Residences				Impacted Res. Not Benefited <sup>4</sup>	Total Estimated Cost <sup>5</sup>	Cost per Benefited Residence
				5-5.9 dB(A)	6.0-6.9 dB(A)	> 7 dB(A)	Impacted <sup>2</sup>	Not Impacted <sup>3</sup>	Total	Average Reduction dB(A)			
14	2000	SH <sup>6</sup>	9	1	8	0	9	14	23	6.3	0	N/A <sup>8</sup>	N/A <sup>8</sup>
8	2000												
22	2000	ROW <sup>7</sup>	9	8	0	0	8	0	8	5.2	1	N/A <sup>8</sup>	N/A <sup>8</sup>

<sup>1</sup> Full height is for the length indicated. If a shoulder noise barrier location is indicated, the length of vertical height tapers at the shoulder barrier's terminus (See FDOT Standard Plans) would be in addition to the length indicated.

<sup>2</sup> Benefited residences with predicted noise levels that approach or exceed the NAC.

<sup>3</sup> Benefited residences with predicted noise levels that do not approach the NAC.

<sup>4</sup> Impacted residences that do not receive a minimum 5 dB(A) reduction from proposed noise barrier.

<sup>5</sup> Unit cost of \$30/ft<sup>2</sup>

<sup>6</sup> SH - Shoulder noise barrier on Florida's Turnpike.

<sup>7</sup> ROW – Right of Way noise barrier on Florida's Turnpike.

<sup>8</sup> Noise barrier did not meet the noise reduction design goal of a 7 dB(A) reduction at any receptor, so no cost analysis was conducted.

The predicted noise levels are shown in Appendix B and the receptor locations are shown on sheet 10 in the project aerials, located in Appendix C.

### 3.3.4 Single Family Residence on SR 19 (CNE SB06)

An isolated single-family residence on SR 19 is located on the southbound side of Florida's Turnpike at approximately station 1316+80. One NAC B receptor was added to the model to represent one isolated residential unit. At this isolated receptor, noise levels are expected to approach or exceed the NAC for the Build condition in the design year (2045).

Noise levels at the residence are expected to decrease by 2.4 dB(A) in the design year. This decrease is likely due to changes in the vertical profile of the Turnpike roadway and the construction of jersey barriers in this area which will shield tire-pavement noise. Therefore, the SB06 receptor is not impacted by a 15 dB(A) substantial increase. Because a minimum of two impacted noise sensitive locations must be benefitted for noise abatement to be feasible, noise abatement was not considered for the isolated single-family residence on SR 19.

The predicted noise levels are shown in Appendix B and the receptor location is shown on sheet 11 in the project aerials, located in Appendix C.

### 3.3.5 Single-Family Residence (CNE SB07)

An isolated single-family residence is located on the southbound side of Florida's Turnpike at approximately station 1455+00. Noise levels at this isolated residence were analyzed in the PD&E Study phase and were not predicted to approach or exceed the NAC (60.4 dB(A)) for the Build condition in the design year (2045). Noise levels in the PD&E Study were predicted to increase, but only by 0.8 dB(A). Therefore no SB07 receptors are impacted by a 15 dB(A) substantial increase. Because the roadway design has not substantially changed in this area since the PD&E Study, this location was not re-modeled

during the design phase. In addition, because a minimum of two impacted noise sensitive locations must be benefitted for noise abatement to be feasible, noise abatement was not considered for this isolated single-family residence.

The receptor location is shown on sheet 15 in the project aerials located, in Appendix C and the predicted noise levels are shown in Appendix B.

### 3.3.6 South Lake Hospital ER- Blue Cedar (CNE SB08)

A new hospital is being constructed on the southbound side of Florida's Turnpike at approximately station 1505+00. This site was vacant at the time of the PD&E Study and associated noise analysis. During the design phase, a review of building permits for the hospital found that a permit was issued May 22, 2018. Therefore, it does not meet the DPK, and was not included in the noise analysis.

The location of the hospital parcel is shown on sheet 17 in the project aerials located in Appendix C.

## 4.0 CONCLUSIONS

Noise levels at 34 residences are predicted to approach or exceed the Noise Abatement Criteria (NAC) [i.e., 66 dB(A) for Activity Category B] established by the FHWA for the Build condition. No noise sensitive sites are expected to experience a substantial increase of 15 dB(A) in traffic noise compared to existing conditions.

Noise barriers were evaluated for the impacted noise sensitive sites. The results of the noise barrier evaluations conclude that noise barriers are not a feasible and/or reasonable method to abate roadway-related noise impacts for any of the 34 impacted residences.

## 5.0 CONSTRUCTION NOISE AND VIBRATION

During the construction phase of the proposed project, short-term noise may be generated by stationary and mobile construction equipment. The construction noise will be temporary at any location and will be controlled by adherence to the most recent edition of FDOT's Standard Specifications for Road and Bridge Construction<sup>4</sup>.

Using the listing of sensitive sites found in FDOT's Project Development and Environment Manual, residences were identified as the only land use potentially sensitive to vibration that could occur during construction. If during final design it is determined that measures to control vibration are necessary, the project's construction provisions can be modified as needed.

## 6.0 PUBLIC INVOLVEMENT

To promote compatibility between land use planning and Florida's Turnpike, the distance between the edge of Florida's Turnpike outside travel lane and the point where the roadway related noise is predicted to reach the NAC for each activity category was estimated. These estimates are referred to as

noise contours and are shown in Appendix D. These estimates provide the general distance at which the noise approaches or exceeds the NAC for each activity type.

The public information meeting for this project has not been held, the rest of this section will be added after the public comment period.

## 7.0 REFERENCES

1. *23 CFR Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise*; Federal Highway Administration; Tallahassee, Florida; July 2010.
2. *Project Development and Environment Manual; Part 2, Chapter 18, Florida Department of Transportation*; Tallahassee, Florida; January 2019.
3. *FDOT Design Manual; Part 2, Chapter 264, Florida Department of Transportation*; Tallahassee, Florida; January 2019.
4. *Standard Specifications for Road and Bridge Construction*; Florida Department of Transportation; Tallahassee, Florida; July 2017.

