Noise Study Report

Florida Department of Transportation
District One

SR 31

Project Development and Environment Study

From SR 78 to CR 78
Lee County, Florida

and

From CR 78 to Cook Brown Road
Lee and Charlotte Counties, Florida

Financial Project ID: 428917-1 & 428917-2

ETDM No: 9791 & 9651

April 2021

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

EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT), District One is conducting a Project Development and Environment (PD&E) study for State Road (SR) 31 in Lee and Charlotte Counties to determine alternative roadway improvements along the corridor. The study limits are from SR 78 in Lee County to Cook Brown Road in Charlotte County, a distance of approximately 5.3 miles. The purpose of the PD&E Study is to document the need for additional capacity within the study corridor and to evaluate the costs and impacts associated with providing this additional capacity.

An additional purpose of this PD&E study is to evaluate engineering and environmental data and document information that will aid FDOT in determining the type, preliminary design, and location of the proposed improvements. The study is being conducted in order to meet the requirements of the National Environmental Policy Act (NEPA) and other related federal and state laws, rules, and regulations.

The objectives of this noise study are to identify noise sensitive sites adjacent to the SR 31 project corridor, compare and evaluate predicted traffic noise levels at these sites with and without the project, and evaluate noise abatement measures where warranted. Additional objectives include the evaluation of construction noise and the estimation of future noise level contours adjacent to the project corridor. This information will assist local officials in the development of setback requirements for future noise sensitive land uses.

This study was prepared in accordance with 23 CFR, Part 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (July 13, 2010). The evaluation uses methodology established by the FDOT and documented in the *PD&E Manual*, Part 2, Chapter 18 (July 1, 2020), Highway Traffic Noise.

The Federal Highway Administration (FHWA) approved Traffic Noise Model (TNM) was used to predict traffic noise levels at 56 noise sensitive sites located adjacent to SR 31 for the existing (2017) and future year (2045) conditions with and without the proposed realignment improvements. The existing condition traffic noise levels are predicted to range from 42.2 to 68.7 dB(A) for Activity Category B and C of FHWA's Noise Abatement Criteria (NAC), 39.7 dB(A) for the single receptor in Category D, and 62.3 dB(A) for the single receptor in Category E. The no-build condition traffic noise levels are predicted to range from 43.6 to 70.6 dB(A) for Activity Category B and C, 41.4 dB(A) for the single receptor in Category D, and 63.8 dB(A) for the single receptor in Category E. The proposed build alternative is predicted to result in traffic noise levels ranging from 49.3 to 64.1 dB(A) for Activity Category B and C, 35.3 dB(A) for the single receptor in Category D, and there is no predicted noise level for the single receptor in Category E since it will be moved to a new location that has not yet been determined. None of the 56 noise sensitive sites evaluated are predicted to experience future noise levels with the proposed improvements to SR 31 that approach, meet, or exceed the NAC for their respective Activity Category.

Additionally, none of the evaluated sites are predicted to experience a substantial increase [15 dB(A) or more] of traffic noise as a result of the proposed improvements. The maximum increase between the existing condition and the proposed build alternative is 11.1 dB(A) at receptor 1-E-07.

Because of the elapsed time between when the noise study was performed and when the Environmental Document will be signed by FDOT, the potential exists for additional residential building permits to be granted subsequent to this study. The date of the PD&E land use review was October 14, 2020. Any noise analysis performed during the design phase of this project will include a review of building permit dates. Any noise sensitive site that is identified as permitted between the completion of the land use review and the Date of Public Knowledge will be analyzed for traffic noise impacts and, if impacts are predicted, abatement considered during the design phase of the project.

Based on the noise analyses performed to date, there are no noise sensitive sites predicted to experience future noise levels with the proposed improvements to SR 31 that approach, meet, or exceed the NAC for their respective Activity Category. Furthermore, none of the evaluated sites are predicted to experience a substantial increase of traffic noise as a result of the proposed improvements. Therefore, noise abatement considerations are not warranted.

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1.1 Project Description

The FDOT District One is conducting a PD&E study for SR 31 in Lee and Charlotte Counties to determine alternative roadway improvements along the corridor. The study limits are from SR 78 in Lee County to Cook Brown Road in Charlotte County. The purpose of the PD&E Study is to document the need for additional capacity within the study corridor and to evaluate the costs and impacts associated with providing this additional capacity. The project limits are shown in **Figure 1-1** and the total project length is approximately 5.3 miles.

An additional purpose of this PD&E study is to evaluate engineering and environmental data and document information that will aid FDOT in determining the type, preliminary design, and location of the proposed improvements. The study is being conducted to meet the requirements of the NEPA and other related federal and state laws, rules, and regulations.

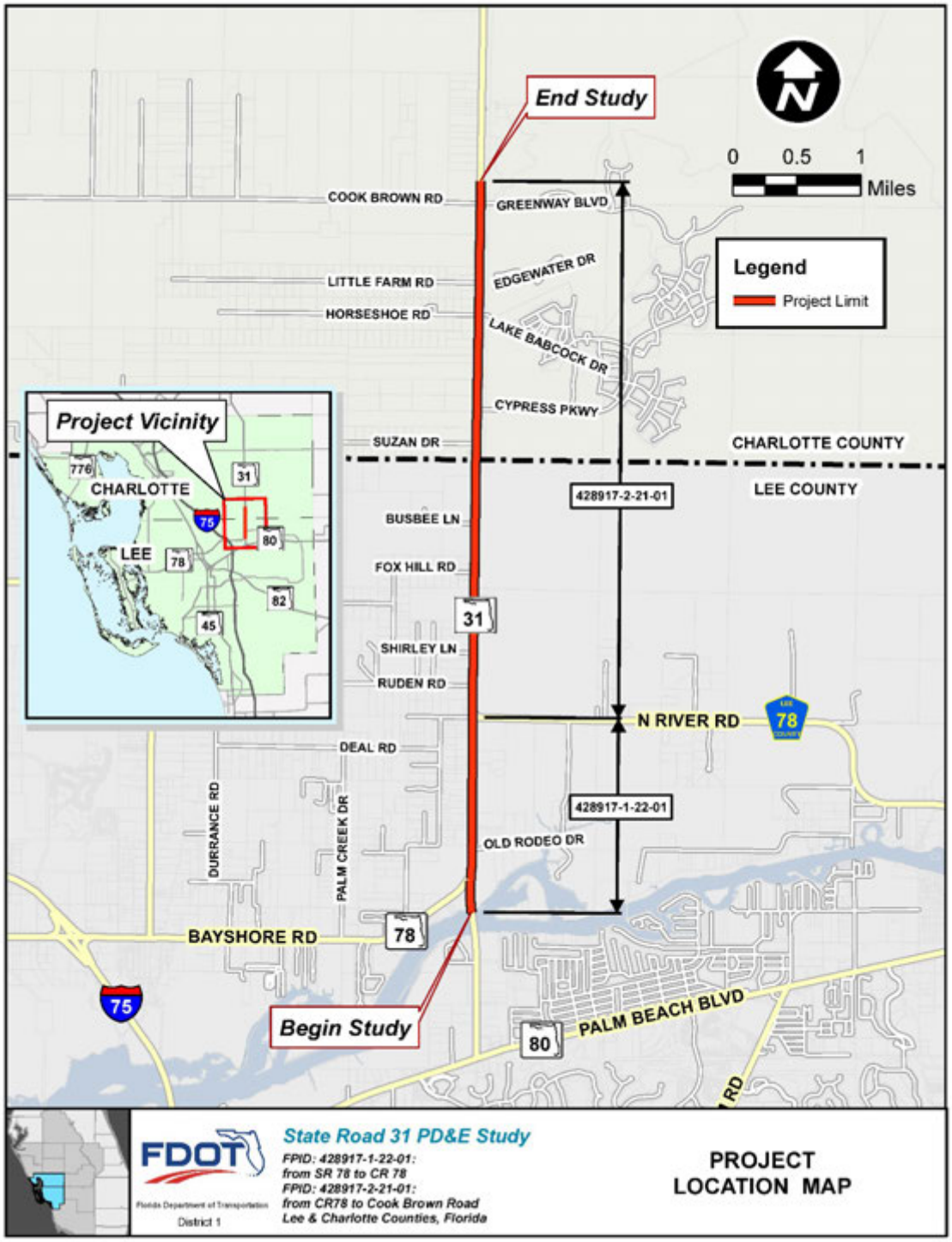


Figure 1-1 Project Location Map

1.2 Proposed Improvements

The primary purpose of this project is to increase capacity on SR 31 from SR 78 to Cook Brown Road in order to accommodate the anticipated growth in traffic associated primarily with the Babcock Ranch Development of Regional Impact (DRI).

Secondary goals of the project are to increase emergency evacuation capabilities in northern Lee and southern Charlotte Counties by providing a facility capable of handling evacuation of future residents and workers; to enhance system linkage connecting freight and personal vehicle traffic to the roadway network in northern Lee and southern Charlotte Counties; and to improve modal interrelationships by providing bicycle and pedestrian facilities to link the Babcock Ranch development with existing development.

The preferred alternative is divided between an interim and ultimate improvement and the details of each are as follows:

1.2.1 Preferred Interim Improvement

The initial construction of the interim improvement includes construction of a new four-lane divided roadway from SR 78 to Cypress Parkway. This section is located on a new alignment east of the existing SR 31 roadway and the 50-foot-wide Florida Gas Transmission pipeline easement. From Cypress Parkway to Horseshoe Road, the roadway shifts back to the west and involves widening SR 31 to the east of its existing alignment and will use a combination of the existing SR 31 roadway right-of-way and new right-of-way. The existing two-lane undivided section of SR 31 will remain in place from north of SR 78 to south of Cypress Parkway and will serve as a frontage road for local access. A separate project will relocate the existing Florida Gas Transmission (FGT) easement from the east side to the west side of existing SR 31 from just north of the Lee/Charlotte County Line to just north of Horseshoe Road. From just north of Horseshoe Road, the gas line will transition back to the east side of the road and connect with the existing FGT easement.

The preferred interim typical section from SR 78 to Cypress Parkway includes two, 11-foot travel lanes in each direction separated by a 44-foot median that will accommodate future inside widening with Type F curb along the inside and outside lanes. A 12-foot wide shared-use path is proposed along both sides of the roadway. Between SR 78 and the Lee/Charlotte County Line, approximately 208 feet of right-of-way is required. It should be noted that from the Lee/Charlotte County Line northward, the shared-use path on the east side will be 10 feet wide and located outside of the proposed roadway right-of-way on the Chain of Lakes berm. Approximately 192 feet of right-of-way is needed from the Lee/Charlotte County Line to Cypress Parkway. **Figure 1-2** depicts the preferred interim 4-lane typical section from SR 78 to the Lee/Charlotte County Line. **Figure 1-3** depicts the preferred interim 4 lane typical section from the Lee/Charlotte County Line to Cypress Parkway.

From Cypress Parkway to Horseshoe Road, the preferred typical section includes two, 11-foot travel lanes in each direction separated by a 22-foot median. Type F curb will be placed along the median and along the outside travel lanes. Approximately 107 feet of additional right-of-way is needed along the east side of SR 31 for a total width of 207 feet.

Through this section, the Florida Gas Transmission gas line will be relocated to a new 50-foot-wide easement along the west side of the existing SR 31 right-of-way. This typical section includes dual ditches and a 12-foot shared-use path along the west side of the road. A 10-foot shared-use path will also be provided along the east side of the road, outside the roadway right-of-way on the Chain of Lakes berm on Babcock Ranch property. **Figure 1-4** illustrates this proposed typical section.

1.2.2 Preferred Ultimate Improvement

The preferred ultimate 6-lane improvement includes providing six lanes for SR 31 from SR 78 to Cypress Parkway and four lanes from Cypress Parkway to Cook Brown Road. The design speed is 45 mph.

The ultimate 6-lane preferred alternative includes widening the interim 4-lane divided SR 31 roadway to a six-lane divided roadway from SR 78 to Cypress Parkway. This will involve adding one through lane in each direction to the median. From Cypress Parkway to Horseshoe Road, the interim 4-lane divided roadway will remain. From Horseshoe Road to Cook Brown Road, the existing two-lane SR 31 roadway will be widened to a 4-lane divided roadway to the west within a combination of existing road right-of-way and proposed road right-of way.

The preferred ultimate 6-lane typical section from SR 78 to Cypress Parkway includes three, 11-foot travel lanes in each direction separated by a 22-foot median with Type F curb along the inside and outside lanes. As previously mentioned, this widening will be done towards the median. **Figure 1-2** depicts the preferred 6-lane ultimate typical section from SR 78 to the Lee/Charlotte County Line. **Figure 1-3** depicts the preferred ultimate 6-lane typical section from the Lee/Charlotte County Line to Cypress Parkway.

From Cypress Parkway to Horseshoe Road, the preferred 4-lane interim improvement will remain as the ultimate improvement and is illustrated in **Figure 1-4**.

Between Horseshoe Road and Cook Brown Road, the existing SR 31 roadway will be reconstructed as a 4-lane divided roadway. The alignment involves widening to the west, which will require an additional 107 feet to the west of the existing SR 31 right-of-way, for a total roadway right-of-way width of 207 feet. The preferred ultimate 4-lane typical section includes two, 11-foot travel lanes in each direction separated by a 22-foot median. Type F curb will be placed along the median and along the outside travel lanes. The existing Florida Gas Transmission gas line will remain within the existing 50-foot easement along the east side of SR 31. **Figure 1-5** shows this preferred 4-lane ultimate roadway typical section.

