I-75 REST AREAS PROJECT DEVELOPMENT AND ENVIRONMENT (PD&E) STUDY

SARASOTA AND CHARLOTTE COUNTIES

DRAFT NOISE STUDY REPORT

FINANCIAL PROJECT NO.: 423373-1-22-01

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FDOT

EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study to identify sites for the placement of one northbound (NB) and one southbound (SB) rest area facility along I-75. In April of 2015, the FDOT closed the Jones Loop Road Rest Area at exit 161 in Charlotte County. This facility was an "off-system" rest area that serviced vehicles in both directions of I-75. The closure of this facility increased the distance between existing rest area facilities. The purpose of this study is to identify the optimal locations of two new rest areas (northbound and southbound) that will replace the recently closed rest area.

Following a site selection process, two preferred rest area sites have been identified along I-75, one each in the northbound and southbound direction: Alternative Site NB-2B is located on the east side of I-75 just south of the Airport Road overpass in Charlotte County; Alternative Site SB-2 is located on the west side of I-75 just south of Airport Road in Charlotte County.

As part of this PD&E Study, a traffic noise analysis has been conducted in accordance with FDOT's PD&E Manual, Chapter 17. The Preferred Build Alternative (i.e., Alternative Sites NB-2B and SB-2) is predicted to result in traffic noise impacts at one location: the Punta Gorda Alliance Church playground area. Noise abatement measures were evaluated for this site in accordance with FDOT policy. It was determined that traffic system management techniques, alignment modifications and property acquisition are not reasonable abatement measures. Land use controls were identified as a feasible abatement measure that could be used in the future by local officials to minimize the permitting and construction of incompatible land uses along the I-75 corridor.

The results of this study indicate that noise barriers would not be a feasible and cost reasonable method of reducing traffic noise levels for the impacted playground area at Punta Gorda Alliance Church. Because the church playground is relatively small, it is not reasonable to assume that the playground would experience sufficient usage to satisfy FDOT's Special Use Locations criteria for noise abatement; therefore, a noise barrier is not considered reasonable at this location.

Based on the noise analyses performed in this study, there appears to be no apparent solutions available to mitigate the predicted noise impacts at the Punta Gorda Alliance Church where noise barriers have not been recommended. The traffic noise impact to this noise sensitive site is an unavoidable consequence of the project. Because of the low number of unavoidable impacted sites (i.e., one), the noise impacts associated with this project are not considered significant.

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1 Introduction

1.1 Purpose

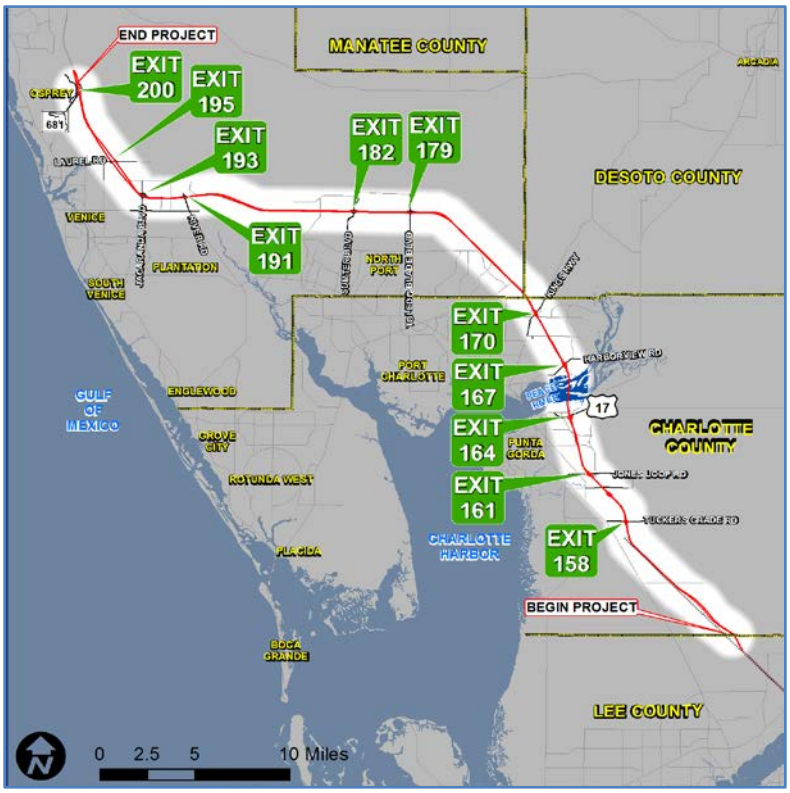
The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study to identify sites for the replacement of the rest area facilities along I-75 in Charlotte County. The purpose of this study is to identify the optimal locations of two new rest areas (northbound and southbound) that will replace the recently closed rest area. In April of 2015, the FDOT closed the Jones Loop Road Rest Area at exit 161. This facility was an "off-system" rest area that serviced vehicles in both directions of I-75. The closure of this facility increased the distance between existing rest area facilities. One of the considerations for the placement of the new rest area facilities will be that they are as equidistant to the existing rest area sites as possible.

As part of this PD&E Study, a noise study is being conducted in accordance with FDOT's Project Development and Environment Manual, Chapter 17, "Highway Traffic Noise" and with Title 23 CFR (Code of Federal Regulations) Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise. The primary objectives of this noise study are to: 1) describe the existing site conditions including noise sensitive land uses within the project study area, 2) document the methodology used to conduct the noise assessment, 3) assess the significance of traffic noise levels on noise sensitive sites for both the No Build Alternative and the Preferred Build Alternative, and 4) evaluate mitigative measures for those noise sensitive sites that approach or exceed Federal Highway Administration's (FHWA) Noise Abatement Criteria (NAC). Other objectives of this study include consideration of impacts related to construction noise and vibration, and the development of noise level contours, which can be used in the future to identify compatible land uses. The methods and results of this noise study are summarized in this report. The information within this report is also intended to provide the technical support for the findings presented in the Preliminary Engineering Report (PER) and Type 2 Categorical Exclusion Environmental Determination Form.