# **Appendix A**

## **Traffic Data**

**435786-1 - Widen Florida's Turnpike (SR 91) from Minneola (MP 279) to Leesburg North (MP 289.3)  
Noise Analysis Traffic Data  
2019 Existing Conditions**

Florida's Turnpike Mainline													
Mainline Segment	Number of Lanes	AADT	LOS C AADT	Peak Hour Peak Direction	LOS C Peak Hour Peak Direction	Design Hr. % Trucks	Design Hr. % MT	Design Hr. % HT	Design Hr. % Buses	Design Hr. % Motorcycles	Standard K-factor	D-factor	Posted Speed (mph)
<b>Florida's Turnpike (SR 91)</b>													
North of Leesburg North (MP 289)	4	53,200	44,600	2,090	2,560	8.10%	1.34%	6.51%	0.26%	0.02%	10.0%	57.4%	70
From Leesburg North (MP 289) to Leesburg South (MP 285)	4	47,100	44,600	1,775	2,560	8.10%	1.34%	6.51%	0.26%	0.02%	10.0%	57.4%	70
From Leesburg South (MP 285) to Minneola (MP 279)	4	60,300	53,600	2,275	3,080	8.10%	1.34%	6.51%	0.26%	0.02%	10.0%	57.4%	70
South of Minneola (MP 279)	4	69,900	53,600	3,162	3,080	8.10%	1.34%	6.51%	0.26%	0.02%	10.0%	57.4%	70
<b>Florida's Turnpike Ramps</b>													
Interchange Ramp	Number of Lanes	One-Way AADT	One-Way LOS C AADT	Peak Hour Peak Direction	LOS C Peak Hour Peak Direction	Design Hr. % Trucks	Design Hr. % MT	Design Hr. % HT	Design Hr. % Buses	Design Hr. % Motorcycles	K-factor	D-factor	Posted Speed (mph)
<b>Leesburg North/U.S. 27 (MP 289)</b>													
Northbound On-ramp	1	3,050	11,700	207	1,260	8.05%	4.61%	3.15%	0.30%	0.13%	10.0%	53.7%	45
Southbound Off-ramp	1	3,050	11,700	315	1,260	8.05%	4.61%	3.15%	0.30%	0.13%	10.0%	53.7%	45
<b>Leesburg South/U.S. 27 (MP 285)</b>													
Northbound Off-ramp	1	6,600	12,100	703	1,380	6.54%	3.69%	2.55%	0.30%	0.11%	9.2%	62.0%	25
Southbound On-ramp	1	6,600	12,400	738	1,420	6.54%	3.69%	2.55%	0.30%	0.11%	9.2%	62.0%	45
<b>Minneola (MP 279)</b>													
Northbound On-ramp	1	800	14,900	82	1,420	3.35%	0.55%	2.66%	0.14%	0.07%	9.0%	52.9%	45
Southbound Off-ramp	1	800	14,900	89	1,420	3.35%	0.55%	2.66%	0.14%	0.07%	9.0%	52.9%	45
Northbound Off-ramp	2	5,600	19,900	1,053	2,840	3.35%	0.55%	2.66%	0.14%	0.07%	9.7%	73.6%	45
Southbound On-ramp	1	5,600	10,000	872	1,420	3.35%	0.55%	2.66%	0.14%	0.07%	9.7%	73.6%	45
<b>Arterials</b>													
Arterial Segment	Number of Lanes	AADT	LOS C AADT	Peak Hour Peak Direction	LOS C Peak Hour Peak Direction	Design Hr. % Trucks	Design Hr. % MT	Design Hr. % HT	Design Hr. % Buses	Design Hr. % Motorcycles	K-factor	D-factor	Posted Speed (mph)
U.S. 27 (MP 289)	4	27,900	30,800	1,349	1,490	8.05%	4.61%	3.15%	0.30%	0.13%	9.0%	53.7%	55
S.R. 19 (MP 285)	2	12,700	11,200	607	536	3.35%	0.55%	2.66%	0.14%	0.07%	9.0%	53.1%	55
C.R. 561 (MP 282)	2	7,000	12,200	335	581	3.35%	0.55%	2.66%	0.14%	0.07%	9.0%	53.1%	45

(1) Number of lanes were obtained from the aerial maps and design layouts.

(2) Traffic data was obtained from the traffic data developed for the project.

(3) Peak hour demand and LOS C Peak Hour maximum service volumes are provided directionally.

(4) LOS C targets were based on the the 2013 FDOT Quality and LOS Handbook, and adjusted for local conditions.

(5) LOS C AADTs were estimated using K and D factors and the design hour peak direction LOS C maximum service volumes.

(6) Florida's Turnpike mainline and tolled ramps design hour truck percentages are based on toll data. Truck percentages for non-tolled ramps are based on applicable adjacent toll data. Truck percentages for arterials were estimated from counts and distributed based on class data from the Florida Traffic Online Application. The medium vehicle classifications listed here make a distinction between medium trucks and buses.

(7) Posted speed data was obtained from field observations

**435786-1 - Widen Florida's Turnpike (SR 91) from Minneola (MP 279) to Leesburg North (MP 289.3)  
Noise Analysis Traffic Data  
2045 Build Conditions**