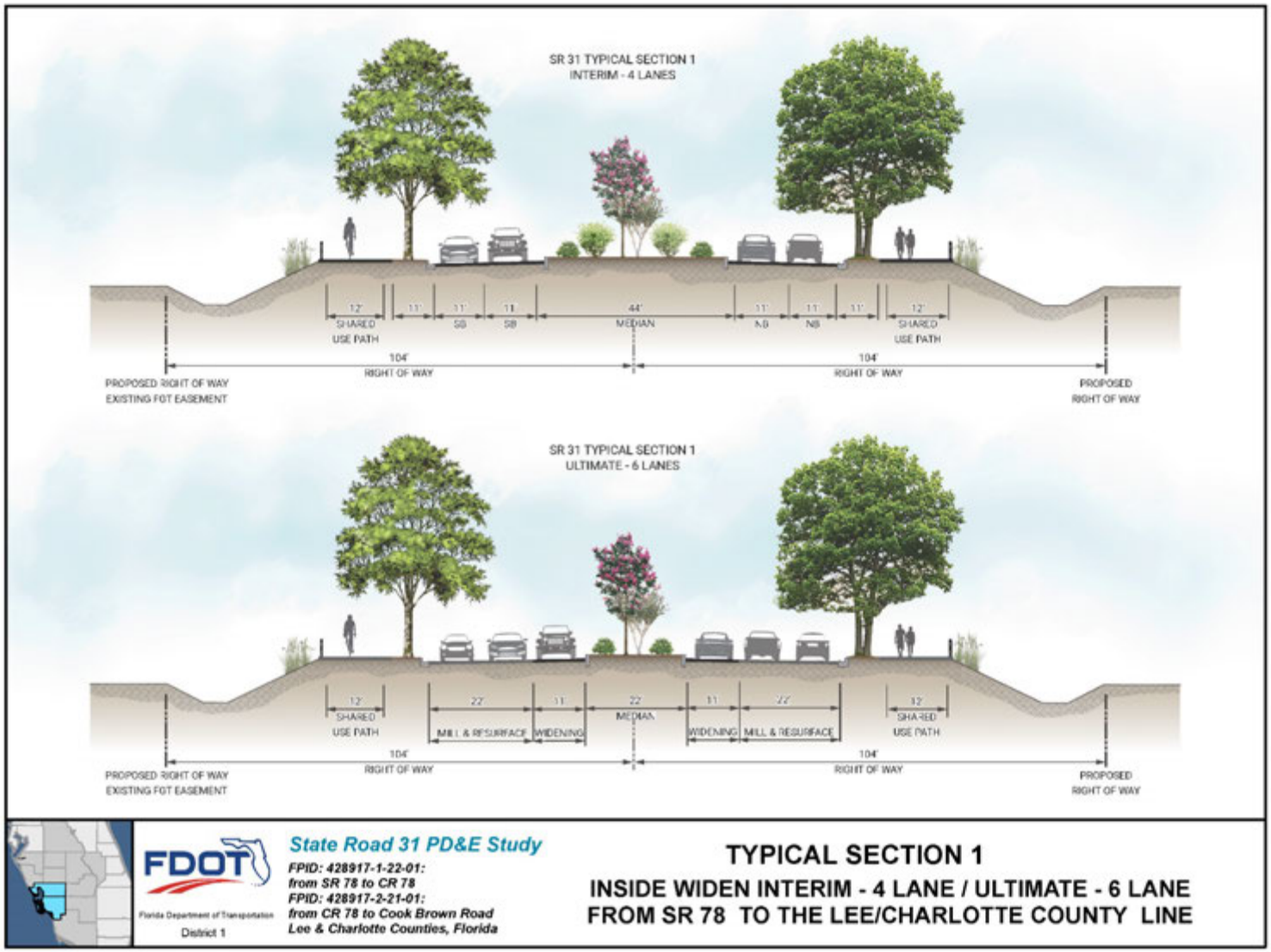


Figure 1-2 Typical Roadway Section from SR 78 to Lee/Charlotte County Line

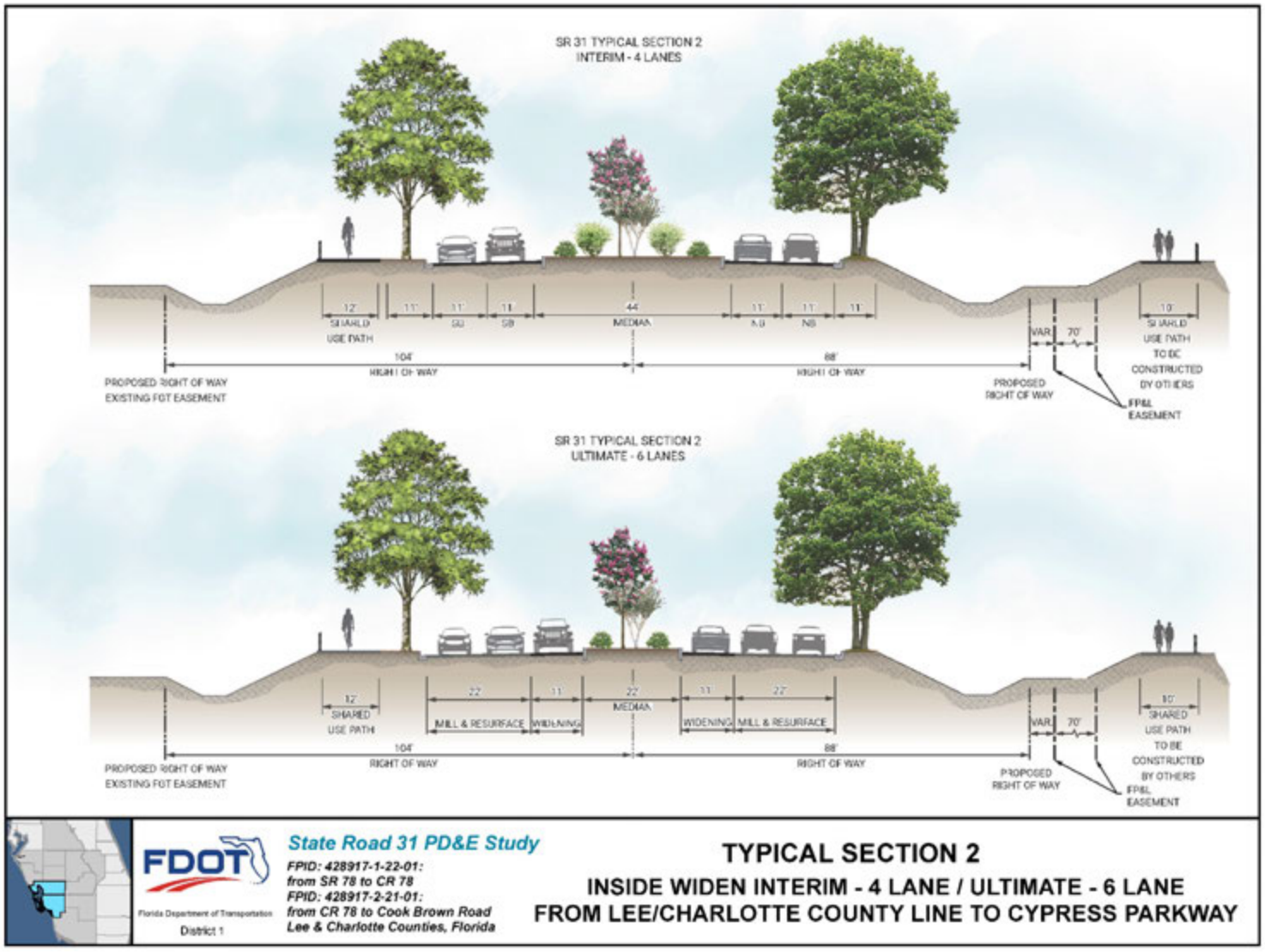


Figure 1-3 Typical Roadway Section from Lee/Charlotte County Line to Cypress Parkway

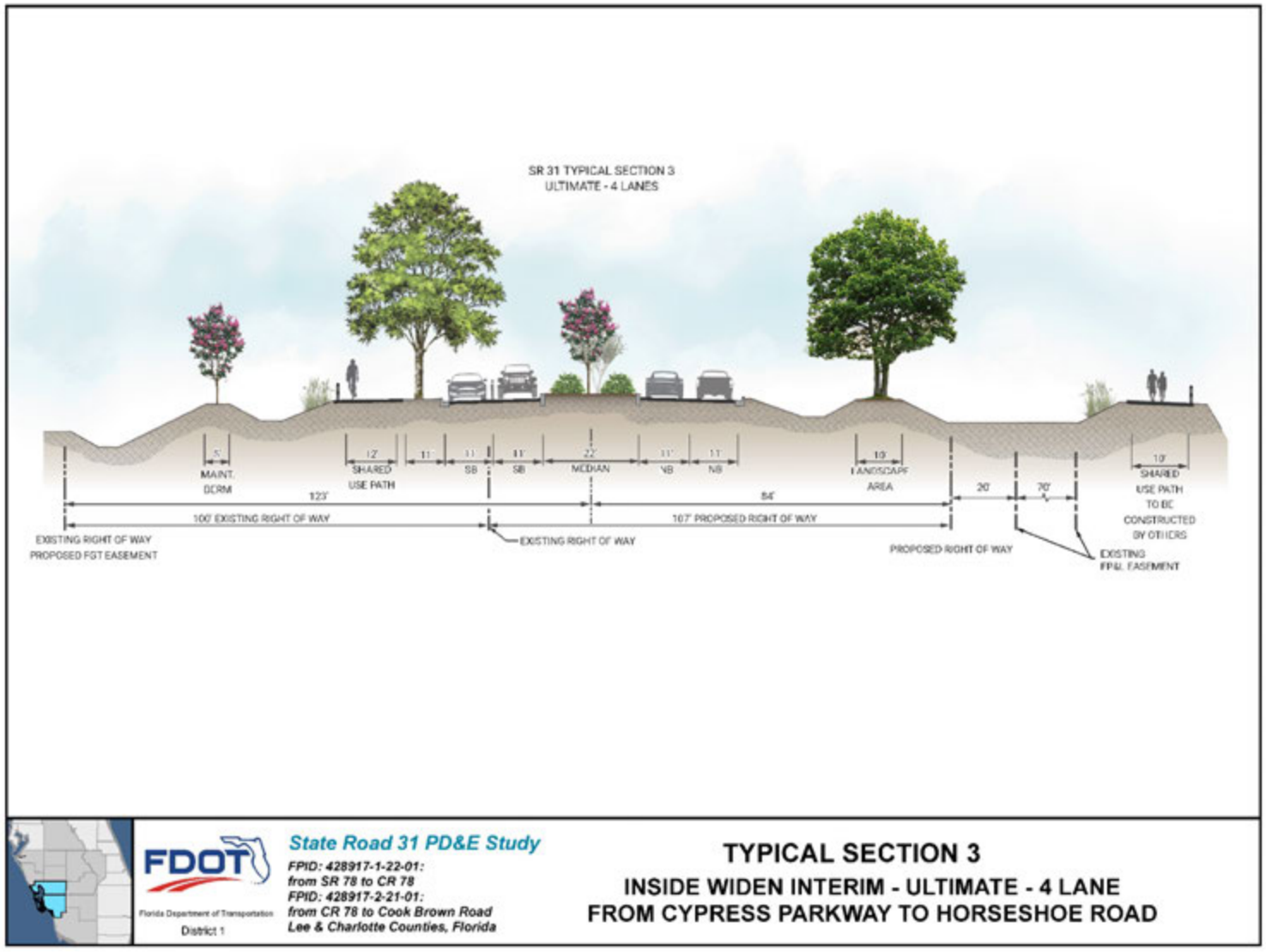


Figure 1-4 Typical Roadway Section from Cypress Parkway to Horseshoe Road

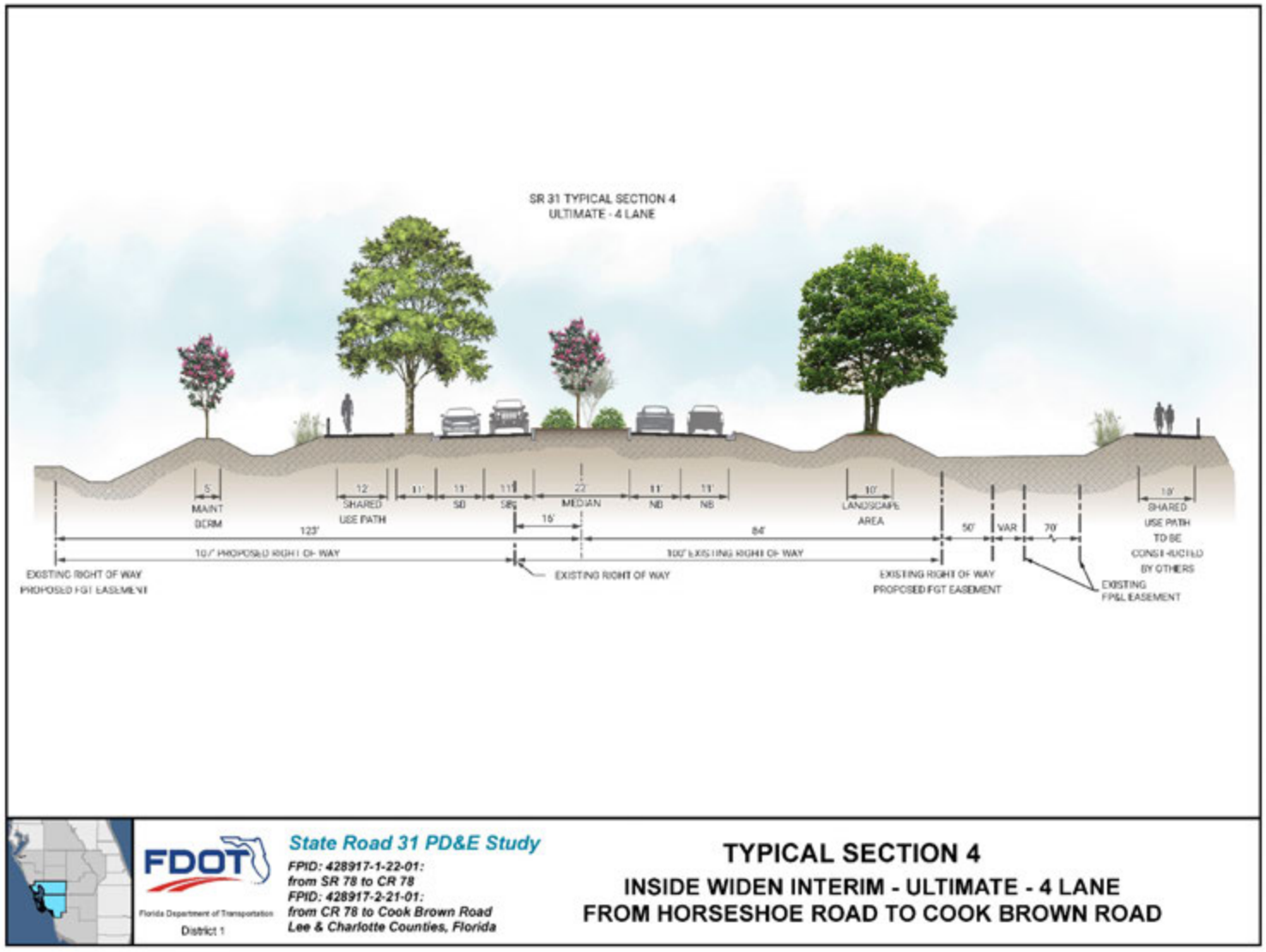


Figure 1-5 Typical Roadway Section from Horseshoe Road to Cook Brown Road

2.0 METHODOLOGY

This study was prepared in accordance with 23 CFR, Part 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (July 13, 2010). The evaluation uses methodology established by the FDOT and documented in the *PD&E Manual*, Part 2, Chapter 18 (July 1, 2020), Highway Traffic Noise. Part 2, Chapter 18 of the *PD&E Manual* is the FDOT's official traffic noise policy.

The prediction of existing and future traffic noise levels with and without the preferred build alternative was performed using FHWA's computer model for highway traffic noise prediction and analysis - TNM version 2.5. TNM predicts sound energy, in one-third octave bands, between highways and nearby receptors while considering the intervening ground's acoustical characteristics and topography. TNM was used to predict traffic noise levels at noise sensitive land uses along the SR 31 project corridor.