1.2 Project Description

The study limits extend from the Charlotte/Lee County line north to the interchange of SR 681 and I-75, see **Figure 1-1**. The total study corridor length is approximately 51 miles (22 miles in Charlotte County and 29 miles in Sarasota County). Note that there is a very small portion (approximately 0.214 miles) of I-75 located in DeSoto County between Charlotte County and Sarasota County. For this study, this portion is included in the Sarasota County portion of the project. The project identifies two sites for new rest areas along I-75, one each in the northbound and southbound direction.

Figure 1-1: Project Location Map



To identify the best potential location for the new rest areas along I-75, a three phase evaluation process was conducted. During the first phase, data was collected from a variety of sources to develop a preliminary base map of the corridor's existing conditions within the study limits between the Charlotte/Lee County line and SR 681 in Sarasota County. During the second phase, an initial corridor screening was conducted to locate segments within the corridor with potential for a new rest area site. The third and final phase included a viability screening of the initially identified segments to determine which locations provided the most potential for the new rest area sites.

After the first and second phases were conducted, ten viable segments were identified including potential sites at the existing Punta Gorda WIM stations (northbound and southbound). Each of the ten viable segments were then analyzed and evaluated for potential impacts to the 100-year floodplain, wetlands, and listed species habitat in accordance with the site selection criteria for avoidance and minimization of impacts to these environmental features. After the conclusion of the screening, four segments were recommended for further study. These four segments were NB WIMS, NB-2, SB WIMS, and SB-2. The other segments were recommended to be eliminated from further consideration due to their comparatively higher impacts to the natural environment, including wetlands and available natural habitat. After reviewing the engineering and environmental factors, as well as public comments, the following sites were selected as the Preferred Alternatives:

- Southbound Site SB-2
- Northbound Site NB-2B

1.3 Proposed Improvements

The proposed improvements consist of two new rest area sites: Alternatives NB-2B and SB-2. Alternative NB-2B (**Figure 1-2**) is located on the east side of I-75 just south of the Airport Road overpass in Charlotte County. The site consists of open improved pasture. This alternative develops an auxiliary lane north of North Jones Loop Road. This lane becomes a single exit only lane ramp to the rest area. This single lane ramp then separates into two single lane ramps. One ramp is for cars and the other ramp is for trailer trucks and RVs. Two ramps leading from the separate parking areas converge into a single lane ramp. This single lane ramp then merges with I-75 as a parallel entrance ramp.

In addition to the parking for vehicles, the rest area site includes the main building with restrooms, vending, and security, as well as picnic shelters, a dog park and a maintenance building.

The total right-of-way impact for this site is approximately 14.4 acres. This includes the acreage for the site, ponds, and floodplain compensation sites. No residential or businesses relocations are anticipated with this alternative.

Alternative SB-2 (**Figure 1-3**) is located on the west side of I-75 just south of Airport Road in Charlotte County. The site consists primarily of open improved pasture. This alternative develops an auxiliary lane north of Airport road. This lane becomes a single exit only lane ramp to the rest area. This single lane ramp then separates into two single lane ramps. One ramp is for cars and the other ramp is for trailer trucks and RVs. Two ramps leading from the separate parking areas converge into a single lane ramp. This single lane ramp then merges with I-75 as a parallel entrance ramp.

In addition to the parking for vehicles, the rest area site includes the main building with restrooms, vending, and security, as well as picnic shelters, a dog park and a maintenance building.

The total right-of-way impact for this site is approximately 17.5 acres. This includes the acreage for the site, ponds, and floodplain compensation sites. No residential or businesses relocations are anticipated with this alternative.

For reference, **Figure 1-4** displays the existing land use attributes of the study area.

