NOISE STUDY TECHNICAL MEMORANDUM

Florida Department of Transportation

District 5

I-95 at Pioneer Trail Interchange

Project Development and Environment (PD&E) Study

West of Williamson Boulevard to East of Turnbull Bay Road

Volusia County, Florida

Financial Management Number: 436292-1-22-01

EDTM Number: 14193

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

The Florida Department of Transportation is conducting a PD&E Study to evaluate the proposed construction of a new interchange along I-95 at Pioneer Trail near milepost (MP) 19.032 in Volusia County. The proposed interchange is located between two existing interchanges along I-95 at State Road (SR) 44 located near MP 16.287, approximately 2.74 miles to the south and SR 421 (Dunlawton Avenue) located near MP 23.300, approximately 4.26 miles to the north.

The proposed project includes the construction of a new interchange at the existing Pioneer Trail overpass. Facility improvements will include the widening of the Pioneer Trail overpass through reconstruction, construction of entry and exit ramps, construction of stormwater management facilities, and improvements to Pioneer Trail to the east and west of the interchange. Minor improvements to I-95 may be required for entry and exit ramp lanes. This action will require the acquisition of additional right-of-way (ROW) for the construction of the ramps and stormwater management facilities.

This technical memorandum has been prepared to document an analysis of the potential noise impacts associated with the project. The Federal Highway Administration (FHWA) has established Noise Abatement Criteria (NAC) for seven land use categories. If predicted noise levels approach or exceed the NAC levels, or a substantial noise increase is predicted, noise abatement must be considered. A substantial noise increase occurs when the existing noise level is predicted to be exceeded by 15 dB(A) or more by the project. FDOT defines 'approach' as within 1.0 dB(A) of the FHWA criteria.

Noise sensitive receptor sites include areas where frequent exterior human use occurs and where a reduced noise level would be beneficial. Included are lands which require quiet (Activity Category A), residential areas (Activity Category B), a variety of non-residential land uses such as parks, schools, places of worship, and medical facilities (Activity Category C), and commercial properties with areas of exterior use such as restaurants, hotels, and other places of business (Activity Category E). Activity Category D includes noise sensitive sites that have interior uses but no exterior activities such as hospitals, libraries, recording studios, television studios, and public meeting rooms. Activity Categories F (industrial and retail facilities) and G (undeveloped lands) have no exterior uses and are not considered noise sensitive and thus do not have any noise abatement criteria.

Because the project study area only contains land uses in Categories F and G, there are no noise sensitive areas with any noise abatement criteria within the project study area (i.e. no noise receptors or land uses that would be considered noise sensitive areas). Therefore, Traffic Noise Modeling (TNM) to predict impacts to noise receptors was not conducted for this study. However, the TNM program was used to develop noise contours for the land use planning of local governments for future use based on the procedures and policy established in Part 2, Chapter 18 "Noise", of the FDOT PD&E Manual (revised June 2017) and on the regulatory material found in 23 Code of Federal Regulations (CFR), Part 772, and entitled "Procedures for Abatement of Highway Traffic Noise and Construction Noise", which are available from the FHWA and FDOT.

The Federal Highway Administration's (FHWA) TNM Version 2.5 computer program was used to determine noise contours for the study area. This model is the latest version of TNM and was used as required by 23 CFR 772. The model estimates the acoustic intensity at noise receptor sites based upon the roadway design and is influenced by vehicle speed and type.

Field measurements of existing traffic noise levels were collected on September 18, 2018 for this study. The primary purpose of this is to ensure that traffic noise is the main source of noise, and to validate the TNM input values and verify that the model accurately predicts the existing traffic noise based upon the current conditions. In order to collect data required, field monitoring was conducted by four noise monitoring

specialists in accordance with the FHWA's guidance document "Measurement of Highway-Related Noise". Larson Davis SoundTrack LxT Noise Logging Dosimeters were used to collect sound levels at the location. Sound measurements were collected in decibels (dB), which is a unit of measure used to determine sound intensities. The decibel levels were measured on an A-weighted scale (dB(A)), which is the frequency of sound that is heard by a human ear. The average sound level over a one-hour period is considered the Level Equivalent Hourly (Leq(h)) and is used in the noise modeling process. The dosimeter was calibrated on site just prior to the onset of sampling to ensure accuracy and mounted on a tripod at a height of approximately 5 feet which is standard and equivalent to the average height of the human ear. Noise readings were taken 3 separate times at 15-minute intervals during both the morning (9:00 – 11:30 AM) and afternoon (1:00 – 4:00 PM), periods of non-peak traffic activity along the project corridor.