2.1 Noise Metrics

Noise is typically defined as unwanted sound. It is emitted from many sources including airplanes, factories, railroads, power generation plants, daily community activities and vehicles. Noise levels for common outdoor and indoor activities are shown in **Figure 2-1**.

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

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

Figure 2-1 Noise Levels for Common Outdoor and Indoor Activities

The predicted noise levels presented in this report are expressed in decibels (dB) on the A-weighted scale [dB(A)]. This scale most closely approximates the response characteristics of the human ear to traffic noise. All noise levels are reported as hourly equivalent level [Leq(h)] values, which is the equivalent steady-state sound level for a one-hour period that contains the same acoustic energy as the time-varying sound level during the same time period.

A receptor is defined as a discrete or representative location of a noise sensitive area(s) for any of the land use categories listed in FHWA's NAC. Receptors representing the noise sensitive sites adjacent to SR 31 were mapped in TNM in accordance with the FDOT *PD&E Manual*, Part 2, Chapter 18 (July 1, 2020), Highway Traffic Noise.

TNM receptor locations for the residential sites were placed at the edge of the dwelling unit closest to the major traffic noise source. Receptor locations for other noise sensitive land uses were placed at the location of exterior activity closest to the major traffic noise source.

2.2 Traffic Data

As stipulated in the FDOT Noise Policy – Traffic Requirements (Part 2, Chapter 18, Section 18.2.1.5 of the *PD&E Manual*), traffic characteristics that would yield the highest traffic noise impact for the design year were used to ensure "worst-case" traffic noise conditions in the analysis. Consistent with guidance set forth in the FDOT Traffic Noise Modeling and Analysis Practitioners Handbook (December 31, 2018), the maximum peak-hourly traffic representing LOS "C" was used in TNM unless the traffic analysis showed that LOS "C" will not be reached. If LOS "C" will not be reached, then demand volumes were used. **Table 2-1** presents the traffic volume characteristics used in TNM for the roadway segments of the SR 31 project study area in the 2017 existing and 2045 no-build and build conditions.

Table 2-1 Traffic Volume Characteristics used in TNM

Traffic Segment	2017 Existing Condition	2045 No-Build Condition	2045 Build Condition
From SR 78 to CR 78 (N. River Rd)	Demand	LOS C	Demand
From CR 78 (N. River Rd) to Shirley Ln	Demand	LOS C	LOS C
From Shirley Ln to Fox Hill Rd	Demand	LOS C	Demand
From Fox Hill Rd to Busbee Ln	Demand	LOS C	Demand
From Busbee Ln to Cypress Pkwy	Demand	LOS C	Demand
From Cypress Pkwy to Horseshoe Rd	Demand	LOS C	Demand
From Horseshoe Rd to Little Farm Rd	Demand	LOS C	Demand
From Little Farm Rd to Cook Brown Rd	Demand	LOS C	Demand

All of the traffic data used in the noise analysis are documented in the Traffic Data for Noise Analysis table signed/approved on November 19, 2020 and provided in **APPENDIX A**. Traffic data for the 2017 existing, 2045 no-build and 2045 build conditions are presented in this output file as hourly volumes between vehicle types (cars, medium trucks, heavy trucks, buses, and

motorcycles) as required for TNM input. The vehicle speeds used in TNM are based on existing posted speed limits and the proposed posted speed for the build alternative.

2.3 Noise Abatement Criteria

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. As shown in **Table 2-2**. NAC vary according to land use activity.

Table 2-2 Noise Abatement Criteria

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 design standards for noise abatement measures.
2. Includes undeveloped lands permitted for this activity category.

Note: FDOT defines that a substantial noise increase occurs when existing noise level is predicted to exceeded by 15 decibels or more as a result of the transportation improvement project.

As defined in 23 CFR 772, traffic noise impacts occur when predicted future traffic noise levels associated with the proposed improvements approach, meet, or exceed the NAC or when predicted future traffic noise levels substantially exceed the existing condition noise levels. FDOT defines "approach" to mean within 1 dB(A) of the NAC. A substantial increase in noise is defined as an increase of 15 or more decibels above the existing noise level as a direct result of the transportation improvement project in question.

For example, Activity Category B (residential) applies to a majority of the noise sensitive land uses within the study limits. Under Activity Category B, noise abatement measures would be considered if the predicted future exterior levels from the proposed improvements are 66 dB(A) or higher, or if the predicted future traffic noise levels exceed the existing condition noise levels by 15 dB(A) or more.

Common noise environments are defined in the *PD&E Manual*, Part 2, Chapter 18 (July 1, 2020) as groups of receptors within the same activity category of FHWA's NAC that are exposed to similar noise sources and levels, traffic volumes, traffic mix, speed, and topographic features. The developed lands along the project corridor include both noise sensitive and non-noise sensitive sites. Field reviews within the project limits revealed 56 noise sensitive sites in the vicinity of the SR 31 project corridor for inclusion within the analysis. The locations of these sites are mapped on the aerials (with concept plan and receptor sites) provided in **APPENDIX C**.

Activity Category A

Activity Category A focuses on the exterior impact criteria for 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 for the area to continue to serve its intended purpose. The approach NAC level for this activity category is 56 dB(A). No Activity Category A land uses are located adjacent to the study limits.

Activity Category B

Activity Category B includes the exterior impact criteria for single-family (including mobile home parks) and multifamily residences. This may include units above ground level. The approach NAC level for this activity category is 66 dB(A). There are 49 residences within the study limits that were evaluated as part of this traffic noise analysis.

Activity Category C

Activity Category C includes the exterior impact criteria for a variety of land use facilities. The approach NAC level for this activity category is 66 dB(A). Examples of this activity category include 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, recreation areas, golf courses, Section 4(f) resources, schools, television studios, trails, and trail crossings. Note that these criteria apply only to the exterior areas of Activity Category C. There were five Activity Category C land uses (the bleachers at a rodeo arena, an athletic field, a playground and two separate locations on a hiking trail) located adjacent to the study limits and are represented by receptors 1-E-13, 1-W-10, 1-W-12, 6-E-01, and 6-E-02, respectively.

Activity Category D

Activity Category D includes the interior impact criteria for a variety of land use facilities listed in Activity Category C that may have interior uses. The approach NAC level for this activity category is 51 dB(A). One Activity Category D land use (a church/school) is located adjacent to the study limits of the SR 31 project and is represented by receptor 1-W-11.

Activity Category E

Activity Category E includes the exterior impact criteria for developed lands that are less sensitive to highway traffic noise. The approach NAC level for this activity category is 71 dB(A) in exterior areas of frequent human use. Examples of this activity category include hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in Activity Category A-D or F. One Activity Category E land use (an outdoor seating area at a restaurant) is located adjacent to the study limits of the SR 31 project and is represented by receptor 1-E-11R. This site will be moved to a new location that has not yet been determined and will therefore not have a predicted traffic noise level in the build condition.

Activity Category F

Activity Category F land uses include 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. There is no NAC level for this activity category since the FHWA considers these land uses as not sensitive to highway traffic noise; therefore, no noise analysis is required for these locations.

Activity Category G

Activity Category G includes undeveloped lands that are not permitted for construction. There is no NAC level for Activity Category G. Although consideration of mitigation is not required, the FDOT must determine and document highway traffic noise levels and provide this information to local governments. Noise contours are developed to illustrate the best estimate of the distance from the edge of the nearest travel lane at which traffic noise would approach or exceed the NAC for Activity Categories A, B, C, D and E. Land use controls and noise contours are discussed further in **Section 2-4** and will assist local officials in planning and permitting future noise compatible land uses on the undeveloped parcels.

In addition to the established residential areas, the traffic noise evaluation attempted to identify residential areas that have been permitted. Development will be deemed permitted if a proposed noise sensitive land use such as a residence has received a building permit (or occupancy permit if mobile home) from the local agency with jurisdiction for each building prior to the Date of Public Knowledge (i.e., date that the environmental document is approved by FDOT). The permitted residences identified in the Babcock Ranch DRI are represented by receptors 7-E-01 through 7-E-06 and 8-E-01 through 8-E-06.

Due to the elapsed time between when the noise study was performed and when the Date of Public Knowledge will be established, the potential exists for additional residential building permits to be granted subsequent to this study. Any noise analysis performed during the design phase of

his project will include a review of building permit dates. The date of the PD&E land use review was October 14, 2020.

2.4 Noise Abatement Measures

FDOT considers noise abatement measures when future traffic noise levels attributed to a proposed roadway improvement approach, meet, or exceed the NAC, or when levels increase substantially. Since noise levels from the preferred build alternative are not predicted to exceed the NAC at any of the noise sensitive sites modeled, noise abatement measures were not evaluated for the proposed improvements. As outlined in the *PD&E Manual*, Part 2, Chapter 18 (July 1, 2020), these measures may include traffic management, alignment modifications, land use controls, and noise barriers. The following discusses the feasibility (i.e., amount of noise reduction, engineering considerations) and/or reasonableness (i.e., number of noise sensitive sites benefited, absolute noise levels, cost, etc.) of these measures.

2.4.1 Traffic Management Measures

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 SR 31 would lower traffic noise levels; however, it would also eliminate the ability to efficiently move people and goods through the study limits. Therefore, this method of noise mitigation is not considered reasonable.

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 realigning SR 31, the existing Florida Gas transmission line dictates the proposed horizontal alignment. For this reason, shifting the SR 31 alignment to reduce traffic noise would result in other undesirable impacts and is not a reasonable measure to reduce noise levels associated with this project.

2.4.3 Buffer Zones

Another noise abatement measure is to use 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.

Noise contours were developed to illustrate the best estimate of the distance from the edge of the nearest travel lane at which traffic noise would approach the NAC for Activity Categories A, B, C, D 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 receptor and the roadway.

Table 2-3 will assist local officials in planning and permitting future noise compatible land uses adjacent to SR 31. These contours are shown graphically in **Figure 2-2, Figure 2-3, Figure 2-4, Figure 2-5, Figure 2-6, Figure 2-7, Figure 2-8,** and **Figure 2-9**.

Table 2-3 Estimated Noise Contours

Traffic Segment	NAC Activity Category			
	A – 56 dB(A)	B/C – 66 dB(A)	D – 51 dB(A)*	E – 71 dB(A)
From SR 78 to CR 78 (N. River Road)	535 feet	134 feet	<25 feet**	62 feet
From CR 78 (N. River Road) to Shirley Lane	535 feet	133 feet	<25 feet**	60 feet
From Shirley Lane to Fox Hill Road	530 feet	133 feet	<25 feet**	61 feet
From Fox Hill Road to Busbee Lane	525 feet	129 feet	<25 feet**	58 feet
From Busbee Lane to Cypress Parkway	505 feet	122 feet	<25 feet**	53 feet
From Cypress Parkway to Horseshoe Road	420 feet	90 feet	<25 feet**	43 feet
From Horseshoe Road to Little Farm Road	395 feet	80 feet	<25 feet**	38 feet
From Little Farm Road to Cook Brown Road	395 feet	80 feet	<25 feet**	38 feet

*Represents an interior noise level. A reduction factor of 25 dB(A) is applied to the modeling results consistent with guidance from *FHWA Highway Traffic Noise: Analysis and Abatement Guidance* (August 11, 2010) in order to identify the estimated contour distance for NAC Activity Category D.
** This distance is within the proposed ROW

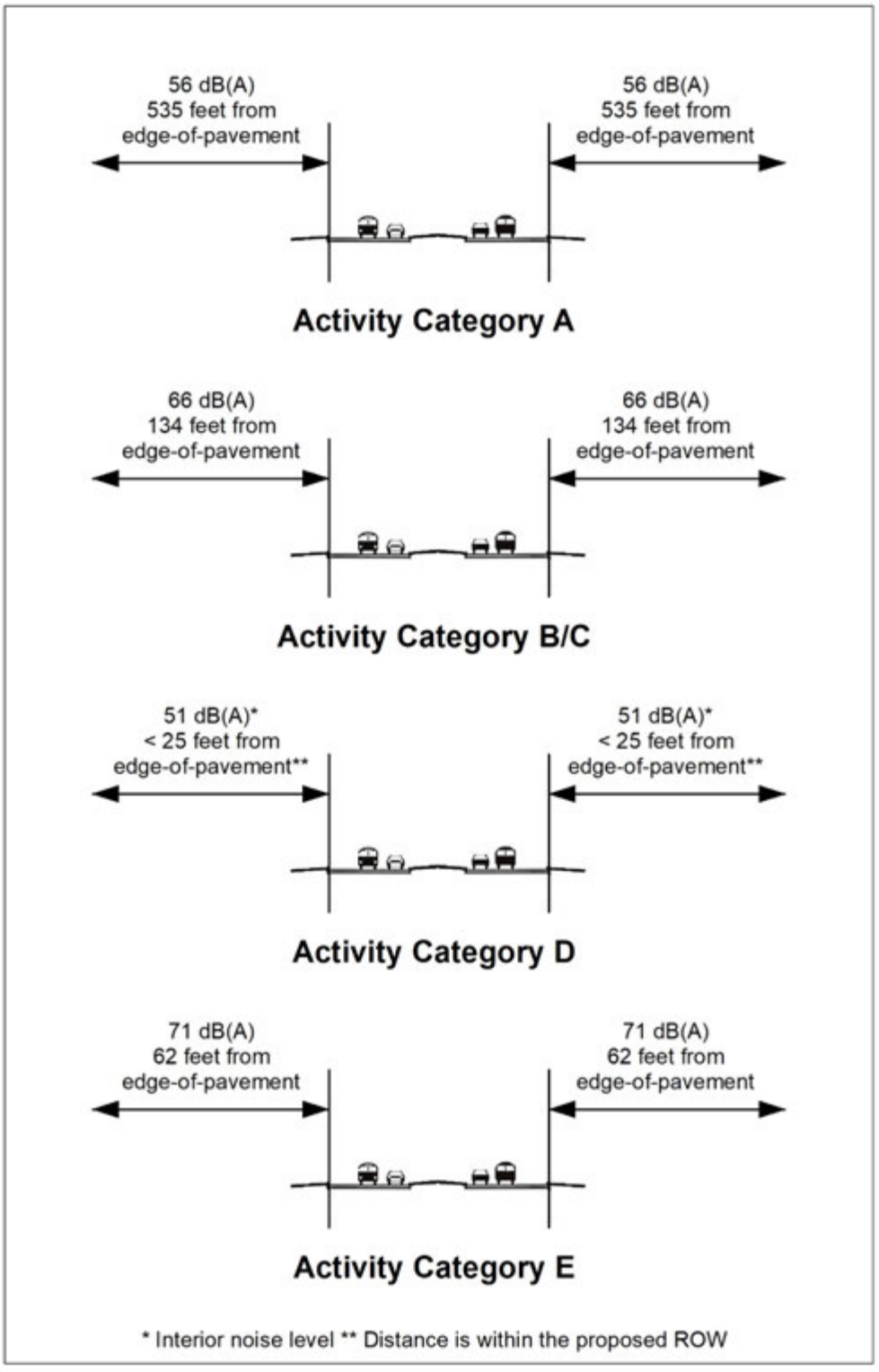


Figure 2-2 Noise Contours from SR 78 to CR 78 (N. River Road)

