Traffic Noise Study Report

Poinciana Parkway (SR 538) Widening

From Cypress Parkway (CR 580) to North of Reedy Creek Mitigation Bank
Osceola County, Florida
CFX Project Number: 538-165

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

ACRONYMS

CFR	Code of Federal Regulations
CFX	Central Florida Expressway Authority
CNE	Common Noise Environment
CR	County Road
dB(A)	Decibel (A-Weighted)
DHV	Design Hourly Volume
EB	Eastbound
EOP	Edge of Pavement
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
HCS	Highway Capacity Software
LOS	Level of Service
MP	Milepost
Mph	Miles Per Hour
NAC	Noise Abatement Criteria
NB	Northbound
NRDG	Noise Reduction Design Goal
NSA	Noise Study Area
NSR	Noise Study Report
PD&E	Project Development & Environment
RCMB	Reedy Creek Mitigation Bank
ROW	Right-of-Way
SB	Southbound
SR	State Road
TNM	Traffic Noise Model
WB	Westbound

1.0 INTRODUCTION

Poinciana Parkway (SR 538) is a limited-access toll road that extends from the Polk-Osceola County line at Cypress Parkway (CR 580) in Poinciana to US 17/US 92. The parkway was initially constructed as a two-lane facility with room for expansion within the existing right of way (ROW). The Central Florida Expressway Authority (CFX) is now conducting a study to transition the existing two-lane undivided roadway to a four-lane divided roadway between the Polk-Osceola County line and Cypress Parkway. The project includes a second proposed bridge over the Reedy Creek Mitigation Bank (RCMB) and new ramps to and from the south at the existing SR 538 interchange with Marigold Avenue. The existing "spur" from SR 538 to Cypress Parkway is to be removed and replaced with a new alignment terminating at the existing Cypress Parkway intersection with Solivita Boulevard (See **Figure 1**: Project Location Map on the following page).

The objective of this Traffic Noise Study Report is to summarize the traffic noise study conducted for this widening project. The analysis identifies the noise sensitive receptors within the study corridor and evaluates the noise levels predicted to occur as a result of the widening project.

2.0 ANALYZED ALTERNATIVES

The noise impact analysis compares the predicted traffic noise associated with the proposed Build Alternative, existing traffic noise within the study corridor, and a No-Build Alternative.

2.1 Existing Conditions

Poinciana Parkway is currently a two-lane undivided, limited-access roadway within 300 feet of right-of-way. The two travel lanes are 12 feet wide with a paved 10-foot shoulder adjacent to the northbound lane, and a 5-foot paved shoulder adjacent to the southbound lane. The posted speed limit is 55 miles per hour (mph).

2.2 No-Build Alternative

The noise impact analysis also considers an alternative that assesses what would happen to the environment in the future if this proposed widening project was not built. This alternative, called the No-Build Alternative, consists of the existing roadways within the study area and the routine maintenance improvements to these facilities. While the No-Build Alternative does not meet project needs, it provides a baseline condition to compare and measure the effects of the proposed project.

Figure 1: Project Location Map

2.3 Proposed Build Alternative

The proposed project constructs an additional two lanes to the west of the existing two-lane Poinciana Parkway. The additional lanes will carry southbound traffic, and the existing lanes will carry northbound traffic on the Parkway. The travel lanes will be separated by a grassed median that varies in width. The project includes a second proposed bridge over the Reedy Creek Mitigation Bank (RCMB) and new ramps to and from the south at the existing SR 538 interchange with Marigold Avenue. The existing "spur" from SR 538 to Cypress Parkway is to be removed and replaced with a new alignment terminating at the existing Cypress Parkway intersection with Solivita Boulevard. For further reference refer to **Appendix A: Typical Sections.**

3.0 METHODOLOGY

The traffic noise study conducted for this project is consistent with *Code of Federal Regulations* (C.F.R.), Title 23, § 772[1], Chapter 335, Section 335.17, *Florida Statutes*[2], Part II, Chapter 18 of the Florida Department of Transportation's (FDOT) *Project Development and Environment Manual* [3], and Federal Highway Administration's (FHWA) traffic noise analysis guidelines contained in *FHWA-HEP-10-025*[4].

3.1 Noise Metrics

Traffic noise is a combination of noises produced by the engine, exhaust, and tires and is never constant. The noise metric used to describe this combination of noise is referred to as "Leq." This metric allows for the fluctuations of daily traffic noise to be analyzed in terms of steady noise levels with the same acoustic energy, and thus, is the level of constant sound. Constant sound is quantified by a meter that measures units called decibels (dB). For highway traffic noise, an adjustment or weighting of the high and low-pitched sounds is applied to approximate the way an average person hears. These adjusted sounds are called "A-weighted decibels" and are expressed as "dB(A)."

3.2 Noise Model

The FHWA Traffic Noise Model (TNM) - version 2.5 was used to predict traffic noise levels for this project following guidelines outlined in the FDOT *Traffic Noise Modeling and Analysis Practitioners Handbook*[5]. This program estimates the traffic noise level from a series of roadway segments (the source) at a noise sensitive site (the receptor). The TNM program requires specific data to be entered. These data are noise-influencing variables that include the volume and types of vehicles traveling the roadway, vehicular speed, roadway geometry, and the presence of

[1] Federal Highway Administration, *Code of Federal Regulations*, Title 23 Part 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise", (July 13, 2010)
[2] *Florida Statutes*, Chapter 335, § 335.17
[3] Florida Department of Transportation, *Project Development and Environment Manual,* Part 2, Chapter 18, (January 14, 2019)
[4] FHWA, *FHWA-HEP-10-025: Highway Traffic Noise: Analysis and Abatement Guidance, (*December 2011)
[5] FDOT, *Traffic Noise Modeling and Analysis Practitioners Handbook*, (January 2016)

existing barriers between the road and receptor such as berms and building rows. All input data coordinates were defined using the NAD 1983 2001 State Plane Florida East system.

3.2.1 Elevation Data

Elevation data for Poinciana Parkway was obtained from the As-Built Plans for the existing Poinciana Parkway[6]. Data for the noise receptors and cross streets were obtained from the Florida Geographic Data Library[7] and Google Earth[8].

3.2.2 Traffic Data

To predict project noise levels, traffic characteristics that contribute to the greatest traffic noise impact for the 2045 design year were used in the TNM modeling. Worst-case noise conditions occur with the maximum amount of traffic traveling at the posted speed. A Level of Service (LOS) C operating condition produces the highest noise level and was used for this project. A summary of the traffic data provided by the CFX traffic consultant is included in **Appendix B: Noise Study Traffic Data**.

3.2.3 Noise Receptor Data

Noise receptor points are used in the TNM to analyze traffic impacts to noise sensitive sites (discussed further in the following section). For residences, traffic noise levels were predicted at the edge of the dwelling unit closest to the nearest primary roadway. For other noise sensitive sites within the study area, traffic noise levels were predicted where the exterior activity occurs. Receptor sites were modeled five feet above the local ground elevation.

The reporting of project noise levels was simplified by using representative receptors within each NSA to represent Common Noise Environments (CNE), which are defined by FDOT as a group of receptors within the same Activity Category that are exposed to similar noise sources and levels; traffic volumes, traffic mix, and speed; and topographic features.

3.2.4 Noise Sensitive Sites

Noise sensitive sites are defined as any property where frequent human use occurs and where a lowered noise level would be of benefit. To determine which land uses within the study corridor are "noise sensitive," this noise impact analysis used the FHWA Noise Abatement Criteria (NAC). Shown on the following page in **Table 1,** these criteria are divided into individual land use activity categories. For each of these categories, the FDOT has established noise levels at which noise abatement must be considered.

[6] Osceola County Expressway Authority. Final "As-Built" Plans Poinciana Parkway Design/Build Segment 4. Revised April 12, 2016
[7] University of Florida. Florida Geographic Data Library, https://www.fgdl.org/metadataexplorer/about.html
[8] Google Earth 2019

Table 1: Noise Abatement Criteria

Hourly A-Weighted Sound Level-decibels (dB(A))				Description of Activity Category
Activity Category	Activity Leq(h) [1]		Evaluation Location	
	FHWA	FDOT		
A	57.0	56.0	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]	67.0	66.0	Exterior	Residential.
C[2]	67.0	66.0	Exterior	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, golf courses, places of worship, playgrounds, public meeting rooms, public/nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52.0	51.0	Interior	Auditoriums, daycare centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public/nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[2]	72.0	71.0	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 design standards for noise abatement measures.

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

One additional criterion for determining project impacts that warrant abatement consideration occurs when project noise levels are below the NAC but show a substantial increase (15.0 dB(A) or more) over existing levels.

An illustration of typical exterior and interior noises and their corresponding decibel reading is presented on the following page in **Table 2**. This table provides the reader with a better understanding of the noise levels discussed herein.

Table 2: Typical Noise Levels

Common Outdoor Activity	dB(A)	Inside Activity
Jet Flyover at 1,000 ft. Gas Lawn Mower at 3 ft.	--110-- --100--	Rock Band
Diesel Truck at 50 ft. (at50 mph) Busy Urban Area Daytime	--90-- --80--	Food Blender at 3 ft. Garbage Disposal at 3 ft.
Gas Mower at 100 ft. Commercial Area Heavy Traffic at 300 ft.	--70-- --60--	Vacuum Cleaner at 10 ft. Normal Speech at 3 ft. Large Business Office
Quiet Urban Daytime Quiet Urban Nighttime Quiet Suburban Nighttime	--50-- --40--	Dishwasher Next Room Theater, Large Conference Room (Background)
Quiet Rural Nighttime	--30-- --20--	Library Bedroom at Night
Lowest Threshold of Human Hearing	--10-- --0--	Lowest Threshold of Human Hearing
Source: California Dept. of Transportation Technical Noise Supplement, Oct. 1998, Pg. 18		

3.3 Noise Abatement Measures

When traffic noise impacts are identified, noise abatement must be considered. The potential abatement alternatives include traffic management techniques, alternative roadway alignments, buffer zones, and noise barriers. The most common type of noise abatement measure is the construction of a noise barrier that reduces traffic noise by blocking the sound path between the roadway and the adjacent noise receptor.

For a noise barrier to be considered both reasonable and feasible, the following factors must be evaluated.

- To be considered acoustically feasible, the barrier must reduce traffic-related noise levels by at least 5.0 dB(A) for at least two impacted receptors.

- The noise barrier must achieve the FDOT noise reduction design goal of 7.0 dB(A) for at least one benefited receptor. The term "benefited" is defined by FDOT as a receptor receiving at least 5.0 dB(A) of noise reduction from the barrier.
- The cost of the noise barrier should not exceed the FDOT limit of $42,000 per benefited receptor.

Other factors must also be considered when evaluating a barrier's feasibility, including accessibility, sight distance, and aesthetics. Accessibility refers to the ingress and egress to properties that would be affected by the construction of a noise barrier. Sight distance is a safety issue that refers to the ability of drivers to see far enough in each direction to safely enter the roadway. Aesthetics refers to the physical appearance of the noise barrier from both the highway side and the affected property side.

4.0 TRAFFIC NOISE ANALYSIS

4.1 Model Validation

Existing noise levels are measured in the project corridor to confirm if traffic noise is the primary source of noise. Field measurements are also required to verify the accuracy of the TNM before it can be used to predict noise levels. To accomplish this, a series of three 10-minute measurements were taken on December 10, 2019, at one location adjacent to Rhododendron Avenue. This site was selected to represent homes adjacent to the northbound Poinciana Parkway ROW. An illustration of this measurement site is provided in **Appendix D: Project Aerials** on Page D-4.

Existing noise levels were measured using an Extech Instruments Model 407780A Type 2 Integrating Sound Level Meter. The sound level meter, calibrated at 94.0 dB(A) with an Extech Instruments Model 407766 calibrator, was adjusted to the A-weighted frequency scale, which approximates the frequency sensitivity of the human ear.

During each of the 10-minute measurement sessions, traffic data, including vehicle volumes and speeds by type, and meteorological conditions were recorded. The traffic speeds were recorded the travel speed using a Bushnell Speedster hand-held radar gun. Temperature, wind, and humidity were measured using an Ambient weather WM-3 handheld meter. The weather during the monitoring sessions was 78° under clear skies, 73% humidity, with winds out of the Southeast at 3-5 mph. No unusual noise events occurred during the three 10-minute sessions.

Validation of TNM occurs when the model-predicted noise levels are within three decibels of the field-measured levels. Since all noise levels in this analysis are based on a one-hour period, each of the 10-minute field-recorded traffic volumes was adjusted upward by a factor of "6" to reflect hourly traffic flow. Once adjusted, these volumes were input into the noise prediction model. As shown in **Table 3,** TNM predicted within the 3.0-decibel acceptance range for each 10-minute session. Consequently, the model is acceptable for predicting noise levels on this project.

Table 3: Field Measurement Data and TNM Validation Results

SESSION #1	Start Time: 10:48 A.M.									
	Poinciana NB		NB On Ramp		Poinciana SB		SB Off Ramp		Rhododendron	
Mode	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed
Car	90	57	24	44	42	57	12	45	24	22
Med. Truck	18	55	0	0	18	55	6	45	0	0
Heavy Truck	0	0	0	0	12	55	0	0	0	0
Bus	0	0	0	0	0	0	0	0	0	0
Motorcycle	0	0	0	0	0	0	0	0	0	0
RESULTS	Field Measurement: dB(A)						53.9			
	TNM Prediction: dB(A)						55.3			
	Variance:						1.4			
SESSION #2	Start Time: 11:00 A.M.									
	Poinciana NB		NB On Ramp		Poinciana SB		SB Off Ramp		Rhododendron	
Mode	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed
Car	90	57	18	45	108	57	48	45	18	25
Med. Truck	6	55	0	0	0	0	0	0	6	21
Heavy Truck	6	52	0	0	12	55	0	0	0	0
Bus	0	0	0	0	0	0	0	0	0	0
Motorcycle	0	0	0	0	0	0	0	0	0	0
RESULTS	Field Measurement: dB(A)						54.3			
	TNM Prediction: dB(A)						55.5			
	Variance:						1.2			
SESSION #3	Start Time: 11:20 A.M.									
	Poinciana NB		NB On Ramp		Poinciana SB		SB Off Ramp		Rhododendron	
Mode	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed
Car	120	58	12	45	66	61	36	45	12	26
Med. Truck	12	57	0	0	6	56	6	45	6	28
Heavy Truck	6	57	0	0	0	0	0	0		
Bus	0	0	0	0	0	0	0	0		
Motorcycle	0	0	0	0	6	59	0	0		
RESULTS	Field Measurement: dB(A)						54.7			
	TNM Prediction: dB(A)						55.3			
	Variance:						0.6			

4.2 Identification of Noise Sensitive Sites

Using **Table 1** as a guide, the majority of the noise sensitive land uses within the study corridor fall under Activity Category B - Residential. The Activity Category C land uses within the project study corridor are related to Poinciana Academy of Fine Arts School and its playground and field.

