Final Traffic Noise Technical Report

State Highway (SH) 72 from Farm-to-Market Road (FM) 237 to United States Highway (US) 87

CSJs: 0270-01-051, 0270-10-014
Yoakum District, Dewitt County

August 2019

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.

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1.0 Project Description

The Texas Department of Transportation (TxDOT) Yoakum District proposes to widen State Highway (SH) 72 from a two-lane to a four-lane undivided roadway in DeWitt County, Texas. The proposed project is located southeast of San Antonio, Texas and extends from Farm-to-Market Road (FM) 237 east of Yorktown to United States Highway (US) 87 in Cuero. The total length of the proposed project is approximately 14.0 miles. The Guadalupe River bridge crossing located 1.1 miles west of the project's eastern termini at US 87 in Cuero, is currently under construction as a separate project. Although included in the limits of this project, no additional work will be done on the Guadalupe River bridge crossing.

2.0 Noise Analysis

2.1 Background and Methodology

This analysis was accomplished in accordance with TxDOT's Federal Highway Administration (FHWA)-approved *Traffic Noise Policy* (2019). Traffic Noise Model version 2.5 (TNM 2.5) was utilized in this assessment. Traffic volume data used in this analysis and approved by TxDOT's Transportation Planning and Programming division can be found in **Appendix 2**.

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."

Dominant noise sources within the proposed project area include traffic on existing roads and various kinds of local activity.

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; and
- Consideration and evaluation of measures to reduce noise impacts.

FHWA has established the Noise Abatement Criteria (NAC) listed in **Table 1** 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: 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, amphitheaters, 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 receiver approaches, equals or exceeds the NAC. "Approach" is defined as one dB(A) below the FHWA 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 receiver 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.

The FHWA traffic noise modeling software (version 2.5) was used to calculate existing and predicted (2039) traffic noise levels for all receivers. 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.

2.2 Consideration of Future Noise Impacts

Existing and predicted traffic noise levels were modeled at receiver locations (**Table 2** and **Figure 2**) 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

Receiver	NAC Category	NAC Level	Existing 2019	Predicted 2039	Change (+/-)	Noise Impact
R1	B (Residential)	67	56	59	+3	No
R2	B (Residential)	67	53	55	+2	No
R3	B (Residential)	67	55	57	+2	No
R4	B (Residential)	67	55	57	+2	No
R5	B (Residential)	67	54	56	+2	No
R6	C (RV Park)	67	60	62	+2	No
R7	D (Church)	52	35	38	+3	No
R8	B (Residential)	67	51	53	+2	No
R9	B (Residential)	67	56	61	+5	No
R10	B (Residential)	67	55	58	+3	No
R11	B (Residential)	67	54	58	+4	No
R12	C (Cemetery)	67	59	62	+3	No
R13	B (Residential)	67	62	65	+3	No
R14	B (Residential)	67	56	60	+4	No
R15	B (Residential)	67	51	55	+4	No
R16	B (Residential)	67	61	64	+3	No
R17	B (Residential)	67	50	53	+3	No
R18	B (Residential)	67	55	58	+3	No
R19	B (Residential)	67	50	53	+3	No
R20	B (Residential)	67	61	64	+3	No
R21	B (Residential)	67	54	58	+4	No
R22	B (Residential)	67	56	60	+4	No
R23	B (Residential)	67	53	56	+3	No
R24	B (Residential)	67	51	54	+3	No
R25	B (Residential)	67	50	53	+3	No
R26	B (Residential)	67	55	59	+4	No
R27	B (Residential)	67	52	55	+3	No
R28	B (Residential)	67	52	56	+4	No
R29	B (Residential)	67	50	53	+3	No
R30	B (Residential)	67	60	63	+3	No
R31	B (Residential)	67	59	62	+3	No
R32	B (Residential)	67	58	62	+4	No
R33	B (Residential)	67	60	63	+3	No
R34	B (Residential)	67	57	61	+4	No
R35	B (Residential)	67	61	64	+3	No
R36	B (Residential)	67	57	60	+3	No

