



Traffic Noise Analysis Report

US 87

From east of US 385 to FM 2589 west of Dumas

Hartley and Moore Counties

CSJ Number(s): 0425-01-021, 0425-01-022, 0425-02-037, 0425-02-038, and 0425-02-040

Amarillo

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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 9, 2019, and executed by FHWA and TxDOT.

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The Texas Department of Transportation (TxDOT) proposes to improve the existing United States Highway (US) 87 from east of the US 385/US 87 interchange to Farm-to-Market (FM) 2589 west of Dumas in Hartley and Moore counties, Texas. The proposed improvements would include widening the existing Super 2 roadway to a four-lane divided roadway within the project limits, with drainage improvements extending approximately 5,200 feet to the east of FM 2589. The project length is approximately 20 miles. This project is a Type 1 project due to the widening and construction of two additional through lanes.

Introduction

This analysis was accomplished in accordance with TxDOT's (FHWA-approved) Traffic Noise Policy (2019).

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. FHWA Noise Abatement Criteria (NAC)

Activity Category	FHWA (dB(A) Leq)	Description of Land Use Activity Areas
A	57 (exterior)	Lands on which serenity and quiet are of extra-ordinary 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

Activity Category	FHWA (dB(A) Leq)	Description of Land Use Activity Areas
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.

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

Absolute criterion - The predicted noise level at a receptor approaches, equals, or exceeds the NAC. "Approach" is defined as one dB(A) below the NAC. For example: a noise impact would occur at a Category B residence if the noise level is predicted to be 66 dB(A) or above.

Relative criterion - The predicted noise level substantially exceeds the existing noise level at a receptor even though the predicted noise level does not approach, equal or exceed the NAC. "Substantially exceeds" is defined as more than 10 dB(A). For example: a 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).

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.

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.

The approved traffic data used in this analysis is included in **Attachment A**.

Validation

A validation study was performed in order to ensure that traffic noise is the main source of noise and to verify that the existing model accurately predicts existing traffic noise based on current conditions. Model validation compares field-collected sound level measurements to traffic noise levels calculated in an

existing condition model that used field-collected traffic parameters. Differences between the measured and calculated levels for this project were within the +/- 3 dB(A) tolerance allowed by FHWA. Therefore, the existing noise model is considered validated for this project. Additional information on the validation study is included in **Attachment B**.

Results

Existing and predicted traffic noise levels were modeled at receiver locations (**Table 2** and **Figure 1**) 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 Levels dB(A) Leq

Representative Receiver	NAC Category	NAC Level	Existing	Predicted 2043	Change (+/-)	Noise Impact (Yes/No)
R1 Residential	B	67	62	67	+5	Yes
R1a Residential	B	67	61	67	+6	Yes
R2 Residential	B	67	58	58	NA	No
R3 Residential	B	67	57	60	+3	No
R4 Residential	B	67	59	58	-1	No
R4a Residential	B	67	64	63	-1	No
R5 Residential	B	67	65	63	-2	No
R5a Residential	B	67	64	63	-1	No
R6 Residential	B	67	67	64	-3	No
R7 Residential	B	67	69	67	-2	Yes
R8 Residential	B	67	59	58	-1	No
R9 Residential	B	67	52	56	+4	No
R10 Residential	B	67	53	53	NA	No
R11 Residential	B	67	53	54	+1	No
R12 Residential	B	67	51	52	+1	No
R13 Residential	B	67	57	61	+4	No
R14 Residential	B	67	57	61	+4	No
R15 Residential	B	67	68	67	-1	Yes

Representative Receiver	NAC Category	NAC Level	Existing	Predicted 2043	Change (+/-)	Noise Impact (Yes/No)
R16 Residential	B	67	65	66	+1	Yes
R17 Residential	B	67	66	67	+1	Yes
R 18 Residential	B	67	57	58	+1	No
R 19 Residential	B	67	61	62	+1	No
R 20 Residential	B	67	53	54	+1	No
R 21 Residential	B	67	57	57	NA	No
R 22 Residential	B	67	58	58	NA	No

As indicated in **Table 2**, the proposed project would result in a traffic noise impact at one or more representative receiver locations.

Predicted traffic noise levels are lower at R4, R4a, R5, R5a, R6, R7, R8, and R15 due to a shifting of approximately half of the projected traffic onto lanes farther in distance from the receptors.

Noise abatement measures were considered for each location with predicted noise impacts.

Abatement Analysis

Before any abatement measure can be proposed for incorporation into the project, it must be both feasible and reasonable. Feasibility and reasonableness considerations include constructability, the predicted acoustic reductions provided by an abatement measure, a cost allowance, and whether the adjacent receptors desire abatement. Receptors associated with an abatement measure that achieve a noise reduction of five dB(A) or greater are called benefited receptors.

In order to be "feasible," the abatement measure must benefit a minimum of two impacted receptors AND reduce the predicted noise level by at least five dB(A) at greater than 50% of first-row impacted receptors.

In order to be "reasonable," the abatement measure must also reduce the predicted noise level by at least seven dB(A) for at least one benefited receptor (noise reduction design goal) and not exceed the standard barrier cost of 1,500 square feet per benefited receptor. In addition, an abatement measure may not be reasonable if the construction costs are unreasonably high due to site constraints, as determined through an alternate barrier cost assessment.

The following noise abatement measures were considered: traffic management, alteration of horizontal and/or vertical alignments, acquisition of undeveloped property to act as a buffer zone, and the construction of noise barriers.

Traffic management – Control devices could be used to reduce the speed of the traffic; however, the minor benefit of one dB(A) per five mph reduction in speed does not outweigh the associated increase in congestion and air pollution. Other measures such as time or use restrictions for certain vehicles are prohibited on state highways.

Alteration of horizontal and/or vertical alignments – Any alteration of the existing alignment would displace existing businesses and residences, require additional right of way and not be cost effective/reasonable.

Buffer zone – The acquisition of undeveloped property to act as a buffer zone is designed to avoid rather than abate traffic noise impacts and, therefore, is not feasible.

Noise barriers – Noise barriers in the form of noise walls are the most commonly used noise abatement measures and were considered for this project. Noise barriers were evaluated for each of the impacted receptor locations with the following results:

R1, R1a, R7, R15, R16 and R17 - These receivers are separate, isolated residences, which are not associated with a neighborhood or subdivision. Because a noise abatement measure must potentially benefit a minimum of two impacted receptors, noise abatement for these locations is not feasible.

None of the above noise abatement measures would be both feasible and reasonable; therefore, no abatement measures are proposed for this project.

Noise Contours for Land Use Planning

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, that no new activities are planned or constructed along or within the following predicted (2043) noise impact contours.

Land Use	Impact Contour	Distance from Right of Way
NAC category B & C	66 dB(A)	120 feet
NAC category E	71 dB(A)	50 feet

Construction Noise

Noise associated with the construction of the 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 receptors is expected to be exposed to construction noise for a long duration; therefore, any extended disruption of normal activities is not expected. Provisions will 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.

Local Official Notification and Date of Public Knowledge Statement

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

List of Attachments

- A. Map figures
- B. Traffic data
- C. Existing Model Validation Study

Attachment A

Figure 1: Project Location Map

Figure 2: Noise Receiver Maps

Attachment B
Traffic Data

Attachment C
Existing Model Validation Study