Analysis of interior (Category D) noise levels was not required for this project as all Category B and C locations have areas of exterior use. There are no land uses in the study corridor that warrant an Activity Category A analysis and no Category E land uses with exterior areas that are noise sensitive.

The remainder of the corridor is Activity Category G undeveloped land. A records search of these parcels, conducted in December 2019, did not identify any active permits for buildings that would be considered noise sensitive.

A total of 139 noise sensitive sites were analyzed for project-related traffic noise impacts, all within the area known locally as Poinciana Village 2. The noise analysis identified three Noise Study Areas (NSA) that contain the 139 analyzed noise sensitive sites east of the Poinciana Parkway. While the project corridor extends beyond these NSAs, these NSAs are the only areas containing noise sensitive sites. A set of project aerials illustrating the entire corridor, the three NSAs, all representative receptors, and the analyzed sites is included as **Appendix D.**

A discussion of each NSA and the predicted traffic noise is provided in the following sections.

4.3 Predicted Noise Levels

A summary of the noise impact analysis is provided in **Appendix C: Noise Impact Comparison Matrix**. This matrix summarizes the TNM-predicted noise levels for the 2019 Existing condition, the 2045 No-Build Alternative, and the 2045 Build Alternative. Currently, none of the analyzed receptors experience noise levels that meet or exceed the 66.0 dB(A) Noise Abatement Criterion (NAC). Similarly, no receptor meets or exceeds the NAC under the No-Build Alternative.

With the traffic increase associated with the Build Alternative, 21 residences are predicted to have traffic noise levels that meet or exceed the NAC. Nine of these residences are located in NSA 1 and twelve residences are locted in NSA 2. Each of these impacted sites requires noise abatement consideration which is discussed in detail in **Section 4.4**. The following discussion summarizes the predicted noise levels for each of the three NSAs.

4.3.1 Noise Study Area 1

NSA 1 is located north of Koa Street to north of the Poinciana Academy of Fine Arts. Seventy-five (75) residences in two neighborhoods, and the Poinciana Academy of Fine Arts playground and fields were included in the analysis. The analyzed noise sensitive sites and neighborhoods in this NSA are illustrated in **Appendix D** on Pages D-3 through D-5.

The project is not predicted to have noise impacts in Neighborhood 1. However, in Neighborhood 2, the predicted noise levels associated with the widening project exceed the 66.0 dB(A) NAC at four residences represented by receptor 1-16.1 and five residences represented by receptor 1-17, with the highest noise level, 66.5 dB(A), at receptor 1-16.1. These noise levels average 9.3 dB(A) over existing conditions with the greatest increase being 11.2 dB(A). Neither of these

increases are considered substantial. Due to the predicted noise levels at these impacted sites, noise abatement consideration is required.

4.3.2 Noise Study Area 2

NSA 2/Neighborhood 3 begins north of the school and continues to north of Glouster Court, as illustrated in **Appendix D** on Pages D-5 and D-6. The noise analysis evaluated project impacts at 34 residences.

Neither the existing nor the No-Build Alternative result in noise levels that meet or exceed the NAC. However, with the increased traffic from the Build Alternative, twelve sites, represented by receptor 2-2, will exceed the NAC with a noise level of 68.0 dB(A)). The average noise level increase over existing conditions is 9.4 dB(A) with the greatest increase being 10.0 dB(A). Neither of these increases is considered substantial. Due to the predicted noise level at receptor 2-2, noise abatement consideration is required.

4.3.3 Noise Study Area 3

North of Glouster Court to Marigold Avenue is NSA 3/Neighborhood 4. The noise analysis evaluated project impacts at 28 residences, as illustrated in **Appendix D** on Page D-7.

The predicted project-related noise levels in NSA 3 do not exceed the NAC, with the highest noise level being 64.9 dB(A) at receptor 3-1. The average project noise levels are 10.5 dB(A) higher than existing conditions with the greatest increase being 11.6 dB(A). Neither of these increases are considered substantial. The predicted noise levels do constitute a project impact; thus, noise abatement is not required.

4.4 Noise Abatement Consideration

Of the 139 analyzed noise sensitive sites, 21 are predicted to be impacted by the Build Alternative. For a noise barrier to be considered feasible, it must achieve at least a 5.0 dB(A) of insertion loss/noise reduction for at least two impacted receptors. To be considered reasonable, the barrier must achieve the FDOT noise reduction design goal (NRDG) of at least 7.0 dB(A) at one benefited receptor and cost no more than $42,000 per benefited receptor. Note: noise receptors are considered benefited by a noise barrier if they receive at least 5.0 dB(A) of noise reduction from that barrier.

4.4.1 Noise Barrier 1 – NSA 1

To determine the effectiveness of a noise barrier for the impacted homes in Neighborhood 2, Receptors 1-16, 1-16.1, 1-17, and 1-17.1 were subdivided into smaller groupings. When receptor 1-17 was subdivided, the analysis indicated that two residences were not impacted by traffic noise; bringing the total number of impacted residenced in NSA 1 to seven.

Five noise barrier options were evaluated to abate for these impacts. Four of the options evaluated a noise barrier positioned along the extended roadway shoulder north of Koa Street. Where the noise barrier parallels the on-ramp, it is positioned approximately 10 feet from the edge of the travel lane. As the barrier transitions to the mainline shoulder, it is positioned 24 feet from the edge of the outside NB travel lane.

The fifth option evaluated a two-segment noise barrier system. The first segment is positioned at the edge of the NB 12-foot paved shoulder of the Koa overpass just north of the bridge. The second segment is positioned along the on-ramp/mainline NB shoulder with the 24-foot offset from the NB travel lane.

FDOT limits a noise barrier's maximum height to 14 feet when it is constructed on roadway shoulders. When a noise barrier is constructed on mechanically stabilized earth (MSE), maximum heights are restricted to 8 feet.

Refer to **Table 4** on the following page for a tabular summary of the following bullet points.

- Option 1 is designed to provide abatement for just the impacted residences in Neighborhood 2. Fourteen (14) non-impacted residences are also benefited. This option meets all FDOT requirements.
- Option 2 lengthens the barrier to provide the lowest cost per benefited receptor total. In addition to providing a benefit to all seven impacted residences, this option also benefits 15 non-impacted residences with an average noise reduction of 7.2 dB(A). Option 2 meets all FDOT requirements.
- Option 3 lengthens the barrier further to benefit the most residences in the impacted neighborhood. All impacted residences and 18 non-impacted residences are benefited with an average noise reduction of 7.5 dB(A). Option 3 meets all FDOT requirements.
- Option 4 extends the southern terminus of the noise barrier along the on-ramp shoulder to provide added benefit to Neighborhood 1. Because of the overpass, only one residence in this neighborhood benefits from the extension which increases the total benefited to 26 residences. The average noise reduction is identical to Option 3 (7.5 dB(A)) however, Option 4 does not meet the FDOT reasonable cost criterion.
- Option 5 is a two-segment system that provides the most benefit to both neighborhoods. The first segment is mounted on the extended shoulder of the overpass at the maximum height of 8 feet (parts of the overpass are on MSE). The second segment parallels the on-ramp and NB travel lanes. With this option, all impacted residences and 20 non-impacted residences will receive a noise reduction benefit averaging 7.6 dB(A). Option 5 does not meet the FDOT reasonable cost criterion; however, CFX will carry this option forward for further evaluation in the project's final design phase of development. An illustration of Option 5 is provided in **Figure 2.**

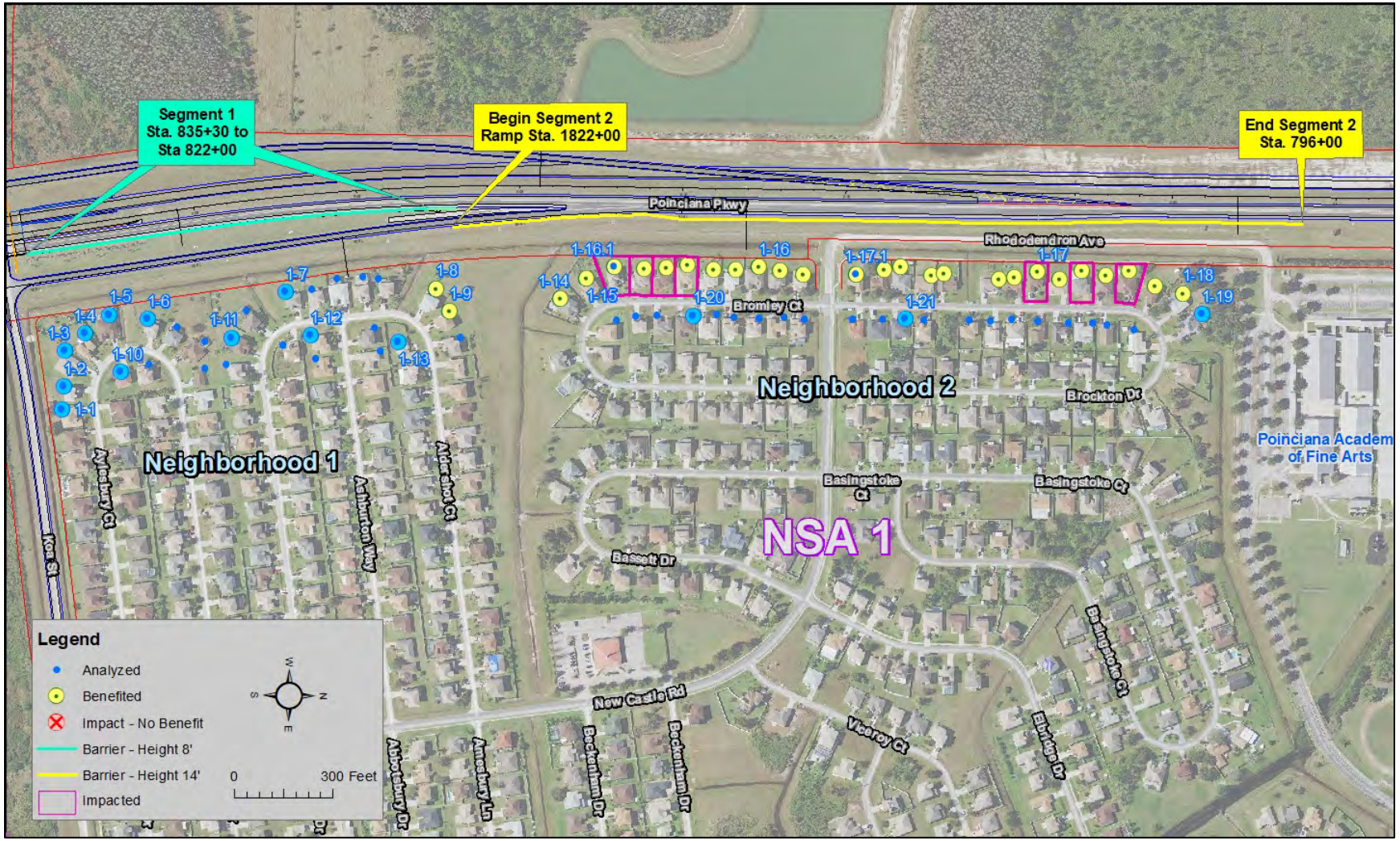
Table 4: Noise Barrier 1 Evaluation Summary

Evaluated Barrier Options				Number of Impacted Sites	Number of Impacted Sites Within a Noise Reduction Range			Number of Benefited Sites *1				Total Estimated Cost *4	Cost per Benefited Receptor *5
Option	Height (feet)	Length (feet)	Approx. Location (Roadway Stationing)		5-5.9 dB(A)	6-6.9 dB(A)	≥ 7.0 dB(A) *2	Impacted	Other *3	Total	Noise Reduction dB(A) Average (Max)		
Option 1	14	2003	Sta. 1819+00 to 799+20	7	0	3	4	7	14	21	7.2 (8.1)	$ 841,260	$ 40,060
Option 2	14	2044	Sta. 1819+44 to 799+00	7	0	3	4	7	15	22	7.2 (8.1)	$ 858,480	$ 39,022
Option 3	14	2404	Sta. 1821+00 to 796+00	7	0	0	7	7	18	25	7.5 (8.6)	1,009,680	$ 40,387
Option 4	14	3804	Sta. 1835+00 to 796+00	7	0	0	7	7	19	26	7.5 (8.6)	$1,597,680	$ 61,449
Option 5 *(CFX Preferred)*	8	1321	Sta. 835+30 to 822+00	7	0	0	7	7	20	27	7.6 (8.6)	$1,368,720	$ 50,693
	14	2504	Sta. 1822+00 to 796+00										

*1 = Minimum of 5.0 dB(A) required to be considered benefited by noise barrier.
*2 = FDOT Noise Reduction Design Goal is 7.0 dB(A) at a minimum of 1 benefited receptor.
*3 = Refers to non-impacted noise-sensitive sites.
*4 = Based on FDOT Statewide average of $30 per square foot.
*5 = FDOT Reasonable Cost Guideline is $42,000.

Note: A more detailed summary of the Noise Barrier 1 options is provided in **Appendix E: Noise Barrier Evaluation Tables**.

Figure 2: Noise Barrier 1 – Option 5 (CFX Preferred)



4.4.2 Noise Barrier 2 – NSA 2

To determine the effectiveness of a noise barrier for the impacted homes in Neighborhood 3, Receptors 2-2, 2-3, 2-4, and 2-5 were subdivided into smaller groupings. When receptor 2-2 was subdivided, the analysis indicated that one residence was not impacted by traffic noise; bringing the total number of impacted residences in NSA 2 to 11. Five noise barrier options were evaluated to abate for these impacts. Each of the options position the noise barrier 24 feet from the edge of the outside NB travel lane and at the maximum-allowed height of 14 feet. Refer to **Table 5** on the following page for a tabular summary of the following bullet points.