Table 2: Traffic Noise Levels dB(A) Leq						
Receiver	NAC Category	NAC Level	Existing 2019	Predicted 2039	Change (+/-)	Noise Impact
R37	B (Residential)	67	54	58	+4	No
R38	B (Residential)	67	61	65	+4	No
R39	B (Residential)	67	58	62	+4	No
R40	B (Residential)	67	61	64	+3	No
R41	B (Residential)	67	54	58	+4	No
R42	B (Residential)	67	60	63	+3	No
R43	B (Residential)	67	61	64	+3	No
R44	B (Residential)	67	62	64	+2	No
R45	B (Residential)	67	60	64	+4	No
R46	B (Residential)	67	61	65	+4	No
R47	B (Residential)	67	57	61	+4	No
R48	B (Residential)	67	60	65	+5	No
R49	B (Residential)	67	59	64	+5	No
R50	B (Residential)	67	63	66	+3	**Yes**
R51	B (Residential)	67	60	63	+3	No
R52	B (Residential)	67	61	65	+4	No
R53	B (Residential)	67	59	65	+6	No
R54	C (RV Park)	67	59	63	+4	No
R55	B (Residential)	67	56	59	+3	No
R56	D (Church)	52	27	31	+4	No
R57	B (Residential)	67	56	59	+3	No
R58	B (Residential)	67	58	60	+2	No
R59	B (Residential)	67	60	62	+2	No
R60	B (Residential)	67	58	61	+3	No
R61	B (Residential)	67	58	61	+3	No
R62	C (RV Park)	67	57	61	+4	No
R63	B (Residential)	67	60	64	+4	No
R64	B (Residential)	67	59	63	+4	No
R65	B (Residential)	67	60	64	+4	No
R66	B (Residential)	67	60	64	+4	No
R67	B (Residential)	67	60	64	+4	No
R68	B (Residential)	67	60	64	+4	No
R69	B (Residential)	67	59	63	+4	No
R70	B (Residential)	67	61	65	+4	No
R71	B (Residential)	67	61	64	+3	No
R72	B (Residential)	67	60	63	+3	No
R73	B (Residential)	67	58	61	+3	No
R74	B (Residential)	67	57	61	+4	No
R75	B (Residential)	67	59	63	+4	No
R76	B (Residential)	67	61	64	+3	No
R77	B (Residential)	67	60	63	+3	No

Table 2: Traffic Noise Levels dB(A) Leq

Receiver	NAC Category	NAC Level	Existing 2019	Predicted 2039	Change (+/-)	Noise Impact
R78	B (Residential)	67	60	64	+4	No
R79	D (Church)	52	39	42	+3	No

As indicated in **Table 2**, the proposed project would result in a traffic noise impact, and 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 walls.

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 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.

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 could displace existing businesses and residences, require additional right-of-way, and is typically not 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 walls - This is the most commonly used noise abatement measure. Noise walls were evaluated for each of the impacted receiver locations with the following results:

R50: This receiver represents a single, isolated house. Because a noise abatement measure must potentially benefit a minimum of two impacted receptors, noise abatement for this location 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.

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 (2039) noise impact contours (Table 3).

Table 3: Land Use Contours for Undeveloped Land

Land Use	Impact Contour	Distance from Right-of-Way
NAC Category B & C	66 dB(A)	120 feet
NAC Category E	71 dB(A)	35 feet

2.3 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 receivers are 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.

3.0 Conclusions

As indicated in Table 2, the proposed project would result in a traffic noise impact. Noise abatement measures were examined at each of the impacted receivers and none were found to be both feasible and reasonable; therefore, no abatement measures are proposed for this project.

4.0 Local Officials Statement

A copy of this traffic noise analysis will be made available to local officials to ensure, to the maximum extent possible, future developments are planned, designed, and programmed in a manner that would avoid traffic noise impacts. 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 project.