Figure 1-2: Alternative NB-2B

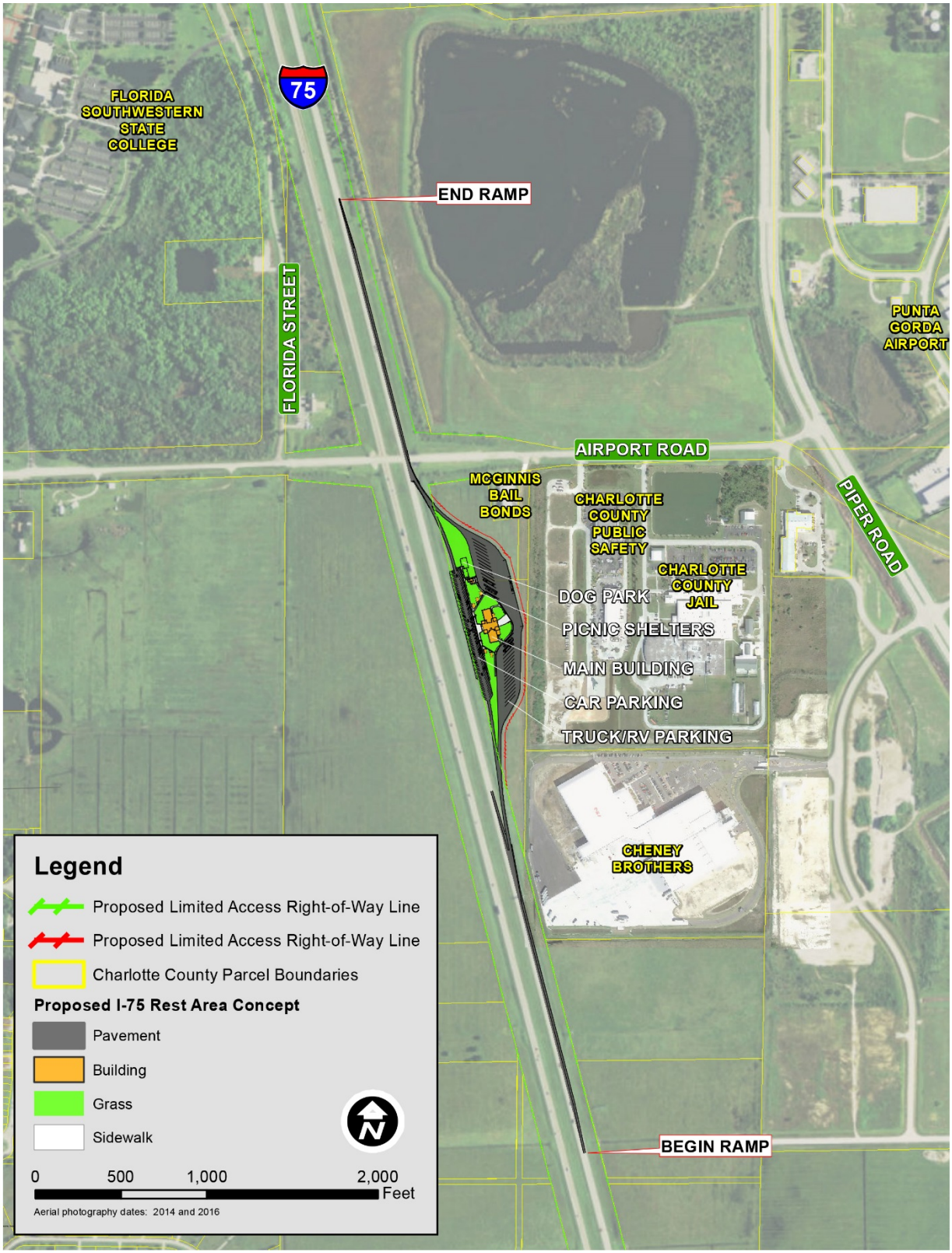


Figure 1-3: Alternative SB-2

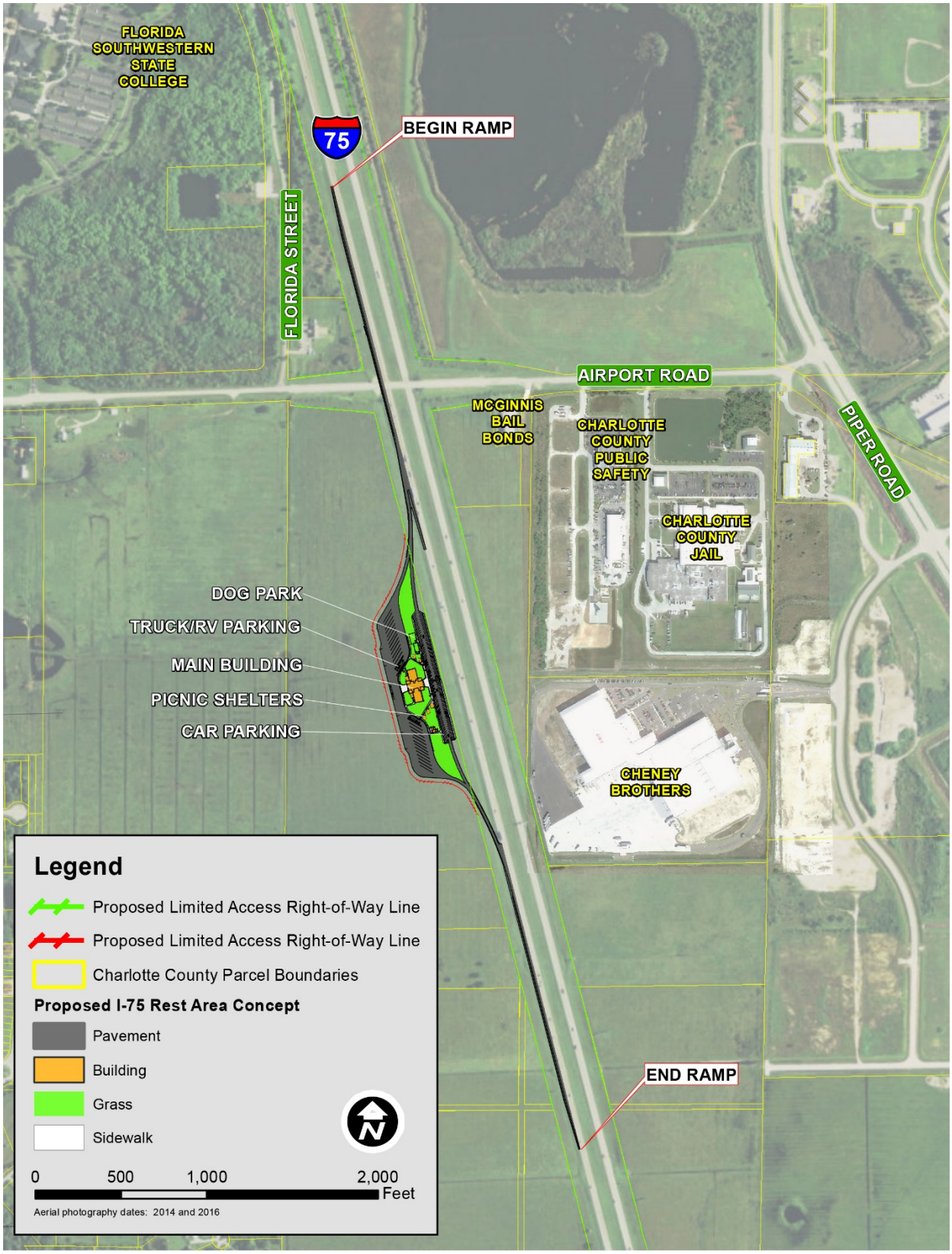
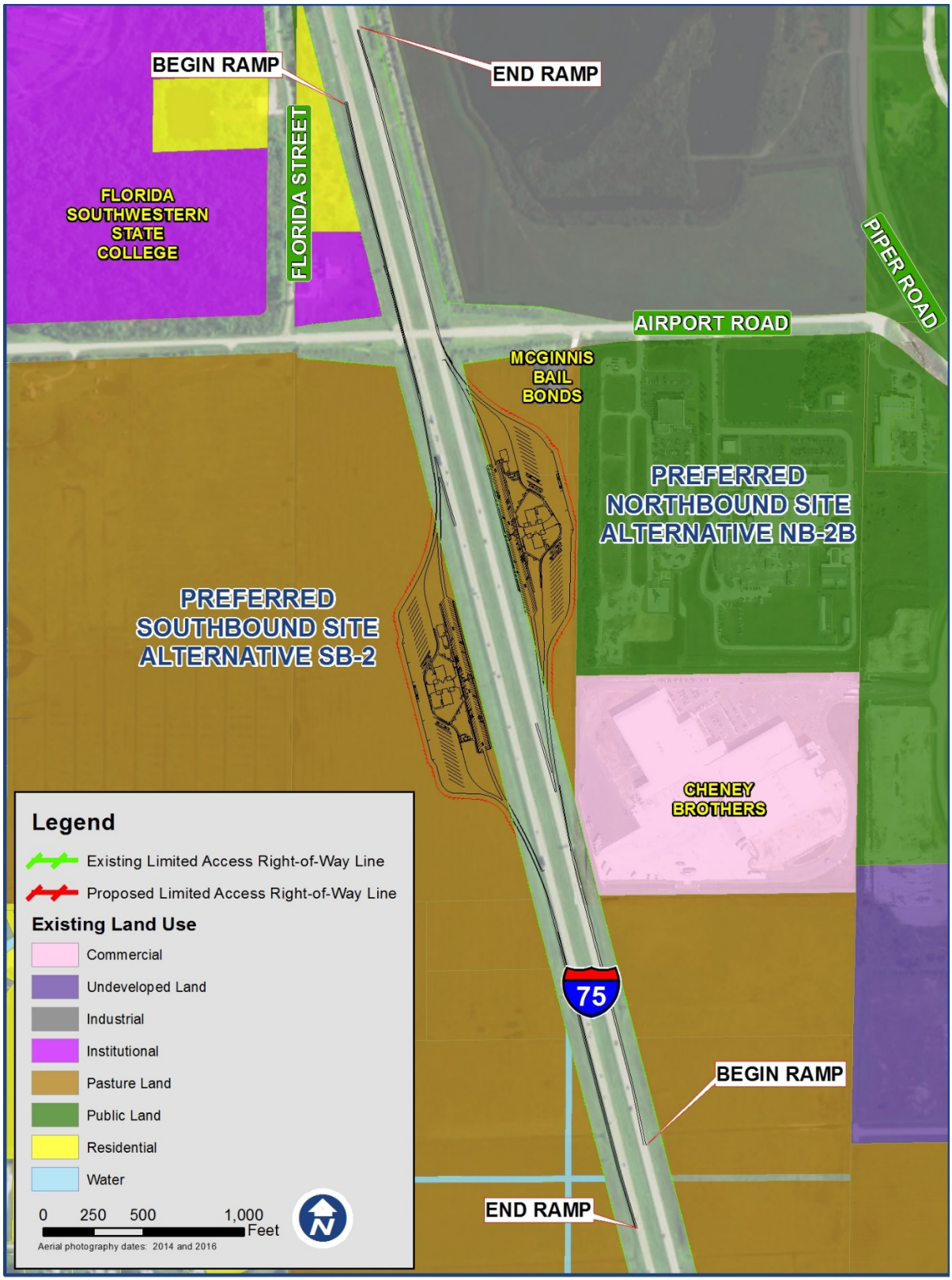


