



E **88TH** AVE
8800 N

I-76 NB RAMPS TO HIGHWAY 2



NOISE TECHNICAL REPORT

May 2021

Prepared for:
City of Commerce City



ENVIRONMENTAL ASSESSMENT



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Acronyms and Abbreviations

CDOT	Colorado Department of Transportation
CFR	Code of Federal Regulations
dBA	A-weighted decibels
EA	Environmental Assessment
FHWA	Federal Highway Administration
I-76	Interstate 76
L _{eq}	one-hour equivalent sound level
LOS	Level of Service
mph	miles per hour
NAC	Noise Abatement Criterion
NAAG	Noise Analysis and Abatement Guidelines
NB	northbound
NEPA	National Environmental Policy Act
TNM	FHWA's Traffic Noise Model

Contents

	Page No.
1.0 Executive Summary	1
2.0 Introduction	2
3.0 Background	4
3.1 Characteristics of Noise	5
3.2 Applicable Regulations, Guidelines, and Tools	5
3.3 CDOT Noise Abatement Criteria and Land Use Activity Categories	5
4.0 Noise Analysis Methods	7
4.1 Noise Study Zone Identification	7
4.2 Land Use Identification	9
4.3 Noise Measurements	10
4.4 Model Validation	12
4.5 TNM Model Inputs	13
5.0 TNM Results	20
5.1 Existing Conditions Summary	20
5.2 No-Action Alternative Summary	20
5.3 Proposed Action Summary	20
5.4 Considered Alternative Summary	20
6.0 Noise Abatement Evaluation	24
6.1 Noise Abatement Options Considered	24
6.2 Noise Abatement: Noise Insulation	24
6.3 Noise Barrier Evaluation	24
7.0 Statement of Likelihood	30
8.0 Construction Noise	32
8.1 Construction Noise Implications	32
8.2 Local Noise Ordinances	33
9.0 Mitigation	33
10.0 Information for Local Officials	35
11.0 References	35

Appendices

- Appendix A. Noise Measurement Data
- Appendix B. TNM Noise Modeling Input Data
- Appendix C. TNM Noise Modeling Results
- Appendix D. Noise Abatement Determination Worksheets (CDOT Form 1209)

Figures

	Page No.
Figure 1. E. 88th Avenue Location Map	2
Figure 2. Noise Study Zone Activity Categories and Noise Measurement Locations	8
Figure 3a. Receiver Locations for Existing (2019) Conditions and 2040 No-Action Alternative	15
Figure 3b. Receiver Locations for Existing (2019) Conditions and 2040 No-Action Alternative	16
Figure 3c. Receiver Locations for Existing (2019) Conditions and 2040 No-Action Alternative	17
Figure 4. TNM Model Objects for 2019 Existing Conditions and 2040 No-Action Alternative.....	18
Figure 5. TNM Model Objects for 2040 Proposed Action	19
Figure 6a. Receiver Noise Levels for 2040 Proposed Action (Impacts Identified)	21
Figure 6b. Receiver Noise Levels for 2040 Proposed Action (Impacts Identified)	22
Figure 6c. Receiver Noise Levels for 2040 Proposed Action (Impacts Identified)	23
Figure 7. Potential Noise Barrier Locations	28

Tables

Table 1. Noise Analysis and Abatement Evaluation Overview	1
Table 2. Project Background	3
Table 3. CDOT Noise Abatement Criteria	5
Table 4. Land Use Considerations	9
Table 5. Noise Measurement Information	10
Table 6. Traffic Counts and Speeds Collected During Noise Measurement Periods	12
Table 7. Noise Measurement Results and Model Validation Summary	12
Table 8. TNM Model Inputs	14
Table 9. Noise Barriers Evaluated for the Proposed Action	26
Table 10. Modeled Noise Levels With and Without Abatement	30
Table 11. Summary of Impacts and Mitigation	34

1.0 EXECUTIVE SUMMARY

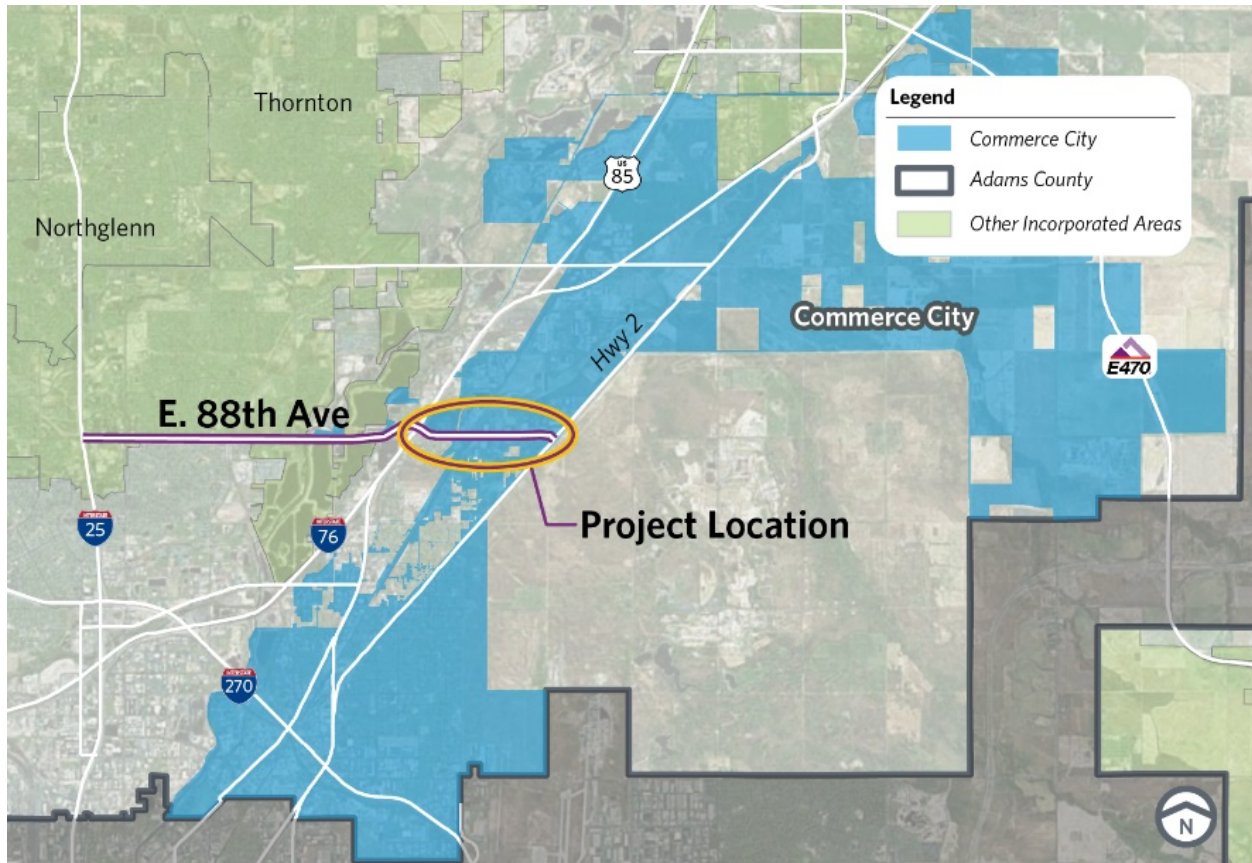
This traffic noise technical report has been prepared in support of the E. 88th Avenue: I-76 NB Ramps to Highway 2 Environmental Assessment (Figure 1). A summary of this project’s traffic noise analysis and abatement evaluation is included in Table 1.

Table 1. Noise Analysis and Abatement Evaluation Overview

Project Location and Type I Status Explanation	This project is located in Commerce City, Adams County, Colorado. It is a Type I project because it would include the addition of through travel lanes by new construction.
Noise Level and Impact Overview	<ul style="list-style-type: none"> ▪ Existing (2019) modeled noise levels range from 43.9 to 72.6 A-weighted decibels (dBA) at 215 receivers¹, which represent 215 receptors. ▪ Future (2040) modeled noise levels for the No-Action Alternative range from 44.7 dBA to 73.9 dBA at 215 receivers, which represent 215 receptors. ▪ Future (2040) modeled noise levels for the Proposed Action range from 44.7 dBA to 74.1 dBA at 215 receivers, which represent 215 receptors. The Proposed Action is expected to impact the following receivers and receptors: <ul style="list-style-type: none"> – 28 Activity Category B receivers representing 28 receptors
Noise Abatement Considerations and Commitments Overview	<ul style="list-style-type: none"> ▪ Six noise barriers were evaluated, as shown in Section 6.3. ▪ Noise Barrier A was determined to be feasible and reasonable. ▪ Noise Barrier B was determined to be feasible and reasonable. ▪ Noise Barrier C was determined not to be feasible. ▪ Noise Barrier D was determined to be feasible but not reasonable because cost exceeded the Cost Benefit Index. ▪ Noise Barrier E was determined to be feasible and reasonable. ▪ Noise Barrier F was determined to be feasible and reasonable.
Information for Local Officials	This project’s Noise Study Zone includes land that is unpermitted and undeveloped (i.e., Activity Category G). Therefore, Part 772.17 of Title 23 of the Code of Federal Regulations (23 CFR 772.17) is applicable and information does need to be submitted to local officials, as described in Section 10.0.

¹ A receiver is a modeled point that represents one or more receptors. Receptor types are listed in Table 3, in the column titled “Description of Land Use Category.” A receiver that represents more than one receptor must represent receptors of the same Activity Category.

Figure 1. E. 88th Avenue Location Map



2.0 INTRODUCTION

The City of Commerce City, in consultation with the Federal Highway Administration (FHWA) and the Colorado Department of Transportation (CDOT), is proposing to improve approximately 1.6 miles of East 88th Avenue (E. 88th Avenue) between Interstate 76 (I-76) and Highway 2, and on Rosemary Street between E. 88th Avenue and East 86th Avenue (E. 86th Avenue). The improvements described in Table 2 and hereafter called the Proposed Action constitute a Type I project because of the addition of through-travel lane(s) by new construction or restriping an existing highway. Because the Proposed Action is Type I and because there is at least one Activity Category A, B, C, D, and/or E receptor within the Noise Study Zone (defined in Section 4.1), a noise analysis was needed to determine if noise levels would be impacted as a result of building the Proposed Action. HDR, acting on behalf of Commerce City, conducted a noise analysis for the Proposed Action and prepared this report. Table 2 includes information about this project and provides context for this traffic noise analysis.

Table 2 Project Background

Project Location	City of Commerce City, Adams County, Colorado
Affected Roadways	East 88th Avenue (E. 88th Avenue) and Rosemary Street
Project Purpose	The purpose of the E. 88th Avenue project is to improve traffic operations and accommodate current and future general vehicular traffic, heavy trucks, bicycles, and pedestrians on E. 88th Avenue between Interstate 76 (I-76) and Highway 2 (Hwy 2).
Project Need	<p>The needs for the project are described by two interrelated statements:</p> <p>Need 1: Improve roadway operations. The need for improvement in roadway operations is primarily due to substandard road design and insufficient future capacity.</p> <ul style="list-style-type: none"> ▪ Substandard Road Design. E. 88th Avenue is a two-lane minor arterial roadway. Roadway operations on E. 88th Avenue are negatively affected by its substandard road design characteristics that cause congestion, such as narrow lane widths and lack of turn lanes and acceleration/deceleration lanes, which is exacerbated by the high number of heavy truck trips in the corridor. The high number of access points increases congestion on the corridor as vehicles accelerate and decelerate to turn in and out of the driveways, affecting overall corridor efficiency. ▪ Insufficient Future Capacity. E. 88th Avenue has insufficient capacity to accommodate the projected demand for vehicle trips in the corridor. Daily traffic volume in 2019 exceeded 20,000 vehicles per day at Rosemary Street with a current level-of-service (LOS) rating of B. Daily volume at this location is projected to exceed 27,500 vehicles per day in 2040 (an increase of 37.5%), operating at LOS E. <p>Need 2: Accommodate all users. The E. 88th Avenue corridor serves commuter, residential, and commercial trips. The number of heavy truck trips exceeds 15% of overall trips during peak hour, and the growth of heavy-truck traffic is expected to keep pace with the growth of general vehicular traffic. The substandard road design characteristics do not accommodate efficient heavy truck movements and contribute to congestion. In addition, there are no sidewalks or bicycle facilities on E. 88th Avenue and no pedestrian or bicycle connections to the bus stops on Brighton Road. This causes pedestrians and bicyclists to use the unpaved shoulders, compromising safety, and can discourage non-vehicular travel in the corridor.</p>
Proposed Action Description	<p>This project would include:</p> <ul style="list-style-type: none"> • Two lanes each direction, with raised median and a multiuse path on the north and sidewalk on the south, west of Rosemary Street • Access changes between Brighton Road and the O'Brian Canal: <ul style="list-style-type: none"> ○ Improved Jolene Court approach to Brighton Road.

Table 2 Project Background

	<ul style="list-style-type: none"> ○ Permitted U-turn at E. 88th Avenue and Brighton Road. ○ Improved access at the Mile High Flea Market with a signalized intersection, dedicated left-turn and U-turn movements, and dynamic lane (left-turn lane during events and travel lane during normal roadway operations). ● New single-span bridge over the O'Brian Canal and improved at-grade crossing of UPRR to accommodate wider roadway and bicycle and pedestrian facilities. ● Widened Rosemary Street with sidewalks on both sides and reconfigured intersection with E. 88th Avenue. ● One lane in each direction, with a two-way left-turn lane and a buffer-separated multiuse path on the north and sidewalk on the southeast of Rosemary Street. ● Multiuse path and sidewalk extended across the BNSF Railway tracks and Highway 2. <p>Stormwater Drainage and Water Quality Treatment – Section of Irondale Gulch Outfall would detain stormwater and water would be treated within the proposed right-of-way.</p>
<p>No-Action Alternative Description</p>	<p>Under the No-Action Alternative, the project study area would remain largely the same as its existing condition, with the exception of future implementation of the Irondale Gulch Outfall project, which will require reconstructing a portion of E. 88th Avenue from Brighton Road to Willow Street to construct the regional storm sewer underneath the roadway.</p>
<p>Prior National Environmental Policy Act (NEPA) Approvals</p>	<p>This project is a new action.</p>

3.0 BACKGROUND

This noise analysis was conducted as required by 23 CFR 772 in accordance with CDOT’s *Noise Analysis and Abatement Guidelines* (NAAG) (CDOT, 2015b) and FHWA’s *Highway Traffic Noise: Analysis and Abatement Guidance* (Guidance) (FHWA, 2011). The analysis determines whether 2040 traffic noise levels from the Proposed Action would exceed applicable impact thresholds at properties (i.e., receptors) near the proposed improvements of the Proposed Action. Traffic noise abatement was evaluated for any such impacted receptors. This noise analysis included the following tasks:

- ◆ Conducting field measurements of existing sound levels (see Section 4.3).
- ◆ Validating a noise model using field measurement results (see Section 4.4).
- ◆ Modeling existing noise conditions for existing roadways (see Section 4.5 and Section 5.0).
- ◆ Modeling the future build alternative (Proposed Action) and a future No-Action Alternative (see Sections 4.5 and Section 5.0).

- ◆ Completing noise abatement evaluation (see Section 1.0).
- ◆ Determining noise contour lines for unpermitted, undeveloped land (see Section 9.0).

3.1 Characteristics of Noise

Fundamental information about noise, such as terminology, how sound travels, and sound intensity is included in CDOT’s NAAG. It is incorporated by reference to supplement this report.

3.2 Applicable Regulations, Guidelines, and Tools

This resource analysis followed guidance contained in the CDOT NEPA Manual (CDOT, 2017) and the following:

- ◆ **23 CFR Part 772 (Procedures for Abatement of Highway Traffic Noise and Construction Noise)** (23 CFR §772, 2010): Federal highway noise standard that must be followed in analyzing and abating highway traffic noise. This regulation required states to adopt state-specific guidelines, which included adopting specific parameters, such as the noise reduction design goal.
- ◆ **CDOT NAAG** (CDOT, 2015b): Provides Colorado’s procedural and technical requirements for analyzing highway project traffic noise and evaluating noise abatement.
- ◆ **FHWA Guidance** (FHWA, 2011): Provides FHWA guidance for applying 23 CFR Part 772 in the analysis and abatement of highway traffic noise.
- ◆ **Measurement of Highway-Related Noise** (FHWA, 1996): Includes procedures for measuring highway noise.
- ◆ **FHWA Traffic Noise Model (TNM) Version 2.5**, (FHWA, 2004): Model used to determine existing and design year noise impacts.

3.3 CDOT Noise Abatement Criteria and Land Use Activity Categories

A traffic noise impact occurs if either of the following conditions is met:

- ◆ Predicted design year traffic noise level approaches (i.e., equals) or exceeds CDOT’s Noise Abatement Criteria (NAC) at a minimum of one receptor
- ◆ Predicted design year traffic noise level substantially exceeds, which is defined as a noise increase of 10 dBA or more, the existing highway traffic noise level at a minimum of one receptor.

CDOT’s NAC are shown in Table 3. CDOT’s NAAG require that the one-hour equivalent sound level (L_{eq}) be used in the analysis.

Table 3. CDOT Noise Abatement Criteria

Activity Category	Activity L_{eq} (dBA) ¹	Evaluation Location	Description of Land Use Category
A	56	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.

Table 3. CDOT Noise Abatement Criteria

Activity Category	Activity L _{eq} (dBA) ¹	Evaluation Location	Description of Land Use Category
B ²	66	Exterior	Residential.
C ²	66	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, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	51	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 ²	71	Exterior	Hotels, motels, time-share resorts, vacation rental properties, offices, restaurants/bars, and other developed lands, properties or activities not included in Activity Categories A through D or F.
F	Not Applicable	Not Applicable	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	Not Applicable	Not Applicable	Undeveloped lands that are not permitted for development.

¹Hourly A-weighted sound level in dBA, reflecting a 1-dBA approach value below 23 CFR 772 values.

²Includes undeveloped lands permitted for this activity category.

The NAC for Activity Category D applies to interior areas of frequent human use. All other NACs apply to exterior areas of frequent human use. Exterior area examples include yards for Activity Category B, park activity areas for Activity Category C, and exterior restaurant dining areas for Activity Category E.

Undeveloped lands for which development has been permitted before the Date of Public Knowledge must be treated as though the development has already been constructed. CDOT considers a proposed development to be permitted when a formal building permit has been issued to the developer.

