

DRAFT
NOISE STUDY REPORT

Florida Department of Transportation

District 4

SR 5/ US 1 at Aviation Boulevard

Indian River, Florida

Financial Management Number: 441693-1-22-02

ETDM Number: 14475

April 2024

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 May 26, 2022, and executed by the Federal Highway Administration (FHWA) and FDOT

Project Development & Environment (PD&E) Study

SR 5/US 1 at Aviation Boulevard

Financial Management Number: 441693-1-22-02

ETDM Number: 14475

Indian River County, Florida

Draft

NOISE STUDY REPORT

Prepared for:



Florida Department of Transportation

District 4

Prepared by:

ESA

5404 Cypress Center Drive, Suite 125

Tampa, FL 33609

April 2, 2024

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 May 26, 2022, and executed by the Federal Highway Administration (FHWA) and FDOT.

Executive Summary

The Florida Department of Transportation (FDOT), District Four, is conducting a Project Development and Environment (PD&E) study to evaluate capacity improvements to the intersection of State Road (SR) 5/US 1 and Aviation Boulevard, located in the City of Vero Beach and Indian River County.

The project proposes operational and capacity improvements to the intersection of SR 5/US 1 and Aviation Boulevard/32nd Street. Additional features were considered such as multi-modal improvements. The north-south limits of the PD&E study extend beyond the intersection along US 1 between 28th Street and south of 36th Street. The west limits extend along Aviation Boulevard between west of Airport North Drive and SR 5/US 1. The east limits include the area east of SR 5/US 1 to 13th Avenue and 33rd Street.

The objectives of this Noise Study Report (NSR) are to identify noise sensitive land uses within the project limits, to evaluate existing and future traffic noise levels at the sites with and without the proposed improvements, and to evaluate the need for and effectiveness of noise abatement measures. Additional objectives include the evaluation of construction noise impacts and the identification of noise impact contours adjacent to the corridor.

The traffic noise analysis was performed following FDOT procedures that comply with Title 23 Code of Federal Regulations (CFR), Part 772 “Procedures for Abatement of Highway Traffic Noise and Construction Noise.” The evaluation follows the FDOT’s traffic noise policy documented in the “Highway Traffic Noise” chapter of the FDOT PD&E Manual (July 1, 2023). The prediction of future traffic noise levels with the roadway improvements was performed using Version 2.5 of the Federal Highway Administration’s (FHWA’s) Traffic Noise Model (TNM).

Within the project limits, 38 TNM receptors (i.e., a discrete or representative location of a noise sensitive area(s)) representing the various noise sensitive sites were modeled to represent 27 noise sensitive uses including 22 residences (Activity Category B of the Noise Abatement Criteria (NAC)), a baseball field (Activity Category C), Small Wonders Preschool Gym (Activity Category D), Camp Haven and Vero Motel, and the restaurant outdoor seating area at Big Shots Golf (Activity Category E).

Existing (2021) and future no-build (2045) exterior traffic noise levels are predicted to range from 52.8 to 60.4 dB(A) at the residences and recreation area (Activity Categories B and C, respectively) and from 57.2 to 71.4 dB(A) at the Camp Haven, Vero Motel, and restaurant outdoor seating area considered Activity Category E. An interior noise level of 46.6 dB(A) was predicted for the Small Wonders Preschool Gym.

Design year (2045) exterior traffic noise levels with the project (future build with Preferred Alternative 1) are predicted to range from 52.4 to 66.7 dB(A) at the residences, with traffic noise levels predicted to approach, meet, or exceed the NAC for Activity Category B at one residence. A traffic noise level of 53.6 dB(A) was predicted for the baseball field, a level that does not approach, meet, or exceed the NAC for Activity Category C.

Traffic noise levels are not predicted to approach, meet, or exceed the NAC for any of the Activity Category E uses evaluated, ranging from 62.5 to 69.2 dB(A). Finally, an interior traffic noise level of 47.0 dB(A) at the Small Wonders Preschool Gym does not approach, meet, or exceed the NAC for Activity Category D.

When compared to existing traffic noise levels, the largest increase with the proposed project is predicted to be 10.2 dB(A). None of the evaluated noise sensitive land uses are predicted to experience a substantial increase [greater than 15 dB(A)] in traffic noise resulting from the proposed project.

Traffic management, alternative roadway alignments, noise buffer zones, and noise barriers were considered as abatement measures for the impacted land uses. Traffic management and alternative roadway alignments were determined to be unreasonable methods of reducing predicted noise levels. When used in conjunction with compatible land use planning, noise buffer zones can be an effective abatement measure. Noise contours, which are used to establish noise buffer zones, have been prepared for the future improved roadway facility and are discussed in this report.

Noise barriers were not evaluated for the single impacted residential receptor. Consistent with FDOT's traffic noise policy, a noise barrier must benefit a minimum of two impacted receptors to be considered feasible. The residential receptor is considered an "isolated impact" where there is only one impacted receptor to potentially benefit, and as a result, would not achieve minimum feasibility requirements. There does not appear to be any other method of reducing the predicted traffic noise impacts at the impacted residence.

Noise abatement measures are not recommended for construction as part of this project. If changes occur to the current conceptual design, additional analysis may be warranted. If the additional analysis results in a noise abatement measure recommendation, the FDOT commits to the construction of feasible and reasonable noise abatement measures at noise-impacted locations contingent on the following:

1. Final recommendations on the construction of the abatement measure are determined during the project's final design and through the public involvement process;
2. Detailed noise analyses during the final design process support the need, feasibility, and reasonableness of providing abatement;

3. Cost analysis indicates that the cost of the noise barrier(s) will not exceed the cost reasonable criterion;
4. Community input supporting types, heights, and locations of the noise barrier(s) is provided to the District Office; and
5. Safety and engineering aspects as related to the roadway user and the adjacent property.

Land uses within the project limits are identified in the FDOT's listing of noise and vibration-sensitive sites (e.g., residences, schools, hotels/motels, and recreation uses). Construction of the proposed roadway improvements is not expected to have any significant noise or vibration impact. 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.

Community Coordination and public involvement have been an integral part of the project development process to ensure residents and stakeholders can provide input to the project development process. Both in-person and virtual Alternatives Public Workshops were conducted in October 2023. Various display boards and presentation materials were available showing the project build alternatives under consideration at the time. Members of the FDOT and project consultant team were available to answer questions and address concerns from stakeholders and the public. No traffic noise-related concerns were received during either the virtual or in-person meetings. The Public Hearing for the project is anticipated in June 2024.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	ii
1.0 INTRODUCTION	1
1.1 PROJECT OVERVIEW	1
1.2 PURPOSE & NEED	2
1.3 EXISTING ROADWAY CONDITIONS AND TYPICAL SECTIONS	5
1.4 DESCRIPTION OF PREFERRED ALTERNATIVE	7
2.0 NOISE STUDY METHODOLOGY	9
2.1 TRAFFIC DATA	9
2.2 MEASURED SOUND LEVELS AND COMPUTER MODEL VALIDATION	10
2.3 RAIL NOISE	12
2.4 NOISE ABATEMENT CRITERIA	12
3.0 RESULTS OF THE NOISE ANALYSIS	15
4.0 EVALUATION OF ABATEMENT ALTERNATIVES	20
4.1 TRAFFIC MANAGEMENT	20
4.2 ALIGNMENT MODIFICATIONS	20
4.3 BUFFER ZONES	20
4.4 NOISE BARRIERS	25
4.5 SUMMARY	26
4.5.1 Statement of Likelihood	26
5.0 CONSTRUCTION NOISE AND VIBRATION	27
6.0 COMMUNITY COORDINATION	28
7.0 REFERENCES	29

LIST OF FIGURES

Figure 1-1	Project Location Map	2
Figure 1-2	Existing Typical Section 1 – SR 5/US 1	6
Figure 1-3	Existing Typical Section – Aviation Boulevard	7
Figure 4-1	Noise Contours: SR 5/US 1 from 28 th Street to South of 36 th Street.....	22
Figure 4-2	Noise Contours: Aviation Blvd. from West of Airport N. Dr. to SR 5/US 1 23	
Figure 4-3	Noise Contours: Aviation Boulevard SR 5/US 1 to 33 rd Street.....	24

LIST OF TABLES

Table 2-1	Existing Measurement Data	10
Table 2-2	Model Validation Results	12
Table 2-3	FHWA Noise Abatement Criteria (NAC)	13
Table 3-1	Predicted Traffic Noise Levels	16
Table 4-1	Noise Contours	21

APPENDICES

Appendix A: Preferred Alternative Concept and Typical Sections

Appendix B: Noise Study Traffic Data

Appendix C: Project Aerials

Appendix D: Measurement Documentation

Appendix E: Rail Noise

Appendix F: TNM Input Files (Provided Electronically)

1.0 Introduction

1.1 Project Overview

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) study to evaluate improvements to the intersection of State Road (SR) 5/US 1 and Aviation Boulevard, located in the City of Vero Beach, Indian River County (**Figure 1**).

The project intersection of SR 5/US 1 and Aviation Boulevard is located within the urbanized area of the City of Vero Beach in Indian River County, Florida. This is a 4-legged, signalized intersection that accommodates the Florida East Coast (FEC) Railroad crossing on the eastbound approach. The FEC Railroad, which is part of the Strategic Intermodal System (SIS) Railroad Corridor, includes double-tracks running north-south parallel to SR 5/US 1 on the west side. Pedestrian crosswalks are provided on the northbound and westbound approaches of the intersection. There are no dedicated bicycle facilities. Nearby landmarks include Vero Beach Regional Airport, Cleveland Clinic Indian River Hospital and Indian River Medical Center, and downtown Vero Beach. The intersection is near a Runway Protection Zone (RPZ) of the Vero Beach Regional Airport.

The project proposes operational and capacity improvements to the intersection of SR 5/US 1 and Aviation Boulevard/32nd Street. Various alternatives were considered during the PD&E study, which include grade-separated crossings over the FEC Railroad. Additional features were considered such as multi-modal improvements. To account for potential grade separation and other solutions that address the purpose and need, the north-south limits of the PD&E study extend beyond the intersection along US 1 between 28th Street to south of Pickerill Lane, (approximately 0.55 miles). The west limits extend along Aviation Boulevard between 27th Avenue and SR 5/US 1 (approximately 1 mile). The east limits include the area east of SR 5/US 1 to 13th Avenue.

The objectives of this Noise Study Report (NSR) are to identify noise sensitive land uses within the project limits, to evaluate existing and future traffic noise levels at the sites with and without the proposed improvements, and to evaluate the need for and effectiveness of noise abatement measures. Additional objectives include the evaluation of construction noise impacts and the identification of noise impact contours adjacent to the corridor.



Figure 1-1 Project Location Map

1.2 Purpose & Need

Purpose

The primary purpose of the project is to evaluate intersection improvement solutions to address existing and projected traffic demands, improve safety, support economic growth, and enhance modal interrelationships with rail, bicycle, and pedestrian modes.

Need

Project Status

The project is listed in the Indian River County Metropolitan Planning Organization's (IRC MPO) 2045 Long Range Transportation Plan (LRTP) Cost Feasible Plan Projects as project ID 2 as a "New Interchange" with an implementation timeframe between 2036 to 2045. This project is also listed as Priority Project #6 in the MPOs 2021/2022 Priority Projects Report. The project is programmed for funding for Preliminary Engineering (PE) phase in the Transportation Improvement Program (TIP) and the State Transportation

Improvement Plan (STIP). The project is planned for funding for the right of way and construction phases according to the 2045 LRTP.

Traffic Demand and Capacity

According to the IRC MPO 2021 Priority Projects Report, the intersection is currently failing or nearly failing during peak periods and in peak directions.

As part of this PD&E study, FDOT District 4 developed, under a separate study, the Traffic Forecasting Memorandum - SR 5/US 1 at Aviation Boulevard PD&E Support, dated November 2, 2021. The ETDM traffic forecasting section is updated as follows.

The SR 5/US 1 at Aviation Blvd intersection operates in the year 2021 at Level of Service (LOS) C/D in the AM/PM peak periods. With the eastbound and westbound approaches operating at LOS E or F for both periods, with the eastbound queue length exceeding the available storage.

The future No-Build (without improvements) condition shows the 2045 traffic demand increasing due to population and employment growth as well as planned capacity improvements in the immediate network; therefore, conditions are expected to degrade at this intersection without improvements.