Figure 1-4: Existing Land Use Map



2 Methodology

2.1 Noise Metrics

This study was prepared in accordance with Title 23 CFR Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise. The evaluation used methodology established by the FDOT and documented in the PD&E Manual, Part 2, Chapter 17 (July 2016). The methods and results of the traffic noise analysis are summarized within this section and involved the following procedures:

- Identification of Noise Sensitive Receptors;
- Field Measurement of Noise Levels and Noise Model Validation;
- Prediction of Existing Future Noise Levels;
- Assessment of Traffic Noise Impacts; and
- Consideration of Noise Abatement Procedures.

Noise levels documented in this report represent the hourly equivalent sound level (LAeq1h). LAeq1h is the steady-state sound level, which contains the same amount of acoustic energy as the actual time-varying sound level over a one-hour period. LAeq1h is measured in A-weighted decibels (dB(A)), which closely approximate the human frequency response. Sound levels of typical noise sources and environments are provided in **Table 2-1** as a frame of reference.

2.2 Traffic Data

Traffic data used in this noise study was obtained from the Design Traffic Technical Memorandum (October 2016) prepared as part of this PD&E Study and the Level of Service (LOS) "C" volumes provided in the generalized tables of FDOT's Quality/Level of Service Handbook (updated 2013). **Table 2-2** summarizes the peak hour demand traffic volumes and LOS "C" volumes for the project corridor and the traffic data used in the prediction of traffic noise levels by vehicle type for the Existing Conditions, No Build Alternative, and the Preferred Build Alternative (i.e., Alternatives NB-2B and SB-2). Traffic volumes used to predict noise levels in this study included the least of either: 1) the traffic capacity of the roadway at LOS "C" or 2) the projected traffic demand of the roadway. The vehicle mix (i.e., percentage of cars, heavy trucks, medium trucks, etc.) for each roadway segment analyzed in this study was based on the latest Annual Vehicle Classification Report (2015) for FDOT Count Site 0350 (telemetered site) along I-75 in Charlotte County. The vehicle speeds used in TNM (Version 2.5) were based on the expected posted speed limit or the roadway design speed (ramps) along this portion of I-75. These traffic volumes can be expected to produce the noisiest traffic conditions likely to occur during the design year. Additional documentation for the traffic data used in this study is provided in **Appendix A**.