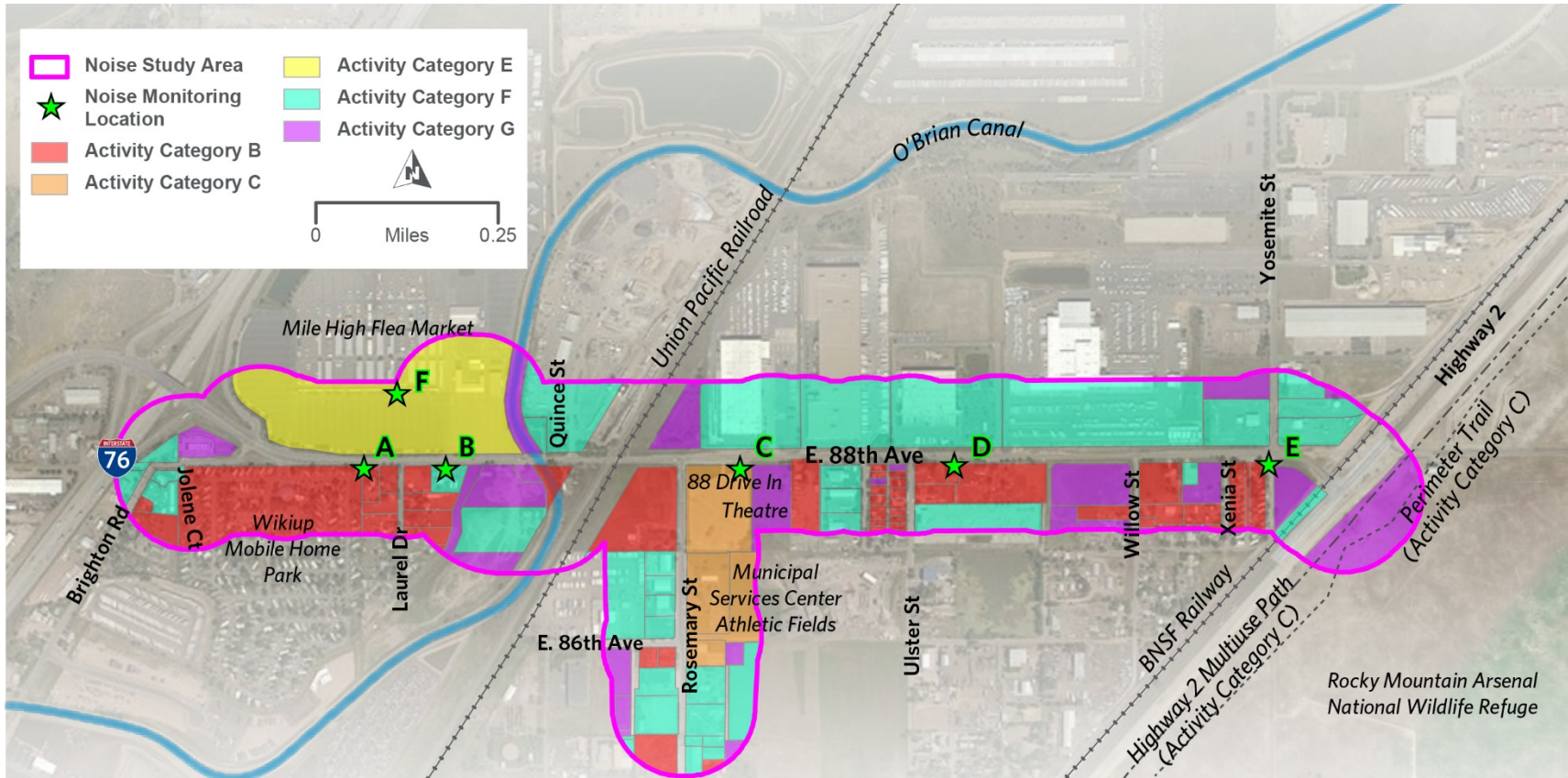
4.0 NOISE ANALYSIS METHODS

Prior to running a noise model, the analysis includes identifying the Noise Study Zone, identifying the land uses within the Noise Study Zone, taking noise measurements within the Noise Study Zone, validating the noise model, and inputting several parameters into the noise model. These steps are described in this section.

4.1 Noise Study Zone Identification

The Noise Study Zone for this project extends 500 feet in all directions from the proposed edge of travel lanes throughout the project extent, as shown in Figure 2.

Figure 2. Noise Study Zone Activity Categories and Noise Measurement Locations



1 **4.2 Land Use Identification**

2 Table 4 identifies the land use categories and noise receivers and receptors included in the noise
 3 analysis. Figure 2 identifies land uses in the Noise Study Zone.

Table 4. Land Use Considerations

<p>Receiver Activity Category Summary (see Table B-5 in Appendix B)</p>	<p>Receivers with the following Activity Categories were modeled in the existing condition and design year scenarios:</p> <ul style="list-style-type: none"> ▪ Activity Category B: 212 receivers representing 212 receptors ▪ Activity Category C: 2 receivers representing 2 receptors ▪ Activity Category E: 1 receiver representing 1 receptor
<p>Other Considerations</p>	<ul style="list-style-type: none"> ▪ The Noise Study Zone does not contain any permitted receptors that have not been built. ▪ The Noise Study Zone contains Activity Category F activities and Activity Category G land. Activity Category F activities and Activity Category G land are not considered noise sensitive, so receivers are not required for these locations. Because this project’s Noise Study Zone includes land that is unpermitted and undeveloped (i.e., Activity Category G) Part 772.17 of Title 23 of the Code of Federal Regulations (23 CFR 772.17) is applicable and information does need to be submitted to local officials, as described in Section 10.0. ▪ The following three Non-Historic Section 4(f) properties were identified (Figure 2): <ul style="list-style-type: none"> – There are several recreational fields located at the Municipal Services Center east of Rosemary Street and the Ministerio Palabra De Vida (Receptor 115). The future predicted noise level at Receptor 115 is 60.8 dBA and well below the CDOT impact criteria for NAC B or C. Noise impacts are not predicted at the recreational fields. – The Highway 2 Multiuse Path is located east of Highway 2, running parallel to the highway. There are no existing formal Highway 2 bicycle or pedestrian crossings or areas where user congregating would be expected along the trail, such as rest areas with benches or scenic viewing areas. The Proposed Action would not include roadway improvements to Highway 2 as its intersection with E. 88th Avenue was recently reconstructed, but would include formalized bicycle and pedestrian crossings of Highway 2. The bicycle and pedestrian crossing improvements would not include rest areas, benches, or scenic viewing areas. – The Rocky Mountain Arsenal National Wildlife Refuge Perimeter Trail is located east of Highway 2 right-of-way. There are no existing areas near the E. 88th Avenue and Highway 2 intersection where user congregating would be expected along the trail, such as rest areas with benches or scenic viewing areas. ▪ The Noise Study Zone has 11 Section 106 sites, 6 of which may require noise information for Section 106 purposes, which may differ from highway traffic noise requirements. These are discussed in the <i>Historic Properties</i>

Table 4. Land Use Considerations

	<i>Effects Report and Section 4(f) Analysis located in Appendix A to the E. 88th Avenue (I-76 NB Ramps to Highway 2) Environmental Assessment.</i>
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4.3 Noise Measurements

Table 5 summarizes noise measurement information and procedures used for this analysis. Traffic noise measurements were performed at different locations to acquire data for TNM model validation. Traffic counts and speeds, listed in Table 6, were collected during the noise measurement periods. Noise measurement field data sheets are in Appendix A.

Table 5. Noise Measurement Information

Number of Noise Measurement Locations	6
Noise Measurement Locations (see Figure 2)	<ul style="list-style-type: none"> ▪ Measurement Location A: WikiUp Manufactured Home Park ▪ Measurement Location B: near E. 88th Avenue/Laurel Drive ▪ Measurement Location C: near the 88 Drive-In Theatre ▪ Measurement Location D: near E. 88th Avenue/Ulster Street ▪ Measurement Location E: near E. 88th Avenue/Yosemite Street ▪ Measurement Location F: Mile High Flea Market <p>All of these measurement locations were selected because they were representative of the noise environment for each nearby area.</p>
Noise Measurement Date(s) and Time(s)	<ul style="list-style-type: none"> ▪ Measurement Location A1: February 1, 2019, started 10:57 a.m.; ended 11:27 a.m. ▪ Measurement Location A2: February 1, 2019, started 3:53 p.m.; ended 4:23 p.m. ▪ Measurement Location B1: February 1, 2019, started 9:30 a.m.; ended 10:00 a.m. ▪ Measurement Location B2: February 1, 2019, started 4:30 p.m.; ended 5:00 p.m. ▪ Measurement Location C1: February 1, 2019, started 8:49 a.m.; ended 9:19 a.m. ▪ Measurement Location C2: February 1, 2019, started 2:30 p.m.; ended 3:00 p.m. ▪ Measurement Location D1: February 1, 2019, started 8:14 a.m.; ended 8:44 a.m. ▪ Measurement Location D2: February 1, 2019, started 12:13 p.m.; ended 12:43 p.m. ▪ Measurement Location E1: February 1, 2019, started 7:38 a.m.; ended 8:08 a.m.

Table 5. Noise Measurement Information

	<ul style="list-style-type: none"> ▪ Measurement Location E2: February 1, 2019, started 11:39 a.m.; ended 12:09 p.m. ▪ Measurement Location F1: February 1, 2019, started 10:17 a.m.; ended 10:47 a.m. ▪ Measurement Location F2: February 1, 2019, started 3:18 p.m.; ended 3:48 p.m.
Length of Noise Measurements	30 minutes
Basis for Measurement Length	Noise measurements were taken for 30 minutes per CDOT TNM Users Guide for those locations close to the road and around 60 dBA noise level.
Method to Estimate Traffic Volume During Noise Measurement	Traffic was counted manually, classified by vehicle type, and used as input in the validation of the FHWA Traffic Noise Model (TNM).
Method to Estimate Traffic Speed	Used posted speed limit.
Weather Conditions (See Appendix A)	Noise measurements were made during weather conditions acceptable according to FHWA guidance (FHWA, 1996). Weather conditions, including wind speed and direction, were monitored during the measurements.
Sound Level Meter Used	Larson Davis 831; Type I
Sound Level Meter Laboratory Calibration Date	October 18, 2018
Field Calibrator Used	Larson Davis CAL200 Calibrations traceable to the United States National Institute of Standards and Technology were performed in the field before each set of measurements and checked in the field after each set of measurements.
Height of Noise Measurement Above Grade	5 feet
Other Considerations	N/A

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Table 6. Traffic Counts and Speeds Collected During Noise Measurement Periods

Measurement Location ID	Equivalent Hourly Traffic Volume					Estimated Vehicular Speed (mph)	Posted Speed Limit (mph)
	Cars	Medium Trucks	Heavy Trucks	Buses	Motor-cycles		
A1	624	24	142	2	0	35	35
A2	1200	80	120	6	4	35	35
B1	610	34	206	2	0	35	35
B2	1266	28	118	6	2	35	35
C1	158	22	70	0	0	40	40
C2	318	32	70	0	0	40	40
D1	194	20	54	2	0	40	40
D2	134	12	64	2	0	40	40
E1	304	60	70	2	0	40	40
E2	152	14	64	0	0	40	40
F1	648	46	164	0	0	40	40
F2	1194	58	164	0	0	40	40

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4.4 Model Validation

Existing noise levels were measured in the field, as described in Section 4.3, and compared to computer predictions to verify the accuracy of the computer model. This process is called model validation. If the predicted and measured levels are within ± 3 dBA of one another, the model is within the accepted level of accuracy and is considered to have been validated. Measured noise levels, corresponding modeled noise levels, and the differences between the two are presented in Table 7.

Table 7. Noise Measurement Results and Model Validation Summary

Noise Measurement Location ID	Location (see Figure 2)	Measured L_{eq} (dBA)	Modeled L_{eq} (dBA)	Difference (dBA)
A1	Wikiup Manufactured Home Park	68.4	69.0	+0.6
A2		68.9	69.7	+0.8
B1	near E. 88th Avenue/Laurel Drive	70.5	69.8	-0.7
B2		71.5	69.2	-2.3

Table 7. Noise Measurement Results and Model Validation Summary

Noise Measurement Location ID	Location (see Figure 2)	Measured L _{eq} (dBA)	Modeled L _{eq} (dBA)	Difference (dBA)
C1	near the 88 Drive-In Theatre	65.0	64.9	-0.1
C2		63.1	65.3	+2.2
D1	near E. 88th Avenue/Ulster Street	67.4	66.4	-1.0
D2		64.3	65.9	+1.6
E1	near E. 88th Avenue/Yosemite Street	67.8	67.6	-0.2
E2		66.2	65.9	-0.3
F1	Mile High Flea Market	62.5	59.7	-2.8
F2		61.3	60.2	-1.1

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Differences between measured and predicted levels are all within the allowable ±3 dBA tolerance.

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Therefore, the noise model is considered to be validated for this project.

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4.5 TNM Model Inputs

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The noise model software being used on this project was TNM Version 2.5, as required by FHWA. It was used to analyze noise levels for existing (2019) and future (2040) conditions. As part of the analysis, noise levels were calculated by the model at receivers in the Noise Study Zone. Each receiver represented one or more receptors. Modeling results represent predicted traffic conditions during peak, worst-hour noise periods. Table 8 describes model inputs and methods.

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Table 8. TNM Model Inputs

Noise Sensitive Receptors	Noise sensitive receptors are defined according to CDOT’s NAC (see Section 3.3). Receivers (modeled points) were selected to represent these receptors within the Noise Study Zone.
Receivers	Receivers are listed in Table B-5 in Appendix B and shown in Figure 3a through Figure 3c.
Modeled Roadways	<p>The following roadways were modeled:</p> <ul style="list-style-type: none"> ▪ E. 88th Avenue ▪ Interstate 76 (I-76) ▪ Highway 2 (Hwy 2) ▪ Rosemary Street ▪ Ulster Street ▪ Willow Street <p>For the Proposed Action, the analysis included roads that would be changed or newly built by the project, would have substantially different traffic volumes, or would be important local traffic noise sources.</p>
Differences in How Roadways Were Modeled Between Alternatives	<p>The Proposed Action model differed from the Existing Conditions model in the following ways:</p> <ul style="list-style-type: none"> ▪ Traffic volumes ▪ Number of lanes and alignment of E. 88th Avenue ▪ Improvements in access to E. 88th Avenue between Brighton Road and Quince Street. ▪ Improvements to the E. 88th Avenue and Rosemary Street intersection.
TNM Objects and Elevations	The only objects that were modeled were receivers, roadways, ground zones and building barriers. The Noise Study Zone does not contain any additional features that would affect noise to a degree that they needed to be included in the model (Figure 4 and Figure 5).
Existing Noise Barriers	The Noise Study Zone did not contain any existing noise barriers.
Modeled Pavement Type	Average (FHWA requirement)
Default Ground Type	Lawn
Traffic Data (See Appendix B)	<ul style="list-style-type: none"> ▪ Roadway coordinates were generated from GIS, CAD and aerial photographs. ▪ Traffic volumes and vehicle mix were supplied by EST Engineering for both the existing and 2040 years.

Figure 3a. Receiver Locations for Existing (2019) Conditions and 2040 No-Action Alternative

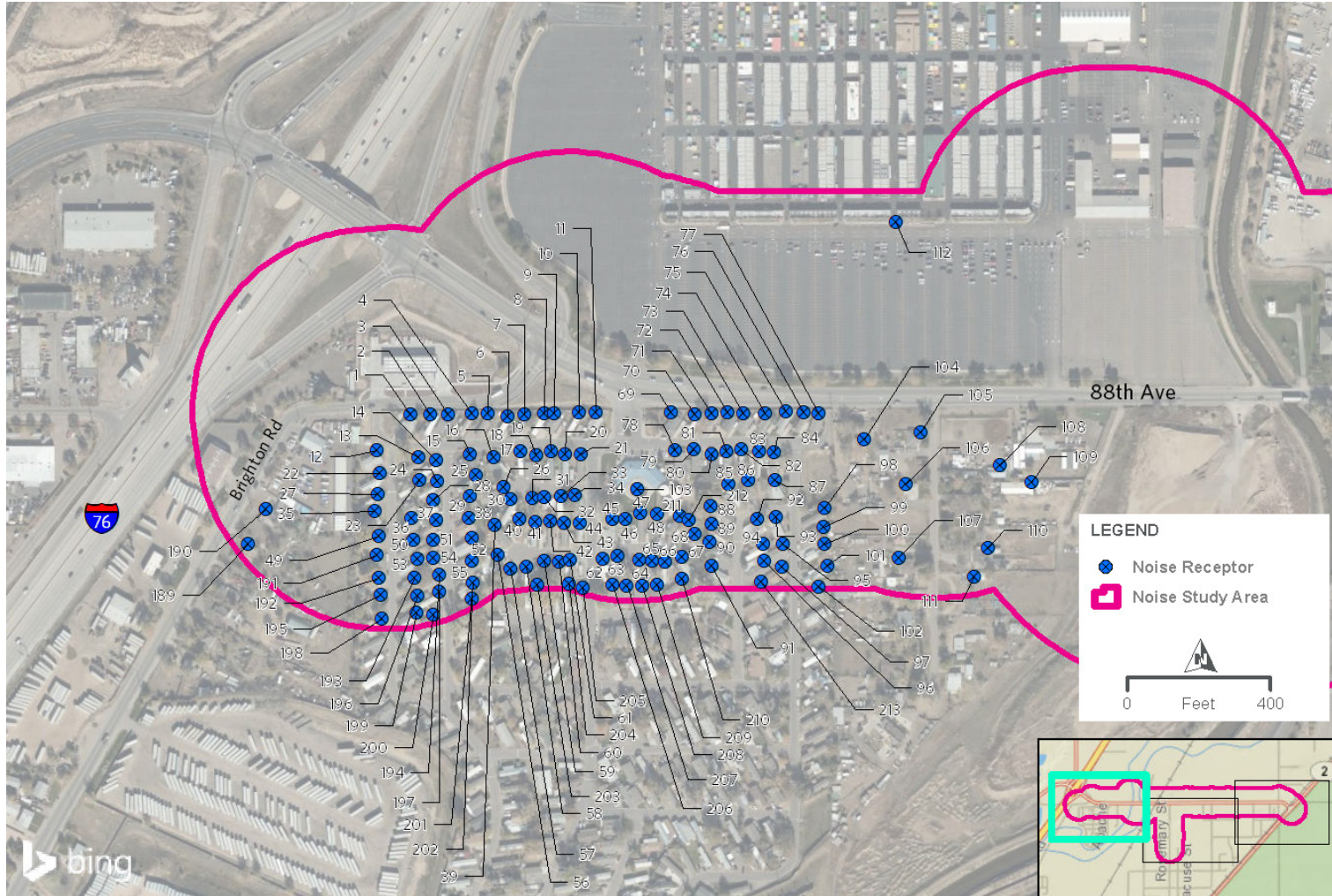
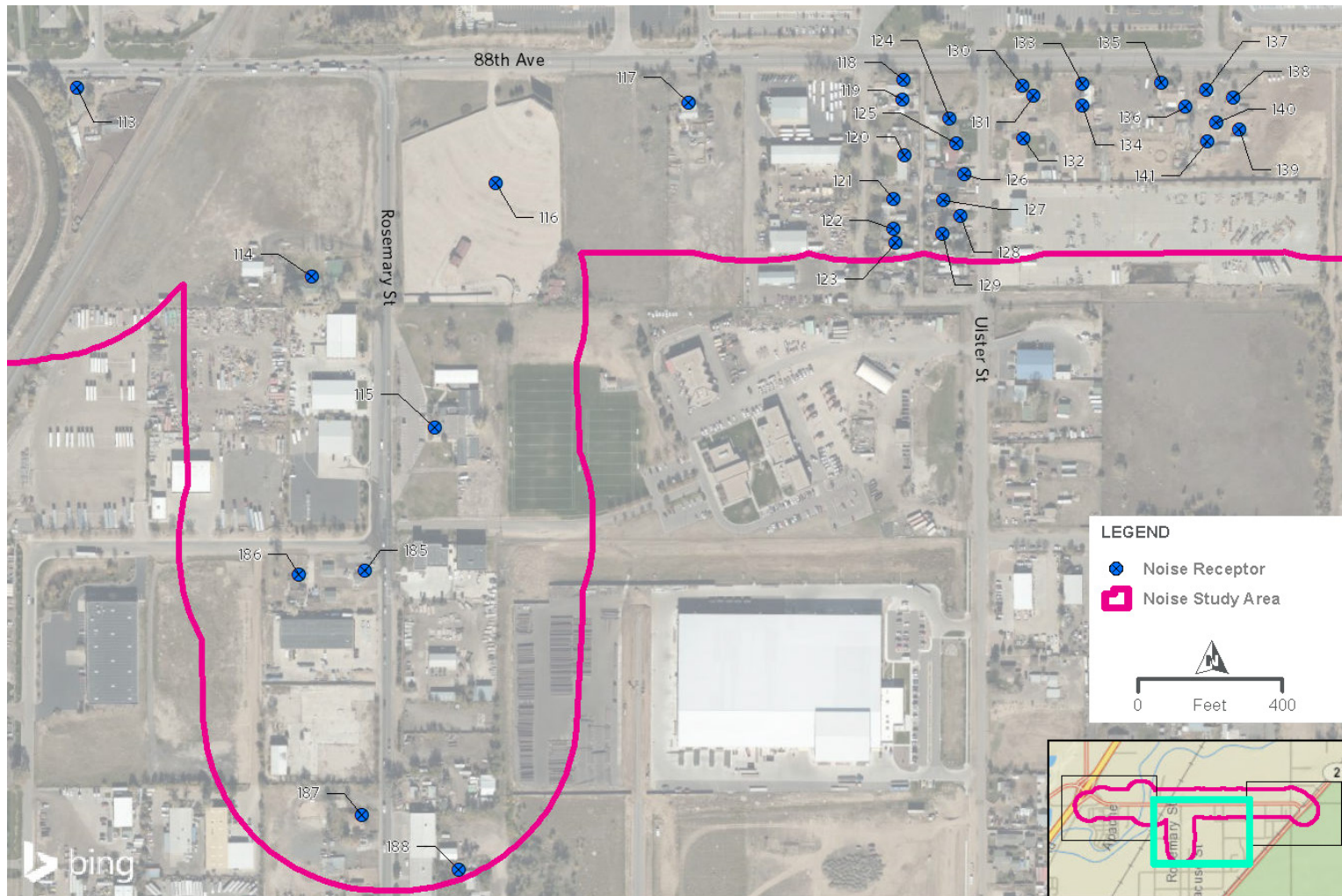