Florida's Turnpike Mainline													
Mainline Segment	Number of Lanes	AADT	LOS C AADT	Peak Hour Peak Direction	LOS C Peak Hour Peak Direction	Design Hr. % Trucks	Design Hr. % MT	Design Hr. % HT	Design Hr. % Buses	Design Hr. % Motorcycles	Standard K-factor	D-factor	Posted Speed (mph)
<b>Florida's Turnpike (SR 91)</b>													
North of Leesburg North (MP 289)	8	117,300	89,100	5,300	5,120	8.10%	1.34%	6.51%	0.26%	0.02%	10.0%	57.4%	70
From Leesburg North (MP 289) to Leesburg South (MP 285)	8	109,600	89,100	5,050	5,120	8.10%	1.34%	6.51%	0.26%	0.02%	10.0%	57.4%	70
From Leesburg South (MP 285) to Minneola (MP 279)	8	123,600	107,200	5,560	6,160	8.10%	1.34%	6.51%	0.26%	0.02%	10.0%	57.4%	70
South of Minneola (MP 279)	8	142,200	107,200	6,350	6,160	8.10%	1.34%	6.51%	0.26%	0.02%	10.0%	57.4%	70
<b>Florida's Turnpike Ramps</b>													
Interchange Ramp	Number of Lanes	One-Way AADT	One-Way LOS C AADT	Peak Hour Peak Direction	LOS C Peak Hour Peak Direction	Design Hr. % Trucks	Design Hr. % MT	Design Hr. % HT	Design Hr. % Buses	Design Hr. % Motorcycles	K-factor	D-factor	Posted Speed (mph)
<b>Leesburg North/U.S. 27 (MP 289)</b>													
Northbound On-ramp	1	3,850	11,700	520	1,260	8.05%	4.61%	3.15%	0.30%	0.13%	10.0%	53.7%	45
Southbound Off-ramp	1	3,850	11,700	520	1,260	8.05%	4.61%	3.15%	0.30%	0.13%	10.0%	53.7%	45
<b>Leesburg South/U.S. 27 (MP 285)</b>													
Northbound On-ramp	1	2,300	12,100	310	1,380	6.54%	3.69%	2.55%	0.30%	0.11%	9.2%	62.0%	25
Southbound Off-ramp	1	2,300	12,400	310	1,420	6.54%	3.69%	2.55%	0.30%	0.11%	9.2%	62.0%	45
Northbound Off-ramp	1	9,300	12,100	1,000	1,380	6.54%	3.69%	2.55%	0.30%	0.11%	9.2%	62.0%	25
Southbound On-ramp	1	9,300	12,400	1,000	1,420	6.54%	3.69%	2.55%	0.30%	0.11%	9.2%	62.0%	45
<b>Minneola (MP 279)</b>													
Northbound On-ramp	1	4,400	14,900	490	1,420	3.35%	0.55%	2.66%	0.14%	0.07%	9.0%	52.9%	45
Southbound Off-ramp	1	4,400	14,900	490	1,420	3.35%	0.55%	2.66%	0.14%	0.07%	9.0%	52.9%	45
Northbound Off-ramp	2	13,700	19,900	1,620	2,840	3.35%	0.55%	2.66%	0.14%	0.07%	9.7%	73.6%	45
Southbound On-ramp	1	13,700	10,000	1,620	1,420	3.35%	0.55%	2.66%	0.14%	0.07%	9.7%	73.6%	45
<b>Arterials</b>													
Arterial Segment	Number of Lanes	AADT	LOS C AADT	Peak Hour Peak Direction	LOS C Peak Hour Peak Direction	Design Hr. % Trucks	Design Hr. % MT	Design Hr. % HT	Design Hr. % Buses	Design Hr. % Motorcycles	K-factor	D-factor	Posted Speed (mph)
U.S. 27 (MP 289)	4	51,000	30,800	2,465	1,490	8.05%	4.61%	3.15%	0.30%	0.13%	9.0%	53.7%	55
S.R. 19 (MP 285)	2	18,200	11,200	870	536	3.35%	0.55%	2.66%	0.14%	0.07%	9.0%	53.1%	55
C.R. 561 (MP 282)	2	9,800	12,200	469	581	3.35%	0.55%	2.66%	0.14%	0.07%	9.0%	53.1%	45

(1) Number of lanes were obtained from the aerial maps and design layouts.

(2) Traffic data was obtained from the traffic data developed for the project.

(3) Peak hour demand and LOS C Peak Hour maximum service volumes are provided directionally.

(4) LOS C targets were based on the the 2013 FDOT Quality and LOS Handbook, and adjusted for local conditions.

(5) LOS C AADTs were estimated using K and D factors and the design hour peak direction LOS C maximum service volumes.

(6) Florida's Turnpike mainline and tolled ramps design hour truck percentages are based on toll data. Truck percentages for non-tolled ramps are based on applicable adjacent toll data. Truck percentages for arterials were estimated from counts and distributed based on class data from the Florida Traffic Online Application. The medium vehicle classifications listed here make a distinction between medium trucks and buses.

