Design Noise Study Report

Daniel Webster Western Beltway

SR 429 / Binion Road Interchange
Orange County, Florida
CFX Project No: 429-309

April 2025

CENTRAL
FLORIDA
EXPRESSWAY
AUTHORITY

TABLE OF CONTENTS

1 INTRODUCTION 1

1.1 PD&E STUDY RESULTS AND COMMITMENTS 2

1.2 DESIGN CHANGES/IMPROVEMENTS 2

2 METHODOLOGY 2

2.1 NOISE METRICS 3

2.2 TRAFFIC DATA 3

2.3 NOISE ABATEMENT CRITERIA 3

2.4 NOISE ABATEMENT MEASURES 5

2.4.1 Changes to Florida Noise Policy/Procedure 6

2.4.2 Noise Barrier Feasibility Criteria 6

2.4.3 Noise Barrier Reasonableness Criteria 7

2.4.4 Nonresidential Barrier Analysis 7

2.4.5 Existing Noise Barriers 8

3 TRAFFIC NOISE ANALYSIS AND ABATEMENT EVALUATION 8

3.1 CHANGES IN NOISE SENSITIVE SITES 9

3.2 PREDICTED NOISE LEVELS AND ABATEMENT ANALYSIS 10

3.3 ABATEMENT OPTIONS 10

3.3.1 Noise Study Area EB1 11

3.3.2 Noise Study Area WB1 11

3.3.3 Noise Study Area NB1 12

3.3.4 Noise Study Area NB2 12

4 CONCLUSIONS 13

5 CONSTRUCTION NOISE AND VIBRATION IMPACTS 15

6 COMMUNITY COORDINATION 15

7 REFERENCES 16

LIST OF FIGURES

Figure 1-1: Project Location Map 1

LIST OF TABLES

Table 2-1 Noise Abatement Criteria 4
Table 2-2 Comparative Sound Levels 5
Table 4-1 Final Design Barrier Summary 14

LIST OF APPENDICES

Appendix A: Noise Study Traffic Data
Appendix B: Predicted Noise Levels
Appendix C: Project Aerials

1 INTRODUCTION

CFX conducted a Project Development & Environment (PD&E) Study in 2022 to evaluate alternatives for a proposed half interchange (northbound [NB] on-ramp and southbound [SB] off-ramp) expressway connection from Binion Road to SR 429. The new interchange and improvements will provide enhanced mobility to southwest Apopka, improve emergency vehicle access to the hospital, and support economic development. The project study area is illustrated in **Figure 1-1**.

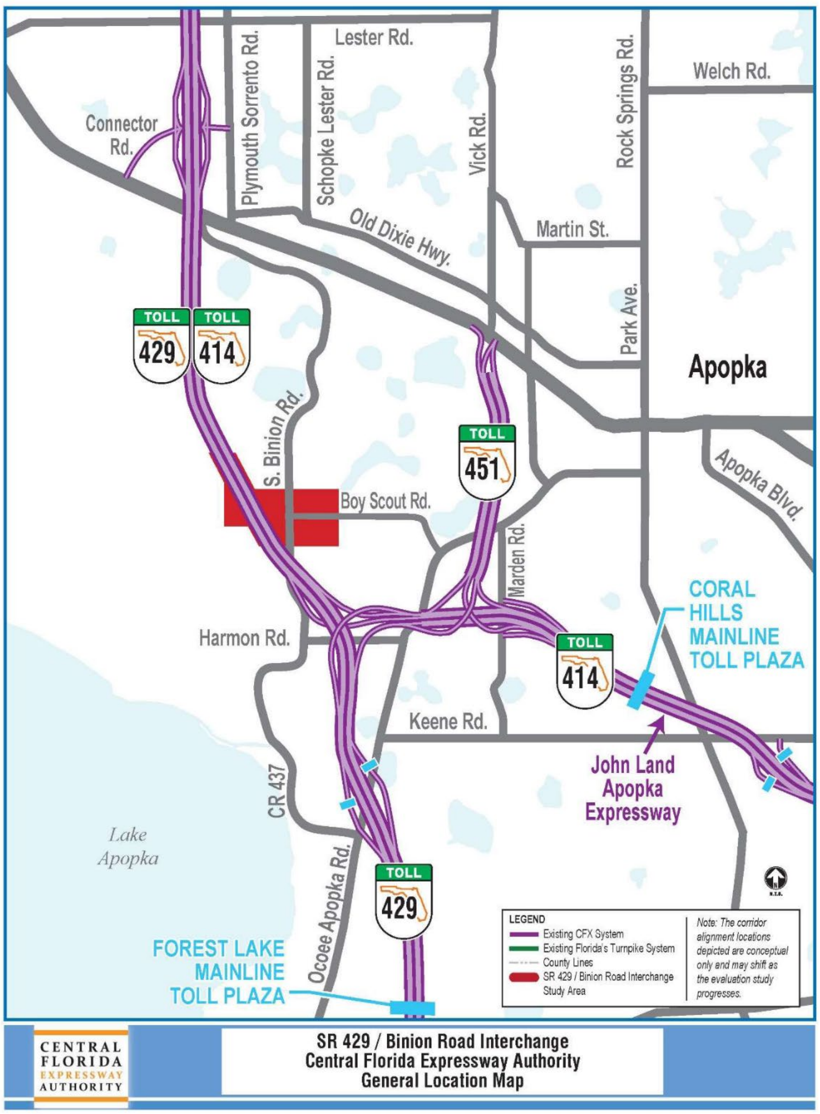


Figure 1-1: Project Location Map

1.1 PD&E STUDY RESULTS AND COMMITMENTS

As part of the project's PD&E Study phase, a Noise Study Report (NSR) was prepared in October 2022. The results of the PD&E NSR concluded that compared to the existing condition, the project would noticeably increase exterior noise levels in various locations along the corridor.

Three noise barrier wall scenarios were evaluated to determine potential abatement options for the residences in Binion Reserve (Noise Study Area [NSA] NB1) and Ivy Trails (NSA NB2). Two options were determined to meet feasibility and reasonableness criteria and recommended for further evaluation during the project's final design phase.

