Interstate 70 Eastbound Auxiliary Lane (Exit 203 to Exit 205)

REVISED TRAFFIC NOISE TECHNICAL REPORT

NEPA Documented Categorical Exclusion

Project Number NHPP 0702-383 and Subaccount Number 22381

Date of Report April 22, 2022 (Post NEPA)

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LIST OF ABBREVIATIONS AND ACRONYMS

CDOT	Colorado Department of Transportation
CFR	Code of Federal Regulations
dB	decibels
dBA	A-weighted decibels
EB	eastbound
e/o	East of
FAQ	frequently asked question
FHWA	Federal Highway Administration
ft^2	square feet
Guidance	FHWA's Highway Traffic Noise: Analysis and Abatement Guidance
ID	identification
I-70	Interstate 70
Leq	one-hour equivalent sound level
mph	miles per hour
NAC	Noise Abatement Criterion
NAAG	Noise Analysis and Abatement Guidelines
NEPA	National Environmental Policy Act
US6/SH 9	United State Highway 6/State Highway 9 (Blue River Parkway)
TNM	FHWA's Traffic Noise Model
WB	westbound
w/o	west of

1 EXECUTIVE SUMMARY

This traffic noise technical report has been prepared in support of the Interstate 70 Eastbound Auxiliary Lane project. An executive summary of this project's traffic noise analysis and abatement evaluation is included in Table 1. Report revised based on more accurate information on individual residential units within each building at Prospect Point.

Table 1 Project Overview

Project Location	This project is in Silverthorne and Dillion, Summit County, Colorado (See Figure 1).
Type I Status Explanation	This project is a Type I project because it would include construction of an east bound auxiliary lane between exit 203 and exit 205.
Noise Level and Impact Overview	• Existing (2020) modeled noise levels range from 46.2 to 72.2 A-weighted decibels (dBA) at 110 receivers[1], which represent 137 receptors. • Future (2045) modeled noise levels for the Proposed Action range from 50.0 dBA to 75.4 dBA at 110 receivers[2], which represent 137 receptors. The Proposed Action is expected to impact 25 Activity Category B receivers, which represents 29 receptors, 5 Activity Category C receivers, which represents 5 receptors and no Activity Category E receivers.
Noise Abatement Considerations and Commitments Overview	Two noise barriers were evaluated, as shown in Figures 6A and 6B. None of the barriers were found to be reasonable and feasible. Barriers EB1, EB-2 were found to be feasible but not reasonable. Barriers on the WB site would not be feasible due to the receivers being 25 feet or more above the Interstate 70.
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 provided to local officials, as described in Chapter 9.

2 PROJECT INTRODUCTION

Colorado Department of Transportation (CDOT), in cooperation with the Federal Highway Administration (FHWA), is preparing a Documented Categorical Exclusion for this project. The improvements, which are described in Table 2 and hereafter called the Proposed Action. The project constitute a Type I project because an auxiliary lane longer than 2,500 feet, project's approximate length of 19,000 feet, is being added, on the EB I-70, in Summit County between the end of the EB on ramp at Exit 203 and approximately 2,500 feet east of the onramp from Exit 205, between the cities of Silverthorne and Dillon, Colorado.

Because the project 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, a noise analysis is needed to determine if receptors will be impacted as a result

[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.

of building the project. WSP, USA, acting on behalf of CDOT, conducted a noise analysis for the project and prepared this report using the CDOT noise report template. Table 2 includes information about this project and provides context for this traffic noise analysis.

Table 2 Project Background

Project Location	Town of Silverthorne and Town of Dillon and Summit County, Colorado (See Figure 1)
Affected Roadways	Interstate 70 and Eastbound 205 exit ramp.
Project Purpose	The purpose of the I-70 Eastbound Auxiliary Lane Project is to enhance safety, reduce delays, and improve travel time reliability for travel on eastbound I-70 between Exit 203 (Frisco) and Exit 205 (Silverthorne/Dillon). The improvements will provide improved safety and reduce travel time delays for the downhill eastbound lanes approaching Exit 205. Additionally, the single lane exit ramp to Exit 205 will provide a more visible and safer exit on the short-curved off-ramp.
Project Need	The I-70 Eastbound Auxiliary Lane Project is needed to improve safety and reduce crashes; reduce delays; and improve travel reliability on I-70 between Frisco and Silverthorne/Dillon. Improving the pavement surface and advancing travel reliability and safety on this stretch of I-70 will address some of the I-70 Mountain Corridor regional travel issues.
Proposed Action Description	This project would include: Adding one lane of traffic to the inside of EB lanes between Exit 203 and east of the EB On Ramp for the scenic overlook. Adding one lane to the outside of the EB lanes from east of the EB On Ramp from the scenic overlook to a half mile west of the I-70 Bridge over the Blue River, where the new lane shifts to inside of the EB lanes and remains in the inside through the end of the project. • Addition of a continuous auxiliary lane from the existing Exit 203 on-ramp to-and-through the Exit 205 interchange connecting to the existing eastbound auxiliary lane that begins at the existing eastbound Exit 205 on-ramp, • Widening the outside shoulder to a width of 12 feet, • Improvements to the scenic overlook exit and entrance ramps, • Addition of six truck parking spaces at the eastbound scenic overlook, • Reconstruction of the Exit 205 eastbound off-ramp (change to single lane exit with a new extended auxiliary deceleration exit lane). • Widening of the I-70 bridge over the Blue River and I-70 bridge over US6/SH 9 (Blue River Parkway), • Pavement rehabilitation (mill and overlay) of the existing pavement surface. • Wildlife fencing from Exit 203 to the Blue River for both sides (westbound lanes and eastbound lanes) of I-70 (Funding Dependent), • No change to the existing ramp terminals (existing signalized intersections) or storage lengths for the approach lanes at each intersection, • No change to westbound I-70 and westbound on-and-off ramps at Exit 205
Prior National Environmental Policy Act (NEPA) Approvals	Not applicable. This project is a new action.

3 BACKGROUND

This noise analysis was done as required by 23 CFR 772 in accordance with CDOT's *Noise Analysis and Abatement Guidelines* (NAAG) (CDOT, 2020) and FHWA's *Highway Traffic Noise: Analysis and Abatement Guidance* (Guidance) (FHWA, 2011). The analysis determines whether 2045 traffic noise levels from the Proposed Action will exceed applicable impact thresholds at properties (i.e., receptors) within the Proposed Action Noise Study Zone (this zone is described in Section 4.1). Traffic noise abatement is evaluated for any such impacted receptors. The analysis was conducted based on design files provided from WSP USA. The CADD files were received by the noise analyst on 09/08/2020.

This noise analysis included the following tasks:

- Conducting field measurements of existing condition sound levels (see Section 4.3)
- Validating an existing condition noise model using field measurement results (see Section 4.4)
- Modeling existing condition noise levels for existing roadways (see Chapter 5)
- Modeling Proposed Action noise levels for design roadways (see Chapter 5)
- Evaluating noise abatement (see Chapter 6)
- Modeling noise contour lines for unpermitted, undeveloped land (see Chapter 9)

3.1 Characteristics of Noise

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

3.2 Applicable Regulations, Guidelines, and Tools

The following regulation, guidelines, and tools were used to complete this noise analysis:

- ***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, 2020): Fulfilled Federal requirement to adopt state-specific guidelines. 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.
- ***Noise Measurement Handbook*** (FHWA, 2018): Includes procedures for measuring highway noise.
- **FHWA Traffic Noise Model (TNM) Version 2.5** (FHWA, February 2004): Model used to determine existing condition and design year noise levels.

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 any receptor
- Predicted design year traffic noise level substantially exceeds the existing condition highway traffic noise level at any receptor. "Substantial" is defined as a noise increase of 10 dB or more between the existing condition and design year noise levels.

Table 3 shows CDOT's NAC. The CDOT NAAG requires that the one-hour equivalent sound level (Leq) be used in the analysis.

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. Examples of exterior areas 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.

Table 3 CDOT Noise Abatement Criteria

Activity Category	Activity L_{eq} (dBA)[1, 2]	Evaluation Location	Activity Description
A	56.0	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[3]	66.0	Exterior	Residential
C[3]	66.0	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	51.0	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[3]	71.0	Exterior	Hotels, motels, time-share resorts[4], offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	Not Applicable	Not Applicable	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, ship yards, utilities (water resources, water treatment, electrical), warehousing, malls[5], stores[5], shops[5], and Government managed land.[4,6]
G	Not Applicable	Not Applicable	Undeveloped lands that are not permitted.

1 Table 1 of 23 CFR 772 allows state highways agencies to use either Leq(h) or L10(h) on a project, but not both. CDOT uses Leq(h), which is an Hourly A-weighted sound level in dBA.

2 NACs are for impact determination only. They are not design standards for noise abatement measures.

3 Includes undeveloped lands permitted for this activity category.

4 This activity description is not listed in Table 1 of 23 CFR 772.

5 This activity description is not listed in Table 1 of 23 CFR 772, but is in FHWA's FAQ D7.

6 Areas of frequent human use within the Government (Federal, State, and County) managed land will be treated as the appropriate land use (e.g., a campground would be Activity Category C, as described in Section 3.5.4 of the CDOT NAAG).

4 NOISE ANALYSIS METHODS

The noise 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 existing condition noise model, and inputting several parameters into the noise model. These steps are described in this chapter.

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 on Figure 2.

4.2 Land Use Identification

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

Table 4 Land Use Considerations

Receiver Activity Category Summary (see Table 9)	Receivers with the following Activity Categories were modeled in the existing condition and design year scenarios: • Activity Category B: 99 receivers representing 126 receptors • Activity Category C: 6 receivers representing 6 receptors • Activity Category E: 5 receivers representing 5 receptors
Other Considerations	• 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 1 location of 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. However, contour lines must be provided for Activity Category G lands. Distance to the 71 and 66 dBA contours for this area are given in section 9. Areas not identified as Activity Category B, C, E or G in Figure 2 are Activity Category F. • The Noise Study Zone contains four Section 4(f) sites with frequent human use. These are represented by sites 23, 44, 52 and 53. • The Noise Study Zone does not have any Section 106 sites

4.3 Field Noise Measurements

Tables 5 and 6 summarize noise measurement information 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 A-1 of Appendix A, were collected during the noise measurement periods. Noise measurement field data sheets are in Appendix A.

Table 5 Field Noise Measurement Summary

Measurement Location ID	Location	Date	Time (a.m. or p.m.)		Length (minutes)
			Start	Stop	
M1	Northeast of I-70/SH 9, South of Ptarmigan Trail near Community Center	6/25/20	8:50 a.m.	9:05 a.m.	15
M2	Northeast of I-70/SH 9, North of Ptarmigan Trail, just east of CR 2020	6/25/20	8:50 a.m.	9:05 a.m.	15

Table 5 Field Noise Measurement Summary

Measurement Location ID	Location	Date	Time (a.m. or p.m.)		Length (minutes)
			Start	Stop	
M3	Southeast of I-70/US 6, North of CR 53, behind Organic Cannabis	6/25/20	12:00 p.m.	12:15 p.m.	15
M4	North of I-70, at CR 1260B, Trailhead parking area	6/25/20	9:45 a.m.	10:00 a.m.	15
M5	South of I-70, North of Lake Forest Condos off Dillon Dam Rd.	6/25/20	10:30 a.m.	10:45 a.m.	15
M6	South of I-70, South of Dillon Dam Rd, adjacent to Prospect Point Apts.	6/25/20	11:05 a.m.	11:20 a.m.	15

Table 6 Field Noise Measurement Details

Number of Field Measurement Locations	6
Field Measurement Locations	Traffic noise measurement locations are shown on Figure 2. These measurement locations were selected because they best represent the noise sensitive land uses in the area and provide different exposures to the existing I-70 for validation.
Basis for Measurement Length	Traffic on I-70 was constant with no large time without traffic. The Leq had not changed more than 0.2 dBA for at least 2 minutes before the 15-minute mark.
Method to Estimate Traffic Volume During Field Measurement	On-Site counting with traffic clicker
Method to Estimate Traffic Speed	Drove test vehicle through traffic within 15 minutes of each measurement.
Weather Conditions Summary (See Appendix A)	Noise measurements were made during weather conditions acceptable according to FHWA guidance (FHWA, 1996). Weather conditions, including wind speed, were monitored during the measurements
Sound Level Meter Used	Type I Quest Sound Pro DL-2 -1/3 SN 13641& SN 13635
Sound Level Meter Laboratory Calibration Date	June 6, 2020
Field Calibrator Used	Larson Davis Call 200
Height of Noise Measurement Above Grade	5 feet

4.4 Validation of Existing Condition Model

Existing condition noise levels were measured in the field, as described in Section 4.3, and compared to computer noise level predictions that were based on traffic data measured in the field. This was done to verify

the accuracy of the existing condition noise model. This process is called validation of the existing condition noise model. The model may be described as an initial existing condition model during the validation process because it is not required to include any receivers except those representing the noise measurement locations.