Appendix 1

Figures

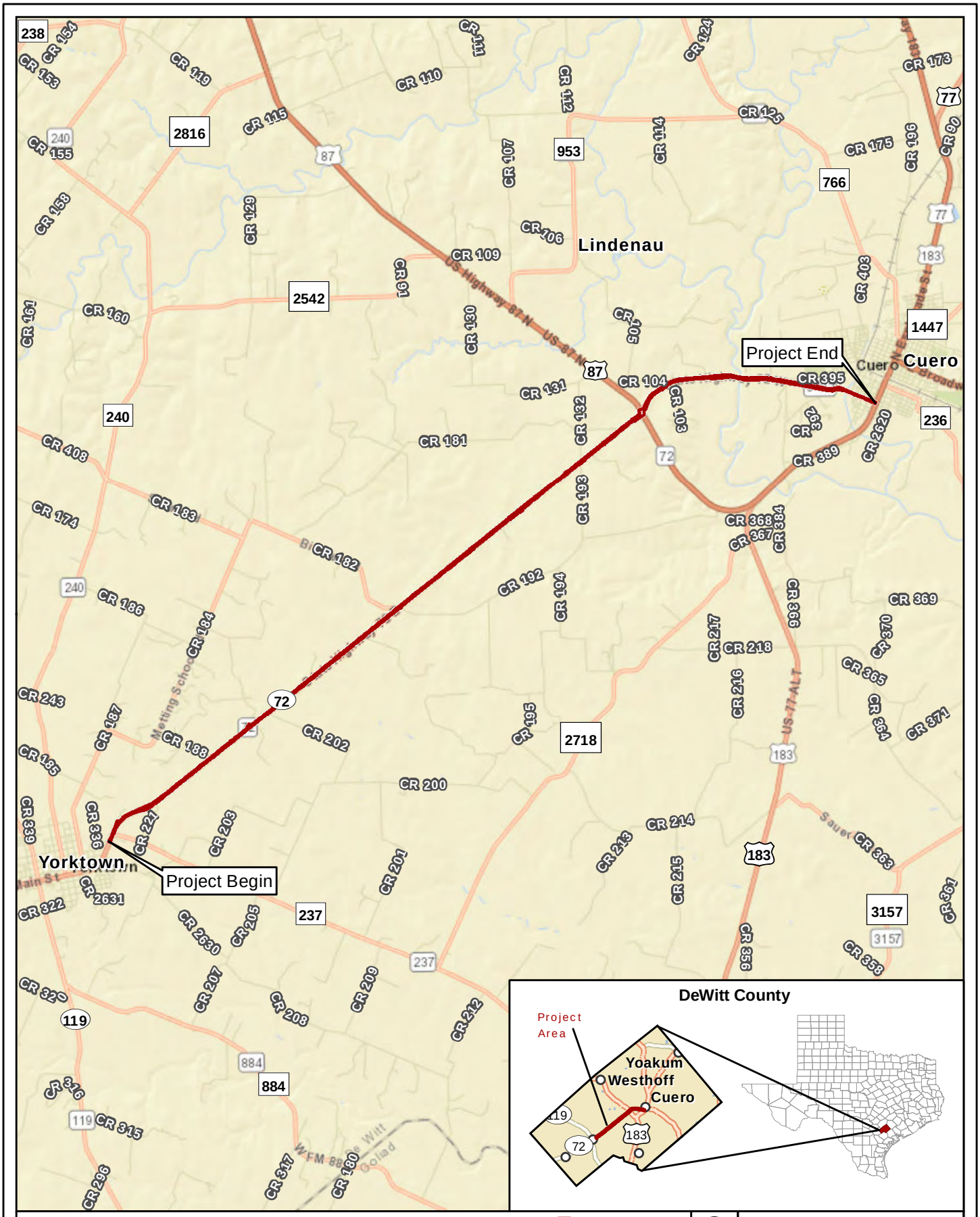

Figure 1

Project Location (Road Base)

SH 72 from FM 237 to US 87

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N Nau St
E 8th St
N Stark St
Elizabeth Ave
CR 336
CR 335 E 8th
E 7th St
Elizabeth St
CR 337 E 7th
N Louis Ave
E 6th St
N Mertins St
E Main St
S Mertins St
S Gaebler St
E 4th St
Old 237
CR 338 Old Underpass Rd
72
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
CR 2618 Industrial
237
CR 221 Community Hall

Figure 2a

Location of Noise Receivers

■ Non-impacted Receiver Project Location

SH 72 from FM 237 to US 87

CSJ: 0270-01-051, 0271-10-014

Data Sources:
CMEC (2019), TxDOT (2018)
Aerial Source: Google (2018)