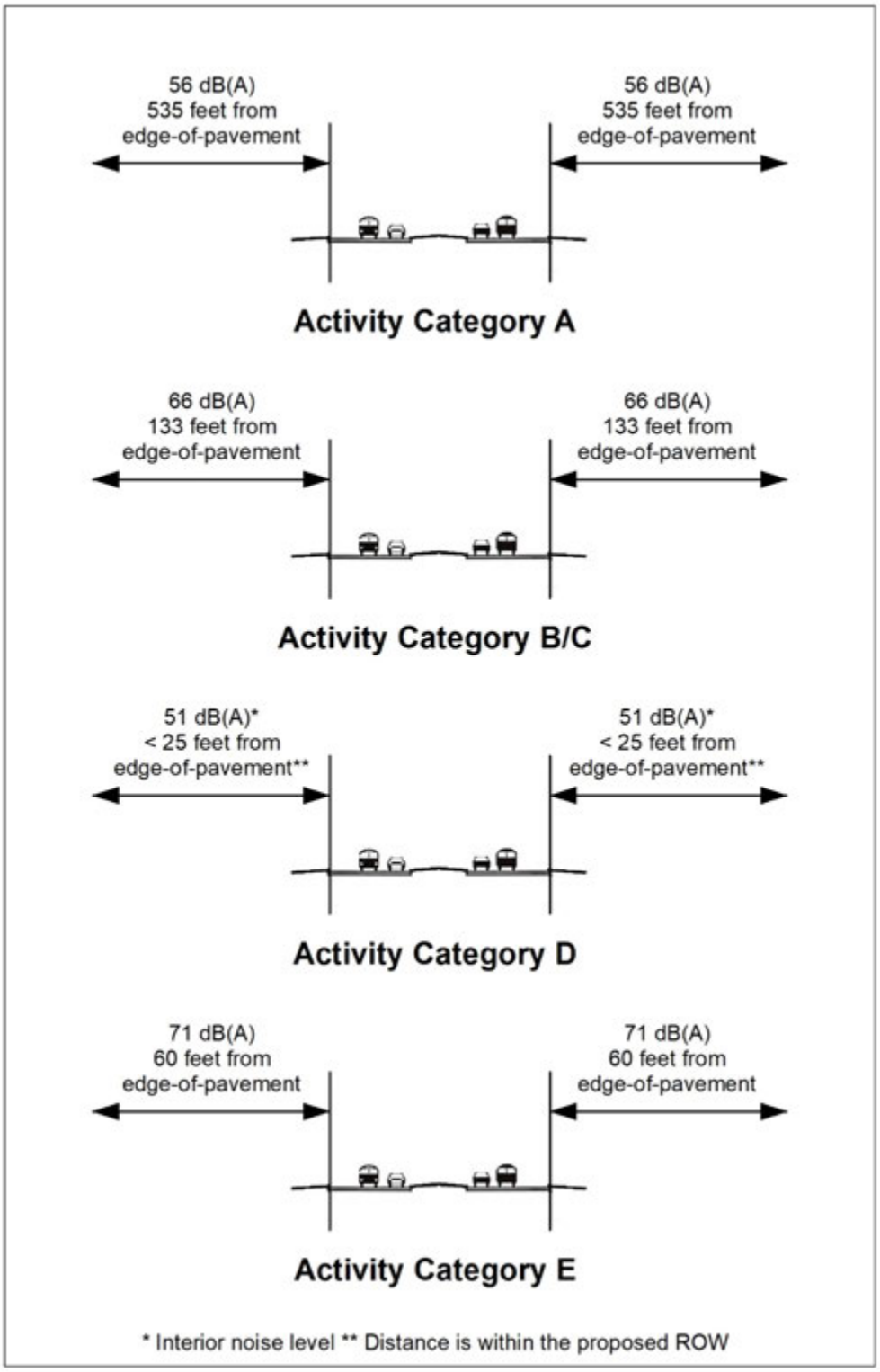


Figure 2-3 Noise Contours from CR 78 (N. River Road) to Shirley Lane

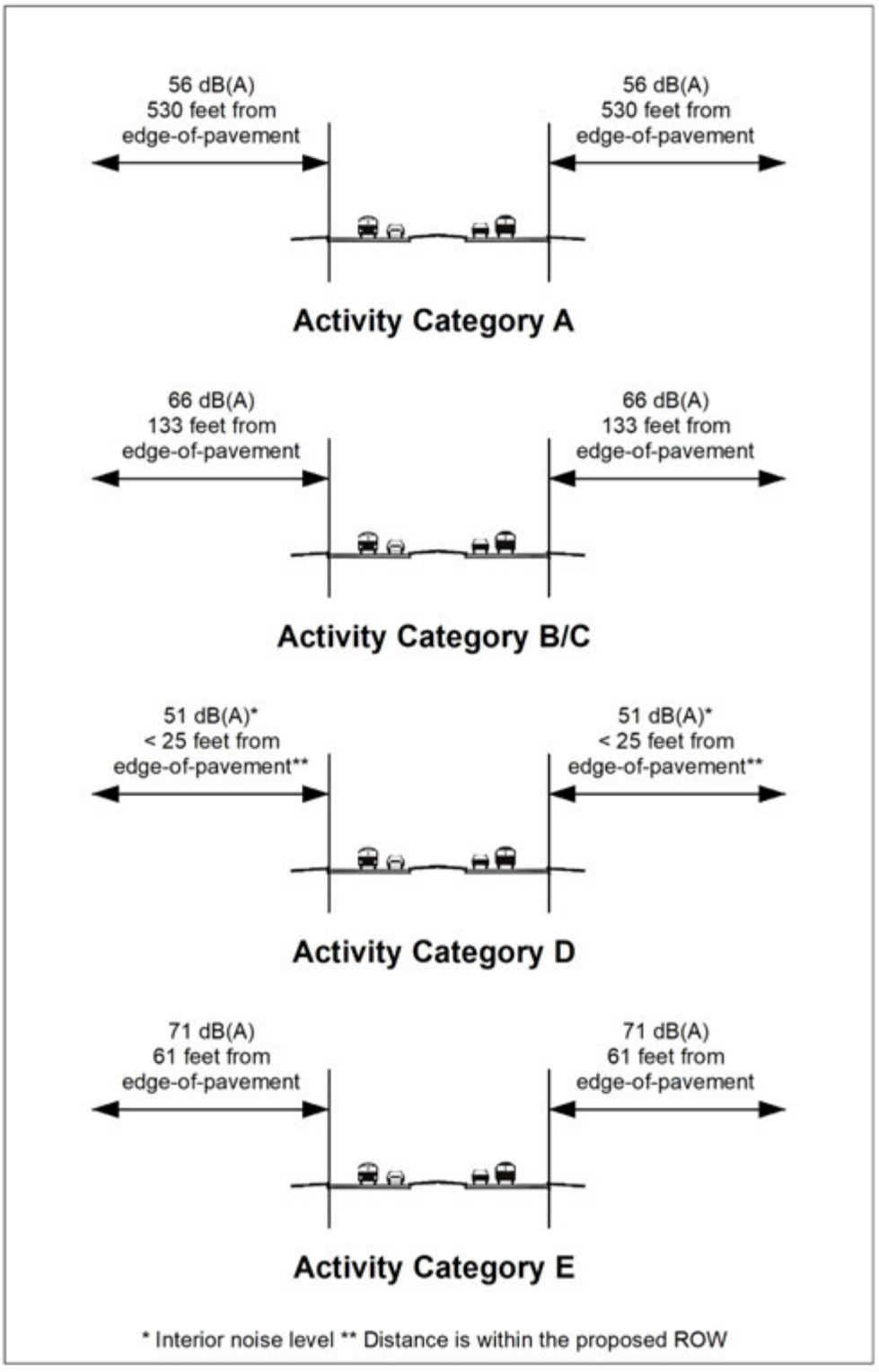


Figure 2-4 Noise Contours from Shirley Lane to Fox Hill Road

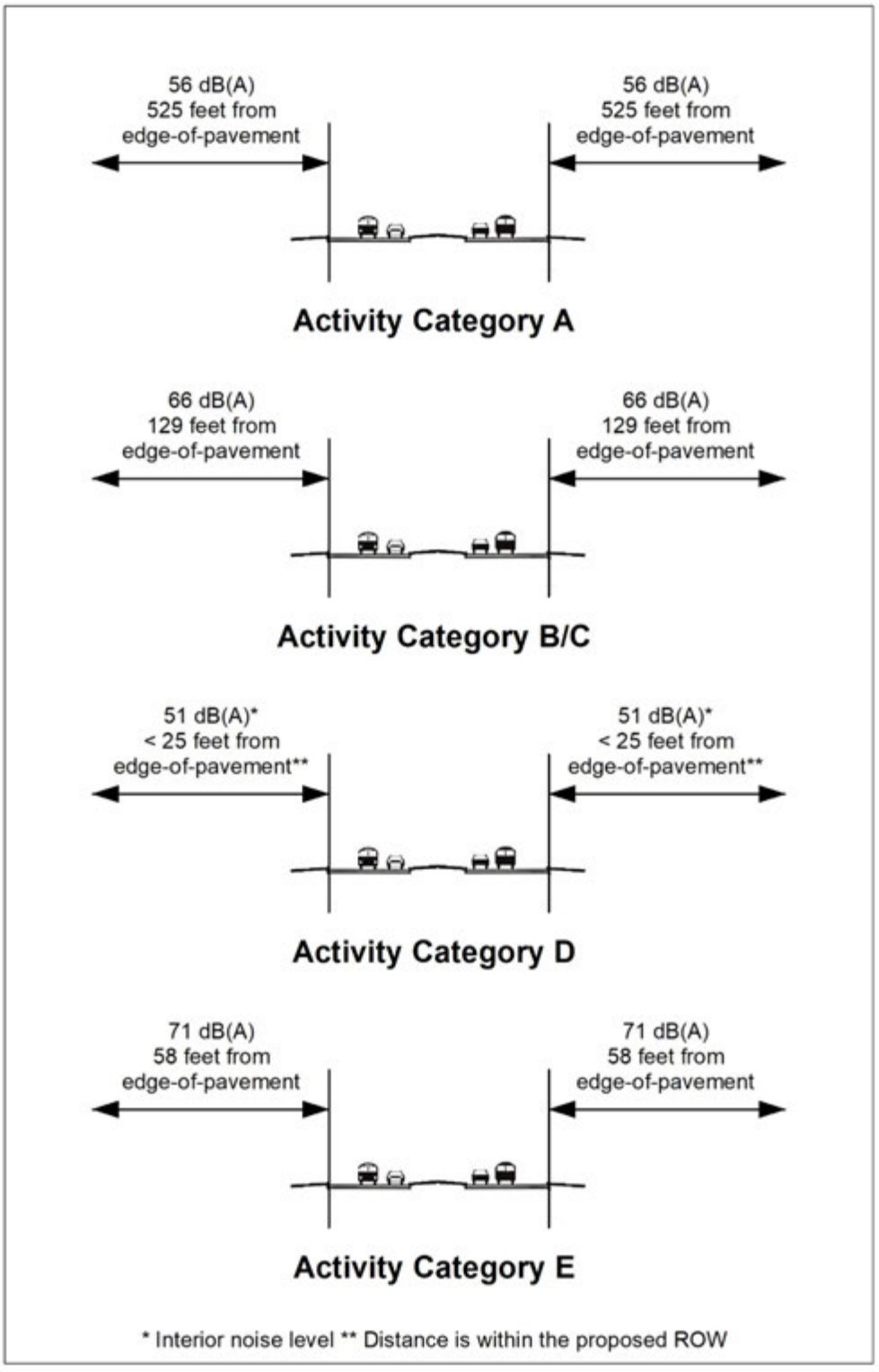


Figure 2-5 Noise Contours from Fox Hill Road to Busbee Lane

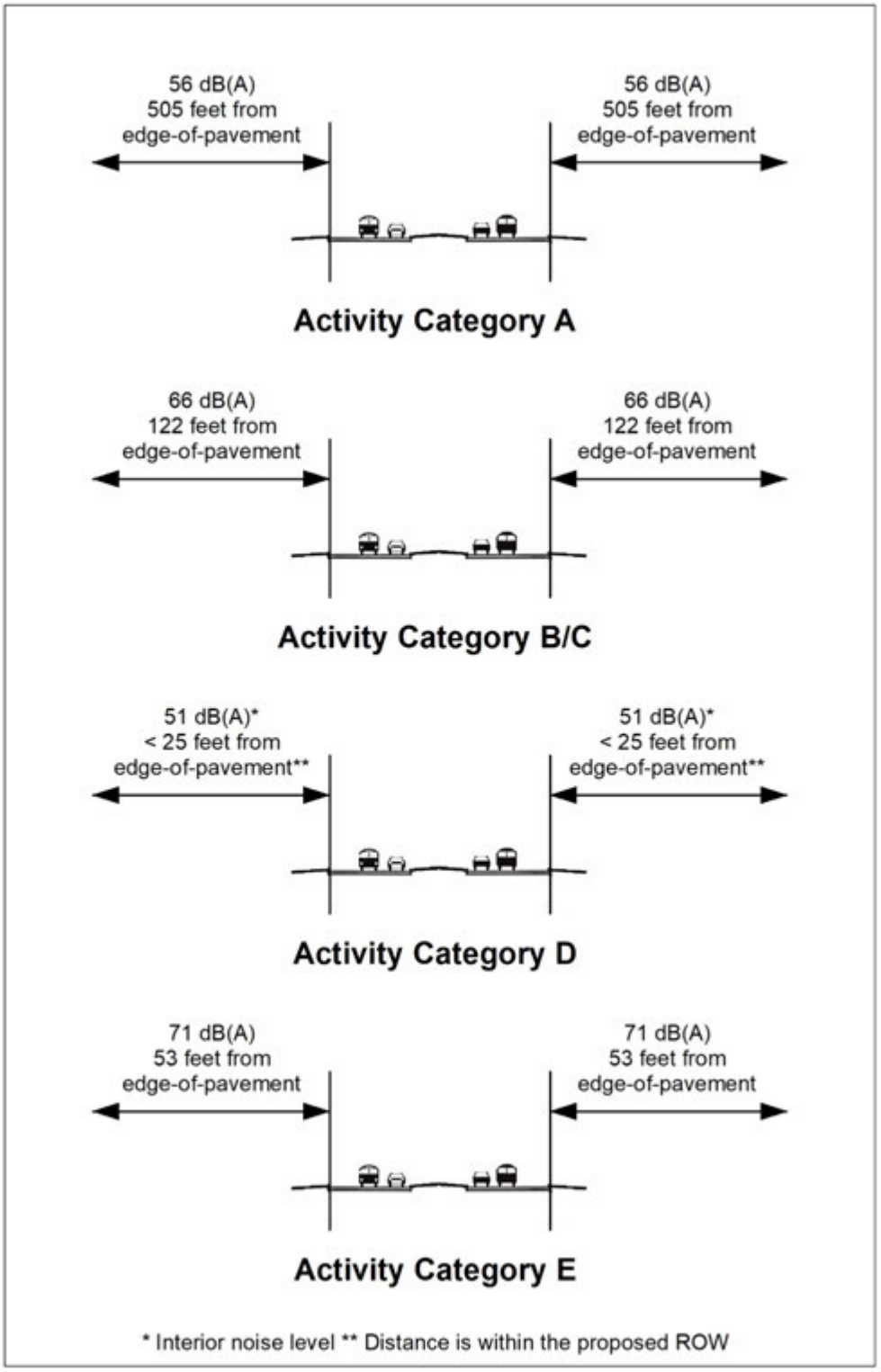


Figure 2-6 Noise Contours from Busbee Lane to Cypress Parkway

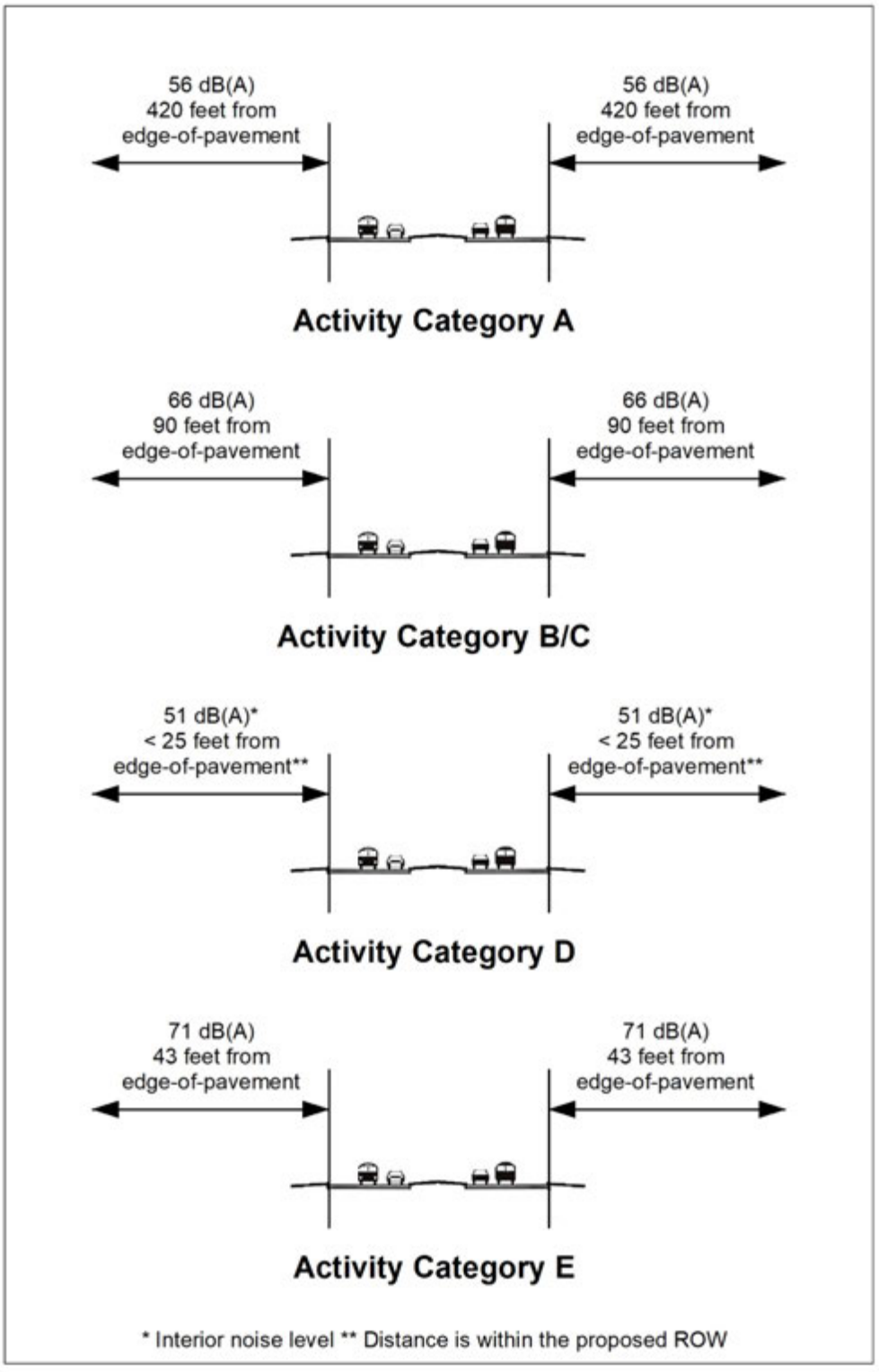


Figure 2-7 Noise Contours from Cypress Parkway to Horseshoe Road

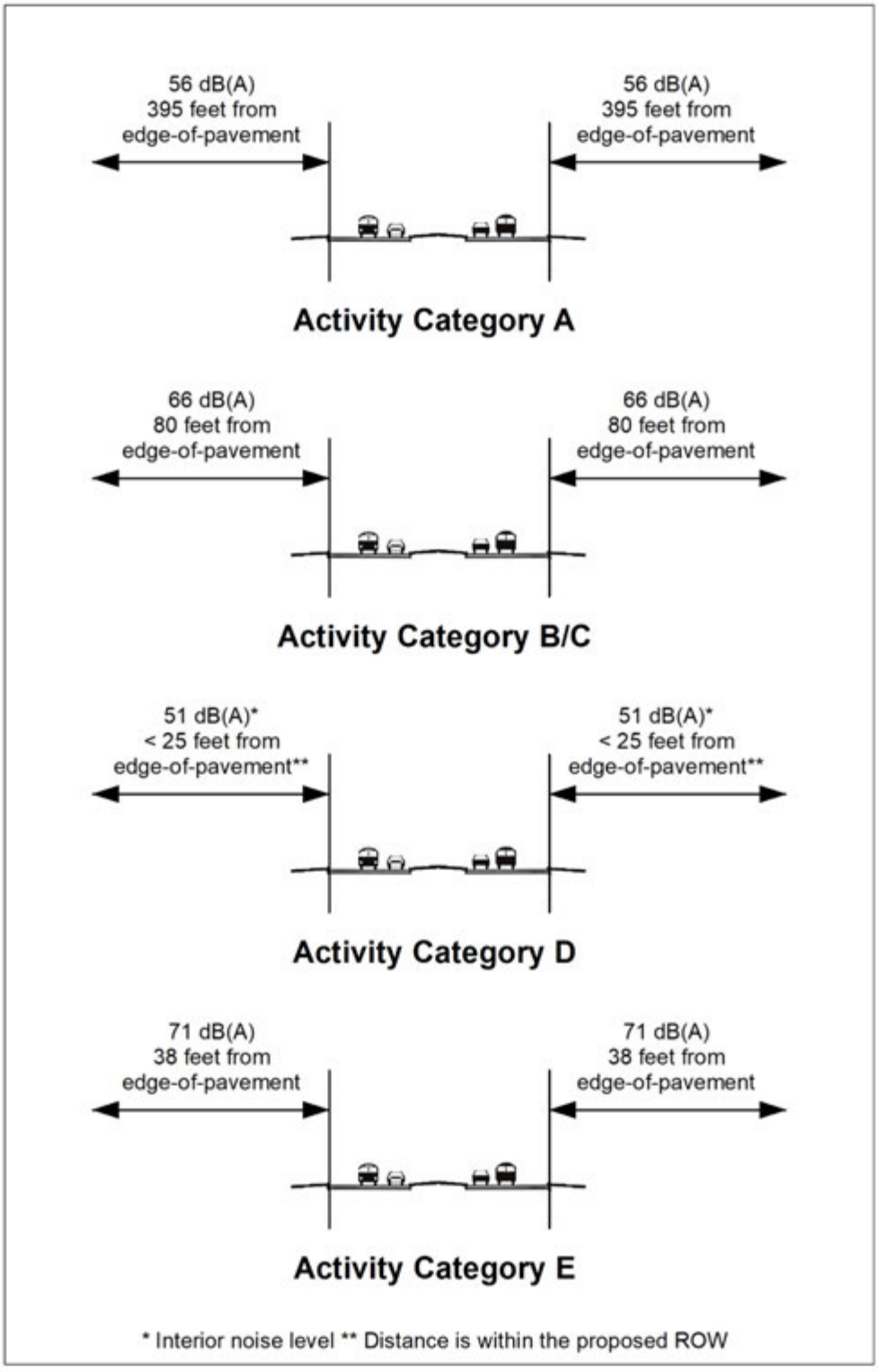


Figure 2-8 Noise Contours from Horseshoe Road to Little Farm Road

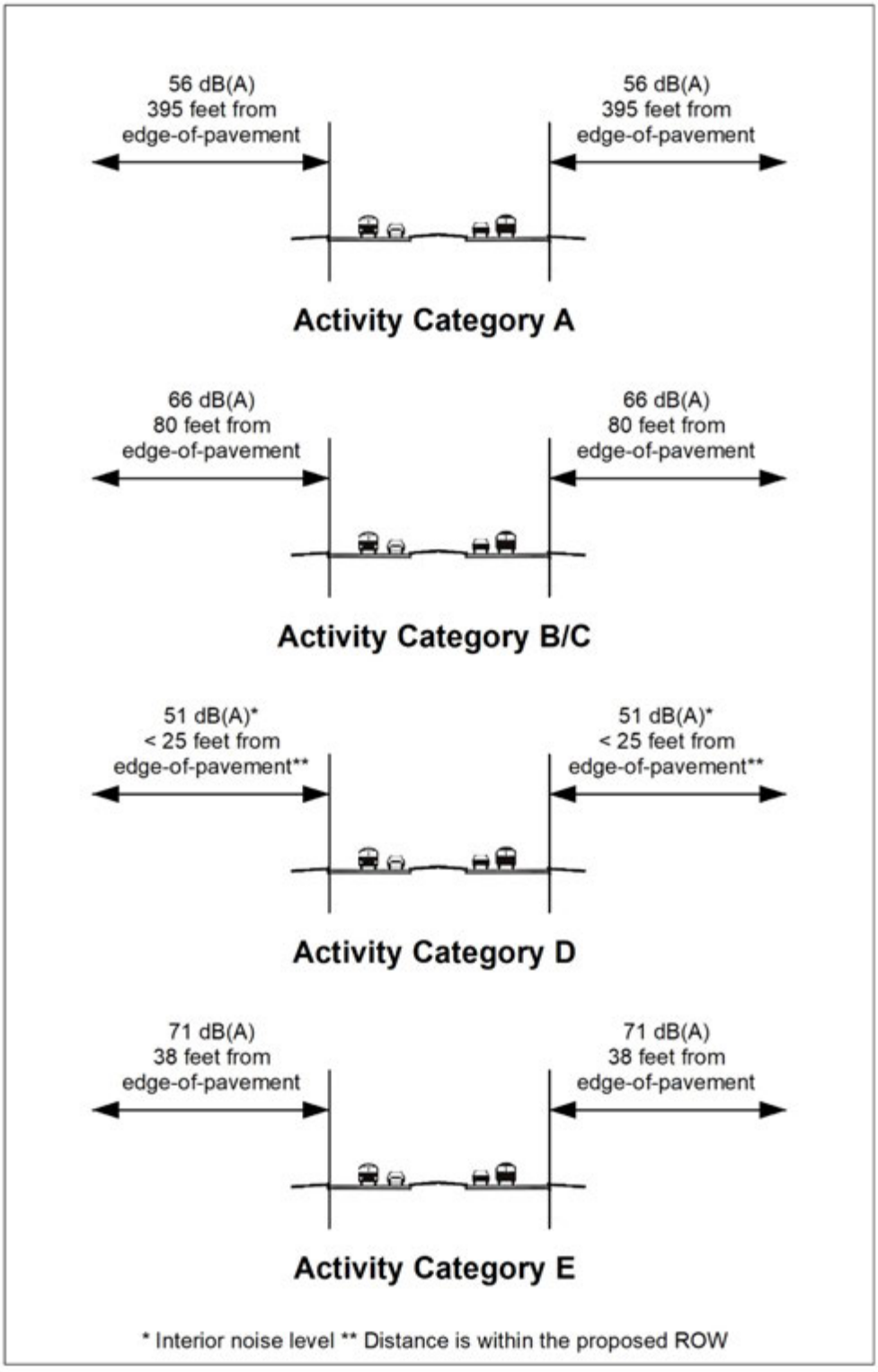


Figure 2-9 Noise Contours from Little Farm Road to Cook Brown Road

2.4.4 Noise Barriers

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

No noise sensitive sites are predicted to experience future noise levels with the proposed improvements to SR 31 that exceed the NAC for their respective Activity Category. Furthermore, none of the evaluated sites are predicted to experience a substantial increase of traffic noise as a result of the proposed improvements. Therefore, noise abatement considerations are not warranted, and noise barriers were not evaluated.

3.0 TRAFFIC NOISE ANALYSIS

3.1 Model Validation

To validate the accuracy of TNM as a prediction model, traffic noise levels were measured on the morning of October 14, 2020, at two locations adjacent to SR 31. The locations are shown on the aerials (with concept plan and receptor sites) provided in **APPENDIX C** and the Validation Monitoring Field Data Sheets are provided in **APPENDIX D**. The locations were selected because they provide a clear view of the passing vehicles traveling at free-flow conditions for more than 1,000 feet in each direction in close proximity to noise sensitive sites.

Traffic data including vehicle volumes by type, vehicle speeds, and meteorological conditions were recorded during each measurement period. The measurements were taken following procedures documented in the *Noise Measurement Handbook* (FHWA-HEP-18-065, 2018) using a Casella CEL-633C Type I sound level meter. The sound level meter was calibrated using a Casella CEL-120 acoustic calibrator. Speeds of passing vehicles were recorded with a Stalker Sport radar gun. The recorded traffic data were used as input in TNM to determine if, given the topography and actual site conditions of the area, the computer model could "recreate" the measured levels with the existing roadway.

Table 3-1 presents the field measurements and the validation results for both locations adjacent to SR 31. Following FDOT guidelines, a noise prediction model is considered within the accepted level of accuracy if the measured and predicted noise levels are within a tolerance standard of three dB(A). As shown, the ability of the model to predict noise levels within the FDOT limits of three dB(A) for the project was confirmed. The noise model usually predicts noise levels higher than measured levels, however, there are certain instances where vehicle volumes are so low during a measurement period that background noises (i.e., birds, insects, lawn equipment, etc.) will cause measured levels to be higher than those predicted. These instances occurred during validation measurement #1 run 1 and #2 run 1.

