Traffic Noise Study Report

State Road (SR) 528 at Dallas Boulevard

Project Development and Environment (PD&E) Study
Orange County, Florida
CFX Project No: 528-307

Prepared For:
Central Florida Expressway Authority

Prepared By:
Environmental Transportation Planning, LLC
Ponte Vedra Beach, FL

In Association With:
Dewberry Engineers, Inc.
Orlando, FL

May 2023

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

CFX is conducting a Project Development and Environment (PD&E) Study of the State Road (SR) 528 (Martin B. Anderson Beachline Expressway) & Dallas Boulevard interchange.

Currently, the Dallas Boulevard interchange (Exit 24) is a half interchange consisting of a westbound on-ramp and an eastbound off-ramp. Completing a full interchange by adding a westbound off-ramp and eastbound on-ramp has been identified as a need to provide enhanced access and mobility to the Wedgefield community and eastern Orange County. Currently, residents within Wedgefield must travel north in the subdivision to access SR 520 and then south to access SR 528 in the eastbound direction, a distance ranging from approximately seven to thirteen miles, and vice versa when traveling westbound on SR 528. Therefore, this PD&E Study will analyze and evaluate the completion of the Dallas Boulevard interchange by adding a westbound off-ramp and eastbound on-ramp. The project study area is illustrated in **Figure 1.**

The general objective of the PD&E Study is to provide documented information necessary for CFX to decide on the type, design, and location of the proposed improvement within the project limits.

The goals of the project include:

- Identify a Preferred Alternative design concept that is consistent with the current and future goals of CFX.
- Complete a full interchange for SR 528 at Dallas Boulevard.
- Enhance mobility for the area's design concept that is consistent with the current and future development.
- Ensure that conceptual designs accommodate current and future capacity improvements.
- Provide consistency with local plans and policies.
- Promote regional connectivity.

1.1 Build Alternative

The PD&E is evaluating two potential Build Alternatives. Alternative 1 includes a roundabout intersection for Dallas Boulevard, while Alternative 2 involves a signalized intersection on the south side of SR 528. Both alternatives include shifting the SR 528 mainline to the south and the expansion of SR 528 to six lanes through the interchange. The alternative typical sections and layouts are illustrated in **Appendices A**, **D, and E**. Additional engineering detail can be found in the project's associated engineering documentation.

1.2 No-Build Alternative

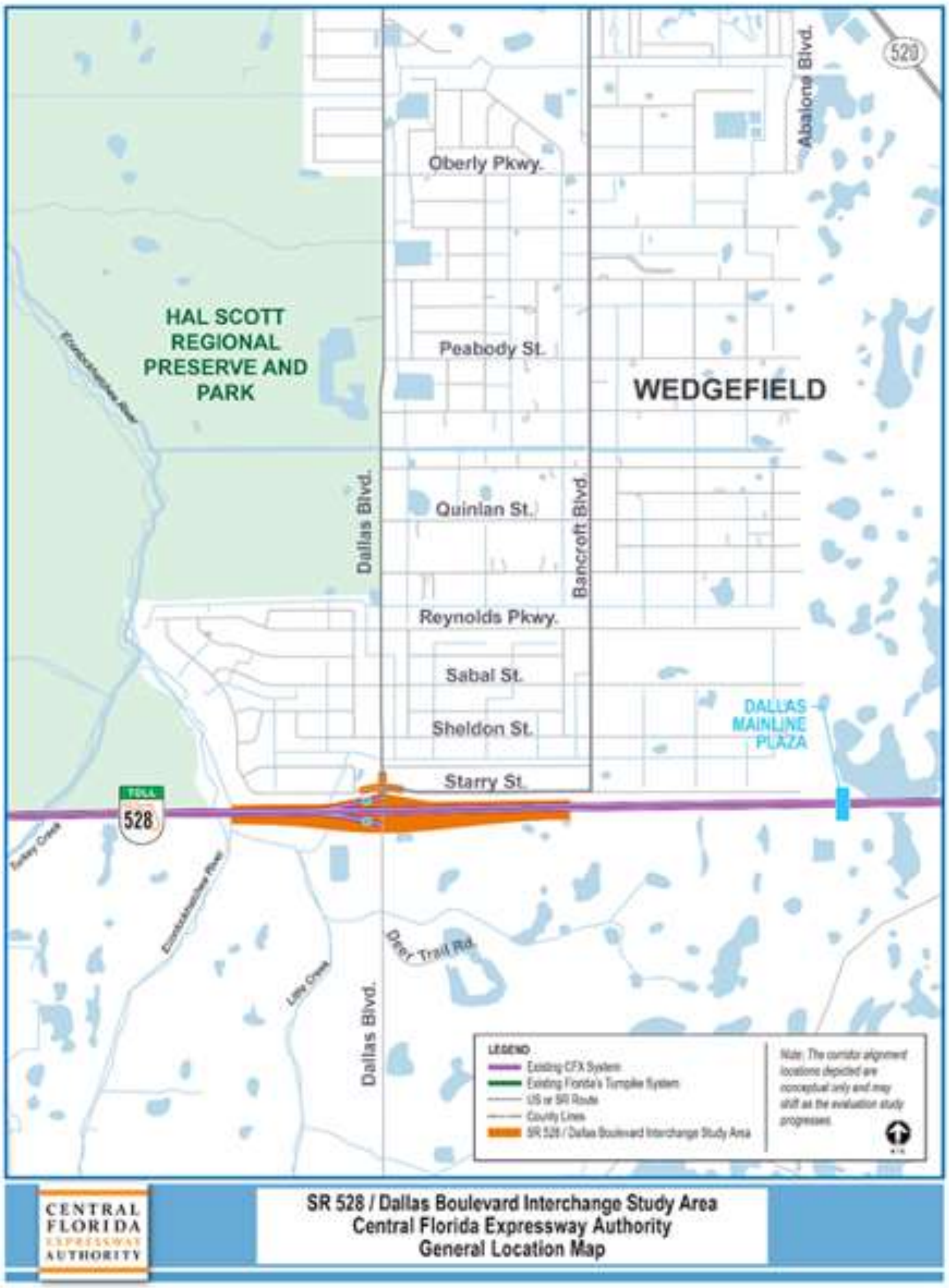
Consistent with Florida Department of Transportation (FDOT) guidelines, this analysis also considers an alternative that assesses what would happen to the environment in the future if this proposed project was not built. This Alternative, the No-Build Alternative, consists of the existing roadways within the study area, programmed improvements to existing facilities, and routine maintenance improvements. While the No-Build Alternative does not meet project needs, it provides a baseline condition to compare and measure the proposed project's effects.

1.3 Study Objective

This report summarizes the traffic noise analysis conducted for CFX Project #528-307. The analysis identifies the noise sensitive receptors within the study corridor, evaluates the noise levels predicted to occur due to the proposed project, and analyzes potential abatement options where noise impacts are predicted.

Sites not specifically identified in **Appendices D and E** are 1) not within the project limits or 2) are located too far from the roadway to be considered noise sensitive.

Figure 1: Project Location Map



2.0 METHODOLOGY

The traffic noise study conducted for this project is consistent with *Code of Federal Regulations* (C.F.R.), Title 23, § 772; Chapter 335, Section 335.17, *Florida Statutes*; Part II, Chapter 18 of the Florida Department of Transportation's (FDOT) *Project Development and Environment Manual*; and Federal Highway Administration's (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. The analysis evaluated noise levels for the 2022 existing condition and the 2050 Design Year No-Build and Build Alternatives.

Noise receptor coordinates used in the TNM are located in 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.

Project engineering design files were used to determine the design alternative's location for input into TNM. Roadway elevation data for the study was obtained from the project engineering team. Data for the noise receptors and cross streets were obtained from the United States Geological Survey digital elevation models[1].

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 [L_{eq}]. The L_{eq} 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 2050 Design Year's 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 Level of Service (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 analysis are included in **Appendix B**.

[1] USGS, https://apps.nationalmap.gov/lidar-explorer/#/

2.3 NOISE ABATEMENT CRITERIA

Land use plays an important role in traffic noise analyses. To determine which land uses are "noise sensitive," this noise impact analysis used the FHWA Noise Abatement Criteria (NAC). **Table 1** shows these criteria are divided into individual land use activity categories. The FDOT has established noise levels at which noise abatement must be considered for each category, referred to in this report as the FDOT NAC. Another criterion for determining project impacts warrant abatement consideration occurs when project noise levels are below the NAC but show a substantial increase (15.0 dB(A) or more) over existing levels.

Table 1: Noise Abatement Criteria

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

(Based on Table 1 of 23 CFR Part 772)

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

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

An illustration of typical exterior and interior noises and their corresponding sound level is presented in **Table 2**. This table gives the reader a better understanding of the noise levels discussed herein. In Florida, noise levels that reach 66.0 dB(A) at Activity Category B and C land use require noise abatement consideration. A 71.0 dB(A) noise level is required for an Activity Category E land use to be impacted by traffic noise.

Table 2: Comparative Sound Levels

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

2.4 Noise Abatement Measures

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

Consistent with the FDOT PD&E Manual – Chapter 18, the following factors must be evaluated to determine if a noise barrier is considered feasible and reasonable:

- The barrier must reduce traffic-related noise levels by at least 5.0 dB(A) for at least two impacted receptors to be considered acoustically feasible. Receptors that receive the 5.0 dB(A) reduction, or higher, are defined as "benefited" by FDOT. Consequently, noise barriers are not evaluated for isolated and single receptors.
- To be considered acoustically reasonable, the noise barrier must achieve the FDOT noise reduction design goal of 7.0 dB(A) for at least one benefited receptor.
- The cost per benefited receptor (CBPR) is calculated by multiplying the barrier's total square footage by \$30. Per Chapter 18, \$30 per/ft^2 is the statewide average used to determine cost reasonableness regardless of barrier type (shoulder/traffic railing mounted, right-of-way post/panel, etc.) To be considered cost reasonable, a barrier that meets all acoustical criteria should not exceed \$42,000 per benefited receptor.

In some locations, noise barriers may provide a benefit to non-impacted residences. Due to design considerations or aesthetics, CFX may propose noise barriers exceeding cost reasonableness limits. An example would be extending a noise barrier to maintain community continuity (i.e., avoiding terminating a noise barrier in the middle of a community).

Consistent with the FDOT Design Manual, Section 264[2], noise barrier heights are limited as follows:

- Noise barriers on bridge and retaining wall structures are limited to a maximum height of 8 feet; unless otherwise specified;
- Shoulder-mounted noise barriers at the edge of shoulder pavement are limited to a maximum height of 14 feet; and
- Non-shoulder mounted noise barriers (i.e., post and panel) outside the clear recovery zone are limited to a maximum height of 22 feet. If a non-shoulder barrier is placed within the clear recovery zone, it must be shielded.

Other factors must also be considered when evaluating a barrier's feasibility, including accessibility, sight distance, and aesthetics. Accessibility refers to the ingress and egress to properties that would be affected by constructing a noise barrier. Sight distance is a safety issue

[2] FDOT, *FDOT Design Manual*

related to drivers' ability to see far enough in each direction to enter the roadway safely. Aesthetics refers to the noise barrier's physical appearance from the highway and affected property.

3.0 TRAFFIC NOISE ANALYSIS

3.1 Identification of Noise Sensitive Sites

Using **Table 1** as a guide, the noise sensitive land uses analyzed within the study corridor fall under Activity Category B [residential].

No land uses in the study corridor warrant an Activity Category A, C, D, or E analysis. A search of building permits for potentially noise sensitive Category G (undeveloped) and non-noise-sensitive Category F lands within the study area did not identify any active permits for future buildings that would be considered noise sensitive. Another search will be conducted during the final design process. Any noise sensitive land permitted between the time of this report and the approval of the Project Environmental Impact Report will be analyzed for project noise impacts during the final design process if warranted.

3.2 Model Validation

Existing noise levels are measured in the project corridor to confirm if traffic is the primary noise source. These field measurements are also required to verify the accuracy of the TNM before it can be used to predict noise levels. Three 10-minute measurements were taken on February 28, 2023, using an Extech Instruments Model 407780 Type 2 Integrating Sound Level Meter. The sound level meter, calibrated at 114.0 dB(A) with an Extech Instruments Model 407766 calibrator, was adjusted to the A-weighted frequency scale, which approximates the frequency sensitivity of the human ear. Traffic data, including vehicle volumes, speeds by type, and meteorological conditions, were recorded during each measurement session. The data collection effort also recorded the travel speed for each type of vehicle using a Bushnell Speedster handheld radar gun.

