

Welaunee Boulevard Alternative Noise Study Technical Memorandum

Northeast Gateway: Welaunee Boulevard
Auxiliary Traffic Noise Analysis

October 2019

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1. Introduction

Blueprint Intergovernmental Agency is conducting a Project Development and Environment (PD&E) study for the Northeast Gateway, Phase 1, Welaunee Boulevard project from Fleischmann Road to Centerville Road at Shamrock Street, among other study routes. A simple overpass for Welaunee Boulevard over Interstate 10 (I-10) is being considered as part of the PD&E study; however, a future interchange is proposed by the Capital Region Transportation Planning Agency in its *Connections 2040 Regional Mobility Plan*¹.

Due to public comments from residents in the area, this planning level traffic noise study was initiated as an additional effort to the PD&E study. This technical memorandum provides a comparison of the magnitude of potential highway traffic noise impacts from potential Welaunee Boulevard interchange alternatives. It is not intended to analyze abatement for potentially impacted receptors.

Noise sensitive land uses are any properties where there is frequent human use that might be impacted by traffic noise levels that approach, meet, or exceed the Noise Abatement Criteria (NAC) as established by the Federal Highway Administration (FHWA) for various land use categories. Typical noise sensitive land uses include residences, schools, churches, commercial properties with outdoor areas of use, and recreational areas.

There were four interchange alternatives (diamond, split cloverleaf, folded diamond east and folded diamond west) along with a future no-build alternative which were analyzed and documented in this technical memorandum and are shown below in **Figures 1 through 4**. These four alternatives were chosen for analysis since they are the most common interchanges and one of these would likely be chosen if an interchange was to be constructed at Welaunee Boulevard and I-10.