0 500 Feet
0 150 Meters

1 in = 500 feet
Scale: 1:6,000
Date: 6/28/2019

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Figure 2b

Location of Noise Receivers

■ Non-impacted Receiver Project Location

SH 72 from FM 237 to US 87

Data Sources:
CMEC (2019), TxDOT (2018)
Aerial Source: Google (2018)

CSJ: 0270-01-051, 0271-10-014

0 500 Feet
0 150 Meters

1 in = 500 feet
Scale: 1:6,000
Date: 6/28/2019

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Figure 2c

Location of Noise Receivers

SH 72 from FM 237 to US 87

■ Non-impacted Receiver Project Location

CSJ: 0270-01-051, 0271-10-014

Data Sources:
CMEC (2019), TxDOT (2018)
Aerial Source: Google (2018)

0 500 Feet
0 150 Meters

1 in = 500 feet
Scale: 1:6,000
Date: 6/28/2019

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Figure 2d

Location of Noise Receivers

SH 72 from FM 237 to US 87

■ Non-impacted Receiver Project Location

Data Sources:
CMEC (2019), TxDOT (2018)
Aerial Source: Google (2018)

CSJ: 0270-01-051, 0271-10-014

0 500 Feet
0 150 Meters

1 in = 500 feet
Scale: 1:6,000
Date: 6/28/2019

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Figure 2e

Location of Noise Receivers

SH 72 from FM 237 to US 87

Project Location

Data Sources:
CMEC (2019), TxDOT (2018)
Aerial Source: Google (2018)

CSJ: 0270-01-051, 0271-10-014

0 500 Feet	1 in = 500 feet
0 150 Meters	Scale: 1:6,000
	Date: 6/28/2019

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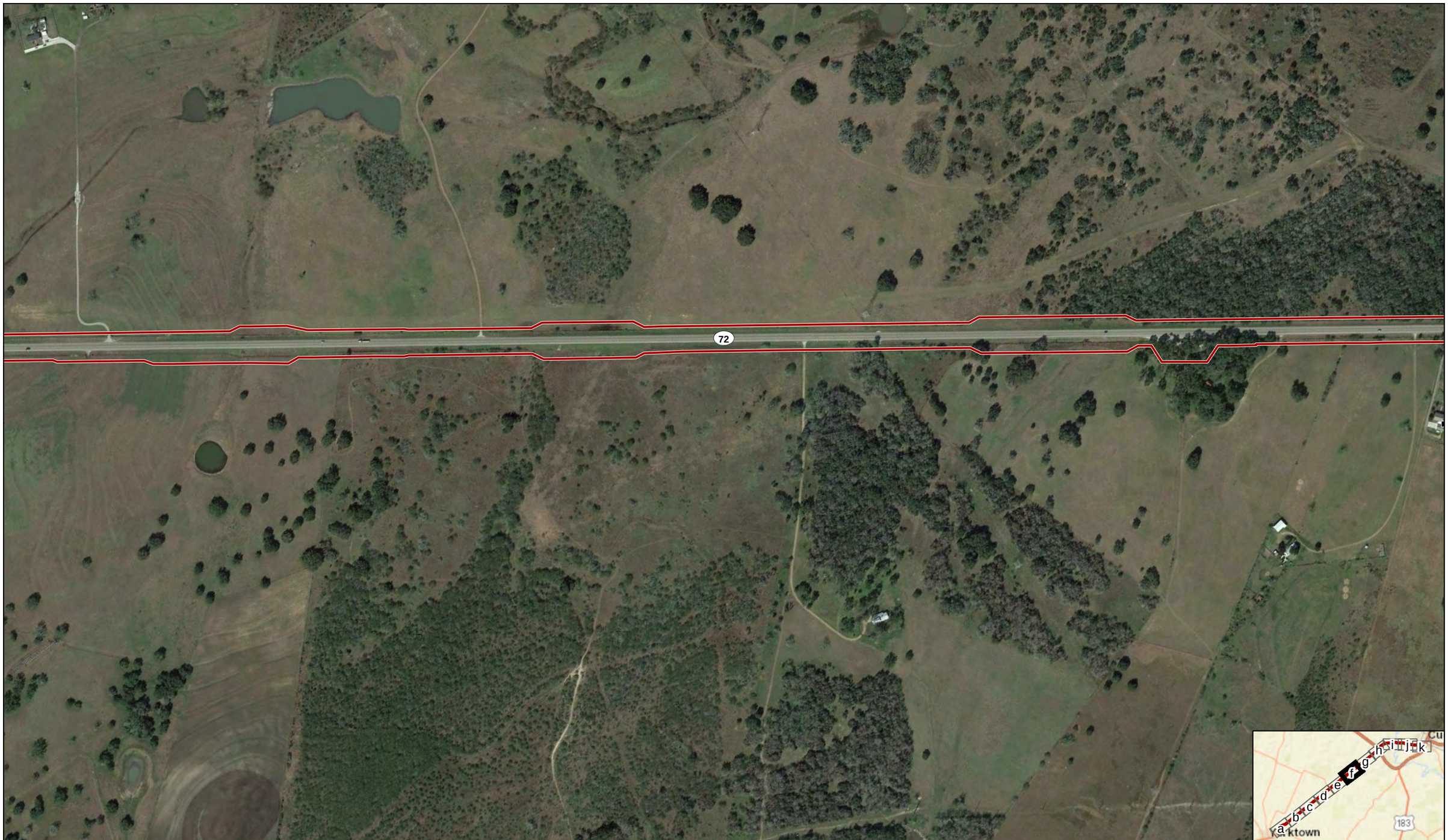