One location within the study corridor was selected to undergo a series of three 10-minute measurements. The validation site, illustrated in **Appendix D – Page D-1**, was selected for measurement because it presented a clear view of free-flow traffic conditions on SR 528. No unusual noise events occurred during this location's three 10-minute monitoring sessions. During the monitoring session, the weather was 85°, with 53% humidity, under clear skies with light breezes ranging from five to eight miles per hour.

Validation of TNM occurs when the model-predicted noise levels are within three decibels of the field-measured levels. Since all noise levels in this analysis are based on one hour, each of the 10-

minute sessions' field-recorded traffic volumes was adjusted upward by a factor of six to reflect hourly traffic flow. Once adjusted, these volumes were input into the noise prediction model. As shown in **Table 3**, TNM predicted within the 3.0-decibel acceptance range for each 10-minute session. Consequently, the model is acceptable for predicting noise levels for this project.

Table 3: Field Measurement Data and TNM Validation Results

FIELD TRAFFIC COUNT: 2/23/2023										
Session #1: 3:07 PM										
SR 528	**Cars**		**Medium Trucks**		**Heavy Trucks**		**Buses**		**Motorcycles**	
	Volume	**Avg. Speed**	**Volume**	**Avg. Speed**	**Volume**	**Avg. Speed**	**Volume**	**Avg. Speed**	**Volume**	**Avg. Speed**
EB	311	70	13	66	18	65	0	0	1	70
WB	264	70	26	66	32	65	0	0	0	0
Field Measurement (dB(A)):					73.7					
TNM Prediction (dB(A)):					76.5					
Variance:					2.8					
Session #2: 3:18 PM										
SR 528	**Cars**		**Medium Trucks**		**Heavy Trucks**		**Buses**		**Motorcycles**	
	Volume	**Avg. Speed**	**Volume**	**Avg. Speed**	**Volume**	**Avg. Speed**	**Volume**	**Avg. Speed**	**Volume**	**Avg. Speed**
EB	324	70	12	66	16	65	1	70	1	70
WB	272	70	24	66	26	65	1	0	1	70
Field Measurement (dB(A)):					73.6					
TNM Prediction (dB(A)):					76.4					
Variance:					2.8					
Session #3: 3:29 PM										
SR 528	**Cars**		**Medium Trucks**		**Heavy Trucks**		**Buses**		**Motorcycles**	
	Volume	**Avg. Speed**	**Volume**	**Avg. Speed**	**Volume**	**Avg. Speed**	**Volume**	**Avg. Speed**	**Volume**	**Avg. Speed**
EB	351	70	11	66	15	65	0	0	3	70
WB	310	70	22	66	28	65	0	0	0	0
Field Measurement (dB(A)):					74.1					
TNM Prediction (dB(A)):					76.7					
Variance:					2.6					

3.3 Predicted Noise Levels

Traffic on SR 528 is the dominant noise source within the project's evaluation area. For this project, 41 receptor sites, all Activity Category B, were analyzed for project-related impacts. The noise analysis divided the project corridor into two Noise Study Areas (NSA). The 2022 existing condition and 2050 No-Build and Build Alternatives noise analysis results discussed in this section are also detailed in **Appendix C.**

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 considered a doubling noise.

A discussion of each NSA and the corresponding impact and abatement analysis is provided in the following sections.

3.3.1 Noise Study Area 1

NSA 1 is north of SR 528 and west of Dallas Boulevard. There are no existing barriers within this section. Twenty single-family residences were included in the analysis and are represented by receptors 1-1 through 1-20. This NSA and its associated receptors are illustrated in **Appendix D - Pages D-1 and D2** and **Appendix E – Pages E-1 and E-2**.

Currently, the average noise level for all NSA 1 receptors is 59.0 dB(A), with the highest noise level being 64.5 dB(A) at receptor 1-8. No residences are currently affected by traffic noise. Receptor 1-8 is predicted to exceed the 66.0 dB(A) NAC under the No-Build Alternative.

The overall traffic noise levels increase by an average of 2.9 dB(A) for Alternative 1 and 4.3 dB(A) for Alternative 2. Under Alternative 1, receptor 1-4 has the highest build-related noise level, 65.5 dB(A), a 4.4 dB(A) increase over the existing condition. With Alternative 2, receptor 1-4 has the highest build-related noise level, 67.2 dB(A), a 6.1 dB(A) increase over the existing condition. None of these increases are considered substantial (defined as 15.0 dB(A) or higher).

No receptors are predicted to meet or exceed the NAC under Alternative 1. For Alternative 2, three residences, represented by receptors 1-2 thru 1-4, are predicted to exceed the NAC, therefore, they are deemed impacted. Noise abatement was considered for Alternative 2 to mitigate the three impacts, as summarized in **Section 3.4.1**.

3.3.2 Noise Study Area 2

NSA 2 is north of SR 528 and east of Dallas Boulevard. There are no existing barriers within this section. Twenty-one single-family residences were included in the analysis and are represented by receptors 2-1 through 2-20. This NSA and its associated receptors are illustrated in **Appendix D -Pages D-2 and D3** and **Appendix E – Pages E-2 and E-3**.

Currently, the average noise level for all NSA 2 receptors is 58.5 dB(A), with the highest noise level being 61.9 dB(A) at receptor 2-4. No residences are currently affected by traffic noise, nor are any predicted to be impacted under the No-Build Alternative.

The overall traffic noise levels increase by an average of 4.8 dB(A) for Alternative 1 and 6.0 dB(A) for Alternative 2. Under Alternative 1, receptor 2-7 has the highest build-related noise level, 67.7 dB(A), a 6.2 dB(A) increase over the existing condition. With Alternative 2, receptor 2-4 has the highest build-related noise level, 70.0 dB(A), an 8.1 dB(A) increase over the existing condition. None of these increases are considered substantial.Four receptors are predicted to meet or exceed the NAC under Alternative 1. For Alternative 2, seven sites, represented by receptors 2-3 thru 2-8, are predicted to meet or exceed the NAC. Noise abatement was considered for both Build Alternatives to mitigate these impacts, as summarized in **Section 3.4.2** and **Section 3.4.3**.

3.4 Barrier Analysis

Noise barriers were evaluated to mitigate the impacts resulting from proposed build alternatives.

3.4.1 Alternative 1: Noise Barrier WB-R1

Barrier WB-R1 illustrated in **Appendix D - Page D-3** was evaluated parallel to the westbound SR 528 to abate the predicted traffic noise impacts to receptors 2-4 thru 2-7 in NSA 2 as a result of the Alternative 1 Roundabout. One analysis scenario evaluated placing a barrier near the CFX right-of-way line, while the other evaluated placing a barrier along the mainline and ramp shoulder edge of pavement (EOP).

As shown in **Table 4**, the shoulder barrier option, at the maximum allowed height of 14 feet, benefits (e.g., provides at least a 5 dB(A) reduction) seven homes (four impacted and three non-impacted) and meets the 7.0 dB(A) Noise Reduction Design Goal (NRDG). However, with a Cost Per Benefited Receptor (CPBR) calculated at $137,460, the barrier far exceeds the FDOT and CFX cost reasonableness criteria of $42,000 per benefited receptor. The ROW barrier options, ranging in height from 16 feet to the maximum allowed height of 22 feet, meet all acoustic criteria and benefit seven homes—still, the respective CPBRs are also substantially higher than the cost reasonableness criteria.

Barrier WB-R1 is not deemed reasonable per FDOT and CFX criteria; thus, it has been removed from further consideration.

Table 4: Noise Barrier WB-R1 Evaluation Summary

NSA 2: Barrier WB-R1 Evaluation Summary														
Evaluated Barrier Options				Number of Impacted Residential Sites	Number of Impacted Sites Within a Noise Reduction Range			Number of Benefited Sites *1				Total Estimated Cost *4	Cost per Benefited Receptor *5	Recommended for further consideration in final design?
Option	Barrier Type/Location	Height (feet)*6	Length (feet)		5-5.9 dB(A)	6-6.9 dB(A)	≥ 7.0 dB(A) *2	Impacted	Other *3	Total	Avg. Reduction dB(A)			
1 *Illustrated*	Shoulder	14	2,291	4	0	1	3	4	3	7	6.5	$ 962,220	$ 137,460	No
2 *Illustrated*	ROW	22	1,889		0	0	4	4	3	7	7.3	$ 1,246,740	$ 178,106	No
3	ROW	20	1,909		0	0	4	4	3	7	6.9	$ 1,145,400	$ 163,629	No
4	ROW	18	1,978		0	0	4	4	3	7	6.5	$ 1,068,120	$ 152,589	No
5	ROW	16	2,137		0	3	1	4	3	7	6.2	$ 1,025,760	$ 146,537	No

*1 = Minimum of 5.0 dB(A) required to be considered benefited by noise barrier.
*2 = FDOT Noise Reduction Design Goal is 7.0 dB(A) at a minimum of 1 benefited receptor.
*3 = Refers to non-impacted noise-sensitive sites.
*4 = Based on FDOT Statewide average of $30 per square foot.
*5 = FDOT Reasonable Cost Guideline is $42,000.
*6 = 8-ft max on MSE/Bridge; 14-ft max on shoulder; 22-ft max at ROW or offset from shoulder.

3.4.2 Alternative 2: Noise Barrier WB-S1

Barrier WB-S1 illustrated in **Appendix E - Page E-1** was evaluated parallel to the westbound SR 528 to abate the predicted traffic noise impacts to receptors 1-2 thru 1-4 in NSA 1 as a result of Alternative 2. One scenario evaluated placing a barrier near the CFX right-of-way line, while the other evaluated placing a barrier along the mainline and ramp shoulder edge of pavement (EOP).

As shown in **Table 5**, the shoulder barrier options benefit the three homes at the maximum allowed height of 14 feet but cannot meet the 7.0 dB(A) NRDG. Additionally, the respective CPBRs far exceed the FDOT and CFX cost reasonableness criteria. The ROW barrier options ranging in height from 20 feet to 22 feet meet acoustic criteria, with the 22-foot options meeting the 7.0 dB(A)NRDG. However, as with the shoulder barrier options, all ROW barrier options are substantially higher than the cost reasonableness criteria.

Barrier WB-S1 is not deemed reasonable per FDOT and CFX criteria; thus, it has been removed from further consideration.

Table 5: Noise Barrier WB-S1 Evaluation Summary

NSA 1: Barrier WB-S1 Evaluation Summary														
Evaluated Barrier Options				Number of Impacted Residential Sites	Number of Impacted Sites Within a Noise Reduction Range			Number of Benefited Sites *1				Total Estimated Cost *4	Cost per Benefited Receptor *5	Recommended for further consideration in final design?
Option	Barrier Type/Location	Height (feet)*6	Length (feet)		5-5.9 dB(A)	6-6.9 dB(A)	≥ 7.0 dB(A) *2	Impacted	Other *3	Total	Avg. Reduction dB(A)			
1	Shoulder	14	2,176	3	2	1	0	3	0	3	5.7	$ 913,920	$ 304,640	No
2 Illustrated	Shoulder	14	1,100		3	0	0	3	0	3	5.3	$ 462,000	$ 154,000	No
3	ROW	22	1,480		1	1	1	3	1	4	6.3	$ 976,800	$ 244,200	No
4 Ilustrated	ROW	22	970		1	1	1	3	1	4	6.2	$ 640,200	$ 160,050	No
5	ROW	20	970		2	1	0	3	0	3	5.7	$ 582,000	$ 194,000	No

*1 = Minimum of 5.0 dB(A) required to be considered benefited by noise barrier.
*2 = FDOT Noise Reduction Design Goal is 7.0 dB(A) at a minimum of 1 benefited receptor.
*3 = Refers to non-impacted noise-sensitive sites.
*4 = Based on FDOT Statewide average of $30 per square foot.
*5 = FDOT Reasonable Cost Guideline is $42,000.
*6 = 8-ft max on MSE/Bridge; 14-ft max on shoulder; 22-ft max at ROW or offset from shoulder.

3.4.3 Alternative 2: Noise Barrier WB-S2

Barrier WB-S2 illustrated in **Appendix E - Page E-3** was evaluated parallel to the westbound SR 528 to abate the predicted traffic noise impacts to receptors 2-3 thru 2-8 in NSA 21 as a result of Alternative 2. One scenario evaluated placing a barrier near the CFX right-of-way line, while the other evaluated placing a barrier along the mainline and ramp shoulder edge of pavement (EOP).

As shown in **Table 6**, the 14-foot-tall shoulder barrier option only benefits six of the seven impacted homes and meets the 7.0 dB(A) NRDG. However, the CPBR far exceeds the FDOT and CFX cost reasonableness criteria. The ROW barrier options, ranging in height from 14 to 22 feet, all meet acoustic criteria. However, as with the shoulder option, all the ROW barrier options are substantially higher than the cost reasonableness criteria.