If predicted and measured noise levels are within ±3.0 dB of each another, the existing condition noise 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 Existing Condition Model Validation Summary

Noise Measurement Location ID[1]	Location (see Figure 2)	Measured Leq (dBA)	Modeled Leq (dBA)	Difference (dB)
M1	Northeast of I-70/SH 9, South of Ptarmigan Trail near Community Center	66.7	66.1	-0.6
M2	Northeast of I-70/SH 9, North of Ptarmigan Trail, just east of CR 2020	64.6	64.4	-0.2
M3	Southeast of I-70/US 6, North of CR 53, behind Organic Cannabis	64.9	63.7	-1.2
M4	North of I-70, at CR 1260B, Trailhead parking area	62.6	62.9	0.3
M5	South of I-70, North of Lake Forest Condos off Dillon Dam Rd.	65.1	65.3	0.2
M6	South of I-70, South of Dillon Dam Rd, adjacent to Prospect Point Apts.	66.3	64.6	-1.7

1. Two measurements were taken at each site, except for Site 5. All measurements were within the ±3.0 dB tolerance, the levels reported in the table are the validation runs that were closest to the field measurements.

Differences between measured and predicted levels are all within the allowable ±3.0 dB tolerance. Therefore, the existing condition noise model is validated for this project.

4.5 TNM Model Inputs

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 (2020) and future (2045) 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 worst-hour noise periods. Appendix B contains the traffic volumes by roadway. Traffic data from the traffic report is used since the volumes did not exceed the volumes from Table 3 of CDOT NAAG.

Table 8 TNM Model Inputs and Methods

Noise Sensitive Receptors	Noise sensitive receptors are defined according to Table 3. Receivers (modeled points) have been selected to represent these receptors within the Noise Study Zone.
Receivers	Receivers are listed in Table 9 and shown in Figures 4 and 5.
Modeled Roadways	The following roadways were modeled: • I-70 • Part of the EB On and Part of the WB Off for Exit 203 • EB and WB On and Off Ramps for Exit 205 • EB and WB On and Off Ramps for Scenic outlook • New EB I-70 Auxiliary lane - Proposed action.

Table 8 TNM Model Inputs and Methods

	For the Proposed Action the analysis included a new lane on the I-70 newly built by the project, traffic on the EB I-70 will be affected by the lane addition.
TNM Objects and Elevations	The following objects were modeled: terrain lines, buildings modeled as noise barriers, and jersey barrier modeled as a noise barrier. These are shown in Figure 3.
Existing Noise Barriers	There is one existing noise barrier within the Noise Study Zone, on the EB I-70, east of exit 205. The precast concrete barrier on top of a jersey barrier is approximately 250 feet long and 10 feet in height. The proposed project will not affect this barrier.
Modeled Pavement Type	Average (FHWA requirement)
Default Ground Type	Field Grass was used because most of the area is high grass and shrub.
Traffic Data (See Appendix B)	• Roadway coordinates are generated from CAD dated 9-8-2020 and aerial photographs • Traffic volumes are from: o Interstate 70 Eastbound Auxiliary Lane – Transportation and Traffic Existing and Future Conditions Report Analysis of I-70 Alternatives and Exit 205 Conditions – WSP, August 20, 2020 • Vehicle mix(es) is/are from: o WSP Traffic Modeling (2020) o WSP Traffic Modeling (2045) • Basis for identifying traffic noise worst-hour. Traffic volumes from the WSP August 20, 2020 Traffic Study and Modeling. Traffic volumes that had the highest number of vehicles traveling at the posted speed limits were used to model the worst-hour traffic noise.

5 TNM RESULTS

In the analysis, 110 receivers representing 137 receptors were modeled (see Table 9). The modeled noise levels were used to identify which, if any, receptors would be impacted as a result of the Proposed Action.

Table 9 Modeled Noise Levels Considering Proposed Action

Receiver ID[1]	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2020) L_{eq} (dBA)	Proposed Action (2045) L_{eq} (dBA)	Proposed Action Change From Existing (dB)	Proposed Action Causes Impact? (Yes or No)
1	Residential	B(66)	1	64.8	68.7	3.9	Yes
2	Residential	B(66)	1	65.0	68.7	3.7	Yes
3	Residential Ground Floor Prospect Point	B(66)	1	60.9	64.9	4.0	No
3A	Residential 2nd story Prospect Point Dr.	B(66)	1	56.9	61	4.1	No
4	Residential 2nd story Prospect Point Dr.	B(66)	1	66.0	70	4.0	Yes
4A	Residential 2nd story Prospect Point Dr.	B(66)	1	65.2	69.3	4.1	Yes
5	Residential Ground Floor Prospect Point	B(66)	1	62.0	66.1	4.1	Yes
5A	Residential 2nd story Prospect Point Dr.	B(66)	1	65.3	69.2	3.9	Yes
6	Residential 2nd story Prospect Point Dr.	B(66)	1	55.6	59.7	4.1	No
6A	Residential Ground Floor Prospect Point	B(66)	1	46.6	50.4	3.8	No
6A-2	Residential 2nd story Prospect Point Dr.	B(66)	1	51.7	55.7	4.0	No
7	Residential 2nd story Prospect Point Dr.	B(66)	2	60.2	64.0	3.8	No
8	Residential 2nd story Prospect Point Dr.	B(66)	1	64.5	68.5	4.0	Yes
8A	Residential Ground Floor Prospect Point	B(66)	1	59.4	63.4	4.0	No

Table 9 Modeled Noise Levels Considering Proposed Action

Receiver ID[1]	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2020) L_{eq} (dBA)	Proposed Action (2045) L_{eq} (dBA)	Proposed Action Change From Existing (dB)	Proposed Action Causes Impact? (Yes or No)
8A-2	Residential 2nd story Prospect Point Dr.	B(66)	1	61.9	65.9	4.0	No
9	Residential Ground Floor Prospect Point	B(66)	1	53.7	57.5	3.8	No
9A	Residential 2nd story Prospect Point Dr.	B(66)	1	56.6	60.3	3.7	No
10	Residential 2nd story Prospect Point Dr.	B(66)	1	55.4	59.1	3.7	No
10A	Residential 2nd story Prospect Point Dr.	B(66)	1	55.3	59.0	3.7	No
11	Residential Prospect Point Common Outdoor Area	B(66)	10	56.1	59.9	3.8	No
12	Residential 2nd story Prospect Point Dr.	B(66)	1	62.9	66.9	4.0	Yes
12A	Residential 2nd story Prospect Point Dr.	B(66)	1	61.4	65.5	4.1	No
13	Residential 2nd story Prospect Point Dr.	B(66)	1	63.4	67.2	3.8	Yes
13A	Residential 2nd story Prospect Point Dr.	B(66)	1	62.4	66.2	3.8	Yes
14	Residential Ground Floor Prospect under Receiver 13A	B(66)	1	60.5	64.3	3.8	No
14A	Residential Ground Floor Prospect under Receiver 12A	B(66)	1	58.6	62.6	4.0	No
15	Residential Ground Floor Prospect Point	B(66)	1	56.7	60.7	4.0	No

Table 9 Modeled Noise Levels Considering Proposed Action

Receiver ID[1]	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2020) L_{eq} (dBA)	Proposed Action (2045) L_{eq} (dBA)	Proposed Action Change From Existing (dB)	Proposed Action Causes Impact? (Yes or No)
15A	Residential 2nd story Prospect Point Dr.	B(66)	1	51.5	55.4	3.9	No
16	Residential 2nd story Prospect Point Dr.	B(66)	1	59.1	63.0	3.9	No
16A	Residential Ground Floor Prospect Point.	B(66)	1	58.2	62.1	3.9	No
17	Residential 2nd story Prospect Point Dr.	B(66)	1	62.3	66.0	3.7	Yes
17A	Residential 2nd story Prospect Point Dr.	B(66)	1	62.3	66.1	3.8	Yes
18	Residential 2nd story Prospect Point Dr.	B(66)	1	55.4	59.1	3.7	No
18A	Residential 2nd story Prospect Point Dr.	B(66)	1	55.9	59.6	3.7	No
19	Residential 2nd story Prospect Point Dr.	B(66)	1	54.6	58.3	3.7	No
19A	Residential 2nd story Prospect Point Dr.	B(66)	1	52.9	56.6	3.7	No
20	Residential 2nd story Prospect Point Dr.	B(66)	2	58.1	61.9	3.8	No
21	Residential 2nd story Prospect Point Dr.	B(66)	1	62.0	65.8	3.8	No
21A	Residential 2nd story Prospect Point Dr.	B(66)	1	61.7	65.5	3.8	No
22	Residential 2nd story Prospect Point Dr.	B(66)	1	61.8	65.7	3.9	No

Table 9 Modeled Noise Levels Considering Proposed Action

Receiver ID[1]	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2020) L_{eq} (dBA)	Proposed Action (2045) L_{eq} (dBA)	Proposed Action Change From Existing (dB)	Proposed Action Causes Impact? (Yes or No)
22A	Residential 2nd story Prospect Point Dr.	B(66)	1	61.7	65.6	3.9	No
23	Bike Trail North of Prospect Point (Scenic Viewing Point)	C(66)	1	58.6	62.7	4.1	No
24	Residential (2nd Floor Lake View Terrace)	B(66)	1	56.2	60.2	4.0	No
24-2	Residential (3rd Floor Lake View Terrace)	B(66)	1	59.2	63.2	4.0	No
25	Residential (2nd Floor Lake View Terrace)	B(66)	1	50.9	54.8	3.9	No
25-2	Residential (3rd Floor Lake View Terrace)	B(66)	1	54.7	58.6	3.9	No
26	Residential (2nd Floor Lake View Terrace)	B(66)	1	51.4	55.3	3.9	No
26-2	Residential (3rd Floor Lake View Terrace)	B(66)	1	54.5	58.4	3.9	No
27	Residential (2nd Floor Lake View Terrace)	B(66)	1	53.4	57.3	3.9	No
27-2	Residential (3rd Floor Lake View Terrace)	B(66)	1	57.7	61.6	3.9	No
28	Residential (2nd Floor Lake View Terrace)	B(66)	1	53.3	57.2	3.9	No
28-2	Residential (3rd Floor Lake View Terrace)	B(66)	1	56.7	60.5	3.8	No
29	Residential (2nd Floor Lake View Terrace)	B(66)	1	58.7	62.8	4.1	No

Table 9 Modeled Noise Levels Considering Proposed Action

Receiver ID[1]	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2020) L_{eq} (dBA)	Proposed Action (2045) L_{eq} (dBA)	Proposed Action Change From Existing (dB)	Proposed Action Causes Impact? (Yes or No)
29-2	Residential (3rd Floor Lake View Terrace)	B(66)	1	61.1	65.2	4.1	No
30	Residential (2nd Floor Lake View Terrace)	B(66)	1	59.5	63.6	4.1	No
31	Residential (2nd Floor Lake View Terrace)	B(66)	1	53.7	57.5	3.8	No
31-2	Residential (3rd Floor Lake View Terrace)	B(66)	1	55.9	59.8	3.9	No
32	Residential (3rd Floor Lake View Terrace)	B(66)	1	54.1	57.9	3.8	No
32-2	Residential (3rd Floor Lake View Terrace)	B(66)	1	57.1	60.9	3.8	No
33	Residential (3rd Floor Lake View Terrace)	B(66)	1	53.7	57.5	3.8	No
33-2	Residential (3rd Floor Lake View Terrace)	B(66)	1	56.8	60.6	3.8	No
34	Residential (3rd Floor Lake View Terrace)	B(66)	1	53.8	57.5	3.7	No
34-2	Residential (3rd Floor Lake View Terrace)	B(66)	1	57.0	60.8	3.8	No
35	Residential (3rd Floor Lake View Terrace)	B(66)	1	53.6	57.3	3.7	No
35-2	Residential (3rd Floor Lake View Terrace)	B(66)	1	57.0	60.8	3.8	No
36	Residential (2nd Floor Lake View Terrace)	B(66)	1	52.5	56.3	3.8	No