(7) Posted speed data was obtained from field observations

# **Appendix B**

## **Predicted Noise Levels**

## Appendix B Predicted Noise Levels

Common Noise Environment (CNE)	Rec. Point	No. of Units	NAC	NAC Criteria (dBA)	FDOT Criteria (dBA)	2019 Existing LAeq1h (dBA)	2045 Build LAeq1h (dBA)	NAC Approach or Exceeded	Subst. Increase (>15dB(A))	Description
<b>XX.X</b>	Impacted Receptor									
<b>XX.X</b>	Values from PD&E Noise Study									
NB01	RNB01-001	1	B	67	66	70.2	<b>69.6</b>	Yes	No	Lake Shepherd Shores
NB01	RNB01-002	1	B	67	66	63.9	64.0	No	No	Lake Shepherd Shores
NB01	RNB01-003	1	B	67	66	65.2	65.0	No	No	Lake Shepherd Shores
NB01	RNB01-004	1	B	67	66	65.9	65.6	No	No	Lake Shepherd Shores
NB01	RNB01-005	1	B	67	66	62.8	63.5	No	No	Lake Shepherd Shores
NB01	RNB01-006	1	B	67	66	64.7	65.3	No	No	Lake Shepherd Shores
NB01	RNB01-007	1	B	67	66	72.9	<b>70.5</b>	Yes	No	Lake Shepherd Shores
NB01	RNB01-008	1	B	67	66	68.2	<b>67.3</b>	Yes	No	Lake Shepherd Shores
NB01	RNB01-009	1	B	67	66	66.3	<b>66.5</b>	Yes	No	Lake Shepherd Shores
NB01	RNB01-010	1	B	67	66	69.0	<b>68.7</b>	Yes	No	Lake Shepherd Shores
NB01	RNB01-011	1	B	67	66	69.7	<b>69.6</b>	Yes	No	Lake Shepherd Shores
NB01	RNB01-012	1	B	67	66	75.2	<b>72.8</b>	Yes	No	Lake Shepherd Shores
NB01	RNB01-013	1	B	67	66	76.2	<b>74.1</b>	Yes	No	Lake Shepherd Shores
NB02	RNB02-001	1	B	67	66	63.7	64.9	No	No	Single-Family Residence (SFR)
NB02	RNB02-002	1	B	67	66	64.8	<b>66.2</b>	Yes	No	SFR
NB02	RNB02-003	1	B	67	66	68.6	<b>68.6</b>	Yes	No	SFR
NB02	RNB02-004	1	B	67	66	59.8	60.7	No	No	SFR
NB02	RNB02-005	1	B	67	66	67.5	<b>68.0</b>	Yes	No	SFR
NB02	RNB02-006	1	B	67	66	59.0	59.3	No	No	SFR
NB02	RNB02-007	1	B	67	66	58.2	58.7	No	No	SFR
NB03	RNB03-001	1	B	67	66	64.5	64.9	No	No	Lake Montgomery Estates
NB03	RNB03-002	1	B	67	66	64.9	65.8	No	No	Lake Montgomery Estates
NB03	RNB03-003	1	B	67	66	63.4	64.5	No	No	Lake Montgomery Estates
NB03	RNB03-004	1	B	67	66	61.4	62.6	No	No	Lake Montgomery Estates
NB03	RNB03-005	1	B	67	66	69.2	<b>70.1</b>	Yes	No	SFR
NB03	RNB03-006	1	B	67	66	71.5	<b>70.4</b>	Yes	No	SFR
NB03	RNB03-007	1	B	67	66	71.5	<b>72.2</b>	Yes	No	SFR
NB03	RNB03-008	1	B	67	66	59.1	59.9	No	No	Arrowtree Reserve
NB03	RNB03-009	1	B	67	66	57.8	58.8	No	No	Arrowtree Reserve
NB06	RNB06-001	1	B	67	66	65.2	64.4	No	No	SFR
SB03	RSB03-001	1	B	67	66	76.2	<b>71.5</b>	Yes	No	SFR
SB03	RSB03-002	1	B	67	66	73.5	<b>70.8</b>	Yes	No	SFR
SB03	RSB03-003	1	B	67	66	70.8	<b>69.3</b>	Yes	No	SFR
SB03	RSB03-004	1	B	67	66	69.5	<b>68.2</b>	Yes	No	SFR
SB03	RSB03-005	1	B	67	66	69.2	<b>67.7</b>	Yes	No	SFR
SB03	RSB03-006	1	B	67	66	67.1	<b>66.2</b>	Yes	No	SFR
SB03	RSB03-007	1	B	67	66	69.8	<b>68.9</b>	Yes	No	SFR
SB03	RSB03-008	1	B	67	66	65.7	65.2	No	No	SFR
SB03	RSB03-009	1	B	67	66	68.0	<b>67.3</b>	Yes	No	SFR
SB03	RSB03-010	1	B	67	66	65.4	65.1	No	No	SFR
SB03	RSB03-011	1	B	67	66	66.0	65.8	No	No	SFR
SB04	RSB04-001	1	B	67	66	64.3	63.9	No	No	SFR
SB04	RSB04-002	1	B	67	66	66.8	<b>66.6</b>	Yes	No	SFR
SB04	RSB04-003	1	B	67	66	62.7	62.5	No	No	SFR
SB04	RSB04-004	1	B	67	66	76.0	<b>69.6</b>	Yes	No	SFR
SB05	RSB05-001	1	B	67	66	61.7	61.7	No	No	Bee's RV Resort
SB05	RSB05-002	1	B	67	66	61.6	61.6	No	No	Bee's RV Resort
SB05	RSB05-003	1	B	67	66	61.4	61.4	No	No	Bee's RV Resort
SB05	RSB05-004	1	B	67	66	62.0	62.0	No	No	Bee's RV Resort
SB05	RSB05-005	1	B	67	66	61.9	61.8	No	No	Bee's RV Resort
SB05	RSB05-006	1	B	67	66	61.9	61.8	No	No	Bee's RV Resort
SB05	RSB05-007	1	B	67	66	64.4	64.2	No	No	Bee's RV Resort
SB05	RSB05-008	1	B	67	66	66.9	<b>66.4</b>	Yes	No	Bee's RV Resort
SB05	RSB05-009	1	B	67	66	66.8	<b>66.3</b>	Yes	No	Bee's RV Resort
SB05	RSB05-010	1	B	67	66	64.3	64.1	No	No	Bee's RV Resort
SB05	RSB05-011	1	B	67	66	60.6	60.4	No	No	Bee's RV Resort
SB05	RSB05-012	1	B	67	66	61.7	61.6	No	No	Bee's RV Resort
SB05	RSB05-013	1	B	67	66	59.7	59.4	No	No	Bee's RV Resort
SB05	RSB05-014	1	B	67	66	67.0	<b>66.5</b>	Yes	No	Bee's RV Resort
SB05	RSB05-015	1	B	67	66	61.8	61.7	No	No	Bee's RV Resort
SB05	RSB05-016	1	B	67	66	64.4	64.2	No	No	Bee's RV Resort
SB05	RSB05-017	1	B	67	66	59.6	59.3	No	No	Bee's RV Resort

## Appendix B Predicted Noise Levels

Common Noise Environment (CNE)	Rec. Point	No. of Units	NAC	NAC Criteria (dBA)	FDOT Criteria (dBA)	2019 Existing LAeq1h (dBA)	2045 Build LAeq1h (dBA)	NAC Approach or Exceeded	Subst. Increase (>15dB(A))	Description
<b>XX.X</b>	Impacted Receptor									
<b>XX.X</b>	Values from PD&E Noise Study									
SB05	RSB05-018	1	B	67	66	66.7	<b>66.2</b>	Yes	No	Bee's RV Resort
SB05	RSB05-019	1	B	67	66	61.8	61.6	No	No	Bee's RV Resort
SB05	RSB05-020	1	B	67	66	59.6	59.3	No	No	Bee's RV Resort
SB05	RSB05-021	1	B	67	66	64.1	64.0	No	No	Bee's RV Resort
SB05	RSB05-022	1	B	67	66	59.1	58.8	No	No	Bee's RV Resort
SB05	RSB05-023	1	B	67	66	67.3	<b>66.7</b>	Yes	No	Bee's RV Resort
SB05	RSB05-024	1	B	67	66	64.3	64.1	No	No	Bee's RV Resort
SB05	RSB05-025	1	B	67	66	61.9	61.8	No	No	Bee's RV Resort
SB05	RSB05-026	1	B	67	66	59.3	58.9	No	No	Bee's RV Resort
SB05	RSB05-027	1	B	67	66	66.5	<b>66.0</b>	Yes	No	Bee's RV Resort
SB05	RSB05-028	1	B	67	66	66.8	<b>66.3</b>	Yes	No	Bee's RV Resort
SB05	RSB05-029	1	B	67	66	59.9	59.6	No	No	Bee's RV Resort
SB05	RSB05-030	1	B	67	66	61.8	61.7	No	No	Bee's RV Resort
SB05	RSB05-031	1	B	67	66	64.4	64.2	No	No	Bee's RV Resort
SB05	RSB05-032	1	B	67	66	62.6	62.5	No	No	Bee's RV Resort
SB05	RSB05-033	1	B	67	66	67.0	<b>66.4</b>	Yes	No	Bee's RV Resort
SB05	RSB05-034	1	B	67	66	61.5	61.5	No	No	Bee's RV Resort
SB05	RSB05-035	1	B	67	66	64.1	63.7	No	No	Bee's RV Resort
SB05	RSB05-036	1	B	67	66	63.1	62.9	No	No	Bee's RV Resort
SB05	RSB05-037	1	B	67	66	61.6	61.5	No	No	Bee's RV Resort
SB05	RSB05-038	1	B	67	66	62.9	62.6	No	No	Bee's RV Resort
SB05	RSB05-039	1	B	67	66	67.1	<b>66.5</b>	Yes	No	Bee's RV Resort
SB05	RSB05-040	1	B	67	66	62.3	62.1	No	No	Bee's RV Resort
SB05	RSB05-041	1	B	67	66	61.3	61.3	No	No	Bee's RV Resort
SB05	RSB05-042	1	B	67	66	65.4	65.0	No	No	Bee's RV Resort
SB05	RSB05-043	1	B	67	66	64.4	64.2	No	No	Bee's RV Resort
SB05	RSB05-044	1	B	67	66	60.6	60.5	No	No	Bee's RV Resort
SB05	RSB05-045	1	B	67	66	63.8	63.7	No	No	Bee's RV Resort
SB05	RSB05-046	1	B	67	66	62.5	62.3	No	No	Bee's RV Resort
SB05	RSB05-047	1	B	67	66	63.0	62.9	No	No	Bee's RV Resort
SB05	RSB05-048	1	B	67	66	60.9	60.9	No	No	Bee's RV Resort
SB05	RSB05-049	1	B	67	66	62.0	62.0	No	No	Bee's RV Resort
SB05	RSB05-050	1	B	67	66	61.3	61.3	No	No	Bee's RV Resort
SB06	RSB06-001	1	B	67	66	70.2	<b>67.8</b>	Yes	No	SFR
SB07	RSB07-001	1	B	67	66	<b>59.6</b>	<b>60.4</b>	No	No	SFR