Figure 2f

Location of Noise Receivers

SH 72 from FM 237 to US 87

■ Non-impacted Receiver Project Location

Data Sources:
CMEC (2019), TxDOT (2018)
Aerial Source: Google (2018)

CSJ: 0270-01-051, 0271-10-014

0 500 Feet
0 150 Meters

1 in = 500 feet
Scale: 1:6,000
Date: 6/28/2019

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Figure 2g

Location of Noise Receivers

SH 72 from FM 237 to US 87

■ Non-impacted Receiver Project Location

Data Sources:
CMEC (2019), TxDOT (2018)
Aerial Source: Google (2018)

CSJ: 0270-01-051, 0271-10-014

0 500 Feet
0 150 Meters

1 in = 500 feet
Scale: 1:6,000
Date: 6/28/2019

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CR 181 Smith Ranch Rd

CR 104 Old San Antonio

R28

R29

R30

R31

R32

R33

R34

R35

R36

R37

R38

72

87

CR 103 Hefner Ln

Figure 2h

Location of Noise Receivers

SH 72 from FM 237 to US 87

■ Non-impacted Receiver Project Location

CSJ: 0270-01-051, 0271-10-014

Data Sources:
CMEC (2019), TxDOT (2018)
Aerial Source: Google (2018)

0 500 Feet
0 150 Meters

1 in = 500 feet
Scale: 1:6,000
Date: 6/28/2019

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CR 399 Mulberry

CR 401 River Rdg

72

CR 104 Old San Antonio

R35

R37

R38

R39

R40

R41

R42

R43

CR 103 Hefner Ln

Kirbyville

183

Figure 2i

Location of Noise Receivers

SH 72 from FM 237 to US 87

■ Non-impacted Receiver Project Location

Data Sources:
CMEC (2019), TxDOT (2018)
Aerial Source: Google (2018)

CSJ: 0270-01-051, 0271-10-014

0 500 Feet
0 150 Meters

1 in = 500 feet
Scale: 1:6,000
Date: 6/28/2019

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Figure 2j

Location of Noise Receivers

SH 72 from FM 237 to US 87

- Non-impacted Receiver
- Impacted Receiver
- Project Location

Data Sources:
CMEC (2019), TxDOT (2018)
Aerial Source: Google (2018)

CSJ: 0270-01-051, 0271-10-014

0 500 Feet
0 150 Meters
1 in = 500 feet
Scale: 1:6,000
Date: 6/28/2019

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Figure 2k

Location of Noise Receivers

SH 72 from FM 237 to US 87

■ Non-impacted Receiver Project Location

CSJ: 0270-01-051, 0271-10-014

Data Sources:
CMEC (2019), TxDOT (2018)
Aerial Source: Google (2018)