Table 9 Modeled Noise Levels Considering Proposed Action

Receiver ID[1]	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2020) L_{eq} (dBA)	Proposed Action (2045) L_{eq} (dBA)	Proposed Action Change From Existing (dB)	Proposed Action Causes Impact? (Yes or No)
36-2	Residential (3rd Floor Lake View Terrace)	B(66)	1	55.1	58.8	3.7	No
37	Residential (2nd Floor Lake View Terrace)	B(66)	2	51.3	55.2	3.9	No
37-2	Residential (3rd Floor Lake View Terrace)	B(66)	2	54.1	58.2	4.1	No
38	Residential (2nd Floor Lake View Terrace)	B(66)	2	52.6	56.5	3.9	No
38-2	Residential (3rd Floor Lake View Terrace)	B(66)	2	56.0	60.0	4.0	No
39	Residential (2nd Floor Lake View Terrace)	B(66)	2	51.2	55.2	4.0	No
39-2	Residential (3rd Floor Lake View Terrace)	B(66)	2	53.0	57.0	4.0	No
40	Residential (2nd Floor Lake View Terrace)	B(66)	2	52.6	56.6	4.0	No
40-2	Residential (3rd Floor Lake View Terrace)	B(66)	2	55.5	59.5	4.0	No
41	Residential (2nd Floor Lake View Terrace)	B(66)	2	50.5	54.5	4.0	No
41-2	Residential (3rd Floor Lake View Terrace)	B(66)	2	52.7	56.6	3.9	No
42	WB Scenic Outlook Sign	C(66)	1	72.2	75.4	3.2	Yes
43	EB Scenic Outlook Sign	C(66)	1	70.6	75.4	4.8	Yes
44	Salt Link Trail Head	C(66)	1	63.7	67.3	3.6	Yes

Table 9 Modeled Noise Levels Considering Proposed Action

Receiver ID[1]	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2020) L_{eq} (dBA)	Proposed Action (2045) L_{eq} (dBA)	Proposed Action Change From Existing (dB)	Proposed Action Causes Impact? (Yes or No)
45	Wilderness Vacation Rentals Outdoor Office Desk	E(71)	1	64.7	68.0	3.3	No
46	Residential (Blue Ridge Townhomes)	B(66)	2	63.9	67.3	3.4	Yes
47	Residential (Blue Ridge Townhomes)	B(66)	2	63.6	67.1	3.5	Yes
48	Residential (Blue Ridge Townhomes)	B(66)	1	63.3	66.8	3.5	Yes
49	Residential (Blue Ridge Townhomes)	B(66)	2	62.2	65.8	3.6	No
50	Residential (Blue Ridge Townhomes)	B(66)	2	61.7	65.4	3.7	No
51	Residential (Blue Ridge Townhomes)	B(66)	1	61.4	65.1	3.7	No
52	Silverthorne Bike Trail (Bench Rest Area)	C(66)	1	67.9	71.3	3.4	Yes
53	Silverthorne Bike Trail (Bench Rest Area)	C(66)	1	59.4	67.9	8.5	Yes
54	Bakers Brewery Outdoor Dining	E(71)	1	62.9	67.3	4.4	No
55	Hotel (La Quinta Inn) I	E(71)	1	59.4	63.8	4.4	No
56	Residential along Ptarmigan Trail	B(66)	1	58.4	63.6	5.2	No
57	Hotel (Days Inn)	E(71)	1	61.9	66.9	5.0	No
58	Residential along Ptarmigan Trail	B(66)	1	63.0	67.9	4.9	Yes
59	Residential along Ptarmigan Trail	B(66)	1	60.5	65.2	4.7	No
60	Residential along Ptarmigan Trail	B(66)	1	61.5	66.1	4.6	Yes
61	Residential along Ptarmigan Trail	B(66)	1	61.9	66.0	4.1	Yes
62	Residential along Ptarmigan Trail	B(66)	1	58.7	62.7	4.0	No

Table 9 Modeled Noise Levels Considering Proposed Action

Receiver ID[1]	Receiver Description	Activity Category / CDOT NAC (dBA)	Number of Receptors Represented by Receiver	Existing Condition (2020) L_{eq} (dBA)	Proposed Action (2045) L_{eq} (dBA)	Proposed Action Change From Existing (dB)	Proposed Action Causes Impact? (Yes or No)
63	Residential along Ptarmigan Trail	B(66)	1	46.2	50.0	3.8	No
64	Residential along Ptarmigan Trail	B(66)	1	46.4	50.6	4.2	No
65	Residential along Ptarmigan Trail	B(66)	1	49.4	52.9	3.5	No
66	Residential Ground Floor on Little Beaver Trail	B(66)	2	61.8	67.2	5.4	Yes
66-2	Residential 2nd Story on Little Beaver Trail	B(66)	2	64.8	69.8	5.0	Yes
67	Residential 6534 CO Hwy 53	B(66)	1	63.8	68.7	4.9	Yes
68	Residential 760 CO Hwy 53	B(66)	1	63.2	68.2	5.0	Yes
69	Hotel (Comfort Suites Pool Area)	E(71)	1	54.7	59.4	4.7	No
70	Residential on Pinery Acres Circle	B(66)	1	52.1	55.8	3.7	No
71	South CO Hwy 53	B(66)	1	64.7	68.4	3.7	Yes
72	Residential on Pinery Acres Circle	B(66)	1	64.3	67.7	3.4	Yes
73	Residential on Pinery Acres Circle	B(66)	1	62.5	66.0	3.5	Yes

1 – "##-2" denotes the receiver location on the higher floor above the ground level receiver labeled "##." Corresponding figures only identify the ground level receiver with the "##;" however each receiver located above the ground floor is located at the same location, just at a higher elevation.

5.1 Existing Conditions Summary

Under existing conditions (2020), modeled noise levels at 110 receivers range from 46.2 to 72.2 dBA. Figure 4 shows the locations of all modeled receivers. Table 9 has the modeled noise level at each receiver. Existing conditions are not described as having noise impacts. If the project were not built, the project would not be responsible to mitigate noise via an abatement measure regardless of if existing noise levels exceeded NACs.

5.2 Proposed Action Summary

Under the Proposed Action (2045), modeled noise levels at 110 receivers would range from 50.0 to 75.4 dBA. Thirty receivers, representing 34 receptors would exceed the NAC. No receivers would experience a substantial noise increase of at least 10 dBA. Therefore, a total of 30 receivers, representing 34 receptors, would be impacted during the 2045 worst-hour noise period (see Figure 6). Table 9 has the modeled noise level at each receiver

6 NOISE ABATEMENT EVALUATION

As described in Chapter 5, 34 receptors in the Noise Study Zone would be impacted by noise in 2045 under the Proposed. Therefore, abatement for the impacted receptors was evaluated in accordance with guidelines from The CDOT NAAG and FHWA's Guidelines. Although abatement was required to be evaluated, it is only recommended for inclusion in the project when determined to be both feasible and reasonable. Abatement is feasible if it:

- Provides at least 5 dB of noise reduction for at least three impacted receptors
- Does not have any design and construction factors that are "fatal flaw" issues (e.g., safety, barrier height, topography, drainage, utilities, abatement maintenance, maintenance access to adjacent properties, and access to adjacent properties [i.e., arterial widening projects])

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

- Meets the minimum noise reduction design goal of at least 7 dB for at least two benefited receptors
- The Cost Benefit ($/receptor) equals or is less than the Cost Benefit Index ($34,000/receptor)
- Has support from more than 50 percent of the potentially benefited receptors[3]

6.1 Noise Abatement Options Considered

Noise barriers (walls and, to a lesser extent, berms) are commonly used as noise abatement and must be evaluated when doing a mitigation analysis for 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; and acquisition of real property or interests therein to serve as a buffer zone to preempt development which would be adversely

[3] Support determined through Benefited Receptor Preference Survey, which may be conducted after the NEPA process and is documented in a separate report.

impacted by traffic noise. However, these mitigation measures are generally not feasible and/or reasonable. For this project, noise walls and/or berms were the only abatement evaluated.

6.2 Noise Abatement: Noise Insulation

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

6.3 Noise Barrier Evaluation – Proposed Action

Barriers for impact areas on the WB side of I-70 as defined by Receivers 1 and 2, Receivers 46 to 51 and Receivers 58 to 61, were not evaluated because the receivers are located 25 feet or higher above the I-70. The relative height is noted because a 20-foot barrier would not block the line of sight between vehicles travelling on the I-70 and impact locations and would not reduce the noise levels by at least 5 dBA. Barriers for Sites 42, 43, 44, 52 and 53 were not evaluated, because the barrier would not benefit at least three impacted receptors. A barrier was not evaluated for Sites 71, 72 and 73, since Sites 72 and 73 are located 30 feet above the I-70, and any barrier would only reduce noise levels for the 1 receptor at Site 71, which would not satisfy the feasible requirements.

Two barriers were evaluated, EB 1 for the 51 receptors represented by Sites 3 to 23 and EB 2 for the 6 receptors represented by Sites 66 to 68. Barrier placement for each impacted area was considered in two locations on the EB edge of shoulder (EOS) and 12 feet off the EB edge of shoulder. Placement of the barrier on the EOS, would restrict the wall height to a maximum of 12 feet. Based on the TNM modeling, 12-foot-high barriers in these locations do not get 5 dBA noise reduction for at least 3 impacted receptors, so it does not meet the feasible requirements. Moving the barriers 12 feet from the edge of shoulder would allow for a higher wall and keep the base elevation of the barriers within a few feet of the top of roadway. The 12-feet from off the EOS barrier location was determined the optimal location for each set of impacted receivers, and those results are described in Table 10. Figure 6A and 6B shows the location of the evaluated barrier location. Appendix D includes 2 CDOT Noise Abatement Evaluation Worksheets (CDOT Form 1209); one was completed for each optimized barrier. Of these 2 evaluated noise barriers, none were found to be feasible and reasonable, as described in Table 10.

Table 10 Noise Barrier Evaluation for Proposed Action

Barrier ID	EB1	EB2
Barrier Location (general)	EB On Ramp from Exit 203 STA 117+00 to End of On-ramp STA 129+00	EB On Ramp from Exit 205 STA 284+00 to Mainline STA 315+00
Barrier Location: Distance from Proposed Edge of Roadway (feet)	12 feet from Edge of Shoulder	12 feet from Edge of Shoulder
Barrier Location Justification	Barrier Modeled in Location where heights are not restricted to 12 feet, within the right of way.	Barrier Modeled in Location where heights are not restricted to 12 feet, within the right of way.
Impacted Receiver IDs	See Figure 6a	See Figure 6b
Benefited Receiver IDs	See Figure 6a	66,66-2,67,68
Figure #	6a	6b

Table 10 Noise Barrier Evaluation for Proposed Action

Barrier ID	EB1	EB2
Fatal Flaw(s)?	No	No
Reduces Noise ≥5.0 dB for ≥3 impacted receptors	Yes	Yes
Reduces Noise ≥7.0 dB for ≥2 benefited receptors	Yes	Yes
Recommended Barrier Height & Length (feet)[1]	16 Feet High 1003 Feet Long	14 Feet High 1202 Feet Long
Barrier Area[2] (square feet)	16,048	16,828
Unit Cost	$45/ft^2	$45/ft^2
Total Cost[3]	$722,160	$757,260
No. Benefited Receptors	14	6
Total Decibels of Benefit Provided	87.2	25.9
Average Benefit (dB/receptor)	6.2	6.8
Cost Benefit($/receptor)[3]	$51,583	$126,210
Design year Leq Range Without Abatement (dBA)	62.6 to 70.0	67.2 to 69.8
Design year Leq Range With Abatement (dBA)	56.3 to 62.7	59.8 to 62.8
Feasible?	Yes	Yes
Reasonable?	No	No
Recommended?	No	No

Notes:

1. The barrier heights and/or lengths listed in this table are rounded. Therefore, if they are used to calculate the barrier area, the resulting area may be slightly different than the reported barrier area due to round-off error.
2. The barrier areas listed in this table are rounded. Therefore, if they are used to calculate the total cost, the resulting cost may be slightly different than the reported cost due to round-off error.
3. The total cost listed in this table is rounded. Therefore, when used to calculate the cost benefit, the resulting cost benefit may be slightly different than the reported cost benefit due to round-off error.