**Appendix C**  
**Project Aerials**



Impacted Receptors	Existing ROW
Not Impacted Receptors	Common Noise Environment
Proposed ROW	Lake County Parcels

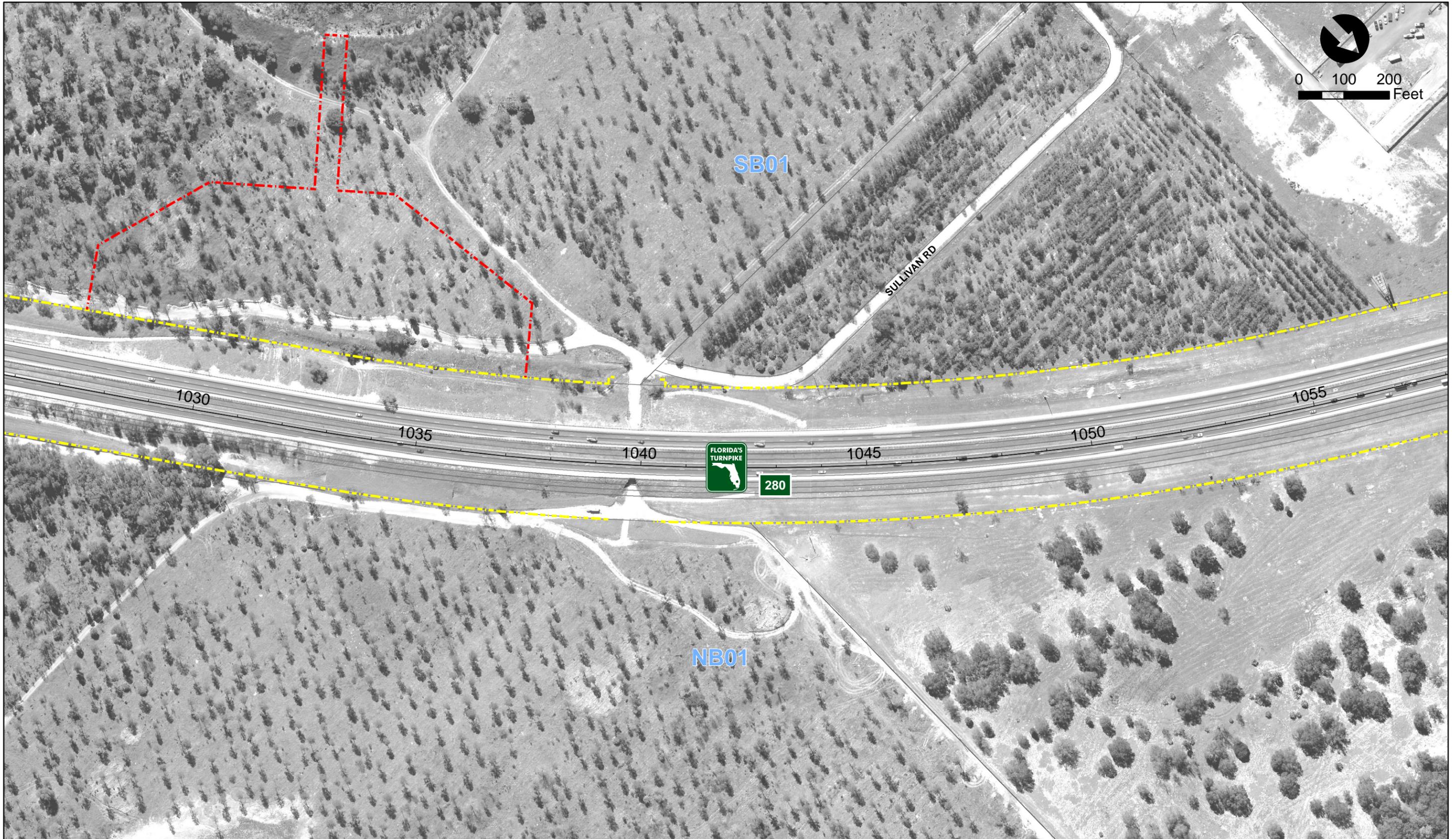
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to US 27 (Leesburg Interchange)*

*NOISE SPECIALIST*  
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<i>STATE OF FLORIDA</i>		
<i>DEPARTMENT OF TRANSPORTATION</i>		
<small>ROAD NO.</small>	<small>COUNTY</small>	<small>FINANCIAL PROJECT ID</small>
91	LAKE	435786-1-52-01

***NOISE STUDY REPORT  
PROJECT AERIALS***

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Impacted Receptors	Existing ROW
Not Impacted Receptors	Common Noise Environment
Proposed ROW	Lake County Parcels

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**NOISE STUDY REPORT  
PROJECT AERIALS**

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Impacted Receptors	Existing ROW
Not Impacted Receptors	Common Noise Environment
Proposed ROW	Lake County Parcels

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	Impacted Receptors		Existing ROW
	Not Impacted Receptors		Common Noise Environment
	Proposed ROW		Lake County Parcels