Figure 1 - Diamond Interchange Concept

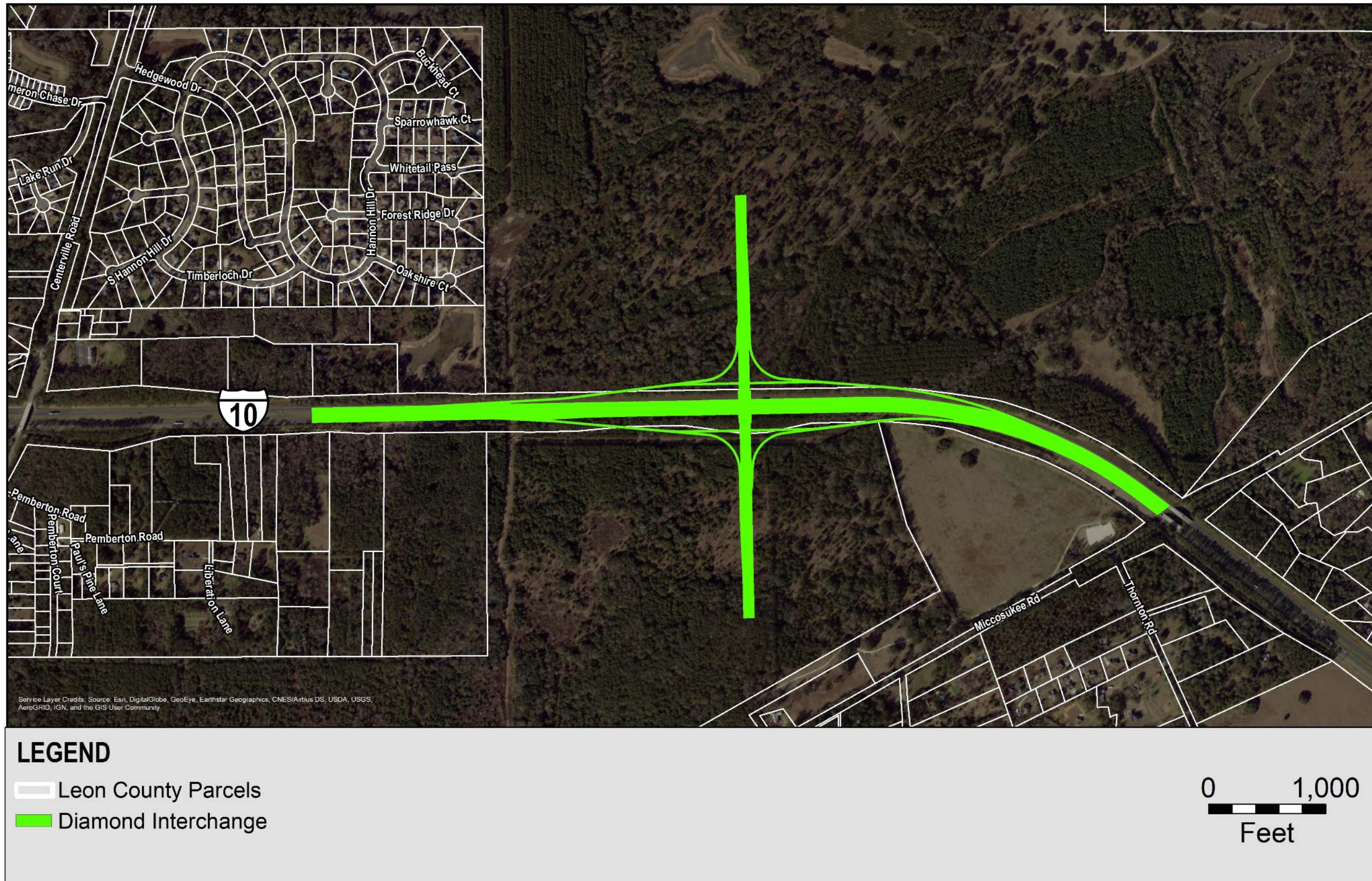


Figure 2 - Split Cloverleaf Interchange Concept