Information that was loaded into the noise model to predict existing and projected noise levels includes: roadway geometry; vehicle types, volumes, and speeds; existing barrier and buffer information, propagation path; and, climatic conditions. In order to gauge traffic volumes during the monitoring periods, traffic counts of the number and type of vehicles traveling in each direction at the monitoring station were recorded. Traffic counts were taken simultaneously during each of the 3 noise recording events. Vehicles were categorized as either 1) passenger cars or light trucks, 2) medium trucks (box or panel trucks with one double-axle) or 3) heavy trucks (two or more double-axles) and motorcycles. Field notes were collected to record general weather and environmental conditions, and all unusual or otherwise noteworthy sound events. Traffic speeds for passing vehicles were determined by the use of a radar gun and recording the resulting speeds during timed monitoring runs. The speeds used in the TNM modeling program for the model validation were based on the average observed speeds of 70 mph for both cars and trucks during the data collection. The TNM model predictions were within 3 decibels (dB(A)) of the field recorded noise levels, therefore the model was validated.

Table 1: Validation of TNM Noise Model

Field Recording Station	Run info	Field Recorded	TNM Predicted	Δ	FHWA/FDOT Limit	Validate
Location 1	AM Run 1	78.8	79.7	0.9	3	YES
	PM Run 1	80.1	80.2	0.1	3	YES

The TNM model was then configured to match the proposed interchange alternatives and run to predict the noise contours adjacent to the roadway. Alternative 1 (the Diamond Interchange) and Alternative 3 (Partial Cloverleaf) were each modeled. Traffic data was utilized from the Project Traffic Analysis Report prepared as a part of this study. The data used was the 2045 Peak Volumes for the proposed alternatives and included traffic on the mainline of I-95, the on and off ramps proposed, and the traffic on Pioneer Trail. The results of these two models were used to plot the predicted contour lines for the 66 dB(A) contour and the 71 dB(A) contour, which represent the Noise Abatement Criteria for Activity Categories B/C (residential/recreation) and E (Hotels, motels, offices, restaurants, etc.) respectively. These represent the activity categories that are most likely to be utilized in future land development in this type of project area. The table below shows the range of the contour lines as they are depicted on the maps (contour lines represented location from the nearest edge of travel lane).

Table 2 - Contour Lines

Alternative	Location Adjacent to I-95	Contour Line (dB)	Contour Distance from Edge of Nearest Travel Lane (feet)
Alternative 1 - Diamond	WB	66	246 – 388
	EB	66	265 – 348
	WB	71	112 – 158
	EB	71	146 – 168
Alternative 3 – Partial Cloverleaf	WB	66	231 – 307
	EB	66	253 – 274
	WB	71	137 – 158
	EB	71	138 – 168