- Option 1 is designed with the shortest evaluated length to provide abatement for only the impacted residences. However, as shown in Table 5, the length does not provide the minimum-required abatement for one impacted receptor, does not meet the FDOT noise reduction design goal, nor does it meet the reasonalbe cost criterion.
- Option 2 lengthens the Option 1 barrier. Not only does this option benefit all 11 impacted residences, but it also benefits an additional three non-impacted residences with an average noise reduction of 6.2 dB(A). Option 2 does not meet the FDOT reasonable cost criterion.
- Option 3 optimizes the barrier's length to provide effective noise reduction at the lowest cost per benefited receptor. In addition to benefiting all 11 impacted residences, this option also benefits four non-impacted residences with an average noise reduction of 5.9 dB(A). Option 3 does not meet the FDOT reasonable cost criterion.
- Option 3A is a hybrid of Option 3 and Option 4 (discussed below) and seeks to reduce the cost per benefited receptor moreso than Option 4. As shown on Table 5, this option benefits all 11 impacted residences and five non-impacted residences with an average noise reduction of 6.5 dB(A). The estimated cost for Option 3A is lower than Option 4, but still exceeds the FDOT reasonable cost criterion. However, the CFX will carry this option forward for further evaluation in the project's final design phase of development. An illustration of Option 3A is provided in **Figure 3**.
- Option 4 is the longest barrier option and seeks to provide noise reduction for as many residences as possible in Neighborhood 3. In addition to benefiting all impacted residences, Option 4 also benefits seven non-impacted residences with an average noise reduction of 6.6 dB(A). However, the cost of the barrier exceeds extends FDOT reasonable cost criterion.

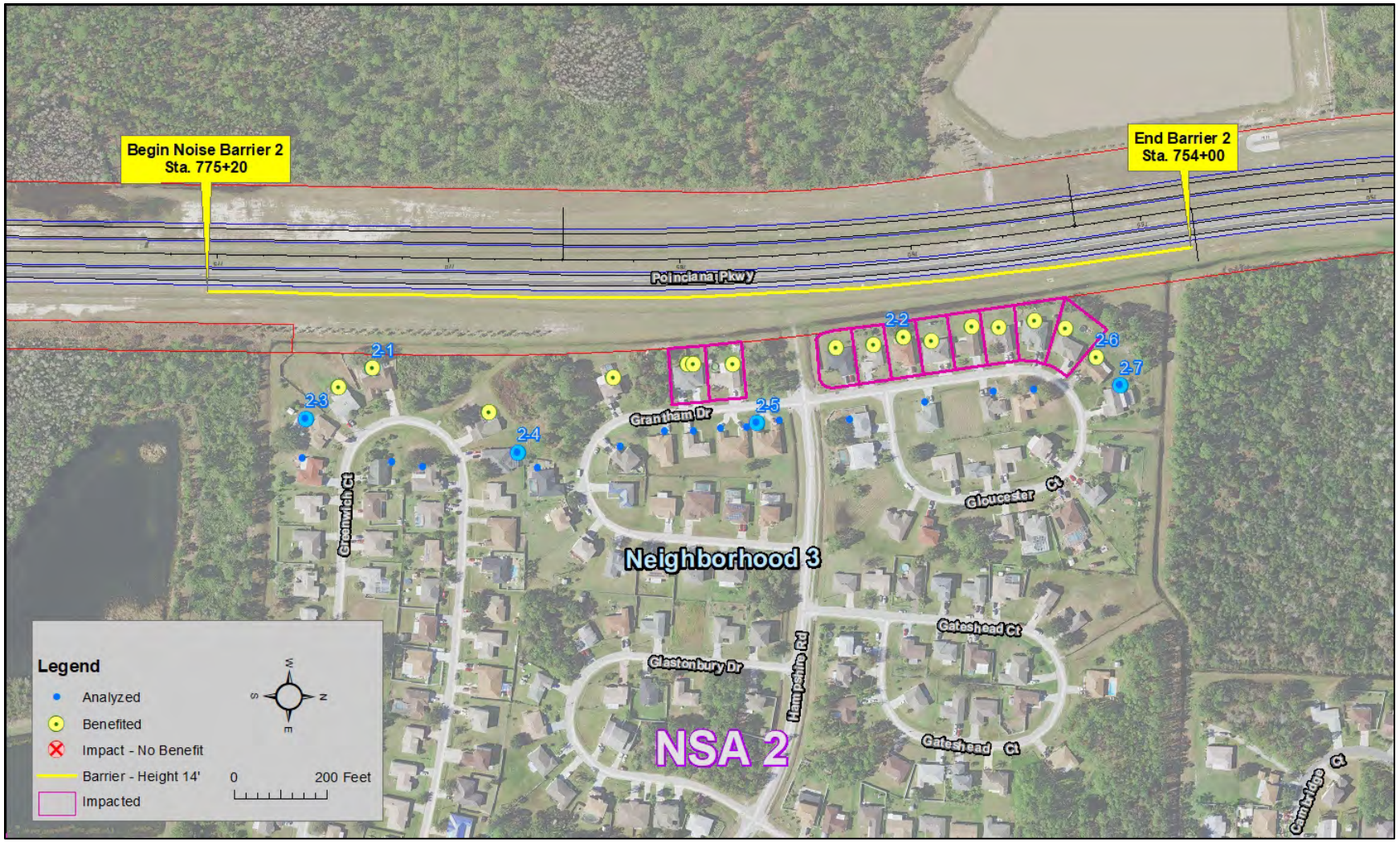
Table 5: Noise Barrier 2 Evaluation Summary

Evaluated Barrier Options				Number of Impacted Sites	Number of Impacted Sites Within a Noise Reduction Range			Number of Benefited Sites *1				Total Estimated Cost *4	Cost per Benefited Receptor *5
Option	Height (feet)	Length (feet)	Approx. Location (Roadway Stationing)		5-5.9 dB(A)	6-6.9 dB(A)	≥ 7.0 dB(A) *2	Impacted	Other *3	Total	Noise Reduction dB(A) Average (Max)		
Option 1	14	1751	Sta. 773+00 to 755+60	11	7	3	0	10	1	11	5.8 (6.8)	$ 735,420	$ 66,856
Option 2	14	1973	Sta. 774+40 to 754.80	11	5	3	3	11	3	14	6.2 (8.1)	$ 828,660	$ 59,190
Option 3	14	1952	Sta. 774+80 to 755+40	11	6	4	1	11	4	15	5.9 (7.2)	$ 819,840	$ 54,656
Option 3A *(CFX Preferred)*	14	2232	Sta. 775+20 to 754+00	11	5	2	4	11	5	16	6.5 (8.9)	$ 937,440	$ 58,590
Option 4	14	2615	Sta. 778+00 to 752+00	11	4	3	4	11	7	18	6.6 (9.2)	$1,098,300	$ 61,017

*1 = Minimum of 5.0 dB(A) required to be considered benefited by noise barrier.
*2 = FDOT Noise Reduction Design Goal is 7.0 dB(A) at a minimum of 1 benefited receptor.
*3 = Refers to non-impacted noise-sensitive sites.
*4 = Based on FDOT Statewide average of $30 per square foot.
*5 = FDOT Reasonable Cost Guideline is $42,000.

Note: A more detailed summary of the Noise Barrier 2 options is provided in **Appendix E: Noise Barrier Evaluation Tables.**

Figure 3: Noise Barrier 2 Option 3A (CFX Preferred)



4.5 Summary and Recommendations

Traffic noise levels were predicted for 139 noise sensitive sites along the project corridor for the 2019 existing condition and the 2045 Design Year No-Build and Build Alternatives. None of the analyzed sites is currently experiencing traffic noise levels that meet or exceed the 66.0 dB(A) NAC, nor are they predicted to do so with the No-Build Alternative. Due to the increase in traffic volumes attributed to the Build Alternative, noise impacts are predicted in NSA 1/Neighborhood 2 and NSA 2/Neighborhood 3. The overall noise increase over existing conditions is predicted to be an average of 9.6 dB(A) with the greatest increase at a residence being 11.6 dB(A). Neither of these two values represent a substantial noise increase (ie., greater than 15. 0 dB(A)).

To mitigate for these impacts, two noise barriers were evaluated. The barrier evaluation analyzed several dimension options using the FDOT feasibility and reasonableness criteria for abatement measures. After careful consideration of all options, CFX is recommending further evaluation of the two noise barrier options summarized below in **Table 6 .**

Table 6: Noise Barrier Options Recommended for Further Evaluation

Barrier #: Option	Height (feet)	Length (feet)	Approx. Location (Roadway Stationing)	Number of Impacted Sites	Number of Benefited Sites *1	Noise Reduction dB(A)*2 Average (Max)	Total Estimated Cost *3	Cost per Benefited Receptor
Noise Barrier 1: Option 5	8	1321	Sta. 835+30 to 822+00	7	27	7.6 (8.6)	$ 1,368,720	$ 50,693
	14	2504	Sta. 1822+00 to 796+00					
Noise Barrier 2: Option 3A	14	2232	Sta. 775+20 to 754+00	11	16	6.5 (8.9)	$ 937,440	$ 58,590

*1 = Minimum of 5.0 dB(A) required to be considered benefited by noise barrier.

*2 = FDOT Noise Reduction Design Goal is 7.0 dB(A) at a minimum of 1 benefited receptor.

*3 = Based on FDOT Statewide average of $30 per square foot.

5.0 CONSTRUCTION NOISE AND VIBRATION IMPACTS

The existing residential and institutional land uses within the limits of this project are considered noise and vibration sensitive. Construction of the proposed roadway improvements is not expected to have any significant noise or vibration impacts. It is anticipated that the application of the *FDOT Standard Specifications for Road and Bridge Construction*[9] will minimize or eliminate most of the potential short-term construction noise and vibration impacts.

Should any noise or vibration issue arise during construction, the Project Engineer, in concert with the CFX Noise Specialist and the Contractor, will investigate additional methods of controlling these impacts.

6.0 COMMUNITY COORDINATION

6.1 Public Meetings

A public hearing will be held for this project, and any comments received pertinent to the noise analysis will be noted in the final version of this report.

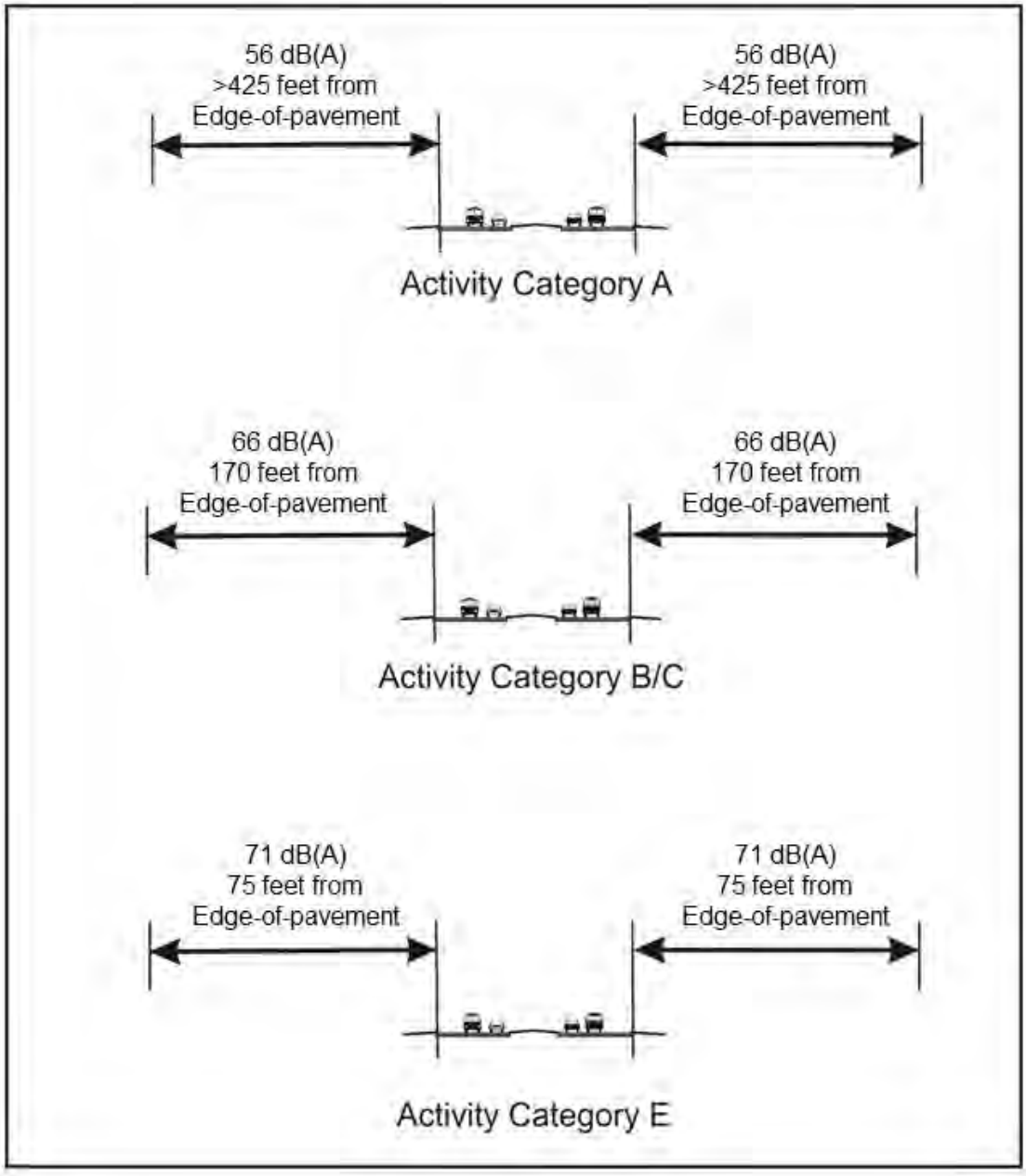
6.2 Coordination with Local Officials

To aid in promoting land use compatibility, a copy of this report, which provides information that can be used to protect future land development from becoming incompatible with anticipated traffic noise levels associated with this section of the Poinciana Parkway, is available to local agencies.