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***NOISE STUDY REPORT  
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	Impacted Receptors		Existing ROW
	Not Impacted Receptors		Common Noise Environment
	Proposed ROW		Lake County Parcels

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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
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**NOISE STUDY REPORT  
PROJECT AERIALS**

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	Impacted Receptors		Existing ROW
	Not Impacted Receptors		Common Noise Environment
	Proposed ROW		Lake County Parcels

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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
91	LAKE	435786-1-52-01

**NOISE STUDY REPORT  
PROJECT AERIALS**

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	Impacted Receptors		Existing ROW
	Not Impacted Receptors		Common Noise Environment
	Proposed ROW		Lake County Parcels

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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
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**NOISE STUDY REPORT  
PROJECT AERIALS**

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- ▲ Impacted Receptors
- ▲ Not Impacted Receptors
- - - Proposed ROW
- Existing ROW
- Common Noise Environment
- Lake County Parcels

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**NOISE STUDY REPORT  
PROJECT AERIALS**

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- ▲ Impacted Receptors
- ▲ Not Impacted Receptors
- - - Proposed ROW
- - - Existing ROW
- - - Common Noise Environment
- Lake County Parcels

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***NOISE STUDY REPORT  
PROJECT AERIALS***

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Impacted Receptors	Existing ROW
Not Impacted Receptors	Common Noise Environment
Proposed ROW	Lake County Parcels

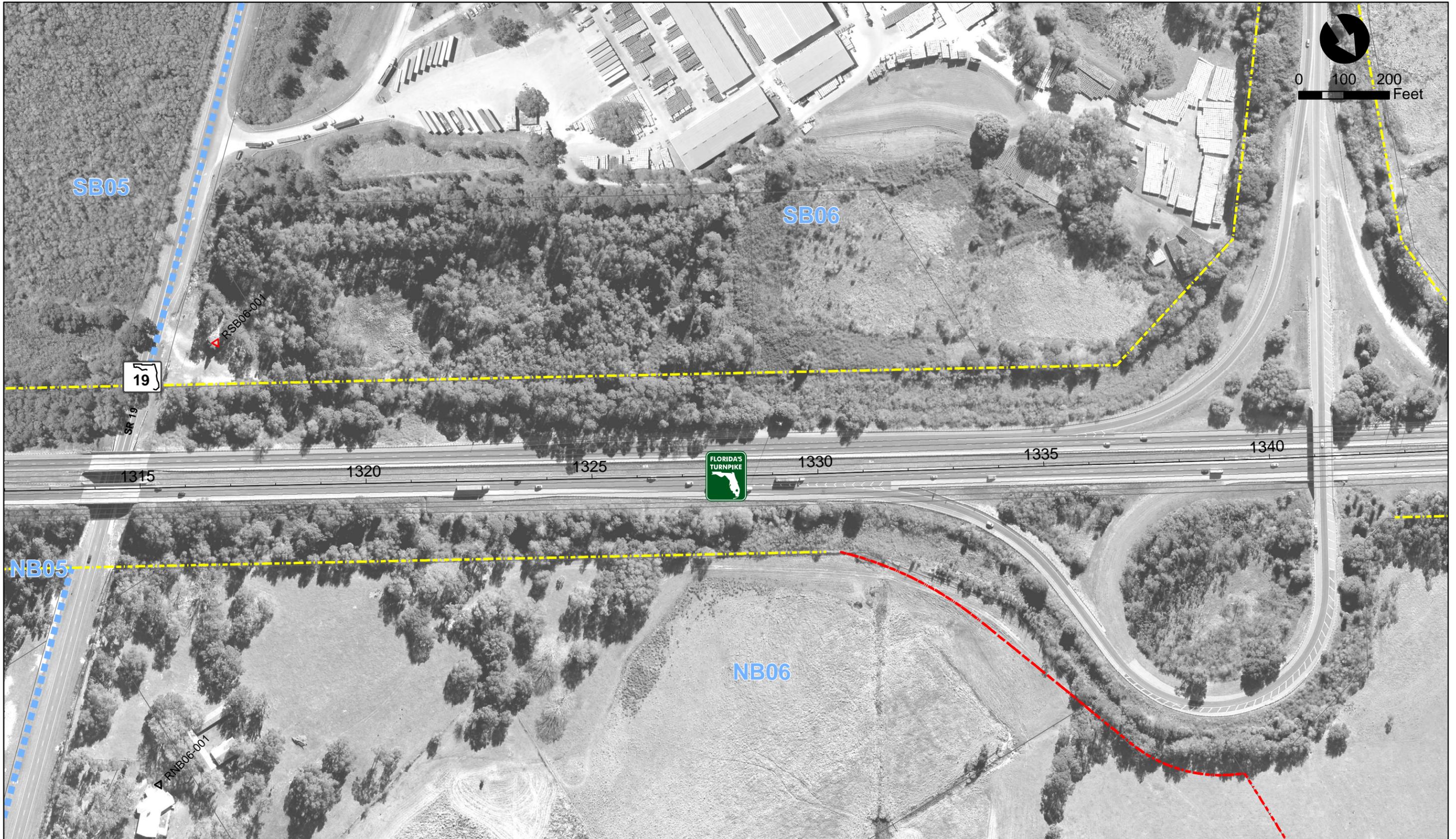
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PROJECT AERIALS**

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- ▲ Impacted Receptors
- ▲ Not Impacted Receptors
- Existing ROW
- Common Noise Environment
- Proposed ROW
- Lake County Parcels

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***NOISE STUDY REPORT  
PROJECT AERIALS***

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- ▲ Impacted Receptors
- - - Existing ROW
- ▲ Not Impacted Receptors
- Common Noise Environment
- - - Proposed ROW
- Lake County Parcels