Table 11A Modeled Noise Levels With and Without Barrier EB1

Receiver ID (Behind Abatement)[1]	Receiver Description	Number of Receptors Represented per Receiver	Are Receptors Benefited? (Yes or No)	Proposed Action (2045) **(dBA for L_{eq} / dB for Insertion Loss)**		
				L_{eq} Without Abatement	L_{eq} With Abatement	Insertion Loss
3	Residential Ground Floor Prospect Point	1	Yes	64.9	58.1	6.8
3A	Residential 2nd story Prospect Point Dr.	1	No	61.0	58.8	2.2
4	Residential 2nd story Prospect Point Dr.	1	Yes	70.0	62.7	7.3
4A	Residential 2nd story Prospect Point Dr.	1	Yes	69.3	62.1	7.2
5	Residential Ground Floor Prospect Point	1	Yes	66.1	59.6	6.5
5A	Residential 2nd story Prospect Point Dr.	1	Yes	69.2	62.5	6.7
6	Residential 2nd story Prospect Point Dr.	1	No	59.7	57.9	1.8
6A	Residential Ground Floor Prospect Point	1	No	50.4	50.1	0.3
6A-2	Residential 2nd story Prospect Point Dr.	1	No	55.7	55	0.7
7	Residential 2nd story Prospect Point Dr.	2	Yes	64.0	57.7	6.3
8	Residential 2nd story Prospect Point Dr.	1	Yes	68.5	61.8	6.7
8A	Residential Ground Floor Prospect Point	1	Yes	63.4	56.5	6.9
8A-2	Residential 2nd story Prospect Point Dr.	1	Yes	65.9	58.5	7.4
9	Residential Ground Floor Prospect Point	1	No	57.5	54.8	2.7
9A	Residential 2nd story Prospect Point Dr.	1	No	60.3	58.2	2.1
10	Residential 2nd story Prospect Point Dr.	1	No	59.1	56.2	2.9

Table 11A Modeled Noise Levels With and Without Barrier EB1

Receiver ID (Behind Abatement)[1]	Receiver Description	Number of Receptors Represented per Receiver	Are Receptors Benefited? (Yes or No)	Proposed Action (2045) **(dBA for L_{eq} / dB for Insertion Loss)**		
				L_{eq} Without Abatement	L_{eq} With Abatement	Insertion Loss
10A	Residential 2nd story Prospect Point Dr.	2	No	59	56	3
11	Residential Prospect Point Common Outdoor Area	10	No	59.9	56.7	3.2
12	Residential 2nd story Prospect Point Dr.	1	Yes	66.9	59.7	7.2
12A	Residential 2nd story Prospect Point Dr.	1	Yes	65.5	58.8	6.7
13	Residential 2nd story Prospect Point Dr.	1	Yes	67.2	62	5.2
13A	Residential 2nd story Prospect Point Dr.	1	No	66.2	62.2	4
14	Residential Ground Floor Prospect under Receiver 13A	1	No	64.3	60.2	4.1
14A	Residential Ground Floor Prospect under Receiver 12A	1	Yes	62.6	56.3	6.3
15	Residential Ground Floor Prospect Point	1	No	60.7	56.4	4.3
15A	Residential 2nd story Prospect Point Dr.	1	No	55.4	51.6	3.8
16	Residential 2nd story Prospect Point Dr.	1	No	63.0	58.9	4.1
16A	Residential Ground Floor Prospect Point	1	No	62.1	58.5	3.6
17	Residential 2nd story Prospect Point Dr.	1	No	66.0	62.5	3.5
17A	Residential 2nd story Prospect Point Dr.	1	No	66.1	62.8	3.3
18	Residential 2nd story Prospect Point Dr.	1	No	59.1	57.6	1.5

Table 11A Modeled Noise Levels With and Without Barrier EB1

Receiver ID (Behind Abatement)[1]	Receiver Description	Number of Receptors Represented per Receiver	Are Receptors Benefited? (Yes or No)	Proposed Action (2045) **(dBA for L_{eq} / dB for Insertion Loss)**		
				L_{eq} Without Abatement	L_{eq} With Abatement	Insertion Loss
18A	Residential 2nd story Prospect Point Dr.	1	No	59.6	58	1.6
19	Residential 2nd story Prospect Point Dr.	1	No	58.3	56.4	1.9
19A	Residential 2nd story Prospect Point Dr.	1	No	56.6	53.5	3.1
20	Residential 2nd story Prospect Point Dr.	2	No	61.9	59.6	2.3
21	Residential 2nd story Prospect Point Dr.	1	No	65.8	62.2	3.6
21A	Residential 2nd story Prospect Point Dr.	1	No	65.5	62.3	3.2
22	Residential 2nd story Prospect Point Dr.	1	No	65.7	62.4	3.3
22A	Residential 2nd story Prospect Point Dr.	1	No	65.6	62.6	3
23	Bike Trail North of Prospect Point	1	No	62.7	60.5	2.2

1 - ##-2 denotes the receiver location on the higher floor above the ground level receiver labeled "##." Corresponding figures only identify the ground level receiver with the "##;" however each receiver located above the ground floor is located at the same location, just at a higher elevation.

Table 11B Modeled Noise Levels With and Without Barrier EB2

Receiver ID (Behind Abatement) [1]	Receiver Description	Number of Receptors Represented per Receiver	Are Receptors Benefited? (Yes or No)	Proposed Action (2045) **(dBA for L_{eq} / dB for Insertion Loss)**		
				L_{eq} Without Abatement	L_{eq} With Abatement	Insertion Loss
66	Residential Ground Floor on Little Beaver Trail	2	Yes	67.2	59.8	7.4
66-2	Residential 2nd Story on Little Beaver Trail	2	Yes	69.8	62.8	7.0
67	Residential 6534 CO Hwy 53	1	Yes	68.7	62.8	5.9
68	Residential 760 CO Hwy 53	1	Yes	68.2	61.2	7.0

1 - ##-2 denotes the receiver location on the higher floor above the ground level receiver labeled "##." Corresponding figures only identify the ground level receiver with the "##;" however each receiver located above the ground floor is located at the same location, just at a higher elevation.

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7 STATEMENT OF LIKLIHOOD

The noise abatement evaluation for the Proposed Action is described in Chapter 6. Thirty receivers, representing 34 receptors, were determined to be impacted by traffic noise in 2045 for the Proposed Action.

Noise abatement at 2 locations for 16 impacted receptors were determined not to be feasible and/or reasonable, as described in Section 6.3 and Table 10.

The final noise abatement decision will be made during the project's final design. Feasibility and reasonableness determinations for this project may change if there are changes in final design after approval of the NEPA documentation.

8 CONSTRUCTION NOISE

This chapter describes construction noise implications, construction noise mitigation strategies, and whether the project is in an area that is subject to local noise ordinances.

8.1 Construction Noise Implications

Properties adjoining project construction may be exposed to noise caused by construction activities of the Proposed Action. Examples of construction equipment noise are shown in Table 12. Construction noise differs from traffic noise in several ways:

- Construction noise lasts only for the duration of construction, with most construction activities in noise-sensitive areas being conducted during hours that are least disturbing to most nearby residents, when feasible.
- Construction activities generally are short term and, depending on the nature of the construction operations, last from seconds (e.g., a truck passing a receptor) to months (e.g., bridge construction).

- Construction equipment noise is intermittent and depends on the type of operation, location, and function of the equipment, as well as the equipment usage cycle.
- As opposed to operational traffic noise, construction noise is not analyzed; there are no FHWA or CDOT construction NACs. However, construction noise is subject to relevant local regulations and ordinances (see Section 8.3).

Table 12 Typical Construction Equipment Noise

Equipment	Maximum Noise Level (dBA at 50 feet)[1]
Scraper	89
Dozer (Bulldozer)	85
Truck (Heavy Truck)	88[2]
Pickup Truck	55
Concrete Pump Truck	82
Backhoe	80
Pneumatic Tools	85

Notes:

1. Noise levels are from Table 9.1 of FHWA's 2006 Construction Noise Handbook (FHWA, 2006), unless otherwise noted.
2. This noise level is from Table 9.9 of FHWA's 2006 Construction Noise Handbook (FHWA, 2006), which is taken from Chapter 12 of the FTA Transit Noise and Vibration Guidance Handbook.

8.2 Construction Noise Mitigation Strategies

To minimize construction noise levels, typical best management practices will be incorporated into construction contracts, plans, and specifications where it is appropriate to do so. The determination of practices weighs the benefits achieved and the overall adverse social, economic, and environmental effects and costs of abatement measures. These may include:

- Notify neighbors in advance when construction noise may occur.
- Keep noisy activities as far from sensitive receptors as possible.
- Keep exhaust systems on equipment in good working order. Maintain equipment on a regular basis; it should be subject to inspection by the construction project manager to ensure maintenance is being conducted.
- 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, as feasible.

8.3 Local Noise Ordinances

The project occurs in Town of Dillon, which does have the following local noise ordinances for construction. Noise Levels between 11:00 p.m. to 6:00 a.m. may not exceed 65 dBA in

commercial areas and 55 dBA in residential area. No person shall engage in construction activity outside of an enclosed structure other than between the hours of 7:00 a.m. and 7:00 p.m., Monday through Saturday, and 10:00 a.m. and 6:00 p.m. on Sunday. Unless the Public Works Director as upon application, alter the hours of construction activity for good cause.

The city of Silverthorne, Frisco, and Summit County permits construction between the hours of 7 A.M. and 7 P.M., Monday through Saturday, with no limits on the construction noise.

The Colorado Noise Statue would also apply to this project, because the city of Silverthorne, Frisco, and Summit County do not limit construction noise, the noise levels set by the Colorado Noise Statue would apply. The maximum permissible noise levels, 25 feet from the property line are listed below,

- Residential – 55 dB(A) – 7 A.M. to 7 P.M. – 50 dB(A) -7 P.M. to 7 A.M.
- Commercial – 60 dB(A) – 7 A.M. to 7 P.M. – 55 dB(A) -7 P.M. to 7 A.M.
- Light Industrial – 70 dB(A) – 7 A.M. to 7 P.M. – 65 dB(A) -7 P.M. to 7 A.M.
- Industrial – 80 dB(A) – 7 A.M. to 7 P.M. –75 dB(A) -7 P.M. to 7 A.M.

9 INFORMATION FOR LOCAL OFFICIALS

This project's Noise Study Zone includes land that is unpermitted and undeveloped (i.e., Activity Category G) (see Figure 2). Therefore, 23 CFR 772.17 is applicable, and noise related information needs to be provided to local officials to support local land use planning decisions and future development, as described in Section 6.3 of the NAAG.

Contour lines represent distances from the edge of the nearest travel lane of the highway improvement to where the design year (2045) noise levels reach the Activity Category B and C NAC (66 dBA) and Activity Category E's NAC (71 dBA). These were developed for Activity Category G land within the Noise Study Zone and are shown on Figure 7. Distance were calculated from the edge of the nearest travel lane of the Interstate EB I-70 in the area to both the 71-dBA contour and the 66-dBA contours, these distances are: 71 dBA – 110 Feet, 66 dBA – 270 feet.

10 IMPACTS AND MITIGATION COMMITMENTS

Because this project is a NEPA classification Documented Categorical Exclusion, the following table that describes impacts on noise resources and mitigation commitments for noise resources is being provided. Information from this table is generally copied into the NEPA document table, which lists impacts and mitigation commitments for all resources.

Table 13 Summary of Impacts and Mitigation Table for NEPA Documents

Impact	Mitigation Commitment	Responsible Branch	Mitigation Timing / Phase
Noise at 36 receptors due to project improvement	None	NA	NA
Temporary noise during construction	Notify neighbors in advance when construction noise may occur.	Construction/Builder	Before Construction
Temporary noise during construction	Keep noisy activities as far from sensitive receptors as possible	Construction/Builder	During Construction
Temporary noise during construction	Place stationary equipment as far from sensitive receptors as possible.	Construction/Builder	During Construction
Temporary noise during construction	Keep exhaust systems on equipment in good working order. Maintain equipment on a regular basis; it should be subject to inspection by the construction project manager to ensure maintenance is being conducted.	Construction/Builder	During Construction
Temporary noise during construction	Use properly designed engine enclosures and intake silencers if appropriate	Construction/Builder	During Construction
Temporary noise during construction	Perform construction activities in noise sensitive areas during hours that are least disturbing to nearby residents, as feasible	Construction/Builder	During Construction

11 SOURCES AND REFERENCES

CDOT. 2020. *Noise Analysis and Abatement Guidelines*, September.

FHWA. 2006. *Construction Noise Handbook*, August.

FHWA. 2010. *Procedures for Abatement of Highway Traffic Noise and Construction Noise, 23 C.F.R.* § *772.*

FHWA. 2011. *Highway Traffic Noise: Analysis and Abatement Guidance*, December.

FHWA. 2018. *Noise Measurement Handbook*, FHWA-HEP-18-065, June.

