



Traffic Noise Analysis Technical Report US 59 Upgrade Redland From FM 2021 to 0.34-mile North of Loop 287 Angelina County, Texas

CSJ: 0176-02-118

November 2018

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by TxDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated December 16, 2014, and executed by FHWA and TxDOT.

Table of Contents

List of Acronyms.....	iii
1. Project Overview.....	1
2. Traffic Noise Analysis.....	1
2.1 Traffic Noise Overview	1
2.2 Results of Traffic Noise Analysis	3
3. References.....	5
Appendix A: Figures:	
Figure 1: Project Location Map	
Figure 2: Traffic Noise Receiver Locations	
Table 1: Noise Abatement Criteria	2
Table 2: Traffic Noise Receivers	3
Table 3: Traffic Noise Contours.....	5

List of Acronyms

dB(A)	A-weighted decibels
FM	farm to market
FHWA	Federal Highway Administration
L _{eq} (h)	hourly equivalent noise levels
mph	miles per hour
NAC	Noise Abatement Criteria
NB	northbound
ROW	right-of-way
SB	southbound
SH	state highway
TxDOT	Texas Department of Transportation

1. Project Overview

The Texas Department of Transportation (TxDOT) proposes to upgrade US 59 to interstate standards by providing frontage roads from FM 2021 to 0.34-mile (mi) north of Loop 287 (see **Figure 1**). The total project length is 2.45-mi. The existing US 59 facility includes two 12-foot-wide northbound (NB) lanes, two 12-foot wide southbound (SB) lanes and a 16-foot center flush median (center turn lane). The proposed improvements include a controlled access freeway section with 12-foot-wide NB and SB frontage roads and two 12-foot-wide mainlanes in each direction. Controlled access means there will not be direct access to the mainlanes. Access to the main lanes would be allowed via entrance and exit ramps.

2. Traffic Noise Analysis

2.1 Traffic Noise Overview

A traffic noise analysis was conducted in accordance with TxDOT's (Federal Highway Administration [FHWA] approved) 2011 *Guidelines for Analysis and Abatement of Roadway Traffic Noise*. These guidelines apply to all state-funded Type I roadway projects, federal and federal aid on new location or include the physical alteration of an existing roadway. The project design physically alters the existing US 59 roadway with the addition of new frontage road lanes; therefore, the guidelines are applicable.

Sound from highway traffic is generated primarily from a vehicle's tires, engine and exhaust. It is commonly measured in decibels and is expressed as "dB."

Sound occurs over a wide range of frequencies. However, not all frequencies are detectable by the human ear; therefore, an adjustment is made to the high and low frequencies to approximate the way an average person hears traffic sounds. This adjustment is called A-weighting and is expressed as "dB(A)."

Also, because traffic sound levels are never constant due to the changing number, type and speed of vehicles, a single value is used to represent the average or equivalent sound level and is expressed as "Leq."

The traffic noise analysis typically includes the following elements:

- Identification of land use activity areas that might be impacted by traffic noise.
- Determination of existing noise levels.
- Prediction of future noise levels.
- Identification of possible noise impacts.
- Consideration and evaluation of measures to reduce noise impacts.

The FHWA has established the following Noise Abatement Criteria (NAC) for various land use activity areas that are used as one of two means to determine when a traffic noise impact would occur (Table 1).

A traffic noise impact occurs when either the absolute or relative criterion is met:

- Absolute criterion—The predicted traffic noise level at a receiver approaches, equals, or exceeds the NAC. "Approach" is defined as 1 dB(A) (A-weighted decibels) below the NAC. For example, a traffic noise impact would occur at a Category B residence if the traffic noise level is predicted to be 66 dB(A) or above.
- Relative criterion—The predicted noise level substantially exceeds the existing traffic noise level at a receiver even though the predicted traffic noise level does not approach, equal, or exceed the NAC. "Substantially exceeds" is defined as an increase of more than 10 dB(A). For example, a traffic noise impact would occur at a Category B residence if the existing level is 54 dB(A) and the predicted level is 65 dB(A). This traffic noise level does not exceed the NAC, but it is more than 10 dB(A) greater than it had been.

Table 1: Noise Abatement Criteria

Activity Category	FHWA (dB(A) Leq)	Description of Land Use Activity Areas
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 sport 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, 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	--	Agricultural, 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: TxDOT (2011)

When a traffic noise impact occurs, noise abatement measures must be considered. A noise abatement measure is any positive action taken to reduce the impact of traffic noise on an activity area.

2.2 Results of Traffic Noise Analysis

The FHWA traffic noise modeling software (TNM 2.5) was used to calculate existing and predicted traffic noise levels. The model primarily considers the number, type and speed of vehicles; highway alignment and grade; cuts, fills and natural berms; surrounding terrain features; and the locations of activity areas likely to be impacted by the associated traffic noise.

Existing and predicted traffic noise levels were modeled at 35 receiver locations (**Table 2** and **Figure 2** in **Appendix A**) that represent the land use activity areas adjacent to the proposed project that might be impacted by traffic noise and potentially benefit from feasible and reasonable noise abatement.