Figure 3b. Receiver Locations for Existing (2019) Conditions and 2040 No-Action Alternative



1

Figure 3c. Receiver Locations for Existing (2019) Conditions and 2040 No-Action Alternative

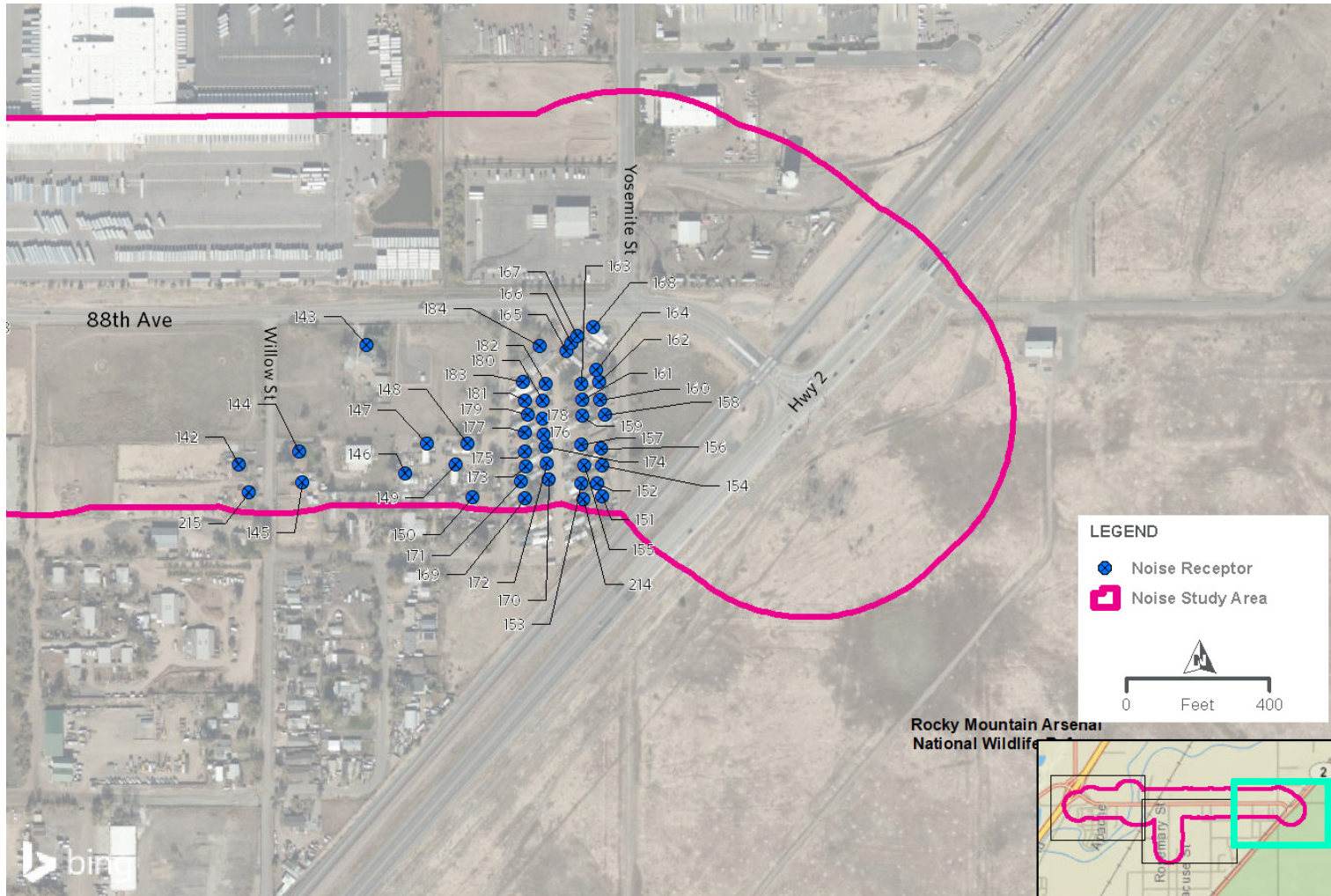


Figure 4. TNM Model Objects for 2019 Existing Conditions and 2040 No-Action Alternative



Figure 5. TNM Model Objects for 2040 Proposed Action



1

5.0 TNM RESULTS

In the analysis, 215 receivers representing 215 receptors were modeled (see Table B-5 in Appendix B). The resulting modeled noise levels were used to identify which, if any, receptors would be impacted as a result of the Proposed Action. The TNM files, which contain model inputs and outputs, are included in this document as Appendix C but submitted separately to CDOT as electronic files.

5.1 Existing Conditions Summary

Under existing conditions (2019), modeled noise levels at 215 receivers range from 43.9 to 72.6 dBA. Figure 3a through Figure 3c show the locations of all modeled receivers. Table B-5 in Appendix B has the modeled noise level at each receiver. Existing conditions are not described as having noise impacts. If the project weren't built, the project would not be responsible to mitigate noise via an abatement measure regardless of if existing noise levels exceeded NACs.

5.2 No-Action Alternative Summary

Under the No-Action Alternative (2040), modeled noise levels at 215 receivers ranged from 44.7 to 73.9 dBA. Figure 3a through Figure 3c show the locations of all modeled receivers. Table B-5 in Appendix B has the modeled noise level at each receiver. No noise impacts are explicitly associated with the No-Action Alternative. If the project weren't built, the project would not be responsible to mitigate noise via an abatement measure regardless of if the No-Action Alternative noise levels exceeded NACs.

5.3 Proposed Action Summary

Under the Proposed Action (2040), modeled noise levels at 215 receivers ranged from 44.7 to 74.1 dBA. 28 receivers, representing 28 receptors, would exceed the NAC and no receivers would experience a substantial noise increase of at least 10 dBA. Therefore, a total of 28 receivers, representing 28 receptors, would be impacted during the design year (2040) peak, worst-hour noise period (see Figure 6a through Figure 6c). Table B-5 in Appendix B has the modeled noise level at each receiver.

5.4 Considered Alternative Summary

Three alignment options along E. 88th Avenue were evaluated in the *Design Options Screening Report*, located in Appendix A of the Environmental Assessment. The alignment that widened away from the most residences was chosen, to minimize impacts. Options proposed outside of the study area would not meet the location-specific Purpose and Need determined within the project study area.

Figure 6a. Receiver Noise Levels for 2040 Proposed Action (Impacts Identified)

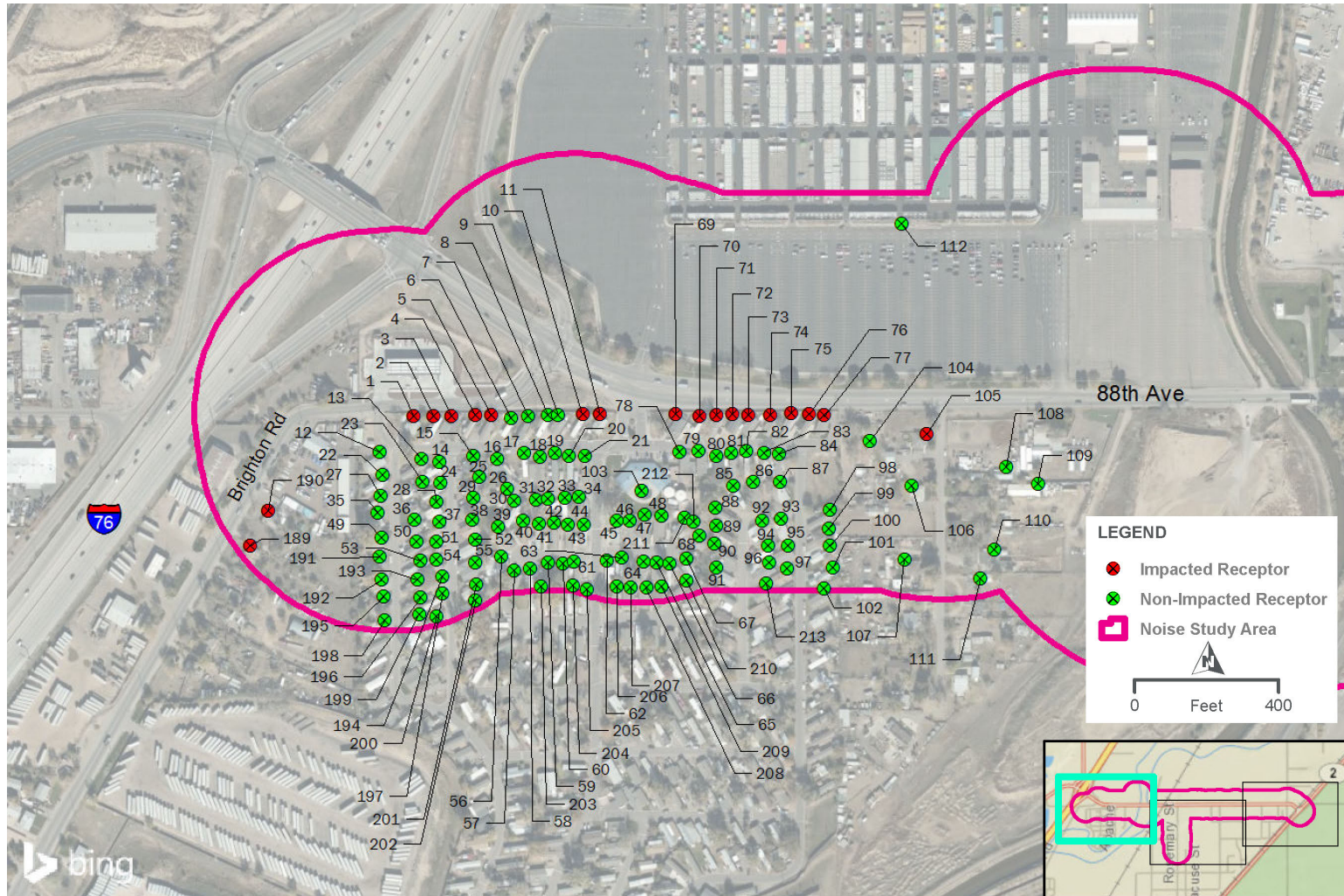


Figure 6b. Receiver Noise Levels for 2040 Proposed Action (Impacts Identified)

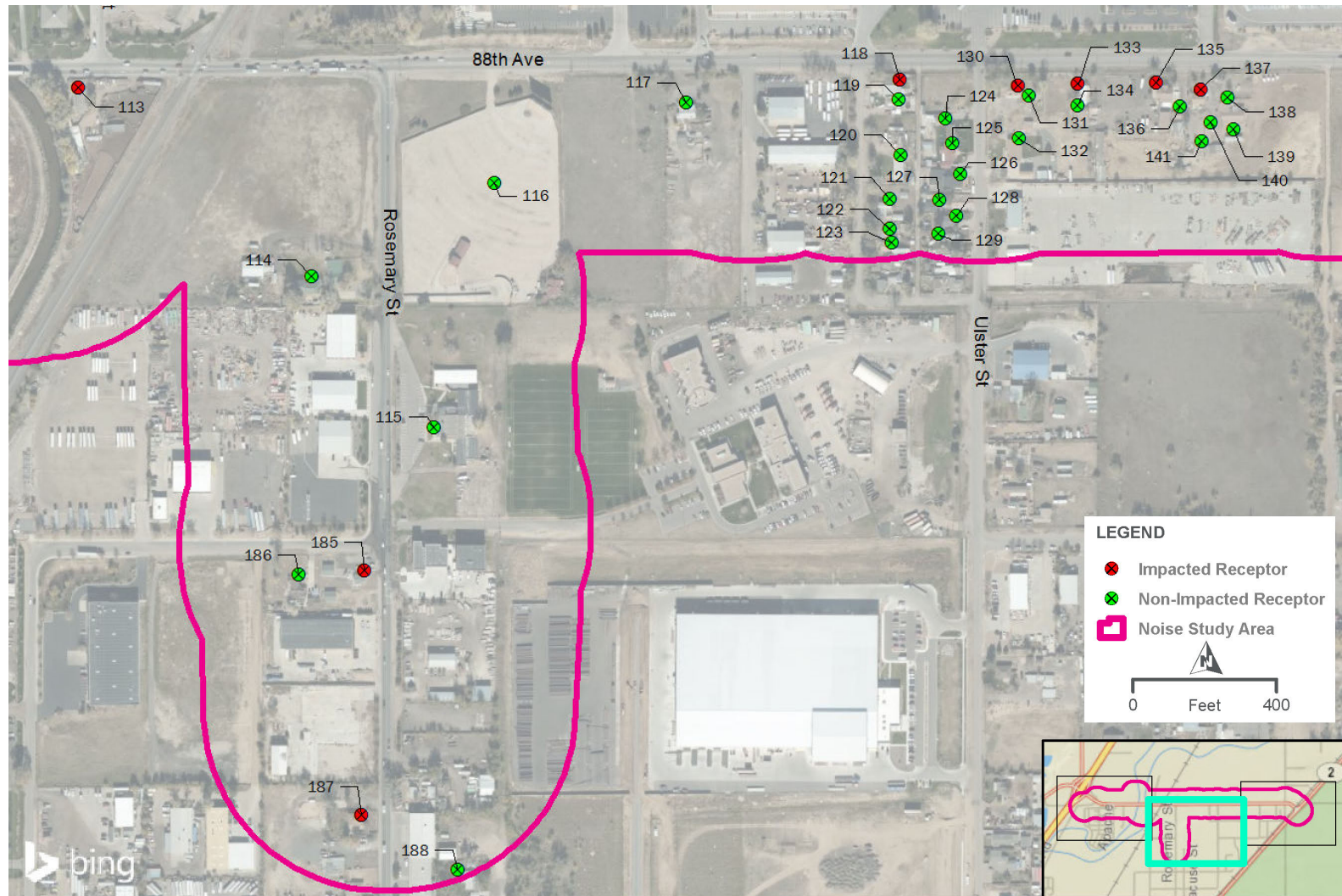
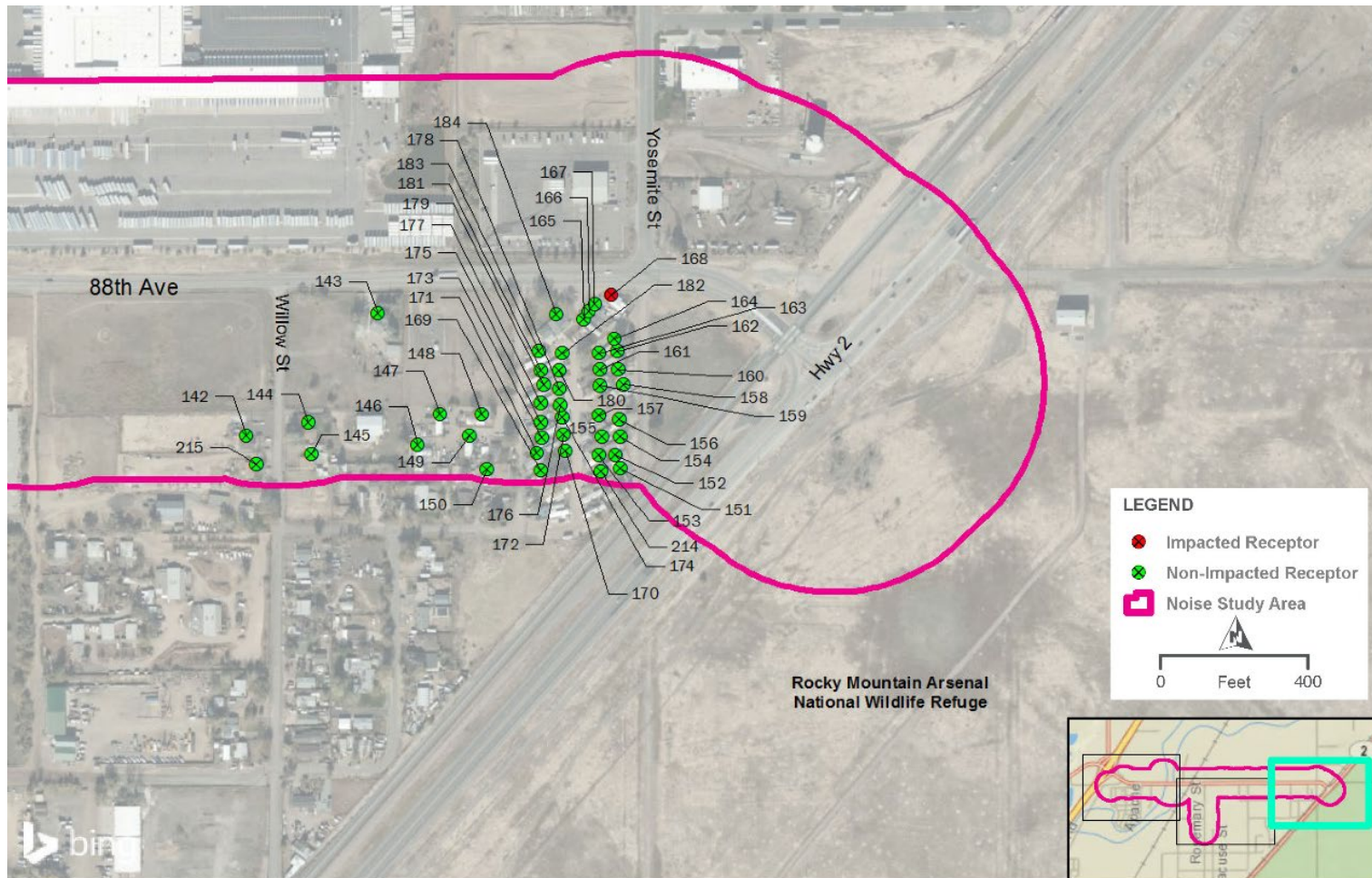


Figure 6c. Receiver Noise Levels for 2040 Proposed Action (Impacts Identified)



6.0 NOISE ABATEMENT EVALUATION

As described in Section 5.0, 28 receptors in the Noise Study Zone would be impacted by noise in 2040 under the Proposed Action. Therefore, abatement for the impacted receptors was evaluated in accordance with guidelines from CDOT's NAAG and FHWA's Guidelines. Although abatement was required to be evaluated, it would only be recommended for inclusion in the project when determined to be both feasible and reasonable.

Abatement is feasible if it:

- ◆ Provides at least 5 dBA of noise reduction for at least one receptor.
- ◆ Does not have any "fatal flaw" issues (e.g., safety, maintenance, access, drainage).
- ◆ Does not exceed 20 feet in height.

If abatement is not found to be feasible, further evaluation is not needed. However, it is found to be feasible, reasonableness is evaluated. Abatement is reasonable if it:

- ◆ Meets the minimum design goal of at least 7 dBA of noise reduction for at least one receptor.
- ◆ Equals or costs less than the Cost Benefit Index of \$6,800/dBA/receptor of benefit.
- ◆ Has support from more than 50 percent of the potentially benefitted receptors, determined through Benefitted Receptor Preference Survey, which may be conducted after the National Environmental Policy Act (NEPA) process and will be documented in a separate report.

6.1 Noise Abatement Options Considered

Noise barriers (and, to a lesser extent, berms) are commonly used as noise abatement and must be evaluated for all impacted receptors, per 23 CFR 772.13(c)(1). Other mitigation measures may also be considered, including traffic management measures (e.g., traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, and exclusive lane designations); alteration of horizontal and vertical alignments; acquisition of real property or interests therein to serve as a buffer zone to preempt development which would be adversely impacted by traffic noise; and noise insulation (for Activity Category D land use facilities only). However, these mitigation measures are generally not feasible and/or reasonable. For this project, noise barriers were the only abatement evaluated.

6.2 Noise Abatement: Noise Insulation

The Noise Study Zone doesn't have any Activity Category D receptors. Therefore, noise insulation was not considered as abatement for this project.

6.3 Noise Barrier Evaluation

Barrier placement was considered in multiple locations. The one determined to be the best performer for each set of impacted receivers was optimized, and those results are described in Table 9.