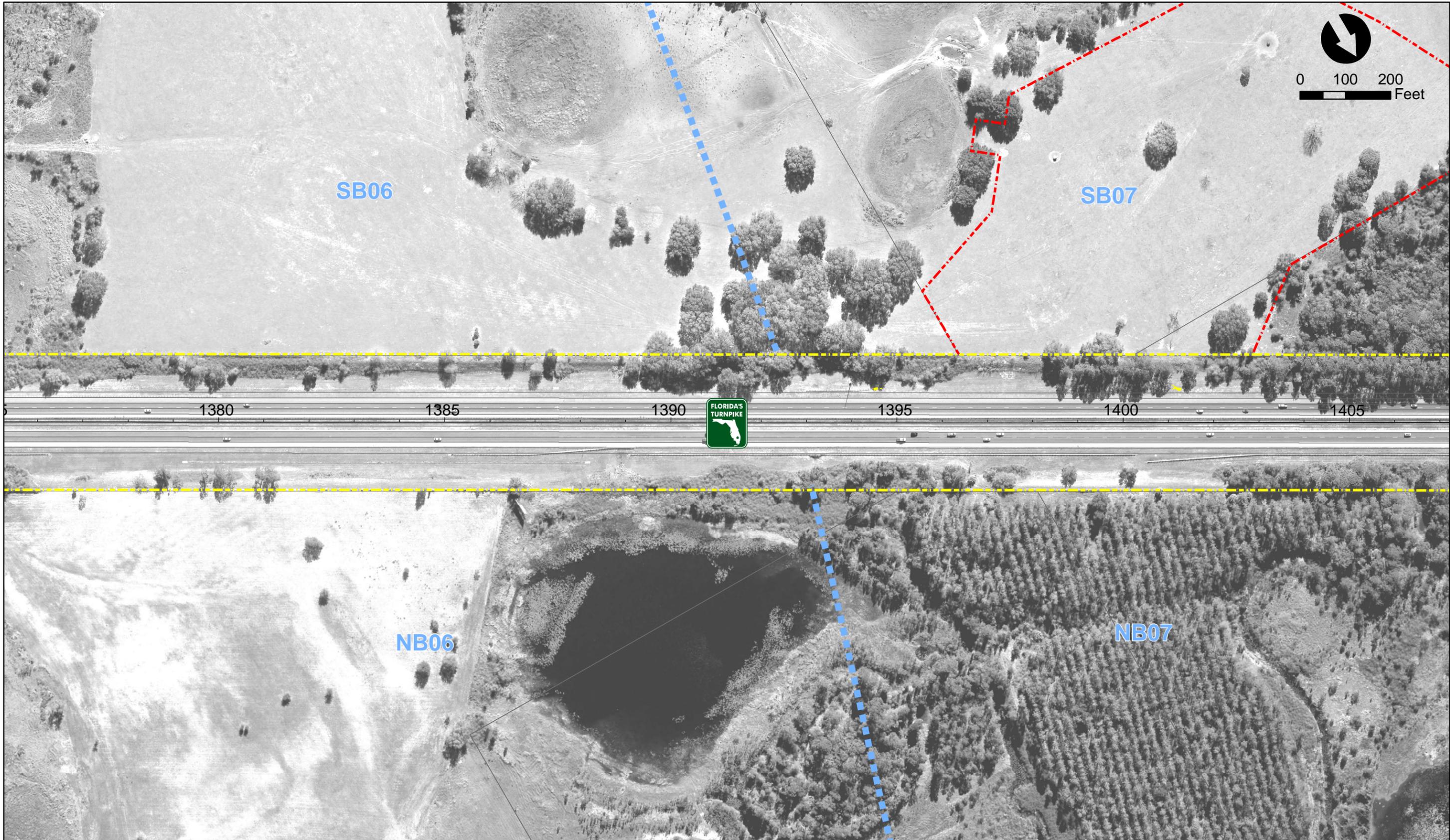
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***NOISE STUDY REPORT***  
***PROJECT AERIALS***

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- ▲ Impacted Receptors
- - - Existing ROW
- ▲ Not Impacted Receptors
- - - Common Noise Environment
- - - Proposed ROW
- Lake County Parcels

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91	LAKE	435786-1-52-01

**NOISE STUDY REPORT  
PROJECT AERIALS**

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- ▲ Impacted Receptors
- - - Existing ROW
- ▲ Not Impacted Receptors
- Common Noise Environment
- - - Proposed ROW
- Lake County Parcels

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***NOISE STUDY REPORT  
PROJECT AERIALS***

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- ▲ Impacted Receptors
- ▲ Not Impacted Receptors
- Proposed ROW
- Existing ROW
- Common Noise Environment
- Lake County Parcels

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**NOISE STUDY REPORT  
PROJECT AERIALS**

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- ▲ Impacted Receptors
- ▲ Not Impacted Receptors
- Proposed ROW
- Existing ROW
- Common Noise Environment
- Lake County Parcels

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**NOISE STUDY REPORT  
PROJECT AERIALS**

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Impacted Receptors	Existing ROW
Not Impacted Receptors	Common Noise Environment
Proposed ROW	Lake County Parcels

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***NOISE STUDY REPORT  
PROJECT AERIALS***

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▲ Impacted Receptors	--- Existing ROW
▲ Not Impacted Receptors	■ Common Noise Environment
--- Proposed ROW	□ Lake County Parcels

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P 407.971.8850

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
91	LAKE	435786-1-52-01

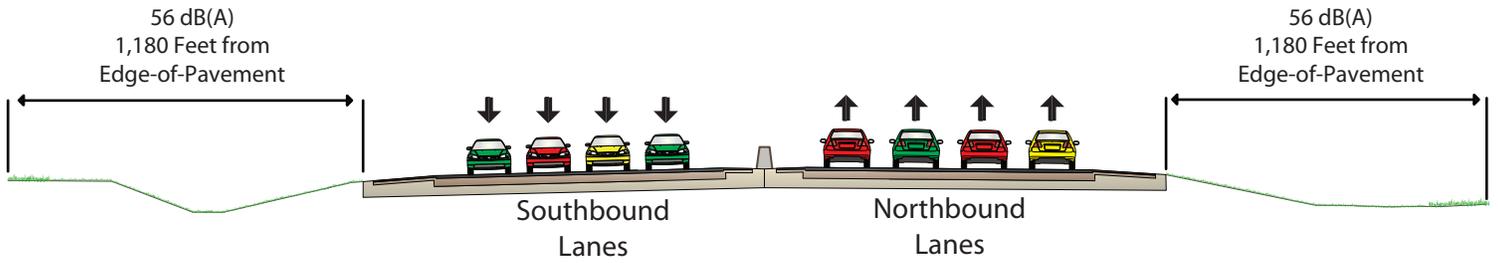
**NOISE STUDY REPORT  
PROJECT AERIALS**