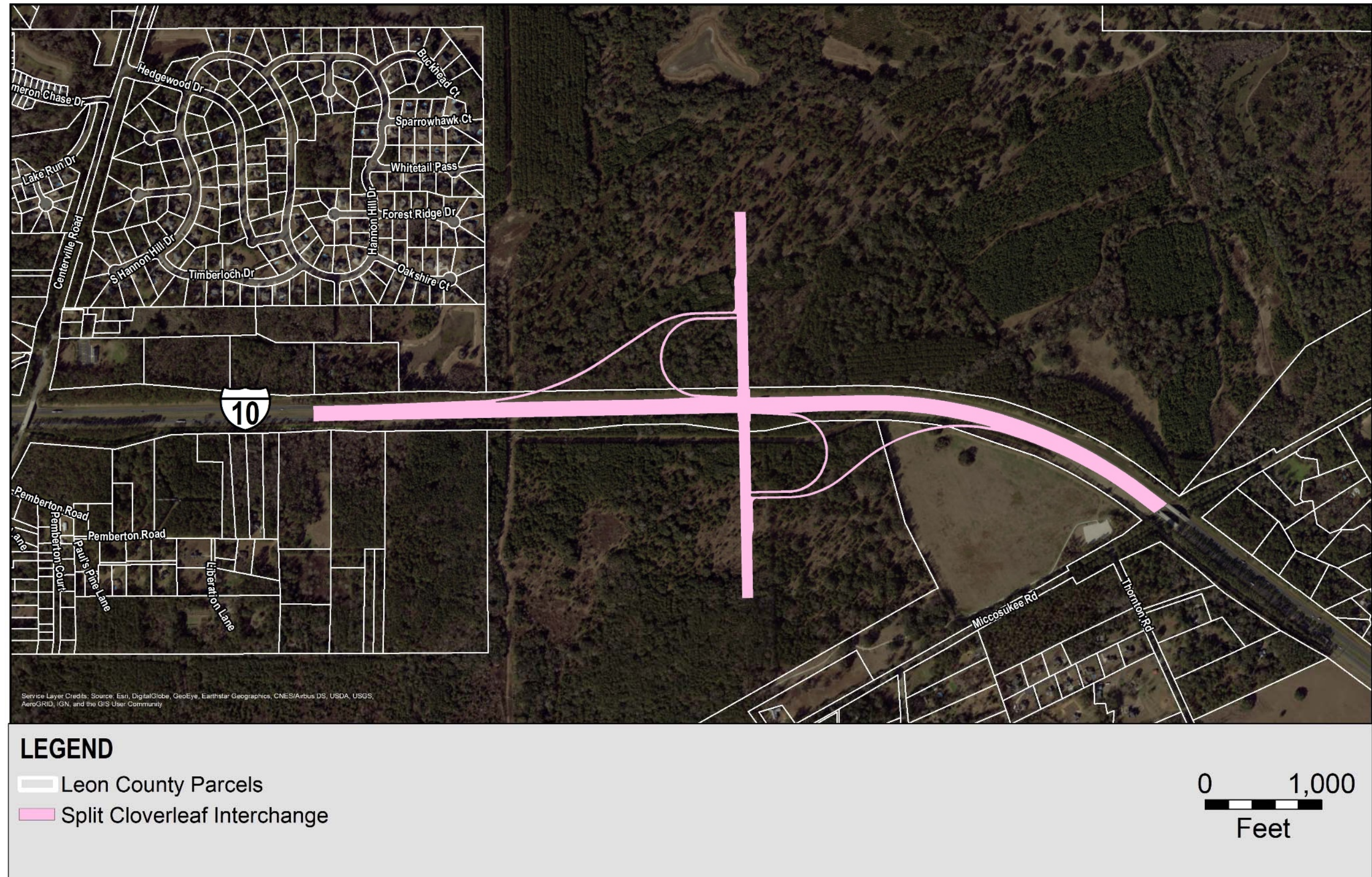


Figure 3 - Folded Diamond East Interchange Concept