In addition, generalized noise impact contours for the Build Alternative have been developed which identify the distances between the Build Alternative and a location where traffic noise levels approach the NAC for Activity Categories A, B, C, and E. The contours, provided on the following page as **Figure 4,** do not account for any reduction in noise levels that may be provided by berms, privacy walls, or intervening structures. Distances also do not account for any increase in noise levels that may be caused by a variation in the noise path, increased roadway elevation, or increased elevation of a noise sensitive site (e.g., second-floor patio). County officials can use the noise contour data to establish compatible development of currently undeveloped parcels or compatible redevelopment in areas where land use changed.

[9] FDOT, *Standard Specifications for Road and Bridge Construction*, July 2018.

Figure 4: Critical Distance Impact Contours



7.0 REFERENCES

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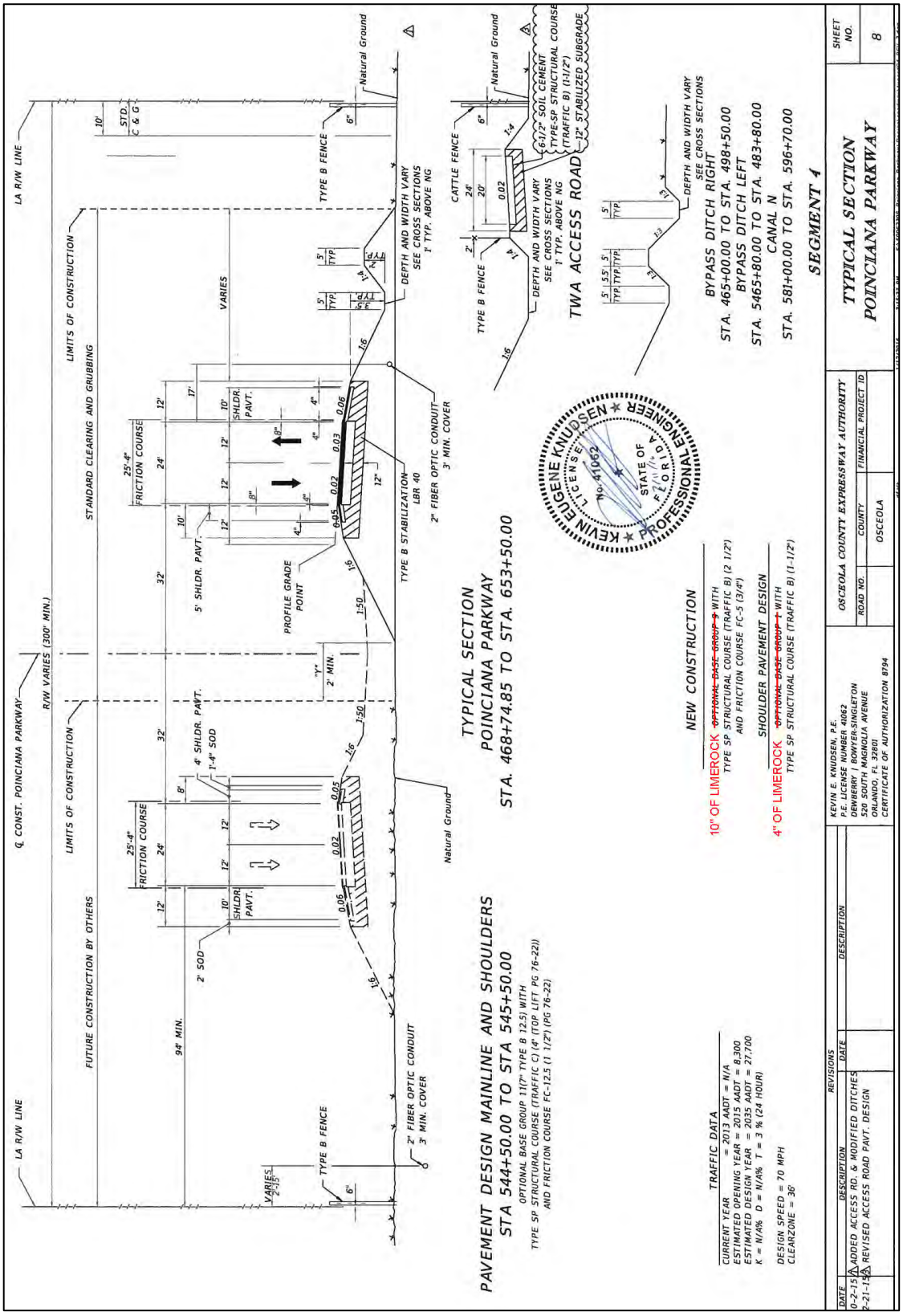
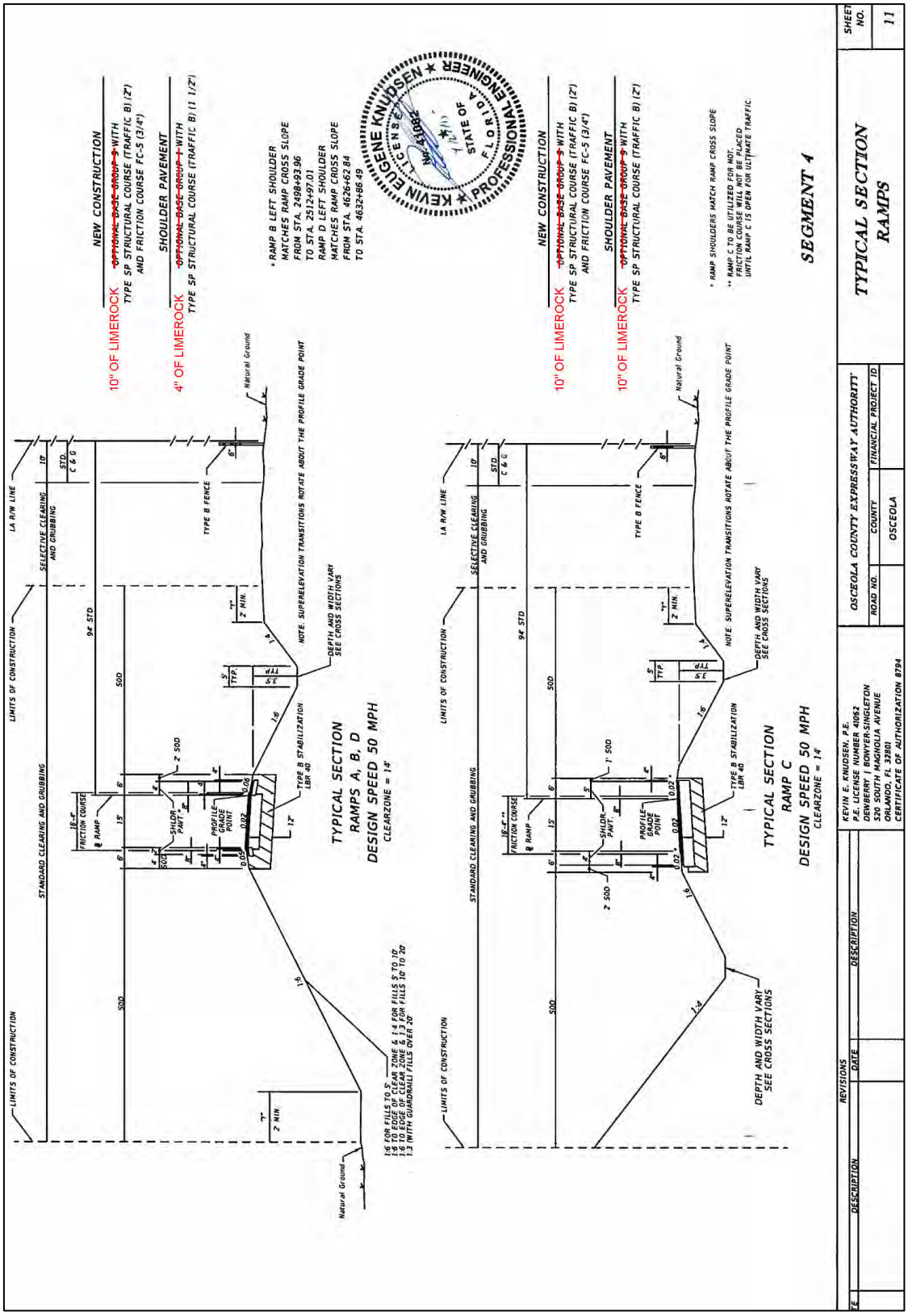
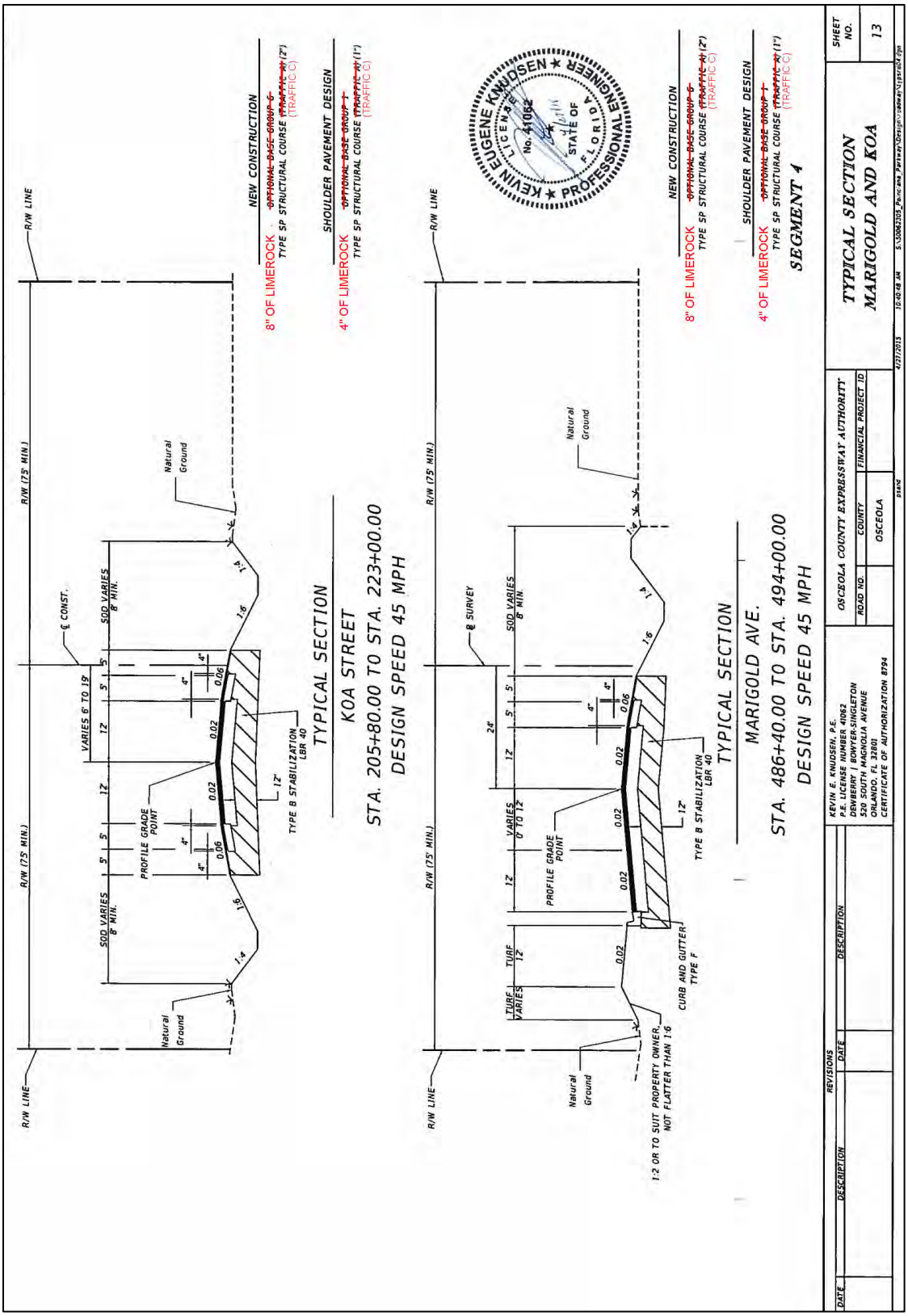
Appendix A:
Typical Sections


PAVEMENT DESIGN MAINLINE AND SHOULDERS
STA 544+50.00 TO STA 545+50.00
OPTIONAL BASE GROUP 11(7" TYPE B 12.5) WITH
TYPE SP STRUCTURAL COURSE (TRAFFIC C) (4" (TOP LIFT PG 76-22))
AND FRICTION COURSE FC-12.5 (1 1/2") (PG 76-22)
TYPICAL SECTION
POINCIANA PARKWAY
STA. 468+74.85 TO STA. 653+50.00
NEW CONSTRUCTION
10" OF LIMEROCK ~~OPTIONAL BASE GROUP 3~~ WITH
TYPE SP STRUCTURAL COURSE (TRAFFIC B) (2 1/2")
AND FRICTION COURSE FC-5 (3/4")
SHOULDER PAVEMENT DESIGN
4" OF LIMEROCK ~~OPTIONAL BASE GROUP 1~~ WITH
TYPE SP STRUCTURAL COURSE (TRAFFIC B) (1-1/2")
TRAFFIC DATA
CURRENT YEAR = 2013 AADT = N/A
ESTIMATED OPENING YEAR = 2015 AADT = 8,300
ESTIMATED DESIGN YEAR = 2035 AADT = 27,700
K = N/A% D = N/A% T = 3 % (24 HOUR)
DESIGN SPEED = 70 MPH
CLEARZONE = 36'
TYPICAL SECTION
POINCIANA PARKWAY
SEGMENT 1
BYPASS DITCH RIGHT
STA. 465+00.00 TO STA. 498+50.00
BYPASS DITCH LEFT
STA. 5465+80.00 TO STA. 483+80.00
CANAL N
STA. 581+00.00 TO STA. 596+70.00
TWA ACCESS ROAD
EUGENE KNUDSEN
LICENSE No. 41062
STATE OF FLORIDA
PROFESSIONAL ENGINEER
KEVIN
OSCEOLA COUNTY EXPRESSWAY AUTHORITY
SHEET NO. 8
DESCRIPTION
DATE
0-2-15 ADDED ACCESS RD. & MODIFIED DITCHES
2-21-15 REVISED ACCESS ROAD PAVT. DESIGN