**Sheet  
No.  
18**

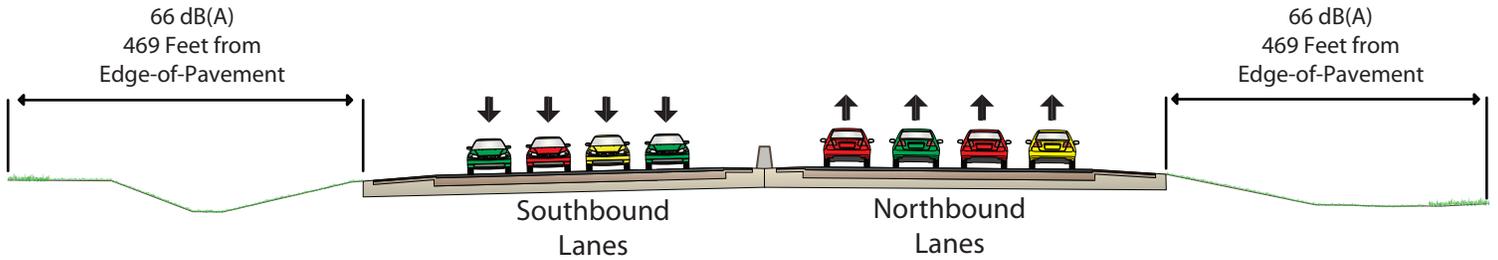
**Appendix D**  
**Project Noise Contours**

# Florida's Turnpike Noise Contours

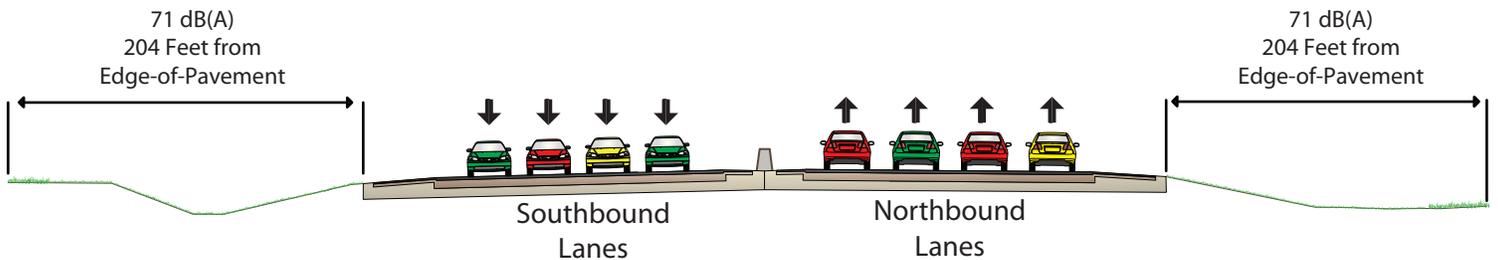
South of Leesburg South Interchange (MP 285)



Activity Category A



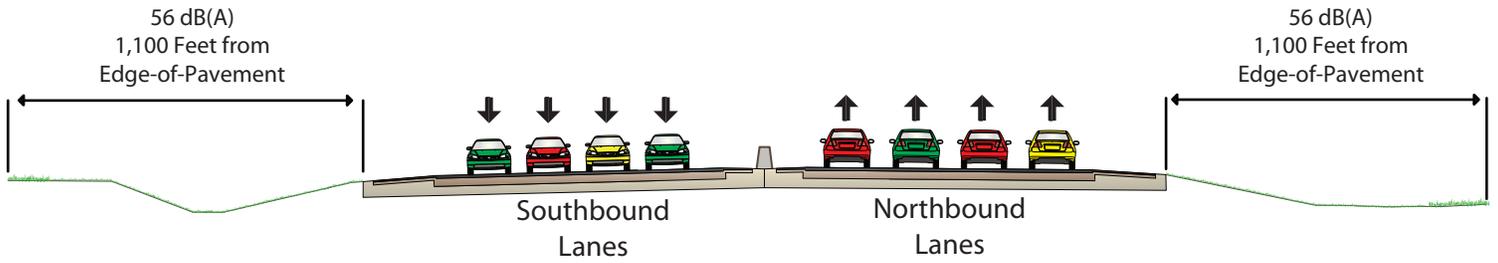
Activity Category B/C



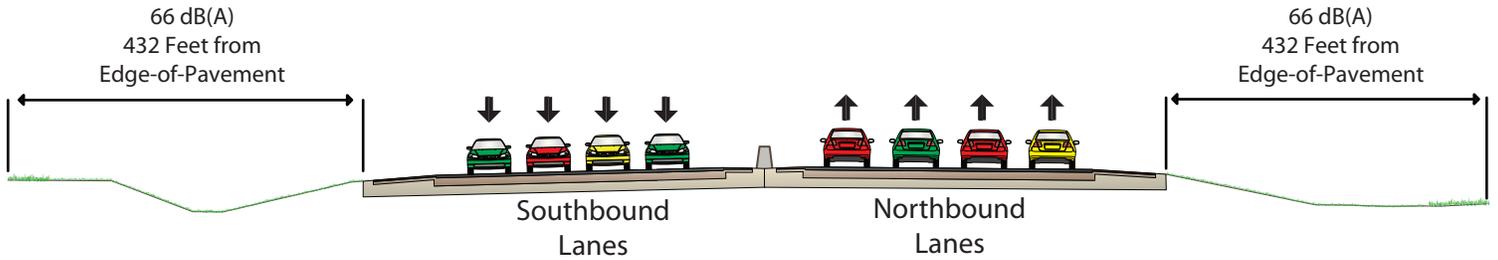
Activity Category E

# Florida's Turnpike Noise Contours

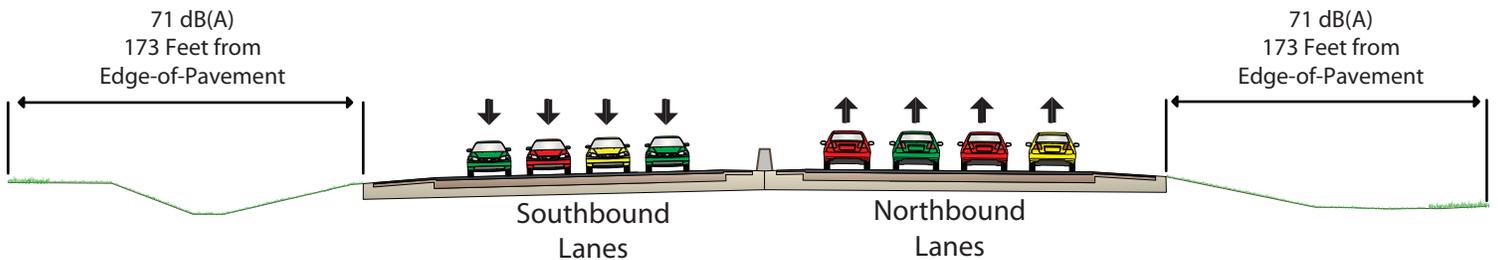
North of Leesburg South Interchange (MP 285)



Activity Category A



Activity Category B/C



Activity Category E