Table 2-1 Sound Levels Typical of Noise Sources and Environments

COMMON OUTDOOR ACTIVITIES	NOISE LEVEL dBA	COMMON INDOOR ACTIVITIES
	---110---	Rock Band
Jet Fly-over at 300 m (1000 ft)		
	---100---	
Gas Lawn Mower at 1 m (3 ft)		
	---90---	
Diesel Truck at 15 m (50 ft), at 80 km/hr (50 mph)		Food Blender at 1 m (3 ft)
	---80---	Garbage Disposal at 1 m (3 ft)
Noisy Urban Area, Daytime		
Gas Lawn Mower, 30 m (100 ft)	---70---	Vacuum Cleaner at 3 m (10 ft)
Commercial Area		Normal Speech at 1 m (3 ft)
Heavy Traffic at 90 m (300 ft)	---60---	
		Large Business Office
Quiet Urban Daytime	---50---	Dishwasher Next Room
Quiet Urban Nighttime	---40---	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	---30---	Library
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (Background)
	---20---	
		Broadcast/Recording Studio
	---10---	
Lowest Threshold of Human Hearing	---0---	Lowest Threshold of Human Hearing

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

2.3 Noise Abatement Criteria

The FHWA has established NAC by land use activity categories. The NAC levels are presented in **Table 2-3**. Noise abatement measures must be considered when predicted noise levels approach or exceed the NAC levels or when a substantial noise increase occurs at a noise sensitive receptor site. A substantial noise increase occurs when the existing noise level is predicted to be exceeded by 15 dB(A) or more as a result of the transportation improvement project. The FDOT defines "approach" as within 1.0 dB(A) of the FHWA criteria. Based on the findings of the PD&E noise study, no substantial increases in traffic noise attributable to the project will occur.

Noise sensitive receptor sites include properties where frequent human use occurs. This includes the exterior of residential land use (Activity Category B); a variety of exterior nonresidential land uses including parks and recreational areas, medical facilities, schools, and places of worship (Activity Category C); and commercial and developed properties including offices, hotels, and restaurants with exterior areas of use (Activity Category E). Noise sensitive sites also include interior use areas for facilities such as auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, recording studios, schools, and television studios (Activity Category D). Categories F and G and commercial and developed properties without exterior areas of use do not have noise abatement

Table 2-2: Traffic Data for Noise Analysis

Roadway	Roadway Segment	Direction	Number of Through Lanes	Predicted Peak Hour Demand Volume		Level of Service C Volume*	Volume Used In TNM	Cars	Medium Trucks	Heavy Trucks	Buses	Motor-cycles	Posted Speed (MPH)
				(AM)	(PM)								
Existing Condition (Year 2014)													
I-75	Between Jones Loop and US 17	Northbound	2	1,712	2,015	2,880	2,015	1,764	76	164	7	4	70
		Southbound	2	1,606	1,698	2,880	1,698	1,487	64	138	6	3	
No-Build Alternative (Design Year 2045)													
I-75	Between Jones Loop and US 17	Northbound	3	4,113	3,366	4,280	4,113	3,601	156	334	14	8	70
		Southbound	3	3,366	4,113	4,280	4,113	3,601	156	334	14	8	
Preferred Alternative (Design Year 2045)													
I-75	South of Rest Areas	Northbound	3	4,113	3,366	4,280	4,113	3,601	156	334	14	8	70
		Southbound	3	3,366	4,113	4,280	4,113	3,601	156	334	14	8	
	Between Rest Area Ramps	Northbound	3	3,675	3,008	4,280	3,675	3,218	139	298	12	7	70
		Southbound	3	3,008	3,675	4,280	3,675	3,218	139	298	12	7	
	North of Rest Areas	Northbound	3	4,113	3,366	4,280	4,113	3,601	156	334	14	8	70
		Southbound	3	3,366	4,113	4,280	4,113	3,601	156	334	14	8	
Rest Area Ramps	NB I-75 Rest Area	NB Off Ramp	1	438	358	N/A	438	358	25	55	0	0	35
		NB On Ramp	1	438	358	N/A	438	358	25	55	0	0	
	SB I-75 Rest Area	SB Off Ramp	1	358	438	N/A	438	358	25	55	0	0	35
		SB On Ramp	1	358	438	N/A	438	358	25	55	0	0	

* LOS "C" volumes obtained from Table 8 of FDOT's Quality/Level of Service Handbook (2013)

Table 2-3 Noise Abatement Criteria [Hourly A-Weighted Sound Level Decibels (dB(A))]

Activity Category	Activity Leq(h)[1]		Evaluation Location	Description of Activity Category
	FHWA	FDOT		
A	57	56	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67	66	Exterior	Residential
C[2]	67	66	Exterior	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	51	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[2]	72	71	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	-	-	-	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	-	-	-	Undeveloped lands that are not permitted.

(Based on Table 1 of 23 CFR Part 772)

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

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

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

criteria levels. Category F includes land uses such as industrial and retail facilities that are not considered noise sensitive as stated in 23 CFR 772. Category G includes undeveloped lands.

For single family residences (i.e., Activity Category B), traffic noise levels were predicted at the edge of the dwelling closest to the travel lanes. The locations of the noise sensitive receptors included in this study are depicted in **Figure 3-1 Noise Analysis Map** provided in Section 3.

2.4 Noise Abatement Measures

FDOT considers noise abatement measures when future traffic noise levels attributed to a proposed roadway widening approach or exceed the NAC, or when levels increase substantially. Since noise levels from the preferred build alternative are predicted to approach or exceed the NAC at one noise sensitive (special use) site, the feasibility and cost reasonableness of noise abatement measures were evaluated for this site. As outlined in the PD&E Manual, Part 2, Chapter 17, these measures may include traffic management, alignment modifications, buffer zones (land use controls), and noise barriers. The following sections further describe each of these potential noise abatement measures.

2.4.1 Traffic Management

Traffic control measures that limit motor vehicle speeds and restrict certain vehicle types can be effective noise mitigation measures. However, these measures may also negate a project's ability to meet the need of the facility. For example, prohibiting heavy trucks from using I-75 would lower traffic noise levels; however, it would also prevent the interstate system from serving its purpose of moving people and goods throughout the region. Therefore, this method of noise mitigation is not reasonable for this project.

2.4.2 Alignment Modifications

Alignment modification involves shifting the roadway alignment at sufficient distances from noise sensitive areas to minimize traffic noise. Since this project involves the construction of new rest areas along an existing interstate facility, the existing alignment dictates the placement of the proposed new rest areas. Several alternative rest area sites were analyzed and the preferred sites were selected in part due to their avoidance of noise sensitive sites. For these reasons, alignment modifications are not a reasonable measure to reduce noise levels associated with this project.