According to the analysis forecast developed from the Treasure Coast Regional Planning Model (TCRPM), the Annual Average Daily Traffic (AADT) is projected to increase 61% between the years 2021 and 2045. Along SR 5/US 1 south of Aviation Boulevard, No-Build traffic volumes are projected to increase from 26,500 to 42,600 AADT for the analysis years 2021 and 2045, respectively. To the north of Aviation Boulevard, SR 5/US 1 traffic volumes will increase from 34,200 to 55,000 AADT. Along Aviation Boulevard, the increase is from 12,000 to 19,300 AADT.

The SR 5/US 1 at Aviation Boulevard intersection operation will degrade to LOS F in the year 2045 for the No-Build condition with delay reaching 135/156 seconds per vehicle for the AM/PM peak periods. With the eastbound and westbound approach LOS F reaching delays of 206/135 seconds per vehicle, with the eastbound queue length exceeding the available storage by 169%.

The Aviation Boulevard extension project, which is a separate nearby project, has construction funds committed in the Fiscal Year 2023/2024 according to the Indian River County Capital Improvement Element adopted in December 2020. The project will replace the westbound approach of the intersection with a new road that extends Aviation Boulevard to the east from US 1 to 41st Street. According to the IRC MPO 2045 LRTP, other planned nearby capacity improvements include widening of Aviation Boulevard from

2 to 4 lanes, from 27th Avenue to the subject intersection with SR 5/US1. These projects will increase the traffic demand at the subject intersection.

Safety

The 2021 Florida Strategic Highway Safety Plan (FSHSP) has identified intersections as an emphasis area while rail crossings are an evolving emphasis area. A historical crash evaluation of the intersection of SR 5/US 1 and Aviation Boulevard revealed a total of 54 crashes observed over a five-year period between 2016 and 2020. Approximately 23% of these crashes resulted in injuries. The majority of these crashes were rear end at approximately 42% followed by sideswipe at 26% and left turn crashes at 15%. These types of crashes may be correlated to congested conditions at the intersection. One crash involved an FEC Railroad train which was struck by a vehicle and resulted in injury. Two crashes involved the FEC Railroad crossing gate. The existing facility's safety performance crash rate was calculated at 0.92 which is significantly higher than the Statewide crash rate of 0.53 and the Districtwide crash rate of 0.34. This indicates a potential safety concern. The SR 5/US 1 corridor has been designated by Indian River County as an evacuation route.

Social Demands or Economic Development

According to the IRC MPO 2045 LRTP, the County's population is projected to grow 41% between the year 2015 to 2045 (143,326 population in 2015 to 201,839 in 2045). Similarly, employment is projected to grow 24% (76,386 employed during 2015 to 94,626 in 2045).

The City of Vero Beach Comprehensive Plan (April 2018) shows existing undeveloped lands along SR 5/US 1 in the vicinity of the intersection with Aviation Boulevard. The Future Land Use map presents a transformation of this area with mixed-use development, commercial, mixed residential, and residential medium. This indicates potential land development growth in the immediate area of the project.

Based on the Indian River County Comprehensive Plan, the Indian River County/City of Vero Beach Enterprise Area includes an area from SR 5/US 1 as the eastern boundary, 43rd Avenue as the western boundary, 53rd Street as the northern boundary, and Atlantic Boulevard as the southern boundary. The Enterprise Area encourages economic growth and investment through tax incentives which may increase traffic demand in the area.

The Vero Beach Regional Airport Master Plan includes an Airport Commercial Village and proposes to increase daily passenger traffic and identifies aircraft storage. Moreover, the master plan forecasts an annual average growth rate for aircraft operations at 1.5% indicating an increase in traffic to/from the airport.

Modal Interrelationships

The intersection of SR 5/US 1 and Aviation Boulevard currently serves numerous modes of transportation, including: vehicles, pedestrians (sidewalks and crosswalks), transit, and the FEC Railroad crossing at the eastbound approach of the intersection. Indian River County's transit system, GoLine, includes three bus routes along SR 5/US 1 and one route along Aviation Boulevard based on the 2021 transit system map. In addition, the Vero Beach Regional Airport is located directly northwest of the intersection with direct access along Aviation Boulevard.

The existing bicycle and pedestrian network are limited in the vicinity of the project. There are no bicycle lanes, and sidewalks are only present on the east side of SR 5/US 1. Guided by the 2015 Bicycle and Pedestrian Plan, the Indian River MPO 2045 LRTP proposes new sidewalks and bicycle facilities in conjunction with roadway improvement projects along Aviation Boulevard between SR 5/US 1 and 43rd Avenue which is the entire southern boundary of the Vero Beach Regional Airport. The plan also proposes a new bicycle facility along SR 5/US 1 north of Aviation Boulevard which supports a vision to have a bicycle facility along most SR 5/US 1 within the County.

The Indian River MPO 2045 LRTP, which is based on the Indian River County Transit Development Plan (TDP), presents several transit needs in the immediate area of the intersection of SR 5/US 1 including a potential bus shelter at the intersection, new/modified route service along SR 5/US 1, and improved route operations along Aviation Boulevard.

The FEC Railroad, which is parallel and abutting west of SR 5/US 1, is part of the FDOT Strategic Intermodal System (SIS). According to the Indian River MPO 2045 LRTP, a performance evaluation goal is to enhance the FDOT SIS by constructing a flyover for the FEC Railroad at the intersection of SR 5/US 1 and Aviation Boulevard (Objective 1.04, Policy 1.04.1, and Performance Indicator 1.041.1).

In 2016, the Vero Beach Regional Airport released their master plan that identified numerous needs such as an "Airport Commercial Village" along Aviation Boulevard which would function as a key commercial district. In addition, the plan describes improvements to Aviation Boulevard which is the gateway and primary access to the Airport.

1.3 Existing Roadway Conditions and Typical Sections

The SR 5/US 1 existing typical section contains two (2) travel lanes in each direction with a center flush paved median for left turns and a concrete sidewalk along the east side. FEC railroad tracks run parallel to SR 5/US 1 along the west side. SR 5/US 1 Bridge #880085 over the Main Canal follows the same typical section as the roadway and includes two-foot shoulders on either side of the bridge. Most of the SR 5/US 1 corridor

is flanked by curb and gutter and has a normal crown. The existing typical section (with normal crown) for SR 5/US 1 can be seen in **Figure 1-2**.

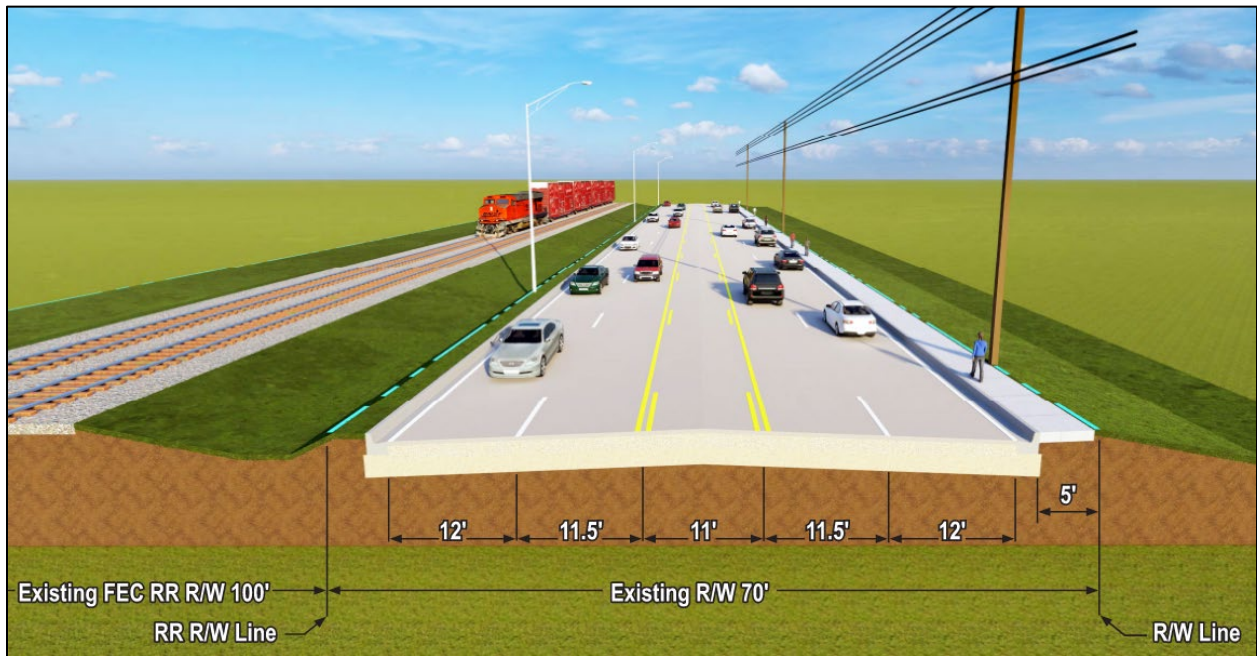


Figure 1-2 Existing Typical Section 1 – SR 5/US 1

Aviation Boulevard is an Indian River County maintained roadway with one (1) travel lane in each direction with curb and gutter from 27th Avenue to 27th Street and grass shoulders from 27th Street to SR 5/US 1. The county is currently evaluating extending Aviation Boulevard east from SR 5/US 1 to the Cleveland Clinic Hospital, which would reconstruct the existing 32nd Street. The proposed extension would connect the intersection of SR 5/US 1 at Aviation Boulevard directly to 37th Street, go along the west perimeter of the hospital campus and extend north of 37th Street to 41st Street. The existing typical section for Aviation Boulevard can be seen in **Figure 1-3**.

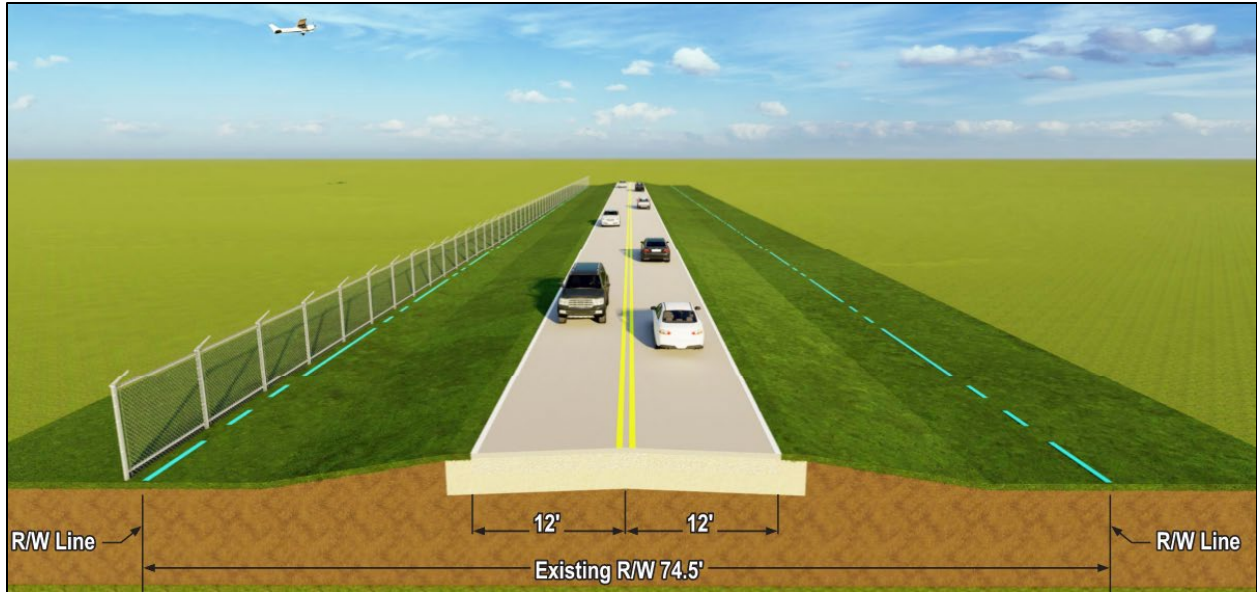


Figure 1-3 Existing Typical Section – Aviation Boulevard

1.4 Description of Preferred Alternative

The Preferred Alternative reconstructs SR5/US 1 and Aviation Boulevard:

- Limits of Construction:
 - SR 5/US 1 limits begin at 28th Street and end 1300 ft north of Aviation Boulevard, for a total length of 2700 ft.
 - Aviation Blvd limits begin 430 ft west of Airport N. Drive and end 670 ft east of SR 5/US 1, for a total length of 1900 ft.
- The existing SR5 5/US 1 bridge (no. 880085) over the IRFWCD Main Canal will be replaced and includes a 12-ft shared use path on the east side.
- A 2.52 acre dry retention pond is proposed and located adjacent to the project between 30th Street and 31st Street.
- SR 5/US 1 at Aviation Boulevard intersection configuration:
 - Northbound approach: two left turns, two travel lanes, and one right turn lane.
 - Southbound approach: one left turn, two travel lanes, and two right turn lanes,
 - Westbound approach: one left turn lane, one travel lane, one right turn lane,

- Eastbound approach: two left turn lanes, one travel lane, one right turn lane,
 - Bicycle lanes are provided on SR 5/US 1 from 29th Street to approximately 350 ft north of 33rd Street.
 - Bicycle lanes are provided on Aviation Boulevard from SR 5/US 1 to 33rd Street in the eastbound and westbound directions; and from SR 5/US 1 to Airport N. Drive in the westbound direction only. Bicyclists will use the shared use path in the eastbound direction within the airport property.
- The alignment east of SR 5/US 1 curves to the north and connects with 33rd Street to be compatible with the proposed alignment of the Aviation Boulevard Extension project being conducted by Indian River County.
 - At the Main Canal Bridge, SR 5/US 1 is shifted 15 feet to the east for additional maintenance access between the bridge and FEC Railroad right-of-way.
 - Bus bays are provided on SR 5/US 1, north and south of the intersection.
 - A 12-foot shared use path is provided along the east side of SR 5/US 1 and a 12-ft shared use path is provided on the south side of Aviation Boulevard.
 - High emphasis crosswalks are provided on the south and east approach of the intersection.
 - Access to Airport N. Drive is provided at-grade north of the intersection with two westbound travel lanes, one westbound right turn lane, one eastbound left lane and two eastbound travel lanes.

The conceptual plans and proposed typical sections for the preferred alternative are provided in **Appendix A**.

2.0 Noise Study Methodology

This traffic noise study was prepared in accordance with Title 23 Code of Federal Regulations (CFR) Part 772, “Procedures for Abatement of Highway Traffic Noise and Construction Noise.”¹ The evaluation uses methodology established by the FDOT Traffic Noise Policy documented in the “Highway Traffic Noise” chapter of the PD&E Manual.² Additional guidance was obtained from the FDOT document “Traffic Noise Modeling and Analysis Practitioners Handbook”.³

The prediction of existing and future traffic noise levels, with and without the roadway improvements, was performed using the Federal Highway Administration’s (FHWA’s) computer model for highway traffic noise prediction and analysis – the Traffic Noise Model (TNM-Version 2.5). The TNM predicts sound energy, in one-third octave bands, between highways and nearby receptors taking the intervening ground’s acoustical characteristics, topography, and rows of buildings into account.

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. The use of the Leq metric and dB(A) as the unit of measurement are specified by 23 CFR Part 772.

2.1 Traffic Data

The traffic data approved for use in the analysis is provided in **Appendix B**. Level of Service “C” (LOS C) or demand volumes, whichever is less, were used for modeled roadway segments within the project limits. The lesser of the two volumes is used since traffic noise is a combination of volume and speed, not necessarily one or the other. If the demand volumes are shown to exceed roadway capacity (i.e., LOS C volumes), there would be a decrease in speed and as a result, a decrease in predicted traffic noise levels. Conversely, if demand traffic volumes are predicted to be less than LOS C/roadway capacity, it’s determined that maximum capacity volumes would not be achieved, and the demand volumes are appropriate for use. This approach ensures that the worst-case traffic noise levels are predicted at noise sensitive land uses.

Vehicle speeds are based on the posted speed limit for the existing and future no-build conditions, and the proposed posted speed limits for the future build condition. The speed limits used include 45 miles per hour (mph) for SR 5/US 1 (existing, future no-build and future build), 35 mph for existing/future no-build, and 30 mph for future build along Aviation Blvd.

2.2 Measured Sound Levels and Computer Model Validation

Since the portion of Aviation Boulevard east of SR5/US 1 will be constructed on new alignment where no roadway currently exists, existing traffic noise levels cannot be modeled using the TNM. For this reason, a series of measurements were conducted to determine existing sound levels.

The field measurements for this project were conducted in accordance with the FHWA's *Noise Measurement Handbook*⁴. Each field measurement was obtained using a Larson Davis Model 720 Sound Level Meter (SLM). The SLM was calibrated before and after each monitoring period with a Larson Davis Model CAL150 Sound-Level Calibrator.

Measurements were conducted at a location within the project limits that is considered representative of noise sensitive land uses and is shown on the figures in **Appendix C**. Four repetitions of 10-minute measurements were conducted. Two sets of measurements were obtained at each location, with one set occurring during the morning hours and another set occurring in the afternoon. The resultant Leq levels for each measurement period were logarithmically averaged to determine a single Leq value to represent the existing condition. The measurement results are provided in **Table 2-1**. As shown, the average measured Leq for all monitoring periods at all measurement sites was 54.1 dB(A), which was used to represent the existing condition for Receptor ID's 13-27. Further information on evaluated receptors is provided in Section 2.3. Documentation supporting the field measurements is provided in **Appendix D**.

Table 2-1 Existing Measurement Data¹

Monitoring Site ID, Location, and Measurement Period Times	Run	Measured Leq(h) – dB(A) ¹		
		AM Measurement Period	PM Measurement Period	Site Average
1: Near Intersection of 33 rd Street and 13 th Avenue AM Measurement Period: 9:34-10:21 AM PM Measurement Period: 2:48-3:31 PM	1	54.2	52.1	
	2	54.0	53.9	
	3	54.3	57.1	
	4	51.5	53.7	
Average		53.6	54.6	54.1

¹ Measurements were obtained on February 7, 2024. The measurement location is provided on the figures in Appendix C.

Future traffic noise levels with and without the proposed project were modeled using the TNM. To ensure that these predictions are as accurate as possible, the computer model was validated using sound levels measured at locations adjacent to the project corridor. Traffic data including motor vehicle volumes, vehicle mix, vehicle speeds (obtained using a handheld radar gun), and meteorological conditions were observed and recorded during each measurement period. The model validation was conducted in accordance with 23 CFR Part 772 and the FDOT's traffic noise policy.

The vehicle data (volumes, fleet mix and speeds) observed and recorded during each monitoring period were used as input for the TNM to determine if, along with the existing roadway geometry and area site conditions, the computer model could "re-create" the measured levels with the existing roadway. Consistent with the FDOT's traffic noise policy, a traffic noise prediction model is considered within the accepted level of accuracy if the measured and predicted noise levels are within a tolerance standard of plus or minus three dB(A). Each measurement period lasted for a duration of 10 minutes, with three 10-minute periods occurring at each location. Observed traffic data for each 10-minute period was multiplied by six to determine the hourly volume for input to the TNM. Vehicle speeds were averaged for each of the five vehicle classifications observed and recorded during each measurement period.

Table 2-2 presents the field measurements and the validation results for the project. As shown, the ability of the model to predict noise levels within the acceptable range of plus or minus three dB(A) for the project was confirmed for the first and third monitoring periods at Site 1, and the first monitoring period at Site 2. For the measurement periods where measured levels are higher than those predicted by the TNM, the difference can be attributed to non-traffic noise related sources (e.g., aircraft arrivals at Vero Beach Regional Airport (VRB) and commuter trains using the FEC railroad) that occurred during the measurement periods and cannot be accounted for in the model. Additionally, increased wind speeds exceeding recommended limits were encountered during the second and third monitoring periods at Site 2. Documentation in support of the model validation measurements is provided in Appendix D of this report.

Table 2-2 Model Validation Results¹

Validation Measurement Site ID / Location ¹	Measurement Period (Time)	Leq(h) – dB(A)			Observed Non-traffic Noise Sources
		Measured	Modeled	Difference ²	
1: Vacant lot at NE Corner of SR 5/US 1 and 30 th Street	1 (11:51am – 12:01pm)	63.6	64.8	-1.2	VRB airport operations, train crossings at 12:11, 12:13, garbage truck on 30 th Street at 12:23pm
	2 (12:04pm – 12:14pm)	72.5	64.1	8.4	
	3 (12:18pm – 12:28pm)	64.3	65.7	-1.4	
2: Open Grassy Area south of Big Shots Golf	1(12:56pm – 1:06pm)	66.6	65.6	1.0	Maintenance activity at Big Shots Golf, motorcycles with loud exhaust/music at 1:02pm, trains at 1:10pm, 1:13pm, sirens at 1:12pm, VRB airport operations, winds increasing during periods 2 and 3.
	2 (1:08pm – 1:18pm)	72.4	65.8	6.6	
	3 (1:20pm – 1:30pm)	79.5	66.7	12.8	

¹ Measurements were obtained on February 7, 2024. Measurement locations are provided on the Figures in Appendix C.

² A negative “Difference” value indicates computer modeled noise levels are higher than those measured in the field.

2.3 Rail Noise

The FEC railway runs parallel to SR 5/US 1 on the west side and carries commuter trains operated by Brightline and freight trains operated by FEC. The Federal Transit Administration (FTA) “Noise Impact Assessment Spreadsheet” was used to estimate the potential contribution of rail noise to a residential receptor closest to the rail facility.

The influence of FEC operational activities was determined to be approximately 1 dB(A) in addition to existing noise levels in the area at the residential receptor nearest the railroad and is presumed to be less for additional receptors that are located further away. Additionally, rail operations occur several times per hour, whereas motor vehicle traffic is constant. As a result, motor vehicle traffic utilizing SR 5/US 1 is considered the dominant noise source in the area. Documentation is provided in **Appendix E**.

2.4 Noise Abatement Criteria

To evaluate traffic noise, the FHWA established Noise Abatement Criteria (NAC). As shown in **Table 2-3**, the criteria vary according to a property’s activity category.

Table 2-3 FHWA Noise Abatement Criteria (NAC)

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, amphitheatres, 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 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.

When predicted traffic noise levels “approach” or exceed the NAC, or when predicted future noise levels increase substantially from existing levels, FDOT policy requires the

consideration of noise abatement measures. The FDOT defines the word “approach” to mean within one dB(A) of the NAC and states that a substantial increase will occur if traffic noise levels are predicted to increase 15 dB(A) or more when compared to existing noise levels as a direct result of a transportation improvement project.

Within the project limits, 38 TNM receptors (i.e., a discrete or representative location of a noise sensitive area(s)) representing the various noise sensitive sites were modeled to represent 27 noise sensitive properties. The modeled receptor locations are provided on the figures in Appendix C. Noise sensitive land uses were verified during field reviews of the project area conducted in June 2023 and February 2024 and based on property records available online from the Indian River County Property Appraiser.

The following provides a description of those evaluated within each Activity Category that are present within the project limits:

- Activity Category B (Residences): 22 receptors were modeled to represent 22 residences adjacent to the project limits. Residential receptor points were located at the edge of the structure closest to SR 5/US 1 depending on the location being evaluated. Exterior traffic noise levels were predicted at residential locations.
- Activity Category C (Recreation Areas): One receptor was placed to evaluate an exterior traffic noise level at the baseball fields near the southern project limit.
- Activity Category D (Schools): One receptor was evaluated at the Small Wonders Preschool Gym, where interior traffic noise levels were predicted. The interior traffic noise level was determined by applying a building reduction factor of 20 dB(A) to the predicted exterior traffic noise level at the face of the building structure closest to SR 5/US 1. The 20 dB(A) reduction factor should be considered conservative and is consistent with guidance found in the FHWA publication “Highway Traffic Noise: Analysis and Abatement Guidance”.⁵
- Activity Category E (Hotels, Motels, and Restaurant Outdoor Seating): 14 receptors were modeled using the TNM to predict exterior traffic noise levels at the Vero Motel and Camp Haven, as well as the restaurant outdoor seating area at Big Shots Golf.

Some noise sensitive properties are planned to be acquired to provide the right-of-way necessary to construct the proposed improvements. In these cases, the acquired property would not exist in the future build, design year condition and as such, were not evaluated for future traffic noise levels with the proposed project but were evaluated under existing and future no-build conditions. This applies to Receptor IDs 3-5, 23, 24, 31 and 32.

3.0 Results of the Noise Analysis

Table 3-1 provides the predicted traffic noise levels for the existing, future no-build, and future build conditions at all receptors evaluated within the project limits. The TNM files have been provided electronically as **Appendix F**.