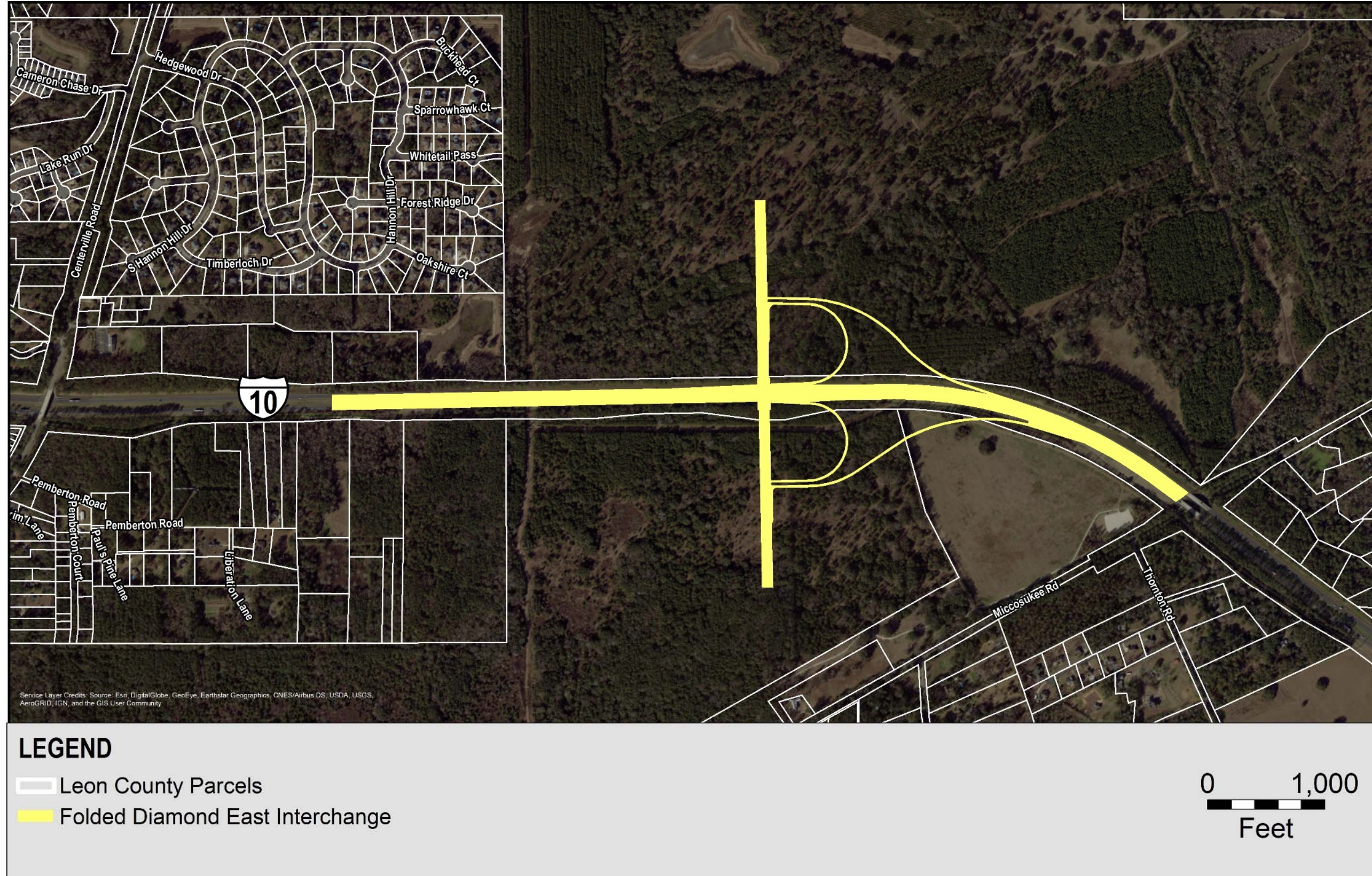
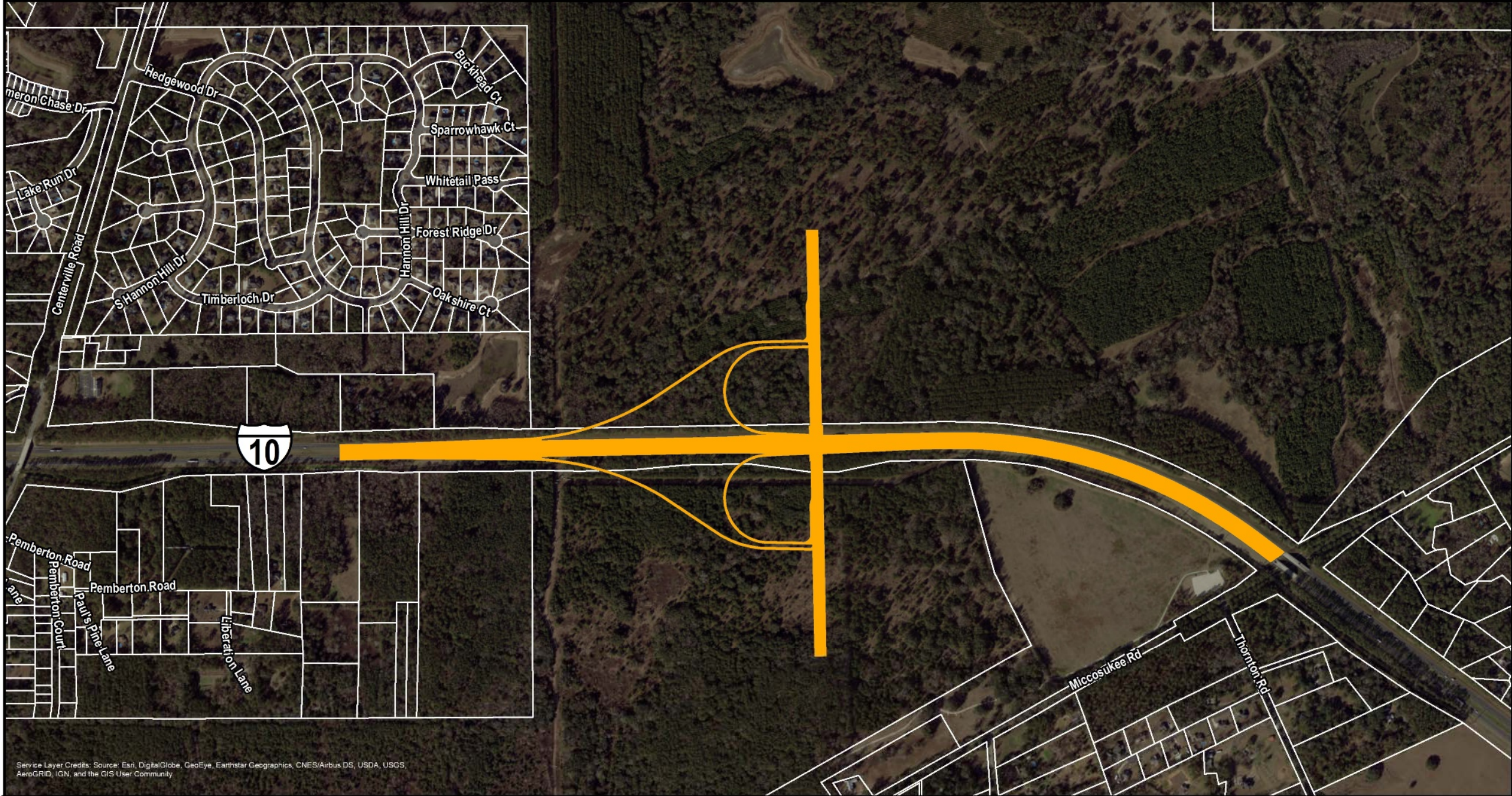
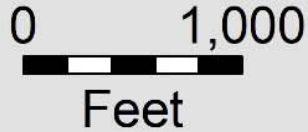