2.4.3 Buffer Zones

Another noise abatement measure is to use buffer zones, or land use controls, to minimize impacts to future development. Providing a buffer between a highway and future noise sensitive land uses is an abatement measure that can minimize/eliminate noise impacts in areas of future development. To encourage use of this abatement measure through local land use planning, noise contours have been developed.

These contours represent the approximate distance from the nearest I-75 edge of pavement to the limits of the area predicted to approach [i.e., within 1 dB(A)] or exceed the NAC in the design year for Activity Categories A, B/C, and E. These noise contours, which delineate points of equal noise level, do not consider any shielding of noise provided by structures between the noise sensitive receiver and the roadway (e.g., trees or buildings). **Table 2-4** will assist local officials in planning and permitting future noise compatible

land uses adjacent to I-75. To minimize the potential for incompatible land use, noise sensitive land uses should be located beyond these distances.

Table 2-4 Design Year Build Alternative Noise Contours

Roadway Segment	Estimated Contour Distances (feet from nearest edge of pavement)		
	Category A	Category B and C	Category E
	56 dB(A)	66 dB(A)	71 dB(A)
I-75 in vicinity of Proposed Rest Areas	1,160	410	240

2.4.4 Noise Barriers

Noise barriers reduce noise levels by blocking the sound path between a roadway and noise sensitive site. To effectively reduce traffic noise, a noise barrier must be relatively long, continuous (with no intermittent openings for driveways, etc.) and of sufficient height.

Per FHWA guidance, the FDOT established a policy in *A Method to Determine Reasonableness and Feasibility of Noise Abatement at Special Use Locations* to evaluate cost reasonableness of nonresidential developments, such as recreation areas, walking trails, hotels, motels, offices, restaurants, etc. This method evaluates the intensity of use of the facility and assigns a value to each user to determine cost reasonableness. Current procedure is to evaluate these uses and, if impacted, preform a noise barrier analysis demonstrating that the number of person-hours of use on an average day would not be achieved based on common sense application (i.e., expected use) at each impacted noise sensitive site.

Noise barriers located along the right-of-way line were evaluated in TNM for heights ranging from 14 feet to 22 feet in 2-foot increments. For a particular height, the length of a barrier was optimized to minimize cost while trying to maintain at least a 5 dB(A) reduction at noise sensitive sites that have predicted noise levels that approach or exceed the NAC. For a noise barrier to be considered feasible and economically reasonable, the following minimum conditions must be met:

- A noise barrier must provide at least the minimum noise reduction of 5 dB(A) at two impacted noise sensitive sites with a reduction of 7 dB(A) or more at one impacted noise sensitive site.
- The cost of the noise barrier should not exceed $42,000 per benefited noise sensitive site. This is the reasonable cost limit established by FDOT. A benefited noise sensitive site is defined as a site that would experience at least a 5-dB(A) reduction as a result of constructing a noise barrier. The current average unit cost used to evaluate economic reasonableness is $30 per square foot, which covers barrier materials and labor.

The evaluation of noise barriers for sites predicted to be impacted by this project is presented below in Section 3.3.

3 Traffic Noise Analysis

This section describes the steps taken to complete the PD&E phase traffic noise analysis. This analysis utilized the best available elevation data (LiDAR) and preliminary roadway design concepts to identify noise impacts and evaluate the effectiveness of noise barriers along the project limits.

3.1 Model Validation

Noise measurements were taken at representative locations within the project limits to verify that TNM-predicted noise levels are representative of actual levels along I-75. The locations of the monitoring sites are depicted in **Figure 3-1**.

The field measurements were taken on December 14, 2016 using Larson-Davis Model 870 sound-level analyzers, in accordance with the methodology established by the FHWA and documented in Report No. DP-96-046, *Measurement of Highway-Related Noise: Final Report*, May 1996. Prior to the measurements, the sound meters were calibrated to 114 dB(A) (A-weighted decibels) using a Larson-Davis Model CA250 sound-level calibrator. At each site, noise level monitoring was conducted in ten-minute intervals with the microphone approximately five feet above the land surface.

Community noises and traffic information such as the number of cars, medium trucks, heavy trucks, and average speeds, were collected at the same time the noise monitoring took place. A K15-K Doppler Radar Gun was used to obtain average operating speeds for each vehicle type. The dates, times, traffic data, and measured noise levels for each of the monitoring sites are provided in **Appendix C**. Since all noise levels in this report are based on a one-hour period, the field-recorded traffic volumes were adjusted upward to reflect hourly volumes. The traffic data, along with the existing roadway geometry, was used as input to TNM 2.5 to predict traffic noise levels at each of the sites monitored.

To verify the computer-predicted noise levels, the TNM 2.5-predicted noise levels were compared to measured noise levels. When measured noise levels are within +/- 3.0 dB(A) of the computer-predicted levels, the model is considered verified. All of the monitored levels were within +/- 3.0 dB(A) of the TNM 2.5-predicted levels (see **Table 3-1**). Therefore, the model has been verified and is acceptable for predicting future traffic noise levels along I-75. Documentation in support of the field measurements and model validation is provided in **Appendix C** of this report.