TYPICAL SECTION
RAMPS A, B, D
DESIGN SPEED 50 MPH
CLEARZONE = 14'
TYPICAL SECTION
RAMP C
DESIGN SPEED 50 MPH
CLEARZONE = 14'
SEGMENT 4
TYPICAL SECTION
RAMPS
OSCEOLA COUNTY EXPRESSWAY AUTHORITY
OSCEOLA
SHEET NO. 11
KEVIN E. KNUDSEN, P.E.
P.E. LICENSE NUMBER 41062
DEWBERRY | BOWYER-SINGLETON
520 SOUTH MAGNOLIA AVENUE
ORLANDO, FL 32801
CERTIFICATE OF AUTHORIZATION 8794
REVISIONS
NO. DESCRIPTION DATE DESCRIPTION


R/W LINE
R/W (75' MIN.)
℄ CONST.
SOD VARIES 8' MIN.
VARIES 6' TO 19'
PROFILE GRADE POINT
Natural Ground
TYPE B STABILIZATION LBR 40
NEW CONSTRUCTION
8" OF LIMEROCK
~~OPTIONAL BASE GROUP 6~~
TYPE SP STRUCTURAL COURSE ~~TRAFFIC A~~ (2")
(TRAFFIC C)
SHOULDER PAVEMENT DESIGN
4" OF LIMEROCK
~~OPTIONAL BASE GROUP 1~~
TYPE SP STRUCTURAL COURSE ~~TRAFFIC A~~ (1")
(TRAFFIC C)
TYPICAL SECTION
KOA STREET
STA. 205+80.00 TO STA. 223+00.00
DESIGN SPEED 45 MPH
℄ SURVEY
TURF VARIES
TURF 12'
VARIES 0' TO 12'
CURB AND GUTTER TYPE F
1:2 OR TO SUIT PROPERTY OWNER, NOT FLATTER THAN 1:6
TYPICAL SECTION
MARIGOLD AVE.
STA. 486+40.00 TO STA. 494+00.00
DESIGN SPEED 45 MPH
KEVIN E. KNUDSEN ★ PROFESSIONAL ENGINEER ★ LICENSE No. 41062 STATE OF FLORIDA
REVISIONS
DESCRIPTION
DATE
KEVIN E. KNUDSEN, P.E.
P.E. LICENSE NUMBER 41062
DEWBERRY | BOWYER-SINGLETON
520 SOUTH MAGNOLIA AVENUE
ORLANDO, FL 32801
CERTIFICATE OF AUTHORIZATION 8794
OSCEOLA COUNTY EXPRESSWAY AUTHORITY
ROAD NO.
COUNTY
OSCEOLA
FINANCIAL PROJECT ID
TYPICAL SECTION
MARIGOLD AND KOA
SEGMENT 4
SHEET NO.
13
4/27/2015
16:40:08 AM

Appendix B:
Noise Study Traffic Data

TRAFFIC DATA FOR NOISE STUDIES

Red denotes volumes used in modeling

Project Description: Poinciana Parkway (SR 538) Widening from Cypress Parkway (CR 580) to N. of Reedy Creek Mitigation Bank

CFX Project #: 538-165

Segment Description: **Poinciana Pkwy Mainline**

	Cypress Parkway to KOA St			KOA St to Marigold Ave			Marigold Ave to US 17 (S. Orange Blossom Trl)		
Data (Directional)	**Existing Facility**	**No-Build (Design Year)**	**Build (Design Year)**	**Existing Facility**	**No-Build (Design Year)**	**Build (Design Year)**	**Existing Facility**	**No-Build (Design Year)**	**Build (Design Year)**
Year	2019	2045	2045	2019	2045	2045	2019	2045	2045
Number of Lanes	1	1	2	1	1	2	1	1	2
LOS C Peak Hour Directional Volume *1, *4	918	918	**2880**	918	**918**	**2880**	918	**918**	**2880**
Demand Peak Hour Directional Volume *2	**233**	**675**	780	**306**	920	1070	**777**	1560	1850
Demand Off-Peak Hour Directional Volume *2	**105**	**445**	515	**139**	610	710	**187**	1040	1230
Posted Speed*4	55	55	55	55	55	55	55	55	55
D%*3	75	75	75	75	75	75	75	75	75
Tpeak (DHV%)*3	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59
MT(DHV%)*3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
HT (DHV%)*3	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
Buses (DHV%)*4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Motorcycles (DHV%)*4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Data Sources:

*1 = Build LOS C Directional Volumes per Dewberry email, January 17, 2020

*2 = Poinciana Parkway Design Hour Volumes, CDM Smith, February 3, 2020

*3 = Tpeak, MT & HT DHV% per CDM Smith email to Dewberry, February 3, 2020

*4 = Existing/No-Build LOS C, Bus and Motorcycle DHV%, and posted speed from Noise Analysis Technical Memorandum, Poinciana Parkway Design-Build Project. Osceola County Expressway Authority, February 2016: Appendix B -Traffic Summary Table: Build Roadway Network - Design Year Traffic (2 lanes)(2035)

TRAFFIC DATA FOR NOISE STUDIES

Red denotes volumes used in modeling

Project Description: Poinciana Parkway (SR 538) Widening from Cypress Parkway (CR 580) to N. of Reedy Creek Mitigation Bank

CFX Project #: 538-165

Segment Description: **CR 580 (KOA St) East of Poinciana Pkwy**

Data	Existing Facility	No-Build (Design Year)	Build (Design Year)
Year	2019	2045	2045
Number of Lanes	1	1	1
LOS C Peak Hour Directional Volume *1	315	315	315
Demand Peak Hour Directional Volume	Not Available	Not Available	Not Available
Posted Speed*2	45	45	45
D%*1	60	60	60
Tpeak (DHV%)*1	2.5	2.5	2.5
MT(DHV%)*1	1.6	1.6	1.6
HT (DHV%)*1	0.9	0.9	0.9
Buses (DHV%)*1	0.5	0.5	0.5
Motorcycles (DHV%)*1	0.4	0.4	0.4

Data Sources:

*1 = Noise Analysis Technical Memorandum, Poinciana Parkway Design-Build Project. Osceola County Expressway Authority, February 2016; Appendix B -Traffic Summary Table: Build Roadway Network - Design Year Traffic (2 lanes)(2035)

*2 = Field confirmation of posted speed on existing roadway

TRAFFIC DATA FOR NOISE STUDIES

Red denotes volumes used in modeling

Project Description: Poinciana Parkway (SR 538) Widening from Cypress Parkway (CR 580) to N. of Reedy Creek Mitigation Bank

CFX Project #: 538-165

Segment Description: **Poinciana Pkwy at CR 580 (KOA St) Ramps**

	NB On-Ramp			SB Off-Ramp		
Data	**Existing Facility**	**No-Build (Design Year)**	**Build (Design Year)**	**Existing Facility**	**No-Build (Design Year)**	**Build (Design Year)**
Year	2019	2045	2045	2019	2045	2045
Number of Lanes	1	1	1	1	1	1
Demand Peak Hour Directional Volume *1	73	345	390	34	230	260
Posted Speed*3	45	45	45	45	45	45
Tpeak (DHV%)*2	4.3	4.3	4.3	4.3	4.3	4.3
MT(DHV%)*2	2.9	2.9	2.9	2.9	2.9	2.9
HT (DHV%)*2	1.4	1.4	1.4	1.4	1.4	1.4
Buses (DHV%)*3	0.5	0.5	0.5	0.5	0.5	0.5
Motorcycles (DHV%)*3	0.4	0.4	0.4	0.4	0.4	0.4

Data Sources:

*1 = Poinciana Parkway Design Hour Volumes, CDM Smith, February 3, 2020

*2 = Tpeak, MT & HT DHV% per CDM Smith email to Dewberry, February 3, 2020

*3 = DHV% and posted speed from Noise Analysis Technical Memorandum, Poinciana Parkway Design-Build Project. Osceola County Expressway Authority, February 2016: Appendix B -Traffic Summary Table: Build Roadway Network - Design Year Traffic (2 lanes)(2035)

TRAFFIC DATA FOR NOISE STUDIES

Red denotes volumes used in modeling

Project Description: Poinciana Parkway (SR 538) Widening from Cypress Parkway (CR 580) to N. of Reedy Creek Mitigation Bank

CFX Project #: 538-165

Segment Description: Marigold Ave East of Poinciana Pkwy

Data	Existing Facility	No-Build (Design Year)	Build (Design Year)
Year	2019	2045	2045
Number of Lanes	1	1	1
LOS C Peak Hour Directional Volume *1	315	315	315
Demand Peak Hour Directional Volume	Not Available	Not Available	Not Available
Posted Speed*2	45	45	45
D%*1	60	60	60
Tpeak (DHV%)*1	3.0	3.0	3.0
MT(DHV%)*1	2.0	2.0	2.0
HT (DHV%)*1	1.0	1.0	1.0
Buses (DHV%)*1	0.5	0.5	0.5
Motorcycles (DHV%)*1	0.4	0.4	0.4

Data Sources:

*1 = Noise Analysis Technical Memorandum, Poinciana Parkway Design-Build Project. Osceola County Expressway Authority, February 2016: Appendix B -Traffic Summary Table: Build Roadway Network – Design Year Traffic (2 lanes)(2035)

*2 = Field confirmation of posted speed on existing roadway

TRAFFIC DATA FOR NOISE STUDIES

Red denotes volumes used in modeling

Project Description: Poinciana Parkway (SR 538) Widening from Cypress Parkway (CR 580) to N. of Reedy Creek Mitigation Bank

CFX Project #: 538-165

Segment Description: Poinciana Pkwy at CR 580 (KOA St) Ramps

	NB On-Ramp			NB Off-Ramp			SB On-Ramp			SB Off-Ramp		
Data	**Existing Facility**	**No-Build**	**Build**	**Existing Facility**	**No-Build**	**Build**	**Existing Facility**	**No-Build**	**Build**	**Existing Facility**	**No-Build**	**Build**
Year	2019	2045	2045	2019	2045	2045	2019	2045	2045	2019	2045	2045
Number of Lanes	1	1	1	0	0	1	0	0	1	1	1	1
Demand Peak Hour Directional Volume *1	471	740	880	0	0	100	0	0	65	48	495	585
Posted Speed*3	45	45	45			45			45	45	45	45
Tpeak (DHV%)*2	4.3	4.3	4.3			4.3			4.3	4.3	4.3	4.3
MT(DHV%)*2	2.9	2.9	2.9			2.9			2.9	2.9	2.9	2.9
HT (DHV%)*2	1.4	1.4	1.4			1.4			1.4	1.4	1.4	1.4
Buses (DHV%)*3	0.5	0.5	0.5			0.5			0.5	0.5	0.5	0.5
Motorcycles (DHV%)*3	0.4	0.4	0.4			0.4			0.4	0.4	0.4	0.4

Data Sources:

*1 = Poinciana Parkway Design Hour Volumes, CDM Smith, February 3, 2020

*2 =Tpeak, MT & HT DHV% per CDM Smith email to Dewberry, February 3, 2020

*3 = DHV% and posted speed from Noise Analysis Technical Memorandum, Poinciana Parkway Design-Build Project. Osceola County Expressway Authority, February 2016: Appendix B -Traffic Summary Table: Build Roadway Network - Design Year Traffic (2 lanes)(2035)

Appendix C:
Noise Impact Comparison Matrix

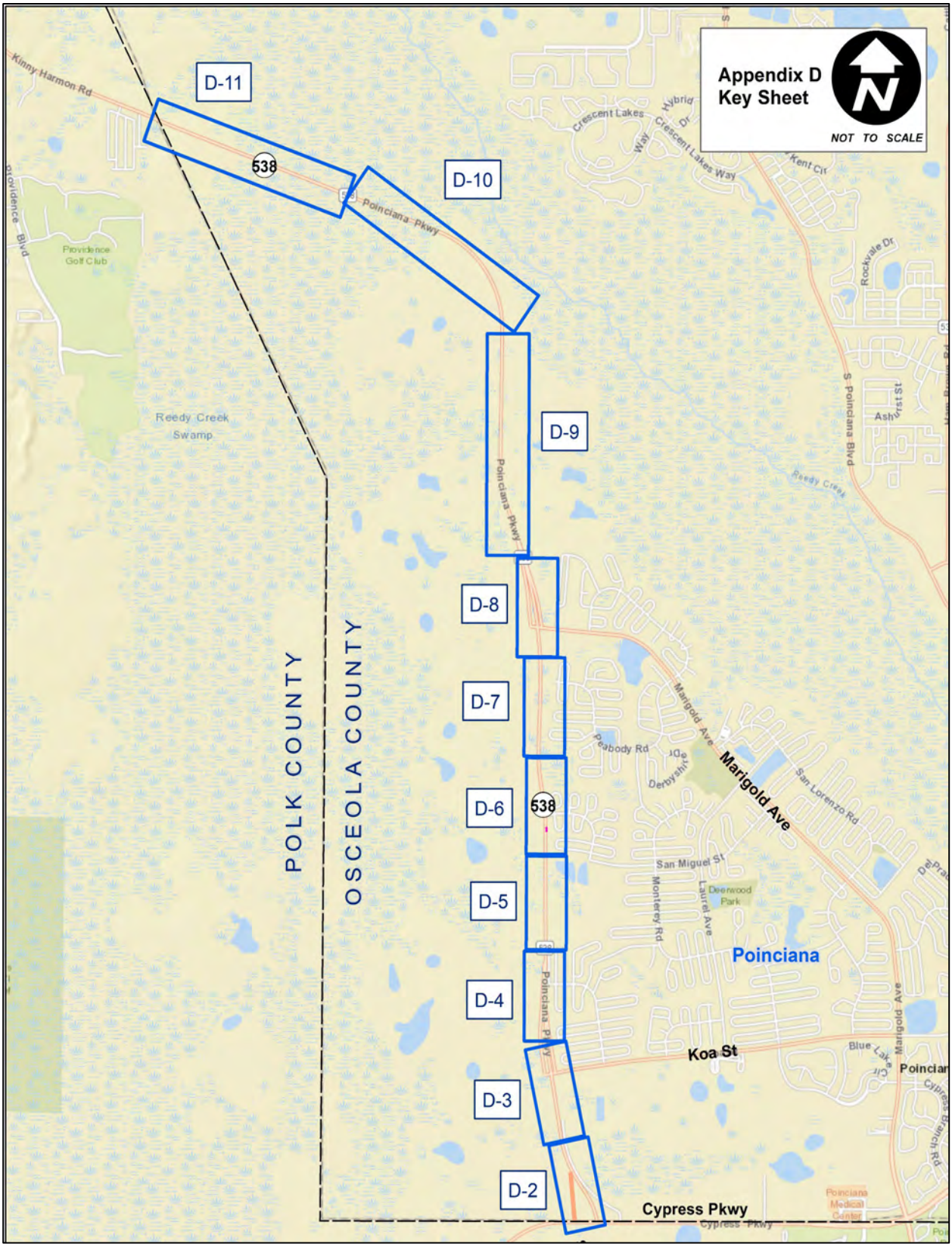
APPENDIX C: Noise Impact Comparison Matrix										
Noise Sensitive Sites				Predicted Noise Levels (dB(A)) *Red = Noise Level above NAC*						
Receptor ID	Activity Category	# Sites Represented	FDOT NAC Impact Criterion (dB(A))	2019 Existing Conditions		2045 No-Build Alternative	2045 Build Alternative			
				Distance to EOP*1 (ft)	Predicted Noise Level (dB(A))	Predicted Noise Level (dB(A))	Distance to EOP*1 (ft)	Predicted Noise Level (dB(A))	Change from Existing (dB(A))	Consider Abatement
NSA 1: Neighborhoods 1 and 2 - Illustrated on Page D-3 thru D-5 in Appendix D										
1-1	B	1	66.0	394	61.0	61.8	394	63.2	2.2	-
1-2	B	1	66.0	316	59.5	60.8	316	63.1	3.6	-
1-3	B	1	66.0	222	58.2	60.5	222	63.6	5.4	-
1-4	B	1	66.0	170	55.4	59.8	170	63.3	7.9	-
1-5	B	1	66.0	126	54.5	60.3	126	63.5	9.0	-
1-6	B	3	66.0	153	52.9	59.2	153	62.8	9.9	-
1-7	B	5	66.0	132	53.1	59.9	132	63.1	10.0	-
1-8	B	1	66.0	186	53.4	61.0	186	64.4	11.0	-
1-9	B	1	66.0	260	50.7	58.1	260	61.6	10.9	-
1-10	B	2	66.0	302	52.0	56.7	302	60.7	8.7	-
1-11	B	2	66.0	248	50.2	56.8	248	61.0	10.8	-
1-12	B	3	66.0	277	48.3	55.0	277	59.1	10.8	-
1-13	B	6	66.0	327	48.1	55.3	327	59.3	11.2	-
1-14	B	1	66.0	253	52.5	59.6	253	63.0	10.5	-
1-15	B	1	66.0	191	54.9	62.1	191	65.3	10.4	-
1-16	B	5	66.0	159	54.8	62.4	159	65.6	10.8	-
1-16.1	B	4	66.0	162	56.2	63.3	162	66.5	10.3	Yes*2
1-17	B	5	66.0	162	55.9	62.4	162	66.1	10.2	Yes*2