1.2 DESIGN CHANGES/IMPROVEMENTS

The Preferred Alternative improvements, as presented in the Project Environmental Impact Report (PEIR), were approved on February 1, 2023. This date is considered the project's official Date of Public Knowledge. Additional improvements recommended to be included in the design of the project since the PD&E are related to the following:

- Minor alignment revisions for Ramps C and D to avoid wetland and right-of-way (ROW) impacts.
- Roundabout sidewalk/trail modifications.

2 METHODOLOGY

The traffic noise impact analysis conducted for this project is consistent with Title 23, Code of Federal Regulations (CFR), § 772, Part II, Chapter 18 of the FDOT Project Development and Environment Manual, and Chapter 335, Section 335.17, Florida Statutes. This assessment also adheres to current Federal Highway Administration (FHWA) traffic noise analysis guidelines contained in FHWA-HEP-10-025. The FHWA Traffic Noise Model (TNM) - version 2.5 was used to predict traffic noise levels for this project, following guidelines set forth in the FDOT Traffic Noise Modeling and Analysis Practitioners Handbook.

Noise receptor coordinates used in the TNM correlate to exterior areas where frequent human use may occur, usually at the edge of the residential structure closest to the project roadways, unless the analyst's professional judgment determines otherwise.

The project design files were used to determine the location for input into TNM. Vertical elevations for SR 429 and associated roadways were obtained from the project's engineering data. Vertical elevations for noise receptors and cross/side streets were obtained from the United States Geological Survey digital elevation models.

2.1 NOISE METRICS

Sound levels for this analysis are expressed in decibels (dB) using an "A"-scale weighting expressed as dB(A). This scale most closely approximates the response characteristics of the human ear to typical traffic sound levels. All reported sound levels are hourly equivalent noise levels [Leq(h)]. The Leq(h) is defined as the equivalent steady-state sound level that, in a given hourly period, contains the same acoustic energy as the time-varying sound level for the same hourly period.

2.2 TRAFFIC DATA

Traffic noise is heavily dependent on traffic volume and speed, with the amount of noise generated by traffic increasing as the vehicle speed and number of vehicles increase. Characteristics contributing to the highest traffic noise levels were used to predict project noise levels. Worst-case noise conditions occur with the maximum traffic traveling at the posted speed and represent a LOS C operating condition. However, if the traffic analysis indicates the roadway will operate below LOS C, the project's demand peak-hour directional traffic volumes are used per Chapter 18 of the FDOT PD&E Manual. Traffic volumes and speeds used in the PD&E analysis were utilized for this final design analysis and are included in **Appendix A**.

2.3 NOISE ABATEMENT CRITERIA

Land use plays an important role in traffic noise analysis. To determine which land uses are "noise sensitive," this noise impact analysis used the FDOT Noise Abatement Criteria (NAC) shown in column three in **Table 2-1**. The FDOT has established noise levels for each activity category, at which noise abatement must be considered. In Florida, noise levels that meet or exceed FDOT NAC 66.0 dB(A) at Activity Category B and C land uses require noise abatement consideration. A 71.0 dB(A) noise level is required for an Activity Category E land use to be considered impacted by traffic noise. Another criterion for determining when project impacts warrant abatement consideration occurs when project noise levels are below the FDOT NAC but show a substantial increase (15.0 dB(A) or more) over existing levels. A substantial increase typically occurs in areas where traffic noise is a minor component of the existing noise environment but would become a major component after the project is constructed (e.g., a new alignment project).

Hourly A-Weighted Sound Level-decibels (dB(A))				Description of Activity Category
Activity Category	Activity Leq(h) [1]		Evaluation Location	
	FHWA	FDOT		
A	57.0	56.0	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67.0	66.0	Exterior	Residential.
C[2]	67.0	66.0	Exterior	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public/nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52.0	51.0	Interior	Auditoriums, daycare centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public/nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[2]	72.0	71.0	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in A-D or F.
F	-	-	-	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	-	-	-	Undeveloped lands that are not permitted.

(Based on Table 1 of 23 CFR Part 772)
[1] The Leq(h) Activity Criteria values are for impact determination only and are not design standards for noise abatement measures.
[2] Includes undeveloped lands permitted for this activity category.

Table 2-1 Noise Abatement Criteria

For comparison purposes, typical noise levels for common indoor and outdoor activities are provided in **Table 2-2**.

Common Outdoor Activity	dB(A)	Inside Activity
Jet Flyover at 1,000 ft. Gas Lawn Mower at 3 ft.	--110-- --100--	Rock Band
Diesel Truck at 50 ft. (at50 mph) Busy Urban Area Daytime	--90-- --80--	Food Blender at 3 ft. Garbage Disposal at 3 ft.
Gas Mower at 100 ft. Commercial Area Heavy Traffic at 300 ft.	--70-- --60--	Vacuum Cleaner at 10 ft. Normal Speech at 3 ft. Large Business Office
Quiet Urban Daytime Quiet Urban Nighttime Quiet Suburban Nighttime	--50-- --40--	Dishwasher Next Room Theater, Large Conference Room (Background)
Quiet Rural Nighttime	--30-- --20--	Library Bedroom at Night
Lowest Threshold of Human Hearing	--10-- --0--	Lowest Threshold of Human Hearing
Source: *California Dept. of Transportation Technical Noise Supplement, Sep. 2013, Pg. 2-20*		

Table 2-2 Comparative Sound Levels

2.4 NOISE ABATEMENT MEASURES

When traffic noise impacts are identified as part of the traffic noise analysis, noise abatement must be considered. The potential abatement alternatives considered during the PD&E included traffic management, alternative roadway alignments, buffer zones, and noise barriers. The PD&E analysis determined that noise barrier walls were the only measure possible for this project due to the limited ROW and the proposed typical sections.

2.4.1 Changes to Florida Noise Policy/Procedure

Since the PD&E study was approved, FDOT has revised the statewide noise policy contained in Chapter 18 of the PD&E Manual. The following changes have been incorporated into this re-evaluation to reflect the revised Chapter 18 (July 31, 2024).

2.4.1.1 *Cost Effectiveness Guidelines – Residential Noise Barrier Evaluation*

The PD&E noise analysis used $30.00 per square foot to determine the cost of a noise barrier, with a reasonable cost of $42,000 per benefited receptor as the upper limit. The policy has been updated to a $40.00 per square foot cost calculation, with a cost effectiveness guideline of $64,000 per benefited receptor.