WSP August 20, 2020, Interstate 70 Eastbound Auxiliary Lane – Transportation and Traffic Existing and Future Conditions Report Analysis of I-70 Alternatives and Exit 205 Conditions

Figure 1 Interstate 70 EB Auxiliary Lane Project Vicinity

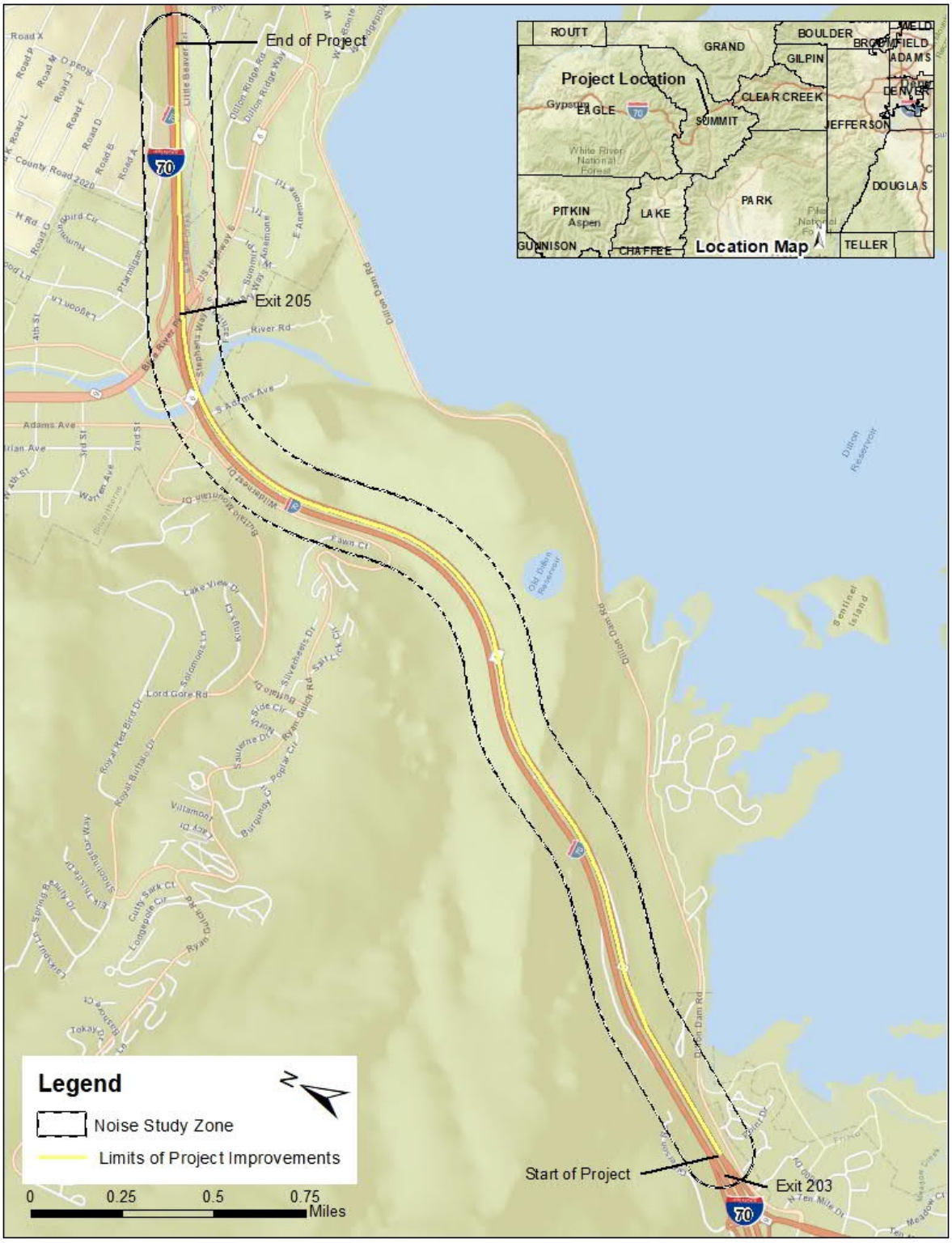

Figure 2 **Interstate 70 EB Auxiliary Noise Study Zone, Activity Categories, and Noise Measurement Locations**

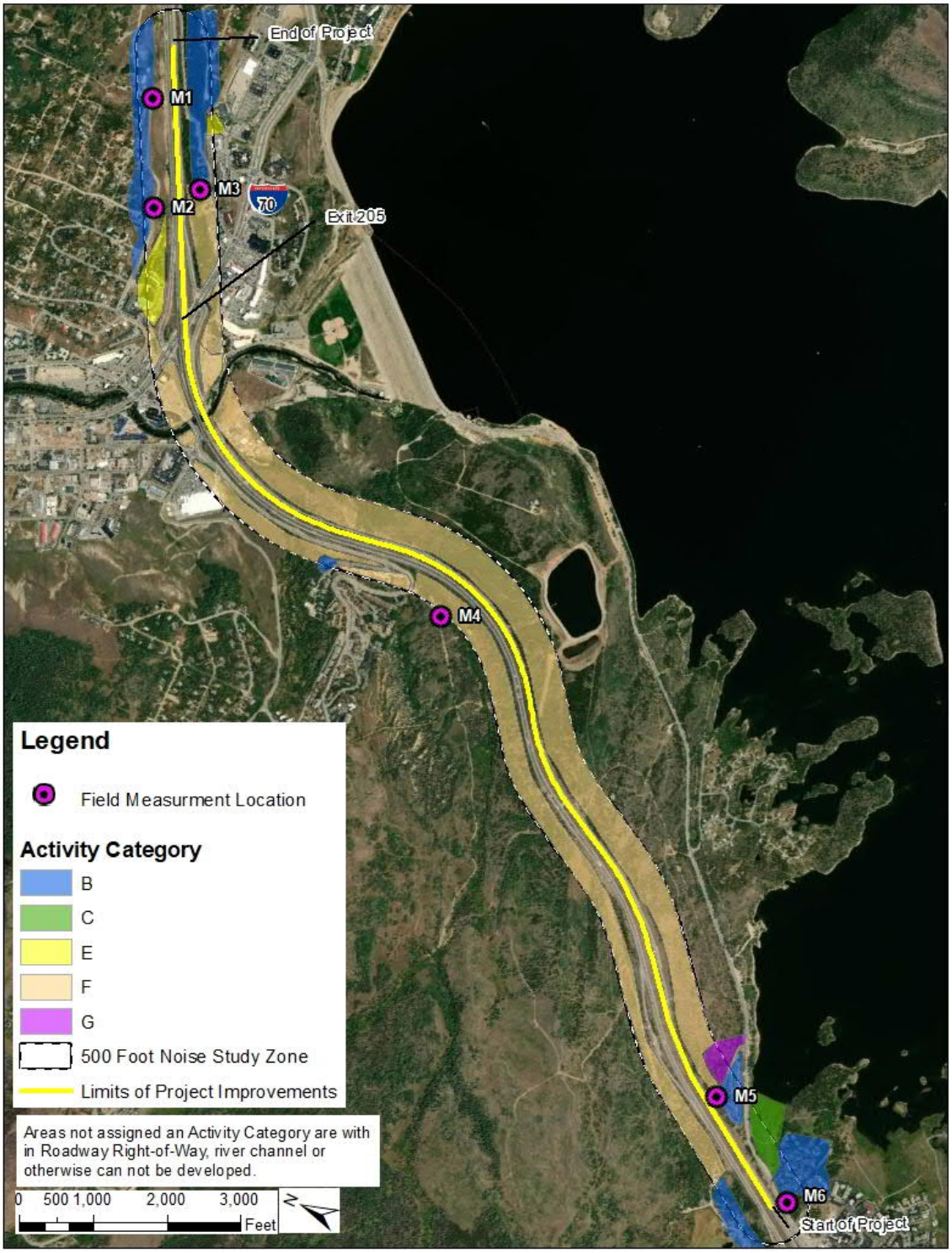

Figure 3 Interstate 70 EB Auxiliary TNM Model Objects for 2045 Proposed Action

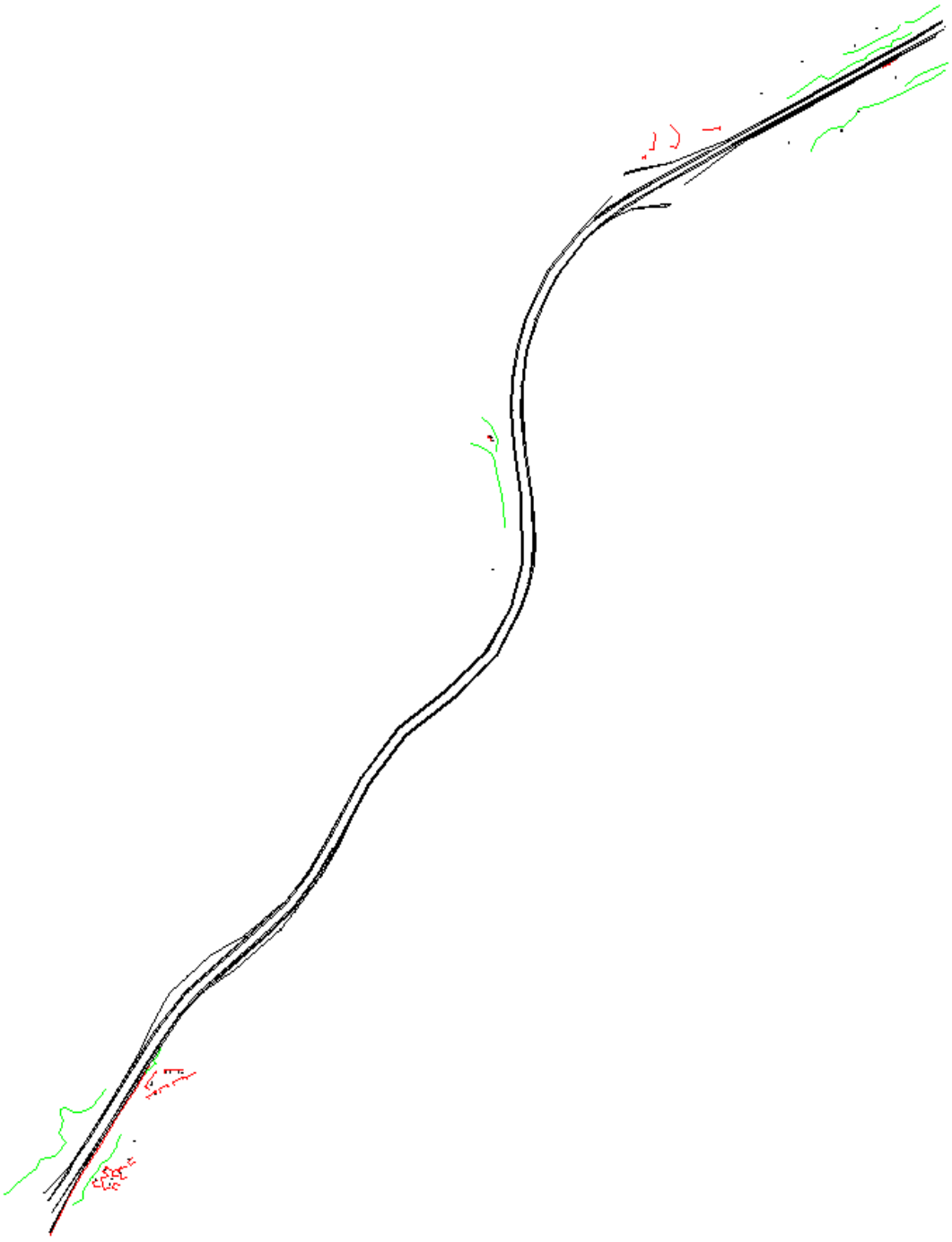

Figure 4 **Interstate 70 EB Auxiliary Lane Roadways and Receiver Locations for Existing Condition (2020)**

Figure 4A Interstate 70 EB Auxiliary Lane Roadways and Receiver Locations for Existing Condition (2020)