Figure 4 - Folded Diamond West Interchange Concept



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- Leon County Parcels
- Folded Diamond West Interchange



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2. Methodology

This technical memorandum was prepared using methodology established by the Florida Department of Transportation (FDOT) in the *Project Development and Environment (PD&E) Manual, Part 2, Chapter 18* (Effective January 14, 2019)². Build noise levels were predicted using the FHWA Traffic Noise Model (TNM), version 2.5. All measured and predicted noise levels are expressed in decibels (dB) using the A weighting scale (dBA). Examples of common noise levels are listed in **Table 1**. This scale most closely approximates the response characteristics of the human ear to traffic noise. All noise levels are reported as hourly equivalent noise levels Leq (h), which can be compared directly to criteria levels established by FHWA. 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 for the same hourly period.

Table 1 - Typical Noise Levels

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

Source: California Department of Transportation Technical Noise Supplement, October 1998, Page 18.

3. Traffic Data

As part of the traffic noise analysis process, project-specific traffic data was entered in the TNM models to predict future noise levels. This section of the report provides the specific traffic information that was utilized during the analysis.

Traffic noise is heavily dependent on traffic speed, with the amount of noise generated by traffic increasing as the vehicle speed increases. To simulate “worst-case” conditions, Level of Service (LOS) C peak hour directional traffic volumes were modelled for this noise analysis. Traffic data, LOS C traffic volumes, and speed limits used in the analysis are shown in **Tables 2 through 4.**

Table 2 - Traffic Data Percentages by Roadway

Roadway	Medium Trucks	Heavy Trucks	Buses	Motorcycles
Centerville Road	2.53%	0.67%	0.56%	0.14%
Welaunee Boulevard	3.02%	0.28%	0.48%	0.23%
I-10	3.00%	9.60%	0.19%	0.15%
I-10/Welaunee Boulevard Ramps	3.00%	9.60%	0.19%	0.15%

Table 3 - LOS C Peak Hour Directional Traffic Volume by Roadway

Roadway	LOS C Traffic
Centerville Road	1,510
Welaunee Boulevard	3,420
I-10	5,540
I-10/Welaunee Boulevard Ramps	554

Table 4 - Speed Limit by Roadway

Roadway	Speed Limit (mph)
Centerville Road	45
Welaunee Boulevard	50
I-10	70
I-10/Welaunee Boulevard Interchange Ramps	50

4. Traffic Noise Analysis

Noise sensitive sites can be any property where frequent human use occurs. Thirty-six (36) noise sensitive sites were identified for further analysis as part of this study, all of which are residences, and are shown in **Figure 5**.

The FHWA has established noise levels at which noise abatement must be considered for various categories of noise sensitive sites. These noise levels are referred to as the Noise Abatement Criteria (NAC). As shown in **Table 5**, the NAC varies according to the activity category.

Table 5 - FHWA Noise Abatement Criteria

Activity Category	Leq (h)	Description of Land Use Activity Category
A	57 (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	67 (Exterior)	Residential
C	67 (Exterior)	Active sports areas, amphitheatres, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52 (Interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, schools, and television studios.
E	72 (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.

Source: 23 CFR Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise, FHWA, 2011.

Noise abatement measures are considered when predicted traffic noise levels for Design Year build alternatives (year 2049 for this project) approach or exceed the NAC. FDOT defines “approach” as within 1 dBA of the FHWA criteria.

Another criterion that triggers the consideration of noise abatement measures is if a substantial increase is predicted for a noise sensitive site. The FDOT defines a “substantial increase” as an increase of 15 or more dBA above the existing noise level as a direct result of the transportation improvement project in question. While noise abatement will not be considered in this planning level analysis, the NAC thresholds will be used for comparison of the results.