As shown, existing (2021) and future no-build (2045) noise levels (both predicted and measured as discussed previously) range from 53.2 to 60.4 dB(A) at the 22 residences evaluated, from 52.8 to 53.6 dB(A) at the baseball field, and from 57.2 to 71.4 dB(A) at the Camp Haven, Vero Motel, and restaurant outdoor seating area. An existing interior traffic noise level of 46.6 dB(A) was predicted for the Small Wonders Preschool Gym.

Design year (2045) traffic noise levels with the project (future build preferred alternative) are predicted to range from 52.4 to 66.7 dB(A) at the residences, with traffic noise levels predicted to approach, meet, or exceed the NAC for Activity Category B at one residence. A predicted noise level of 53.6 dB(A) at the baseball field does not approach, meet, or exceed the NAC for Activity Category C. Traffic noise levels at Camp Haven, Vero Motel, and restaurant outdoor seating area are predicted to range from 62.5 to 69.2 dB(A) and do not approach, meet, or exceed the NAC for Activity Category E. A future interior traffic noise level of 47.0 dB(A) predicted for the Small Wonders Preschool Gym does not approach, meet, or exceed the NAC for Activity Category D.

When compared to existing traffic noise levels, the largest increase with the proposed project is predicted to be 10.2 dB(A). None of the evaluated noise sensitive land uses are predicted to experience a substantial increase [15 dB(A) or more] in traffic noise resulting from the proposed project.

Table 3-1 Predicted Traffic Noise Levels

Site ID's	Sheet ¹	Type of Sites Represented	NAC Activity Category	Range of Predicted Traffic Noise Levels – Leq(h) dB(A)				Number of Sites Predicted to Approach, Meet, or Exceed NAC with Preferred Alternative	Number of Sites Predicted to Experience Substantial Increase with Preferred Alternative
				Existing (2021)	Future No-Build (2045)	Future Build with Preferred Alternative (2045) ²	Increase from Existing		
1	1	Small Wonders Preschool Gym	D (Interior)	46.6	46.6	47.0	0.4	No	No
2		Baseball Field	C	52.8	52.8	53.6	0.8	No	No
3		Vero Motel	E	71.4	71.4	N/A ²			
4				60.7	60.7	N/A ²			
5				63.2	63.2	N/A ²			
6				60.2	60.2	66.5	6.3	No	No
7				58.8	58.8	64.5	5.7	No	No
8				58.7	58.7	63.6	4.9	No	No
9				57.2	57.2	62.5	5.3	No	No
10				Residence	B	58.4	58.4	66.7	8.3
11		Residence	B	56.0	56.0	62.5	6.5	No	No

Table 3-2 Predicted Traffic Noise Levels (Continued)

Site ID's	Sheet ¹	Type of Site(s) Represented	NAC Activity Category	Range of Predicted Traffic Noise Levels – Leq(h) dB(A)				Does Future Build Approach, Meet, or Exceed NAC with Preferred Alternative?	Substantial Increase with Preferred Alternative
				Existing (2021)	Future No-Build (2045)	Future Build with Preferred Alternative (2045) ²	Increase from Existing		
12	1	Residence	B	55.0	55.0	60.8	5.8	No	No
13		Residence	B	54.1	54.1	55.0	0.9	No	No
14		Residence	B	54.1	54.1	55.1	1.0	No	No
15		Residence	B	54.1	54.1	55.9	1.8	No	No
16		Residence	B	54.1	54.1	55.5	1.4	No	No
17	2	Residence	B	54.1	54.1	57.1	3.0	No	No
18		Residence	B	54.1	54.1	57.1	3.0	No	No
19		Residence	B	54.1	54.1	53.1	-1.0	No	No
20		Residence	B	54.1	54.1	52.4	-1.7	No	No
21		Residence	B	54.1	54.1	62.9	8.8	No	No
22		Residence	B	54.1	54.1	64.3	10.2	No	No

Table 3-3 Predicted Traffic Noise Levels (Continued)

Site ID's	Sheet ¹	Type of Sites Represented	NAC Activity Category	Range of Predicted Traffic Noise Levels – Leq(h) dB(A)				Number of Sites Predicted to Approach, Meet, or Exceed NAC with Preferred Alternative	Number of Sites Predicted to Experience Substantial Increase with Preferred Alternative
				Existing (2021)	Future No-Build (2045)	Future Build with Preferred Alternative (2045) ²	Change from Existing		
23	2	Residence	B	54.1	54.1	N/A ²			
24		Residence	B	54.1	54.1	N/A ²			
25		Residence	B	54.1	54.1	61.6	7.5	No	No
26		Residence	B	54.1	54.1	64.0	9.9	No	No
27		Residence	B	54.1	54.1	62.9	8.8	No	No
28		Residence	B	53.2	53.2	60.0	6.8	No	No
29		Residence	B	54.6	54.6	59.2	4.6	No	No
30		Residence	B	56.1	56.1	61.1	5.0	No	No
31		Camp Haven	E	69.5	69.5	N/A ²			
32				65.4	65.4	N/A ²			
33				61.8	61.8	69.2	7.4	No	No

Table 3-4 Predicted Traffic Noise Levels (Continued)

Site ID's	Sheet ¹	Type of Sites Represented	NAC Activity Category	Range of Predicted Traffic Noise Levels – Leq(h) dB(A)				Number of Sites Predicted to Approach, Meet, or Exceed NAC with Preferred Alternative	Number of Sites Predicted to Experience Substantial Increase with Preferred Alternative
				Existing (2021)	Future No-Build (2045)	Future Build with Preferred Alternative (2045) ²	Increase from Existing		
34	2	Camp Haven	E	59.0	59.0	65.2	6.2	No	No
35				57.5	57.5	63.2	5.7	No	No
36				58.1	58.1	63.8	5.7	No	No
37		Residence	B	60.4	60.4	62.3	1.9	No	No
38		Restaurant Outdoor Seating	E	63.1	63.1	63.5	0.4	No	No

¹ Please refer to the Figures in Appendix C.

² Some receptors were not evaluated with Preferred Alternative due to potential right-of-way acquisition. Please see Section 2.4, Page 20 for additional information.

4.0 Evaluation of Abatement Alternatives

The FDOT is required to consider traffic noise abatement measures when design year future build traffic noise levels approach, meet, or exceed the NAC for a given activity category or when levels increase substantially [15 dB(A) or more] compared to existing levels. The abatement measures considered for Activity Category B land use predicted to be impacted by traffic noise from the proposed project include traffic management, roadway alignment modifications, buffer zones, and noise barriers. The following subsections discuss the feasibility (e.g., amount of noise reduction and engineering considerations) and cost reasonableness of each of the abatement measures.

4.1 Traffic Management

Traffic management measures that limit motor vehicle speeds and/or reduce traffic volumes can be effective mitigation measures. However, they also negate the ability of the project to accommodate the forecast future travel demand. For example, if the posted speed were reduced, the ability of SR 5/US 1 to accommodate the forecast motor vehicle demand would also be reduced. Notably, the posted speed limit for Aviation Blvd. will be reduced from 35 mph to 30 mph with the preferred alternative, and any further reduction of the speed limit would limit the ability of the roadway to accommodate future traffic demand. As such, reducing traffic speeds and/or volumes is inconsistent with the goal of improving the ability of the roadway to handle the forecast future demand in the area, and traffic management measures are not considered a reasonable noise abatement measure for the project.

4.2 Alignment Modifications

The roadway alignment for the proposed project generally follows the same alignment as the existing roadway and seeks to minimize the need for additional right-of-way within the project limits beyond that which is already proposed for acquisition. Additionally, the FEC railroad corridor on the west side of SR 5/US 1 limits the ability of the roadway alignment to be shifted further. As such, an alternative roadway alignment is not considered a reasonable noise abatement measure.

4.3 Buffer Zones

Land uses such as residences, hotels, schools, churches, and recreation areas are considered incompatible with highway traffic noise levels that exceed the NAC for their respective Activity Category as detailed in Table 2-3. To reduce the possibility of noise related impacts to future development, noise level contours were developed for the future improved roadway facilities. Noise contours estimate the distance from the outside edge of the nearest travel lane for the future build condition to the location where the NAC for each Activity Category (A through E) is expected to be approached (i.e. within one dB(A)

of the NAC) in the design year (2045). The noise contour distances for SR 5/US 1 and Aviation Boulevard are provided in **Table 4-1** and shown on **Figures 4-1 through 4-3**.

Table 4-1 Noise Contours

Roadway Segment	Activity Category (Approach of NAC)	Distance to Approach (Within 1 dB(A)) of NAC for Activity Category (feet)¹
SR 5/US 1 from 28 th Street to South of 36 th Street (Figure 4-1)	A (56 dB(A))	260
	B/C (66 dB(A))	70
	D ² (51 dB(A))	22
	E (71 dB(A))	22
Aviation Boulevard from West of Airport North Drive to SR 5/US 1 (Figure 4-2)	A (56 dB(A))	170
	B/C (66 dB(A))	30
	D ² (51 dB(A))	Within ROW ³
	E (71 dB(A))	Within ROW ³
Aviation Boulevard from SR 5/US 1 to 33 rd Street (Figure 4-3)	A (56 dB(A))	145
	B/C (66 dB(A))	22
	D ² (51 dB(A))	Within ROW ³
	E (71 dB(A))	Within ROW ³

¹ Distances are measured from the outside edge of the nearest travel lane for the improved roadway, do not account for any reduction in noise levels that may occur from shielding and/or terrain, and should be used for planning purposes only.

² The distance to the interior impact criteria for Activity Category D is based on a conservative reduction factor of 20 dB(A) due to the building envelope that is applied to the predicted exterior traffic noise level.

³ Analysis indicates the distance to this noise contour will not extend outside the Aviation Blvd. Right-of-Way for this project segment.