2.4.1.2 *Methodology to Evaluate Special Land Uses*

FDOT updated the process used to identify traffic noise levels and impacts and to evaluate noise abatement for special land uses (SLU). SLUs are nonresidential noise sensitive sites (NAC Activity Categories C and E). This updated methodology consists of seven steps and is discussed further in **Section 2.4.4**.

2.4.2 Noise Barrier Feasibility Criteria

Feasibility Factors

The FDOT PD&E Manual stipulates that a noise barrier must meet acoustic and engineering criteria to be considered feasible, as summarized below:

- Acoustic feasibility: The barrier must provide a minimum of 5.0 dB(A) reduction in traffic noise for at least two impacted receptors. Consequently, noise barriers are not evaluated for isolated and single-impacted receptors.
- Engineering feasibility: The engineering review identifies whether other factors must be evaluated for the barrier to be considered feasible.
- Safety: If a noise barrier and safety conflict exists, safety must be the primary consideration. An example of such a conflict would be the loss of a safe sight distance (line of sight) at an intersection or driveway resulting from a noise barrier placement.
- Accessibility to adjacent properties: The noise barrier placement cannot block ingress and egress on non-limited access roadways. Other access issues to be considered include access to a local sidewalk or normal travel routes. Neither applies to noise barriers on limited-access roadways.

- Right-of-way needs: Does the noise barrier require additional land, access rights, or easements for construction and maintenance?
- Maintenance: Maintenance crews must have reasonable access to both sides of the barrier for personnel and equipment using standard practices.
- Drainage: Does the barrier impact existing or planned drainage?
- Utilities: Does the barrier impact existing utilities?

2.4.3 Noise Barrier Reasonableness Criteria

Reasonableness Factors

If a noise barrier meets the feasibility criteria, the following reasonableness factors must considered for the noise abatement measure to be deemed reasonable.

- Acoustic reasonableness: The barrier must attain the FDOT noise reduction design goal (NRDG) of 7.0 dB(A) for at least one benefited receptor. (Note: to be considered "benefited," the receptor must receive a minimum of 5.0 dB(A) in traffic noise reduction from the barrier). Failure to achieve the NRDG results in the noise abatement measure being deemed not reasonable.
- Cost effectiveness: Using the current $40.00 per square foot statewide average, a cost of $64,000 per benefited receptor is the upper guideline for a cost-reasonable noise barrier.
- Benefited property owner and resident viewpoints: During project development, CFX solicits the opinion of benefited owners and residents regarding noise abatement. Affected owners and residents are given the opportunity to provide input regarding their desires to have the proposed noise abatement measure constructed. This process aims to obtain a response for or against the noise barrier from a majority of respondents to the survey. The noise barrier is not deemed reasonable if a majority consensus is not obtained in favor of the barrier.

2.4.4 Nonresidential Barrier Analysis

The methodology used to evaluate noise barrier systems for nonresidential special use land use (SLU) sites differs from those used for residential locations. The standard procedure for determining the feasibility and reasonableness of a noise barrier for an SLU site is documented in Methodology to Evaluate Traffic Noise at Special Land Uses (FDOT 2024). This SLU evaluation is a multi-step process.

- If an impacted SLU receptor is not adjacent to impacted residences or other impacted SLUs such that a single noise barrier would not be a practical form of abatement for all impacted properties, it is considered isolated. It must go through a Preliminary Screening analysis to determine if it has enough person-hour usage to equate to at least two residences to be found feasible for noise abatement. To meet the feasibility requirement, the isolated SLU must have at least 45,026 person-hours of use per year in the benefited area for a noise barrier to be found as a feasible form of noise abatement.
- A noise barrier is evaluated if the Preliminary Screening results indicate that a full analysis is warranted or if the impacted SLU is adjacent to other impacted SLUs or residences.
- Once it is determined that impacted SLUs are benefited from the analyzed noise barrier, the FDOT SLU Worksheet is utilized to assess whether a noise barrier is a reasonable and feasible form of abatement. The SLU Worksheet (and therefore cost reasonable calculation) includes all residences and SLUs that would receive a benefit from the noise barrier. This methodology allows the combined evaluation of NAC categories A, B, C, D, and E for a single noise barrier system that would potentially benefit all land use types evaluated.

2.4.5 Existing Noise Barriers

There are no existing noise barriers within this project's limits.

3 TRAFFIC NOISE ANALYSIS AND ABATEMENT EVALUATION

The project corridor has been determined to be one Common Noise Environment (CNE). A CNE is a group of receptors within the same Activity Category in Table 2-1 that are exposed to similar noise sources and levels, traffic volumes, traffic mix and speeds, and topographic features. To aid project stakeholders in identifying their location relative to the corridor in general, the noise analysis further divided the study corridor CNE into 22 Noise Study Areas (NSA), eleven on the south side of the corridor and eleven on the north side. The delineation of the NSAs was based on geographical identifying features such as roads, large developments, or environmental areas.

Within the project limits, TNM receiver points representing potential noise sensitive receptors are located in accordance with the FDOT PD&E Manual as follows:

- Residential receptor points are located in areas of frequent outdoor use or the corner of the residential building closest to the major traffic noise source.
- Where residences are clustered together, single receptor points are analyzed as representative of a group of residences with similar characteristics.
- Ground floor receptor points are assumed to be 5 feet above the ground elevation, and all receptors are assumed to be at ground level unless otherwise noted.
- Higher floor receptors are assumed to increase in elevation in 10-foot increments above the ground floor receptor.
- Nonresidential receptor points are located at the edge of the outdoor use area closest to the major traffic noise source.

The alpha-numeric identification for each receptor point associated with a noise sensitive receptor is formulated as follows:

- The first two letters describe on which side of SR 429 the NSA is located (e.g., "NB" indicates the receptor is in an NSA on the northbound side of the corridor).
- The number following the first two letters is a numeric sequencing number (e.g., NB1 is the 1st NSA on the northbound side of SR 429).
- The final three characters are the individual receptor numbers and are separated from the first string of characters with a dash (e.g., NB1-007 is the 7th receptor in the 1st NSA on the northbound side of the SR 429 mainline).
- The letters "SLU" follow the NSA identifier for nonresidential receptors and before the numerical SLU number (e.g., NB1-SLU1-1 is the first nonresidential receptor in NSA NB1).