Table 3-1 Noise Model Validations

Site	Run	Measured Leq(h)	Predicted Leq(h)	Differences
Validation Measurement #1 Temple Baptist Church and School Athletic Field	1	70.9	69.8	1.1
	2	67.7	69.8	2.1
	3	66.9	69.6	2.7
Validation Measurement #2 E of SR31 - 100yds N of Lee/Charlotte county line	1	68.7	68.2	0.5
	2	67.6	68.0	0.4
	3	67.7	67.8	0.1

Noise levels represented in dB(A)

3.2 Predicted Noise Levels

The predicted traffic noise levels modeled for 56 noise sensitive sites along SR 31 are shown in the Predicted Noise Level table located in **APPENDIX B**. The existing (2017) and future year (2045) noise levels with and without the proposed realignment are provided. The existing

condition traffic noise levels are predicted to range from 42.2 to 68.7 dB(A) for Activity Category B and C of FHWA's Noise Abatement Criteria (NAC), 39.7 dB(A) for the single receptor in Category D, and 62.3 dB(A) for the single receptor in Category E. The no-build condition traffic noise levels are predicted to range from 43.6 to 70.6 dB(A) for Activity Category B and C, 41.4 dB(A) for the single receptor in Category D, and 63.8 dB(A) for the single receptor in Category E. The proposed build alternative is predicted to result in traffic noise levels ranging from 49.3 to 64.1 dB(A) for Activity Category B and C, 35.3 dB(A) for the single receptor in Category D, and there is no predicted noise level for the single receptor in Category E since it will be moved to a new location that has not yet been determined. None of the 56 noise sensitive sites evaluated are predicted to experience future noise levels with the proposed improvements to SR 31 that approach, meet, or exceed the NAC for their respective Activity Category.

Additionally, none of the evaluated sites are predicted to experience a substantial increase of traffic noise as a result of the proposed improvements. The maximum increase between the existing condition and the proposed build alternative is 11.1 dB(A) at receptor 1-E-07.

3.3 Noise Abatement Analysis

Based on the noise analyses performed to date, there are no noise sensitive sites predicted to experience future noise levels with the proposed improvements to SR 31 that approach, meet, or exceed the NAC for their respective Activity Category. Furthermore, none of the evaluated sites are predicted to experience a substantial increase of traffic noise as a result of the proposed improvements. Therefore, noise abatement considerations are not warranted, and abatement measures were not evaluated.

4.0 CONCLUSIONS

The TNM noise prediction model was used to predict traffic noise levels at 56 noise sensitive sites located adjacent to SR 31 for the existing (2017) and future year (2045) noise levels with and without the proposed improvements. The existing condition traffic noise levels are predicted to range from 42.2 to 68.7 dB(A) for Activity Category B and C of FHWA's Noise Abatement Criteria (NAC), 39.7 dB(A) for the single receptor in Category D, and 62.3 dB(A) for the single receptor in Category E. The no-build condition traffic noise levels are predicted to range from 43.6 to 70.6 dB(A) for Activity Category B and C, 41.4 dB(A) for the single receptor in Category D, and 63.8 dB(A) for the single receptor in Category E. The proposed build alternative is predicted to result in traffic noise levels ranging from 49.3 to 64.1 dB(A) for Activity Category B and C, 35.3 dB(A) for the single receptor in Category D, and there is no predicted noise level for the single receptor in Category E since it will be moved to a new location that has not yet been determined. None of the 56 noise sensitive sites evaluated are predicted to experience future noise levels with the proposed improvements to SR 31 that approach, meet, or exceed the NAC for their respective Activity Category.

None of the evaluated sites are predicted to experience a substantial increase [15 dB(A) or more] of traffic noise as a result of the proposed improvements. The maximum increase between the existing condition and the proposed build alternative is 11.1 dB(A) at receptor 1-E-07.

Because of the elapsed time between when the noise study was performed and when the Environmental Document will be signed by FDOT (Date of Public Knowledge), the potential exists for additional residential building permits to be granted subsequent to this study. The date of the PD&E land use review was October 14, 2020. Any noise analysis performed during the design phase of this project will include a review of building permit dates. Any noise sensitive site that is identified as permitted between the completion of the land use review and the Date of Public Knowledge will be analyzed for traffic noise impacts and, if impacts are predicted, abatement considered during the design phase of the project.

Based on the noise analyses performed to date, there are no noise sensitive sites predicted to experience future noise levels with the proposed improvements to SR 31 that approach, meet, or exceed the NAC for their respective Activity Category. Furthermore, none of the evaluated sites are predicted to experience a substantial increase of traffic noise as a result of the proposed improvements. Therefore, noise abatement considerations are not warranted.

Final recommendations on the construction of barriers will occur only if changes to the noise environment during the project's final design warrant a re-analysis of which the results predict feasible and reasonable noise barriers. The Florida Department of Transportation is committed to the construction of feasible and reasonable noise abatement measures at noise-impacted locations contingent on the following:

1. Detailed noise analyses during the final design process support the need, feasibility, and reasonableness of providing abatement.

2. Cost analysis indicates that the cost of the noise barrier(s) will not exceed the cost reasonable criterion.

3. Community input supporting types, heights, and locations of the noise barrier(s) is provided to the District Office; and

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

5.0 CONSTRUCTION NOISE AND VIBRATION

Construction of the proposed roadway improvements is not expected to have any significant noise and vibration impact. If sensitive land uses develop adjacent to the roadway prior to construction, increased potential for noise and vibration impacts could result. It is anticipated that the application of the FDOT *Standard Specifications for Road and Bridge Construction* will minimize or eliminate potential construction noise and vibration impacts. However, should unanticipated noise and vibration issues arise during the construction process, the Project Engineer, in coordination with the District Noise Specialist and the Contractor, will investigate additional methods of controlling these impacts.

6.0 COMMUNITY COORDINATION

6.1 Public Meetings

FDOT held a Public Hearing at the Lee Civic Center (Whaley Hall) in Fort Myers on March 11, 2021. The hearing provided attendees an overview of the preferred interim and ultimate improvements, the status of the study to date and an opportunity to ask questions and provide comments. Noise specialists familiar with the noise analysis were present to answer questions and discuss FDOT's traffic noise evaluation process.

One comment related to traffic noise was received via email during the 10 day comment period following the hearing. FDOT provided a response to the comment explaining that as a result of the noise study conducted for this project, no noise barriers were found reasonable or cost feasible along SR 31

6.2 Coordination with Local Officials

Local officials can promote compatibility between land development and highways. FDOT will send copies of this report, which includes the noise contours described in **Section 2.4.3**, to Lee and Charlotte Counties to assist them in permitting future noise-compatible land uses along SR 31.

7.0 REFERENCES

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

Florida Department of Transportation *Project Development and Environment Manual* Part 2, Chapter 18, July 1, 2020. Available from FDOT.

Federal Highway Administration Report Number FHWA-PD-96-009, *FHWA Traffic Noise Model, Version 1.0 User's Guide*. January 1998, 192 pages + supplements. Available from McTrans Center, University of Florida, Gainesville, Florida.

Florida Statute 335.17, *State Highway Construction; Means of Noise Abatement*. 1989; 1 page. Available from FDOT.

Federal Highway Administration Report Number FHWA-HEP-18-065, *Noise Measurement Handbook – Final Report (2018)*.

Florida Department of Transportation *Design Manual (Topic No. 625-000-002)*, Chapter 264, Noise Walls, and Perimeter Walls. January 1, 2018. Available from FDOT.

Florida Department of Transportation *Standard Specifications for Road and Bridge Construction*. July 2018. Available from FDOT

Florida Department of Transportation, *Traffic Noise Modeling and Analysis Practitioners Handbook*, December 31, 2018.

FHWA. Report FHWA-HEP-10-025, *Highway Traffic Noise: Analysis and Abatement Guidance*, December 2011

APPENDIX A

TRAFFIC DATA

SR 31 from SR 78 to CR 78 (N. River Road)
Project Development & Environment Study (FPID # 428917-1-22-01)
Traffic Data for Noise Analysis
From SR 78 to CR 78 (N. River Road)

Demand Peak Hour/LOS C	Direction	Vehicle Type	Existing Year (2017) Posted Speed = 60 mph No. of Lanes = 2 No. of Vehicles	Direction	Vehicle Type	Design Year (2045) No-Build Alt Posted Speed = 60 mph No. of Lanes = 2 No. of Vehicles	Design Year (2045) Build Alt Posted Speed = 45 mph No. of Lanes = 6 No. of Vehicles
PM Peak Hour Demand	Peak Direction (Northbound)	Autos	318	Peak Direction (Northbound)	Autos	3,069	3,069
		Medium Trucks	30		Medium Trucks	64	64
		Heavy Trucks	36		Heavy Trucks	96	96
		Buses	2		Buses	20	20
		Motorcycles	2		Motorcycles	13	13
		Total[1]	389		Total[1]	3,261	3,261
	Off-Peak Direction (Southbound)	Autos	308	Off-Peak Direction (Southbound)	Autos	2,489	2,489
		Medium Trucks	30		Medium Trucks	52	52
		Heavy Trucks	35		Heavy Trucks	78	78
		Buses	2		Buses	16	16
		Motorcycles	2		Motorcycles	11	11
		Total[1]	377		Total[2]	2,645	2,645
LOS C	Peak Direction	Autos	837	Peak Direction	Autos	837	2,905
		Medium Trucks	17		Medium Trucks	17	61
		Heavy Trucks	26		Heavy Trucks	26	91
		Buses	5		Buses	5	19
		Motorcycles	4		Motorcycles	4	12
		Total[2]	890		Total[2]	890	3,087
	Off-Peak Direction	Autos	837	Off-Peak Direction	Autos	837	2,905
		Medium Trucks	17		Medium Trucks	17	61
		Heavy Trucks	26		Heavy Trucks	26	91
		Buses	5		Buses	5	19
		Motorcycles	4		Motorcycles	4	12
		Total[2]	890		Total[2]	890	3,087

[1] *2017 peak hour directional volumes based on traffic counts conducted in March of 2017. 2045 peak hour directional volumes provided by FDOT District One on October 6, 2020.*

[2] *Obtained from Table 7 of the FDOT Quality/Level of Service Handbook (January 2020)*
2-Lane Undivided Uninterrupted Flow Highway (Existing)
6-Lane Divided Class 1 Signalized Arterial ≥ 40 mph (Design Year Build Alternative)

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Greg Root (Print Name) _____ (Signature) Date: 11/18/2020

I have reviewed the information and concur that it is appropriate for use with the traffic noise analysis.

FDOT Reviewer: Christopher Simpson (Print Name) _____ (Signature) Date: 11/19/2020

SR 31 from CR 78 (N. River Road) to Cook Brown Road
Project Development & Environment Study (FPID # 428917-2-21-01)
Traffic Data for Noise Analysis
From CR 78 (N. River Road) to Shirley Lane

Demand Peak Hour/LOS C	Direction	Vehicle Type	Existing Year (2017) Posted Speed = 60 mph No. of Lanes = 2 No. of Vehicles	Direction	Vehicle Type	Design Year (2045) No-Build Alt Posted Speed = 60 mph No. of Lanes = 2 No. of Vehicles	Design Year (2045) Build Alt Posted Speed = 45 mph No. of Lanes = 6 No. of Vehicles
PM Peak Hour Demand	Peak Direction (Southbound)	Autos	226	Peak Direction (Northbound)	Autos	3,416	3,391
		Medium Trucks	30		Medium Trucks	64	63
		Heavy Trucks	36		Heavy Trucks	95	95
		Buses	2		Buses	22	22
		Motorcycles	1		Motorcycles	14	14
		Total[1]	296		Total[1]	3,611	3,585
	Off-Peak Direction (Northbound)	Autos	212	Off-Peak Direction (Southbound)	Autos	2,838	2,812
		Medium Trucks	30		Medium Trucks	53	52
		Heavy Trucks	35		Heavy Trucks	79	78
		Buses	2		Buses	18	18
		Motorcycles	1		Motorcycles	12	12
		Total[1]	280		Total[1]	3,000	2,972
LOS C	Peak Direction	Autos	842	Peak Direction	Autos	842	2,920
		Medium Trucks	16		Medium Trucks	16	54
		Heavy Trucks	23		Heavy Trucks	23	81
		Buses	5		Buses	5	19
		Motorcycles	4		Motorcycles	4	12
		Total[2]	890		Total[2]	890	3,087
	Off-Peak Direction	Autos	842	Off-Peak Direction	Autos	842	2,920
		Medium Trucks	16		Medium Trucks	16	54
		Heavy Trucks	23		Heavy Trucks	23	81
		Buses	5		Buses	5	19
		Motorcycles	4		Motorcycles	4	12
		Total[2]	890		Total[2]	890	3,087

[1] *2017 peak hour directional volumes based on traffic counts conducted in March of 2017. 2045 peak hour directional volumes provided by FDOT District One on October 6, 2020.*

[2] *Obtained from Table 7 of the FDOT Quality/Level of Service Handbook (January 2020)*
2-Lane Undivided Uninterrupted Flow Highway (Existing)
6-Lane Divided Class 1 Signalized Arterial ≥ 40 mph (Design Year Build Alternative)

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Greg Root (Print Name) Greg Root (Signature) Date: 11/18/2020

I have reviewed the information and concur that it is appropriate for use with the traffic noise analysis.