Barrier WB-S2 is not deemed reasonable per FDOT and CFX criteria; thus, it has been removed from further consideration.

Table 6: Noise Barrier WB-S2 Evaluation Summary

NSA 2: Barrier WB-S2 Evaluation Summary														
Evaluated Barrier Options				Number of Impacted Residential Sites	Number of Impacted Sites Within a Noise Reduction Range			Number of Benefited Sites *1				Total Estimated Cost *4	Cost per Benefited Receptor *5	Recommended for further consideration in final design?
Option	Barrier Type/Location	Height (feet)*6	Length (feet)		5-5.9 dB(A)	6-6.9 dB(A)	≥ 7.0 dB(A) *2	Impacted	Other *3	Total	Avg. Reduction dB(A)			
1 *Illustrated*	Shoulder	14	2,066	7	1	3	2	6	0	6	6.6	$ 867,720	$ 144,620	No
2	ROW	22	2,395		0	2	5	7	0	7	8.4	$ 1,580,700	$ 225,814	No
3	ROW	20	2,395		1	1	5	7	0	7	7.8	$ 1,437,000	$ 205,286	No
4 *Illustrated*	ROW	18	2,395		2	1	4	7	0	7	7.3	$ 1,293,300	$ 184,757	No
5	ROW	16	2,395		1	1	4	6	0	6	6.8	$ 1,149,600	$ 191,600	No
6	ROW	14	2,395		1	3	1	5	0	5	6.3	$ 1,005,900	$ 201,180	No

*1 = Minimum of 5.0 dB(A) required to be considered benefited by noise barrier.
*2 = FDOT Noise Reduction Design Goal is 7.0 dB(A) at a minimum of 1 benefited receptor.
*3 = Refers to non-impacted noise-sensitive sites.
*4 = Based on FDOT Statewide average of $30 per square foot.
*5 = FDOT Reasonable Cost Guideline is $42,000.
*6 = 8-ft max on MSE/Bridge; 14-ft max on shoulder; 22-ft max at ROW or offset from shoulder.

4.0 CONCLUSION

None of the 41 analyzed residential sites are currently affected by traffic noise. The noise levels associated with the 2050 No-Build Alternative are predicted to meet or exceed the 66.0 dB(A) NAC at one site.

Build Alternative 1 - Roundabout Intersection

The analysis concluded that the overall traffic noise levels would increase by an average of 3.9 dB(A), with the average project-related noise level predicted to be 62.6 dB(A). The Alternative 1 2050 design year noise levels are predicted to meet or exceed the applicable NAC at four sites. The greatest noise level is predicted to be 67.7 dB(A) in NSA 2. None of the increases are considered substantial (i.e., 15 dB(A) or more over existing levels).

As required, noise abatement consideration was given to all four impacted sites. Five noise barrier options were evaluated to abate the project-related impacts. While the various options meet acoustic criteria, Barrier WB-R1 cannot meet the required FDOT and CFX cost reasonableness criteria. Consequently, WB-R1 is not proposed for further consideration in the final design process.

Build Alternative 2 - Signalized Intersection

The analysis concluded that the overall traffic noise levels would increase by an average of 5.1 dB(A), with the average project-related noise level predicted to be 63.9 dB(A). The Alternative 2 2050 design year noise levels are predicted to meet or exceed the applicable NAC at ten sites, three in NSA 1 and seven in NSA 2. The greatest noise level is predicted to be 70.0 dB(A) in NSA 2. None of the increases are considered substantial.

As required, noise abatement consideration was given to all ten impacted sites. Five noise barrier options were evaluated to abate the project-related impacts in NSA 1, while six were evaluated for NSA 2. While the various options meet acoustic criteria, Barriers WB-S1 and WB-S2 cannot meet the required FDOT and CFX cost reasonableness criteria. Consequently, WB-S1 and WB-S2 are not proposed for further consideration in the final design process.

Based on the noise analyses performed to date, there are no feasible and reasonable solutions to mitigate the noise impacts at the locations identified in **Appendix C**.

5.0 CONSTRUCTION NOISE AND VIBRATION IMPACTS

Construction of the proposed roadway improvements is not expected to have significant vibration or construction noise impacts. Applying the FDOT Standard Specifications for Road and Bridge Construction is anticipated to minimize or eliminate most potential short-term noise and vibration impacts. Should any construction noise or vibration issues arise during construction, the Project Engineer, in concert with the CFX Noise Specialist and the Contractor, will investigate additional methods of controlling these impacts.

6.0 COMMUNITY COORDINATION

6.1 Noise Impact Contours

To aid in promoting land use compatibility, this report, which provides information that can be used to protect future land development from becoming incompatible with anticipated traffic noise levels, can be used by Orange County and officials. In addition, generalized noise impact contours for the build alternatives have been developed, identifying the distances between the project and the location where traffic noise levels may approach or exceed the NAC for Activity Categories A, B, C, and E. The contour distances provided in **Table 7** do not account for any reduction in noise levels that berms, privacy walls, or intervening structures may provide. These distances also do not account for any increase in noise levels caused by local roads not included in the modeling, variation in the noise path, increased roadway elevation, or increased elevation of a noise sensitive site (e.g., second-floor patio). To minimize the potential for incompatible land use, future noise sensitive land uses should be located beyond these distances.

Table 7: Critical Distance Impact Contours

Impact Contours			
Activity Category [*1]	**Corresponding Noise Abatement Criterion**	**Approximate Distance to SR 528**[*2]	
		North of SR 528	**South of SR 528**
Category A	56 dB(A)	880 ft	1090 ft
Category B and C	66 dB(A)	265 ft	in row
Category E	71 dB(A)	in row	in row

*1 Activity Categories as defined in 23 CFR 772.
*2 Does not account for variation caused by topography, local roads, intervening structures, etc.

6.2 Public Meetings

CFX held a public meeting for this project on April 27, 2023. Any comments received during the public meeting comment period about the PD&E Study in general and those pertinent to the noise analysis are documented under separate cover.

7.0 REFERENCES

FHWA. *Code of Federal Regulations*, Title 23 Part 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise." July 13, 2010.

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

FHWA. *Recommended Best Practices for the Use of the FHWA Traffic Noise Model (TNM*. December 8, 2015.

FDOT. A+ Plus Aerial Photo Look-Up System. 2022.

FDOT. *FDOT Design Manual*

FDOT. *Project Development and Environment Manual:* Part II, Chapter 18. Effective July 1, 2020.

FDOT. *Standard Specifications for Road and Bridge Construction*.

FDOT. *Traffic Noise Modeling and Analysis Practitioners Handbook*. December 2018.

Google Earth, @2022 Google. Imagery and elevation data.

Section 335.17, *Florida Statutes. State Highway Construction; Means of Noise Abatement.* 2012.

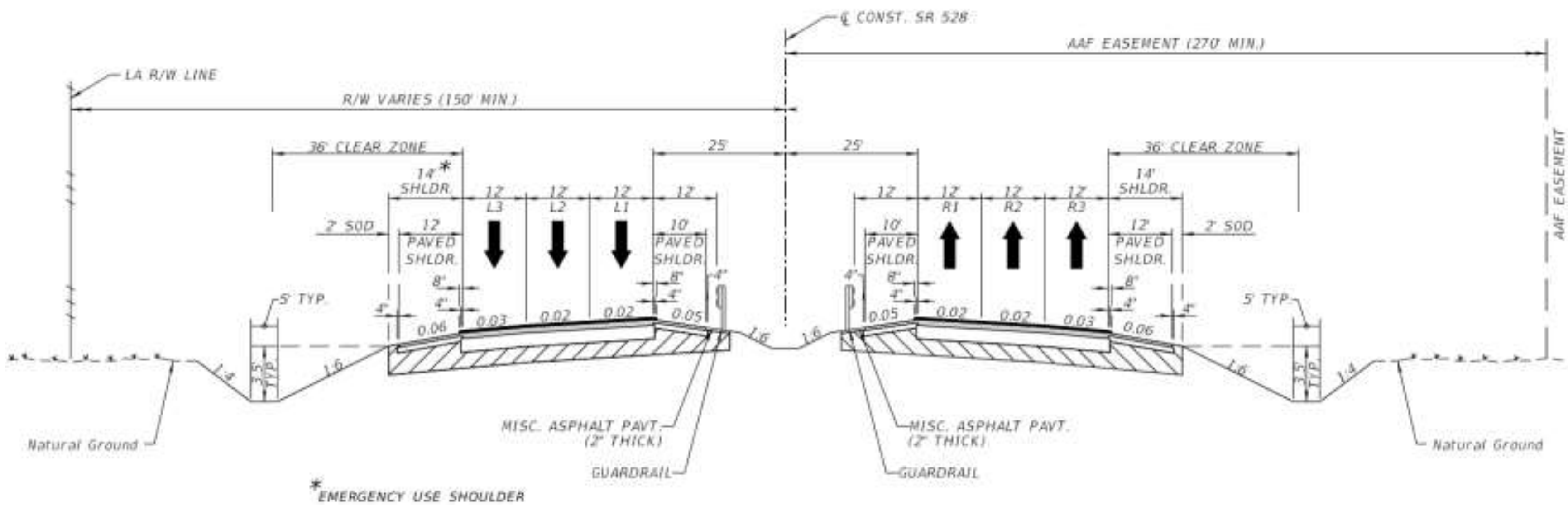
USGS. National Map 2022; https://apps.nationalmap.gov/lidar-explorer/#/.

Appendix A:

Typical Sections

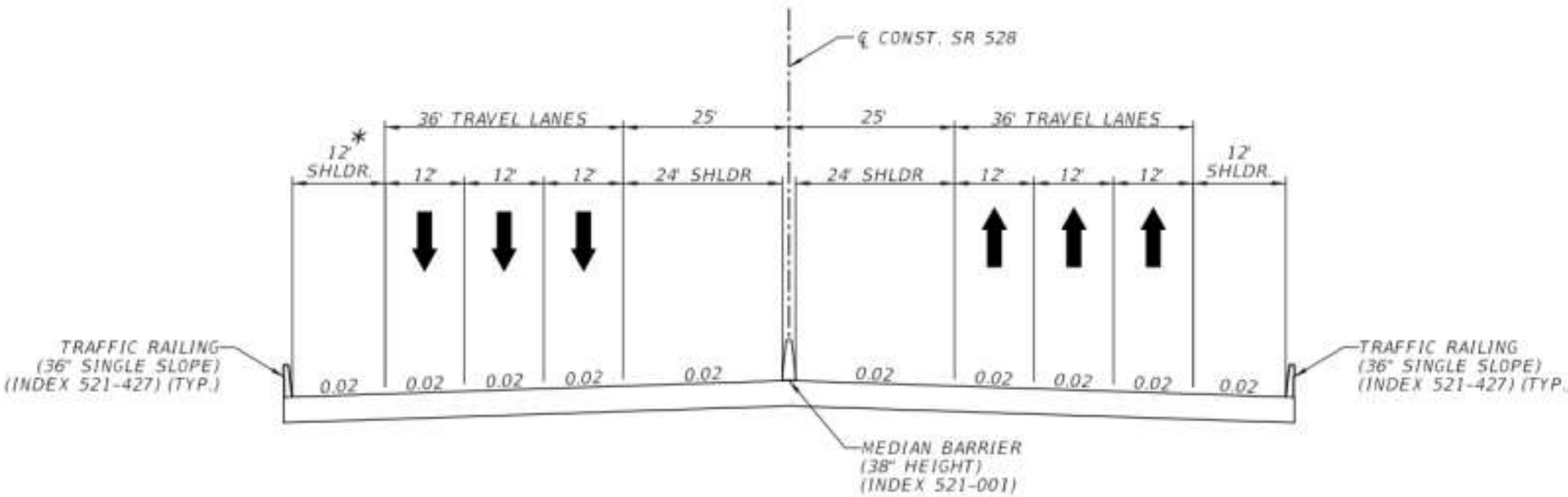
Alternative 1 - Roundabout Intersection
Alternative 2 - Signalized Intersection