3.1 CHANGES IN NOISE SENSITIVE SITES

There have been no changes to the number of analyzed receptors since the PD&E study.

As detailed in Appendix B, the potential for noise impacts was re-evaluated for 54 receptors (52 NAC B and two NAC C).

3.2 PREDICTED NOISE LEVELS AND ABATEMENT ANALYSIS

With the final design concept, noise levels at 22 receptors (21 NAC B and one NAC C SLU sites) are predicted to meet or exceed the NAC.

The following sections discuss each NSA and the predicted project noise levels, impacts, and potential noise abatement considerations given as part of this re-evaluation. The re-evaluation results discussed in this section are also summarized in Appendix C's predicted noise level comparison matrix. When discussing noise level increases, the general rule that applies to perception is:

- A 3 dB(A) increase is barely perceptible to most people.
- A 5 dB(A) increase is noticeable to most people.
- A 10 dB(A) increase is perceived as twice as loud and is considered a doubling of noise.

Sites and communities not specifically identified in this report are outside the project limits or are located too great a distance from the roadway to be affected by the project; thus, they were not included in the study.

3.3 ABATEMENT OPTIONS

Noise barriers associated with transportation projects do not block all sound from the roadway. Rather, they can *reduce* traffic noise by blocking the sound path between a traffic noise source and noise sensitive receptor. To effectively reduce traffic noise, a noise barrier must be relatively long, continuous (with no intermittent openings), and of sufficient height.

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

- Non-shoulder noise barriers located outside the clear recovery zone but within the ROW are initially considered at heights ranging from 8 feet to a maximum height of 22 feet in 2-foot increments.
- If a non-shoulder noise barrier cannot provide feasible and reasonable abatement to an impacted receptor, then a noise barrier is evaluated on the shoulder edge of pavement (EOP). When on a structure (e.g., bridge, Mechanically Stabilized Earth [MSE]

retaining wall), a shoulder noise barrier is typically limited to a maximum height of eight feet. If on an embankment or ground mounted, a shoulder noise barrier is limited to a maximum height of 14 feet. Under certain conditions, CFX evaluates the use of project-specific special design standards for barriers on top of MSE to allow for a height greater than eight feet.

Using the evaluation methodology contained in the FDOT Traffic Noise Modeling and Analysis Practitioners Handbook, noise barriers for each affected area are evaluated to determine the maximum number of impacted receptors that could provide at least a 5 dB(A) reduction in traffic-related noise. Specific conditions, such as overhead utilities, may constrain these noise barriers. As a result of the site-specific conditions, noise barriers may not provide a 5 dB(A) reduction in traffic-related noise to all impacted receptors.

At some locations, non-impacted receptors may benefit from noise barriers due to their proximity to impacted receptors. These receptors are included when determining the cost reasonableness of the noise barrier based on cost per benefited receptor.

Due to design considerations, aesthetics, and other factors, CFX may propose noise barriers that exceed the cost reasonableness guidelines. Examples would be replacing an existing noise barrier or constructing a new noise barrier to maintain community continuity.

3.3.1 Noise Study Area EB1

NSA EB1 is located south of Boy Scout Road between Binion Road and the project's eastern limits on Boy Scout Road. This NSA was referred to as NSA 1 in the PD&E. Since the PD&E, the construction of The Ridge residential development is underway. There are no noise sensitive sites located in proximity to the project corridor. Additionally, if any potentially noise sensitive sites were to be constructed adjacent to the corridor, they would not be eligible for re-evaluation because they came into existence after the project's Date of Public Knowledge and there have been no major design changes. This NSA is shown on page **C1** in **Appendix C.**

3.3.2 Noise Study Area WB1

NSA WB1 is located north of Boy Scout Road between Binion Road and the project's eastern limits on Boy Scout Road. This NSA, referred to as NSA 2 in the PD&E, consists of scattered single-family residences that are not part of a named subdivision. No impacts were predicted for the ten analyzed receptors during the PD&E. The final design re-evaluation determined that these receptors, identified as WB1-001 through WB1-010, continue not to meet or exceed the NAC. This NSA is shown on page **C1** in **Appendix C**.

3.3.3 Noise Study Area NB1

NSA NB1 comprises the area east of SR 429 from the proposed new interchange to approximate station 587+00. This NSA was referred to as NSA 3 in the PD&E. Twenty-five NAC-B receptor points in the Binion Reserve neighborhood, identified as NB1-001 through NB1-025, and the nonresidential NB1-SLU1-1 playground, were re-evaluated for traffic noise impacts resulting from the final design concept.

Currently, the average noise level is 60.7 dB(A), with four residences exceeding the 66.0 dB(A) NAC criterion. The final design concept's average noise level of 65.8 dB(A) is an increase of 5.1 dB(A) over existing conditions, with the greatest increase being 9.3 dB(A) at receptor NB1-014. While the project noise increases are not considered substantial, the predicted noise levels at eleven residences meet or exceed the NAC and require abatement consideration.

The final design barrier analysis results for NSA NB1 – Binion Reserve - are shown on page **C2** in **Appendix C**.

3.3.4 Noise Study Area NB2

NSA EB3, shown on page **C2** in the project aerials **Appendix C**, is located east of SR 429 and spans from approximate station 590+00 to the project's ending limits, near Lust Road. This NSA was evaluated as part of NSA 3 in the PD&E. Seventeen NAC-B receptor points in the Ivy Trails neighborhood, identified as NB2-001 through NB2-017, and the nonresidential NB2-SLU2-1 walking trail, were re-evaluated for traffic noise impacts resulting from the final design concept.

Currently, the average noise level is 61.3 dB(A), with no residences exceeding the 66.0 dB(A) NAC criterion. The walking trail currently exceeds NAC. The final design concept's average noise level of 67.2 dB(A) is an increase of 5.9 dB(A) over existing conditions, with the greatest increase being 7.0 dB(A) at receptor NB2-002. While the project noise increases are not considered substantial, the predicted noise levels at ten residences and the walking trail meet or exceed the NAC and require abatement consideration.