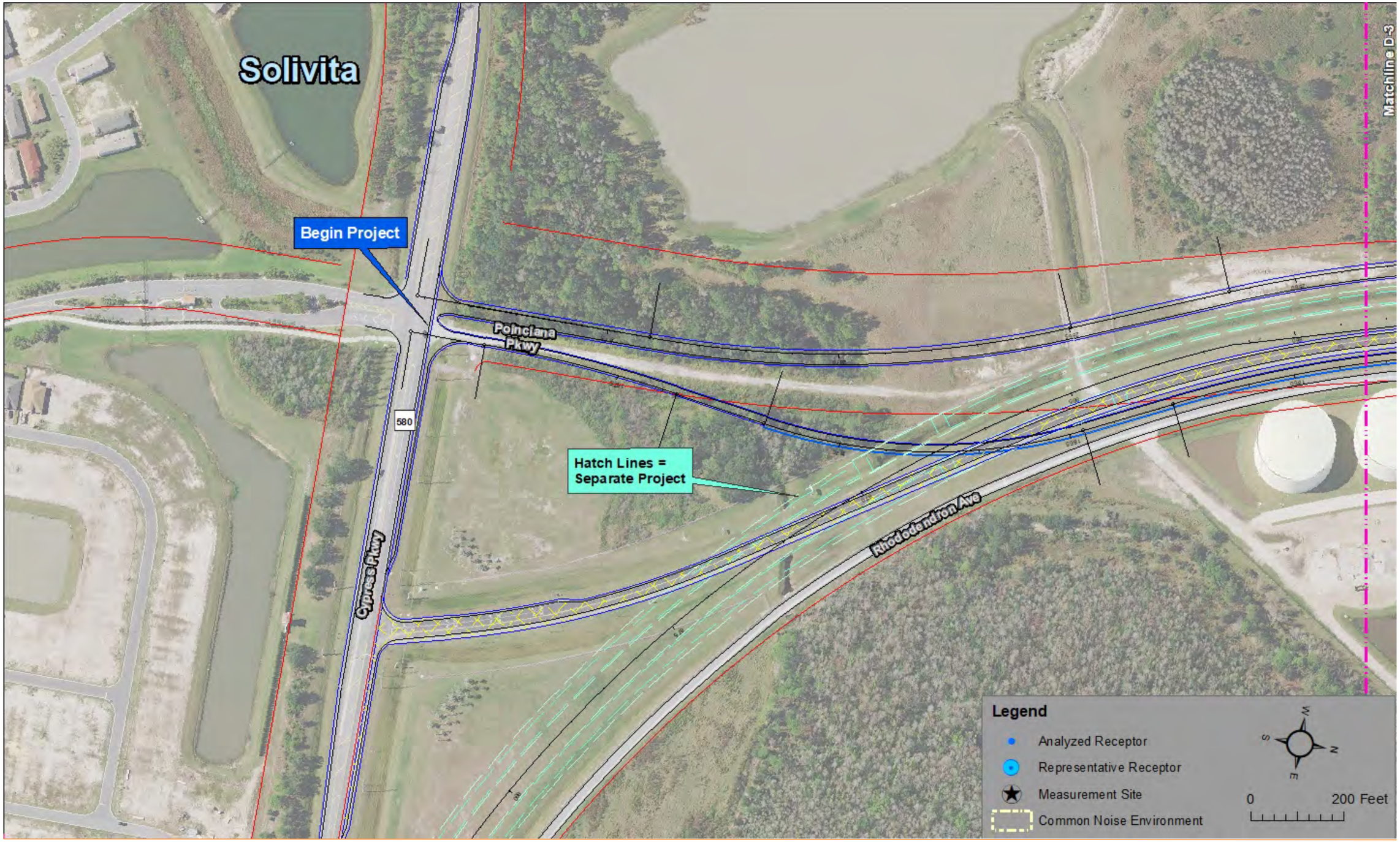
APPENDIX C: Noise Impact Comparison Matrix										
Noise Sensitive Sites				Predicted Noise Levels (dB(A)) *Red = Noise Level above NAC*						
Receptor ID	Activity Category	# Sites Represented	FDOT NAC Impact Criterion (dB(A))	2019 Existing Conditions		2045 No-Build Alternative	2045 Build Alternative			
				Distance to EOP*1 (ft)	Predicted Noise Level (dB(A))	Predicted Noise Level (dB(A))	Distance to EOP*1 (ft)	Predicted Noise Level (dB(A))	Change from Existing (dB(A))	Consider Abatement
1-17.1	B	7	66.0	177	53.8	61.3	177	64.5	10.7	-
1-18	B	2	66.0	232	54.8	60.0	232	64.1	9.3	-
1-19	B	1	66.0	294	52.3	57.5	294	61.9	9.6	-
1-20	B	9	66.0	311	48.3	55.5	311	59.2	10.9	-
1-21	B	12	66.0	312	48.2	55.1	312	59.1	10.9	-
1-22.1	C	1	66.0	195	56.8	61.7	195	65.0	8.2	-
1-22.2	C	1	66.0	447	47.0	52.0	447	56.7	9.7	-
NSA 1 Summary (Totals/Averages)		77			53.3	59.1		62.6	9.3	9
NSA 2: Neighborhood 3- Illustrated on Pages D-5 & D-6 in Appendix D										
2-1	B	2	66.0	178	56.7	61.6	178	65.8	9.1	-
2-2	B	12	66.0	126	59.6	64.5	126	68.0	8.4	Yes*2
2-3	B	2	66.0	280	51.3	56.3	280	60.7	9.4	-
2-4	B	5	66.0	351	48.8	53.7	351	58.7	9.9	-
2-5	B	11	66.0	292	50.6	55.5	292	60.6	10.0	-
2-6	B	1	66.0	224	54.5	59.4	224	63.9	9.4	-
2-7	B	1	66.0	287	51.2	56.1	287	60.9	9.7	-
NSA 2 Summary (Totals/Averages)		34			53.2	58.2		62.7	9.4	12

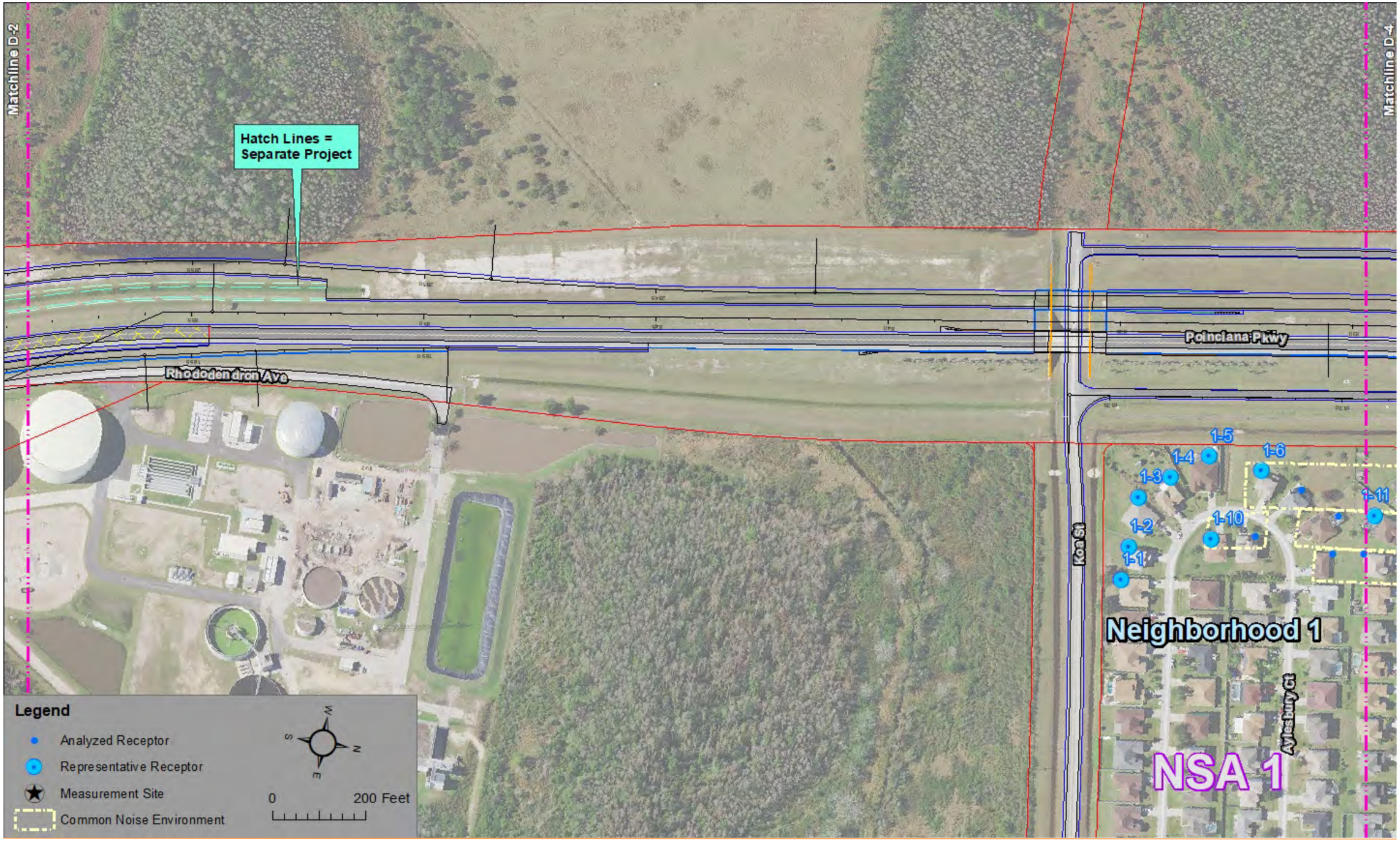
APPENDIX C: Noise Impact Comparison Matrix										
Noise Sensitive Sites				Predicted Noise Levels (dB(A)) *Red = Noise Level above NAC*						
Receptor ID	Activity Category	# Sites Represented	FDOT NAC Impact Criterion (dB(A))	2019 Existing Conditions		2045 No-Build Alternative	2045 Build Alternative			
				Distance to EOP*1 (ft)	Predicted Noise Level (dB(A))	Predicted Noise Level (dB(A))	Distance to EOP*1 (ft)	Predicted Noise Level (dB(A))	Change from Existing (dB(A))	Consider Abatement
NSA 3: Neighborhood 4- Illustrated on Page D-7 in Appendix D										
3-1	B	3	66.0	187	56.0	60.8	187	64.9	8.9	-
3-2	B	1	66.0	292	51.2	56.1	292	60.8	9.6	-
3-3	B	4	66.0	349	49.1	53.9	349	59.0	9.9	-
3-4	B	3	66.0	304	50.7	55.5	298	60.5	9.8	-
3-5	B	13	66.0	395	48.4	53.2	349	59.6	11.2	-
3-6	B	1	66.0	435	49.6	54.0	349	60.8	11.2	-
3-7	B	1	66.0	468	49.1	53.5	379	60.5	11.4	-
3-8	B	1	66.0	540	48.2	52.5	449	59.5	11.3	-
3-9	B	1	66.0	599	47.4	51.6	505	59.0	11.6	-
NSA Summary (Totals/Averages)		28			50.0	54.6		60.5	10.5	0