Alternative 1 - Roundabout Intersection



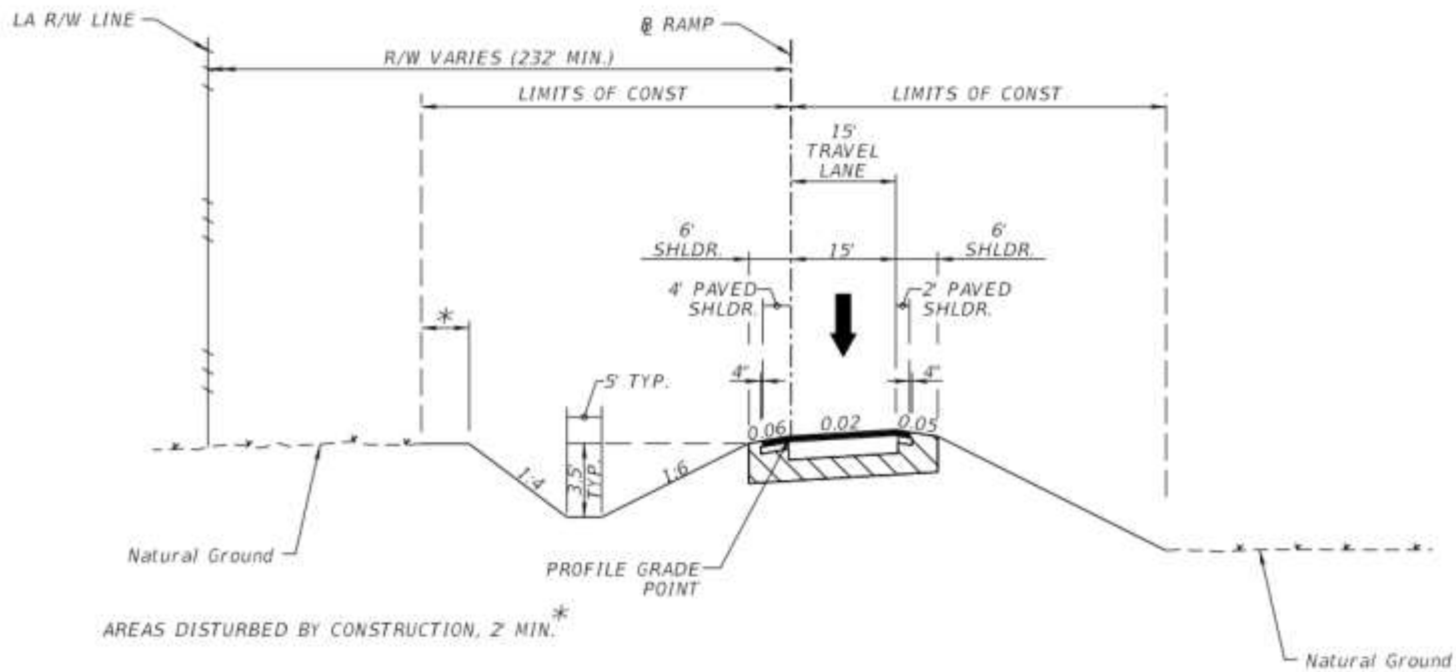
TYPICAL SECTION 1
SR 528 (BEACHLINE EXPRESSWAY)

STA. TBD TO STA. TBD
DESIGN SPEED = 70 MPH



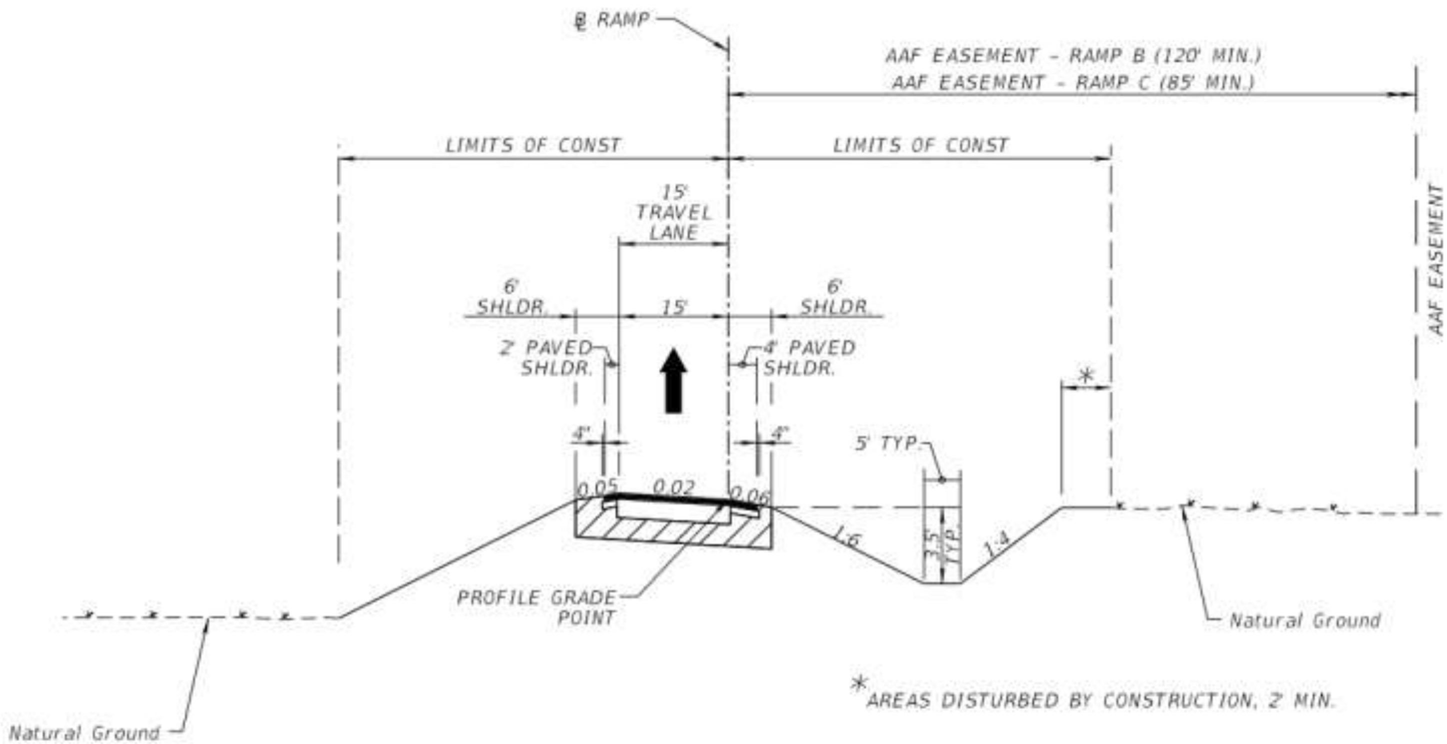
S.R. 528 OVER DALLAS BLVD.

STA. TBD TO STA. TBD
DESIGN SPEED = 70



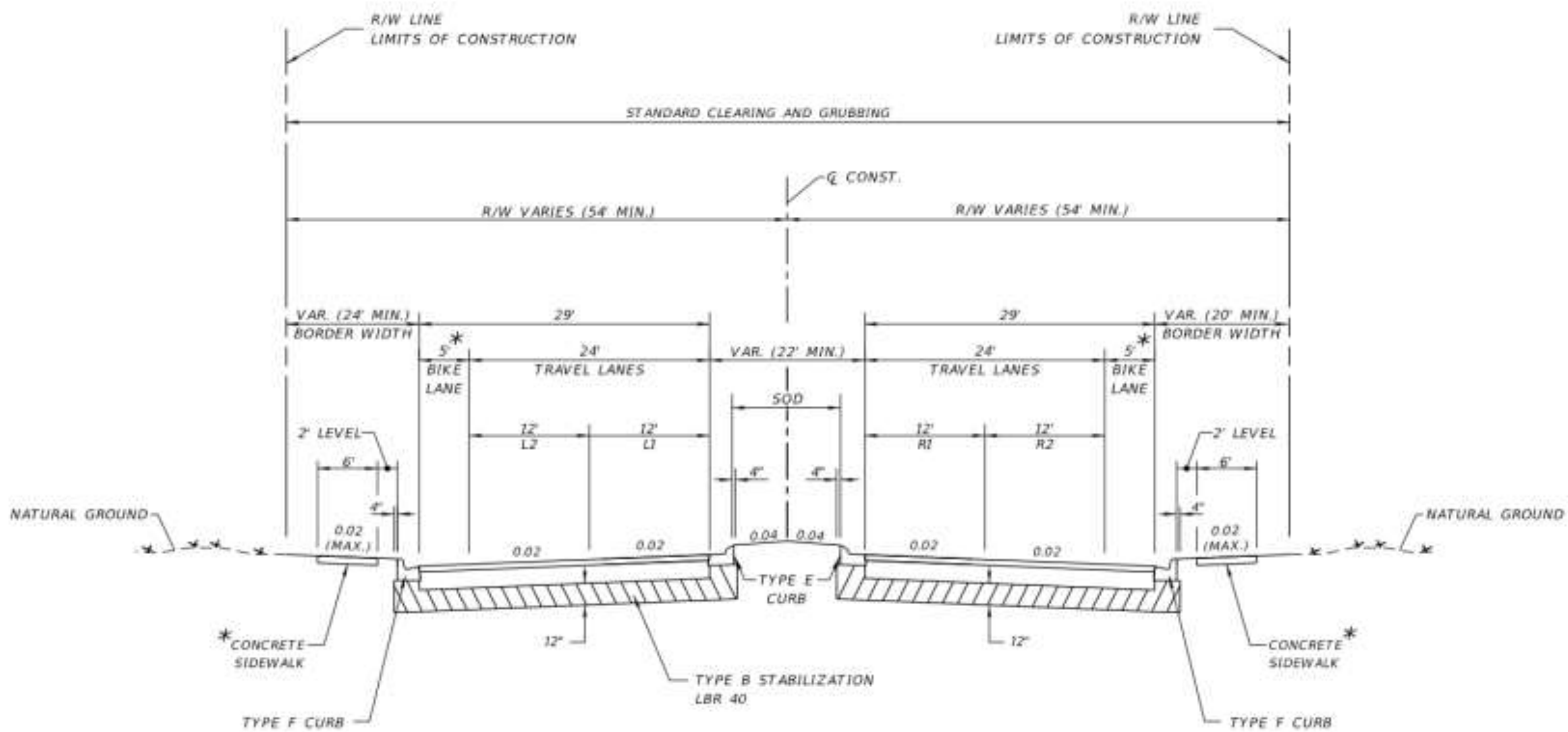
RAMP A (WB ON-RAMP)
RAMP D (WB OFF-RAMP)

STA. TBD TO STA. TBD
DESIGN SPEED = 50 MPH



RAMP B (EB OFF-RAMP)
RAMP C (EB ON-RAMP)

STA. TBD TO STA. TBD
DESIGN SPEED = 50 MPH



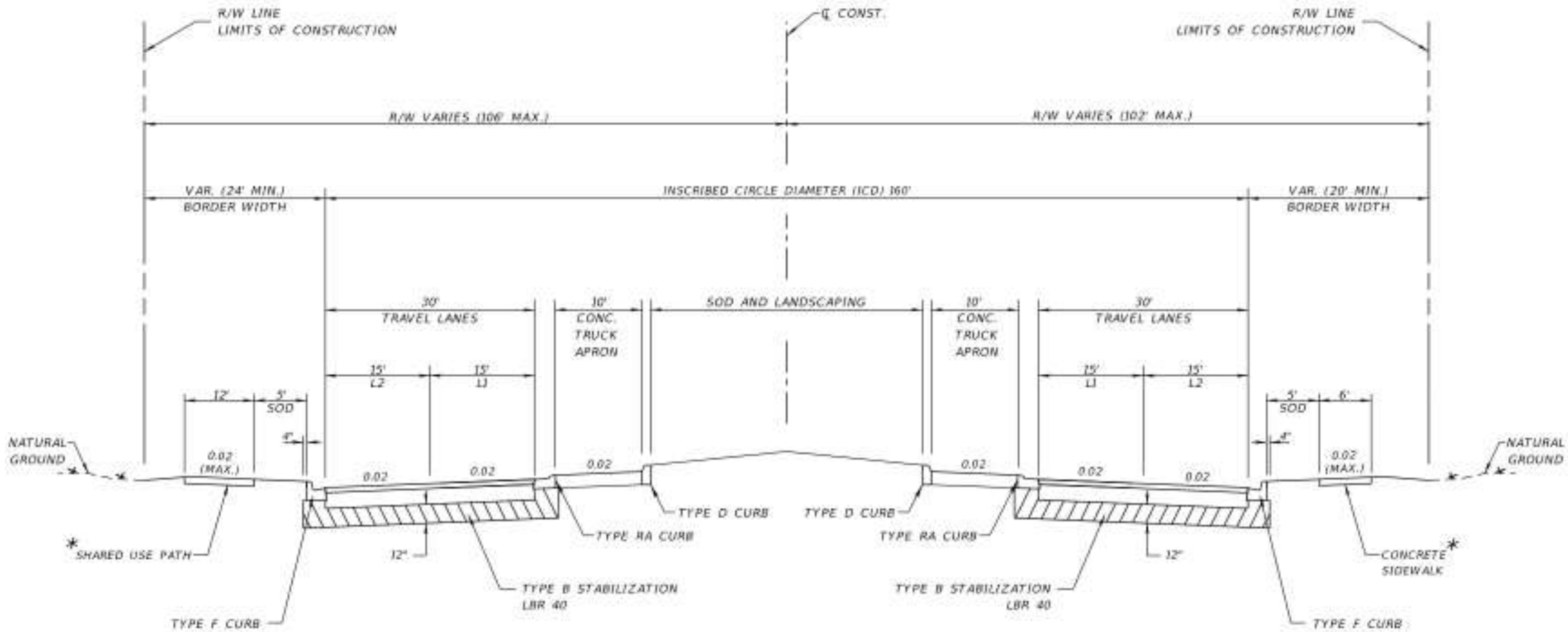
*SIDEWALK REPLACES BIKE LANE AS PART OF BICYCLE BYPASS.