The final design barrier analysis results for NSA NB2 – Ivy Trails - are shown on page **C2** in **Appendix C**.

4 CONCLUSIONS

Noise levels associated with the final design concept were predicted for 54 receptor locations representing 52 residential and two nonresidential SLU sites. Noise levels for 21 residences and one nonresidential SLU site are predicted to meet or exceed the FDOT NAC.

To mitigate the impacts on the residential receptor sites, noise barriers were re-evaluated. The barrier evaluations analyzed several dimension options using the acoustic feasibility and reasonableness criteria in addition to the established CFX cost reasonableness standards for abatement measures. After careful consideration of all options, CFX recommends incorporating the two-segment noise barrier option, summarized in **Table 4-1** and illustrated on page **C2** in **Appendix C**, into the final contract plans.

Sites and communities not specifically identified in this report are outside the project limits or are located too great a distance from the roadway to be affected by the project; thus, they were not included in the study.

Final Design Barrier Summary																
Design Evaluated Barrier					No. of Impacts	Noise Reduction at Impacted Residences			Number of Benefited Residential Sites				Impacted Res. Not Benefited [5]	Total Estimated Cost [6]	Cost per Benefited Residence
Barrier ID	Height (feet)	Length[1] (feet)	Barrier Location	Approximate Station		5-5.9 dB(A)	6-6.9 dB(A)	≥ 7.0 dB(A) [2]	Impacted [3]	Not Impacted [4]	Total	Avg. Reduction dB(A)			
NB1 Segment 1	14	2,252	ROW[7] / SH[8]	1000+60 to 591+00	21	3	3	14	20	5	25	7.6	1	$ 1,761,200	$ 70,448
NB1 Segment 2	14	893	SH[9]	590+20 to 599+00											

[1] Full height is for the length indicated.
[2] Benefited residences with predicted noise levels that meet or exceed the 7.0 dB(A) Noise Reduction Design Goal.
[3] Benefited residences with predicted noise levels that do not meet or exceed the NAC.
[4] Benefited residences with predicted noise levels that do not meet or exceed the NAC.
[5] Impacted residences that do not receive a minimum 5 dB(A) reduction from proposed noise barrier.
[6] Unit cost of $\$40/ft^2$.
[7] ROW – Right of Way noise barrier analyzed near CFX property line.
[8] SH- Shoulder noise barrier analyzed on SR 429 ramp/mainline shoulder edge of pavement and on top of MSE wall.
[9] SH- Shoulder noise barrier analyzed on SR 429 offset from mainline shoulder edge of pavement.

Table 4-1 Final Design Barrier Summary

5 CONSTRUCTION NOISE AND VIBRATION IMPACTS

Based on the existing land use within the limits of this project, the construction of the proposed roadway improvements will have temporary noise and vibration impacts. Construction noise sensitive sites include all sites detailed in **Section 3.0** of this report. Vibration-sensitive sites on the project include residences and medical offices. Trucks, compaction equipment, earth-moving equipment, pumps, and generators are sources of construction noise and vibration. During the construction phase of the proposed project, short-term noise and vibration may be generated by stationary and mobile construction equipment. The construction noise and vibration will be temporary at any location and controlled by adherence to the most recent edition of the FDOT *Standard Specifications for Road and Bridge Construction*.

6 COMMUNITY COORDINATION

Before making any final decisions on the proposed noise barriers, CFX will hold a Pre-Construction Community Meeting in which the proposed barriers, along with other pertinent project construction-related information, will be presented to the public and project stakeholders. To aid in the decision-making process, CFX will directly solicit the opinions of the property owners and renters who benefit (e.g., receive meaningful noise reduction) from the proposed noise barriers. The solicitation of viewpoints will be conducted as part of the pre-construction meeting and a mailed opinion survey. The CFX solicitation process and survey results will be documented under separate cover.

7 REFERENCES

1. 23 CFR Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise Federal Register, Vol. 75, No. 133, July 2010.
2. *Project Development and Environment Manual*; FDOT. July 31, 2024.
3. Section 335.17, *Florida Statutes. State Highway Construction; Means Of Noise Abatement*. 2024.
4. *Highway Traffic Noise: Analysis and Abatement Guidance, FHWA-HEP-10-025;* FHWA. December 2011.
5. *Traffic Noise Modeling and Analysis Practitioners Handbook*; FDOT. December 2018.
6. *Methodology to Evaluate Highway Traffic Noise at Special Land Uses;* FDOT. December 2024.
7. *Standard Specifications for Road and Bridge Construction*; FDOT.

Appendix A: Noise Study Traffic Data

Noise Analysis Traffic Data - SR 429 and Binion Road Interchange
2045 Build Conditions

Freeway Mainline													
Mainline Segment	**Number of Lanes**	**Two-Way AADT**	**Two-Way LOS C AADT**	**Peak Hour Peak Direction**	**LOS C Peak Hour Peak Direction**	**Design Hr. % T**	**Design Hr. % MT**	**Design Hr. % HT**	**Design Hr. % Buses**	**Design Hr. % Motorcycles**	**Standard K-factor**	**D-factor**	**Posted Speed (mph)**
SR 429													
North of US 441 (Ponkan Mainline Plaza)	4	108,400	59,400	5,630	3,100	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	70
From US 441 to Binion Road	6	120,900	89,000	6,240	4,650	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	70
From Binion Road to SR 414	8	116,300	118,700	6,030	6,200	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	70
South of SR 414	8	113,800	118,700	5,900	6,200	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	70
SR 429 Ramps													
SR 429 Ramp	**Number of Lanes**	**One-Way AADT**	**One-Way LOS C AADT**	**Peak Hour Peak Direction**	**LOS C Peak Hour Peak Direction**	**Design Hr. % T**	**Design Hr. % MT**	**Design Hr. % HT**	**Design Hr. % Buses**	**Design Hr. % Motorcycles**	**K-factor**	**D-factor**	**Operational Speed (mph)**
US 441													
Southbound off	1	4,100	14,600	380	1,350	2.00%	0.41%	1.55%	0.04%	0.01%	8.7%	52.8%	45
Northbound on	1	4,100	14,600	380	1,350	2.00%	0.41%	1.55%	0.04%	0.01%	8.7%	52.8%	45
Southbound on	2	10,350	29,400	950	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	8.7%	52.8%	45
Northbound off	2	10,350	29,400	950	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	8.7%	52.8%	45
Binion Road													
Southbound off	1	2,300	13,400	230	1,350	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	53.0%	45
Northbound on	1	2,300	13,400	230	1,350	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	53.0%	45
SR 414													
Southbound off	2	23,850	25,800	2,490	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	45
Northbound on	2	23,850	25,800	2,490	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	45
Southbound on	2	22,600	25,900	2,360	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	45
Northbound off	2	22,600	25,900	2,360	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	45
Arterials and Cross Streets													
Arterial Segment	**Number of Lanes**	**Two-Way AADT**	**Two-Way LOS C AADT**	**Peak Hour Peak Direction**	**LOS C Peak Hour Peak Direction**	**Design Hr. % T**	**Design Hr. % MT**	**Design Hr. % HT**	**Design Hr. % Buses**	**Design Hr. % Motorcycles**	**K-factor**	**D-factor**	**Posted Speed (mph)**
Binion Road													
North of Boy Scout Road	2	13,800	16,600	680	820	4.00%	2.40%	1.47%	0.13%	0.21%	9.0%	54.9%	40
South of Boy Scout Road	2	12,300	16,200	620	820	4.00%	2.40%	1.47%	0.13%	0.21%	9.0%	56.1%	40
Boy Scout Road													
East of Binion Road	2	10,600	15,700	500	740	4.00%	2.40%	1.47%	0.13%	0.21%	9.0%	52.2%	45