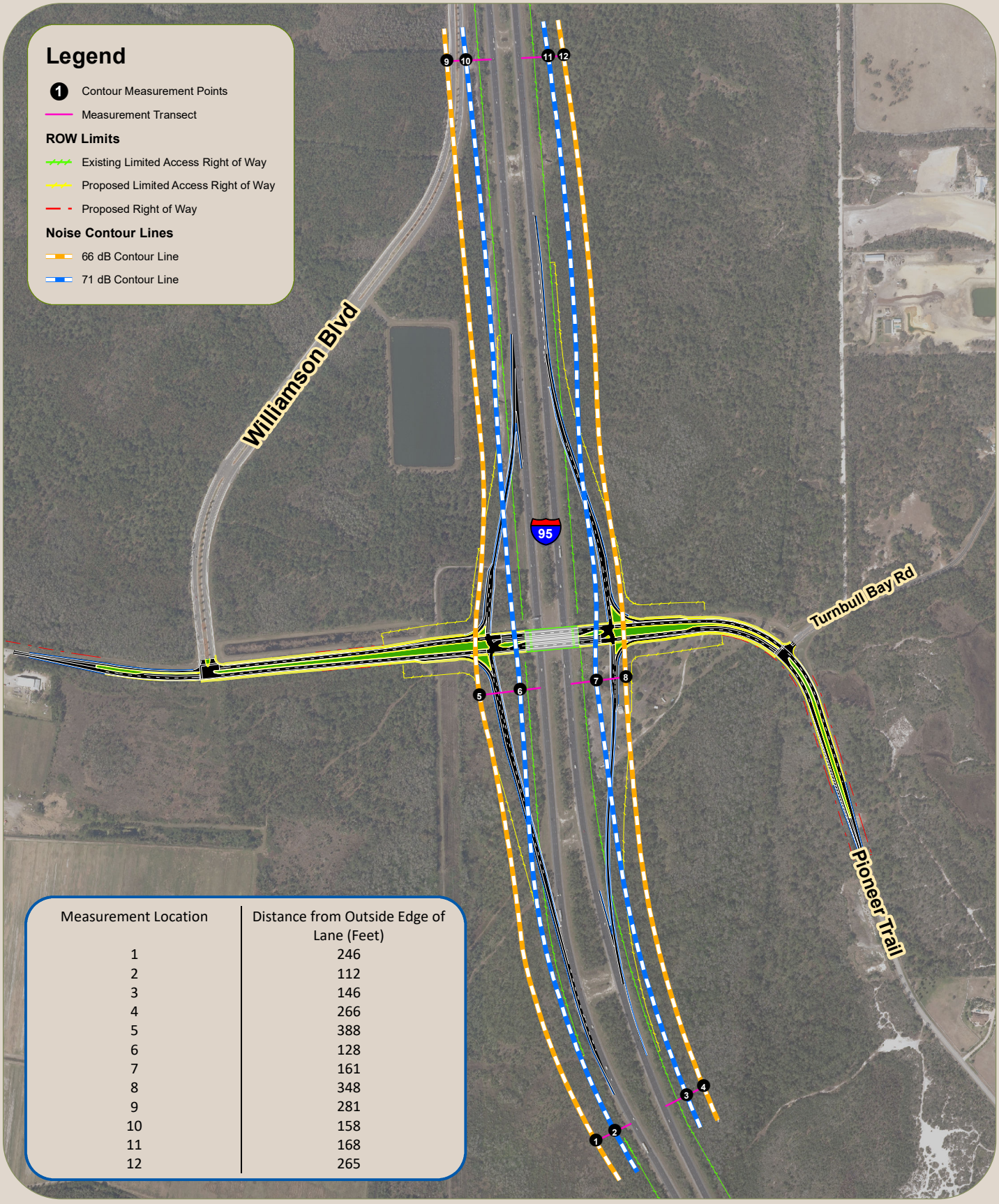
Conclusion

There are no noise sensitive areas within the project study area. The 66 dB(A) and 71 dB(A) contour lines are depicted on the Noise Analysis Maps for each alternative for the purposes of planning. For Alternative 1 (Diamond) the 66 dB(A) line ranges from 246 feet to 388 feet from the edge of pavement on the westbound side, and from 265 feet to 348 feet on the eastbound side. The 71 dB(A) line ranges from 112 feet to 158 feet from the edge of pavement on the westbound side, and from 146 feet to 168 feet on the eastbound side. For Alternative 3 (Partial Cloverleaf), the 66 dB(A) line ranges from 231 feet to 307 feet from the edge of pavement on the westbound side, and from 253 feet to 274 feet on the eastbound side. The 71 dB(A) line ranges from 137 feet to 158 feet from the edge of pavement on the westbound side, and from 138 feet to 168 feet on the eastbound side. Since there are no noise sensitive areas or noise receptors within the project study area, noise impacts were not analyzed, and no noise abatement measures were considered.