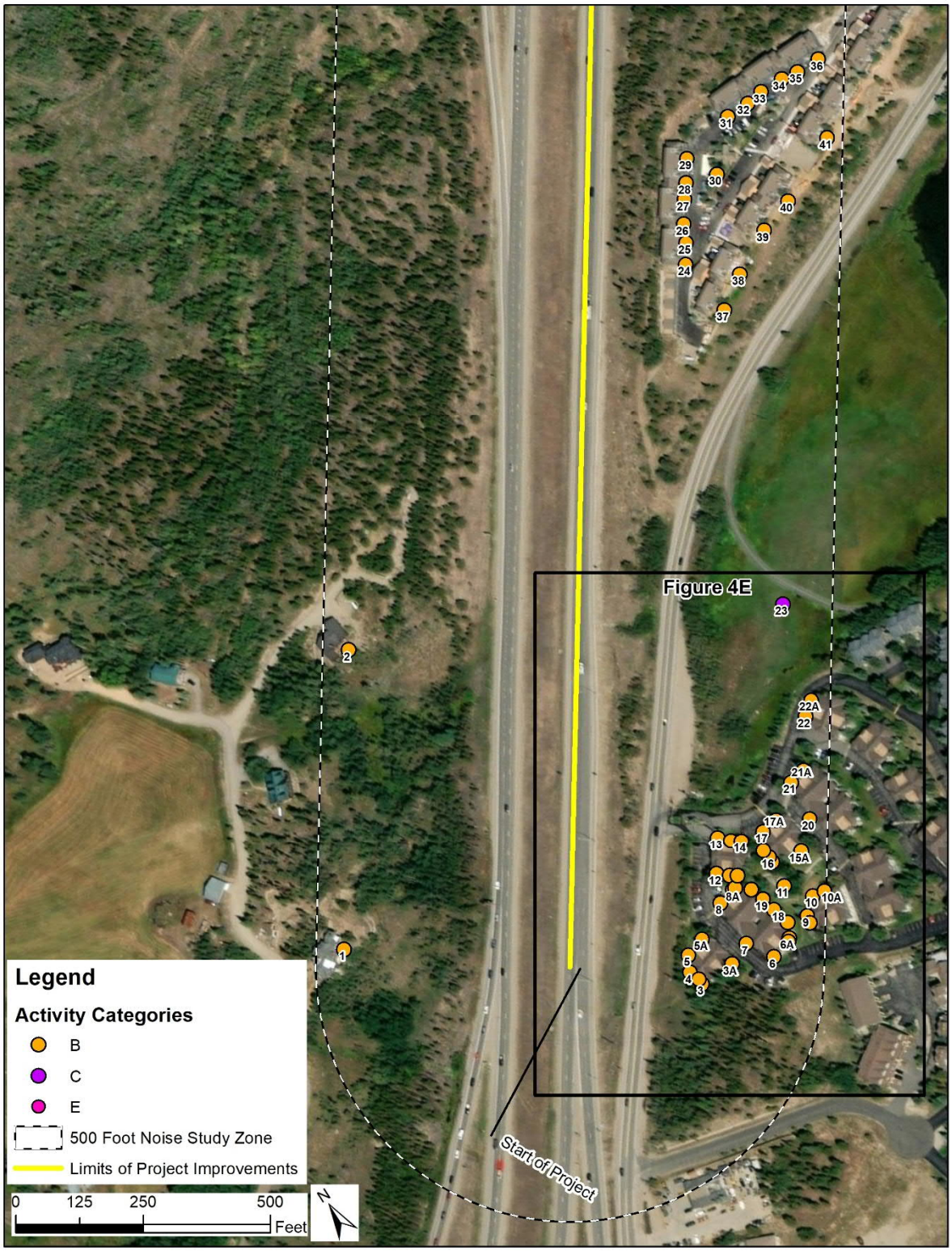

Figure 4B Interstate 70 EB Auxiliary Lane Roadways and Receiver Locations for Existing Condition (2020)

Figure 4C Interstate 70 EB Auxiliary Lane Roadways and Receiver Locations for Existing Condition (2020)

Figure 4D Interstate 70 EB Auxiliary Lane Roadways and Receiver Locations for Existing Condition (2020)

Figure 4E **Interstate 70 EB Auxiliary Lane Roadways and Receiver Locations for Existing Condition (2020)**

Figure 5 Roadways and Receiver Noise Levels for Design Year (2045) Proposed Action (Impacts Identified)

.

Figure 5A **Roadways and Receiver Noise Levels for Design Year (2045) Proposed Action (Impacts Identified)**

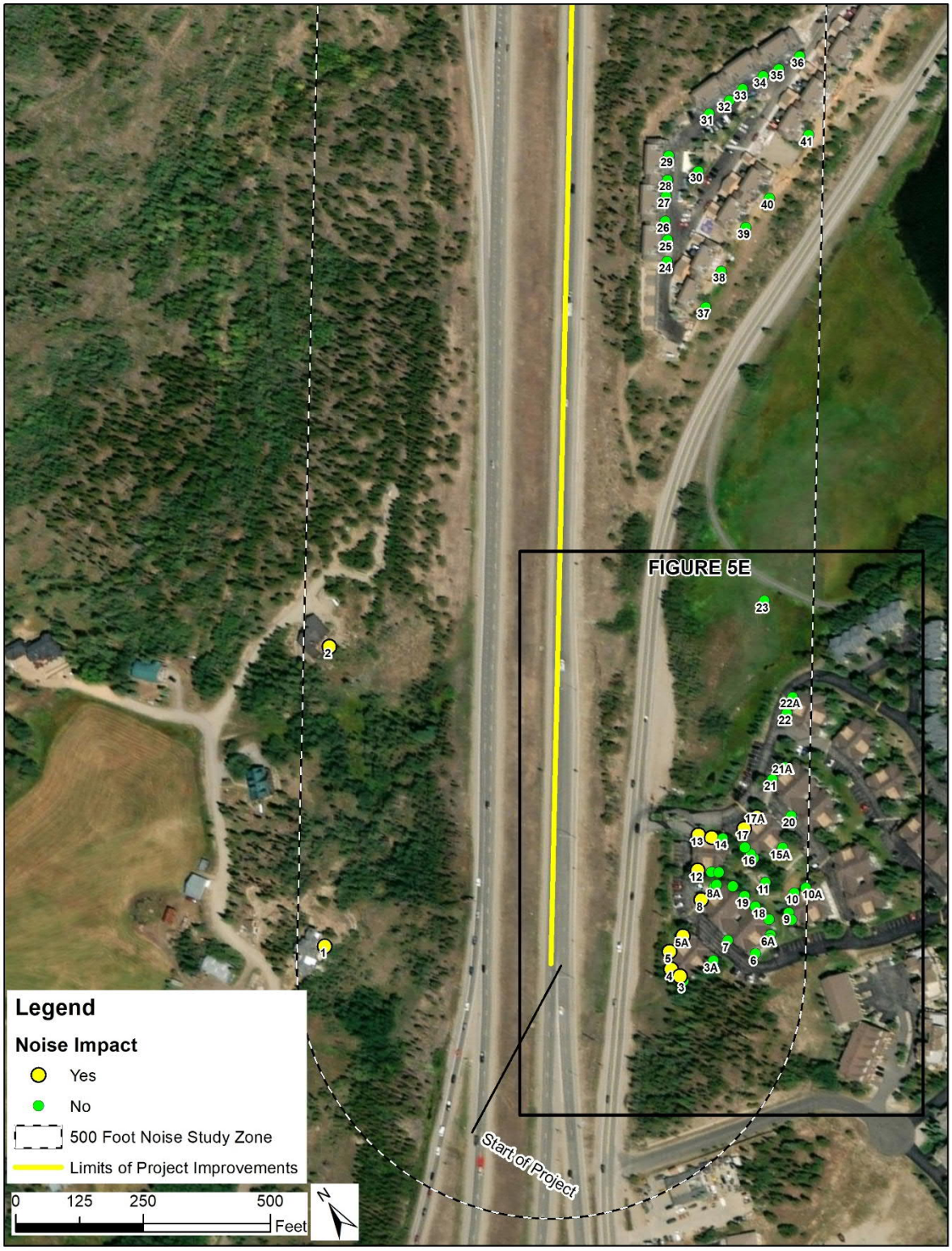

Figure 5B Roadways and Receiver Noise Levels for Design Year (2045) Proposed Action (Impacts Identified)

Figure 5C Roadways and Receiver Noise Levels for Design Year (2045) Proposed Action (Impacts Identified)

Figure 5D Roadways and Receiver Noise Levels for Design Year (2045) Proposed Action (Impacts Identified)

.

Figure 5E **Roadways and Receiver Noise Levels for Design Year (2045) Proposed Action (Impacts Identified)**

Figure 6A Interstate 70 EB Auxiliary Lane Noise Barrier EB-1 Location

Figure 6B Interstate 70 EB Auxiliary Lane Noise EB-2 Location

Figure 7 Interstate 70 EB Auxiliary Lane Noise 71 and 66 dBA Contours in Activity Category G Location

APPENDIX A NOISE MEASUREMENT DATA

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Table A-1 Noise Measurement Traffic Volumes and Speeds Used in Model Validation

Roadway	Measurement Location ID	Date and Time of Traffic Volume and Speed Measurement	Equivalent Hourly Traffic Volume[1]					Estimated Vehicular Speed[2] (mph)	Posted Speed Limit[3] (mph)
			Cars	Medium Trucks	Heavy Trucks	Buses	Motorcycles		
EB-I-70	M1	6/25/20, 8:50 - 9:05 AM	660	28	68	12	0	70	60
WB-I-70	M1	6/25/20, 8:50 - 9:05 AM	968	32	88	0	0	70	60
EB I-70	M2	6/25/20, 8:50 - 9:05 AM	660	28	68	12	0	70	60
WB I-70	M2	6/25/20, 8:50 - 9:05 AM	968	32	88	0	0	70	60
EB I-70	M3	6/25/20, 12:00 – 12:15 P.M.	764	12	40	4	4	70	60
WB I-70	M3	6/25/20, 12:00 – 12:15 P.M.	960	20	52	4	0	70	60
EB I-70	M4	6/25/20, 9:45 - 10:00 AM	1064	40	116	12	16	70	65
WB I-70	M4	6/25/20, 9:45 - 10:00 AM	1424	48	92	0	4	70	65
EB I-70	M5	6/25/20, 10:30 - 10:45 AM	536	12	40	8	4	70	65
I-70 EB On-Ramp from Exit 203	M5	6/25/20, 10:30 - 10:45 AM	272	8	20	0	0	0 to 70	65
WB I-70	M5	6/25/20, 10:30 - 10:45 AM	576	12	52	0	0	70	65
EB I-70	M6	6/25/20, 10:30 - 10:45 AM	536	12	60	8	4	70	65
I-70 EB On-Ramp from Exit 203	M6	6/25/20, 10:30 - 10:45 AM	268	4	32	1	0	0 to 70	65
WB I-70	M6	6/25/20, 10:30 - 10:45 AM	612	4	56	0	12	70	65
I-70 WB Off to Exit 203	M6	6/25/20, 10:30 - 10:45 AM	408	4	40	0	0	45	45

Notes:

1. Traffic volumes were measured during field noise measurements. These are shown on field data sheets, which are in this appendix.

2. Method used to estimate vehicular speed: Freeway was driven within 30 minutes of each measurement.
3. Posted speeds are included for informational purposes. Estimated speeds were used when validating the existing conditions model.

FIELD MEASUREMENT DATA SHEET

Project Name: Interstate 70 Aux Lane EX 203 to 205 **Job #** 1841/1.02 - CDOT NHPP 0702-383

SITE IDENTIFICATION: 1 **OBSERVER(s):** LARRY SLY
START DATE & TIME: 6/25/20 8:45 **END DATE & TIME:** 6/25/20 9:05
ADDRESS: NORTH EAST OF I-70/SH9 SOUTH OF PTARMIGAN TRAIL, NEAR COMMUNITY CENTER
GPS coordinates:

ID

TEMP: 68 °F HUMIDITY: 50 % R.H. WIND: (CALM) LIGHT MODERATE VARIABLE
WINDSPEED: 0 MPH DIR: N NE E SE S SW W NW STEADY GUSTY 0 MPH
SKY (CLEAR) (SUNNY) DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN Other:

Weather

INSTRUMENT: QUEST SP DL-2 **TYPE:** (1) 2 **SERIAL #:** 13641
CALIBRATOR: LD CAL 200 **SERIAL #:** 3415
CALIBRATION CHECK: **PRE-TEST** 94 dBA SPL **POST-TEST** 93.9 dBA SPL **WINDSCREEN** Y
SETTINGS: (A-WEIGHTED) SLOW (FAST) (FRONTAL) RANDOM ANSI OTHER:

Rec #	Start Time / End Time								
1	8:50 / 9:05	L_{eq} 64.6	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}		
	/	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}		
	/	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}		
	/	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}		

COMMENTS:

Acoustic Measurements

PRIMARY NOISE(S): (TRAFFIC) AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER
ROADWAY TYPE: I-70
COUNT DURATION: 15 -MINUTE

	SPEED (mph) NB / (EB) / SB / (WB)		#2 COUNT: NB / EB / SB / WB		SPEED (mph) NB (EB) / SB (WB)	
AUTOS:	165 / 242	70 / 70		/		/
MED. TRUCKS:	7 / 8	70 / 70		/		/
HVY TRUCKS:	17 / 22	65 / 65		/		/
BUSES:	3 / 0	65 / —		/		/
MOTORCYCLES:	0 / 0	— / —		/		/

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**
OTHER:

Source Info and Traffic Counts

TERRAIN: **HARD** (SOFT) **MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:

Description / Sketch

1100 Town Country Road, Suite 200, Orange, CA 92868, 714-835-6886

FIELD MEASUREMENT DATA SHEET

Project Name: Interstate 70 Aux Lane EX 203 to 205 **Job #** 18417.02 - CDOT NHPP 0702-383

ID

SITE IDENTIFICATION: 2 **OBSERVER(s):** RYAN BACCHUS
START DATE & TIME: 6/25/20 8:45 **END DATE & TIME:** 6/25/20 9:05
ADDRESS: NORTHEAST OF I-70/SH 9 NORTH OF PTARMIGAN TRAIL, NEAR EAST OF CR 2020
GPS coordinates:

Weather

TEMP: 60 °F HUMIDITY: 50 % R.H. WIND: (CALM) LIGHT MODERATE VARIABLE
WINDSPEED: 0 MPH DIR: N NE E SE S SW W NW STEADY GUSTY 0 MPH
SKY: (CLEAR) (SUNNY) DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN Other:

Acoustic Measurements

INSTRUMENT: QUEST SP DL-2 **TYPE:** 1 2 **SERIAL #:** 13635
CALIBRATOR: CAL 200 **SERIAL #:** 3415
CALIBRATION CHECK: **PRE-TEST** 94 dBA SPL **POST-TEST** 94.1 dBA SPL **WINDSCREEN** Y
SETTINGS: (A-WEIGHTED) SLOW (FAST) FRONTAL RANDOM ANSI OTHER:

Rec #	Start Time / End Time							
2	8:50 / 9:05	L_{eq} 66.7	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
/ /	/	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
/ /	/	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
/ /	/	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	

COMMENTS:

Source Info and Traffic Counts

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**
ROADWAY TYPE: I-70
COUNT DURATION: 15 -MINUTE

	NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	165 / 242	70 / 70	/	/
MED. TRUCKS:	7 / 8	70 / 70	/	/
HVY TRUCKS:	17 / 22	65 / 65	/	/
BUSES:	03 / 0	65 / —	/	/
MOTORCYCLES:	0 / 0	— / —	/	/

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**
OTHER:

Description / Sketch

TERRAIN: **HARD** (**SOFT**) **MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:

1100 Town Country Road, Suite 200, Orange, CA 92868, 714-835-6886

FIELD MEASUREMENT DATA SHEET

Project Name: Interstate 70 Aux Lane EX 265 to 265 **Job #** 1841/1.02 - CDOT NHPP 0702-383

SITE IDENTIFICATION: 3 **OBSERVER(s):** LARRY SLY
START DATE & TIME: 6/25/20 12:00 **END DATE & TIME:** 6/25/20 12:15
ADDRESS: SOUTH EAST OF I-70/WB, NORTH OF CR 53 BEHIND ORGANIC CANNABIS
GPS coordinates:

ID

TEMP: 78 °F HUMIDITY: 45 % R.H. WIND: CALM (LIGHT) MODERATE VARIABLE
WINDSPEED: 0-8 MPH DIR: (N) NE E SE S SW W NW STEADY GUSTY 10 MPH
SKY: CLEAR SUNNY DARK (PARTLY CLOUDY) OVRCST FOG DRIZZLE RAIN Other: _____

Weather

INSTRUMENT: 04EST SPDL-2 **TYPE:** (1) 2 **SERIAL #:** 13641
CALIBRATOR: LO CAL 250 **SERIAL #:** 3415

CALIBRATION CHECK: **PRE-TEST** 94 dBA SPL **POST-TEST** 94.1 dBA SPL **WINDSCREEN** ___

SETTINGS (A-WEIGHTED) SLOW (FAST) (FRONTAL) RANDOM ANSI OTHER: _____

Rec #	Start Time / End Time							
1	12:00 / 12:15	L_{eq} 64.9	L_{max} ____	L_{min} ____	L_{90} ____	L_{50} ____	L_{10} ____	____
____	____ / ____	L_{eq} ____	L_{max} ____	L_{min} ____	L_{90} ____	L_{50} ____	L_{10} ____	____
____	____ / ____	L_{eq} ____	L_{max} ____	L_{min} ____	L_{90} ____	L_{50} ____	L_{10} ____	____
____	____ / ____	L_{eq} ____	L_{max} ____	L_{min} ____	L_{90} ____	L_{50} ____	L_{10} ____	____

COMMENTS:

Acoustic Measurements

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**

ROADWAY TYPE: I-70

COUNT DURATION: 15 -MINUTE

	SPEED (mph) NB / (EB) / SB / (WB)		#2 COUNT: NB / EB / SB / WB		SPEED (mph) NB EB / SB WB	
AUTOS:	191 / 240	70 / 70	____ / ____		____ / ____	
MED. TRUCKS:	3 / 5	70 / 70	____ / ____		____ / ____	
HVY TRUCKS:	10 / 13	65 / 65	____ / ____		____ / ____	
BUSES:	1 / 1	65 / 65	____ / ____		____ / ____	
MOTORCYCLES:	1 / 0	70 / -	____ / ____		____ / ____	

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** (**BIRDS**)
distant **CHILDREN PLAYING** / distant **TRAFFIC** / (distant **LANDSCAPING**) / distant **TRAINS**
OTHER: CONSTRUCTION / EARTH MOVING TO SOUTH, RIVER

Source Info and Traffic Counts

TERRAIN: **HARD SOFT** (**MIXED**) **FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:

Description / Sketch

1100 Town Country Road, Suite 200, Orange, CA 92868, 714-835-6886

FIELD MEASUREMENT DATA SHEET

Project Name: Interstate 70 Aux Lane EX 203 to 205 **Job #** 1841/1.02 - CDOT NHPP 0702-383

SITE IDENTIFICATION: 4 **OBSERVER(s):** RYAN BACH M&K
START DATE & TIME: 6/25/20 9:40 **END DATE & TIME:** 6/25/20 10:00
ADDRESS: NORTH OF I-70 AT CR 126 OB TRAIL HEAD PARKING AREA
GPS coordinates:

ID

TEMP: 73 °F HUMIDITY: 40 % R.H. WIND: CALM LIGHT MODERATE VARIABLE
WINDSPEED: 0 MPH DIR: N NE E SE S SW W NW STEADY GUSTY 0 MPH
SKY: CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN Other:

Weather

INSTRUMENT: QUEST DL-2 **TYPE:** 1 2 **SERIAL #:** 1363 S
CALIBRATOR: CAL 200 **SERIAL #:** 3415
CALIBRATION CHECK: **PRE-TEST** 94 **dBA SPL** **POST-TEST** 93.9 **dBA SPL** **WINDSCREEN** Y
SETTINGS: A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:

Rec #	Start Time	End Time							
	9:45	10:00	L_{eq} 62.6	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
			L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
			L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
			L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	

COMMENTS:

Acoustic Measurements

PRIMARY NOISE(S): **TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER**
ROADWAY TYPE: I-70
COUNT DURATION: 15 **-MINUTE**

	SPEED (mph) NB / EB / SB / WB		#2 COUNT: NB / EB / SB / WB		SPEED (mph) NB EB / SB WB	
AUTOS:	266 / 356	70 / 70		/		/
MED. TRUCKS:	10 / 12	70 / 70		/		/
HVY TRUCKS:	29 / 23	65 / 65		/		/
BUSES:	3 / 0	65 / 65		/		/
MOTORCYCLES:	4 / 1	70 / 70		/		/

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

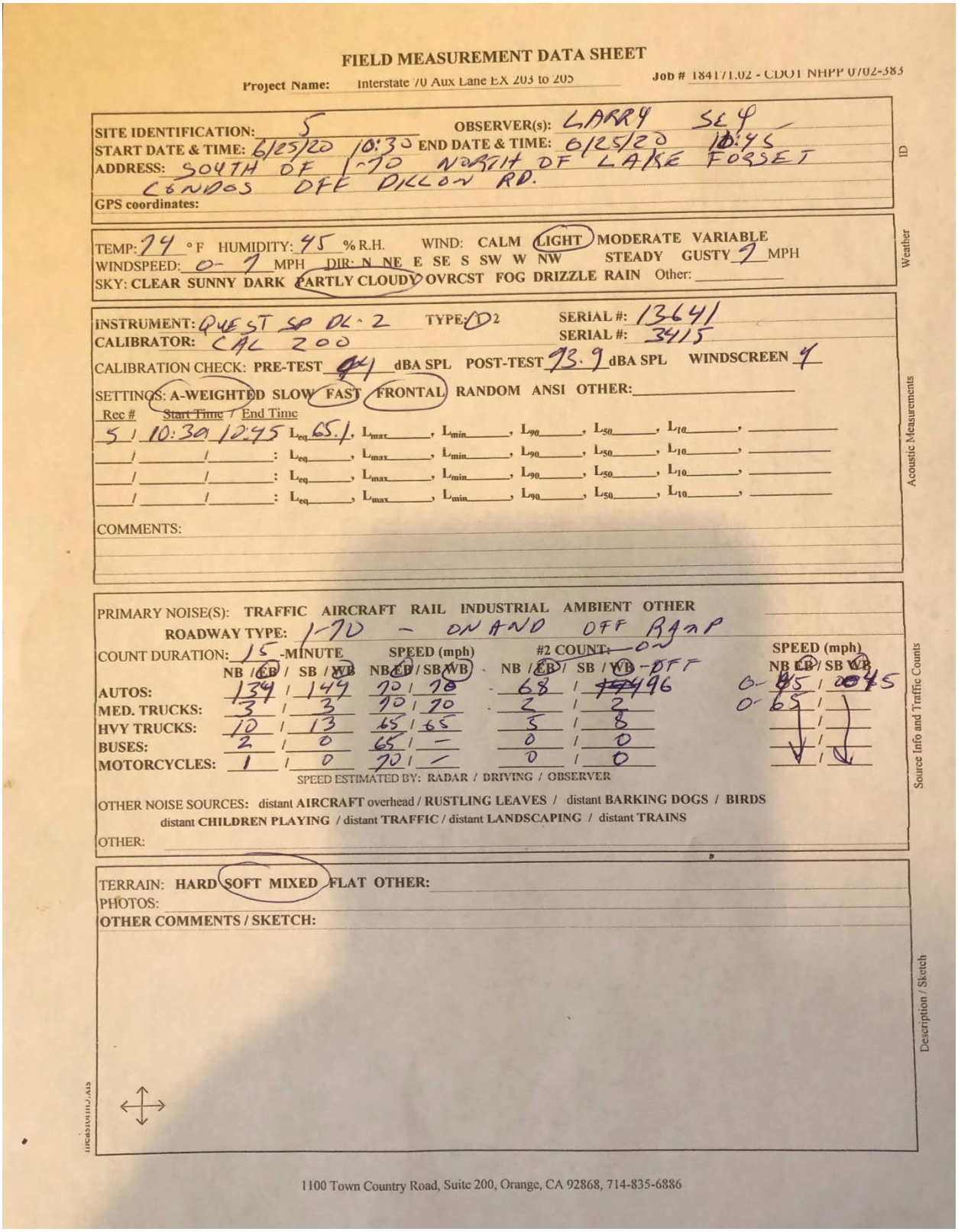
OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**
OTHER:

Source Info and Traffic Counts

TERRAIN: **HARD SOFT MIXED FLAT OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:

Description / Sketch

1100 Town Country Road, Suite 200, Orange, CA 92868, 714-835-6886



FIELD MEASUREMENT DATA SHEET

Project Name: Interstate 70 Aux Lane EX 203 to 205 Job # 18417.02 - CDOT NHPP 0702-383

ID

SITE IDENTIFICATION: 5 OBSERVER(s): LARRY SEY
START DATE & TIME: 6/25/20 10:30 END DATE & TIME: 6/25/20 10:45
ADDRESS: SOUTH OF I-70 NORTH OF LAKE FOSSET CONDOS OFF DILLON RD.
GPS coordinates:

Weather

TEMP: 74 °F HUMIDITY: 45 % R.H. WIND: CALM (LIGHT) MODERATE VARIABLE
WINDSPEED: 0-7 MPH DIR: N NE E SE S SW W NW STEADY GUSTY 7 MPH
SKY: CLEAR SUNNY DARK (PARTLY CLOUDY) OVRCST FOG DRIZZLE RAIN Other:

Acoustic Measurements

INSTRUMENT: QUEST SP DL-2 TYPE: (2) SERIAL #: 13641
CALIBRATOR: CAL 200 SERIAL #: 3415
CALIBRATION CHECK: PRE-TEST 94 dBA SPL POST-TEST 93.9 dBA SPL WINDSCREEN Y
SETTINGS: (A-WEIGHTED) SLOW FAST (FRONTAL) RANDOM ANSI OTHER:

Rec #	Start Time / End Time							
5	10:30 / 10:45	L_{eq} 65.1,	L_{max} ____,	L_{min} ____,	L_{90} ____,	L_{50} ____,	L_{10} ____,	____
____	____ / ____ :	L_{eq} ____,	L_{max} ____,	L_{min} ____,	L_{90} ____,	L_{50} ____,	L_{10} ____,	____
____	____ / ____ :	L_{eq} ____,	L_{max} ____,	L_{min} ____,	L_{90} ____,	L_{50} ____,	L_{10} ____,	____
____	____ / ____ :	L_{eq} ____,	L_{max} ____,	L_{min} ____,	L_{90} ____,	L_{50} ____,	L_{10} ____,	____

COMMENTS:

Source Info and Traffic Counts

PRIMARY NOISE(S): (TRAFFIC) AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER
ROADWAY TYPE: I-70 - ON AND OFF RAMP
COUNT DURATION: 15 -MINUTE