Figure 7 shows the best performing evaluated barrier locations. Appendix D has five CDOT Noise Abatement Determination Worksheets (CDOT Form 1209); one was completed for each barrier that was evaluated.

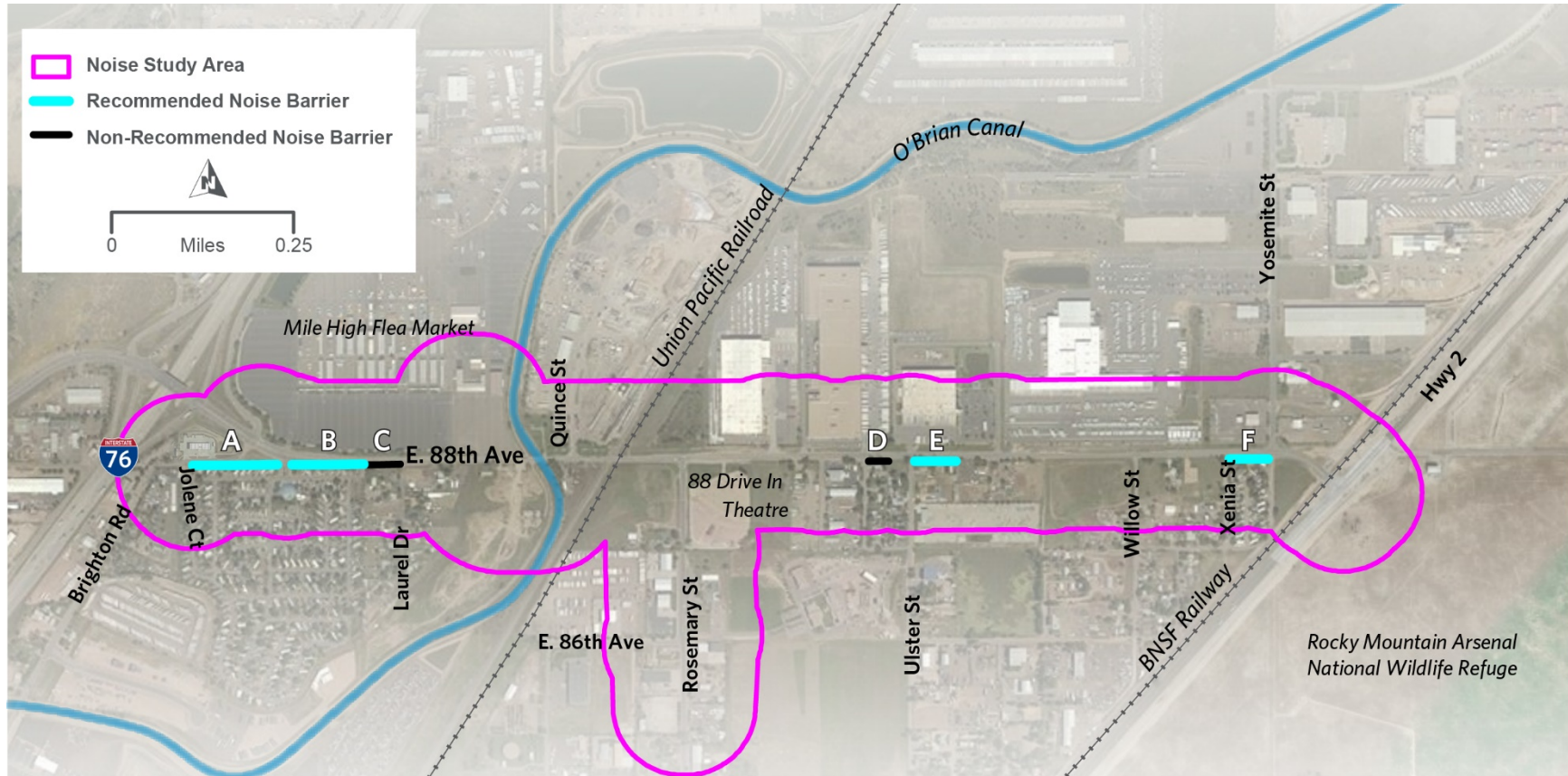
Table 9. Noise Barriers Evaluated for the Proposed Action

Barrier ID	Barrier A	Barrier B	Barrier C	Barrier D	Barrier E	Barrier F
Barrier Location (general)	South of Brighton Road/ E. 88th Avenue, west of Wikiup Entrance	South of E. 88th Avenue, east of Wikiup Entrance	South of E. 88th Avenue, west of Laurel Drive	South of E. 88th Avenue, east of Tamarac Street	South of E. 88th Avenue, east of Ulster Street	South of E. 88th Avenue, between Xenia Street and Yosemite Street
Barrier Location: Distance from Proposed Edge of Roadway (feet)	≈ 53 feet from the edge of the proposed left turn lane from 88th to Brighton. Immediately adjacent to Brighton.	≈ 15 feet from the edge of the proposed E. 88th Avenue	≈ 15 feet from the edge of the proposed E. 88th Avenue	≈ 23 feet from the edge of the proposed 88th Avenue	≈ 24 feet from the edge of the proposed E. 88th Avenue	≈ 25 feet from the edge of the proposed E. 88th Avenue
Benefitted Receiver IDs	1-11	69-77	N/A	118	130-131, 133-134	165-168, 184
Recommended Barrier Height & Length (feet)	8 high x 614 long	10 high x 519 long	20 high x 235 long	8 high x 146 long	12 high x 300 long	12 high x 282 long
Barrier Area (square feet)	4,912	5,190	4,700	1,168	3,600	3,384
Unit Cost	\$45/ft ²	\$45/ft ²	N/A	\$45/ft ²	\$45/ft ²	\$45/ft ²
Total Cost	\$221,040	\$233,550	N/A	\$52,560	\$162,000	\$152,280
No. Benefiting Receptors	11	9	0	1	4	5
Total Decibels of Benefit Provided	85.8	106.7	N/A	7.2	30.2	40.7
Average Benefit (dBA/receptor)	7.8	11.9	N/A	7.2	7.6	8.1

Table 9. Noise Barriers Evaluated for the Proposed Action

Barrier ID	Barrier A	Barrier B	Barrier C	Barrier D	Barrier E	Barrier F
Cost Benefit Index (\$/dBA/receptor)	\$2,576	\$2,189	N/A	\$7,300	\$5,364	\$3,742
Design year L_{eq} Range Without Abatement (dBA)	57.1 to 67.1	57.2 to 74.1	N/A	60.9 to 67.9	55.9 to 66.9	62.4 to 68.1
Design year L_{eq} Range With Abatement (dBA)	56.3 to 60.3	55.5 to 63.5	N/A	58.6 to 60.7	53.9 to 59.1	55.2 to 58.0
Feasible?	Yes	Yes	No	Yes	Yes	Yes
Reasonable?	Yes	Yes	No	No	Yes	Yes
Recommended?	Yes	Yes	No	No	Yes	Yes

Figure 7. Potential Noise Barrier Locations



Six impacted areas and six potential noise barriers were evaluated for the Proposed Action. Of the evaluated noise barriers, 4 were found to be feasible and reasonable, as described Table 9. For details of the modeling completed at each of the 6 noise barrier locations, see the noise abatement evaluation worksheets in Appendix D.

Noise Barrier A was able to achieve the minimum feasible reduction of 5 dBA while achieving the 7 dBA noise reduction goal as well as meeting the Cost Benefit Index of \$6,800/dBA/receptor of benefit. Noise Barrier A is recommended.

Noise Barrier B was able to achieve the minimum feasible reduction of 5 dBA while achieving the 7 dBA noise reduction goal as well as meeting the Cost Benefit Index of \$6,800/dBA/receptor of benefit. Noise Barrier B is recommended.

Noise Barrier C was determined to not be feasible as it was unable to achieve the minimum feasible reduction of 5 dBA at any receptors. Noise Barrier C is not recommended.

Noise Barrier D was able to achieve the minimum feasible reduction of 5 dBA while achieving the 7 dBA noise reduction goal. However, Noise Barrier D was unable to meet the Cost Benefit Index of \$6,800/dBA/receptor of benefit and is not recommended.

Noise Barrier E was able to achieve the minimum feasible reduction of 5 dBA while achieving the 7 dBA noise reduction goal as well as meeting the Cost Benefit Index of \$6,800/dBA/receptor of benefit. Noise Barrier E is recommended.

Noise Barrier F was able to achieve the minimum feasible reduction of 5 dBA while achieving the 7 dBA noise reduction goal as well as meeting the Cost Benefit Index of \$6,800/dBA/receptor of benefit. Noise Barrier F is recommended.

There are several areas where a noise barrier was unable to be modeled for an impacted receptor. Where driveways provide direct access to immediately adjacent roadways, noise barriers would limit sight distance for vehicles entering and existing the property, thus creating safety concerns. These areas are described as follows:

- ◆ **R113.** This receptor directly abuts E. 88th Avenue. A driveway is located directly in front of this property not allowing a noise barrier to be modeled in this location.
- ◆ **R135.** This receptor directly abuts E. 88th Avenue. A driveway is located directly in front of this property not allowing a noise barrier to be modeled in this location.
- ◆ **R137.** This receptor directly abuts E. 88th Avenue. A driveway is located directly in front of this property not allowing a noise barrier to be modeled in this location.
- ◆ **R185.** This receptor directly abuts Rosemary Street. A driveway is located directly in front of this property not allowing a noise barrier to be modeled in this location.
- ◆ **R187.** This receptor directly abuts Rosemary Street. A driveway is located directly in front of this property not allowing a noise barrier to be modeled in this location.
- ◆ **R189.** This receptor directly abuts Brighton Road. A driveway is located directly in front of this property not allowing a noise barrier to be modeled in this location.

R190. This receptor directly abuts Brighton Road. A driveway is located directly in front of this property not allowing a noise barrier to be modeled in this location.

7.0 STATEMENT OF LIKELIHOOD

The noise abatement evaluation for the Proposed Action is described in Section 1.0. 28 receivers representing 28 receptors were determined to be impacted by traffic noise in 2040 for the Proposed Action. The impacts would occur throughout the entire Noise Study Zone and are shown in Figure 2.

Noise abatement was determined to be feasible and reasonable at 4 locations. Therefore, the following noise barriers are recommended to be constructed:

- ◆ Barrier A: South of Brighton Road/ E. 88th Avenue, west of Wikiup Entrance, 8 feet high by 614 feet long.
- ◆ Barrier B: South of E. 88th Avenue, east of Wikiup Entrance, 10 feet high by 519 feet long.
- ◆ Barrier E: South of E. 88th Avenue, east of Ulster Street, 12 feet high by 300 feet long.
- ◆ Barrier F: South of E. 88th Avenue, between Xenia Street and Yosemite Street, 12 feet high by 282 feet long.

Noise abatement at two locations was determined not to be feasible and/or reasonable, as described in Section 1.0 and Table 10.

Note that feasibility and reasonableness determinations for this project may change if there are changes in final design after approval of the NEPA documentation. In addition, abatement won't be built if the Benefitted Receptor Preference Survey results in 50 percent or less support for the abatement.

Table 10. Modeled Noise Levels With and Without Abatement

Benefitted Receiver ID	Benefitted Receiver Description	Barrier ID	Proposed Action (2040)		
			Leq (dBA)		
			Without Abatement	With Abatement	Insertion Loss
1—Single Family	6500 E 88th Avenue	A	67.1	60.3	6.8
2—Single Family	6500 E 88th Avenue	A	66.8	59.1	7.7
3—Single Family	6500 E 88th Avenue	A	66.0	57.4	8.6
4—Single Family	6500 E 88th Avenue	A	66.8	57.1	9.7
5—Single Family	6500 E 88th Avenue	A	66.7	56.3	10.4
6—Single Family	6500 E 88th Avenue	A	65.1	58.1	7.0
7—Single Family	6500 E 88th Avenue	A	65.1	58.0	7.1
8—Single Family	6500 E 88th Avenue	A	65.3	57.6	7.7

Table 10. Modeled Noise Levels With and Without Abatement

Benefitted Receiver ID	Benefitted Receiver Description	Barrier ID	Proposed Action (2040)		
			L _{eq} (dBA)		
			Without Abatement	With Abatement	Insertion Loss
9—Single Family	6500 E 88th Avenue	A	65.2	58.0	7.2
10—Single Family	6500 E 88th Avenue	A	65.6	58.3	7.3
11—Single Family	6500 E 88th Avenue	A	66.0	59.7	6.3
13—Single Family	6500 E 88th Avenue	A	58.9	58.8	0.1
14—Single Family	6500 E 88th Avenue	A	58.0	57.8	0.2
15—Single Family	6500 E 88th Avenue	A	58.4	58.0	0.4
16—Single Family	6500 E 88th Avenue	A	57.9	57.7	0.2
17—Single Family	6500 E 88th Avenue	A	57.9	57.7	0.2
18—Single Family	6500 E 88th Avenue	A	57.1	56.7	0.4
19—Single Family	6500 E 88th Avenue	A	57.6	57.2	0.4
20—Single Family	6500 E 88th Avenue	A	57.9	57.8	0.1
21—Single Family	6500 E 88th Avenue	A	59.3	58.6	0.7
69—Single Family	6500 E 88th Avenue	B	72.6	60.3	12.3
70—Single Family	6500 E 88th Avenue	B	72.7	62.0	10.7
71—Single Family	6500 E 88th Avenue	B	73.5	61.8	11.7
72—Single Family	6500 E 88th Avenue	B	73.7	60.9	12.8
73—Single Family	6500 E 88th Avenue	B	73.6	60.9	12.7
74—Single Family	6500 E 88th Avenue	B	73.6	61.0	12.6
75—Single Family	6500 E 88th Avenue	B	74.1	61.6	12.5
76—Single Family	6500 E 88th Avenue	B	73.9	62.1	11.8
77—Single Family	6500 E 88th Avenue	B	73.1	63.5	9.6
78—Single Family	6500 E 88th Avenue	B	61.7	60.2	1.5
79—Single Family	6500 E 88th Avenue	B	59.3	56.4	2.9
80—Single Family	6500 E 88th Avenue	B	57.4	55.5	1.9

Table 10. Modeled Noise Levels With and Without Abatement

Benefitted Receiver ID	Benefitted Receiver Description	Barrier ID	Proposed Action (2040)		
			L _{eq} (dBA)		Insertion Loss
			Without Abatement	With Abatement	
81—Single Family	6500 E 88th Avenue	B	57.2	55.5	1.7
82—Single Family	6500 E 88th Avenue	B	57.5	55.6	1.9
83—Single Family	6500 E 88th Avenue	B	58.8	56.4	2.4
84—Single Family	6500 E 88th Avenue	B	59.1	56.8	2.3
104—Single Family	6840 E 88th Avenue	C	65.2	61.6	3.6
105—Single Family	8781 Laurel Drive	C	66.1	62.6	3.5
118—Single Family	8796 Tamarac Street	D	67.9	60.7	7.2
119—Single Family	8790 Tamarac Street	D	60.9	58.6	2.3
130—Single Family	8796 Ulster Street	E	66.3	58.4	7.9
131—Single Family	8796 Ulster Street	E	63.1	53.9	9.2
132—Single Family	8786 Ulster Street	E	55.9	54.2	1.7
133—Single Family	8190 E 88th Avenue	E	66.9	59.1	7.8
134—Single Family	8190 E 88th Avenue	E	60.4	55.1	5.3
165—Single Family	8810 E 88th Avenue	F	62.4	55.2	7.2
166—Single Family	8810 E 88th Avenue	F	63.7	55.9	7.8
167—Single Family	8810 E 88th Avenue	F	65.4	56.7	8.7
168—Single Family	8810 E 88th Avenue	F	68.1	56.6	11.5
184—Single Family	8810 E 88th Avenue	F	63.5	58.0	5.5

8.0 CONSTRUCTION NOISE

8.1 Construction Noise Implications

Properties adjoining project construction may be exposed to noise from construction activities from the Proposed Action. Construction noise differs from traffic noise in several ways:

- ◆ Construction noise lasts only for the duration of the construction event, with most construction activities in noise-sensitive areas being conducted during hours that are least disturbing to most nearby residents.
- ◆ Construction activities generally are short term and, depending on the nature of the construction operations, could last from seconds (e.g., a truck passing a receptor) to months (e.g., bridge construction).
- ◆ Construction noise is intermittent and depends on the type of operation, location, and function of the equipment, as well as the equipment usage cycle.

Construction noise is not analyzed; and there are no FHWA or CDOT construction NACs. However, construction noise is subject to relevant local regulations and ordinances (see Section 8.2).

8.2 Local Noise Ordinances

The Proposed Action is located in Commerce City and in Adams County, both of which only have nuisance-based noise ordinances. Therefore, Colorado Noise Statute 25-12-103 applies. This means that noise at 25 feet from the Proposed Action boundary may not exceed 80 dBA from 7:00 a.m. until 7:00 p.m. and 75 dBA from 7:00 p.m. until 7:00 a.m.

9.0 MITIGATION

Noise mitigation measures are presented in Table 11.

Table 11. Summary of Impacts and Mitigation

Mitigation Category	Impact	Mitigation Commitment from Source Document	Responsible Branch	Timing/Phase that Mitigation will be Implemented
Environmental Justice, Noise	Permanent increases in noise levels from increased traffic volumes	Noise barriers are recommended at 4 locations to reduce noise where they were found to be feasible and reasonable. Feasibility and reasonableness determinations may change if there are changes in final design after approval of the NEPA documentation. The recommended noise barriers would not be built if the Benefitted Receptor Preference Survey results in 50 percent or less support for the abatement	City of Commerce City	Pre-Construction
Noise	Noise increases during construction	<p>Typical best management practices will be incorporated into construction contracts where it is appropriate to do so. These may include:</p> <ul style="list-style-type: none"> ▪ Notify neighbors in advance when construction noise may occur. ▪ Keep noisy activities as far from sensitive receptors as possible. ▪ Use properly designed engine enclosures and intake silencers if appropriate. ▪ Place stationary equipment as far from sensitive receptors as possible. ▪ Perform construction activities in noise-sensitive areas during hours that are least disturbing to nearby residents. 	City of Commerce City, Contractor	During Construction

10.0 INFORMATION FOR LOCAL OFFICIALS

This Proposed Action's Noise Study Zone includes land that is unpermitted and undeveloped (i.e., Activity Category G; Figure 2). Therefore, 23 CFR 772.17 is applicable and noise-related information needs to be submitted to local officials to support local land use planning decisions and future development.

Distances from the edge of the nearest travel lane of the highway improvement to where the design year (2040) noise levels reach Activity Category B and C NAC (66 dBA) and Activity Category E NAC (71 dBA), were established for the Noise Study Zone. Distances may vary somewhat through the corridor because of topography and changing road alignments, but in general, land within approximately 135 feet from the proposed new edge of the nearest travel lane are predicted to exceed 66 dBA during peak traffic noise hours. The distance to 71 dBA for sensitive commercial properties is predicted to be approximately 45 feet from the proposed new edge of the nearest travel lane. Properties developed in those areas would not be compatible with Activity Category B or C (66 dBA) or Activity Category E (71 dBA) uses, respectively.

Each state highway agency is required to identify when the public is officially notified of a proposed highway project location. CDOT's NAAG defines the Date of Public Knowledge as the date on which the final environmental project document is approved (i.e., signed Categorical Exclusion Form 128, Finding of No Significant Impact, or Record of Decision). After this date, CDOT and FHWA will be responsible for analyzing and documenting existing and future noise levels for these lands but will not be required to provide noise abatement for development on these lands if it was permitted after the Date of Public Knowledge. Decisions concerning such noise abatement are left to local government agencies and private developers. In addition, these areas would not be eligible for Federal-aid participation for Type II projects, if funding to the Type II program were to be reinstated in Colorado.

11.0 REFERENCES

23 CFR § 772. 2010. Procedures for Abatement of Highway Traffic Noise and Construction Noise.

Colorado Department of Transportation (CDOT). 2015b. Noise Analysis and Abatement Guidelines. January.

Colorado Department of Transportation (CDOT). 2017. CDOT NEPA Manual.

Colorado Noise Statute 25-12-103. Maximum Permissible Noise Levels.

Federal Highway Administration (FHWA). 1996. Measurement of Highway-Related Noise. May.

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

Federal Highway Administration (FHWA). 2011. Highway Traffic Noise: Analysis and Abatement Guidance. December.