Table 2: Traffic Noise Receivers

Representative Receiver	NAC Category	NAC Level	Existing 2022	Predicted 2042	Change (±)	Noise Impact	
R-1	Residence	B	67	55	58	+3	No
R-2	Residence	B	67	56	58	+2	No
R-3	Residence	B	67	57	59	+2	No
R-4	Residence	B	67	62	64	+2	No
R-5	Residence	B	67	55	57	+2	No
R-6	Residence	B	67	58	60	+2	No
R-7	Residence	B	67	59	61	+2	No
R-8	Residence	B	67	60	62	+2	No
R-9	Residence	B	67	60	62	+2	No
R-10	Residence	B	67	58	59	+1	No
R-11	Residence	B	67	56	57	+1	No
R-12	Residence	B	67	57	58	+1	No
R-13	Residence	B	67	56	58	+2	No
R-14	Residence	B	67	56	58	+2	No
R-15	Residence	B	67	56	59	+3	No

Representative Receiver	NAC Category	NAC Level	Existing 2022	Predicted 2042	Change (±)	Noise Impact
R-16	Residence	B	67	59	+2	No
R-17	Cemetery	C	67	64	-1	No
R-18	Residence	B	67	63	-1	No
R-19	Residence	B	67	61	-3	No
R-20	Residence	B	67	61	-3	No
R-21	Residence	B	67	60	-6	No
R-22	Residence	B	67	57	-2	No
R-23	Residence	B	67	58	-4	No
R-24	Residence	B	67	60	-4	No
R-25	Residence	B	67	59	-7	No
R-26	Residence	B	67	60	-1	No
R-27	Residence	B	67	59	0	No
R-28	Residence	B	67	55	+4	No
R-29	Residence	B	67	59	+1	No
R-30	Residence	B	67	63	+1	No
R-31	Residence	B	67	64	+2	No
R-32	Residence	B	67	63	+1	No
R-33	Residence	B	67	59	+2	No
R-34	Residence	B	67	59	+2	No
R-35	Residence	B	67	57	+2	No

As indicated in **Table 2**, the proposed project would not result in a traffic noise impact. Though noise levels are generally anticipated to increase with increasing traffic volumes, receivers R-17 through R-26 are predicted to have lower future noise levels, due to the proposed shift in the travel lanes to the west, away from these receivers. However, to avoid noise impacts that may result from future development of properties adjacent to the project, local officials responsible for land use control programs must ensure, to the maximum extent possible, no new activities are planned or constructed along or within the following predicted (2042) noise impact contours (**Table 3**).

Table 3: Traffic Noise Contours

Undeveloped Area	Land Use	Impact Contour	Distance from ROW
US 59 west side, north of FM 3439	NAC B and C	66 dB(A)	40 feet from ROW
US 59 west side, north of FM 3439	NAC E	71 dB(A)	Within ROW

Noise associated with the construction of the proposed project is difficult to predict. Heavy machinery, the major source of noise in construction, is constantly moving in unpredictable patterns. However, construction normally occurs during daylight hours when occasional loud noises are more tolerable. None of the receivers are expected to be exposed to construction noise for a long duration; therefore, any extended disruption of normal activities is not expected. Provisions would be included in the plans and specifications that require the contractor to make every reasonable effort to minimize construction noise through abatement measures such as work-hour controls and proper maintenance of muffler systems.

A copy of this traffic noise analysis will be made available to local officials. On the date of approval of this document (Date of Public Knowledge), FHWA and TxDOT are no longer responsible for providing noise abatement for new development adjacent to the proposed project.

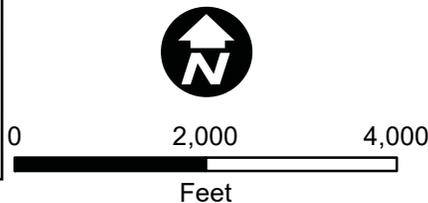
3. References

Federal Highway Administration (FHWA). 2004. FHWA Traffic Noise Model (computer software). Version 2.5.

Texas Department of Transportation (TxDOT). 2011. Guidelines for Analysis and Abatement of Roadway Traffic Noise. April 2011. <http://ftp.dot.state.tx.us/pub/txdot-info/env/toolkit/730-02-gui.pdf> (accessed December 10, 2014).

Appendix A

Figures



Texas Department of Transportation

**Figure 1
Project Location**

**US 59: From FM 2021 to 0.34 Miles North of SL 287
Angelina County, Texas
CSJ: 0176-02-118**

Prepared By: Atkins/VORO5913

Scale: 1:24,000

Job No.: 100055054

Date: Jul 02, 2018



	<p>  Non-impacted Receiver  Existing ROW  Proposed ROW </p> <p>  </p> <p>  </p>	<p>  </p> <p> Figure 2 Traffic Noise Receiver Locations Sheet 1 of 2 </p> <p> US 59: From FM 2021 to 0.34 Miles North of SL 287 Angelina County, Texas CSJ: 0176-02-118 </p> <table border="1"> <tr> <td>Prepared By: Atkins/lowe5714</td> <td>Scale: 1:7,000</td> </tr> <tr> <td>Job No.: 100055054</td> <td>Date: Nov 27, 2018</td> </tr> </table>	Prepared By: Atkins/lowe5714	Scale: 1:7,000	Job No.: 100055054	Date: Nov 27, 2018
Prepared By: Atkins/lowe5714	Scale: 1:7,000					
Job No.: 100055054	Date: Nov 27, 2018					



- ⊙ Non-impacted Receiver
- - Existing ROW
- Proposed ROW

0 750 1,500 Feet



Texas Department of Transportation

Figure 2
Traffic Noise Receiver Locations
Sheet 2 of 2

US 59: From FM 2021 to 0.34 Miles North of SL 287
Angelina County, Texas
CSJ: 0176-02-118

Prepared By: Atkins/lowe5714

Scale: 1:7,000

Job No.: 100055054

Date: Nov 27, 2018