AADT: Annual Average Daily Traffic *MT: Medium Trucks* *HT: Heavy Trucks*

(1) Number of lanes are obtained from field observations, aerial maps and planned projects information.
(2) Traffic data are obtained from the PD&E study traffic development effort.
(3) Peak hour demand and LOS C peak hour maximum service volumes are provided directionally.
(4) LOS C targets are based on the FDOT 2020 Quality/Level of Service Handbook tables, and adjusted for local conditions.
(5) LOS C AADTs are estimated using K and D factors and the design hour peak direction LOS C maximum service volumes.
(6) The vehicle classification factors are obtained from Florida Traffic Online.
(7) Posted speed data are obtained by field observations.

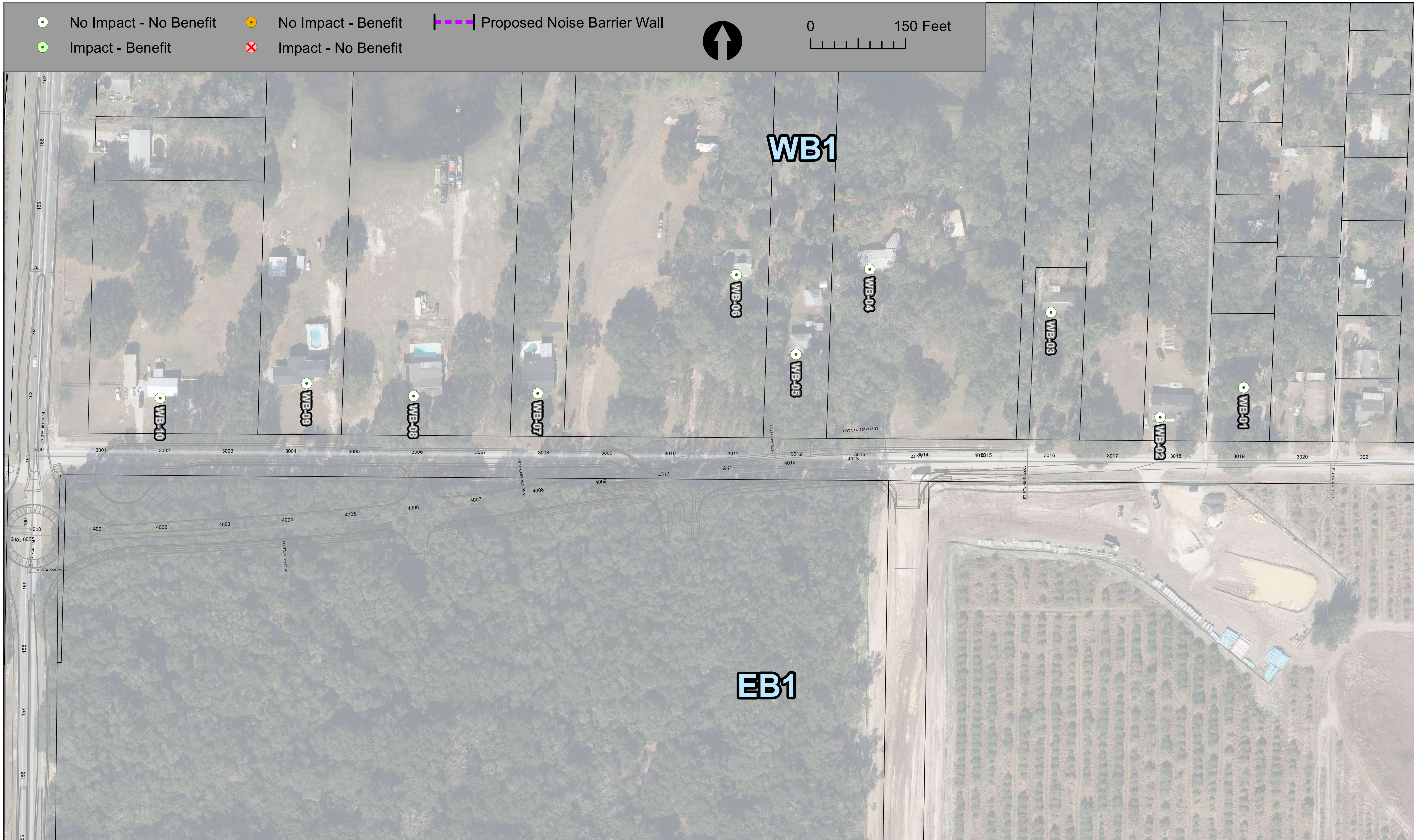
Appendix B: Predicted Noise Levels

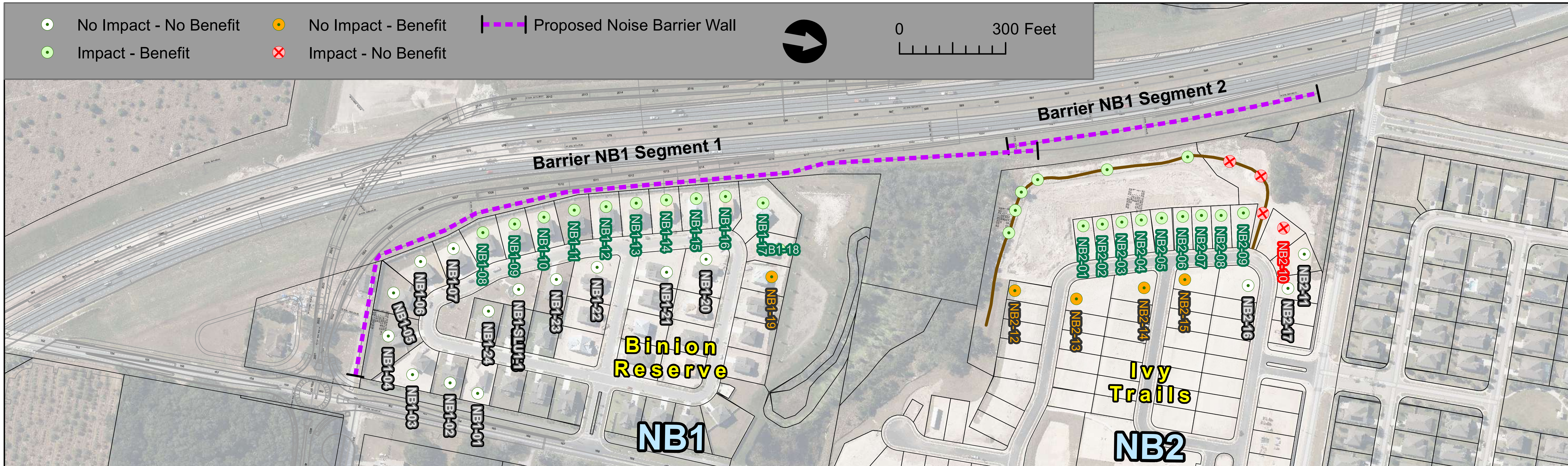
Noise Study Area (NSA)	Receptor Name	No. of Units	NAC	FDOT Criterion (dB(A))	PD&E Study 2022 Existing LAeq1h (dB(A))	PD&E Study 2045 Build LAeq1h (dB(A))	PD&E Study Change from Existing (dB(A))	Final Design 2045 Build LAeq1h (dB(A))	Final Design Noise Level Change from Existing (dB(A))	Description
##-#	Impacted Receptor									
WB1	WB1-001	1	B	66.0	56.7	60.6	3.9	60.7	4.0	SINGLE-FAMILY RESIDENCE
WB1	WB1-002	1	B	66.0	60.4	63.7	3.3	63.7	3.3	SINGLE-FAMILY RESIDENCE
WB1	WB1-003	1	B	66.0	51.7	55.8	4.1	56.1	4.4	SINGLE-FAMILY RESIDENCE
WB1	WB1-004	1	B	66.0	51.5	54.8	2.0	53.1	1.6	SINGLE-FAMILY RESIDENCE
WB1	WB1-005	1	B	66.0	54.2	57.2	3.0	57.2	3.0	SINGLE-FAMILY RESIDENCE
WB1	WB1-006	1	B	66.0	51.5	53.7	2.2	53.3	1.8	SINGLE-FAMILY RESIDENCE
WB1	WB1-007	1	B	66.0	57.8	57.5	-0.3	57.1	-0.7	SINGLE-FAMILY RESIDENCE
WB1	WB1-008	1	B	66.0	57.9	56.0	-1.9	56.2	-1.7	SINGLE-FAMILY RESIDENCE