0 500 Feet
0 150 Meters

1 in = 500 feet
Scale: 1:6,000
Date: 6/28/2019

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Appendix 2

Traffic Analysis for Highway Design and Anticipated Average Daily Traffic and Turning Movement Schematics

Texas Department of Transportation

YOAKUM DISTRICT

SEP 11 2018

TEXAS DEPT. OF TRANSPORTATION

MEMO

September 5, 2018

To: Paul E. Reitz, P.E., District Engineer
Attn: Jeffery W. Vinklarek, P.E., Director of TPD

Through: William E. Knowles, P.E.
Traffic Analysis Section Director, TPP

From: Farideh Dassi
Planner V, TPP

Subject: Traffic Data
CSJ: 0270-10-014
SH 72:
From US 87
To US 87/77A
DeWitt County

Attached are tabulations showing traffic analysis for highway design for the 2019 to 2039 twenty year period and the 2019 to 2049 thirty year period for the described limits of the route. Included is a tabulation showing data for use in air and noise analysis.

Please refer to your original memorandum dated June 26, 2018.

If you have any questions or need additional information, please contact Farideh Dassi at (512) 467-3944.

Attachment

CC: Rene Soto, P.E., Transportation Engineer Supvr, Yoakum District
Design Division

TRAFFIC ANALYSIS FOR HIGHWAY DESIGN

Yoakum District **September 4, 2018**

Description of Location	Average Daily Traffic 2019	Average Daily Traffic 2039	Base Year Dir Dist %	Base Year K Factor	Base Year Percent Trucks ADT	Base Year Percent Trucks DHV	ATHWLD	Percent Tandem Axles in ATHWLD	Total Number of Equivalent 18k Single Axle Load Applications One Direction Expected for a 20 Year Period (2019 to 2039) Flexible Pavement	S N	Rigid Pavement	SLAB
SH 72 From US 87 To US 87/ 77 A DeWitt County	9,500	16,300	52 - 48	10.6	19.2	12.7	11,900	40	7,341,000	3	9,844,000	8"

Data for Use in Air & Noise Analysis

Vehicle Class	Base Year % of ADT	Base Year % of DHV
Light Duty	80.8	87.3
Medium Duty	9.0	5.9
Heavy Duty	10.2	6.8

Description of Location	Average Daily Traffic 2019	Average Daily Traffic 2049	Base Year Dir Dist %	Base Year K Factor	Base Year Percent Trucks ADT	Base Year Percent Trucks DHV	ATHWLD	Percent Tandem Axles in ATHWLD	Total Number of Equivalent 18k Single Axle Load Applications One Direction Expected for a 30 Year Period (2019 to 2049) Flexible Pavement	S N	Rigid Pavement	SLAB
SH 72 From US 87 To US 87/ 77 A DeWitt County	9,500	18,100	52 - 48	10.6	19.2	12.7	12,000	40	11,781,000	3	15,797,000	8"

Texas Department of Transportation

YOAKUM DISTRICT

SEP 11 2018

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SH 72:
From FM 237
To US 87
DeWitt County

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SH 72 From FM 237 To US 87 Dewitt County	5,100	8,600	52 - 48	10.6	24.2	16.0	11,700	40	4,909,000	3	6,586,000	8"

Data for Use in Air & Noise Analysis

Vehicle Class	Base Year % of ADT	Base Year % of DHV
Light Duty	75.8	84.0
Medium Duty	11.3	7.5
Heavy Duty	12.9	8.5

Description of Location	Average Daily Traffic 2019	Average Daily Traffic 2049	Base Year Dir Dist %	Base Year K Factor	Base Year Percent Trucks ADT	Base Year Percent Trucks DHV	ATHWLD	Percent Tandem Axles in ATHWLD	Total Number of Equivalent 18k Single Axle Load Applications One Direction Expected for a 30 Year Period (2019 to 2049) Flexible Pavement	S N	Rigid Pavement	SLAB
SH 72 From FM 237 To US 87 Dewitt County	5,100	9,500	52 - 48	10.6	24.2	16.0	11,700	40	7,848,000	3	10,528,000	8"