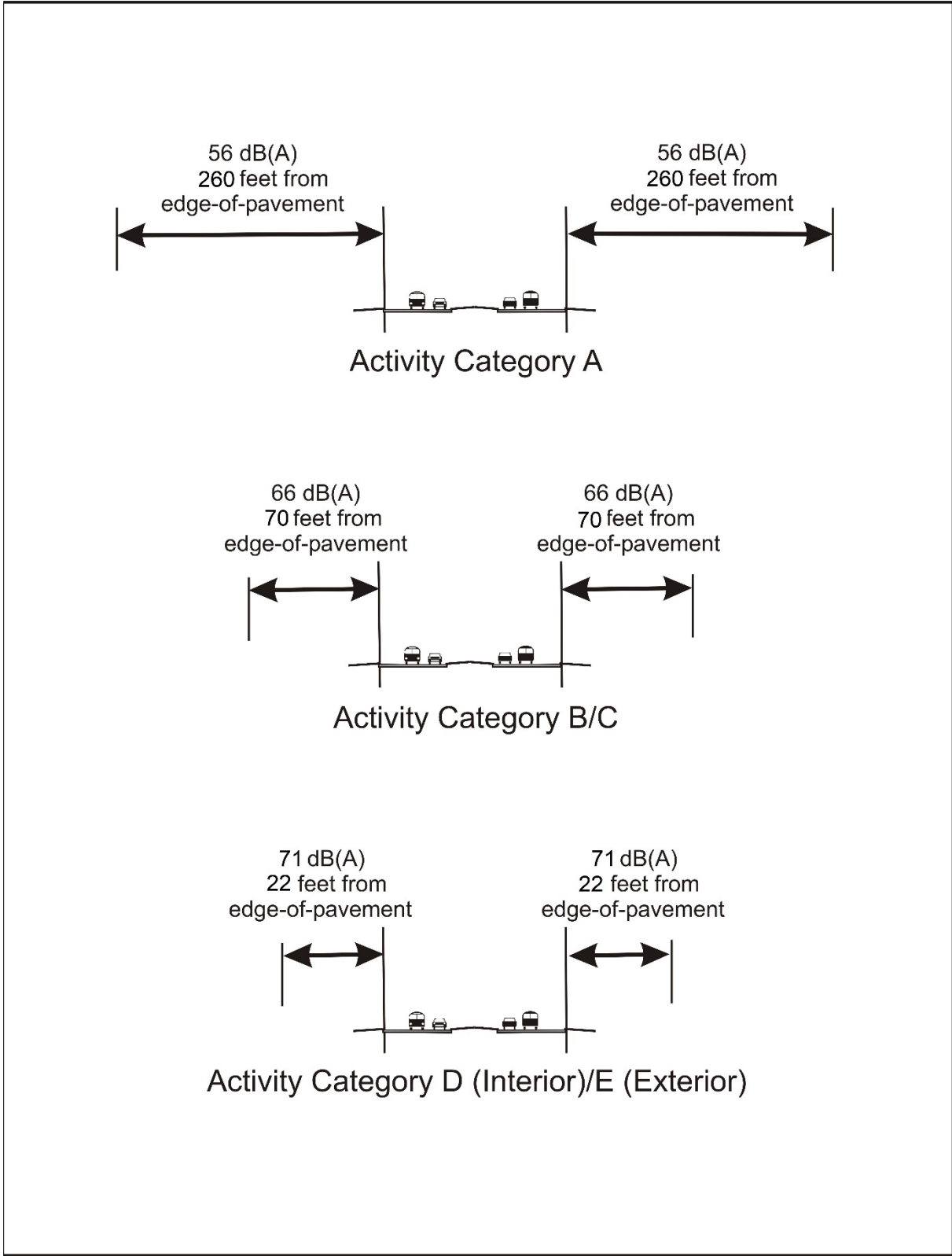


Figure 4-1 Noise Contours: SR 5/US 1 from 28th Street to South of 36th Street

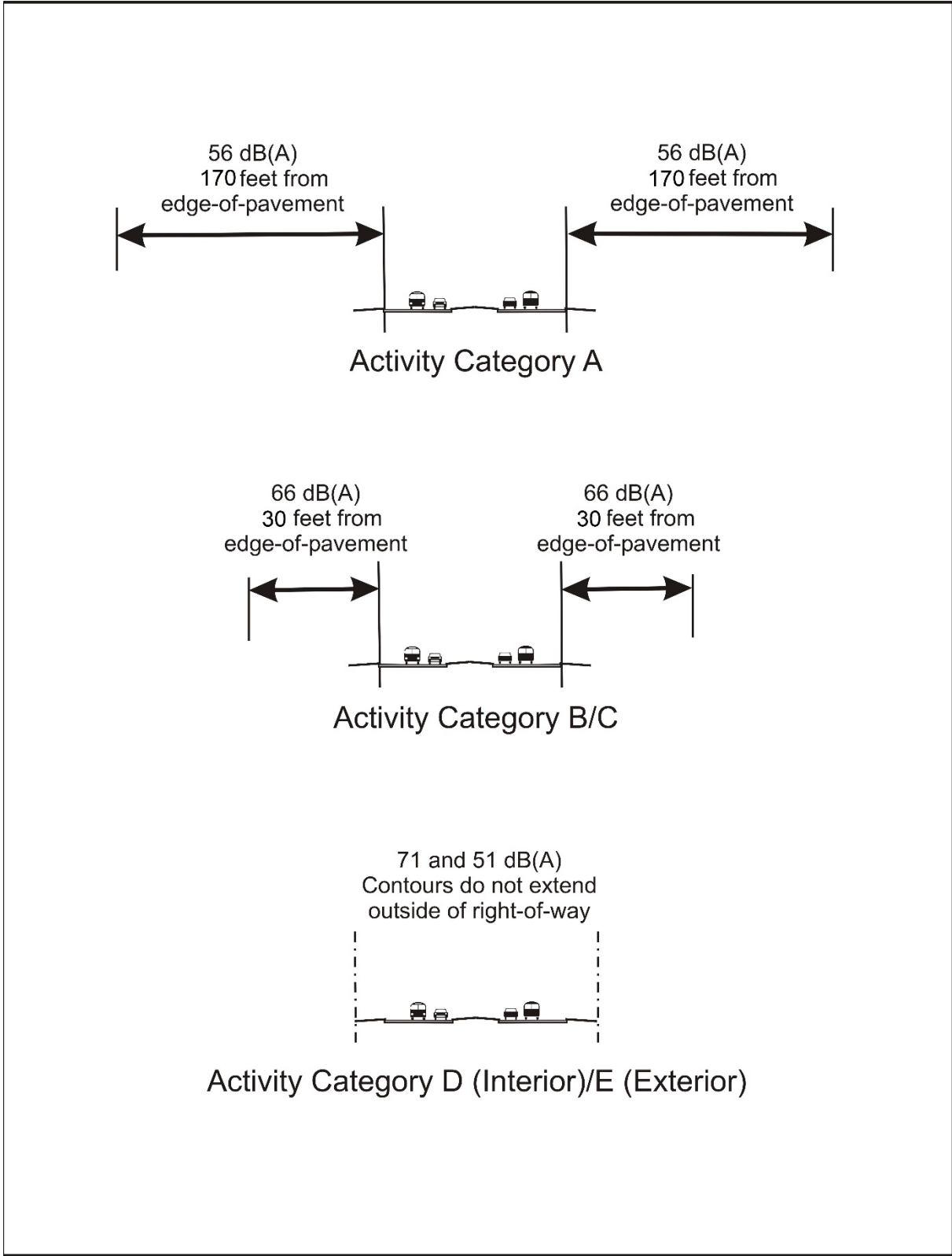


Figure 4-2 Noise Contours: Aviation Boulevard from West of Airport North Drive to SR 5/US 1

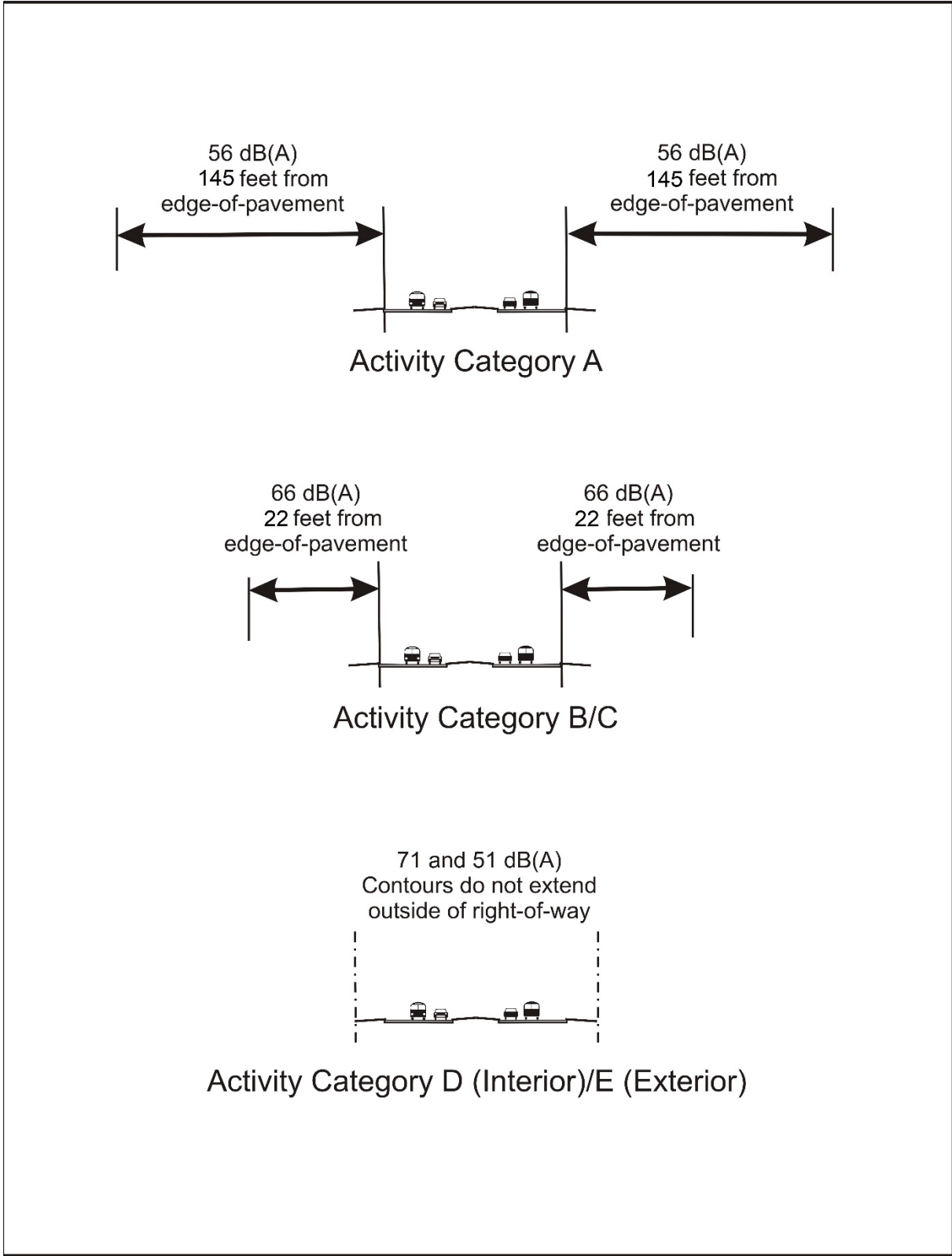


Figure 4-3 Noise Contours: Aviation Boulevard SR 5/US 1 to 33rd Street

4.4 Noise Barriers

Noise barriers reduce noise levels by altering the sound propagation path between the noise source and the receptor. To effectively reduce traffic noise, a noise barrier must be relatively long, continuous (without intermittent openings), and sufficiently tall to provide a discernable reduction in noise levels. Consistent with FDOT's traffic noise policy, the minimum requirements for a noise barrier to be considered both acoustically feasible and economically reasonable are:

- A noise barrier must provide at least a five dB(A) reduction in traffic noise for at least two impacted noise sensitive receptors to be considered a feasible abatement measure. A receptor that meets the minimum five dB(A) noise reduction requirement is considered "benefited,"
- To be considered acoustically reasonable, a noise barrier must provide at least a seven dB(A) reduction (i.e., the FDOT's noise reduction design goal) for at least one benefited receptor and,
- A noise barrier should not cost more than \$42,000 per benefited noise sensitive receptor. The current statewide cost estimate for noise barrier construction, which includes materials and labor, is \$30 per square foot (ft²).

After considering the amount of reduction that may be provided and the cost effectiveness, additional factors must also be considered when evaluating a noise barrier. These additional factors address the feasibility and reasonableness of providing a noise barrier as an abatement measure. Additional feasibility factors include factors that relate to design and construction (i.e., site-specific constructability), safety, access to and from adjacent properties, right-of-way requirements, maintenance, and impacts on utilities and drainage. In addition to the cost and noise reduction design goal described above, FDOT considers the viewpoint of the benefited property owners and residents, if applicable, who may, or may not, desire a noise barrier as an abatement measure. The desires of the benefited property owners and residents are typically solicited during the project's design phase if feasible and cost reasonable abatement is being recommended for construction.

As stated above and consistent with FDOT's traffic noise policy, a noise barrier must benefit a minimum of two impacted receptors to be considered feasible. The traffic noise impact predicted at Receptor 10 is considered "isolated" where there is only one impacted receptor to potentially benefit, and as a result, could not achieve minimum feasibility requirements. A noise barrier was not evaluated for the impacted residential receptor. There does not appear to be any other practicable methods of reducing predicted traffic noise levels at this location.

4.5 Summary

During the design year (2045) with the improvements to the SR 5/US 1 at Aviation Blvd. intersection, traffic noise levels are predicted to approach, meet, or exceed the NAC for Activity Category B at one residence.

Traffic management, alternative roadway alignments, and noise buffer zones were considered as abatement measures for the impacted land uses. Traffic management and alternative roadway alignments were determined to be unreasonable methods of reducing predicted noise levels. When used in conjunction with compatible land use planning, noise buffer zones can be an effective abatement measure. However, since this analysis applies to existing land uses, it is not reasonable to acquire noise sensitive properties as a means of noise abatement.

Noise barriers were not evaluated as a potential abatement measure for the impacted residence. The residence is considered “isolated” where there is only one impacted residence that could potentially be benefited by a noise barrier, and as a result, would not meet minimum feasibility requirements stipulated by FDOT. There does not appear to be any other method of reducing the predicted traffic noise levels at the impacted residential receptors.

4.5.1 *Statement of Likelihood*

Noise abatement measures are not recommended for construction as part of the proposed project. If changes occur to the conceptual Preferred Alternative, additional analysis may be warranted. If this occurs, the FDOT commits to the construction of feasible and reasonable noise abatement measures at noise-impacted locations contingent on the following:

1. Final recommendations on the construction of the abatement measure are determined during the project’s final design and through the public involvement process;
2. Detailed noise analyses during the final design process support the need, feasibility, and reasonableness of providing abatement;
3. Cost analysis indicates that the cost of the noise barrier(s) will not exceed the cost reasonable criterion;
4. Community input supporting types, heights, and locations of the noise barrier(s) is provided to the District Office; and
5. Safety and engineering aspects as related to the roadway user and the adjacent property.