BICYCLE SLIP LANE INTRODUCED UPSTREAM OF TURN LANE TAPER.

DALLAS BOULEVARD

TYPICAL SECTION IS BASED ON DESIGN ELEMENTS FROM THE CONSTRUCTED AAF BRIDGE (SOUTH OF SR 528)

STA. TBD TO STA. TBD
DESIGN SPEED = 45 MPH



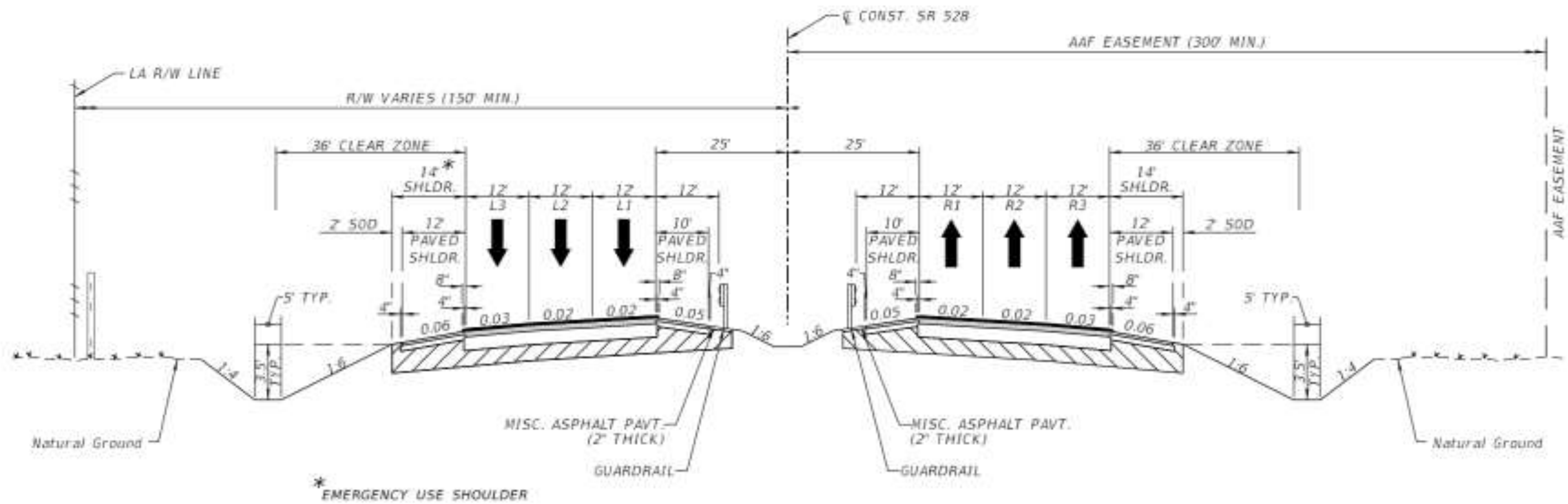
DALLAS BOULEVARD
(CIRCULATORY AND CONNECTING ROADWAYS)
TYPICAL SECTION IS BASED ON DESIGN ELEMENTS
FROM THE CONSTRUCTED AAF BRIDGE (SOUTH OF SR 528)

STA. TBD TO STA. TBD
DESIGN SPEED = 45 MPH

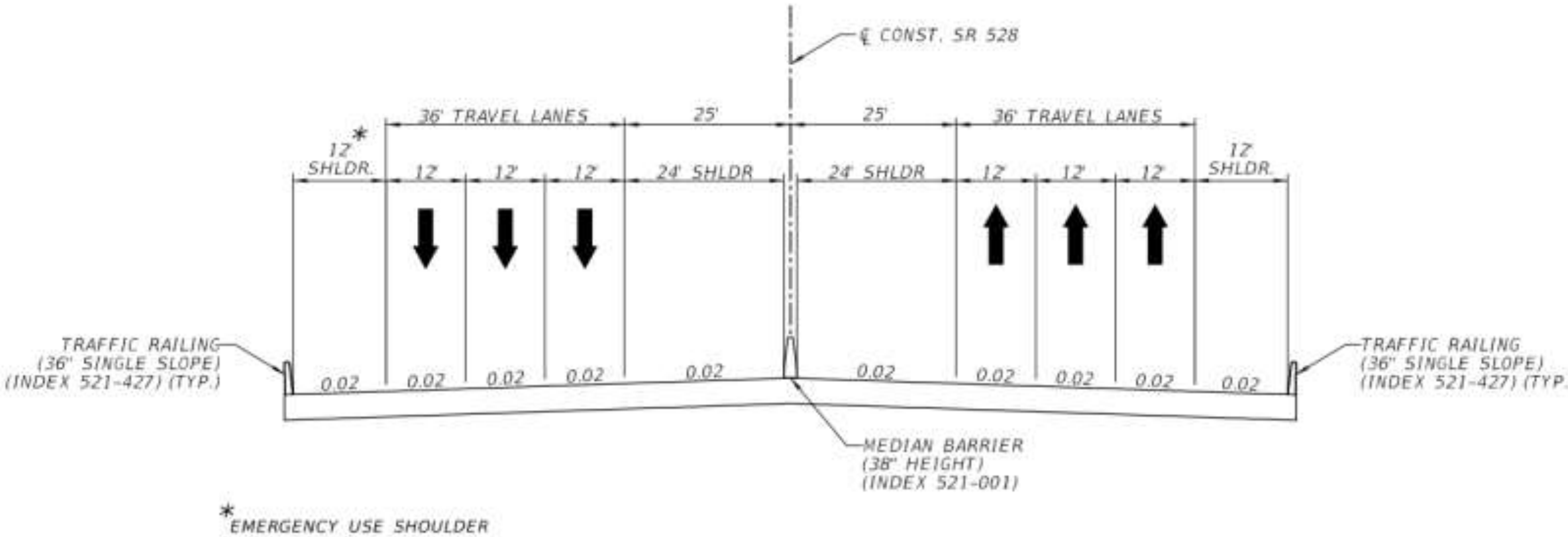
*SIDEWALK REPLACES BIKE LANE AS PART OF BICYCLE BYPASS.

BICYCLE SLIP LANE INTRODUCED UPSTREAM OF TURN LANE TAPER.

Alternative 2 - Signalized Intersection

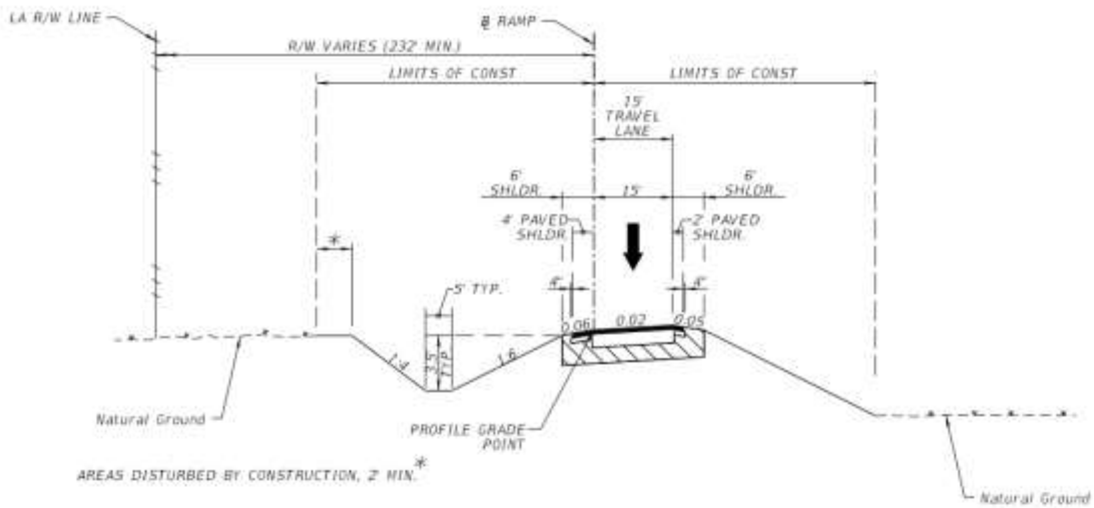


TYPICAL SECTION 1
SR 528 (BEACHLINE EXPRESSWAY)
STA. TBD TO STA. TBD
DESIGN SPEED = 70 MPH



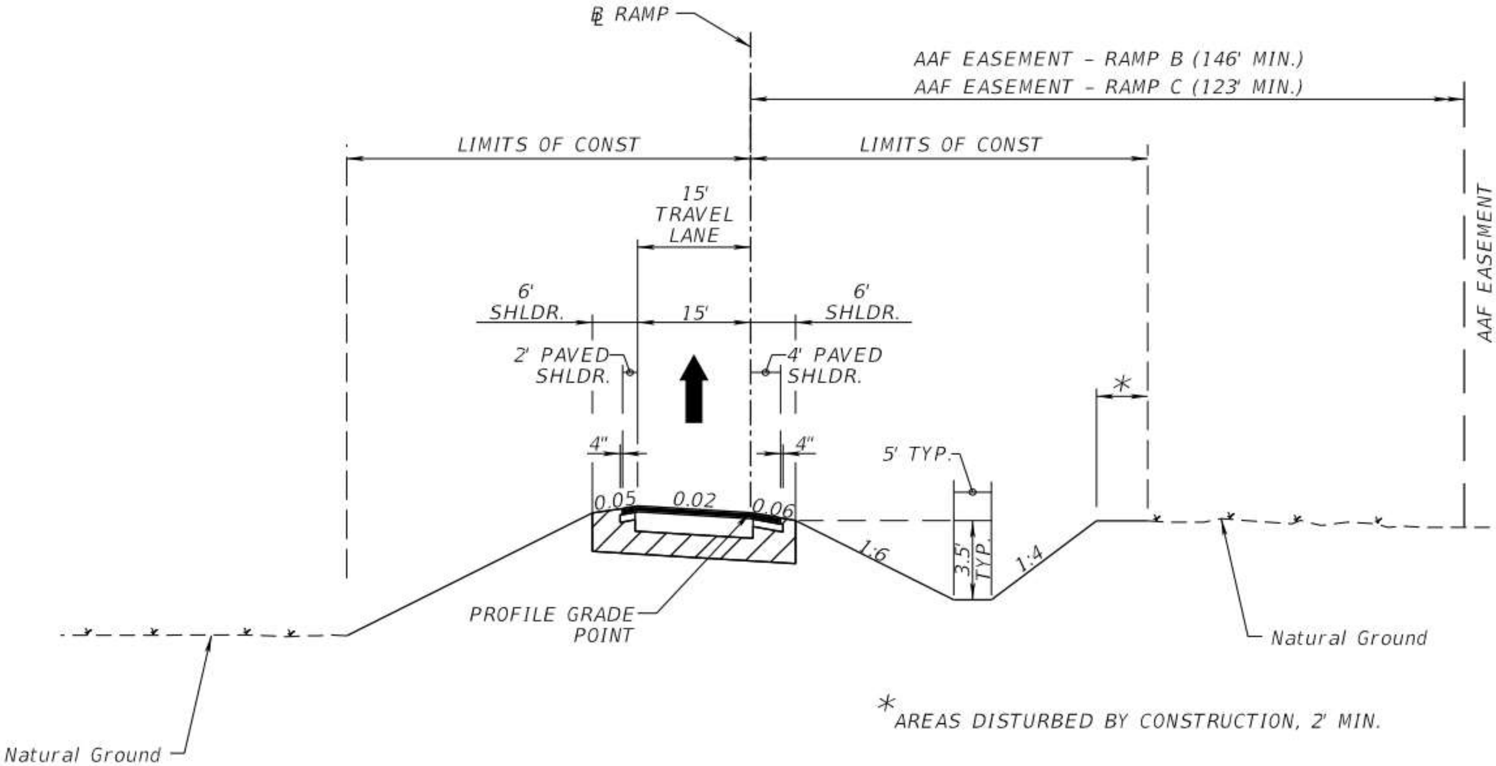
S.R. 528 OVER DALLAS BLVD.