Federal Railroad Administration (FRA). 2017. U.S. DOT Crossing Inventory Form, Crossing Inventory Number 804594Y. <https://fragis.fra.dot.gov/GISFRASafety/>. Form last revised November, 16.

Appendix A. Noise Measurement Data

TRAFFIC NOISE MONITORING LOG SHEET

Loc A

Project Description: 88th Ave EA Data File: .006

Job Number: 10137893 Noise Source: 88th Ave

Date: 1 Feb 2019 By: Tava Kent

Equipment	Type	Serial #
Sound Level Meter	LD 831	1375
Microphone	377 802	135635
Calibrator	CAL 200	9823

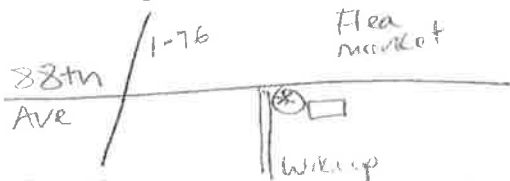
SLM SETTINGS (circle one) FAST SLOW

WEIGHTING (circle one) A Lin.

Location Description: corner home (as close as I can, no RUF)

Wiki up homes / 88th Ave 39.8562 ; -104.9097

Location Diagram: 335 mph



Start Time: 10:57 AM PM Stop Time: 11:27 AM PM Duration: 30 min

Wind Speed: 1-2 mph Wind Direction: SSW

Temperature: 49°F sunny Humidity: 22%

Calibration results before: 113.56 dBA and after 114.0 dBA

+0.6 TNM
69.0 Leq 68.4 dBA Lmin _____ dBA Lmax _____ dBA

L10 _____ dBA L50 _____ dBA L90 _____ dBA

138/276

West Bound

East Bound

	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles
West Bound	 	 5/10	- 30/60		
East Bound	 	 7/14	 1 41/82	1 1/2	

Traffic counts need to be directional

|||| 174/348

1 Loc B

TRAFFIC NOISE MONITORING LOG SHEET

Project Description: 27th Ave FA Data File: .004

Job Number: 10137893 Noise Source: 88th Ave

Date: 1 Feb 2019 By: Tava Kent

Equipment	Type	Serial #
Sound Level Meter	LD 531	1375
Microphone	377 B02	135635
Calibrator	CAL 200	9823

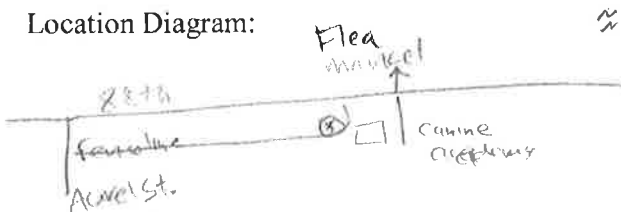
SLM SETTINGS (circle one) FAST SLOW

WEIGHTING (circle one) A Lin.

Location Description: no POE for Canine Academy, set up just (W) of

8790 Laurel 39.8561 -104.9061

Location Diagram:



constant barking dogs & roosters
 chx pigs
 ducks
 horses
 geese
 dogs

Start Time: 9:30 AM PM Stop Time: 10:00 AM PM Duration: 30 min

Wind Speed: 0-2 mph Wind Direction: ESE

Temperature: 45° F Humidity: 41%

Calibration results before: 113.56 dBA and after 114.0 dBA

TNM
69.8 -0.7

Leq 70.5 dBA Lmin _____ dBA Lmax _____ dBA

L10 _____ dBA L50 _____ dBA L90 _____ dBA

135/270

West Bound

East Bound

	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles
West Bound	 	 4/8	 46/92		
East Bound	 	 13/26	 57/114	1 1/2	

Traffic counts need to be directional

170/340

Loc B
2nd reading

TRAFFIC NOISE MONITORING LOG SHEET

Project Description: 88th Ave EA Data File: .012
 Job Number: 10137893 Noise Source: 88th Ave
 Date: 11/6/2019 By: T. Kont

Equipment	Type	Serial #
Sound Level Meter	LD 831	1375
Microphone	377 B02	135635
Calibrator	CAL 200	9823

SLM SETTINGS (circle one) FAST SLOW

WEIGHTING (circle one) (A) Lin.

Location Description: near canine academy
≈ 35 mph

Location Diagram:

Start Time: 16:30 AM PM Stop Time: 17:00 AM PM Duration: 30 min

Wind Speed: 6-7 mph Wind Direction: ESE

Temperature: 54°F Humidity: 22%

Calibration results before: 113.96 dBA and after 114.0 dBA

Leq 71.5 dBA ^{TNM} Lmin _____ dBA Lmax _____ dBA
 L10 _____ dBA ^{69.2} L50 _____ dBA L90 _____ dBA

	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles
(West)		1		1	1
		1/2	15/30	1/2	1/2
(FB)				11	
		18/36	44/88	2/4	

Traffic counts need to be directional

283/566

TRAFFIC NOISE MONITORING LOG SHEET

LOC

Project Description: 88th Ave EA Data File: 003

Job Number: 10137893 Noise Source: 88th Ave

Date: 1 Feb 2019 By: Tara Kent

Equipment	Type	Serial #
Sound Level Meter	L-D 831	1375
Microphone	377B02	135635
Calibrator	CAL 200	9823

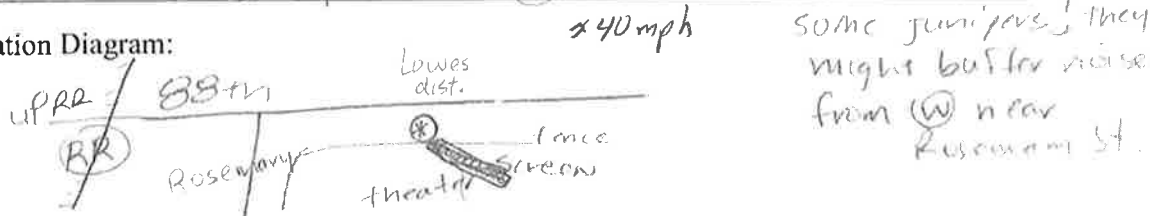
SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) **A** Lin.

Location Description: 39.8560; -104.8181

outside of fence; Right under (L) side of movie screen

Location Diagram:



Start Time: 8:49 AM PM Stop Time: 9:19 AM PM Duration: 30 min

Wind Speed: 1-2 mph Wind Direction: SE

Temperature: 35 °F Humidity: 51 %

Calibration results before: 113.56 dBA and after 114.0 dBA

Leq 65.0 dBA ^{TNM} 64.9 -0.1 Lmin _____ dBA Lmax _____ dBA

L10 _____ dBA L50 _____ dBA L90 _____ dBA

88th
West
Bound

East

Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles
 41/82	 7/14	 19/36		
 38/76	 4/8	 17/34		

Traffic counts need to be directional

TRAFFIC NOISE MONITORING LOG SHEET

Lac
2nd
Reader

Project Description: 88th Ave FA Data File: 009

Job Number: 10137893 Noise Source: 88th

Date: 1 Feb 2019 By: Kiva Kent

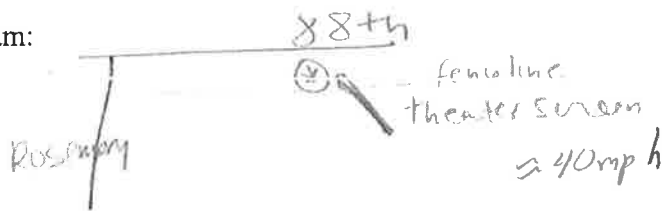
Equipment	Type	Serial #
Sound Level Meter	L.D 831	1375
Microphone	1302 377	135635
Calibrator	CAL 200	9832

SLM SETTINGS (circle one) FAST SLOW

WEIGHTING (circle one) A Lin.

Location Description: at Drive in theater

Location Diagram:



Start Time: 14:30 AM PM Stop Time: 15:00 AM PM Duration: 30 min

Wind Speed: 4-5 mph Wind Direction: ESE

Temperature: 58°F Humidity: 14%

Calibration results before: 115.56 dBA and after 114.0 dBA

Leq 63.1 dBA ^{TMM} 63.3 22.2 Lmin _____ dBA Lmax _____ dBA

L10 _____ dBA L50 _____ dBA L90 _____ dBA

88th
West Bound
97/194 11
E-bound

Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles
### ### ### ### ###	### 9/18	###-##-## ### 1 21192		
### ### ### ###	### 7/14	### ## 14/28		

Traffic counts need to be directional

TRAFFIC NOISE MONITORING LOG SHEET

Project Description: 88th Ave EA Data File: data_002

Job Number: 10137893 Noise Source: 88th & Uster

Date: 1 Feb 2019 By: Tara Kant

Equipment	Type	Serial #
Sound Level Meter	Lawson-D 831	1375
Microphone	377 B02	135635
Calibrator	CAL 200	9823

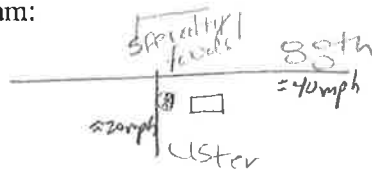
SLM SETTINGS (circle one) **FAST** **(SLOW)**

WEIGHTING (circle one) **(A)** Lin.

Location Description: 39.8561 ; -104.8937

SE corner 88th / Uster

Location Diagram:



Start Time: 8:14 AM PM Stop Time: 8:44 AM PM Duration: 30m

Wind Speed: 0-1 mph Wind Direction: NW

Temperature: 32°F Humidity: 54%

Calibration results before: 113.56 dBA and after 114.0 dBA

Leq 67.4 dBA ^{TNM} 66.4 -1.0 Lmin _____ dBA Lmax _____ dBA

L10 _____ dBA L50 _____ dBA L90 _____ dBA

88th

West Bound

East Bound

Uster N-S

SB

	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles
West Bound	 52/104	1 1/2	 1 16/32		
East Bound	 45/90	 9/18	 1 11/22	1 1/2	
Uster N-S	Traffic counts need to be directional				
	 8/16	 6/12	 7/14		
SB	 8/16	1 1/2		1 1/2	

Loc D
2nd Road

TRAFFIC NOISE MONITORING LOG SHEET

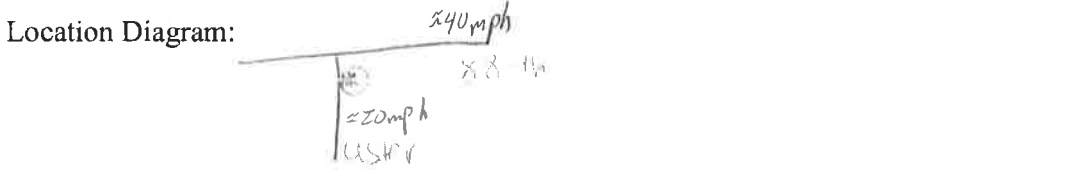
Project Description: 88th Ave FA Data File: 008
 Job Number: 10137893 Noise Source: 88th / Uster
 Date: 1 Feb 2019 By: T. Kent

Equipment	Type	Serial #
Sound Level Meter	L D 831	1375
Microphone	377 B22	135635
Calibrator	CAL 200	9823

SLM SETTINGS (circle one) FAST SLOW

WEIGHTING (circle one) (A) Lin.

Location Description: Uster / 88th



Start Time: 12:13 AM PM Stop Time: 12:43 AM PM Duration: 30 min

Wind Speed: 4-5 mph Wind Direction: S

Temperature: 53°F Sunny Humidity: 17%

Calibration results before: 113.56 dBA and after 114.0 dBA

Leq 64.3 dBA ^{75.9} _{65.9 +1.6} Lmin _____ dBA Lmax _____ dBA

L10 _____ dBA L50 _____ dBA L90 _____ dBA

88th
West Bound

East Bound

Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles
 36/72	 5/10	 18/36	1 1/2	
 31/62	1 1/2	 14/28		

Uster

Traffic counts need to be directional

N-B	 13/26	2/4	4/8
S-B	 11/22	5/10	2/4

Loc E

TRAFFIC NOISE MONITORING LOG SHEET

Project Description: 88th Ave EA Data File: data.001

Job Number: 10137893 Noise Source: 88th Ave & Yosemite

Date: Feb 1 2019 By: Tara Kent

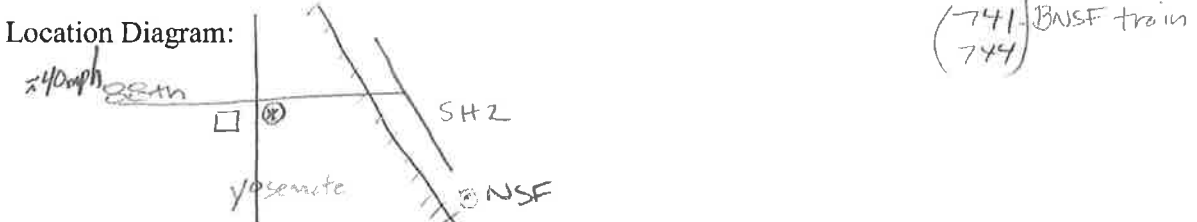
also some JPL Co-Workers on SH2

Equipment	Type	Serial #
Sound Level Meter	L-D 831	1375
Microphone	377B02	135635
Calibrator	CAL 200	9823

SLM SETTINGS (circle one) FAST SLOW

WEIGHTING (circle one) A Lin.

Location Description: 39.8562; -104.8843
SE corner of 88th / Yosemite



Start Time: 7:38 AM PM Stop Time: 8:08 AM PM Duration: 30 min

Wind Speed: 0-1 mph Wind Direction: NW

Temperature: 27°F Humidity: 59%

Calibration results before: 113.56 dBA and after 114.0 dBA

Leq 67.8 dBA ^{TNM} 62.6 -0.2 Lmin dBA Lmax dBA

L10 dBA L50 dBA L90 dBA

88th Ave
West bound

East bound

	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles
West bound	 92/184	 12/24	 19/36	1 1/2	
East bound	 60/120	 18/36	 17/34		

Yosemite
NB
SB

Traffic counts need to be directional

NB	2/4				
SB	3/6				

LLa F
2nd Reading

TRAFFIC NOISE MONITORING LOG SHEET

Project Description: 88th Ave EA Data File: 007
Job Number: 10137893 Noise Source: 88th Ave / Yosemite
Date: 1 Feb 2019 By: Tara Kent

Equipment	Type	Serial #
Sound Level Meter	LD 831	1375
Microphone	377 B02	135655
Calibrator	CAL 200	9822

SLM SETTINGS (circle one) FAST SLOW

WEIGHTING (circle one) (A) Lin.

Location Description: 88th / Yosemite
540 mph

Location Diagram:

Start Time: 11:39 AM PM Stop Time: 12:09 AM PM Duration: 30 min

Wind Speed: 3-4 mph Wind Direction: SW

Temperature: 53°F Humidity: 19%

Calibration results before: 113.56 dBA and after 114.0 dBA

Leq 66.2 dBA ^{TAMM} 65.9 - 0.3 Lmin _____ dBA Lmax _____ dBA

L10 _____ dBA L50 _____ dBA L90 _____ dBA

West Bound

East Bound

Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles
IIII IIII IIII IIII IIII IIII IIII II 37/74	1 1/2	IIII IIII IIII II 17/34		
IIII IIII IIII IIII IIII IIII IIII IIII 39/78	IIII 1 6/12	IIII IIII IIII 15/30		

Yosemite

Traffic counts need to be directional

N-B	1 1/2	III 3/6	1 1/2	
S-B	1 1/2	1 1/2		

TRAFFIC NOISE MONITORING LOG SHEET

LOC F
2nd reading

Project Description: 88th Ave FA Data File: 010

Job Number: 10137893 Noise Source: 88th Ave

Date: 1 Feb 2019 By: T Kont

Equipment	Type	Serial #
Sound Level Meter	40831	1375
Microphone	377B02	135635
Calibrator	CAL200	9832

SLM SETTINGS (circle one)

FAST

SLOW

WEIGHTING (circle one)

A

Lin.

Location Description: mile high flea market

parking

Location Diagram:

≈ 40 mph

Start Time:

15:18 AM PM

Stop Time:

15:48 AM PM

Duration:

30 min

Wind Speed: 7-8 mph

Wind Direction: SEF

Temperature: 58° F

Humidity: 18%

Calibration results before: 113.56 dBA and after 114.0 dBA

Leq 61.3 dBA ^{TJM} Lmin _____ dBA Lmax _____ dBA

L10 _____ dBA L50 _____ dBA L90 _____ dBA

335/670
West Bound
East Bound

Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles
13/26		45/90		
16/32		37/74		

Traffic counts need to be directional

262/524

Appendix B. TNM Noise Modeling Input Data

Table B-1. Suggested Maximum Traffic Volumes for Worst Noise Hour

Posted Speed Limit (mph)	Maximum Traffic Volumes by Facility Type (vehicles/lane/hour) ¹		
	Freeway	Non-Freeway Multiple Lane	Two-lane Roadway
75 or above	1600	NA	NA
70	1700	NA	NA
65	1800	1700	1300
60	1900	1800	1300
55	2000	1900	1300
50	2100	2000	1400
45	2200	2100	1500
40	Not applicable	2200	1600
35 or below	Not applicable	2200	1600

Note 1: For TNM modeling, the estimated traffic volumes from the project traffic analysis are to be used if they are less than the volumes presented in Exhibit 4. Although not referenced in the TNM User's Guide, if the estimated traffic volumes for a project roadway are higher than the corresponding volumes shown in Exhibit 4, the traffic volumes from Exhibit 4 are to be used in the noise analysis because added traffic would cause speeds to slow which in turn will reduce noise levels

1
2

Table B-2. 2019 EXISTING TRAFFIC VOLUMES

	Speed Limit (mph)	AM Hourly Volume	PM Hourly Volume	CDOT VALUE	Value Used in Analysis	AUTOS	Medium Trucks	Heavy Trucks	Buses	Motorcycles
<i>vehicle percentage</i>						96%	3%	2%	0%	0%
EB 88th (W of Frontage) out	40	612	394	2200	612	581	18	12	0	0
EB 88th (W of Frontage) in	40	612	394	2200	612	581	18	12	0	0
<i>vehicle percentage</i>						91%	4%	4%	0%	0%
EB 88th (btn ramps) out	35	612	394	2200	612	563	24	24	0	0
EB 88th (btn ramps) in	35	612	394	2200	612	563	24	24	0	0
<i>vehicle percentage</i>						91%	4%	5%	0%	0%
EB 88th (ramp to Brighton) out	35	612	394	2200	612	557	24	31	0	0
EB 88th (ramp to Brighton) in	35	612	394	2200	612	557	24	31	0	0
EB 88th (Brighton to Flea Market) out	40	620	361	2200	620	564	25	31	0	0
EB 88th (Brighton to FleaMarket) in	40	620	361	2200	620	564	25	31	0	0
EB 88th(Flea Market to Rosemary)	40	1218	709	1600	1218	1108	49	61	0	0
<i>vehicle percentage</i>						88%	5%	7%	0%	0%
EB 88th (Rosemary to Ulster)	40	245	233	1600	245	216	12	17	0	0
EB 88th (Ulster to Willow)	40	300	202	1600	300	264	15	21	0	0
EB 88th (Willow to Yosemite)	40	316	205	1600	316	278	16	22	0	0
<i>vehicle percentage</i>						77%	13%	10%	0%	0%
EB 88th (Yosemite to Hwy 2) out	40	135	103	2200	135	104	18	14	0	0
EB 88th (Yosemite to Hwy 2) in	40	135	103	2200	135	104	18	14	0	0
WB 88th (Hwy 2 to Yosemite) out	40	136	122	2200	136	104	18	14	0	0
WB 88th (Hwy 2 to Yosemite) in	40	136	122	2200	136	104	18	14	0	0