I-95 at Pioneer Trail Interchange PD&E Study

West of Williamson Boulevard to East of Turnbull Bay Road

FPID No. 436292-1-22-01 | ETDM No. 14193



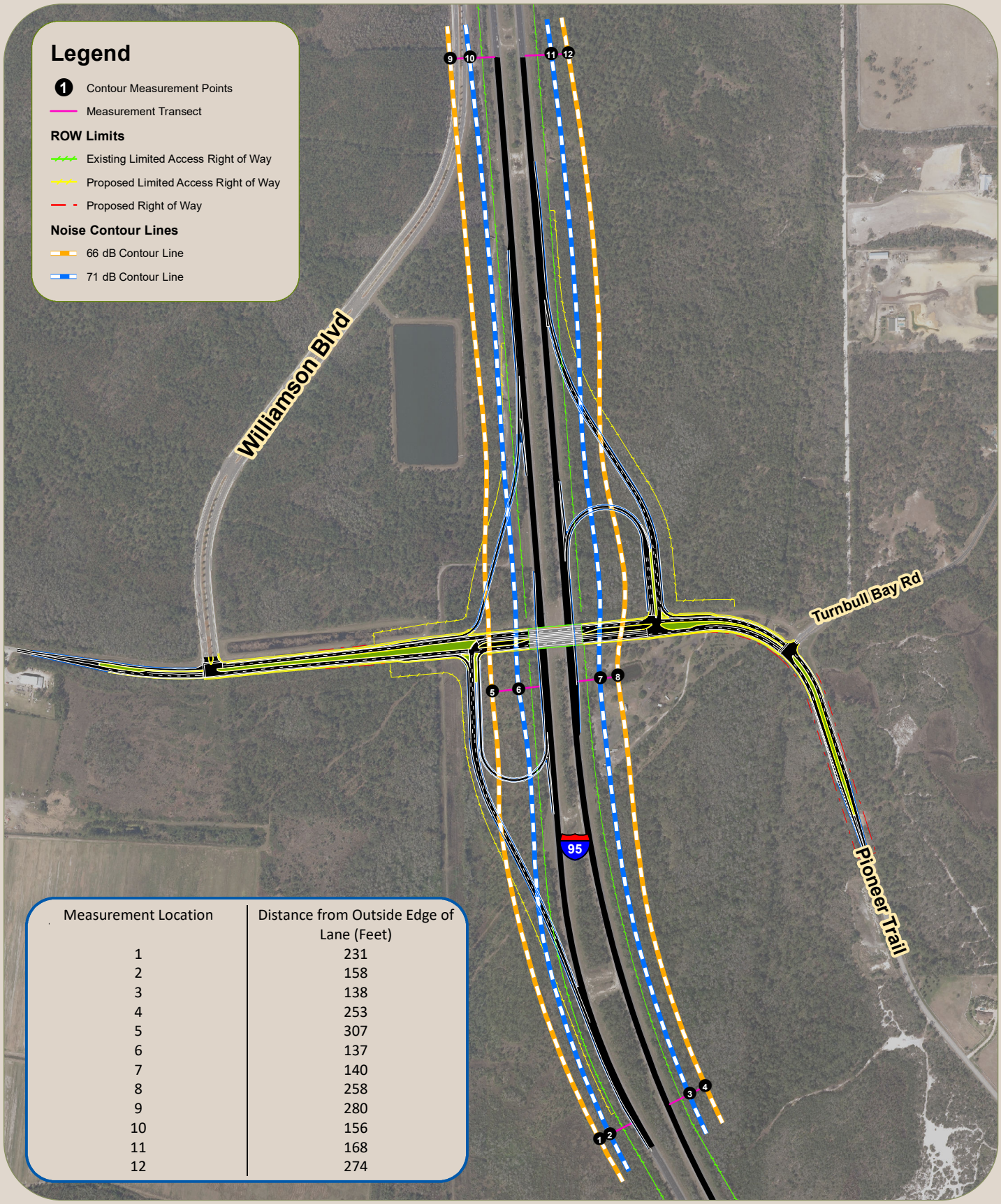
Measurement Location	Distance from Outside Edge of Lane (Feet)
1	246
2	112
3	146
4	266
5	388
6	128
7	161
8	348
9	281
10	158
11	168
12	265

ALTERNATIVE 1 (TIGHTDIAMOND)
NOISE CONTOUR LINES

I-95 at Pioneer Trail Interchange PD&E Study

West of Williamson Boulevard to East of Turnbull Bay Road

FPID No. 436292-1-22-01 | ETDM No. 14193



Measurement Location	Distance from Outside Edge of Lane (Feet)
1	231
2	158
3	138
4	253
5	307
6	137
7	140
8	258
9	280
10	156
11	168
12	274

ALTERNATIVE3 (PARTIAL CLOVERLEAF - 2 LOOP)
NOISE CONTOUR LINES

436292-1-22-01 | January 2020

Noise Study Technical Memorandum

FIGURE 2

TRAFFIC DATA FOR NOISE STUDIES

Federal Aid Number(s):	
FPID Number(s):	FPID: 436292-1
State/Federal Route No.:	SR 9
Road Name:	I-95
Project Description:	Interchange with Pioneer Trail
Segment Description:	
Section Number:	79002000
Mile Post To/From:	MP 19.032

Existing Facility:		D =	55	%
		T24 =	13.5%	% of 24 Hour Volume
Year:	2018	Tpeak =	6.5%	% of Design Hour Volume
		MT =	3.25%	% of Design Hour Volume
LOS C Peak Hour Directional Volume:	4,580	HT =	2.5%	% of Design Hour Volume
Demand Peak Hour Volume:	1,930	B =	0.25%	% of Design Hour Volume
Posted Speed:	70	MC =	0.5%	% of Design Hour Volume

No Build Alternative (Design Year):		D =	55	%
		T24 =	13.5%	% of 24 Hour Volume
Year:	2045	Tpeak =	6.5%	% of Design Hour Volume
		MT =	3.25%	% of Design Hour Volume
LOS C Peak Hour Directional Volume:	4,580	HT =	2.5%	% of Design Hour Volume
Demand Peak Hour Volume:	4,100	B =	0.25%	% of Design Hour Volume
Posted Speed:	70	MC =	0.5%	% of Design Hour Volume

Build Alternative (Design Year):		D =	55	%
		T24 =	13.5%	% of 24 Hour Volume
Year:	2045	Tpeak =	6.5%	% of Design Hour Volume
		MT =	3.25%	% of Design Hour Volume
LOS C Peak Hour Directional Volume:	4,580	HT =	2.5%	% of Design Hour Volume
Demand Peak Hour Volume:	4,100	B =	0.25%	% of Design Hour Volume
Posted Speed:	70	MC =	0.5%	% of Design Hour Volume

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

Prepared By: Mike Drauer (Print Name) _____ Date: 01/24/2020

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

FDOT Reviewer: Suraj Pamulapati (Print Name) _____ (Signature) Date: 10/20/2020