FDOT Reviewer: Christopher Simpson (Print Name) (Signature) Date: 11/19/2020

SR 31 from CR 78 (N. River Road) to Cook Brown Road
Project Development & Environment Study (FPID # 428917-2-21-01)
Traffic Data for Noise Analysis
From Shirley Lane to Fox Hill Road

Demand Peak Hour/LOS C	Direction	Vehicle Type	Existing Year (2017) Posted Speed = 60 mph No. of Lanes = 2 No. of Vehicles	Direction	Vehicle Type	Design Year (2045) No-Build Alt Posted Speed = 60 mph No. of Lanes = 2 No. of Vehicles	Design Year (2045) Build Alt Posted Speed = 45 mph No. of Lanes = 6 No. of Vehicles
PM Peak Hour Demand	Peak Direction (Southbound)	Autos	208	Peak Direction (Northbound)	Autos	2,979	2,975
		Medium Trucks	30		Medium Trucks	65	65
		Heavy Trucks	36		Heavy Trucks	97	97
		Buses	2		Buses	19	19
		Motorcycles	1		Motorcycles	13	13
		Total[1]	278		Total[1]	3,173	3,168
	Off-Peak Direction (Northbound)	Autos	187	Off-Peak Direction (Southbound)	Autos	2,379	2,373
		Medium Trucks	30		Medium Trucks	52	52
		Heavy Trucks	35		Heavy Trucks	78	77
		Buses	2		Buses	15	15
		Motorcycles	1		Motorcycles	10	10
		Total[1]	254		Total[1]	2,534	2,527
LOS C	Peak Direction	Autos	836	Peak Direction	Autos	836	2,899
		Medium Trucks	18		Medium Trucks	18	63
		Heavy Trucks	27		Heavy Trucks	27	94
		Buses	5		Buses	5	19
		Motorcycles	4		Motorcycles	4	12
		Total[2]	890		Total[2]	890	3,087
	Off-Peak Direction	Autos	836	Off-Peak Direction	Autos	836	2,899
		Medium Trucks	18		Medium Trucks	18	63
		Heavy Trucks	27		Heavy Trucks	27	94
		Buses	5		Buses	5	19
		Motorcycles	4		Motorcycles	4	12
		Total[2]	890		Total[2]	890	3,087

[1] *2017 peak hour directional volumes based on traffic counts conducted in March of 2017. 2045 peak hour directional volumes provided by FDOT District One on October 6, 2020.*

[2] *Obtained from Table 7 of the FDOT Quality/Level of Service Handbook (January 2020)*
2-Lane Undivided Uninterrupted Flow Highway (Existing)
6-Lane Divided Class 1 Signalized Arterial ≥ 40 mph (Design Year Build Alternative)

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Greg Root (Print Name) Greg Root (Signature) Date: 11/18/2020

I have reviewed the information and concur that it is appropriate for use with the traffic noise analysis.

FDOT Reviewer: Christopher Simpson (Print Name) (Signature) Date: 11/19/2020

SR 31 from CR 78 (N. River Road) to Cook Brown Road
Project Development & Environment Study (FPID # 428917-2-21-01)
Traffic Data for Noise Analysis
From Fox Hill Road to Busbee Lane

Demand Peak Hour/LOS C	Direction	Vehicle Type	Existing Year (2017) Posted Speed = 60 mph No. of Lanes = 2 No. of Vehicles	Direction	Vehicle Type	Design Year (2045) No-Build Alt Posted Speed = 60 mph No. of Lanes = 2 No. of Vehicles	Design Year (2045) Build Alt Posted Speed = 45 mph No. of Lanes = 6 No. of Vehicles
PM Peak Hour Demand	Peak Direction (Southbound)	Autos	205	Peak Direction (Southbound)	Autos	2,695	2,690
		Medium Trucks	30		Medium Trucks	61	61
		Heavy Trucks	36		Heavy Trucks	91	91
		Buses	2		Buses	17	17
		Motorcycles	1		Motorcycles	12	11
		Total[1]	275		Total[1]	2,876	2,871
	Off-Peak Direction (Northbound)	Autos	181	Off-Peak Direction (Northbound)	Autos	2,434	2,428
		Medium Trucks	30		Medium Trucks	55	55
		Heavy Trucks	35		Heavy Trucks	83	82
		Buses	1		Buses	16	16
		Motorcycles	1		Motorcycles	10	10
		Total[1]	248		Total[1]	2,598	2,591
LOS C	Peak Direction	Autos	834	Peak Direction	Autos	834	2,893
		Medium Trucks	19		Medium Trucks	19	65
		Heavy Trucks	28		Heavy Trucks	28	98
		Buses	5		Buses	5	19
		Motorcycles	4		Motorcycles	4	12
		Total[2]	890		Total[2]	890	3,087
	Off-Peak Direction	Autos	834	Off-Peak Direction	Autos	834	2,893
		Medium Trucks	19		Medium Trucks	19	65
		Heavy Trucks	28		Heavy Trucks	28	98
		Buses	5		Buses	5	19
		Motorcycles	4		Motorcycles	4	12
		Total[2]	890		Total[2]	890	3,087

[1] *2017 peak hour directional volumes based on traffic counts conducted in March of 2017. 2045 peak hour directional volumes provided by FDOT District One on October 6, 2020.*

[2] *Obtained from Table 7 of the FDOT Quality/Level of Service Handbook (January 2020)*
2-Lane Undivided Uninterrupted Flow Highway (Existing)
6-Lane Divided Class 1 Signalized Arterial ≥ 40 mph (Design Year Build Alternative)

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Greg Root (Print Name) _____ (Signature) Date: 11/18/2020

I have reviewed the information and concur that it is appropriate for use with the traffic noise analysis.

FDOT Reviewer: Christopher Simpron (Print Name) _____ (Signature) Date: 11/19/2020

SR 31 from CR 78 (N. River Road) to Cook Brown Road
Project Development & Environment Study (FPID # 428917-2-21-01)
Traffic Data for Noise Analysis
From Busbee Lane to Cypress Parkway

Demand Peak Hour/LOS C	Direction	Vehicle Type	Existing Year (2017) Posted Speed = 60 mph No. of Lanes = 2 No. of Vehicles	Direction	Vehicle Type	Design Year (2045) No-Build Alt Posted Speed = 60 mph No. of Lanes = 2 No. of Vehicles	Design Year (2045) Build Alt Posted Speed = 45 mph No. of Lanes = 6 No. of Vehicles
PM Peak Hour Demand	Peak Direction (Southbound)	Autos	209	Peak Direction (Northbound)	Autos	2,253	2,244
		Medium Trucks	26		Medium Trucks	62	62
		Heavy Trucks	36		Heavy Trucks	93	93
		Buses	2		Buses	15	15
		Motorcycles	1		Motorcycles	10	10
		Total[1]	274		Total[1]	2,433	2,423
	Off-Peak Direction (Northbound)	Autos	180	Off-Peak Direction (Southbound)	Autos	1,969	1,959
		Medium Trucks	26		Medium Trucks	54	54
		Heavy Trucks	35		Heavy Trucks	82	81
		Buses	1		Buses	13	13
		Motorcycles	1		Motorcycles	9	8
		Total[1]	244		Total[1]	2,126	2,116
LOS C	Peak Direction	Autos	824	Peak Direction	Autos	824	2,859
		Medium Trucks	23		Medium Trucks	23	79
		Heavy Trucks	34		Heavy Trucks	34	119
		Buses	5		Buses	5	19
		Motorcycles	4		Motorcycles	4	12
		Total[2]	890		Total[2]	890	3,087
	Off-Peak Direction	Autos	824	Off-Peak Direction	Autos	824	2,859
		Medium Trucks	23		Medium Trucks	23	79
		Heavy Trucks	34		Heavy Trucks	34	119
		Buses	5		Buses	5	19
		Motorcycles	4		Motorcycles	4	12
		Total[2]	890		Total[2]	890	3,087

[1] *2017 peak hour directional volumes based on traffic counts conducted in March of 2017. 2045 peak hour directional volumes provided by FDOT District One on October 6, 2020.*

[2] *Obtained from Table 7 of the FDOT Quality/Level of Service Handbook (January 2020)*
2-Lane Undivided Uninterrupted Flow Highway (Existing)
6-Lane Divided Class 1 Signalized Arterial ≥ 40 mph (Design Year Build Alternative)

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Greg Root (Print Name) Greg Root (Signature) Date: 11/18/2020

I have reviewed the information and concur that it is appropriate for use with the traffic noise analysis.

FDOT Reviewer: Christopher Simpson (Print Name) (Signature) Date: 11/19/2020

SR 31 from CR 78 (N. River Road) to Cook Brown Road
Project Development & Environment Study (FPID # 428917-2-21-01)
Traffic Data for Noise Analysis
From Cypress Parkway to Horseshoe Road

Demand Peak Hour/LOS C	Direction	Vehicle Type	Existing Year (2017) Posted Speed = 60 mph No. of Lanes = 2 No. of Vehicles	Direction	Vehicle Type	Design Year (2045) No-Build Alt Posted Speed = 60 mph No. of Lanes = 2 No. of Vehicles	Design Year (2045) Build Alt Posted Speed = 45 mph No. of Lanes = 4 No. of Vehicles
PM Peak Hour Demand	Peak Direction (Southbound)	Autos	206	Peak Direction (Southbound)	Autos	1,396	1,396
		Medium Trucks	22		Medium Trucks	59	59
		Heavy Trucks	36		Heavy Trucks	89	89
		Buses	2		Buses	9	9
		Motorcycles	1		Motorcycles	6	6
		Total[1]	267		Total[1]	1,560	1,560
	Off-Peak Direction (Northbound)	Autos	192	Off-Peak Direction (Northbound)	Autos	1,326	1,326
		Medium Trucks	22		Medium Trucks	56	56
		Heavy Trucks	35		Heavy Trucks	84	84
		Buses	2		Buses	9	9
		Motorcycles	1		Motorcycles	6	6
		Total[1]	252		Total[1]	1,482	1,482
LOS C	Peak Direction	Autos	796	Peak Direction	Autos	797	1,709
		Medium Trucks	34		Medium Trucks	34	73
		Heavy Trucks	51		Heavy Trucks	51	109
		Buses	5		Buses	5	11
		Motorcycles	4		Motorcycles	4	8
		Total[2]	890		Total[2]	890	1,910
	Off-Peak Direction	Autos	796	Off-Peak Direction	Autos	797	1,709
		Medium Trucks	34		Medium Trucks	34	73
		Heavy Trucks	51		Heavy Trucks	51	109
		Buses	5		Buses	5	11
		Motorcycles	4		Motorcycles	4	8
		Total[2]	890		Total[2]	890	1,910

[1] *2017 peak hour directional volumes based on traffic counts conducted in March of 2017. 2045 peak hour directional volumes provided by FDOT District One on October 6, 2020.*

[2] *Obtained from Table 7 of the FDOT Quality/Level of Service Handbook (January 2020)*
2-Lane Undivided Uninterrupted Flow Highway (Existing)
4-Lane Divided Class 1 Signalized Arterial ≥ 40 mph (Design Year Build Alternative)

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Greg Root (Print Name) _____ (Signature) Date: 11/18/2020

I have reviewed the information and concur that it is appropriate for use with the traffic noise analysis.

FDOT Reviewer: Christopher Simpson (Print Name) _____ (Signature) Date: 11/19/2020

SR 31 from CR 78 (N. River Road) to Cook Brown Road
Project Development & Environment Study (FPID # 428917-2-21-01)
Traffic Data for Noise Analysis
From Horseshoe Road to Little Farm Road

Demand Peak Hour/LOS C	Direction	Vehicle Type	Existing Year (2017) Posted Speed = 60 mph No. of Lanes = 2 No. of Vehicles	Direction	Vehicle Type	Design Year (2045) No-Build Alt Posted Speed = 60 mph No. of Lanes = 2 No. of Vehicles	Design Year (2045) Build Alt Posted Speed = 45 mph No. of Lanes = 4 No. of Vehicles
PM Peak Hour Demand	Peak Direction (Southbound)	Autos	176	Peak Direction (Southbound)	Autos	885	885
		Medium Trucks	18		Medium Trucks	60	60
		Heavy Trucks	37		Heavy Trucks	90	90
		Buses	1		Buses	6	6
		Motorcycles	1		Motorcycles	4	4
		Total[2]	233		Total[1]	1,046	1,046
	Off-Peak Direction (Northbound)	Autos	174	Off-Peak Direction (Northbound)	Autos	823	823
		Medium Trucks	18		Medium Trucks	56	56
		Heavy Trucks	36		Heavy Trucks	84	84
		Buses	1		Buses	6	6
		Motorcycles	1		Motorcycles	4	4
		Total[2]	231		Total[1]	973	973
LOS C	Peak Direction	Autos	751	Peak Direction	Autos	753	1,615
		Medium Trucks	52		Medium Trucks	51	110
		Heavy Trucks	78		Heavy Trucks	77	165
		Buses	5		Buses	5	11
		Motorcycles	4		Motorcycles	4	8
		Total[2]	890		Total[2]	890	1,910
	Off-Peak Direction	Autos	751	Off-Peak Direction	Autos	753	1,616
		Medium Trucks	52		Medium Trucks	51	110
		Heavy Trucks	78		Heavy Trucks	77	165
		Buses	5		Buses	5	11
		Motorcycles	4		Motorcycles	4	8
		Total[2]	890		Total[2]	890	1,910

[1] *2017 peak hour directional volumes based on traffic counts conducted in March of 2017. 2045 peak hour directional volumes provided by FDOT District One on October 6, 2020.*

[2] *Obtained from Table 7 of the FDOT Quality/Level of Service Handbook (January 2020)*
2-Lane Undivided Class 1 Signalized Arterial ≥ 40 mph (Design Year No-Build Alternative)
4-Lane Divided Class 1 Signalized Arterial ≥ 40 mph (Design Year Build Alternative)

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Greg Root (Print Name) _____ (Signature) Date: 11/18/2020

I have reviewed the information and concur that it is appropriate for use with the traffic noise analysis.

FDOT Reviewer: Christopher Simpson (Print Name) _____ (Signature) Date: 11/19/2020

SR 31 from CR 78 (N. River Road) to Cook Brown Road
Project Development & Environment Study (FPID # 428917-2-21-01)
Traffic Data for Noise Analysis
From Little Farm Road to Cook Brown Road

Demand Peak Hour/LOS C	Direction	Vehicle Type	Existing Year (2017) Posted Speed = 60 mph No. of Lanes = 2 No. of Vehicles	Direction	Vehicle Type	Design Year (2045) No-Build Alt Posted Speed = 60 mph No. of Lanes = 2 No. of Vehicles	Design Year (2045) Build Alt Posted Speed = 45 mph No. of Lanes = 4 No. of Vehicles
PM Peak Hour Demand	Peak Direction (Southbound)	Autos	158	Peak Direction (Southbound)	Autos	858	858
		Medium Trucks	18		Medium Trucks	59	59
		Heavy Trucks	37		Heavy Trucks	88	88
		Buses	1		Buses	6	6
		Motorcycles	1		Motorcycles	4	4
		Total[2]	215		Total[1]	1,015	1,015
	Off-Peak Direction (Northbound)	Autos	157	Off-Peak Direction (Northbound)	Autos	827	827
		Medium Trucks	18		Medium Trucks	57	57
		Heavy Trucks	36		Heavy Trucks	85	85
		Buses	1		Buses	6	6
		Motorcycles	1		Motorcycles	4	4
		Total[2]	213		Total[1]	979	979
LOS C	Peak Direction	Autos	748	Peak Direction	Autos	752	1,614
		Medium Trucks	53		Medium Trucks	52	111
		Heavy Trucks	80		Heavy Trucks	77	166
		Buses	5		Buses	5	11
		Motorcycles	4		Motorcycles	4	8
		Total[2]	890		Total[2]	890	1,910
	Off-Peak Direction	Autos	748	Off-Peak Direction	Autos	752	1,614
		Medium Trucks	53		Medium Trucks	52	111
		Heavy Trucks	80		Heavy Trucks	77	166
		Buses	5		Buses	5	11
		Motorcycles	4		Motorcycles	4	8
		Total[2]	890		Total[2]	890	1,910

[1] *2017 peak hour directional volumes based on traffic counts conducted in March of 2017. 2045 peak hour directional volumes provided by FDOT District One on October 6, 2020.*

[2] *Obtained from Table 7 of the FDOT Quality/Level of Service Handbook (January 2020)*
2-Lane Undivided Uninterrupted Flow Highway (Existing)
4-Lane Divided Class 1 Signalized Arterial ≥ 40 mph (Design Year Build Alternative)

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Greg Root (Print Name) Greg Root (Signature) Date: 11/18/2020

I have reviewed the information and concur that it is appropriate for use with the traffic noise analysis.