5.0 Construction Noise and Vibration

Land uses within the project limits are identified in the FDOT listing of noise and vibration-sensitive sites (e.g., residences, schools, hotels/motels, and recreation uses). Construction of the proposed roadway improvements is not expected to have any significant noise or vibration impact. If additional sensitive land uses are developed adjacent to the roadway prior to construction, increased potential for noise or vibration impacts could result. It is anticipated that the application of the FDOT “Standard Specifications for Road and Bridge Construction”⁶ will minimize or eliminate potential construction noise and vibration impacts. However, should unanticipated noise or 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

Community Coordination and public involvement has been an integral component since the beginning of the PD&E Study to ensure local residents and stakeholders have the opportunity to provide input to the project development process.

A virtual Alternatives Public Workshop was conducted online on Tuesday October 10, 2023. The virtual meeting consisted of a PowerPoint presentation with various project information that was also available via display boards provided at the in-person meeting the following day, and on the project website (<https://www.fdot.gov/projects/sr5aviationblvdpede/home-page>). The virtual meeting concluded with a question-and-answer session. No traffic noise concerns were received during the virtual meeting.

An in-person Alternatives Public Workshop was held on October 11, 2023, from 5:30pm to 7:30pm at the Vero Beach Community Center located at 2266 14th Avenue, Vero Beach, FL 32960. Various display boards were available showing each of the project build alternatives that were under consideration at the time. The video presentation was also played in a continuous loop throughout the duration of the meeting. Members of the FDOT and project consultant team were available to answer questions and address concerns from stakeholders and the public. No traffic noise related concerns were received during the meeting or in the comment period that followed.

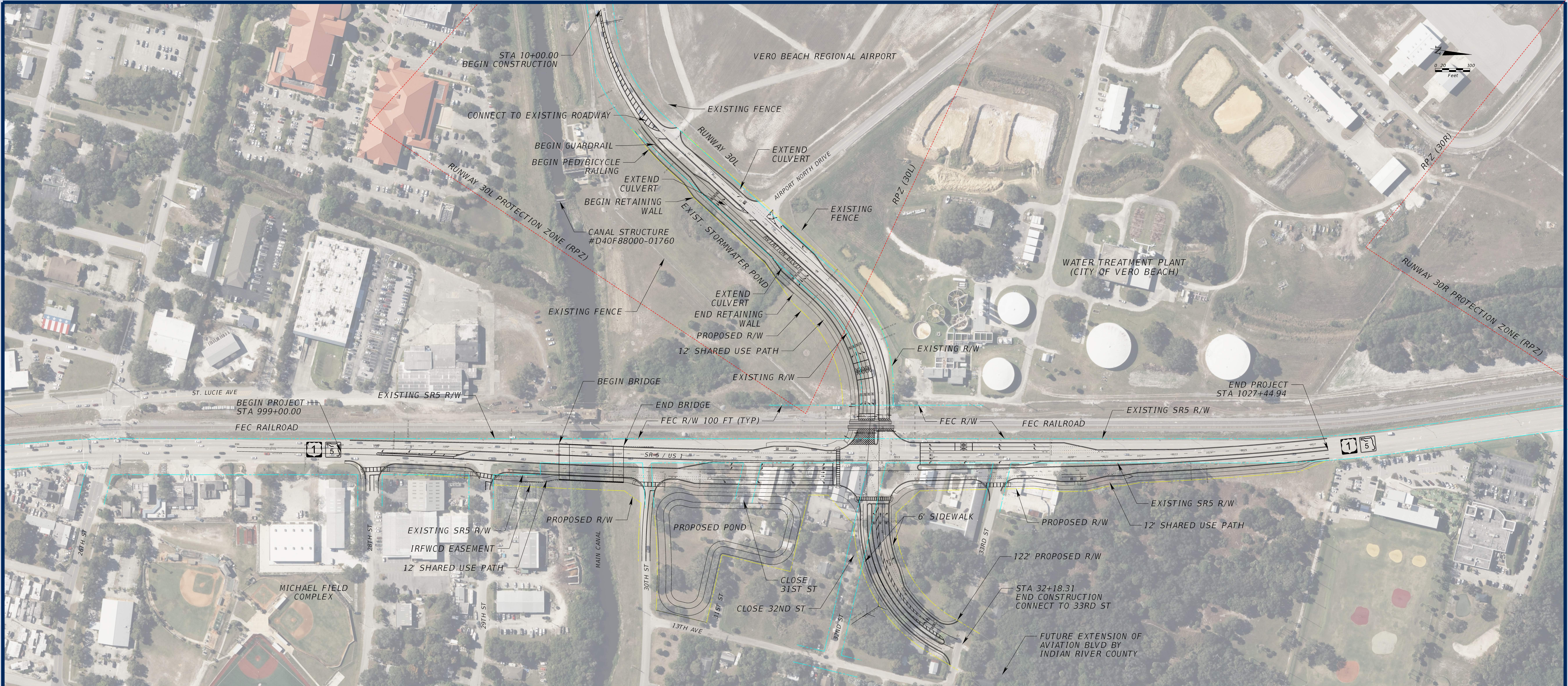
The Public Hearing for the project is anticipated in June 2024.

Once Location and Design Concept Acceptance (LDCA) occurs, a copy of the noise study report should be submitted to the appropriate local planning and zoning officials for their use. To assist local planning and zoning efforts, the noise contours developed for this project and presented in Section 4.3 and Table 4-1 of this report identify the distances from the nearest edge of the travel lane to where an approach of each Activity Category of the NAC is predicted to occur in the design year (2045) with the proposed improvements. It is important to note that noise contour distances do not consider any reduction in sound levels that would occur from shielding due to existing structures or topography and only consider noise resulting from motor vehicle traffic on the roadways for which the contours were generated.

7.0 References

1. 23 Code of Federal Regulations, Part 772: “Procedures for Abatement of Highway Traffic Noise and Construction Noise.” Federal Highway Administration; July 13, 2010.
2. Project Development and Environment Manual, Part 2, Chapter 18. Florida Department of Transportation. July 1, 2023.
3. Traffic Noise Modeling and Analysis Practitioners Handbook. Florida Department of Transportation. January 1, 2016.
4. Noise Measurement Handbook. Federal Highway Administration. FHWA- HEP-18-065. June 2018.
5. Highway Traffic Noise: Analysis and Abatement Guidance. Federal Highway Administration. FHWA-HEP-10-025. December 2011.
6. Florida Department of Transportation Standard Specifications for Road and Bridge Construction. January 2024.

Appendix A
Preferred Alternative Concept and
Typical Sections



**Preferred Alternative
(Alternative 1)**

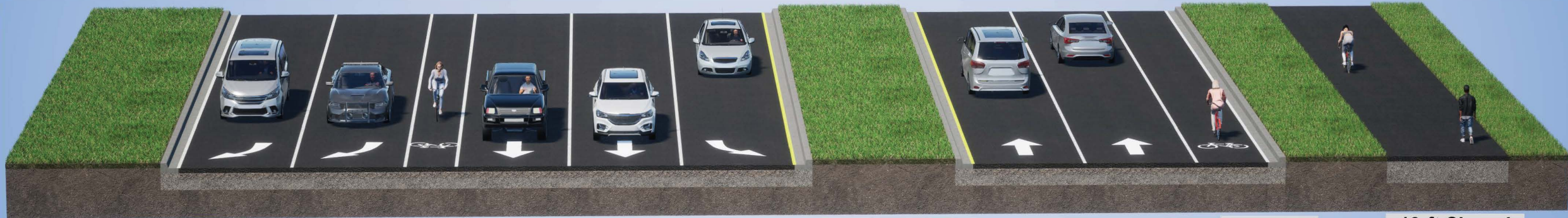
State Road (SR) 5/US 1 at Aviation Boulevard

**Project Development and Environment (PD&E) Study
Indian River County, Florida
Financial Project ID: 441693-1-22-02
Efficient Transportation Decision Making (ETDM) Number: 14475**



**Draft Alternative
March 17th, 2024**

SR 5/US 1 – Southbound Approach



Two 11-ft Lanes

7-ft Bike Lane

Three 11-ft Lanes

10 ft - 17 ft
Traffic
Separator

Two 11-ft Lanes

7-ft Bike Lane

12-ft Shared
Use Path

Proposed Right-of-Way
98 ft – 153 ft

SR 5/US 1- Northbound Approach



7-ft Bike Lane

Two 11-ft Lanes

4-ft Traffic Separator

Four 11-ft Lanes

7-ft Bike Lane

11-ft Lane

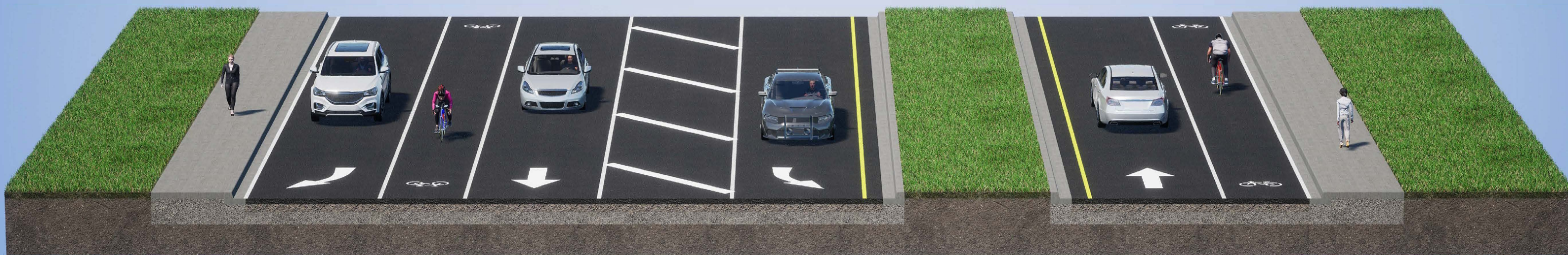
12-ft Shared Use Path

Proposed Right-of-Way
104 ft – 163 ft

Aviation Boulevard - West of SR 5/US 1



Aviation Boulevard - East of SR 5/US 1



Appendix B

Noise Study Traffic Data

TRAFFIC DATA FOR NOISE STUDIES:

Federal Aid Number(s):	TBD
FPID Number(s):	441693-1-22-02
State/Federal/ County Route No.:	N/A
Road Name:	Aviation Blvd
Project Description:	Project Development and Environmental (PD&E) Study
Segment Description:	Aviation Blvd from 27th Avenue to US 1
Section Number:	N/A
Mile Post:	From N/A To N/A
Context Classification	C3C Suburban Commercial

Existing Facility:	2L Undivided	D=	51.9 %
		T24=	7.90 % of 24 Hour Volume
Year	2021	Tpeak=	3.95 % of Design Hour Volume
Annual Average Daily Traffic (AADT)	12,000	MT=	1.93 % of Design Hour Volume
LOS C Peak Hour Directional Volume	718	HT=	0.47 % of Design Hour Volume
Demand Peak Hour Directional Volume:	1,011	B=	0.09 % of Design Hour Volume
Posted Speed:	30 mph	MC=	0.20 % of Design Hour Volume

No-Build Alternative (Design Year):	2L Undivided	D=	51.9 %
		T24=	7.90 % of 24 Hour Volume
Year:	2045	Tpeak=	3.95 % of Design Hour Volume
Annual Average Daily Traffic (AADT)	20,400	MT=	1.93 % of Design Hour Volume
LOS C Peak Hour Directional Volume:	718	HT=	0.47 % of Design Hour Volume
Demand Peak Hour Directional Volume:	1,011	B=	0.09 % of Design Hour Volume
Posted Speed:	30 mph	MC=	0.20 % of Design Hour Volume

Build Alternative (Design Year):	4L Divided	D=	51.9 %
		T24=	7.90 % of 24 Hour Volume
Year:	2045	Tpeak=	3.95 % of Design Hour Volume
Annual Average Daily Traffic (AADT)	20,400	MT=	1.93 % of Design Hour Volume
LOS C Peak Hour Directional Volume:	1,436	HT=	0.47 % of Design Hour Volume
Demand Peak Hour Directional Volume:	1,710	B=	0.09 % of Design Hour Volume
Posted Speed:	30 mph	MC=	0.20 % of Design Hour Volume