	SPEED (mph) NB / (EB) / SB / (WB)		#2 COUNT: ON NB / (EB) / SB / (WB) - OFF	SPEED (mph) NB (EB) / SB (WB)
AUTOS:	134 / 149	70 / 70	68 / ~~124~~ 96	0-65 / 0-65
MED. TRUCKS:	3 / 3	70 / 70	2 / 2	0-65 /
HVY TRUCKS:	10 / 13	65 / 65	5 / 8	/
BUSES:	2 / 0	65 / —	0 / 0	/
MOTORCYCLES:	1 / 0	70 / —	0 / 0	/

SPEED ESTIMATED BY: RADAR / DRIVING / OBSERVER

OTHER NOISE SOURCES: distant AIRCRAFT overhead / RUSTLING LEAVES / distant BARKING DOGS / BIRDS
distant CHILDREN PLAYING / distant TRAFFIC / distant LANDSCAPING / distant TRAINS
OTHER:

Description / Sketch

TERRAIN: HARD (SOFT) MIXED FLAT OTHER:
PHOTOS:
OTHER COMMENTS / SKETCH:

1100 Town Country Road, Suite 200, Orange, CA 92868, 714-835-6886

FIELD MEASUREMENT DATA SHEET

Project Name: Interstate 70 Aux Lane EB 203 to 205 **Job #** 18417.02 - CDOT NHPP 0702-383

ID

SITE IDENTIFICATION: 6 **OBSERVER(s):** LARRY SLY
START DATE & TIME: 6/25/20 11:05 **END DATE & TIME:** 6/25/20 11:20
ADDRESS: SOUTH OF I-70 SOUTH OF PILLOW RAM ROAD, ADJACENT TO PROSPECT POINT APTS.
GPS coordinates:

Weather

TEMP: 74 °F HUMIDITY: 45 % R.H. WIND: CALM (LIGHT) MODERATE VARIABLE
WINDSPEED: 0~8 MPH DIR: N NE E SE S SW W NW STEADY GUSTY 8 MPH
SKY: CLEAR SUNNY DARK (PARTLY CLOUDY) OVRCST FOG DRIZZLE RAIN Other:

Acoustic Measurements

INSTRUMENT: QUEST SP DL-2 TYPE: (1) 2 SERIAL #: 13641
CALIBRATOR: QUEST QC 20 SERIAL #: 3415
CALIBRATION CHECK: PRE-TEST 94 dBA SPL POST-TEST 93.9 dBA SPL WINDSCREEN ___
SETTINGS: (A-WEIGHTED) SLOW (FAST) (FRONTAL) RANDOM ANSI OTHER:

Rec #	Start Time	End Time							
6	11:05	11:20	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
			L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
			L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
			L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	

COMMENTS:

Source Info and Traffic Counts

PRIMARY NOISE(S): **TRAFFIC** AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER
ROADWAY TYPE: I-70 - ON AND OFF RAMP
COUNT DURATION: 15 -MINUTE

	SPEED (mph) NB / EB / SB / WB				#2 COUNT: ON NB / EB / SB / WB				SPEED (mph) NB EB / SB WB	
AUTOS:	134	153	70	70	67	102	OFF		65	45
MED. TRUCKS:	3	1	70	70	1	1				
HVY TRUCKS:	15	14	65	65	3	10				
BUSES:	1	0	65	~	1	0				
MOTORCYCLES:	0	3	~	70	0	0				

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER NOISE SOURCES: distant **AIRCRAFT** overhead / **RUSTLING LEAVES** / distant **BARKING DOGS** / **BIRDS**
distant **CHILDREN PLAYING** / distant **TRAFFIC** / distant **LANDSCAPING** / distant **TRAINS**
OTHER:

Description / Sketch

TERRAIN: **HARD** (SOFT) **MIXED** **FLAT** **OTHER:**
PHOTOS:
OTHER COMMENTS / SKETCH:

1100 Town Country Road, Suite 200, Orange, CA 92868, 714-835-6886

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APPENDIX B TNM NOISE MODELING INPUT DATA

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Table B-1: Traffic Input Data

Roadway Link	Number of Lanes	Cars /Lane / Hour	Medium Trucks / Lane / Hour	Heavy Trucks / Lane / Hour	Speed (mph)
Existing Conditions Model Traffic Data (2020 year)[1]					
I-70 EB (e/o 205)	2	740	12	49	60
I-70 WB (e/o 205)	3	470	8	31	60
I-70/Exit 205 EB Off	2	474	18	8	45
I-70/Exit 205 EB On	1	729	28	12	0 to 65[2]
I-70 EB Between EB Off and EB On	2	263	6	24	65
I-70 WB Between WB Off and WB On	2	447	9	40	65
I-70/Exit 205 WB Off	1	503	18	12	45
I-70/Exit 205 WB On	1	619	22	14	0 to 65[2]
I-70 EB (w/o 205)	2	801	16	72	65
I-70 WB (w/o 205)	3	516	10	46	65
I-70/Scenic Area EB Off	1	19	0	1	45
I-70/Scenic Area EB On	1	19	0	1	0 to 65[2]
I-70/Scenic Area WB Off	1	14	0	0	45
I-70/Scenic Area WB On	1	14	0	0	0 to 65[2]
I-70 EB (e/o 203)	2	801	16	72	65
I-70 WB (e/o 203)	3	516	10	46	65
I-70/Exit 203 EB On	2	374	6	4	0 to 65[2]
I-70/Exit 203 WB Off	1	519	9	5	45

Notes:

1. Existing Conditions traffic data source: Interstate 70 Eastbound Auxiliary Lane – Transportation and Traffic Existing and Future Conditions Report Analysis of I-70 Alternatives and Exit 205 Conditions – August 20, 2020
2. On-Ramp modeled using TNM On-Ramp Flow Control, TNM models the traffic as accelerated from 0 to 65 mph, before merging on the I-70.

Roadway Link	Number of Lanes	Cars /Lane / Hour	Medium Trucks / Lane / Hour	Heavy Trucks / Lane / Hour	Speed (mph) Cars/MT/HT
Design Year Proposed Action Model Traffic Data (2045 year)[1]					
I-70 EB (e/o 205)	2	1692	32	130	60
I-70 WB (e/o 205)	3	853	14	56	60
I-70/Exit 205 EB Off	2	474	18	8	45
I-70/Exit 205 EB On	1	949	36	15	0 to 65[1]
I-70 EB Between EB Off and EB On	3	982	20	88	65
I-70 WB Between WB Off and WB On	2	951	19	85	65
I-70/Exit 205 WB Off	1	684	26	16	45
I-70/Exit 205 WB On	1	944	36	15	0 to 65[2]
I-70 EB (w/o 205)	3	1485	30	133	65
I-70 WB (w/o 205)	3	934	19	84	65
I-70/Scenic Area EB Off	1	29	0	1	45
I-70/Scenic Area EB On	1	29	0	1	0 to 65[2]
I-70/Scenic Area WB Off	1	24	0	1	45
I-70/Scenic Area WB On	1	24	0	1	0 to 65[2]
I-70 EB (e/o 203)	2	2228	45	200	65
I-70 WB (e/o 203)	3	934	19	84	65
I-70/Exit 203 EB On	2	879	15	9	45
I-70/Exit 203 WB Off	1	974	16	10	65

Notes:

1. Proposed Action traffic data source: Interstate 70 Eastbound Auxiliary Lane – Transportation and Traffic Existing and Future Conditions Report Analysis of I-70 Alternatives and Exit 205 Conditions – August 20, 2020
2. *On-Ramp modeled using TNM Off-Ramp Flow Control, TNM models the traffic as in accelerated from 0 to 65 mph, before merging on the I-70.*

APPENDIX C TNM NOISE MODELING RESULTS

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

APPENDIX D NOISE ABATEMENT EVALUATION WORKSHEETS

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COLORADO DEPARTMENT OF TRANSPORTATION

NOISE ABATEMENT EVALUATION WORKSHEET

Project Name & Subaccount Code: Interstate 70 Eastbound Auxiliary Lane NHPP072-383 22381

Noise Abatement ID: EB-1

A. **FEASIBILITY:**

1. Can the noise barrier reduce noise by 5 dB for at least three impacted receptors?
   ☑ YES ☐ NO ☐ NA
2. Is there a fatal flaw that keeps the noise barrier from being built? ☐ YES ☑ NO ☐ NA
   If the answer is YES, select the most relevant fatal flaw. [ ]

B. **REASONABLENESS:**

1. Can the proposed noise barrier reduce noise by 7 dB for at least two impacted receptors?
   ☑ YES ☐ NO ☐ NA
2. Is the Cost Benefit less than or equal to $34,000 per receptor? ☐ YES ☑ NO ☐ NA
3. Are more than 50% of responding benefited residents/owners in favor of the recommended noise abatement measure?
   ☐ YES ☐ NO ☑ NA ☐ To be determined - Survey not yet conducted

C. **INSULATION CONSIDERATION:**

1. For impacted Activity Category C receptors with exterior areas of frequent human use but potential to be Activity Category D receptors: Was a noise wall or berm determined to be feasible and reasonable? ☐ YES ☐ NO ☑ NA
2. If the answer to C1 is NO or there are no exterior areas of frequent human use, does the Activity Category D receptor interior have noise impacts? ☐ YES ☐ NO ☑ NA

D. **ADDITIONAL CONSIDERATIONS:**

Barrier was conisdered in two locations, on the EOS and 12 feet off the EOS. A barrier on the EOS could only be 12 foot high and would not be feasiable. This sheet is for a barrier located 12 feet off the EOS.

E. **STATEMENT OF LIKELIHOOD:**

1. Is noise barrier feasible? ☑ YES ☐ NO
2. Is noise barrier reasonable? ☐ YES, survey completed ☐ YES, survey pending ☑ NO ☐ NA
3. Will insulation of impacted Activity Category D receptor(s) be considered? ☐ YES ☐ NO ☑ NA
4. Is the noise barrier recommended? ☐ YES ☑ NO

F. **ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:**

Barrier was modeled 12 feet from the EB EOS. At 16 feet high the barrier would provided at least three impacted receptors with 5 dB, making the barrier feasiable. While the barrier also meets the reasonableness requirement of reducing the noise by 7 dB at least two imapct receptors, the cost benefit would be aover the $34,000 per benfited receptor, makeing this barrier unreasonalbe. This barrier is not recommend.

Completed by: Kevin Keller Date: 9-Mar-2022

CDOT Form # 1209.1 (09/20)

COLORADO DEPARTMENT OF TRANSPORTATION

NOISE ABATEMENT EVALUATION WORKSHEET

Project Name & Subaccount Code: Interstate 70 Eastbound Auxiliary Lane NHPP072-383 22381

Noise Abatement ID: EB-2

A. **FEASIBILITY:**

1. Can the noise barrier reduce noise by 5 dB for at least three impacted receptors?
   ☑ YES ☐ NO ☐ NA
2. Is there a fatal flaw that keeps the noise barrier from being built? ☐ YES ☑ NO ☐ NA
   If the answer is YES, select the most relevant fatal flaw. ☐

B. **REASONABLENESS:**

1. Can the proposed noise barrier reduce noise by 7 dB for at least two impacted receptors?
   ☑ YES ☐ NO ☐ NA
2. Is the Cost Benefit less than or equal to $34,000 per receptor? ☐ YES ☑ NO ☐ NA
3. Are more than 50% of responding benefited residents/owners in favor of the recommended noise abatement measure?
   ☐ YES ☐ NO ☑ NA ☐ To be determined - Survey not yet conducted

C. **INSULATION CONSIDERATION:**

1. For impacted Activity Category C receptors with exterior areas of frequent human use but potential to be Activity Category D receptors: Was a noise wall or berm determined to be feasible and reasonable? ☐ YES ☐ NO ☑ NA
2. If the answer to C1 is NO or there are no exterior areas of frequent human use, does the Activity Category D receptor interior have noise impacts? ☐ YES ☐ NO ☑ NA

D. **ADDITIONAL CONSIDERATIONS:**

Barrier was conisdered in two locations, on the EOS and 12 feet off the EOS. A barrier on the EOS could only be 12 foot high and would not be feasiable. This sheet is for a barrier located 12 feet off the EOS.

E. **STATEMENT OF LIKELIHOOD:**

1. Is noise barrier feasible? ☑ YES ☐ NO
2. Is noise barrier reasonable? ☐ YES, survey completed ☐ YES, survey pending ☑ NO ☐ NA
3. Will insulation of impacted Activity Category D receptor(s) be considered? ☐ YES ☐ NO ☑ NA
4. Is the noise barrier recommended? ☐ YES ☑ NO

F. **ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:**

Barrier was modeled 12 feet from the EB EOS. At 14 feet high the barrier would provided at least three impacted receptors with 5 dB, making the barrier feasiable. While the barrier also meets the reasonableness requirement of reducing the noise by 7 dB at least two imapct receptors, the cost benefit would be aover the $34,000 per benfited receptor, makeing this barrier unreasonalbe. This barrier is not recommend.

Completed by: Kevin Keller Date: 27-May-2021

CDOT Form # 1209.1 (09/20)