Table B-2. 2019 EXISTING TRAFFIC VOLUMES

	Speed Limit (mph)	AM Hourly Volume	PM Hourly Volume	CDOT VALUE	Value Used in Analysis	AUTOS	Medium Trucks	Heavy Trucks	Buses	Motorcycles
<i>vehicle percentage</i>						83%	8%	9%	0%	0%
WB 88th (Yosemite to Willow)	40	397	254	1600	397	330	32	36	0	0
<i>vehicle percentage</i>						88%	5%	7%	0%	0%
WB 88th (Willow to Ulster)	40	293	252	1600	293	258	15	21	0	0
<i>vehicle percentage</i>						91%	4%	5%	0%	0%
WB 88th (Ulster to Rosemary)	40	431	355	1600	431	392	17	22	0	0
<i>vehicle percentage</i>						94%	3%	3%	0%	0%
WB 88th (Rosemary to Flea Market)	40	806	965	1600	965	907	29	29	0	0
WB 88th (Flea Market to Brighton)	40	779	957	1600	957	900	29	29	0	0
WB 88th (Flea Market to Brighton)out	40	390	479	2200	479	450	14	14	0	0
WB 88th (Flea Market to Brighton)in	40	390	479	2200	479	450	14	14	0	0
WB 88th (Brighton to ramps) out	35	410	513	2200	513	482	15	15	0	0
WB 88th (Brighton to ramps) in	35	410	513	2200	513	482	15	15	0	0
<i>vehicle percentage</i>						98%	1%	1%	0%	0%
WB 88th (btn ramps) out	35	410	513	2200	513	502	5	5	0	0
WB 88th (btn ramps) in	35	410	513	2200	513	502	5	5	0	0
<i>vehicle percentage</i>						98%	1%	1%	0%	0%
WB 88th (W of Frontage) out	40	410	513	2200	513	502	5	5	0	0
WB 88th (W of Frontage) in	40	410	513	2200	513	502	5	5	0	0
88th Median/Turn (NOTRAFFIC)1	--	--	--	--	--	--	--	--	--	--
88th Median/Turn (NOTRAFFIC)2	--	--	--	--	--	--	--	--	--	--
88th Median/Turn (NOTRAFFIC)3	--	--	--	--	--	--	--	--	--	--

Table B-2. 2019 EXISTING TRAFFIC VOLUMES

	Speed Limit (mph)	AM Hourly Volume	PM Hourly Volume	CDOT VALUE	Value Used in Analysis	AUTOS	Medium Trucks	Heavy Trucks	Buses	Motorcycles
88th Median/Turn (NOTRAFFIC)4	--	--	--	--	--	--	--	--	--	--
88th Median/Turn (NOTRAFFIC)5	--	--	--	--	--	--	--	--	--	--
88th Median/Turn (NOTRAFFIC)6	--	--	--	--	--	--	--	--	--	--
<i>vehicle percentage</i>						94%	4%	2%	0%	0%
NB I76 (S of ramps) out	65	--	--	1800	1800	1692	72	36	0	0
NB I76 (S of ramps) mid	65	--	--	1800	1800	1692	72	36	0	0
NB I76 (S of ramps) in	65	--	--	1800	1800	1692	72	36	0	0
NB OFFR from I76	45	--	--	--	--	--	--	--	--	--
NB OFFR from I76 out	45	--	--	--	--	--	--	--	--	--
NB OFFR from I76 mid	45	--	--	--	--	--	--	--	--	--
NB OFFR from I76 in	45	--	--	--	--	--	--	--	--	--
NB I76 (btn ramps) out	65	--	--	1800	1800	1692	72	36	0	0
NB I76 (btn ramps) mid	65	--	--	1800	1800	1692	72	36	0	0
NB I76 (btn ramps) in	65	--	--	1800	1800	1692	72	36	0	0
NB ONR to I76	45	--	--	--	--	--	--	--	--	--
NB I76 (N of ramps) out	65	--	--	1800	1800	1692	72	36	0	0
NB I76 (N of ramps) mid	65	--	--	1800	1800	1692	72	36	0	0
NB I76 (N of ramps) in	65	--	--	1800	1800	1692	72	36	0	0
SB I76 (N of ramps) out	65	--	--	1800	1800	1692	72	36	0	0
SB I76 (N of ramps) mid	65	--	--	1800	1800	1692	72	36	0	0
SB I76 (N of ramps) in	65	--	--	1800	1800	1692	72	36	0	0
SB I76 (btn ramps) out	65	--	--	1800	1800	1692	72	36	0	0
SB I76 (btn ramps) mid	65	--	--	1800	1800	1692	72	36	0	0
SB I76 (btn ramps) in	65	--	--	1800	1800	1692	72	36	0	0

Table B-2. 2019 EXISTING TRAFFIC VOLUMES

	Speed Limit (mph)	AM Hourly Volume	PM Hourly Volume	CDOT VALUE	Value Used in Analysis	AUTOS	Medium Trucks	Heavy Trucks	Buses	Motorcycles
SB OFFR from I76	45	--	--	--	--	--	--	--	--	--
SB OFFR from I76 out	45	--	--	--	--	--	--	--	--	--
SB OFFR from I76 in	45	--	--	--	--	--	--	--	--	--
SB ONR to I76	45	--	--	--	--	--	--	--	--	--
SB I76 (S of ramps) out	65	--	--	1800	1800	1692	72	36	0	0
SB I76 (S of ramps) mid	65	--	--	1800	1800	1692	72	36	0	0
SB I76 (S of ramps) in	65	--	--	1800	1800	1692	72	36	0	0
I76 MEDIAN NO TRAFFIC	--	--	--	--	--	--	--	--	--	--
<i>vehicle percentage</i>						91%	7%	2%	0%	0%
NB Brighton (S of 88th)	35	127	194	1600	194	177	14	4	0	0
<i>vehicle percentage</i>						93%	5%	2%	0%	0%
SB Brighton (S of 88th)	35	207	149	1600	207	193	10	4	0	0
NB Brighton RT Lane NO TRAFFIC	--	--	--	--	--	--	--	--	--	--
NB Brighton (N of 88th)	35	103	91	1600	103	96	5	2	0	0
SB Brighton (N of 88th)	35	202	63	1600	202	188	10	4	0	0
<i>vehicle percentage</i>						97%	2%	1%	0%	0%
NB Rosemary Street	35	410	710	1600	710	689	14	7	0	0
<i>vehicle percentage</i>						93%	5%	2%	0%	0%
SB Rosemary Street	35	922	559	1600	922	857	46	18	0	0
<i>vehicle percentage</i>						95%	4%	1%	0%	0%
NB Ulster Street	25	71	90	1600	90	86	4	1	0	0
SB Ulster Street	25	54	62	1600	62	59	2	1	0	0
<i>vehicle percentage</i>						97%	3%	0%	0%	0%
NB Willow Street	25	8	28	1600	28	27	1	0	0	0
SB Willow Street	25	14	24	1600	24	23	1	0	0	0

Table B-2. 2019 EXISTING TRAFFIC VOLUMES

	Speed Limit (mph)	AM Hourly Volume	PM Hourly Volume	CDOT VALUE	Value Used in Analysis	AUTOS	Medium Trucks	Heavy Trucks	Buses	Motorcycles
<i>vehicle percentage</i>						92%	5%	3%	0%	0%
NE Hwy 2 (S of 88th)	55	538	1400	1300	1300	1196	65	39	0	0
<i>vehicle percentage</i>						93%	3%	4%	0%	0%
NE Hwy 2 (S of 88th) out	55	269	700	1900	700	651	21	28	0	0
NE Hwy 2 (S of 88th) in	55	269	700	1900	700	651	21	28	0	0
<i>vehicle percentage</i>						92%	5%	3%	0%	0%
NE Hwy 2 (N of 88th)	55	587	1351	1300	1300	1196	65	39	0	0
SW Hwy 2 (N of 88th)	55	1492	573	1300	1300	1196	65	39	0	0
SW Hwy 2 (S of 88th)	55	1492	600	1300	1300	1196	65	39	0	0

1
2

Table B-3. 2040 NO-BUILD TRAFFIC VOLUMES

	Speed Limit (mph)	AM Hourly Volume	PM Hourly Volume	CDOT VALUE	Value Used in Analysis	AUTOS	Medium Trucks	Heavy Trucks	Buses	Motorcycles
<i>vehicle percentage</i>						95%	3%	2%	0%	0%
EB 88th (W of Frontage) out	40	832	535	2200	832	790	25	17	0	0
EB 88th (W of Frontage) in	40	832	535	2200	832	790	25	17	0	0
<i>vehicle percentage</i>						92%	4%	4%	0%	0%
EB 88th (btn ramps) out	35	832	535	2200	832	765	33	33	0	0
EB 88th (btn ramps) in	35	832	535	2200	832	765	33	33	0	0
<i>vehicle percentage</i>						91%	4%	5%	0%	0%
EB 88th (ramp to Brighton) out	35	832	535	2200	832	757	33	42	0	0
EB 88th (ramp to Brighton) in	35	832	535	2200	832	757	33	42	0	0
EB 88th (Brighton to FleaMarket)out	40	843	491	2200	843	767	34	42	0	0
EB 88th (Brighton to FleaMarket)in	40	843	491	2200	843	767	34	42	0	0
EB 88th(FleaMarket to Rosemary)	40	1294	964	1600	1294	1178	52	65	0	0
<i>vehicle percentage</i>						88%	5%	7%	0%	0%
EB 88th (Rosemary to Ulster)	40	334	317	1600	334	294	17	23	0	0
EB 88th (Ulster to Willow)	40	480	279	1600	480	422	24	34	0	0
EB 88th (Willow to Yosemite)	40	420	279	1600	420	370	21	29	0	0
<i>vehicle percentage</i>						77%	13%	10%	0%	0%
EB 88th (Yosemite to Hwy 2) out	40	184	141	2200	184	141	24	18	0	0
EB 88th (Yosemite to Hwy 2) in	40	184	141	2200	184	141	24	18	0	0
WB 88th (Hwy 2 to Yosemite) out	40	185	166	2200	185	142	24	19	0	0
WB 88th (Hwy 2 to Yosemite) in	40	185	166	2200	185	142	24	19	0	0

Table B-3. 2040 NO-BUILD TRAFFIC VOLUMES

	Speed Limit (mph)	AM Hourly Volume	PM Hourly Volume	CDOT VALUE	Value Used in Analysis	AUTOS	Medium Trucks	Heavy Trucks	Buses	Motorcycles
<i>vehicle percentage</i>						83%	8%	9%	0%	0%
WB 88th (Yosemite to Willow)	40	568	324	1600	568	471	45	51	0	0
<i>vehicle percentage</i>						88%	5%	7%	0%	0%
WB 88th (Willow to Ulster)	40	399	343	1600	399	351	20	28	0	0
<i>vehicle percentage</i>						91%	4%	5%	0%	0%
WB 88th (Ulster to Rosemary)	40	586	483	1600	586	533	23	29	0	0
<i>vehicle percentage</i>						94%	3%	3%	0%	0%
WB 88th (Rosemary to Flea Market)	40	1095	1312	1600	1312	1233	39	39	0	0
WB 88th (Flea Market to Brighton)	40	1060	1301	1600	1301	1223	39	39	0	0
WB 88th (Flea Market to Brighton)out	40	530	651	2200	651	611	20	20	0	0
WB 88th (Flea Market to Brighton)in	40	530	651	2200	651	611	20	20	0	0
WB 88th (Brighton to ramps) out	35	558	697	2200	697	655	21	21	0	0
WB 88th (Brighton to ramps) in	35	558	697	2200	697	655	21	21	0	0
<i>vehicle percentage</i>						98%	1%	1%	0%	0%
WB 88th (btn ramps) out	35	558	697	2200	697	683	7	7	0	0
WB 88th (btn ramps) in	35	558	697	2200	697	683	7	7	0	0
<i>vehicle percentage</i>						98%	1%	1%	0%	0%
WB 88th (W of Frontage) out	40	558	697	2200	697	683	7	7	0	0
WB 88th (W of Frontage) in	40	558	697	2200	697	683	7	7	0	0
88th Median/Turn (NOTRAFFIC)1	--	--	--	--	--	--	--	--	--	--
88th Median/Turn (NOTRAFFIC)2	--	--	--	--	--	--	--	--	--	--

Table B-3. 2040 NO-BUILD TRAFFIC VOLUMES

	Speed Limit (mph)	AM Hourly Volume	PM Hourly Volume	CDOT VALUE	Value Used in Analysis	AUTOS	Medium Trucks	Heavy Trucks	Buses	Motorcycles
88th Median/Turn (NOTRAFFIC)3	--	--	--	--	--	--	--	--	--	--
88th Median/Turn (NOTRAFFIC)4	--	--	--	--	--	--	--	--	--	--
88th Median/Turn (NOTRAFFIC)5	--	--	--	--	--	--	--	--	--	--
88th Median/Turn (NOTRAFFIC)6	--	--	--	--	--	--	--	--	--	--
<i>vehicle percentage</i>						94%	4%	2%	0%	0%
NB I76 (S of ramps) out	65	--	--	1800	1800	1692	72	36	0	0
NB I76 (S of ramps) mid	65	--	--	1800	1800	1692	72	36	0	0
NB I76 (S of ramps) in	65	--	--	1800	1800	1692	72	36	0	0
NB OFFR from I76	--	--	--	--	--	--	--	--	--	--
NB OFFR from I76 out	--	--	--	--	--	--	--	--	--	--
NB OFFR from I76 mid	--	--	--	--	--	--	--	--	--	--
NB OFFR from I76 in	--	--	--	--	--	--	--	--	--	--
NB I76 (btn ramps) out	65	--	--	1800	1800	1692	72	36	0	0
NB I76 (btn ramps) mid	65	--	--	1800	1800	1692	72	36	0	0
NB I76 (btn ramps) in	65	--	--	1800	1800	1692	72	36	0	0
NB ONR to I76	--	--	--	--	--	--	--	--	--	--
NB I76 (N of ramps) out	65	--	--	1800	1800	1692	72	36	0	0
NB I76 (N of ramps) mid	65	--	--	1800	1800	1692	72	36	0	0
NB I76 (N of ramps) in	65	--	--	1800	1800	1692	72	36	0	0
SB I76 (N of ramps) out	65	--	--	1800	1800	1692	72	36	0	0
SB I76 (N of ramps) mid	65	--	--	1800	1800	1692	72	36	0	0
SB I76 (N of ramps) in	65	--	--	1800	1800	1692	72	36	0	0
SB I76 (btn ramps) out	65	--	--	1800	1800	1692	72	36	0	0

Table B-3. 2040 NO-BUILD TRAFFIC VOLUMES

	Speed Limit (mph)	AM Hourly Volume	PM Hourly Volume	CDOT VALUE	Value Used in Analysis	AUTOS	Medium Trucks	Heavy Trucks	Buses	Motorcycles
SB I76 (btn ramps) mid	65	--	--	1800	1800	1692	72	36	0	0
SB I76 (btn ramps) in	65	--	--	1800	1800	1692	72	36	0	0
SB OFFR from I76	--	--	--	--	--	--	--	--	--	--
SB OFFR from I76 out	--	--	--	--	--	--	--	--	--	--
SB OFFR from I76 in	--	--	--	--	--	--	--	--	--	--
SB ONR to I76	--	--	--	--	--	--	--	--	--	--
SB I76 (S of ramps) out	65	--	--	1800	1800	1692	72	36	0	0
SB I76 (S of ramps) mid	65	--	--	1800	1800	1692	72	36	0	0
SB I76 (S of ramps) in	65	--	--	1800	1800	1692	72	36	0	0
I76 MEDIAN NO TRAFFIC	--	--	--	--	--	--	--	--	--	--
<i>vehicle percentage</i>						91%	7%	2%	0%	0%
NB Brighton (S of 88th)	35	174	265	1600	265	241	19	5	0	0
<i>vehicle percentage</i>						93%	5%	2%	0%	0%
SB Brighton (S of 88th)	35	283	204	1600	283	263	14	6	0	0
NB Brighton RTLane NO TRAFFIC	--	--	--	--	--	--	--	--	--	--
NB Brighton (N of 88th)	35	142	126	1600	142	132	7	3	0	0
SB Brighton (N of 88th)	35	276	87	1600	276	257	14	6	0	0
<i>vehicle percentage</i>						97%	2%	1%	0%	0%
NB Rosemary Street	35	558	965	1600	965	936	19	10	0	0
<i>vehicle percentage</i>						93%	5%	2%	0%	0%
SB Rosemary Street	35	1253	760	1600	1253	1165	63	25	0	0
<i>vehicle percentage</i>						95%	4%	1%	0%	0%
NB Ulster Street	25	98	123	1600	123	117	5	1	0	0
SB Ulster Street	25	75	85	1600	85	81	3	1	0	0
<i>vehicle percentage</i>						97%	3%	0%	0%	0%

Table B-3. 2040 NO-BUILD TRAFFIC VOLUMES

	Speed Limit (mph)	AM Hourly Volume	PM Hourly Volume	CDOT VALUE	Value Used in Analysis	AUTOS	Medium Trucks	Heavy Trucks	Buses	Motorcycles
NB Willow Street	25	28	61	1600	61	59	2	0	0	0
SB Willow Street	25	64	38	1600	64	62	2	0	0	0
<i>vehicle percentage</i>						92%	5%	3%	0%	0%
NE Hwy 2 (S of 88th)	55	732	1902	1300	1300	1196	65	39	0	0
<i>vehicle percentage</i>						93.0%	4.0%	3.0%	0.0%	0.0%
NE Hwy 2 (S of 88th) out	55	366	951	1900	951	884	38	29	0	0
NE Hwy 2 (S of 88th) in	55	366	951	1900	951	884	38	29	0	0
<i>vehicle percentage</i>						92%	5%	3%	0%	0%
NE Hwy 2 (N of 88th)	55	798	1835	1300	1300	1196	65	39	0	0
SW Hwy 2 (N of 88th)	55	2027	779	1300	1300	1196	65	39	0	0
SW Hwy 2 (S of 88th)	55	2027	816	1300	1300	1196	65	39	0	0

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Table B-4. 2040 BUILD TRAFFIC VOLUMES

	Speed Limit (mph)	AM Hourly Volume	PM Hourly Volume	CDOT VALUE	Value Used in Analysis	AUTOS	Medium Trucks	Heavy Trucks	Buses	Motorcycles
<i>vehicle percentage</i>						98%	1%	1%	0.0%	0.0%
EB 88th (W of Frontage) out	40	832	535	2200	832	818	8	6	0	0
EB 88th (W of Frontage) in	40	832	535	2200	832	818	8	6	0	0
<i>vehicle percentage</i>						96%	3%	2%	0.0%	0.0%
EB 88th (btn ramps) out	35	832	535	2200	832	795	22	16	0	0
EB 88th (btn ramps) in	35	832	535	2200	832	795	22	16	0	0
<i>vehicle percentage</i>						91%	4%	5%	0.0%	0.0%
EB 88th (ramp to Brighton) out	35	832	535	2200	832	757	34	41	0	0
EB 88th (ramp to Brighton) in	35	832	535	2200	832	757	34	41	0	0
<i>vehicle percentage</i>						94%	3%	3%	0.0%	0.0%
WB 88th (Brighton to ramps) out	35	606	686	2200	686	646	20	20	0	0
WB 88th (Brighton to ramps) in	35	606	686	2200	686	646	20	20	0	0
<i>vehicle percentage</i>						98%	1%	1%	0.0%	0.0%
WB 88th (btn ramps) out	35	606	686	2200	686	670	9	7	0	0
WB 88th (btn ramps) in	35	606	686	2200	686	670	9	7	0	0
<i>vehicle percentage</i>						98%	1%	1%	0%	0%
WB 88th (W of Frontage) out	40	606	686	2200	686	674	7	5	0	0
WB 88th (W of Frontage) in	40	606	686	2200	686	674	7	5	0	0
<i>vehicle percentage</i>						94%	4%	2%	0%	0%
NB I76 (S of ramps) out	65	--	--	1800	1800	1687	77	36	0	0
NB I76 (S of ramps) mid	65	--	--	1800	1800	1687	77	36	0	0
NB I76 (S of ramps) in	65	--	--	1800	1800	1687	77	36	0	0
NB OFFR from I76	45	--	--	--	--	--	--	--	--	--
NB OFFR from I76 out	45	--	--	--	--	--	--	--	--	--
NB OFFR from I76 mid	45	--	--	--	--	--	--	--	--	--