WB1	WB1-009	1	B	66.0	56.2	55.2	-1.0	55.4	-0.8	SINGLE-FAMILY RESIDENCE
WB1	WB1-010	1	B	66.0	59.8	57.5	-2.3	57.8	-2.0	SINGLE-FAMILY RESIDENCE
NB1	NB1-001	1	B	66.0	60.0	62.4	2.4	62.3	2.3	BINION RESERVE RESIDENCE
NB1	NB1-002	1	B	66.0	58.1	60.3	2.2	61.3	3.2	BINION RESERVE RESIDENCE
NB1	NB1-003	1	B	66.0	55.8	58.0	2.2	60.5	4.7	BINION RESERVE RESIDENCE
NB1	NB1-004	1	B	66.0	53.6	55.9	2.3	58.5	4.9	BINION RESERVE RESIDENCE
NB1	NB1-005	1	B	66.0	54.4	57.2	2.8	59.3	4.9	BINION RESERVE RESIDENCE
NB1	NB1-006	1	B	66.0	57.7	61.1	3.4	63.3	5.6	BINION RESERVE RESIDENCE
NB1	NB1-007	1	B	66.0	59.2	62.6	3.4	64.9	5.7	BINION RESERVE RESIDENCE
NB1	NB1-008	1	B	66.0	60.3	63.9	3.6	67.8	7.5	BINION RESERVE RESIDENCE
NB1	NB1-009	1	B	66.0	62.0	65.7	3.7	69.6	7.6	BINION RESERVE RESIDENCE
NB1	NB1-010	1	B	66.0	62.9	66.7	3.8	70.4	7.5	BINION RESERVE RESIDENCE
NB1	NB1-011	1	B	66.0	66.3	70.0	3.7	73.3	7.0	BINION RESERVE RESIDENCE
NB1	NB1-012	1	B	66.0	64.8	68.6	3.8	73.6	8.8	BINION RESERVE RESIDENCE
NB1	NB1-013	1	B	66.0	64.5	68.0	3.5	73.6	9.1	BINION RESERVE RESIDENCE
NB1	NB1-014	1	B	66.0	64.1	67.5	3.4	73.4	9.3	BINION RESERVE RESIDENCE
NB1	NB1-015	1	B	66.0	68.8	72.3	3.5	73.3	4.5	BINION RESERVE RESIDENCE
NB1	NB1-016	1	B	66.0	70.5	74.0	3.5	73.0	2.5	BINION RESERVE RESIDENCE
NB1	NB1-017	1	B	66.0	67.3	71.4	4.1	70.6	3.3	BINION RESERVE RESIDENCE
NB1	NB1-018	1	B	66.0	63.5	68.4	4.9	66.6	3.1	BINION RESERVE RESIDENCE
NB1	NB1-019	1	B	66.0	60.0	64.3	4.3	64.6	4.6	BINION RESERVE RESIDENCE
NB1	NB1-020	1	B	66.0	60.4	64.5	4.1	63.8	3.4	BINION RESERVE RESIDENCE
NB1	NB1-021	1	B	66.0	59.1	62.9	3.8	63.0	3.9	BINION RESERVE RESIDENCE
NB1	NB1-022	1	B	66.0	57.9	61.7	3.8	61.2	3.3	BINION RESERVE RESIDENCE
NB1	NB1-023	1	B	66.0	57.9	61.9	4.0	62.3	4.4	BINION RESERVE RESIDENCE