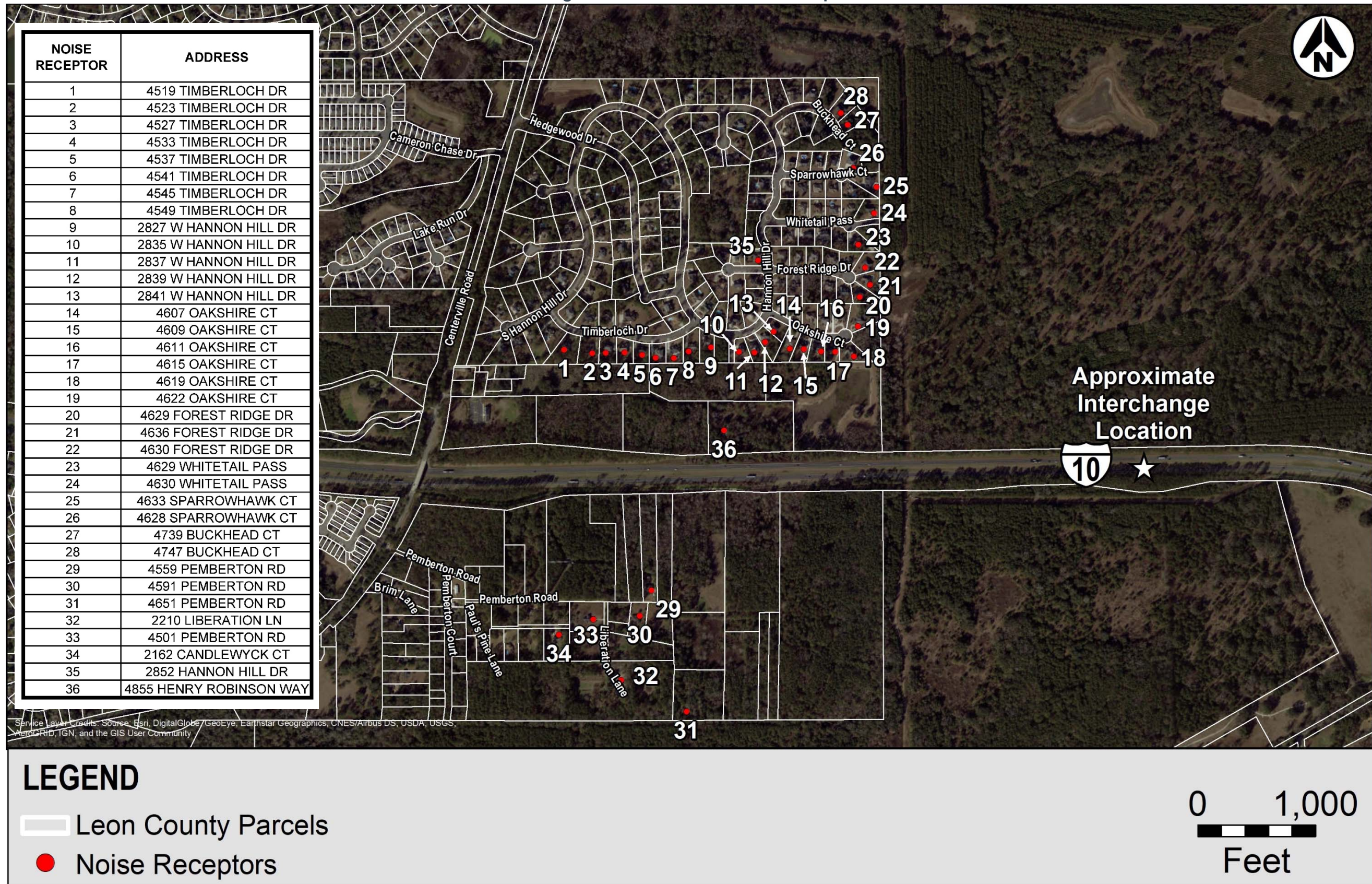
Receptor points representing the noise sensitive sites were developed in accordance with the FDOT *PD&E Manual* as follows:

- Residential receiver sites were placed at the edges of buildings closest to the major traffic noise source.
- Ground floor receiver sites were assumed to be five (5) feet above the ground elevation.

Elevations of the variables (roadways, receptors, etc.) were extracted from Google Earth and cross referenced with the City of Tallahassee’s LIDAR map for accuracy.

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Figure 5 - Noise Sensitive Sites Map



5. Measured Noise Levels

Noise monitoring was performed on August 3, 2019 to establish existing noise levels. The noise monitoring followed procedures documented in FHWA's *Measurement of Highway-Related Noise* (May 1996)³. Noise measurements were obtained using a Larson Davis 820SLM noise monitor. The monitor was calibrated at 114.0 dB and was checked prior to each monitoring trial by a Larson Davis CAL200 calibrator. All monitoring events were ten (10) minutes in duration consistent with the FDOT *PD&E Manual*.

Site selection for the noise monitoring was dependent on the location of noise sensitive sites. Ambient noise levels for the project area were established by monitoring at eight sites. The major source of ambient noise in the project area is residential noise such as landscaping maintenance activities. The measurements from the Ambient Noise Monitoring are shown in **Table 6** and the site locations are shown on **Figure 6**. The three (3) field measured levels for each monitoring site were averaged to obtain existing noise levels for the noise sensitive sites.

Table 6 - Ambient Noise Monitoring

Location	Trial #	Date / Time	Field Measured Level (dBA)	Average Measured Noise Level (dBA)
Monitoring Site # 1 (Near 2835 W Hannon Hill Dr)	1	8/3/2019	8:05 AM	53.2
	2		8:15 AM	
	3		8:25 AM	
Monitoring Site # 2 (Near 4619 Oakshire Ct)	1	8/3/2019	8:32 AM	51.0
	2		8:42 AM	
	3		8:52 AM	
Monitoring Site # 3 (Near 4629 Whitetail Pass)	1	8/3/2019	10:31 AM	48.6
	2		10:41 AM	
	3		10:51 AM	
Monitoring Site # 4 (Near 4565 Forest Ridge Dr)	1	8/3/2019	10:31 AM	51.8
	2		10:41 AM	
	3		10:51 AM	
Monitoring Site # 5 (Near 4541 Timberloch Dr)	1	8/3/2019	10:31 AM	52.3
	2		10:41 AM	
	3		10:51 AM	
Monitoring Site # 6 (Near 4855 Henry Robinson Way)	1	8/3/2019	10:31 AM	56.1
	2		10:41 AM	
	3		10:51 AM	
Monitoring Site # 7 (Near 4123 Pemberton Rd)	1	8/3/2019	10:31 AM	50.6
	2		10:41 AM	
	3		10:51 AM	
Monitoring Site # 8 (Near 4300 Pemberton Rd)	1	8/3/2019	11:25 AM	48.4
	2		11:35 AM	
	3		11:45 AM	