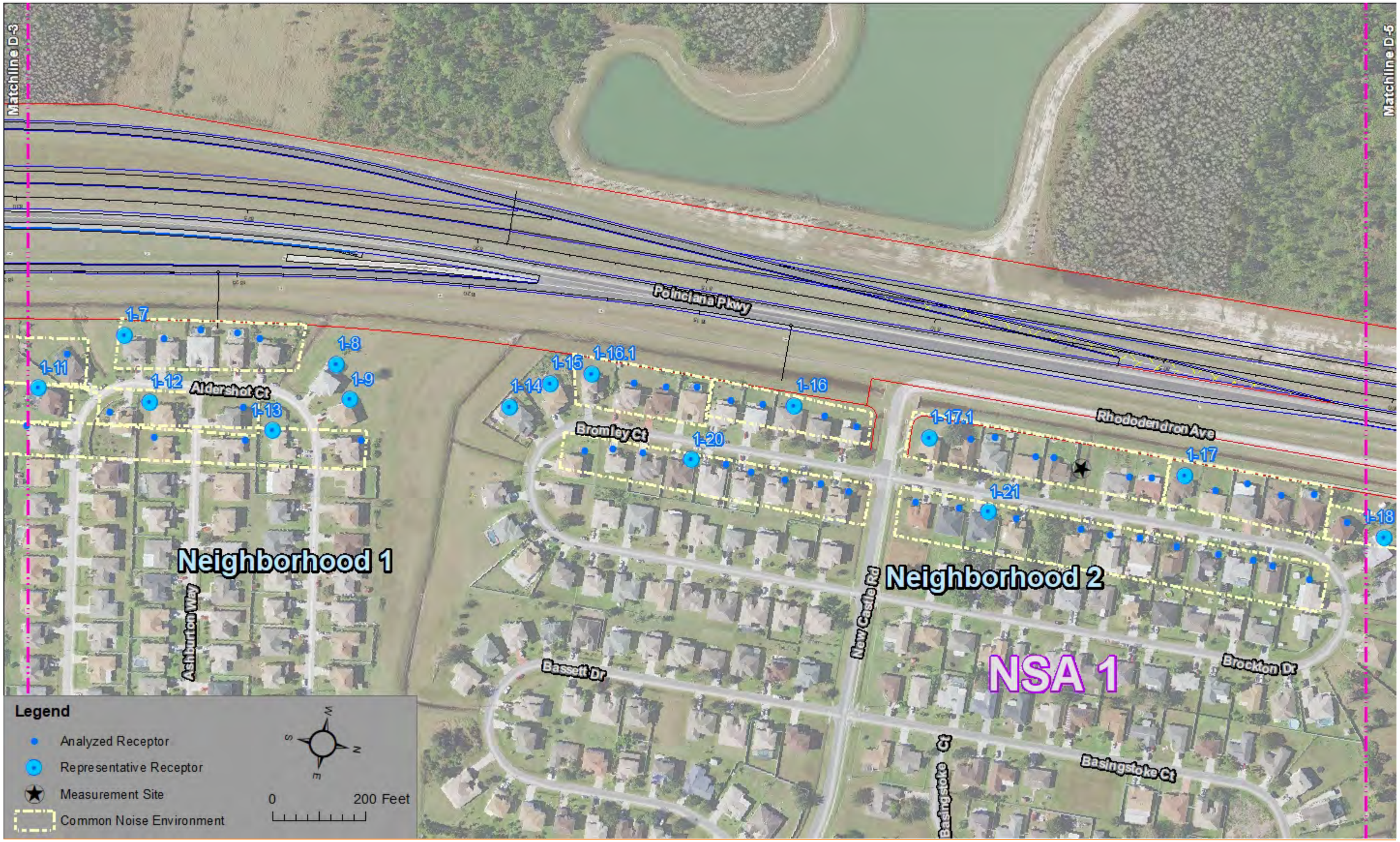
**1 = EOP refers to Edge of pavement (Closest Poinciana Parkway/Ramps)*
**2 = More refined barrier analyses indicate that not all represented sites are impacted.*

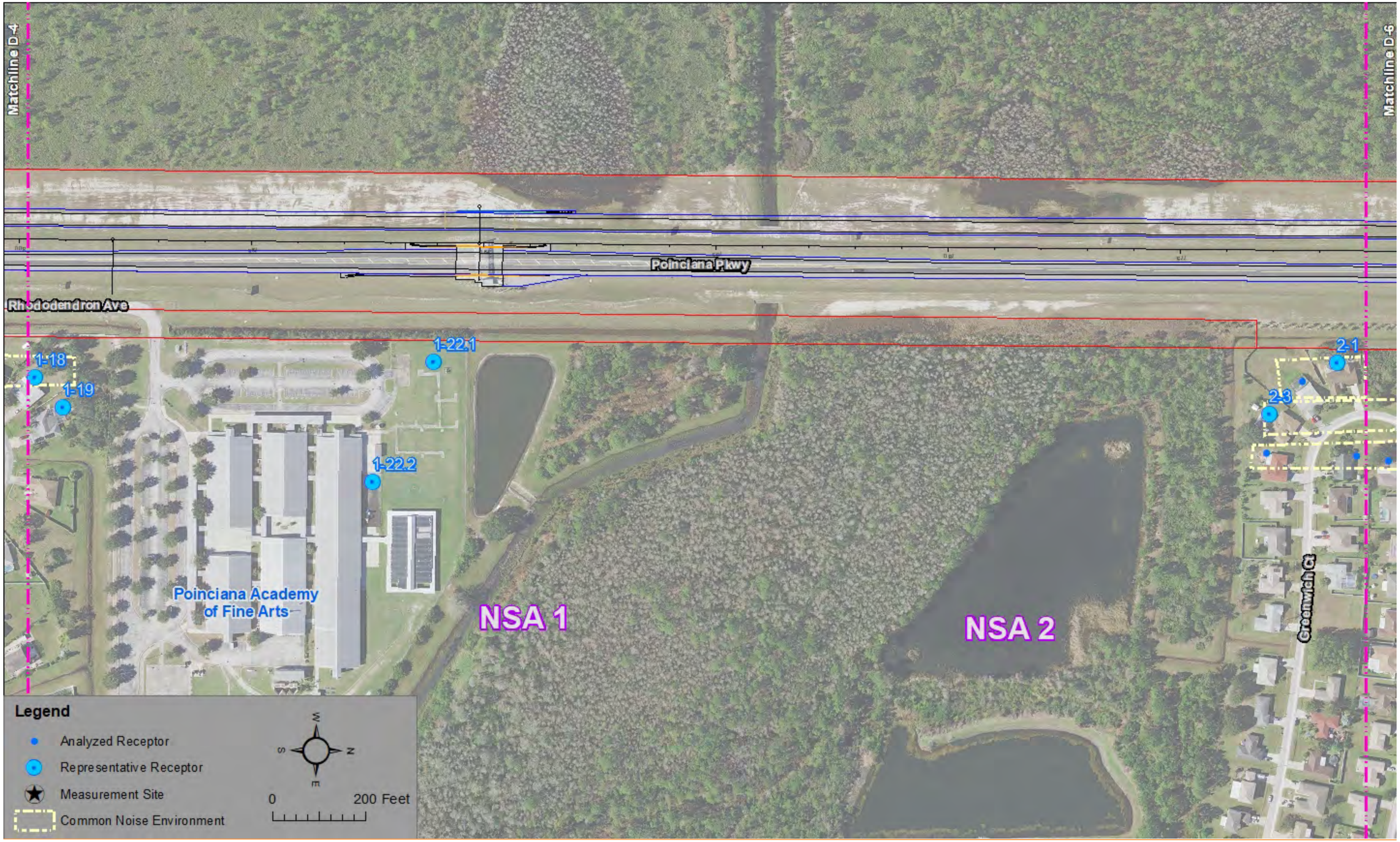
Appendix D:
Project Aerials

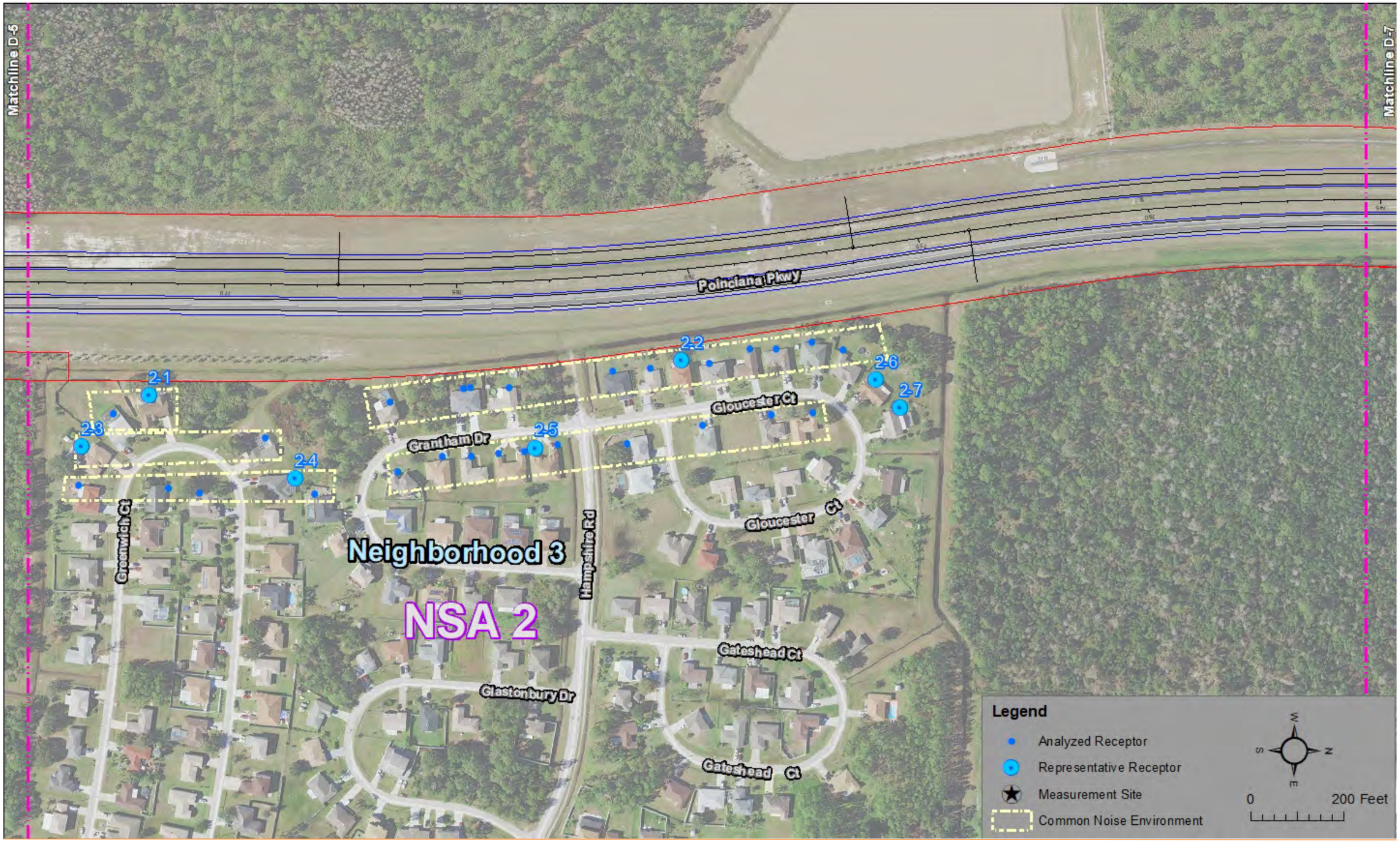

Appendix D
Key Sheet
NOT TO SCALE
D-11
D-10
D-9
D-8
D-7
D-6
D-5
D-4
D-3
D-2
538
Poinciana Pkwy
Kinny Harmon Rd
Providence Blvd
Providence Golf Club
Reedy Creek Swamp
POLK COUNTY
OSCEOLA COUNTY
Crescent Lakes Way
Hybrid Dr
Kent Cir
Rockvale Dr
S Poinciana Blvd
Ashurst St
Reedy Creek
Peabody Rd
Derbyshire
Marigold Ave
San Lorenzo Rd
San Miguel St
Monterey Rd
Laurel Ave
Deerwood Park
Poinciana
Koa St
Blue Lake Cir
Cypress Branch Rd
Poinciana Medical Center
Cypress Pkwy

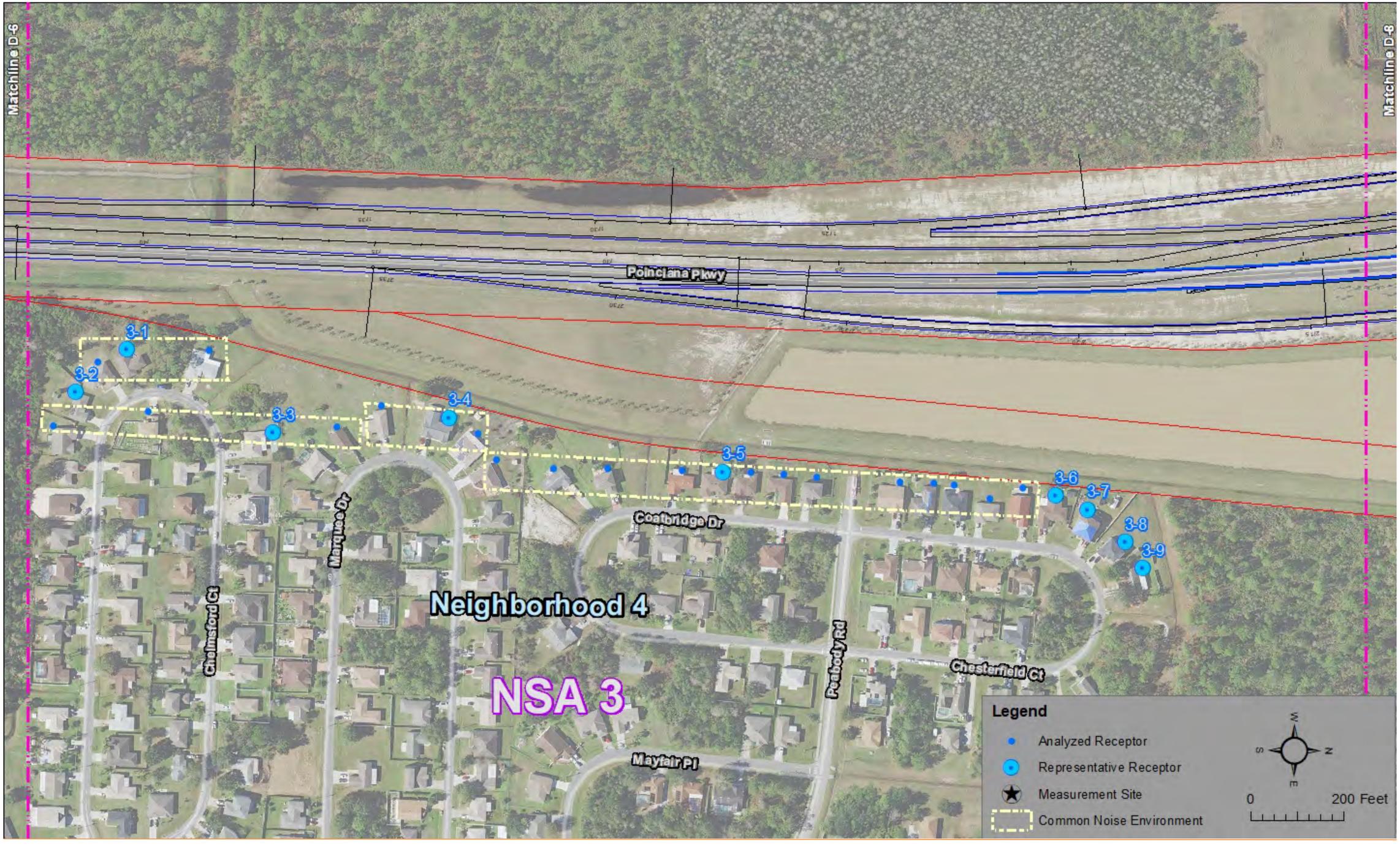

Solivita
Begin Project
Poinciana Pkwy
580
Cypress Pkwy
Hatch Lines =
Separate Project
Rhododendron Ave
Matchline D-3
Legend
Analyzed Receptor
Representative Receptor
Measurement Site
Common Noise Environment
0
200 Feet