##-# Impacted Receptor

Noise Study Area (NSA)	Receptor Name	No. of Units	NAC	FDOT Criterion (dB(A))	PD&E Study 2022 Existing LAeq1h (dB(A))	PD&E Study 2045 Build LAeq1h (dB(A))	PD&E Study Change from Existing (dB(A))	Final Design 2045 Build LAeq1h (dB(A))	Final Design Noise Level Change from Existing (dB(A))	Description
NB1	NB1-024	1	B	66.0	55.9	59.8	3.9	60.5	4.6	BINION RESERVE RESIDENCE
NB1	NB1-025	1	B	66.0	55.8	59.7	3.9	60.5	4.7	BINION RESERVE RESIDENCE
NB1	NB1-SLU1-1	1	C	66.0	56.1	60.0	3.9	60.4	4.3	BINION RESERVE PLAYGROUND
NB2	NB2-01	1	B	66.0	62.1	66.0	3.9	68.7	6.6	IVY TRAILS RESIDENCE
NB2	NB2-02	1	B	66.0	62.1	66.0	3.9	69.1	7.0	IVY TRAILS RESIDENCE
NB2	NB2-03	1	B	66.0	62.2	66.0	3.8	69.0	6.8	IVY TRAILS RESIDENCE
NB2	NB2-04	1	B	66.0	62.4	66.2	3.8	69.1	6.7	IVY TRAILS RESIDENCE
NB2	NB2-05	1	B	66.0	62.5	66.4	3.9	69.0	6.5	IVY TRAILS RESIDENCE
NB2	NB2-06	1	B	66.0	62.4	66.4	4.0	68.9	6.5	IVY TRAILS RESIDENCE
NB2	NB2-07	1	B	66.0	62.2	66.3	4.1	68.6	6.4	IVY TRAILS RESIDENCE
NB2	NB2-08	1	B	66.0	61.9	66.3	4.4	68.4	6.5	IVY TRAILS RESIDENCE
NB2	NB2-09	1	B	66.0	62.0	66.2	4.2	68.4	6.4	IVY TRAILS RESIDENCE
NB2	NB2-10	1	B	66.0	61.7	65.3	3.6	67.4	5.7	IVY TRAILS RESIDENCE
NB2	NB2-11	1	B	66.0	60.5	64.4	3.9	65.6	5.1	IVY TRAILS RESIDENCE
NB2	NB2-12	1	B	66.0	58.8	62.7	3.9	65.3	6.5	IVY TRAILS RESIDENCE
NB2	NB2-13	1	B	66.0	58.7	62.4	3.7	64.7	6.0	IVY TRAILS RESIDENCE
NB2	NB2-14	1	B	66.0	59.0	62.8	3.8	65.0	6.0	IVY TRAILS RESIDENCE
NB2	NB2-15	1	B	66.0	59.7	63.3	3.6	65.3	5.6	IVY TRAILS RESIDENCE
NB2	NB2-16	1	B	66.0	59.3	63.2	3.9	64.6	5.3	IVY TRAILS RESIDENCE
NB2	NB2-17	1	B	66.0	59.1	63.1	4.0	64.0	4.9	IVY TRAILS RESIDENCE
NB2	NB2-SLU2-1	1	C	66.0	66.0	67.8	1.8	69.3	3.3	IVY TRAILS WALKING TRAIL

Appendix C: Project Aerials


No Impact - No Benefit
No Impact - Benefit
Proposed Noise Barrier Wall
Impact - Benefit
Impact - No Benefit
0
150 Feet
WB1
WB-01
WB-02
WB-03
WB-04
WB-05
WB-06
WB-07
WB-08
WB-09
WB-10
EB1



Binion Reserve (NSA NB1) and Ivy Trails (NSA NB2)

Design Evaluated Barrier						No. of Impacts	Noise Reduction at Impacted Residences			Number of Benefited Residential Sites				Impacted Res. Not Benefited[5]	Total Estimated Cost[6]	Cost per Benefited Residence
Option	Height (feet)	Length[1] (feet)	Barrier Location	Barrier ID	Approximate Station		5-5.9 dB(A)	6-6.9 dB(A)	≥ 7.0 dB(A)[2]	Impacted[3]	Not Impacted[4]	Total	Avg. Reduction dB(A)			
1	14	2,252	ROW[7] / SH[8]	NB1 Segment 1	1000+60 to 591+00	21	3	3	14	20	5	25	7.6	1	$ 1,761,200	$ 70,448
	14	893	SH[9]	NB1 Segment 2	590+20 to 599+00											

1 Full height is for the length indicated.

2 Benefited residences with predicted noise levels that meet or exceed the 7.0 dB(A) Noise Reduction Design Goal.

3 Benefited residences with predicted noise levels that do not meet or exceed the NAC.

4 Benefited residences with predicted noise levels that do not meet or exceed the NAC.

5 Impacted residences that do not receive a minimum 5 dB(A) reduction from proposed noise barrier.

6 Unit cost of $40/ft^2.

7 ROW – Right of Way noise barrier analyzed near CFX property line.

8 SH- Shoulder noise barrier analyzed on SR 429 ramp/mainline shoulder edge of pavement and on top of MSE wall.

9 SH- Shoulder noise barrier analyzed on SR 429 offset from mainline shoulder edge of pavement.