Notes

1. Design hour percentages typically assumed to be half of daily percentages
2. Classification data for T₂₄ and T_{peak} obtained from Project Traffic Forecast Report
3. Classification data for Medium Trucks (MT), Heavy Trucks (HT), Buses (B) and Motorcycles (MC) obtained from Count Data Collected as part of the Project Traffic Forecast Report

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

Prepared By:	Godfrey Lamptey, P.E., PTOE	Godfrey Lamptey	Digitally signed by Godfrey Lamptey Date: 2024.02.22 20:04:45-05'00'	Date: <u>2/21/2024</u>
	Name	Signature		

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

FDOT Reviewer:	Raj Shanmugam, PE	<i>Raj Shanmugam</i>	Date: <u>3/4/2024</u>
	Name	Signature	

TRAFFIC DATA FOR NOISE STUDIES:

Federal Aid Number(s):	TBD
FPID Number(s):	441693-1-22-02
State/Federal/ County Route No.:	N/A
Road Name:	Aviation Blvd
Project Description:	Project Development and Environmental (PD&E) Study
Segment Description:	Aviation Blvd from US 1 to 33rd Street
Section Number:	N/A
Mile Post:	From N/A To N/A
Context Classification	C3C Suburban Commercial

Existing Facility:	2L Undivided	D=	0.00 %
		T24=	0.00 % of 24 Hour Volume
Year	N/A	Tpeak=	0.00 % of Design Hour Volume
Annual Average Daily Traffic (AADT)	N/A	MT=	0.00 % of Design Hour Volume
LOS C Peak Hour Directional Volume	N/A	HT=	0.00 % of Design Hour Volume
Demand Peak Hour Directional Volume:	N/A	B=	0.00 % of Design Hour Volume
Posted Speed:	N/A	MC=	0.00 % of Design Hour Volume

No-Build Alternative (Design Year):	2L Undivided	D=	0.00 %
		T24=	0.00 % of 24 Hour Volume
Year:	N/A	Tpeak=	0.00 % of Design Hour Volume
Annual Average Daily Traffic (AADT)	N/A	MT=	0.00 % of Design Hour Volume
LOS C Peak Hour Directional Volume:	N/A	HT=	0.00 % of Design Hour Volume
Demand Peak Hour Directional Volume:	N/A	B=	0.00 % of Design Hour Volume
Posted Speed:	N/A	MC=	0.00 % of Design Hour Volume

Build Alternative (Design Year):	2L Divided	D=	51.9 %
		T24=	7.90 % of 24 Hour Volume
Year:	2045	Tpeak=	3.95 % of Design Hour Volume
Annual Average Daily Traffic (AADT)	11,000	MT=	1.93 % of Design Hour Volume
LOS C Peak Hour Directional Volume:	718	HT=	0.47 % of Design Hour Volume
Demand Peak Hour Directional Volume:	1,011	B=	0.09 % of Design Hour Volume
Posted Speed:	30 mph	MC=	0.20 % of Design Hour Volume

Notes

1. Design hour percentages typically assumed to be half of daily percentages
2. Classification data for T₂₄ and T_{peak} obtained from Project Traffic Forecast Report
3. Classification data for Medium Trucks (MT), Heavy Trucks (HT), Buses (B) and Motorcycles (MC) obtained from Count Data Collected as part of the Project Traffic Forecast Report

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

Prepared By:	Godfrey Lamptey, P.E., PTOE	Godfrey Lamptey	Digitally signed by Godfrey Lamptey Date: 2024.02.22 20:05:03-05'00'	Date: <u>2/21/2024</u>
			Name	

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

FDOT Reviewer:	Raj Shanmugam, PE	<i>Raj Shanmugam</i>	Date: <u>3/4/2024</u>

Appendix C

Project Aerials

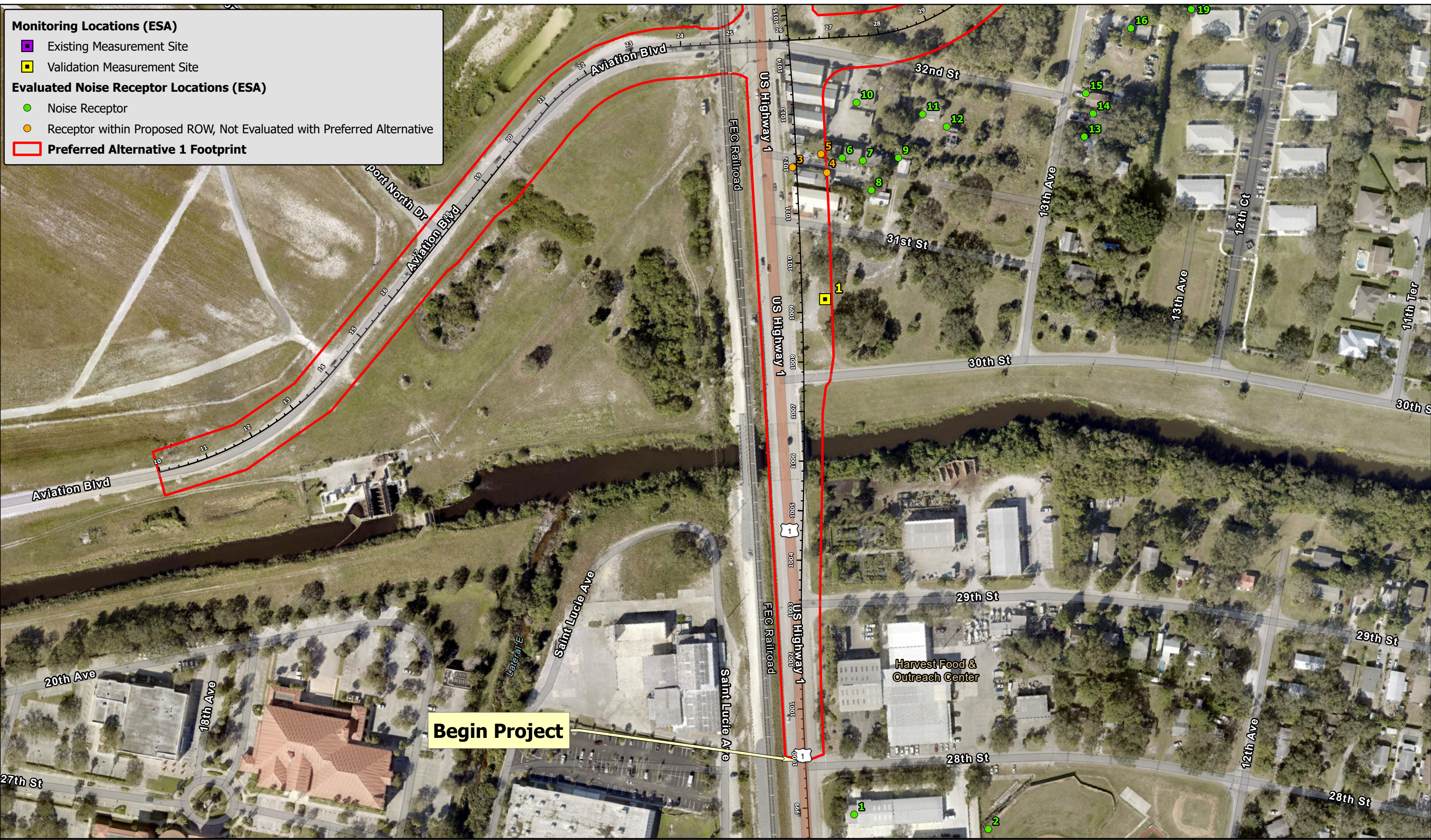
Monitoring Locations (ESA)

- Existing Measurement Site
- Validation Measurement Site

Evaluated Noise Receptor Locations (ESA)

- Noise Receptor
- Receptor within Proposed ROW, Not Evaluated with Preferred Alternative

Preferred Alternative 1 Footprint



U:\GIS\GISProjects\2021\100\2021011128_Aviation_Bld_PDE\03_Aviation_Bld_PDE\Aviation_Bld_PDE\Noise.aprx



Appendix C: Project Aerials
 FPID #: 441693-1-22-02
 State Road (SR) 5/US-1 at Aviation Boulevard PD&E Study
 Indian River County, Florida

0 250 500 US Feet

Data Source(s): ESA, ESRI, FDOT



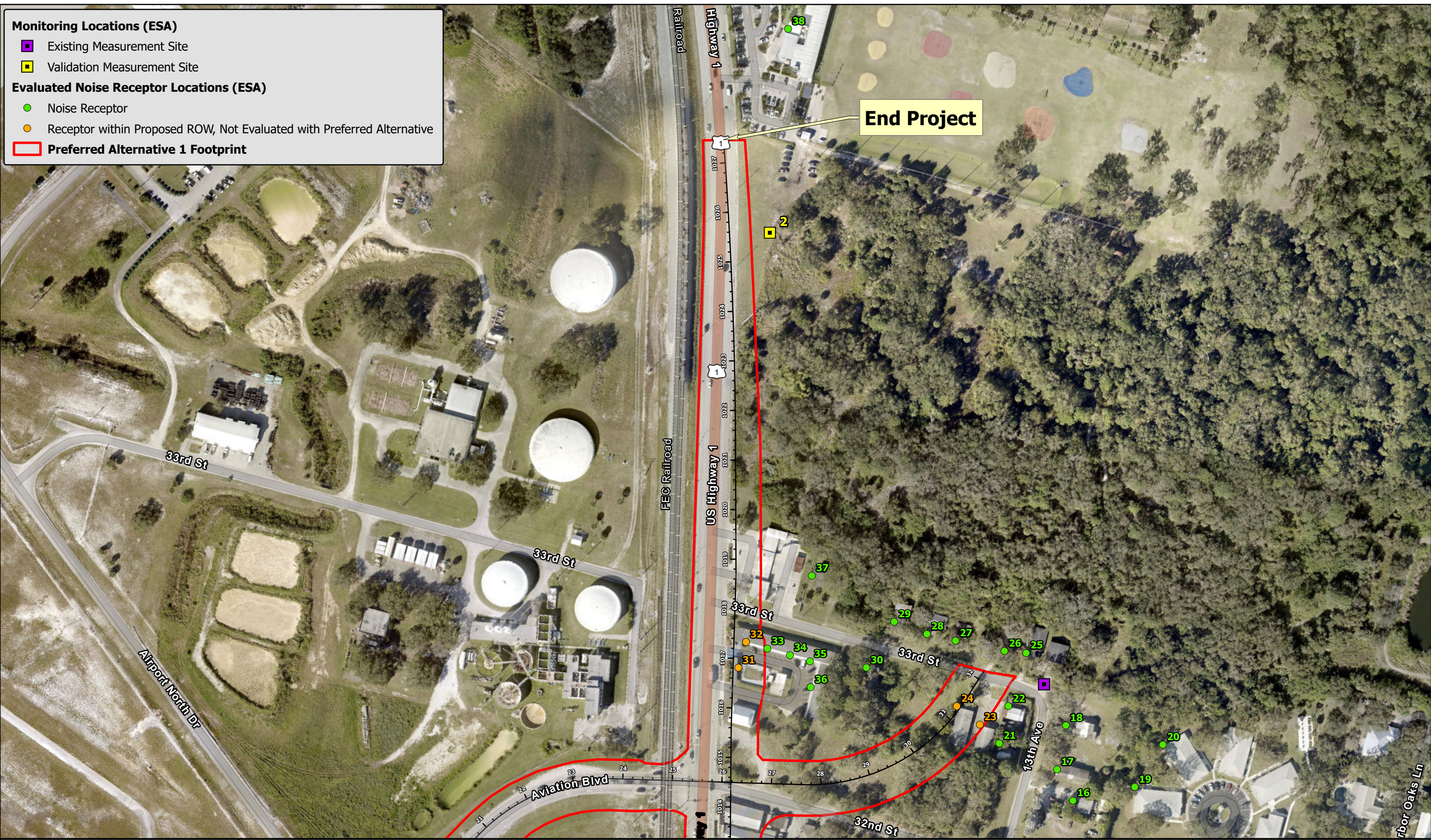
Monitoring Locations (ESA)

- Existing Measurement Site
- Validation Measurement Site

Evaluated Noise Receptor Locations (ESA)

- Noise Receptor
- Receptor within Proposed ROW, Not Evaluated with Preferred Alternative