Table B-4. 2040 BUILD TRAFFIC VOLUMES

	Speed Limit (mph)	AM Hourly Volume	PM Hourly Volume	CDOT VALUE	Value Used in Analysis	AUTOS	Medium Trucks	Heavy Trucks	Buses	Motorcycles
NB OFFR from I76 in	45	--	--	--	--	--	--	--	--	--
NB I76 (btn ramps) out	65	--	--	1800	1800	1687	77	36	0	0
NB I76 (btn ramps) mid	65	--	--	1800	1800	1687	77	36	0	0
NB I76 (btn ramps) in	65	--	--	1800	1800	1687	77	36	0	0
NB ONR to I76	45	--	--	--	--	--	--	--	--	--
NB I76 (N of ramps) out	65	--	--	1800	1800	1687	77	36	0	0
NB I76 (N of ramps) mid	65	--	--	1800	1800	1687	77	36	0	0
NB I76 (N of ramps) in	65	--	--	1800	1800	1687	77	36	0	0
SB I76 (N of ramps) out	65	--	--	1800	1800	1687	77	36	0	0
SB I76 (N of ramps) mid	65	--	--	1800	1800	1687	77	36	0	0
SB I76 (N of ramps) in	65	--	--	1800	1800	1687	77	36	0	0
SB I76 (btn ramps) out	65	--	--	1800	1800	1687	77	36	0	0
SB I76 (btn ramps) mid	65	--	--	1800	1800	1687	77	36	0	0
SB I76 (btn ramps) in	65	--	--	1800	1800	1687	77	36	0	0
SB OFFR from I76	45	--	--	--	--	--	--	--	--	--
SB OFFR from I76 out	45	--	--	--	--	--	--	--	--	--
SB OFFR from I76 in	45	--	--	--	--	--	--	--	--	--
SB ONR to I76	45	--	--	--	--	--	--	--	--	--
SB I76 (S of ramps) out	65	--	--	1800	1800	1687	77	36	0	0
SB I76 (S of ramps) mid	65	--	--	1800	1800	1687	77	36	0	0
SB I76 (S of ramps) in	65	--	--	1800	1800	1687	77	36	0	0
I76 MEDIAN NO TRAFFIC	--	--	--	--	--	--	--	--	--	--
					<i>vehicle percentage</i>	91%	7%	2%	0%	0%
NB Brighton (S of 88th)	35	214	285	1600	285	259	21	5	0	0
					<i>vehicle percentage</i>	93.0%	4.6%	2.4%	0.0%	0.0%

Table B-4. 2040 BUILD TRAFFIC VOLUMES

	Speed Limit (mph)	AM Hourly Volume	PM Hourly Volume	CDOT VALUE	Value Used in Analysis	AUTOS	Medium Trucks	Heavy Trucks	Buses	Motorcycles
SB Brighton (S of 88th)	35	283	233	1600	283	263	13	7	0	0
NB Brighton RTLane NO TRAFFIC	--	--	--	--	--	--	--	--	--	--
NB Brighton (N of 88th)	35	182	150	1600	182	169	8	4	0	0
SB Brighton (N of 88th)	35	276	87	1600	276	257	13	7	0	0
<i>vehicle percentage</i>						97%	2%	1%	0%	0%
NB Rosemary Street	35	558	965	1600	965	939	20	6	0	0
<i>vehicle percentage</i>						93.4%	4.6%	2.0%	0.0%	0.0%
SB Rosemary Street	35	1253	760	1600	1253	1170	58	25	0	0
<i>vehicle percentage</i>						94%	4%	1%	0%	0%
NB Ulster Street	25	98	123	1600	123	116	5	1	0	0
SB Ulster Street	25	75	85	1600	85	80	4	1	0	0
<i>vehicle percentage</i>						96.7%	3.3%	1.1%	0.0%	0.0%
NB Willow Street	25	28	61	1600	61	58	2	1	0	0
<i>vehicle percentage</i>						100.0%	0.0%	0.0%	0.0%	0.0%
SB Willow Street	25	64	38	1600	64	64	0	0	0	0
<i>vehicle percentage</i>						93%	3%	4%	0%	0%
NE Hwy 2 (S of 88th)	55	732	1902	1300	1300	1208	39	53	0	0
NE Hwy 2 (S of 88th) out	55	366	951	1900	951	883	29	39	0	0
NE Hwy 2 (S of 88th) in	55	366	951	1900	951	883	29	39	0	0
NE Hwy 2 (N of 88th)	55	798	1835	1300	1300	1208	39	53	0	0
SW Hwy 2 (N of 88th)	55	2027	779	1300	1300	1208	39	53	0	0
SW Hwy 2 (S of 88th)	55	2027	816	1300	1300	1208	39	53	0	0
<i>vehicle percentage</i>						91%	4%	5%	0%	0%
EB 88th (Brighton to Laurel)out		865	506	2200	865	787	35	43	0	0
EB 88th (Brighton to Laurel)in		865	506	2200	865	787	35	43	0	0

Table B-4. 2040 BUILD TRAFFIC VOLUMES

	Speed Limit (mph)	AM Hourly Volume	PM Hourly Volume	CDOT VALUE	Value Used in Analysis	AUTOS	Medium Trucks	Heavy Trucks	Buses	Motorcycles
EB 88th RT to Wikiup (NoTraffic)	--	--	--	--	--	--	--	--	--	--
EB 88th LT to FleaMrkt (NoTraffic)	--	--	--	--	--	--	--	--	--	--
EB 88th (Quince to Rosemary)out		828	482	2200	828	753	33	41	0	0
EB 88th (Quince to Rosemary)in		828	482	2200	828	753	33	41	0	0
EB 88th RT to Rosemary(NoTraffic)	--	--	--	--	--	--	--	--	--	--
<i>vehicle percentage</i>						77%	13%	10%	0%	0%
EB 88th (Rosemary to SH2)out	40	251	184	2200	251	194	32	25	0	0
EB 88th (Rosemary to SH2)in	40	251	184	2200	251	194	32	25	0	0
EB 88th (Rosemary to SH2)RT	40	193	123	2200	193	149	24	19	0	0
EB 88th (Rosemary to SH2)LT	40	174	158	2200	174	135	22	17	0	0
<i>vehicle percentage</i>						94%	3%	3%	0%	0%
WB 88th (Hwy 2 to Rosemary)out	40	151	156	2200	156	146	5	5	0	0
WB 88th (Hwy 2 to Rosemary)in	40	151	156	2200	156	146	5	5	0	0
<i>vehicle percentage</i>						91%	4%	5%	0%	0%
WB 88th (Hwy 2 to Rosemary)	40	586	483	1600	586	533	22	31	0	0
<i>vehicle percentage</i>						96%	2%	2%	0%	0%
WB 88th(Rosemary to Quince)out	40	529	640	2200	640	614	13	13	0	0
WB 88th(Rosemary to Quince)in	40	529	640	2200	640	614	13	13	0	0
<i>vehicle percentage</i>						94%	3%	3%	0%	0%
WB 88th (Laurel to Brighton)out	40	580	673	2200	673	633	20	20	0	0
WB 88th (Laurel to Brighton)in	40	580	673	2200	673	633	20	20	0	0
WB 88th LT to Brighton(NoTraffic)	--	--	--	--	--	--	--	--	--	--
<i>vehicle percentage</i>						93%	5%	2%	0%	0%

Table B-4. 2040 BUILD TRAFFIC VOLUMES

	Speed Limit (mph)	AM Hourly Volume	PM Hourly Volume	CDOT VALUE	Value Used in Analysis	AUTOS	Medium Trucks	Heavy Trucks	Buses	Motorcycles
SB Rosemary Street out	35	627	380	2200	627	585	29	13	0	0
SB Rosemary Street in	35	627	380	2200	627	585	29	13	0	0
<i>vehicle percentage</i>						97%	2%	1%	0%	0%
NB Rosemary Street out	35	279	483	2200	483	469	10	3	0	0
NB Rosemary Street in	35	279	483	2200	483	469	10	3	0	0
SB Rosemary Street LT(NoTraffic)	--	--	--	--	--	--	--	--	--	--
NB Rosemary Street LT(NoTraffic)	--	--	--	--	--	--	--	--	--	--
<i>vehicle percentage</i>						77%	13%	10%	0%	0%
EB 88th (Rosemary to SH2)	40	367	281	1600	367	284	46	37	0	0
Center Turn Lane (No Traffic)	--	--	--	--	--	--	--	--	--	--
<i>vehicle percentage</i>						92%	4%	5%	0%	0%
EB 88th (Laurel to Quince)out	40	841	471	2200	841	765	34	42	0	0
EB 88th (Laurel to Quince)in	40	841	471	2200	841	765	34	42	0	0
EB 88th LT Lane to Quince	--	--	--	--	--	--	--	--	--	--
<i>vehicle percentage</i>						96%	2%	2%	0%	0%
WB 88th (Quince to Laurel)out	40	580	673	2200	673	646	13	13	0	0
WB 88th (Quince to Laurel)in	40	580	673	2200	673	646	13	13	0	0
WB 88th Accel Lane (No Traffic)	--	--	--	--	--	--	--	--	--	--

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Table B-5. Modeled Noise Levels without Abatement

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing (2019)	No Action (2040)	Proposed Action (2040)	Proposed Action Change From Existing (dBA)	Proposed Action Causes Impact?
				Leq (dBA)	Leq (dBA)	Leq (dBA)		(Yes or No)
Note 1: These receptors will be fully or partially acquired as part of the project. Note 2: Shaded cells are above state standards.								
1	Single Family	B / 66	1	66.6	67.7	67.1	0.5	Yes
2	Single Family	B / 66	1	66.3	67.5	66.8	0.5	Yes
3	Single Family	B / 66	1	65.7	66.8	66.0	0.3	Yes
4	Single Family	B / 66	1	66.4	67.7	66.8	0.4	Yes
5	Single Family	B / 66	1	66.4	67.7	66.7	0.3	Yes
6	Single Family	B / 66	1	65.1	66.4	65.1	0.0	No
7	Single Family	B / 66	1	65.3	66.6	65.1	-0.2	No
8	Single Family	B / 66	1	65.6	66.8	65.3	-0.3	No
9	Single Family	B / 66	1	65.6	66.8	65.2	-0.4	No
10	Single Family	B / 66	1	66.1	67.3	65.6	-0.5	Yes
11	Single Family	B / 66	1	66.1	67.3	66.0	-0.1	Yes
12	Single Family	B / 66	1	59.7	60.4	59.7	0.0	No
13	Single Family	B / 66	1	59.0	59.7	58.9	-0.1	No
14	Single Family	B / 66	1	58.2	58.9	58.0	-0.2	No
15	Single Family	B / 66	1	58.7	59.5	58.4	-0.3	No
16	Single Family	B / 66	1	58.1	59.0	57.9	-0.2	No
17	Single Family	B / 66	1	58.4	59.5	57.9	-0.5	No
18	Single Family	B / 66	1	57.0	58.1	57.1	0.1	No
19	Single Family	B / 66	1	57.5	58.5	57.6	0.1	No
20	Single Family	B / 66	1	57.8	58.9	57.9	0.1	No
21	Single Family	B / 66	1	59.1	60.1	59.3	0.2	No

Table B-5. Modeled Noise Levels without Abatement

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing (2019)	No Action (2040)	Proposed Action (2040)	Proposed Action Change From Existing (dBA)	Proposed Action Causes Impact?
				L _{eq} (dBA)	L _{eq} (dBA)	L _{eq} (dBA)		(Yes or No)
Note 1: These receptors will be fully or partially acquired as part of the project.								
Note 2: Shaded cells are above state standards.								
22	Single Family	B / 66	1	56.9	57.5	56.7	-0.2	No
23	Single Family	B / 66	1	54.6	55.1	54.6	0.0	No
24	Single Family	B / 66	1	55.8	56.7	55.7	-0.1	No
25	Single Family	B / 66	1	56.7	57.7	56.5	-0.2	No
26	Single Family	B / 66	1	55.1	55.9	54.9	-0.2	No
27	Single Family	B / 66	1	54.8	55.4	54.8	0.0	No
28	Single Family	B / 66	1	53.4	54.2	53.3	-0.1	No
29	Single Family	B / 66	1	53.1	53.8	53.1	0.0	No
30	Single Family	B / 66	1	54.5	55.3	54.4	-0.1	No
31	Single Family	B / 66	1	54.6	55.4	54.6	0.0	No
32	Single Family	B / 66	1	54.4	55.1	54.2	-0.2	No
33	Single Family	B / 66	1	54.4	55.3	54.4	0.0	No
34	Single Family	B / 66	1	55.6	56.6	55.8	0.2	No
35	Single Family	B / 66	1	54.1	54.6	54.0	-0.1	No
36	Single Family	B / 66	1	54.8	55.2	54.7	-0.1	No
37	Single Family	B / 66	1	54.8	55.4	54.8	0.0	No
38	Single Family	B / 66	1	53.4	53.9	53.5	0.1	No
39	Single Family	B / 66	1	53.9	54.4	53.9	0.0	No
40	Single Family	B / 66	1	54.5	55.3	54.4	-0.1	No
41	Single Family	B / 66	1	54.9	55.7	54.7	-0.2	No
42	Single Family	B / 66	1	54.7	55.6	54.7	0.0	No

Table B-5. Modeled Noise Levels without Abatement

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing (2019)	No Action (2040)	Proposed Action (2040)	Proposed Action Change From Existing (dBA)	Proposed Action Causes Impact?
				L _{eq} (dBA)	L _{eq} (dBA)	L _{eq} (dBA)		(Yes or No)
Note 1: These receptors will be fully or partially acquired as part of the project.								
Note 2: Shaded cells are above state standards.								
43	Single Family	B / 66	1	55.0	55.9	55.1	0.1	No
44	Single Family	B / 66	1	54.7	55.6	54.7	0.0	No
45	Single Family	B / 66	1	53.5	54.3	53.4	-0.1	No
46	Single Family	B / 66	1	53.6	54.4	53.5	-0.1	No
47	Single Family	B / 66	1	53.7	54.5	53.7	0.0	No
48	Single Family	B / 66	1	53.4	54.2	53.4	0.0	No
49	Single Family	B / 66	1	52.9	53.6	52.7	-0.2	No
50	Single Family	B / 66	1	55.1	55.4	55.2	0.1	No
51	Single Family	B / 66	1	52.9	53.4	52.9	0.0	No
52	Single Family	B / 66	1	52.3	52.8	52.2	-0.1	No
53	Single Family	B / 66	1	53.7	53.9	53.8	0.1	No
54	Single Family	B / 66	1	52.8	53.3	52.7	-0.1	No
55	Single Family	B / 66	1	54.3	54.7	54.4	0.1	No
56	Single Family	B / 66	1	53.1	53.7	53.2	0.1	No
57	Single Family	B / 66	1	54.4	54.8	54.4	0.0	No
58	Single Family	B / 66	1	53.8	54.5	53.8	0.0	No
59	Single Family	B / 66	1	53.4	54.0	53.3	-0.1	No
60	Single Family	B / 66	1	52.5	53.3	52.5	0.0	No
61	Single Family	B / 66	1	52.4	53.0	52.3	-0.1	No
62	Single Family	B / 66	1	52.4	53.2	52.3	-0.1	No
63	Single Family	B / 66	1	51.6	52.3	51.5	-0.1	No

Table B-5. Modeled Noise Levels without Abatement

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing (2019)	No Action (2040)	Proposed Action (2040)	Proposed Action Change From Existing (dBA)	Proposed Action Causes Impact?
				L _{eq} (dBA)	L _{eq} (dBA)	L _{eq} (dBA)		(Yes or No)
Note 1: These receptors will be fully or partially acquired as part of the project.								
Note 2: Shaded cells are above state standards.								
64	Single Family	B / 66	1	51.3	52.0	51.2	-0.1	No
65	Single Family	B / 66	1	50.9	51.7	51.0	0.1	No
66	Single Family	B / 66	1	51.3	52.1	51.3	0.0	No
67	Single Family	B / 66	1	52.2	52.9	52.4	0.2	No
68	Single Family	B / 66	1	53.9	54.7	54.5	0.6	No
69	Single Family	B / 66	1	70.8	72.1	72.6	1.8	Yes
70	Single Family	B / 66	1	71.0	72.3	72.7	1.7	Yes
71	Single Family	B / 66	1	71.7	73.0	73.5	1.8	Yes
72	Single Family	B / 66	1	72.0	73.3	73.7	1.7	Yes
73	Single Family	B / 66	1	72.0	73.3	73.6	1.6	Yes
74	Single Family	B / 66	1	72.1	73.4	73.6	1.5	Yes
75	Single Family	B / 66	1	72.6	73.9	74.1	1.5	Yes
76	Single Family	B / 66	1	72.4	73.7	73.9	1.5	Yes
77	Single Family	B / 66	1	71.9	73.2	73.1	1.2	Yes
78	Single Family	B / 66	1	61.2	62.5	61.7	0.5	No
79	Single Family	B / 66	1	58.5	59.7	59.3	0.8	No
80	Single Family	B / 66	1	56.9	58.1	57.4	0.5	No
81	Single Family	B / 66	1	56.7	57.9	57.2	0.5	No
82	Single Family	B / 66	1	57.1	58.3	57.5	0.4	No
83	Single Family	B / 66	1	58.2	59.4	58.8	0.6	No
84	Single Family	B / 66	1	58.9	60.1	59.1	0.2	No

Table B-5. Modeled Noise Levels without Abatement

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing (2019)	No Action (2040)	Proposed Action (2040)	Proposed Action Change From Existing (dBA)	Proposed Action Causes Impact?
				L _{eq} (dBA)	L _{eq} (dBA)	L _{eq} (dBA)		(Yes or No)
Note 1: These receptors will be fully or partially acquired as part of the project.								
Note 2: Shaded cells are above state standards.								
85	Single Family	B / 66	1	51.4	52.3	51.7	0.3	No
86	Single Family	B / 66	1	52.4	53.3	52.7	0.3	No
87	Single Family	B / 66	1	55.8	57.0	55.5	-0.3	No
88	Single Family	B / 66	1	54.1	55.1	53.7	-0.4	No
89	Single Family	B / 66	1	53.1	54.2	52.8	-0.3	No
90	Single Family	B / 66	1	50.4	51.3	50.3	-0.1	No
91	Single Family	B / 66	1	50.4	51.1	50.4	0.0	No
92	Single Family	B / 66	1	52.2	53.1	52.4	0.2	No
93	Single Family	B / 66	1	54.0	55.1	53.7	-0.3	No
94	Single Family	B / 66	1	50.4	51.2	50.6	0.2	No
95	Single Family	B / 66	1	51.6	52.7	51.9	0.3	No
96	Single Family	B / 66	1	47.2	47.9	47.2	0.0	No
97	Single Family	B / 66	1	49.7	50.6	50.0	0.3	No
98	Single Family	B / 66	1	55.2	56.4	55.0	-0.2	No
99	Single Family	B / 66	1	53.0	54.1	52.9	-0.1	No
100	Single Family	B / 66	1	52.3	53.3	52.5	0.2	No
101	Single Family	B / 66	1	51.7	52.6	52.2	0.5	No
102	Single Family	B / 66	1	50.5	51.1	51.0	0.5	No
103	Pool	B / 66	1	53.9	54.8	54.0	0.1	No
104	Single Family	B / 66	1	66.0	67.3	65.2	-0.8	No
105	Single Family	B / 66	1	67.4	68.7	66.1	-1.3	Yes

Table B-5. Modeled Noise Levels without Abatement

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing (2019)	No Action (2040)	Proposed Action (2040)	Proposed Action Change From Existing (dBA)	Proposed Action Causes Impact?
				L _{eq} (dBA)	L _{eq} (dBA)	L _{eq} (dBA)		(Yes or No)
Note 1: These receptors will be fully or partially acquired as part of the project.								
Note 2: Shaded cells are above state standards.								
106	Single Family	B / 66	1	58.8	60.0	57.3	-1.5	No
107	Single Family	B / 66	1	53.0	54.0	53.1	0.1	No
108	Single Family	B / 66	1	61.8	63.1	60.9	-0.9	No
109	Single Family	B / 66	1	58.4	59.5	57.8	-0.6	No
110	Single Family	B / 66	1	53.4	54.4	53.9	0.5	No
111	Single Family	B / 66	1	51.6	52.5	52.3	0.7	No
112	Flea Market	E / 71	1	60.1	61.2	60.8	0.7	No
113	Single Family	B / 66	1	70.9	71.5	70.8	-0.1	Yes
114	Single Family	B / 66	1	52.3	53.1	54.2	1.9	No
115	School/Church	C / 66	1	58.5	59.9	60.8	2.3	No
116	Drive-In Theater	C / 66	1	55.3	56.4	56.0	0.7	No
117	Single Family	B / 66	1	61.1	62.4	62.9	1.8	No
118	Single Family	B / 66	1	65.3	66.7	67.9	2.6	Yes
119	Single Family	B / 66	1	58.5	59.9	60.9	2.4	No
120	Single Family	B / 66	1	52.5	53.7	54.3	1.8	No
121	Single Family	B / 66	1	48.8	49.9	50.6	1.8	No
122	Single Family	B / 66	1	47.6	48.6	48.7	1.1	No
123	Single Family	B / 66	1	44.1	45.2	45.6	1.5	No
124	Single Family	B / 66	1	58.0	59.4	60.2	2.2	No
125	Single Family	B / 66	1	55.1	56.3	56.4	1.3	No
126	Single Family	B / 66	1	55.1	56.2	56.4	1.3	No