Table 3-1 TNM Model Validation Summary

Measurement Site	Measurement Period	Measured Leq(h)	TNM Predicted Leq(h)	Difference
MS1A	1	69.0	71.9	2.9
	2	68.5	70.6	2.1
	3	69.0	71.1	2.1
MS1B	1	65.0	67.3	2.3
	2	62.9	65.9	3.0
	3	64.9	66.5	1.6

TUSCANY ISLES VILLAS

TI1

FLORIDA SOUTHWESTERN STATE COLLEGE

FLORIDA STREET

BEGIN RAMP

PUNTA GORDA ALLIANCE CHURCH

CH2

MS1B

MS1A

75

PREFERRED SOUTHBOUND SITE SB-2

END RAMP

END RAMP

MCGINNIS BAIL BONDS

PREFERRED NORTHBOUND SITE NB-2B

BEGIN RAMP

CHENEY BROTHERS

CHARLOTTE COUNTY PUBLIC SAFETY

AIRPORT ROAD

PIPER ROAD

FDOT

N

0 250 500 Feet

Legend

- Monitoring Site
- Receptor Site
- Noise Barrier Evaluated (PGAC-CD2)
- Charlotte County Parcel Boundaries (2016)
- Existing Limited Access ROW Line
- Proposed Limited Access ROW Line
- Mainline Widening (FPID# 413042-4-32-01)

Noise Analysis Map
Figure 3-1

3.2 Noise Sensitive Sites

A noise sensitive site is any property (owner occupied, rented or leased) where frequent exterior human use occurs. To evaluate traffic noise, the FHWA has established noise levels at which abatement must be considered. These noise levels are referred to as the NAC. The NAC are noise impact thresholds for considering abatement measures (depicted above in **Table 2-3**).

A land use review was conducted as part of this study to identify all noise sensitive land uses within the project area. Field reviews revealed only two noise sensitive land uses: 1) residences within the Tuscany Isles Villas located west of I-75 and south of Airport Road, and 2) the Punta Gorda Alliance Church located west of I-75 and north of Airport Road, which has an outdoor playground area. Other land uses within the study area, which are not noise sensitive, consist of pasture land, public lands (Charlotte County Public Safety Facilities), commercial lands, and institutional (Florida Southwestern State College). These sites are graphically depicted in **Figure 3-1**.

3.3 Existing Noise Levels

TNM 2.5 was used to predict traffic noise levels at the representative receptor sites along the project corridor that were described above. Predicted exterior noise levels for the existing conditions were 48.9 dB(A) at the nearest residence in Tuscany Isles Villas (i.e., Receptor TI1) and 66.1 dB(A) at the Punta Gorda Alliance Church playground (i.e., Receptor CH2). The locations of these receptor sites are depicted in **Figure 3-1**.

3.4 Predicted Noise Levels and Abatement Analysis

Predicted design year (2045) noise levels for the Preferred Build Alternative were compared to the NAC to assess potential noise impacts associated with the proposed project. All future scenarios (No Build and Build Alternatives) included the planned widening of I-75 from four lanes to six lanes throughout the study area (associated with project FPID No. 413042-4-32-01). The proposed improvements do not result in any substantial noise increases (i.e., greater than 15 dB(A). With the Preferred Build Alternative, design year traffic noise levels will approach or exceed the NAC at only one location: the Punta Gorda Alliance Church playground. The predicted design year noise level for the church playground (Receptor CH2) is 70.6 dB(A) with the Preferred Build Alternative.

The Tuscany Isles Villas residential community (Receptor TI1) is predicted to experience a noise level of 53.5 dB(A) with the Preferred Build Alternative. Therefore, it is not predicted to be impacted by design year traffic noise associated with the project. Because this community is not impacted by the project, consideration of noise abatement measures is not warranted at this location.

A wide range of factors are used to evaluate the feasibility and reasonableness of noise abatement measures. Feasibility deals with engineering considerations including the ability to construct a noise barrier using standard construction methods and techniques and with the ability to provide a reduction of at least 5 dB(A) to the impacted receptor sites. For example, given the topography of a particular location, can the minimum noise reduction [i.e., 5 dB(A)] be achieved given certain access, drainage, utility, safety, or maintenance requirements? In addition, for a noise barrier to be considered feasible, at least two impacted receptor sites must achieve a 5-dB(A) reduction or greater.

Reasonableness implies that common sense and good judgment were applied in a decision related to noise abatement. Reasonableness includes the consideration of the cost of abatement, the amount of noise abatement benefit, and the consideration of the viewpoints of the impacted and benefited property owners and residents. To be deemed reasonable, the noise barrier or other noise abatement measures must not exceed FDOT's reasonable cost criteria of $42,000 per benefited receptor site and must attain FDOT's noise reduction design goal of 7 dB(A) at one or more impacted receptor sites. In addition, once the noise abatement measure has been determined to be reasonable and feasible, the viewpoint of the impacted and benefited property owners must be considered. As part of the reasonableness cost analysis, several conceptual barrier designs were evaluated to determine the most effective location with a minimum length to achieve the desirable decibel reduction and to minimize costs. A number of conceptual barrier designs were evaluated (see **Table 3-2**).

For this project, only ground mounted barrier alternative designs were considered because I-75 is not elevated in the vicinity of Receptor CH2. Ground mounted barriers, which are also referred to as concrete post-and-panel noise walls, are usually constructed in the vicinity of the right-of-way line.

For the outdoor area of use at the Punta Gorda Alliance Church, a playground (pictured to the right), a detailed barrier analysis was conducted. This playground is represented by Receptor CH2. An effort was made (by multiple phone calls) to contact the church to determine the average daily usage of the playground, but no information was provided. TNM was used to determine the effectiveness of a potential noise barrier and to determine the optimal barrier height and length required to provide at least 5-dB(A) of noise reduction for the entire playground area while minimizing costs. Multiple barrier designs were evaluated. **Table 3-2** shows the dimensions, cost and effectiveness of the conceptual barrier designs evaluated. Barriers heights of 16 feet and greater are effective in providing at least 5-dB(A) of noise reduction for the entire playground area while satisfying the noise reduction design goal of 7 dB(A). Therefore, noise abatement measures were evaluated for this playground in accordance with the procedures outlined in FDOT's *A Method to Determine Reasonableness and Feasibility of Noise Abatement at Special Use Locations* (July 2009). **Table 3-3** shows the calculated usage required at the church playground to meet the FDOT's cost criteria for the least costly noise barrier design that is effective (i.e., PGAC-CD3, depicted in **Figure 3-1**). The results of this evaluation show that the required daily usage (i.e., person-hours per day) for the 16-foot-tall and 700-foot-long noise barrier would be 472 person-hours per day. Because the church playground is relatively small (approximately 30 feet by 30 feet square), it is not reasonable to assume that the playground would experience 472 person-hours of usage on a typical day. Therefore, since the expected playground usage is significantly lower than the usage required to meet the FDOT's Special Use Locations criteria, a noise barrier is not considered reasonable at this location.