Figure 6 - Noise Monitoring Sites Map



6. Predicted Noise Levels

Predicted noise levels for the modeled noise sensitive sites are provided in **Table 7**. The locations of the receptors are depicted on the aerials found earlier in this memorandum in **Figure 5**. There was a total of 36 noise receptors analyzed representing 36 noise sensitive sites. All these sites are single residences and would be classified as Activity Category B (Residential) under the FHWA NAC.

Existing noise levels were determined by averaging the ambient noise and the average of these was assigned to each noise sensitive site based on location. The build model with the various interchange configurations and the future no-build alternative were predicted levels based on FHWA's TNM version 2.5. The no-build alternative serves as a future year baseline for comparison of the interchange alternatives.

It should be noted that the TNM is only able to predict noise levels from vehicular traffic and cannot predict noise generated from development which may occur in the vicinity of the interchange. The designated Future Land Use in the vicinity of the interchange is Planned Development, which typically indicates a mixture of residential and non-residential uses. Any future development in the area of the interchange will have to comply with the approved sound limits as outlined in the City of Tallahassee's Sound Ordinance (Section 12-94) for residential and non-residential properties.

Table 7 - Predicted Noise Levels

Receptor Identification	Existing Noise (dBA)	Future No-Build Alternative (dBA)	Future No-Build Alternative increase over Existing	Diamond Interchange (dBA)	Diamond Interchange increase over Existing	Split Cloverleaf Interchange (dBA)	Split Cloverleaf Interchange increase over Existing	Folded Diamond East Interchange (dBA)	Folded Diamond East Interchange increase over Existing	Folded Diamond West Interchange (dBA)	Folded Diamond West Interchange increase over Existing
1	53.2	59.8	6.6	59.8	6.6	59.8	6.6	59.8	6.6	59.8	6.6
2	53.2	60.0	6.8	60.1	6.9	60.1	6.9	60.1	6.9	60.1	6.9
3	53.2	60.1	6.9	60.2	7.0	60.2	7.0	60.1	6.9	60.2	7.0
4	53.2	60.1	6.9	60.2	7.0	60.2	7.0	60.1	6.9	60.2	7.0
5	53.2	60.3	7.1	60.3	7.1	60.4	7.2	60.3	7.1	60.3	7.1
6	53.2	60.5	7.3	60.5	7.3	60.6	7.4	60.5	7.3	60.6	7.4
7	53.2	60.6	7.4	60.6	7.4	60.7	7.5	60.6	7.4	60.7	7.5
8	53.2	60.2	7.0	60.3	7.1	60.3	7.1	60.2	7.0	60.3	7.1
9	53.2	60.0	6.8	60.1	6.9	60.2	7.0	60.0	6.8	60.2	7.0
10	53.2	60.3	7.1	60.4	7.2	60.5	7.3	60.4	7.2	60.5	7.3
11	53.2	60.4	7.2	60.5	7.3	60.6	7.4	60.4	7.2	60.6	7.4
12	53.2	59.2	6.0	59.4	6.2	59.3	6.1	59.2	6.0	59.3	6.1
13	53.2	58.4	5.2	58.5	5.3	58.5	5.3	58.4	5.2	58.5	5.3
14	53.2	59.6	6.4	59.8	6.6	59.8	6.6	59.6	6.4	59.8	6.6
15	53.2	59.6	6.4	59.8	6.6	59.8	6.6	59.6	6.4	59.8	6.6
16	53.2	59.8	6.6	60.0	6.8	59.9	6.7	59.8	6.6	59.9	6.7
17	53.2	60.5	7.3	60.8	7.6	60.7	7.5	60.6	7.4	60.7	7.5
18	53.2	60.1	6.9	60.4	7.2	60.3	7.1	60.1	6.9	60.3	7.1
19	51.0	58.8	7.8	59.1	8.1	59.2	8.2	58.8	7.8	59.2	8.2
20	51.0	57.5	6.5	57.8	6.8	57.9	6.9	57.6	6.6	57.9	6.9
21	51.0	56.2	5.2	56.7	5.7	56.6	5.6	56.2	5.2	56.6	5.6
22	51.0	54.9	3.9	55.0	4.0	55.1	4.1	54.9	3.9	55.1	4.1
23	51.0	54.0	3.0	54.3	3.3	54.2	3.2	54.1	3.1	54.2	3.2
24	48.6	53.2	4.6	53.9	5.3	53.8	5.2	53.8	5.2	53.8	5.2
25	48.6	52.5	3.9	53.0	4.4	53.1	4.5	52.7	4.1	53.1	4.5
26	48.6	52.1	3.5	52.7	4.1	52.5	3.9	52.4	3.8	52.5	3.9
27	48.6	51.2	2.6	51.7	3.1	51.5	2.9	51.4	2.8	51.5	2.9
28	48.6	50.9	2.3	51.4	2.8	51.3	2.7	51.2	2.6	51.3	2.7
29	48.4	60.5	12.1	60.6	12.2	60.6	12.2	60.6	12.2	60.6	12.2
30	48.4	58.8	10.4	58.9	10.5	58.9	10.5	58.9	10.5	58.9	10.5
31	48.4	54.1	5.7	54.2	5.8	54.1	5.7	54.1	5.7	54.2	5.8
32	48.4	55.3	6.9	55.4	7.0	55.3	6.9	55.3	6.9	55.4	7.0
33	48.4	58.7	10.3	58.7	10.3	58.7	10.3	58.7	10.3	58.7	10.3
34	48.4	57.5	9.1	57.5	9.1	57.5	9.1	57.5	9.1	57.5	9.1
35	51.8	54.7	2.9	55.0	3.2	55.1	3.3	54.9	3.1	55.1	3.3