FDOT Reviewer: Christopher Simpson (Print Name) (Signature) Date: 11/19/2020

APPENDIX B

PREDICTED NOISE LEVELS

SR 31 Traffic Noise Noise Level Results Table									
Receiver ID	Dwelling Units	NAC Activity Category	(2017) Existing Noise Level - dB(A)	(2045) No-Build Condition Noise Level - dB(A)	(2045) Build Condition Noise Level - dB(A)	NAC Impact Threshold - dB(A)	Increase between Existing and Build Noise Levels - dB(A)	Substantial Increase Threshold	Impact
1-E-01	1	B	44.0	45.4	53.8	66	9.8	15	No
1-E-02	1	B	42.2	43.6	49.3	66	7.1	15	No
1-E-03	1	B	42.8	44.2	51.6	66	8.8	15	No
1-E-04	1	B	46.8	47.8	56.5	66	9.7	15	No
1-E-05	1	B	44.4	45.6	53.3	66	8.9	15	No
1-E-06	1	B	43.8	45.0	52.3	66	8.5	15	No
1-E-07	1	B	52.3	53.1	63.4	66	11.1	15	No
1-E-08	1	B	46.6	47.5	55.4	66	8.8	15	No
1-E-09	1	B	46.9	48.0	55.8	66	8.9	15	No
1-E-10	1	B	47.9	48.9	57.3	66	9.4	15	No
1-E-11R	0	E	62.3	63.8	N/A	N/A	N/A	N/A	N/A
1-E-12	1	B	48.3	49.5	57.2	66	8.9	15	No
1-E-13	0	C	51.8	52.7	62.0	66	10.2	15	No
1-W-01	1	B	56.7	58.1	55.2	66	-1.5	15	No
1-W-02	1	B	53.6	54.9	53.8	66	0.2	15	No
1-W-03	1	B	61.1	62.6	58.7	66	-2.4	15	No
1-W-04	1	B	60.6	62.0	58.6	66	-2.0	15	No
1-W-05	1	B	63.0	64.6	59.8	66	-3.2	15	No
1-W-06	1	B	60.3	61.7	59.2	66	-1.1	15	No
1-W-07	1	B	62.2	63.7	59.8	66	-2.4	15	No
1-W-08	1	B	63.5	65.1	60.3	66	-3.2	15	No
1-W-09	1	B	68.2	70.1	61.4	66	-6.8	15	No
1-W-10	0	C	68.7	70.6	61.5	66	-7.2	15	No
1-W-11	0	D	39.7	41.4	35.3	51	-4.4	15	No
1-W-12	0	C	55.1	56.2	55.8	66	0.7	15	No
1-W-13	1	B	50.3	51.5	52.3	66	2.0	15	No
2-W-01	1	B	63.5	65.6	60.4	66	-3.1	15	No
2-W-02	1	B	58.5	60.1	58.0	66	-0.5	15	No
2-W-03	1	B	58.2	59.7	57.4	66	-0.8	15	No
2-W-04	1	B	58.4	60.0	57.4	66	-1.0	15	No
2-W-05	1	B	53.8	55.0	55.0	66	1.2	15	No
3-W-01	1	B	52.0	53.1	54.0	66	2.0	15	No
3-W-02	1	B	59.3	61.2	58.7	66	-0.6	15	No
3-W-03	1	B	59.3	61.2	58.8	66	-0.5	15	No
3-W-04	1	B	53.8	55.2	55.8	66	2.0	15	No
3-W-05	1	B	55.0	56.5	56.4	66	1.4	15	No
3-W-06	1	B	53.1	54.5	54.7	66	1.6	15	No
4-W-01	1	B	52.4	53.8	54.2	66	1.8	15	No
4-W-02	1	B	65.3	67.9	60.1	66	-5.2	15	No
4-W-03	1	B	50.4	51.8	53.1	66	2.7	15	No
5-W-01	1	B	58.8	61.2	59.1	66	0.3	15	No
6-E-01	0	C	60.2	63.5	64.1	66	3.9	15	No
6-E-02	0	C	61.0	64.7	63.7	66	2.7	15	No
6-W-01	1	B	53.9	57.2	55.7	66	1.8	15	No

SR 31 Traffic Noise Noise Level Results Table									
Receiver ID	Dwelling Units	NAC Activity Category	(2017) Existing Noise Level - dB(A)	(2045) No-Build Condition Noise Level - dB(A)	(2045) Build Condition Noise Level - dB(A)	NAC Impact Threshold - dB(A)	Increase between Existing and Build Noise Levels - dB(A)	Substantial Increase Threshold	Impact
7-E-01	1	B	52.4	56.5	55.1	66	2.7	15	No
7-E-02	1	B	51.1	55.3	53.9	66	2.8	15	No
7-E-03	1	B	50.2	54.3	53.0	66	2.8	15	No
7-E-04	1	B	53.3	57.4	55.4	66	2.1	15	No
7-E-05	1	B	52.3	56.5	54.5	66	2.2	15	No
7-E-06	1	B	51.4	55.6	53.7	66	2.3	15	No
8-E-01	1	B	53.4	57.5	55.0	66	1.6	15	No
8-E-02	1	B	52.4	56.6	54.2	66	1.8	15	No
8-E-03	1	B	51.4	55.7	53.4	66	2.0	15	No
8-E-04	1	B	53.2	57.4	54.8	66	1.6	15	No
8-E-05	1	B	51.8	56.1	53.7	66	1.9	15	No
8-E-06	1	B	50.5	54.8	52.6	66	2.1	15	No

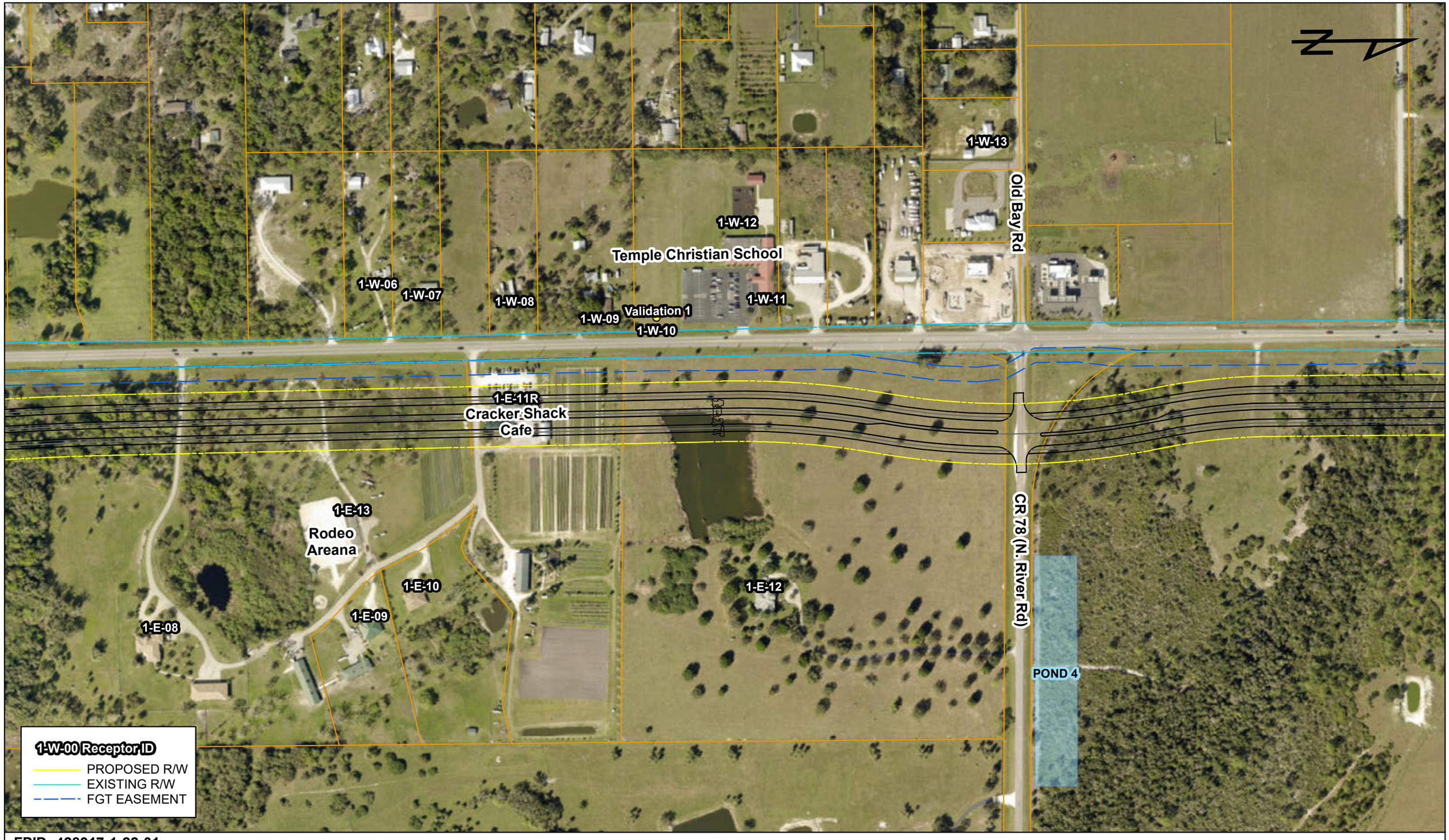
APPENDIX C

AERIALS (with Concept Plan and Receptor Sites)

FPID: 428917-1-22-01:
from SR 78 to CR 78
FPID: 428917-2-21-01:
from CR 78 to Cook Brown Road
Lee and Charlotte Counties, Florida

SR 31 PD&E
Recommended Alternative Concept
Noise Study Results

300 150 0 300
Feet



FPID: 428917-1-22-01:
from SR 78 to CR 78
FPID: 428917-2-21-01:
from CR 78 to Cook Brown Road
Lee and Charlotte Counties, Florida

SR 31 PD&E
Recommended Alternative Concept
Noise Study Results

300 150 0 300
Feet

FPID: 428917-1-22-01:
from SR 78 to CR 78
FPID: 428917-2-21-01:
from CR 78 to Cook Brown Road
Lee and Charlotte Counties, Florida

SR 31 PD&E
Recommended Alternative Concept
Noise Study Results

300 150 0 300
Feet

FPID: 428917-1-22-01:
from SR 78 to CR 78
FPID: 428917-2-21-01:
from CR 78 to Cook Brown Road
Lee and Charlotte Counties, Florida

SR 31 PD&E
Recommended Alternative Concept
Noise Study Results

300 150 0 300
Feet

FPID: 428917-1-22-01:
from SR 78 to CR 78
FPID: 428917-2-21-01:
from CR 78 to Cook Brown Road
Lee and Charlotte Counties, Florida

SR 31 PD&E
Recommended Alternative Concept
Noise Study Results

300 150 0 300
Feet

FPID: 428917-1-22-01:
from SR 78 to CR 78
FPID: 428917-2-21-01:
from CR 78 to Cook Brown Road
Lee and Charlotte Counties, Florida

SR 31 PD&E
Recommended Alternative Concept
Noise Study Results

300 150 0 300
Feet

FPID: 428917-1-22-01:
from SR 78 to CR 78
FPID: 428917-2-21-01:
from CR 78 to Cook Brown Road
Lee and Charlotte Counties, Florida

SR 31 PD&E
Recommended Alternative Concept
Noise Study Results

300 150 0 300
Feet

APPENDIX D

Validation Monitoring Field Data Sheets

Traffic Noise Model Validation Monitoring Field Data Sheet

Project: SR 31 Date: 10/14/2020

#1
Monitor Location: Temple baptist church and school soccer field

Distance from near travel lane / elevation difference / other factors needed for model:

69 ft to EOP

Air Temperature	Wind Speed	Wind Direction	Humidity	% Cloud
88°	8mph	E	55%	20

Monitor Identification: Casella CEL - 63X 2721746 SN

Vehicle Type	Roadway Direction Identification					
	Northbound/Eastbound			Southbound/Westbound		
	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3
Cars	45	60	53	51	58	52
Medium Trucks	5	5	3	0	5	3
Heavy Trucks	9	12	15	22	15	14
Buses	1	0	0	0	0	0
Motorcycles	0	2	1	0	0	1

Vehicle Speed(s): Average = 56 MPH

Event Start Time /Duration: Rep 1 13:09 10' Rep 2 13:23 10' Rep 3 13:46 10'

Results / Leq: Rep 1 70.9 Rep 2 67.7 Rep 3 66.9

Major Noise Source(s): Rep 1 max - 91.7 min - 46.9 SR31 Rep 2 max 80.5 min 42.5 Rep 3 80.5 44.7

Background Noise Source(s): _____

Additional Comments / Unusual Events (e.g., airplane, siren, dog, etc.):

Rep 1 lawn maintenance equipment (weedeater) ran 200 yards away for less than 1 minute

Rep 2 None

Rep 3 none

Field staff for this monitor:

Traffic Noise Model Validation Monitoring Field Data Sheet

Project: SR 31 Date: 10/14/2020

#2
Monitor Location: E of SR-31 - 100 yds N of Lee/Charlotte Co. line

Distance from near travel lane / elevation difference / other factors needed for model:

90' from EOP

Air Temperature	Wind Speed	Wind Direction	Humidity	% Cloud
88	8mph	E/NE	48%	20%

Monitor Identification: Casella - CEL - 63X 2721746 SN

Vehicle Type	Roadway Direction Identification					
	Northbound/Eastbound			Southbound/Westbound		
	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3
Cars	56	54	54	29	43	42
Medium Trucks	5	5	4	3	3	1
Heavy Trucks	10	7	12	13	15	11
Buses	0	0	0	0	0	0
Motorcycles	0	2	0	1	3	0

Vehicle Speed(s): Average = 60 mph

Event Start Time /Duration: Rep 1 14:14 / 10' Rep 2 14:26 / 10' Rep 3 14:40 / 10'

Results / Leq: Rep 1 68.7 (max 83.0, min 43.2) Rep 2 67.6 (max 80.7, min 44.1) Rep 3 67.7 (max 81.3, min 45.4)

Major Noise Source(s):

Background Noise Source(s):

Additional Comments / Unusual Events (e.g., airplane, siren, dog, etc.):

Rep 1 Helicopter flew by parallel to the road

Rep 2 low flying jet directly overhead (short duration)

Rep 3 none

Field staff for this monitor:

APPENDIX E

TNM Files and Digital NSR