Table B-5. Modeled Noise Levels without Abatement

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing (2019)	No Action (2040)	Proposed Action (2040)	Proposed Action Change From Existing (dBA)	Proposed Action Causes Impact?
				L _{eq} (dBA)	L _{eq} (dBA)	L _{eq} (dBA)		(Yes or No)
Note 1: These receptors will be fully or partially acquired as part of the project.								
Note 2: Shaded cells are above state standards.								
127	Single Family	B / 66	1	48.0	49.0	49.3	1.3	No
128	Single Family	B / 66	1	52.2	53.2	53.4	1.2	No
129	Single Family	B / 66	1	46.6	47.6	47.9	1.3	No
130	Single Family	B / 66	1	63.5	65.1	66.3	2.8	Yes
131	Single Family	B / 66	1	60.5	62.1	63.1	2.6	No
132	Single Family	B / 66	1	54.5	55.8	55.9	1.4	No
133	Single Family	B / 66	1	64.0	65.8	66.9	2.9	Yes
134	Single Family	B / 66	1	57.5	59.1	60.4	2.9	No
135	Single Family	B / 66	1	64.3	66.0	67.3	3.0	Yes
136	Single Family	B / 66	1	56.1	57.7	59.0	2.9	No
137	Single Family	B / 66	1	62.3	64.0	65.7	3.4	Yes
138	Single Family	B / 66	1	60.8	62.4	63.8	3.0	No
139	Single Family	B / 66	1	51.6	52.9	53.5	1.9	No
140	Single Family	B / 66	1	52.8	54.3	55.7	2.9	No
141	Single Family	B / 66	1	49.9	51.3	52.1	2.2	No
142	Single Family	B / 66	1	50.5	52.2	52.8	2.3	No
143	Single Family	B / 66	1	63.2	64.6	64.3	1.1	No
144	Single Family	B / 66	1	49.6	50.7	50.6	1.0	No
145	Single Family	B / 66	1	48.7	50.0	50.2	1.5	No
146	Single Family	B / 66	1	48.9	50.1	49.8	0.9	No
147	Single Family	B / 66	1	52.1	53.3	53.1	1.0	No

Table B-5. Modeled Noise Levels without Abatement

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing (2019)	No Action (2040)	Proposed Action (2040)	Proposed Action Change From Existing (dBA)	Proposed Action Causes Impact?
				L _{eq} (dBA)	L _{eq} (dBA)	L _{eq} (dBA)		(Yes or No)
Note 1: These receptors will be fully or partially acquired as part of the project.								
Note 2: Shaded cells are above state standards.								
148	Single Family	B / 66	1	52.0	53.2	52.8	0.8	No
149	Single Family	B / 66	1	49.5	50.2	50.3	0.8	No
150	Single Family	B / 66	1	50.7	51.3	51.3	0.6	No
151	Single Family	B / 66	1	60.9	61.6	61.5	0.6	No
152	Single Family	B / 66	1	59.3	60.0	59.7	0.4	No
153	Single Family	B / 66	1	56.3	57.0	56.6	0.3	No
154	Single Family	B / 66	1	61.1	61.9	61.7	0.6	No
155	Single Family	B / 66	1	58.0	58.8	58.7	0.7	No
156	Single Family	B / 66	1	59.0	59.8	59.4	0.4	No
157	Single Family	B / 66	1	55.7	56.4	55.8	0.1	No
158	Single Family	B / 66	1	59.2	60.1	59.7	0.5	No
159	Single Family	B / 66	1	47.8	48.6	48.7	0.9	No
160	Single Family	B / 66	1	56.4	57.3	56.5	0.1	No
161	Single Family	B / 66	1	53.3	53.8	53.5	0.2	No
162	Single Family	B / 66	1	57.3	58.3	57.7	0.4	No
163	Single Family	B / 66	1	51.9	53.1	52.3	0.4	No
164	Single Family	B / 66	1	58.0	59.0	58.3	0.3	No
165	Single Family	B / 66	1	59.7	61.1	62.4	2.7	No
166	Single Family	B / 66	1	61.5	62.9	63.7	2.2	No
167	Single Family	B / 66	1	63.4	64.7	65.4	2.0	No
168	Single Family	B / 66	1	66.6	67.9	68.1	1.5	Yes

Table B-5. Modeled Noise Levels without Abatement

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing (2019)	No Action (2040)	Proposed Action (2040)	Proposed Action Change From Existing (dBA)	Proposed Action Causes Impact?
				L _{eq} (dBA)	L _{eq} (dBA)	L _{eq} (dBA)		(Yes or No)
Note 1: These receptors will be fully or partially acquired as part of the project.								
Note 2: Shaded cells are above state standards.								
169	Single Family	B / 66	1	46.7	47.5	47.7	1.0	No
170	Single Family	B / 66	1	50.4	50.8	50.9	0.5	No
171	Single Family	B / 66	1	43.9	44.7	44.7	0.8	No
172	Single Family	B / 66	1	51.2	51.8	51.6	0.4	No
173	Single Family	B / 66	1	48.6	49.0	46.2	-2.4	No
174	Single Family	B / 66	1	51.7	52.2	51.3	-0.4	No
175	Single Family	B / 66	1	49.3	49.7	49.0	-0.3	No
176	Single Family	B / 66	1	50.8	51.6	51.9	1.1	No
177	Single Family	B / 66	1	46.6	47.5	47.7	1.1	No
178	Single Family	B / 66	1	49.8	50.5	50.0	0.2	No
179	Single Family	B / 66	1	45.0	46.0	46.0	1.0	No
180	Single Family	B / 66	1	50.1	51.0	50.4	0.3	No
181	Single Family	B / 66	1	46.8	47.7	47.6	0.8	No
182	Single Family	B / 66	1	53.3	54.5	54.8	1.5	No
183	Single Family	B / 66	1	55.6	57.0	56.3	0.7	No
184	Single Family	B / 66	1	61.5	62.9	63.5	2.0	No
185	Single Family	B / 66	1	66.3	67.6	66.8	0.5	Yes
186	Single Family	B / 66	1	54.2	55.4	56.2	2.0	No
187	Single Family	B / 66	1	64.8	66.1	65.7	0.9	Yes
188	Single Family	B / 66	1	55.3	56.6	56.6	1.3	No
189	Single Family	B / 66	1	69.7	69.8	69.8	0.1	Yes

Table B-5. Modeled Noise Levels without Abatement

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing (2019)	No Action (2040)	Proposed Action (2040)	Proposed Action Change From Existing (dBA)	Proposed Action Causes Impact?
				L _{eq} (dBA)	L _{eq} (dBA)	L _{eq} (dBA)		(Yes or No)
Note 1: These receptors will be fully or partially acquired as part of the project.								
Note 2: Shaded cells are above state standards.								
190	Single Family	B / 66	1	69.9	70.0	70.0	0.1	Yes
191	Single Family	B / 66	1	47.7	47.9	47.8	0.1	No
192	Single Family	B / 66	1	58.7	58.8	58.7	0.0	No
193	Single Family	B / 66	1	56.4	56.5	56.4	0.0	No
194	Single Family	B / 66	1	56.2	56.5	56.2	0.0	No
195	Single Family	B / 66	1	60.1	60.2	60.1	0.0	No
196	Single Family	B / 66	1	57.9	58.0	57.9	0.0	No
197	Single Family	B / 66	1	57.3	57.5	57.3	0.0	No
198	Single Family	B / 66	1	60.2	60.3	60.2	0.0	No
199	Single Family	B / 66	1	58.6	58.7	58.6	0.0	No
200	Single Family	B / 66	1	58.1	58.3	58.1	0.0	No
201	Single Family	B / 66	1	55.4	55.7	55.4	0.0	No
202	Single Family	B / 66	1	56.5	56.7	56.5	0.0	No
203	Single Family	B / 66	1	51.4	52.1	51.1	-0.3	No
204	Single Family	B / 66	1	47.7	48.2	47.8	0.1	No
205	Single Family	B / 66	1	53.6	54.1	53.6	0.0	No
206	Single Family	B / 66	1	52.2	52.6	52.2	0.0	No
207	Single Family	B / 66	1	52.7	53.1	52.7	0.0	No
208	Single Family	B / 66	1	52.5	52.9	52.5	0.0	No
209	Single Family	B / 66	1	51.7	52.1	51.7	0.0	No
210	Single Family	B / 66	1	50.8	51.5	50.6	-0.2	No

Table B-5. Modeled Noise Levels without Abatement

Receiver ID	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing (2019)	No Action (2040)	Proposed Action (2040)	Proposed Action Change From Existing (dBA)	Proposed Action Causes Impact?
				L _{eq} (dBA)	L _{eq} (dBA)	L _{eq} (dBA)		(Yes or No)
Note 1: These receptors will be fully or partially acquired as part of the project. Note 2: Shaded cells are above state standards.								
211	Single Family	B / 66	1	53.2	54.0	54.4	1.2	No
212	Single Family	B / 66	1	54.0	54.8	54.9	0.9	No
213	Single Family	B / 66	1	50.1	50.6	50.1	0.0	No
214	Single Family	B / 66	1	57.4	58.2	58.4	1.0	No
215	Single Family	B / 66	1	52.0	53.7	53.9	1.9	No

1

Appendix C. TNM Noise Modeling Results

Note: TNM files, which contain model inputs and outputs, were submitted electronically to CDOT.

Appendix D. Noise Abatement Determination Worksheets (CDOT Form 1209)



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

Instructions: To complete this form refer to CDOT Noise Analysis Guidelines

STIP # _____ Date of Analysis: July 28, 2020

Project Name & Location: 88th Avenue: I-76 NB Interchange Ramps to Highway 2

NOISE BARRIER A

A. FEASIBILITY:

1. Can a 5dBA noise reduction be achieved by constructing a noise barrier or berm?
 YES NO
2. Are there any fatal flaw drainage, terrain, safety, or maintenance issues involving the proposed noise barrier or berm?
 YES NO
3. Can a noise barrier or berm less than 20 feet tall be constructed?
 YES NO

B. REASONABLENESS:

1. Has the Design goal of 7 dBA noise reduction for abatement measure been met for at least one impacted receptor?
 YES NO
2. Is the Cost Benefit Index below \$6800 per receptor per dBA?
 YES NO
3. Are more than 50% of responding benefited resident/owners in favor of the recommended noise abatement measure?
 YES NO N/A

C. INSULATION CONSIDERATION:

1. Are normal noise abatement measures physically infeasible or economically unreasonable?
 YES NO
If the answer to 1 is YES, then:
2. a. Does this project have noise impacts to NAC Activity Category D?
 YES NO N/A
b. If yes, is it reasonable and feasible to provide insulation for these buildings?
 YES NO N/A

D. ADDITIONAL CONSIDERATIONS:

E. STATEMENT OF LIKELIHOOD:

1. Are noise mitigation measures feasible?
 YES NO
2. Are noise mitigation measures reasonable?
 YES NO
3. Is insulation of buildings both feasible and reasonable?
 YES NO N/A
4. Shall noise abatement measures be provided?
 YES NO

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

Completed by: Mike Parsons, PE Date: 07/28/2020



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

Instructions: To complete this form refer to CDOT Noise Analysis Guidelines

STIP # _____ Date of Analysis: July 28, 2020

Project Name & Location: 88th Avenue: I-76 NB Interchange Ramps to Highway 2

NOISE BARRIER B

A. FEASIBILITY:

1. Can a 5dBA noise reduction be achieved by constructing a noise barrier or berm?
 YES NO
2. Are there any fatal flaw drainage, terrain, safety, or maintenance issues involving the proposed noise barrier or berm?
 YES NO
3. Can a noise barrier or berm less than 20 feet tall be constructed?
 YES NO

B. REASONABLENESS:

1. Has the Design goal of 7 dBA noise reduction for abatement measure been met for at least one impacted receptor?
 YES NO
2. Is the Cost Benefit Index below \$6800 per receptor per dBA?
 YES NO
3. Are more than 50% of responding benefited resident/owners in favor of the recommended noise abatement measure?
 YES NO N/A

C. INSULATION CONSIDERATION:

1. Are normal noise abatement measures physically infeasible or economically unreasonable?
 YES NO
If the answer to 1 is YES, then:
2. a. Does this project have noise impacts to NAC Activity Category D?
 YES NO N/A
b. If yes, is it reasonable and feasible to provide insulation for these buildings?
 YES NO N/A

D. ADDITIONAL CONSIDERATIONS:

E. STATEMENT OF LIKELIHOOD:

1. Are noise mitigation measures feasible?
 YES NO
2. Are noise mitigation measures reasonable?
 YES NO
3. Is insulation of buildings both feasible and reasonable?
 YES NO N/A
4. Shall noise abatement measures be provided?
 YES NO

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

Completed by: Mike Parsons, PE Date: 07/28/2020



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

Instructions: To complete this form refer to CDOT Noise Analysis Guidelines

STIP # _____ Date of Analysis: July 28, 2020

Project Name & Location: 88th Avenue: I-76 NB Interchange Ramps to Highway 2

NOISE BARRIER C

A. FEASIBILITY:

1. Can a 5dBA noise reduction be achieved by constructing a noise barrier or berm?
 YES NO
2. Are there any fatal flaw drainage, terrain, safety, or maintenance issues involving the proposed noise barrier or berm?
 YES NO N/A
3. Can a noise barrier or berm less than 20 feet tall be constructed?
 YES NO N/A

B. REASONABLENESS:

1. Has the Design goal of 7 dBA noise reduction for abatement measure been met for at least one impacted receptor?
 YES NO N/A
2. Is the Cost Benefit Index below \$6800 per receptor per dBA?
 YES NO N/A
3. Are more than 50% of responding benefited resident/owners in favor of the recommended noise abatement measure?
 YES NO N/A

C. INSULATION CONSIDERATION:

1. Are normal noise abatement measures physically infeasible or economically unreasonable?
 YES NO
If the answer to 1 is YES, then:
2. a. Does this project have noise impacts to NAC Activity Category D?
 YES NO
b. If yes, is it reasonable and feasible to provide insulation for these buildings?
 YES NO N/A

D. ADDITIONAL CONSIDERATIONS:

E. STATEMENT OF LIKELIHOOD:

- | | |
|---|---|
| 1. Are noise mitigation measures feasible?
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | 2. Are noise mitigation measures reasonable?
<input type="checkbox"/> YES <input type="checkbox"/> NO N/A |
| 3. Is insulation of buildings both feasible and reasonable?
<input type="checkbox"/> YES <input type="checkbox"/> NO N/A | 4. Shall noise abatement measures be provided?
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

Completed by: Mike Parsons, PE Date: 07/28/2020



**COLORADO DEPARTMENT OF TRANSPORTATION
NOISE ABATEMENT DETERMINATION WORKSHEET**

Instructions: To complete this form refer to CDOT Noise Analysis Guidelines

STIP # _____ Date of Analysis: July 28, 2020

Project Name & Location: 88th Avenue: I-76 NB Interchange Ramps to Highway 2

NOISE BARRIER D

A. FEASIBILITY:

1. Can a 5dBA noise reduction be achieved by constructing a noise barrier or berm?
 YES NO
2. Are there any fatal flaw drainage, terrain, safety, or maintenance issues involving the proposed noise barrier or berm?
 YES NO
3. Can a noise barrier or berm less than 20 feet tall be constructed?
 YES NO

B. REASONABLENESS:

1. Has the Design goal of 7 dBA noise reduction for abatement measure been met for at least one impacted receptor?
 YES NO
2. Is the Cost Benefit Index below \$6800 per receptor per dBA?
 YES NO
3. Are more than 50% of responding benefited resident/owners in favor of the recommended noise abatement measure?
 YES NO N/A

C. INSULATION CONSIDERATION:

1. Are normal noise abatement measures physically infeasible or economically unreasonable?
 YES NO
If the answer to 1 is YES, then:
2. a. Does this project have noise impacts to NAC Activity Category D?
 YES NO
- b. If yes, is it reasonable and feasible to provide insulation for these buildings?
 YES NO N/A

D. ADDITIONAL CONSIDERATIONS:

E. STATEMENT OF LIKELIHOOD:

- | | |
|---|---|
| 1. Are noise mitigation measures feasible?
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO | 2. Are noise mitigation measures reasonable?
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
| 3. Is insulation of buildings both feasible and reasonable?
<input type="checkbox"/> YES <input type="checkbox"/> NO N/A | 4. Shall noise abatement measures be provided?
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

Completed by: Mike Parsons, PE Date: 07/28/2020



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

Instructions: To complete this form refer to CDOT Noise Analysis Guidelines

STIP # _____ Date of Analysis: July 28, 2020

Project Name & Location: 88th Avenue: I-76 NB Interchange Ramps to Highway 2

NOISE BARRIER E

A. FEASIBILITY:

1. Can a 5dBA noise reduction be achieved by constructing a noise barrier or berm?
 YES NO
2. Are there any fatal flaw drainage, terrain, safety, or maintenance issues involving the proposed noise barrier or berm?
 YES NO
3. Can a noise barrier or berm less than 20 feet tall be constructed?
 YES NO

B. REASONABLENESS:

1. Has the Design goal of 7 dBA noise reduction for abatement measure been met for at least one impacted receptor?
 YES NO
2. Is the Cost Benefit Index below \$6800 per receptor per dBA?
 YES NO
3. Are more than 50% of responding benefited resident/owners in favor of the recommended noise abatement measure?
 YES NO N/A

C. INSULATION CONSIDERATION:

1. Are normal noise abatement measures physically infeasible or economically unreasonable?
 YES NO
If the answer to 1 is YES, then:
2. a. Does this project have noise impacts to NAC Activity Category D?
 YES NO N/A
b. If yes, is it reasonable and feasible to provide insulation for these buildings?
 YES NO N/A

D. ADDITIONAL CONSIDERATIONS:

E. STATEMENT OF LIKELIHOOD:

1. Are noise mitigation measures feasible?
 YES NO
2. Are noise mitigation measures reasonable?
 YES NO
3. Is insulation of buildings both feasible and reasonable?
 YES NO N/A
4. Shall noise abatement measures be provided?
 YES NO

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

Completed by: Mike Parsons, PE Date: 07/28/2020



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

Instructions: To complete this form refer to CDOT Noise Analysis Guidelines

STIP # _____ Date of Analysis: July 28, 2020

Project Name & Location: 88th Avenue: I-76 NB Interchange Ramps to Highway 2

NOISE BARRIER F

A. FEASIBILITY:

1. Can a 5dBA noise reduction be achieved by constructing a noise barrier or berm?
 YES NO
2. Are there any fatal flaw drainage, terrain, safety, or maintenance issues involving the proposed noise barrier or berm?
 YES NO
3. Can a noise barrier or berm less than 20 feet tall be constructed?
 YES NO

B. REASONABLENESS:

1. Has the Design goal of 7 dBA noise reduction for abatement measure been met for at least one impacted receptor?
 YES NO
2. Is the Cost Benefit Index below \$6800 per receptor per dBA?
 YES NO
3. Are more than 50% of responding benefited resident/owners in favor of the recommended noise abatement measure?
 YES NO N/A

C. INSULATION CONSIDERATION:

1. Are normal noise abatement measures physically infeasible or economically unreasonable?
 YES NO
If the answer to 1 is YES, then:
2. a. Does this project have noise impacts to NAC Activity Category D?
 YES NO N/A
b. If yes, is it reasonable and feasible to provide insulation for these buildings?
 YES NO N/A

D. ADDITIONAL CONSIDERATIONS:

E. STATEMENT OF LIKELIHOOD:

1. Are noise mitigation measures feasible?
 YES NO
2. Are noise mitigation measures reasonable?
 YES NO
3. Is insulation of buildings both feasible and reasonable?
 YES NO N/A
4. Shall noise abatement measures be provided?
 YES NO

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

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