Receptor Identification	Existing Noise (dBA)	Future No-Build Alternative (dBA)	Future No-Build Alternative increase over Existing	Diamond Interchange (dBA)	Diamond Interchange increase over Existing	Split Cloverleaf Interchange (dBA)	Split Cloverleaf Interchange increase over Existing	Folded Diamond East Interchange (dBA)	Folded Diamond East Interchange increase over Existing	Folded Diamond West Interchange (dBA)	Folded Diamond West Interchange increase over Existing
36	56.1	69.2	13.1	69.2	13.1	69.2	13.1	69.2	13.1	69.2	13.1
Average Noise Increase (dBA)		-	6.6	-	6.7	-	6.7	-	6.6	-	6.7

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7. Conclusions

One receptor, Receptor ID 36 (4855 Henry Robinson Way), is predicted to experience traffic noise above the NAC level for Activity Category B sites (residences). No other noise sensitive sites are predicted to experience noise levels above the NAC Activity Category B threshold (66 decibels) or experience a substantial increase in traffic noise levels (15 or more decibels above the existing noise levels).

The average noise increase for all interchanges over the existing noise levels was very close for all interchanges ranging from 6.6 to 6.7 decibels. Also, of note is comparing the future no-build alternative with the interchange alternatives. All the build interchange noise levels for all receptors are within a decibel of the no-build alternative. This shows that regardless of the interchange configurations analyzed, the interchange traffic is anticipated to have little to no effect on noise levels at the receptor locations as the primary noise generator appears to be through-traffic on I-10.

Although not included in the scope of this planning study, one receptor (Receptor ID 36) would be eligible for feasibility and reasonability analysis of a noise barrier (noise wall). As stated below if the Welaunee Boulevard interchange were to be advanced, a future Noise Study Report (NSR) will be completed and noise abatement measures will be fully considered at that time, as appropriate.

8. Public Coordination

A noise analysis handout was mailed on July 30, 2019 to inform project area residents of the upcoming noise monitoring and study. A public workshop will be held at a later date and the summary of that meeting will be included in the final version of this technical memorandum.

9. Into the Future

This is not the final analysis that will be conducted regarding traffic noise for a potential Welaunee Boulevard interchange. Prior to the Welaunee Boulevard interchange being advanced, an Interchange Access Request will have to be prepared to demonstrate an interchange is needed and is viable based on traffic, engineering, and other criteria.

An Interchange Justification Report will need to be prepared for approval by FHWA and a PD&E study will be initiated (most likely by FDOT) to analyze the location and potential impacts from the interchange. As part of that PD&E study, an official NSR will be completed to document potential impacted noise receptors.

10. References

1. Connections 2040 Regional Mobility Plan, Capital Region Transportation Planning Agency; Tallahassee, Florida; February 2016, amended June 17, 2019.
2. Project Development and Environment (PD&E) Manual, Part 2, Chapter 18, Florida Department of Transportation; Tallahassee, Florida; Effective January 14, 2019.
3. Measurement of Highway-Related Noise; Federal Highway Administration; Springfield, Virginia; May 1996.

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