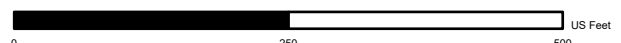
Preferred Alternative 1 Footprint



U:\GIS\GISProjects\2021\sr\202101128_Aviation_Bldg_PD&E\Aviation_Bldg_PD&E\Aviation_Bldg_PD&E\Noise.aprx



Appendix C: Project Aerials
 FPID #: 441693-1-22-02
 State Road (SR) 5/US-1 at Aviation Boulevard PD&E Study
 Indian River County, Florida



Data Source(s): ESA, ESRI, FDOT



Appendix D

Measurement Documentation

Existing Measurement Documentation

Measurement Data Sheet

Date: 2/7/2024 Measurement Taken By: MM

Project: 441693-1: SR 5/US 1 at Aviation Boulevard PD&E Study

Site ID: Existing Measurement Site: Near intersection of 33rd Street and 13th Avenue
AM Monitoring Period

Weather Conditions: Clear: _____ Partly Cloudy: X Cloudy: _____ Other: _____

Temperature: Start: 52 End: 63 (°F)

Wind Direction: Start: N End: N

Wind Speed (Start): Min: 0.5 Max: 4.5 Average: 2.8 (mph)

Wind Speed (End): Min: 2.8 Max: 9.7 Average: 5.4 (mph)

Humidity: Start: 66 End: 65 (%)

Equipment Data

Sound Level Meter: Larson Davis 720 SLM Serial Number: 0409

Date of Last Traceable Calibration: 11/6/2023

Calibration: Start: 114.0 End: 114.1

Battery: Start: 104.0 End: 92.0

Weighting Scale: A Response: Slow

Calibrator: Larson Davis CAL 150 Serial Number: 2282

Run 1: 54.2 dB(A) 9:34-9:44 am	Run 2: 54.0 dB(A) 9:46-9:56am	Run 3: 54.3 dB(A) 9:58-10:08am	Run 4: 51.5 dB(A) 10:11-10:21am
--	---	--	---

Major Noise Sources: Motor vehicle traffic on SR 5/US 1.

Background Noise Sources: VRB aircraft, trains, leaves rustling with wind, traffic on local roads

Other Notes/Observations: Aircraft (both GA and Jet) arrivals/departures at 9:51, 9:53, 10:02, 10:03, 10:06, 10:18, 10:19. Brightline trains at 9:15, 9:40, 9:55, 10:00. Neighbor with hammer at 10:20

Existing Measurement Site Photos - AM Monitoring Period



Measurement Data Sheet

Date: 2/7/2024 Measurement Taken By: MM

Project: 441693-1: SR 5/US 1 at Aviation Boulevard PD&E Study

Site ID: Existing Measurement Site: Near intersection of 33rd Street and 13th Avenue
PM Monitoring Period

Weather Conditions: Clear: _____ Partly Cloudy: X Cloudy: _____ Other: _____

Temperature: Start: 69.3 End: 68.8 (°F)

Wind Direction: Start: N End: N

Wind Speed (Start): Min: 1 Max: 8.1 Average: 2.4 (mph)

Wind Speed (End): Min: 0.8 Max: 9.6 Average: 2.1 (mph)

Humidity: Start: 52 End: 57 (%)

Equipment Data

Sound Level Meter: Larson Davis 720 SLM Serial Number: 0409

Date of Last Traceable Calibration: 11/6/2023

Calibration: Start: 114.0 End: 114.1

Battery: Start: 91.0 End: 82.0

Weighting Scale: A Response: Slow

Calibrator: Larson Davis CAL 150 Serial Number: 2282

Run 1: 52.1 dB(A) 2:48-2:58pm	Run 2: 53.9 dB(A) 2:59-3:09pm	Run 3: 57.1 dB(A) 3:10-3:20pm	Run 4: 53.7 dB(A) 3:21-3:31pm
---	---	---	---

Major Noise Sources: Motor vehicle traffic on SR 5/US 1.

Background Noise Sources: VRB aircraft, trains, leaves rustling with wind, traffic on local roads

Other Notes/Observations: Aircraft (both GA and Jet) arrivals/departures at 3:15, 3:30, 3:28.
Brightline trains at 3:08, 3:11, 3:23. Presumed wildlife hazard cannons at VRB during period 2. Noise coming from local house at 3:27.

Existing Measurement Site Photos - PM Monitoring Period



Validation Measurement Documentation

Validation Monitoring Measurement Data Sheet

Date: 2/7/2024

Measurement Taken By: MM/AH/SB

Project: 441693-1: SR 5/US 1 at Aviation Boulevard PD&E Study

Site ID: 1: Vacant lot at NE corner of SR 5/US 1 and 30th Street

Weather Conditions: Clear: X Partly Cloudy: Cloudy: Other:

Temperature: Start: 71.5 End: 71.1 (°F)

Wind Direction: Start: N End: N

Wind Speed (Start): Min: 1.5 Max: 5.2 Average: 1.6 (mph)

Wind Speed (End): Min: 2.5 Max: 11.7 Average: 2.8 (mph)

Humidity: Start: 50 End: 46 (%)

Equipment Data

Sound Level Meter: Larson Davis 720 SLM Serial Number: 0409

Date of Last Traceable Calibration: 11/6/2023

Calibration: Start: 114.0 End: 114.1

Battery: Start: 97.0 End: 90.0

Weighting Scale: A Response: Slow

Calibrator: Larson Davis CAL 150 Serial Number: 2282

Run 1: 11:51am - 12:01pm	Run 2: 12:04 - 12:14pm	Run 3: 12:18 - 12:28pm
Results: Leq: 63.6 dB(A)	Results: Leq: 72.5 dB(A)	Results: Leq: 64.3 dB(A)

Major Noise Sources: Motor vehicle traffic on SR 5/US 1.

Background Noise Sources: VRB aircraft, trains, leaves rustling with wind

Other Notes/Observations: General Aviation (GA) aircraft arrivals at 11:56, 12:07, 12:08, jet departure at 12:27
Garbage truck on 39th Street at 12:23. Brightline trains at 12:11, 12:13

Observed Traffic Data: Site 1

Run 1

Vehicle Types	Northbound SR 5/US 1		Southbound SR 5/US 1	
	Volume	Speed	Volume	Speed
Auto	144	40	154	40
Medium Truck	9	39	9	39
Heavy Truck	1	38	1	38
Bus	0	0	0	0
Motorcycle	0	0	0	0

Run 2

Vehicle Types	Northbound SR 5/US 1		Southbound SR 5/US 1	
	Volume	Speed	Volume	Speed
Auto	133	41	144	41
Medium Truck	0	0	3	39
Heavy Truck	2	36	2	36
Bus	0	0	0	0
Motorcycle	0	0	0	0

Run 3

Vehicle Types	Northbound SR 5/US 1		Southbound SR 5/US 1	
	Volume	Speed	Volume	Speed
Auto	149	42	166	42
Medium Truck	7	38	6	38
Heavy Truck	0	0	2	40
Bus	0	0	0	0
Motorcycle	1	41	0	0

Site 1 Photos



Validation Monitoring Measurement Data Sheet

Date: 2/7/2024

Measurement Taken By: MM/AH/SB

Project: 441693-1: SR 5/US 1 at Aviation Boulevard PD&E Study

Site ID: 2: Open Grassy Area south of Big Shots Golf

Weather Conditions: Clear: Partly Cloudy: X Cloudy: Other:

Temperature: Start: 68.8 End: 71.3 (°F)

Wind Direction: Start: N End: N

Wind Speed (Start): Min: 5.6 Max: 6.7 Average: 3.5 (mph)

Wind Speed (End): Min: 2 Max: 12.5 Average: 3.8 (mph)

Humidity: Start: 47 End: 49 (%)

Equipment Data

Sound Level Meter: Larson Davis 720 SLM Serial Number: 0409

Date of Last Traceable Calibration: 11/6/2023

Calibration: Start: 114.0 End: 114.0

Battery: Start: 92.0 End: 86.0

Weighting Scale: A Response: Slow

Calibrator: Larson Davis CAL 150 Serial Number: 2282

Run 1: 11:29 - 11:39am	Run 2: 11:43 - 11:53	Run 3: 11:57am - 12:07pm
Results: Leq: 66.6 dB(A)	Results: Leq: 72.4 dB(A)	

Major Noise Sources: SR 5/US 1 traffic, some maintenace activity at Big Shots golf.

Background Noise Sources: leaves rustling with wind, some higher wind gusts.

Other Notes/Observations: Group of motorcycles with loud music/exhaust at 1:02. Jet departure at 1:17, Brightline trains at 1:10, 1:13. Sirens at 1:12, leaf blower at 1:14-1:15

Observed Traffic Data: Site 2

Run 1

Vehicle Types	Northbound SR 5/US 1		Southbound SR 5/US 1	
	Volume	Speed	Volume	Speed
Auto	205	41	176	41
Medium Truck	2	44	4	44
Heavy Truck	0	0	0	0
Bus	0	0	0	0
Motorcycle	14	38	1	38

Run 2

Vehicle Types	Northbound SR 5/US 1		Southbound SR 5/US 1	
	Volume	Speed	Volume	Speed
Auto	238	41	197	41
Medium Truck	4	43	5	43
Heavy Truck	0	0	2	34
Bus	0	0	2	39
Motorcycle	0	0	0	0

Run 3

Vehicle Types	Northbound SR 5/US 1		Southbound SR 5/US 1	
	Volume	Speed	Volume	Speed
Auto	220	42	212	42
Medium Truck	9	40	4	40
Heavy Truck	4	35	3	35
Bus	0	0	0	0
Motorcycle	1	45	0	0

Site 2 Photos



Appendix E

Rail Noise

**SR 5/US 1 at Aviation Boulevard PD&E Study, Indian River County
441693-1**

Rail Noise Contribution Methodology

1. Federal Transit Administration (FTA) Noise Impact Assessment Spreadsheet (Version dated 1.29.2019)
2. Trail Schedules – see attached table.
3. Assumed Diesel Electric Locomotive.
4. Average operating speed = assumed maximum of 79 mph.
5. TNM Receptor 10 (residence) is closest to the rail line at 254 feet.
6. No intervening shielding.
7. Existing noise level of 65 dB(A) obtained from Table 4-6 of FTA Guidance Manual. Since project Preferred Alternative would remove existing shielding features (commercial buildings at intersection of SR 5/US 1 and 32nd Street, it was assumed no shielding is present.
8. Based on above assumptions, rail contribution is 60 dB(A) Ldn, resulting in a 1 dB(A) increase to overall noise levels in the area. Since this level was predicted for the residential receptor nearest the FECss railroad, it is presumed that additional receptors would experience a lower noise contribution from FEC railroad operations as they are located further away from the facility. While FEC rail activities do contribute to overall noise levels in the project area, motor vehicle traffic on SR 5/US 1 is the dominant noise source.

Appendix E: Rail Noise Data

	# Locomotives Per Train	Locomotive Type	# Cars Per Train	Speed (Normal / Max) ¹	Average per Hour	
					# Trains 7a-10p ¹	# Trains 10p-7a
Brightline (Sources 1-2)	2	diesel electric	4	79	1.27	0.56
FEC (Sources 3-4)	2	diesel electric	150	79	0.27	0.00

Daily Totals	
# Trains 7a-10p	# Trains 10p-7a
19.0	5.0
4.0	0.0

¹To be conservative, the maximum operating speed was used, and average # of operations per hour was rounded up.

Project: 441693-1: SR 5 / US 1 at Aviation Blvd. PD&E Study
Receiver: 10

Source	Distance	Project Ldn	Existing Ldn	Noise Criteria		Impact?
				Mod. Impact	Sev. Impact	
1 Diesel Electric Locomotive	254 ft	53.8 dBA	65 dBA	61 dBA	66 dBA	None
2 Rail Car	254 ft	52.8 dBA	65 dBA	61 dBA	66 dBA	None
3 Diesel Electric Locomotive	254 ft	41.8 dBA	65 dBA	61 dBA	66 dBA	None
4 Rail Car	254 ft	56.5 dBA	65 dBA	61 dBA	66 dBA	None
5 --	345 ft		65 dBA	61 dBA	66 dBA	
6 --	345 ft		65 dBA	61 dBA	66 dBA	
Combined Sources		60 dBA	65 dBA	61 dBA	66 dBA	None

Appendix F
TNM Input Files (Provided
Electronically)