STA. TBD TO STA. TBD
DESIGN SPEED = 70



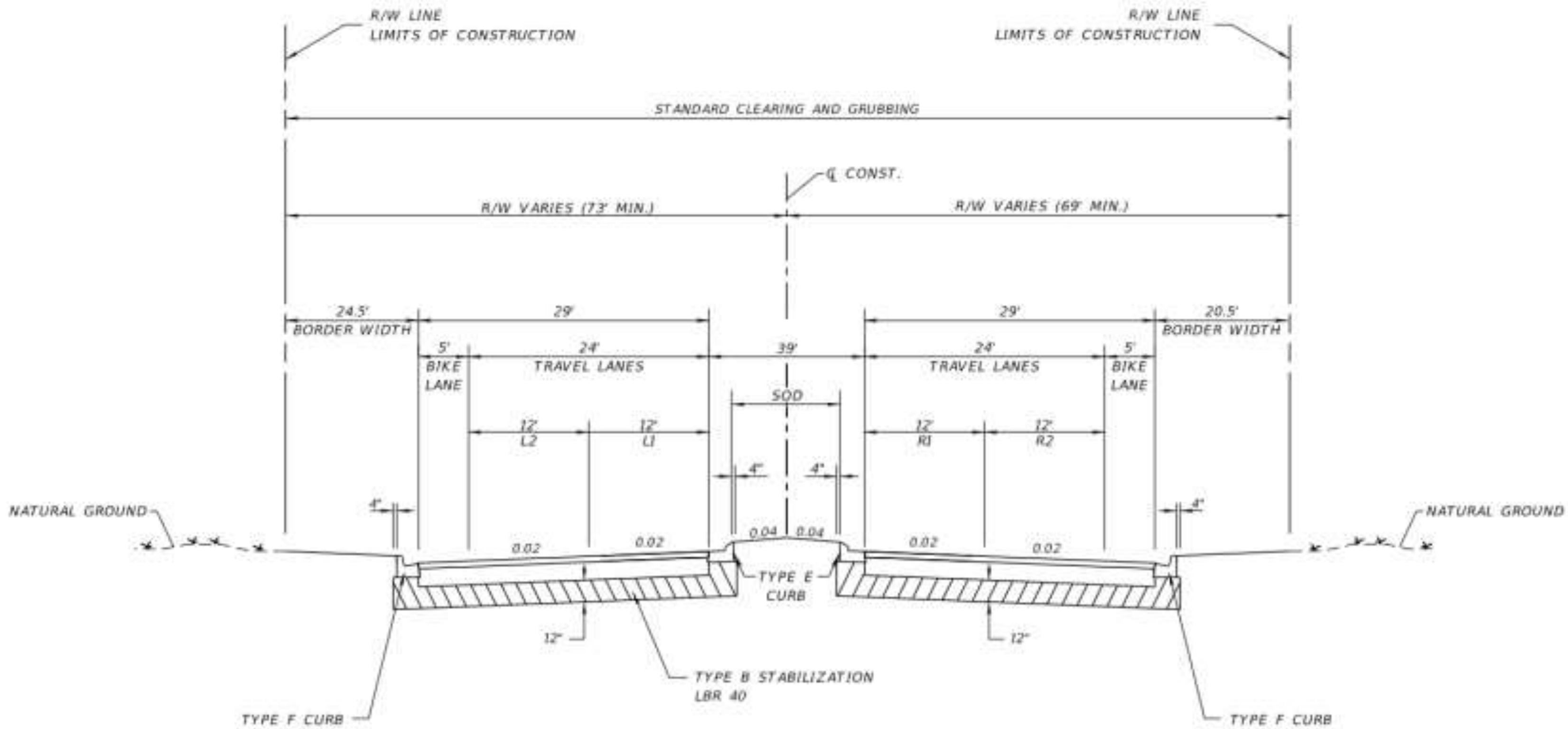
RAMP A (WB ON-RAMP)
RAMP D (WB OFF-RAMP)

STA. TBD TO STA. TBD
DESIGN SPEED = 30 MPH



RAMP B (EB OFF-RAMP)
RAMP C (EB ON-RAMP)

STA. TBD TO STA. TBD
DESIGN SPEED = 50 MPH



DALLAS BOULEVARD
TYPICAL SECTION IS BASED ON DESIGN ELEMENTS
FROM THE CONSTRUCTED AAF BRIDGE (SOUTH OF SR 528)

STA. TBD TO STA. TBD
DESIGN SPEED = 45 MPH

Appendix B:

Noise Study Traffic Data

Noise Analysis Traffic Data - SR 528 and Dallas Boulevard Interchange
2022 Existing 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 528													
West of Innovation Way (ramps to/from east)	4	58,600	58,200	2,306	3,080	3.00%	1.85%	1.08%	0.07%	0.18%	10.0%	53.0%	70
From Innovation Way to Dallas Boulevard	4	60,500	58,200	2,401	3,080	3.00%	1.85%	1.08%	0.07%	0.18%	10.0%	53.0%	70
From Dallas Boulevard to SR 520	4	54,650	58,200	2,050	3,080	3.00%	1.85%	1.08%	0.07%	0.18%	10.0%	53.0%	70
East of SR 520	4	49,450	58,200	1,884	3,080	3.00%	1.85%	1.08%	0.07%	0.18%	10.0%	53.0%	70
SR 528 Ramps													
SR 528 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)**
Innovation Way													
Eastbound on	1	960	10,800	101	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	11.1%	56.4%	45
Westbound off	1	950	10,800	85	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	11.1%	56.4%	45
Dallas Boulevard													
Eastbound off	1	2,925	9,100	351	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	11.0%	67.8%	45
Westbound on	1	2,925	9,100	545	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	11.0%	67.8%	45
SR 520													
Eastbound off	1	3,800	11,700	402	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	9.5%	61.2%	45
Westbound on	1	3,800	11,700	226	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	9.5%	61.2%	45
Eastbound on	1	1,200	10,900	65	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	9.4%	66.2%	45
Westbound off	1	1,200	10,900	139	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	9.4%	66.2%	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)**
Dallas Boulevard													
North of Starry Street	1	4,200	8,900	323	580	2.00%	1.23%	0.72%	0.05%	0.12%	9.0%	72.8%	40
South of Starry Street	1	6,500	8,700	463	580	2.00%	1.23%	0.72%	0.05%	0.12%	9.0%	73.7%	40
Starry Street													
East of Dallas Boulevard	1	1,800	3,900	126	260	2.00%	1.23%	0.72%	0.05%	0.12%	9.0%	74.1%	30
West of Dallas Boulevard	1	300	4,100	20	280	2.00%	1.23%	0.72%	0.05%	0.12%	9.0%	71.0%	30

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

(1) Number of lanes are obtained from field observations and aerial maps.
(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.

Noise Analysis Traffic Data - SR 528 and Dallas Boulevard Interchange
2050 No Build Conditions - SR 528 4 Lanes

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 528													
West of Innovation Way (ramps to/from east)	4	110,800	58,200	6,150	3,080	3.00%	1.85%	1.08%	0.07%	0.18%	10.0%	53.0%	70
From Innovation Way to Dallas Boulevard	4	114,300	58,200	6,370	3,080	3.00%	1.85%	1.08%	0.07%	0.18%	10.0%	53.0%	70
From Dallas Boulevard to SR 520	4	103,300	58,200	5,470	3,080	3.00%	1.85%	1.08%	0.07%	0.18%	10.0%	53.0%	70
East of SR 520	4	98,100	58,200	5,170	3,080	3.00%	1.85%	1.08%	0.07%	0.18%	10.0%	53.0%	70
SR 528 Ramps													
SR 528 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)**
Innovation Way													
Eastbound on	1	1,750	10,800	220	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	11.1%	56.4%	45
Westbound off	1	1,750	10,800	220	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	11.1%	56.4%	45
Dallas Boulevard													
Eastbound off	1	5,500	9,100	820	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	11.0%	67.8%	45
Westbound on	1	5,500	9,100	900	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	11.0%	67.8%	45
SR 520													
Eastbound off	1	7,050	11,700	820	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	9.5%	61.2%	45
Westbound on	1	7,050	11,700	520	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	9.5%	61.2%	45
Eastbound on	1	3,450	10,900	430	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	9.4%	66.2%	45
Westbound off	1	3,450	10,900	430	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	9.4%	66.2%	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)**
Dallas Boulevard													
North of Starry Street	1	11,100	8,700	800	580	2.00%	1.23%	0.72%	0.05%	0.12%	9.0%	74.3%	40
South of Starry Street	1	17,300	8,900	1,170	580	2.00%	1.23%	0.72%	0.05%	0.12%	9.0%	72.3%	40
Starry Street													
East of Dallas Boulevard	1	7,300	4,400	430	260	2.00%	1.23%	0.72%	0.05%	0.12%	9.0%	65.4%	30
West of Dallas Boulevard	1	1,800	5,400	90	260	2.00%	1.23%	0.72%	0.05%	0.12%	9.0%	53.1%	30

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.

Noise Analysis Traffic Data - SR 528 and Dallas Boulevard Interchange
2050 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 528													
West of Innovation Way (ramps to/from east)	6	110,800	89,000	6,150	4,620	3.00%	1.85%	1.08%	0.07%	0.18%	10.0%	52.0%	70
From Innovation Way to Dallas Boulevard	6	114,300	89,000	6,370	4,620	3.00%	1.85%	1.08%	0.07%	0.18%	10.0%	52.0%	70
From Dallas Boulevard to SR 520	6	108,500	89,000	5,630	4,620	3.00%	1.85%	1.08%	0.07%	0.18%	10.0%	52.0%	70
East of SR 520	6	99,900	89,000	5,290	4,620	3.00%	1.85%	1.08%	0.07%	0.18%	10.0%	52.0%	70
SR 528 Ramps													
SR 528 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)**
Innovation Way													
Eastbound on	1	1,750	10,800	220	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	11.1%	56.4%	45
Westbound off	1	1,750	10,800	220	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	11.1%	56.4%	45
Dallas Boulevard													
Eastbound off	1	5,500	9,100	820	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	11.0%	67.8%	45
Westbound on	1	5,500	9,100	900	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	11.0%	67.8%	45
Eastbound on	1	2,600	10,700	330	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	9.4%	67.3%	45
Westbound off	1	2,600	10,700	330	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	9.4%	67.3%	45
SR 520													
Eastbound off	1	7,050	11,700	820	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	9.5%	61.2%	45
Westbound on	1	7,050	11,700	520	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	9.5%	61.2%	45
Eastbound on	1	2,750	11,000	340	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	9.5%	65.4%	45
Westbound off	1	2,750	11,000	340	1,360	3.00%	1.85%	1.08%	0.07%	0.18%	9.5%	65.4%	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)**
Dallas Boulevard													
North of Starry Street	2	12,600	18,800	890	1,240	2.00%	1.23%	0.72%	0.05%	0.12%	9.0%	73.3%	40
South of Starry Street	2	19,300	28,000	1,300	1,810	2.00%	1.23%	0.72%	0.05%	0.12%	9.0%	71.9%	40
Starry Street													
East of Dallas Boulevard	1	7,900	5,600	470	330	2.00%	1.23%	0.72%	0.05%	0.12%	9.0%	66.0%	30
West of Dallas Boulevard	1	1,800	5,400	90	260	2.00%	1.23%	0.72%	0.05%	0.12%	9.0%	53.1%	30

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 C:

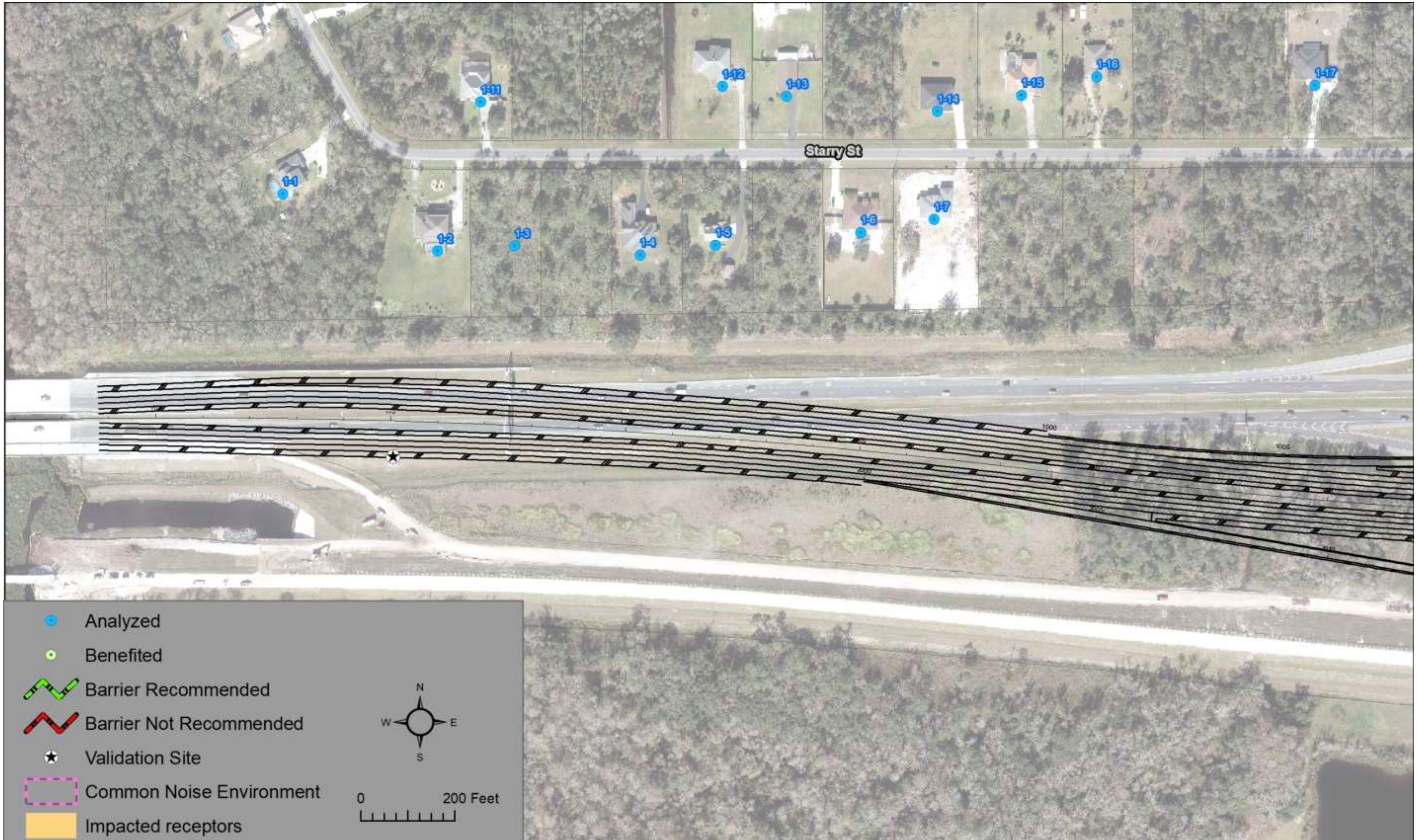
Noise Impact Comparison Matrix

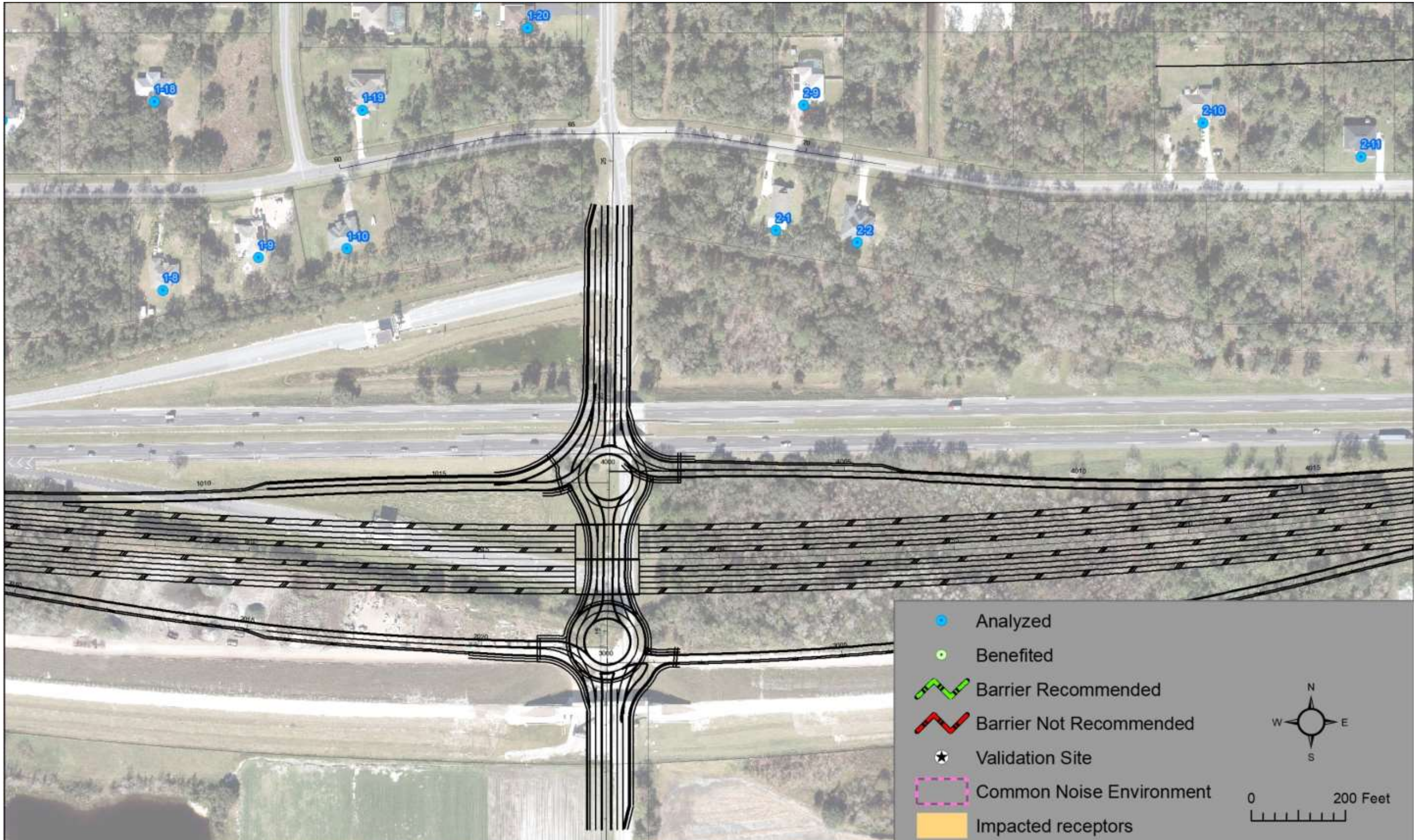
Noise Impact Comparison Matrix										
Noise Sensitive Sites			Predicted Noise Levels (dB(A)) *Red = Noise Level above NAC*							
Receptor ID	# Sites Represented	Impact Criterion (dB(A))	2022 Existing	2050 No-Build Alternative	2050 Build Alternative 1	Change From Existing	2050 Build Alternative 2	Change From Existing	*Consider Abatement*
NSA 1: North of SR 528 - East of Dallas Boulevard - Illustrated on Pages D-1 and D-2 - Appendix D									
1-1	1	66.0	58.9	60.5	62.0	3.1	63.8	4.9	-
1-2	1	66.0	60.5	62.1	65.3	4.8	***66.7***	6.2	***Yes***
1-3	1	66.0	60.2	61.8	65.0	4.8	***66.4***	6.2	***Yes***
1-4	1	66.0	61.1	62.7	65.5	4.4	***67.2***	6.1	***Yes***
1-5	1	66.0	60.7	62.4	64.7	4.0	65.9	5.2	-
1-6	1	66.0	60.7	62.4	63.7	3.0	65.6	4.9	-
1-7	1	66.0	60.3	62.2	63.0	2.7	65.2	4.9	-
1-8	1	66.0	64.5	***66.5***	64.4	-0.1	63.8	-0.7	-
1-9	1	66.0	62.7	64.8	63.5	0.8	62.9	0.2	-
1-10	1	66.0	62.5	64.6	63.5	1.0	62.9	0.4	-
1-11	1	66.0	56.1	58.1	59.8	3.7	61.3	5.2	-
1-12	1	66.0	55.8	57.9	59.4	3.6	61.9	6.1	-
1-13	1	66.0	56.1	58.2	59.6	3.5	61.7	5.6	-
1-14	1	66.0	57.0	59.3	60.1	3.1	62.2	5.2	-
1-15	1	66.0	56.9	59.1	59.8	2.9	61.9	5.0	-
1-16	1	66.0	56.7	58.7	59.3	2.6	61.8	5.1	-
1-17	1	66.0	57.4	59.7	59.5	2.1	61.0	3.6	-
1-18	1	66.0	56.7	58.9	59.4	2.7	60.5	3.8	-
1-19	1	66.0	57.5	59.8	59.8	2.3	61.0	3.5	-
1-20	1	66.0	57.3	59.7	60.9	3.6	61.5	4.2	-
NSA Summary	***20***		***59.0***	***61.0***	***61.9***	***2.9***	***63.3***	***4.3***	
NSA 2: North of SR 528 - West of Dallas Boulevard - Illustrated on Pages D-2 and D-3 - Appendix D									
2-1	1	66.0	60.3	62.4	63.3	3.0	62.9	2.6	-
2-2	1	66.0	60.3	62.4	63.6	3.3	62.8	2.5	-
2-3	1	66.0	60.6	62.6	65.3	4.7	***68.5***	7.9	***Yes***
2-4	1	66.0	61.9	63.9	***67.1***	5.2	***70.0***	8.1	***Yes***
2-5	1	66.0	61.0	63.0	***66.4***	5.4	***69.2***	8.2	***Yes***
2-6	1	66.0	61.1	63.1	***67.1***	6.0	***68.3***	7.2	***Yes***
2-7	1	66.0	61.5	63.6	***67.7***	6.2	***68.3***	6.8	***Yes***
2-8	2	66.0	60.2	62.4	65.9	5.7	***66.2***	6.0	***Yes***
2-9	1	66.0	58.7	61.3	61.4	2.7	62.0	3.3	-
2-10	1	66.0	56.2	58.6	61.1	4.9	61.9	5.7	-
2-11	1	66.0	58.0	61.1	62.9	4.9	63.4	5.4	-
2-12	1	66.0	57.7	60.6	63.4	5.7	63.6	5.9	-
2-13	1	66.0	54.6	57.1	60.0	5.4	61.5	6.9	-
2-14	1	66.0	56.3	58.9	60.9	4.6	62.9	6.6	-
2-15	1	66.0	56.0	58.5	60.7	4.7	62.6	6.6	-
2-16	1	66.0	56.9	59.7	61.9	5.0	63.4	6.5	-
2-17	1	66.0	57.0	59.5	61.8	4.8	63.5	6.5	-
2-18	1	66.0	57.1	59.7	62.1	5.0	63.5	6.4	-
2-19	1	66.0	56.8	59.4	61.7	4.9	62.5	5.7	-
2-20	1	66.0	57.4	60.3	61.9	4.5	62.3	4.9	-
NSA Summary	***21***		***58.5***	***60.9***	***63.3***	***4.8***	***64.5***	***6.0***	