Table 3-2 Barrier Evaluation Summary - Punta Gorda Alliance Church Playground

Noise Barrier Descriptions				Total Estimated Cost	Does Barrier Design Meet 7 dB(A) Reduction Goal At Any Site?	Does Barrier Design Meet 7 dB(A) Reduction Goal For Entire Exterior Use?
Noise Barrier Conceptual Design	Type	Height (Feet)	Length (feet)			
PGAC-CD1	Ground Mounted	14	1,500	$630,000	N	N
PGAC-CD2	Ground Mounted	16	700	$336,000	Y	Y
PGAC-CD3	Ground Mounted	18	700	$378,000	Y	Y
PGAC-CD4	Ground Mounted	20	700	$420,000	Y	Y
PGAC-CD5	Ground Mounted	22	700	$462,000	Y	Y

Table 3-3 Special Land Use Cost Reasonableness Analysis - Punta Gorda Alliance Church Playground

Item	Criteria	Input (16-Foot Tall Ground Mounted Noise Barrier; Conceptual Barrier Design PGAC-CD2)		Units
		Actual Usage	Needed Usage	
1	Enter Length of Proposed Noise Barrier (Begin Station 1707+20/End Station 1714+20)	700	700	feet
2	Enter Height of Proposed Noise Barrier	16	16	feet
3	Total Square Feet of Proposed Noise Barrier (Multiply item 1 by Item 2)	11,200	11,200	$feet^2$
4	Enter the average amount of time that a person stays at the site per visit	**Unknown**	1	hours
5	Enter the average number of people that use this site per day that will receive at least 5 dB(A) benefit from abatement at the site	**Unknown**	**472**	persons
6	Total Person Hours per Day Benefited by Noise Barrier (Multiply Item 4 by Item 5)	---	472	person-hours
7	Average Square Foot of Noise Barrier per Person Hour (Divide Item 3 by Item 6)	---	23.71	$feet^2$/person-hours
8	Cost per Person Hour per Square Foot of Noise Barrier (Multiply Item 7 by $42,000)	N/A	$995,935	$/person-hours/$ft^2$
9	Doest item 8 exceed the "abatement cost factor" of: $995,935/person-hour/$ft^2$?	N/A	N/A	Yes/No
10	If item 9 is no, abatement is reasonable.	N/A	N/A	---
11	If item 9 is yes, abatement is not reasonable.	N/A	N/A	---

X:\104-0007-000 I-75 Rest Areas PD&E\ENVIRONMENTAL\NOISE\Noise Study Report\[SLU Worksheet_I75 RA_Feb02 2017.xlsx]Table 11 Church Playgr

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

4 Conclusions

Design year traffic noise levels are predicted to impact one site (the Punta Gorda Alliance Church) as a result of the proposed rest areas along I-75. Noise abatement measures were evaluated for this site in accordance with FDOT policy. It was determined that traffic system management techniques, alignment modifications and property acquisition are not reasonable abatement measures. Land use controls were identified as a feasible abatement measure that could be used in the future by local officials to minimize the permitting and construction of incompatible land uses along the I-75 corridor.

The results of this study indicate that noise barriers would not be a feasible and cost reasonable method of reducing traffic noise levels for the impacted playground area at Punta Gorda Alliance Church. To effectively reduce traffic noise, a noise barrier must be relatively long, continuous (with no intermittent openings for driveways, etc.) and of sufficient height. Because the church playground is relatively small, it is not reasonable to assume that the playground would experience sufficient usage to satisfy FDOT's Special Use Locations criteria for noise abatement; therefore, a noise barrier is not considered reasonable at this location.

Only land use control appears to be a feasible and reasonable solution to mitigate future traffic noise levels. Copies of this Noise Study Report will be sent to Charlotte County to assist them in permitting future noise-compatible land uses along I-75.

Based on the noise analyses performed in this study, there appears to be no apparent solutions available to mitigate the predicted noise impacts at the Punta Gorda Alliance Church where noise barriers have not been recommended. The traffic noise impact to this noise sensitive site is an unavoidable consequence of the project. Because of the low number of unavoidable impacted sites (i.e., one), the noise impacts associated with this project are not considered significant.

5 Construction Noise and Vibration

During construction of the project, there is the potential for noise impacts to be substantially greater than those resulting from normal traffic operations because heavy equipment is typically used to build roadways. In addition, construction activities may result in vibration impacts. Therefore, early identification of potential noise/vibration sensitive sites along the project area is important in minimizing noise and vibration impacts. The project area does include residential, institutional, and commercial areas that may be affected by noise and vibration associated with construction activities. Construction noise and vibration impacts to these sites will be minimized by adherence to the controls listed in the latest edition of the FDOT's Standard Specifications for Road and Bridge Construction.

6 Community Coordination

Coordination with local agencies and officials will be accomplished during this PD&E Study. In addition, local and community officials will have the opportunity to comment on the proposed project at the Public Hearing.

In accordance with FDOT policies, a Public Hearing will take place during this PD&E Study. The date and location of the Public Hearing will be advertised publicly. The Public Hearing will be conducted to provide the public with information about the project and to collect public comments.

7 References

1) 23 CFR Part 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise*, Federal Register, Vol. 75, No. 133, Tuesday, July 13, 2010; pages 39834-39839. Available from FHWA.
2) Florida Department of Transportation Project Development and Environment Manual Part 2, Chapter 17 (2016).
3) Federal Highway Administration Report Number FHWA-PD-96-046, *Measurement of Highway-Related Noise*. Cynthia S.Y. Lee and Gregg Fleming; May, 1996; 206 pages. Available from the National Technical Information Service (NTIS), Springfield, Virginia.
4) Florida Department of Transportation *A Method to Determine Reasonableness and Feasibility Of Noise Abatement at Special Use Locations*, July 2009.
5) Florida Department of Transportation *Standard Specifications for Road and Bridge Construction*. 2013. Available from FDOT.