Matchline D-2
Matchline D-4
Hatch Lines = Separate Project
Rhododendron Ave
Poinciana Pkwy
Koa St
Aylesbury Ct
1-1
1-2
1-3
1-4
1-5
1-6
1-10
1-11
Neighborhood 1
NSA 1
Legend
Analyzed Receptor
Representative Receptor
Measurement Site
Common Noise Environment
N
S
E
W
0
200 Feet


Matchline D-3
Matchline D-5
Poinciana Pkwy
1-7
1-8
1-9
1-11
1-12
Aldershot Ct
1-13
1-14
1-15
1-16.1
1-16
1-17.1
Rhododendron Ave
1-17
1-18
1-20
1-21
Bromley Ct
Neighborhood 1
Neighborhood 2
NSA 1
Ashburton Way
New Castle Rd
Bassett Dr
Basingstoke Ct
Basingstoke Ct
Brockton Dr
Legend
Analyzed Receptor
Representative Receptor
Measurement Site
Common Noise Environment
N
S
E
W
0
200 Feet


Matchline D-4
Matchline D-6
Poinciana Pkwy
Rhododendron Ave
1-18
1-19
1-22.1
1-22.2
2-1
2-3
Poinciana Academy of Fine Arts
NSA 1
NSA 2
Greenwich Ct
Legend
Analyzed Receptor
Representative Receptor
Measurement Site
Common Noise Environment
N
W
E
S
0
200 Feet


Matchline D-5
Matchline D-7
Poinciana Pkwy
2-1
2-2
2-3
2-4
2-5
2-6
2-7
Gloucester Ct
Grantham Dr
Greenwich Ct
Hampshire Rd
Gloucester Ct
Neighborhood 3
NSA 2
Gateshead Ct
Glastonbury Dr
Gateshead Ct
Legend
Analyzed Receptor
Representative Receptor
Measurement Site
Common Noise Environment
W
S
N
E
0
200 Feet


Matchline D-6
Matchline D-8
Poinciana Pkwy
3-1
3-2
3-3
3-4
3-5
3-6
3-7
3-8
3-9
Coatbridge Dr
Marquise Dr
Chelmsford Ct
Peabody Rd
Chesterfield Ct
Mayfair Pl
Neighborhood 4
NSA 3
Legend
Analyzed Receptor
Representative Receptor
Measurement Site
Common Noise Environment
N
S
E
W
0
200 Feet


Matchline D-7
Matchline D-9
Poinciana Pkwy
Marigold Ave
Eastbourne Rd
Dunbarton Ct
Legend
Analyzed Receptor
Representative Receptor
Measurement Site
Common Noise Environment
N
W
E
S
0
200 Feet


Matchline D-8
Matchline D-10
Poinciana Pkwy
Legend
Analyzed Receptor
Representative Receptor
Measurement Site
Common Noise Environment
N
W
E
S
0
500 Feet


Matchline D-9
Matchline D-11
Poinciana Pkwy
Legend
Analyzed Receptor
Representative Receptor
Measurement Site
Common Noise Environment
0
500 Feet
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community


Matchline D-10
Nature's Path
Sienna Blvd
Sequoia Way
Marabou Dr
Sereno Dr
Tamarind Rd
Kinny Harmon Rd
END PROJECT
N. of Reedy Creek
Mitigation Bank
Poinciana Pkwy
Legend
Analyzed Receptor
Representative Receptor
Measurement Site
Common Noise Environment
S
W
E
N
0
500 Feet
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Appendix E:
Noise Barrier Evaluation Tables

NSA 1: NOISE BARRIER 1 Shoulder Barrier Analysis							
			Option 1	Option 2	Option 3	Option 4	Option 5
		Segment 1 Length (ft):	2003	2044	2404	3804	1321
		Height (ft):	14	14	14	14	8
		Segment 2 Length (ft):	0	0	0	0	2504
		Height (ft):	0	0	0	0	14
Receptor ID	No. of Sites Represented	Noise Level Without Barrier (dB(A))	Noise Level Reduction with Barrier (dB(A))				
1-1	1	63.2	<5.0	<5.0	<5.0	<5.0	<5.0
1-2	1	63.1	<5.0	<5.0	<5.0	<5.0	<5.0
1-3	1	63.6	<5.0	<5.0	<5.0	<5.0	<5.0
1-4	1	63.3	<5.0	<5.0	<5.0	<5.0	<5.0
1-5	1	63.5	<5.0	<5.0	<5.0	<5.0	<5.0
1-6	3	62.8	<5.0	<5.0	<5.0	<5.0	<5.0
1-7	5	63.1	<5.0	<5.0	<5.0	<5.0	<5.0
1-8	1	64.4	<5.0	<5.0	<5.0	5.0	5.4
1-9	1	61.6	<5.0	<5.0	<5.0	<5.0	5.0
1-10	2	60.7	<5.0	<5.0	<5.0	<5.0	<5.0
1-11	2	61.0	<5.0	<5.0	<5.0	<5.0	<5.0
1-12	3	59.1	<5.0	<5.0	<5.0	<5.0	<5.0
1-13	6	59.3	<5.0	<5.0	<5.0	<5.0	<5.0
1-14	1	63.0	<5.0	<5.0	5.0	6.4	6.6
1-15	1	65.3	<5.0	5.1	6.5	7.4	7.8
1-16	1	65.6	7.5	7.6	7.7	7.8	8.0
1-16.1	1	66.5	6.3	6.9	7.8	8.4	8.6
1-16.2	1	66.1	6.7	6.9	7.6	8.0	8.2
1-16.3	1	66.1	7.2	7.4	7.8	8.1	8.3
1-16.4	1	66.3	7.6	7.7	8.1	8.3	8.4
1-16.5	1	65.4	7.2	7.3	7.5	7.7	7.9
1-16.6	1	65.3	7.3	7.3	7.5	7.6	7.8
1-16.7	1	64.9	7.2	7.2	7.4	7.5	7.6
1-16.8	1	64.4	6.9	7.0	7.1	7.2	7.3
1-17	1	66.1	8.1	8.1	8.5	8.5	8.6
1-17.1	1	64.5	7.1	7.1	7.3	7.3	7.4
1-17.2	1	65.1	7.4	7.5	7.6	7.6	7.7
1-17.3	1	65.1	7.4	7.5	7.6	7.6	7.7
1-17.4	2	64.6	7.2	7.2	7.4	7.4	7.5
1-17.5	2	64.8	7.4	7.4	7.7	7.7	7.8
1-17.6	1	64.9	7.2	7.3	7.8	7.8	7.9
1-17.7	1	66.3	7.8	7.8	8.6	8.6	8.6

NSA 1: Noise Barrier 1 Analysis (Cont.)							
			Option 1	Option 2	Option 3	Option 4	Option 5
Segment 1 Length (ft):			2003	2044	2404	3804	1321
Height (ft):			14	14	14	14	8
Segment 2 Length (ft):			0	0	0	0	2504
Height (ft):			0	0	0	0	14
Receptor ID	No. of Sites Represented	Noise Level Without Barrier (dB(A))	Noise Level Reduction with Barrier (dB(A))				
1-17.8	1	65.8	7.0	7.0	8.2	8.2	8.2
1-17.9	1	66.0	6.5	6.6	8.1	8.1	8.2
1-17.10	1	64.7	<5.0	<5.0	7.1	7.1	7.1
1-18	1	64.1	<5.0	<5.0	6.0	6.0	6.0
1-19	1	61.9	<5.0	<5.0	<5.0	<5.0	<5.0
*1 Avg. Noise Reduction (dB(A))			7.2	7.2	7.5	7.5	7.6
*1 Impacted/Not Benefited			0	0	0	0	0
*1 Impacted/Benefited			7	7	7	7	7
*1 Not Impacted/Benefited			14	15	18	19	20
Total Benefited			21	22	25	26	27
Total Cost			$ 841,260	$ 858,480	$1,009,680	$1,597,680	$1,368,720
*3 Cost/Benefited			$ 40,060	$ 39,022	$ 40,387	$ 61,449	$ 50,693
			*2, *3	*2, *3	*2, *3	*2	*2, *4

NOTES:

*1 = Minimum of 5.0 dBA required to be considered benefited by noise barrier.
*2 = Meets the FDOT Noise Reduction Design Goal of 7.0 dB(A) at one benefited receptor.
*3 = FDOT Cost reasonable criterion is $42,000 per benefited receptor.
*4 = CFX Preferred barrier dimension. Carry forward to final design evaluation.

NSA 2: NOISE BARRIER 2 Shoulder Barrier Analysis							
			Option 1	Option 2	Option 3	Option 3A	Option 4
Barrier Length (ft):			1751	1973	1952	2232	2615
Barrier Height (ft):			14	14	14	14	14
Receptor ID	No. of Sites Represented	Noise Level Without Barrier (dB(A))	Noise Level Reduction with Barrier (dB(A))				
2-1	1	65.8	<5.0	6.1	6.5	6.8	7.7
2-1.1	1	64.1	<5.0	<5.0	5.1	5.5	6.7
2-2	1	68.0	5.9	6.1	6.0	6.4	6.5
2-2.1	1	64.6	5.8	6.1	6.1	6.2	6.5
2-2.2	2	66.0	5.1	5.4	5.4	5.5	5.7
2-2.3	1	66.4	<5.0	5.1	5.1	5.3	5.4
2-2.4	1	67.5	5.4	5.6	5.5	5.7	5.9
2-2.5	1	67.6	5.5	5.7	5.6	5.9	6.0
2-2.6	1	67.9	5.7	6.1	5.8	6.3	6.5
2-2.7	1	69.1	6.3	6.8	6.5	7.2	7.4
2-2.8	1	69.0	6.4	7.2	6.7	7.7	7.9
2-2.9	1	69.2	6.8	8.1	7.2	8.9	9.2
2-2.10	1	67.5	5.5	7.2	6.0	8.3	8.7
2-3	1	60.7	<5.0	<5.0	<5.0	<5.0	5.1
2-3.1	1	61.5	<5.0	5.1	5.3	5.4	5.7
2-4	1	58.7	<5.0	<5.0	<5.0	<5.0	<5.0
2-4.1	1	57.7	<5.0	<5.0	<5.0	<5.0	<5.0
2-4.2	1	57.1	<5.0	<5.0	<5.0	<5.0	<5.0
2-4.3	1	57.5	<5.0	<5.0	<5.0	<5.0	<5.0
2-4.4	1	57.8	<5.0	<5.0	<5.0	<5.0	<5.0
2-5	2	60.6	<5.0	<5.0	<5.0	<5.0	<5.0
2-5.1	1	59.1	<5.0	<5.0	<5.0	<5.0	<5.0
2-5.2	1	60.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-5.3	1	60.2	<5.0	<5.0	<5.0	<5.0	<5.0
2-5.4	2	60.2	<5.0	<5.0	<5.0	<5.0	<5.0
2-5.5	1	59.4	<5.0	<5.0	<5.0	<5.0	<5.0
2-5.6	1	58.5	<5.0	<5.0	<5.0	<5.0	<5.0
2-5.7	1	58.6	<5.0	<5.0	<5.0	<5.0	<5.0
2-5.8	1	58.3	<5.0	<5.0	<5.0	<5.0	<5.0
2-6	1	63.9	<5.0	<5.0	<5.0	6.2	6.7
2-7	1	60.9	<5.0	<5.0	<5.0	<5.0	5.3

NSA 2: Shoulder Barrier Analysis (Cont.)					
	Option 1	**Option 2**	**Option 3**	**Option 3A (Preferred)**	**Option 4**
Barrier Length (ft):	**1751**	**1973**	**1952**	**2232**	**2615**
Barrier Height (ft):	**14**	**14**	**14**	**14**	**14**
*1 Avg. Noise Reduction (dB(A))	5.8	6.2	5.9	6.5	6.6
*1 Impacted/Not Benefited	1	0	0	0	0
*1 Impacted/Benefited	10	11	11	11	11
*1 Not Impacted/Benefited	1	3	4	5	7
Total Benefited	11	14	15	16	18
Total Cost	$ 735,420	$ 828,660	$ 819,840	$ 937,440	$ 1,098,300
*3 Cost/Benefited	$ 66,856	$ 59,190	$ 54,656	$ 58,590	$ 61,017
		*2	*2	*2, *4	*2

NOTES:

*1 = Minimum of 5.0 dBA required to be considered benefited by noise barrier.
*2 = Meets the FDOT Noise Reduction Design Goal of 7.0 dB(A) at one benefited receptor.
*3 = FDOT Cost reasonable criterion is $42,000 per benefited receptor.
*4 = CFX Preferred barrier dimension. Carry forward to final design evaluation.