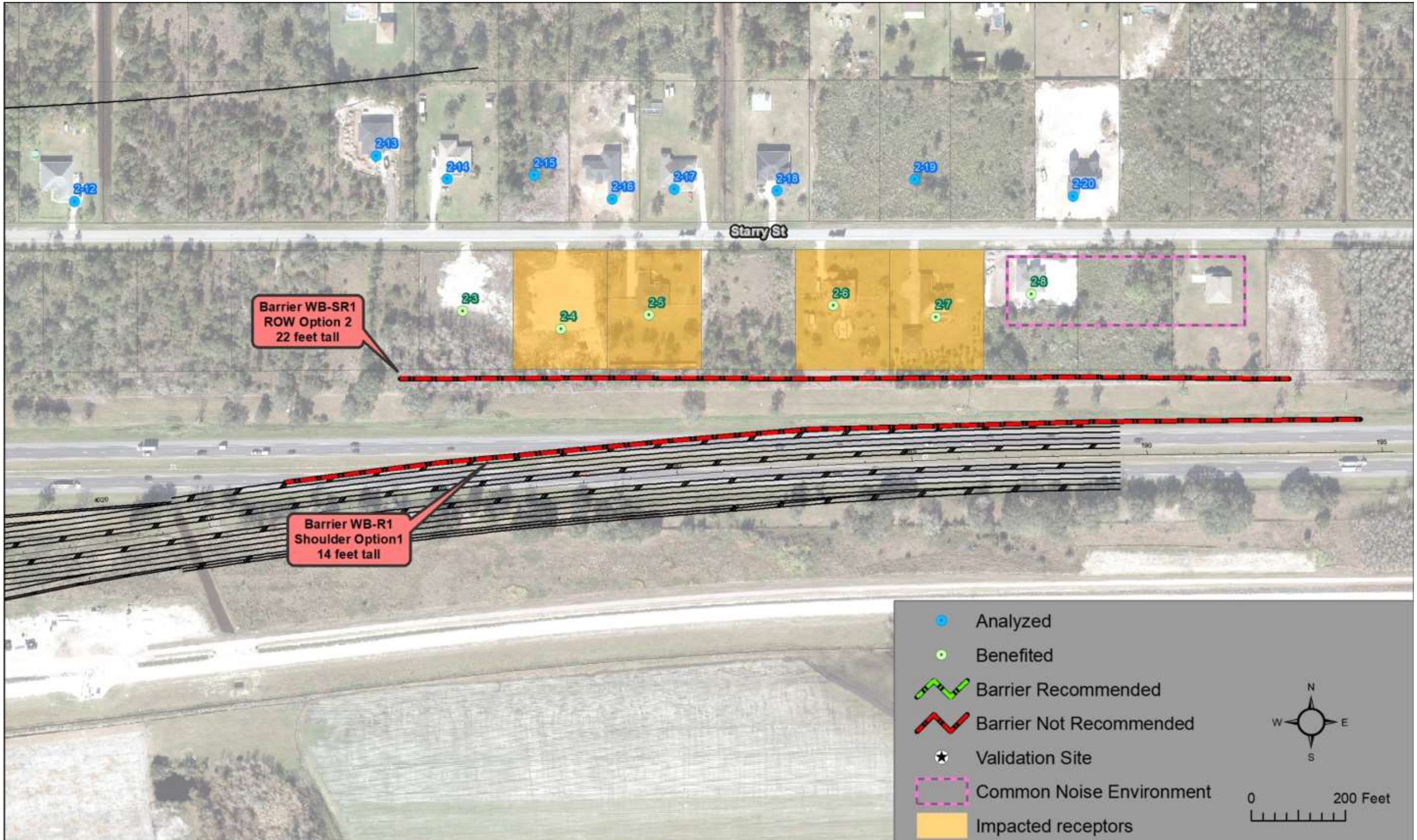
Appendix D:

Project Aerials
Barrier Analysis Locations

Alternative 1 - Roundabout Intersection


Starry St
1-1
1-2
1-3
1-4
1-5
1-6
1-7
1-11
1-12
1-13
1-14
1-15
1-16
1-17
Analyzed
Benefited
Barrier Recommended
Barrier Not Recommended
Validation Site
Common Noise Environment
Impacted receptors
N
W
E
S
0
200 Feet

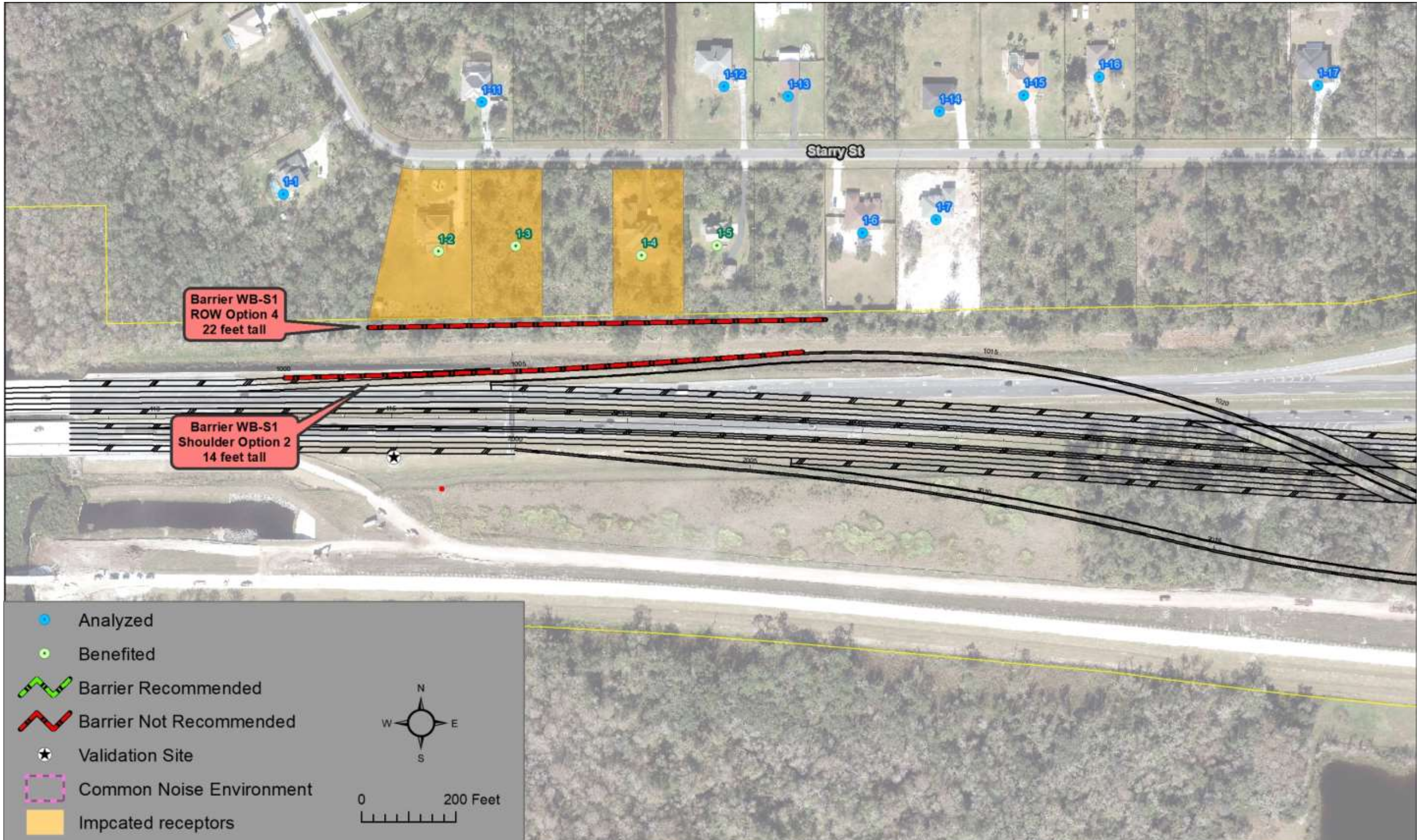

1-20
1-18
1-19
2-9
2-10
2-11
2-1
2-2
1-10
1-9
1-8
Analyzed
Benefited
Barrier Recommended
Barrier Not Recommended
Validation Site
Common Noise Environment
Impacted receptors
N
W
E
S
0
200 Feet


Starry St
2-12
2-13
2-14
2-15
2-16
2-17
2-18
2-19
2-20
2-3
2-4
2-5
2-6
2-7
2-8
Barrier WB-SR1
ROW Option 2
22 feet tall
Barrier WB-R1
Shoulder Option1
14 feet tall
Analyzed
Benefited
Barrier Recommended
Barrier Not Recommended
Validation Site
Common Noise Environment
Impacted receptors
N
W
E
S
0
200 Feet

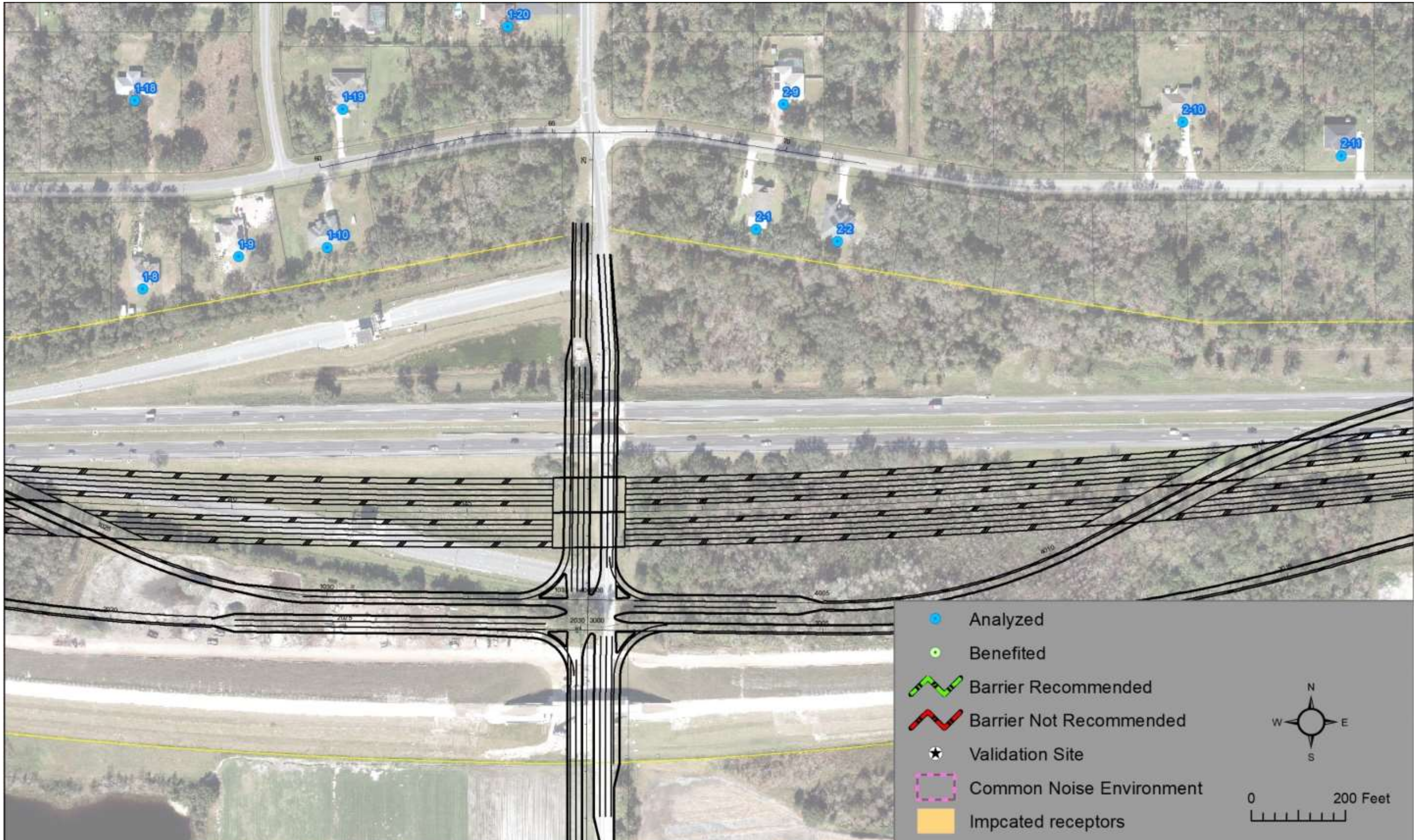
Appendix E:

Project Aerials
Barrier Analysis Locations

Alternative 2 - Signalized Intersection



1-1
1-2
1-3
1-4
1-5
1-6
1-7
1-11
1-12
1-13
1-14
1-15
1-16
1-17
Starry St
Barrier WB-S1
ROW Option 4
22 feet tall
Barrier WB-S1
Shoulder Option 2
14 feet tall
Analyzed
Benefited
Barrier Recommended
Barrier Not Recommended
Validation Site
Common Noise Environment
Impcated receptors
N
W
E
S
0
200 Feet


1-20
1-18
1-19
2-9
2-10
2-11
2-1
2-2
1-10
1-9
1-8
Analyzed
Benefited
Barrier Recommended
Barrier Not Recommended
Validation Site
Common Noise Environment
Impcated receptors
N
W
E
S
0
200 Feet

2-12
2-13
2-14
2-15
2-16
2-17
2-18
2-19
2-20
Starry St
2-3
2-4
2-5
2-6
2-7
2-8
Barrier WB-S2
ROW Option 4
18 feet tall
Barrier WB-S2
Shoulder Option1
14 feet tall
Analyzed
Benefited
Barrier Recommended
Barrier Not Recommended
Validation Site
Common Noise Environment
Impacted receptors
N
W
E
S
0
200 Feet