Appendix F:
Traffic Noise Technical Addendum

US 160 AND US 550 SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

TRAFFIC NOISE TECHNICAL ADDENDUM

JULY 21, 2011

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1.0 Introduction

The US 550 South at US 160 Draft Supplemental Environmental Impact Statement supplements information contained in the 2006 US 160 EIS and 2006 US 160 ROD. Based on a Draft Section 4(f) Evaluation dated March 21, 2011, FHWA determined that the proposed action would result in significant environmental impacts to historic and Section 4(f) properties which were not evaluated in the 2006 US 160 EIS and 2006 US 160 ROD. This technical noise impact and abatement analyses addresses impacts confined to a limited portion of the project where US 550 connects to US 160 east of Durango, Colorado and impacts that were not previously evaluated or that have changed based on revisions to the design.

This technical noise impact and abatement analyses document is therefore focused on evaluating this part of the corridor and changes identified in this area since the US 160 ROD was completed. More specifically, this document covers shifts in the proposed alignments of US 550 connection to US 160 alternative to avoid a gas well on the historic Webb Ranch and additional interchange and auxiliary lane configurations and associated traffic not accounted for in the 2006 US 160 EIS noise study.

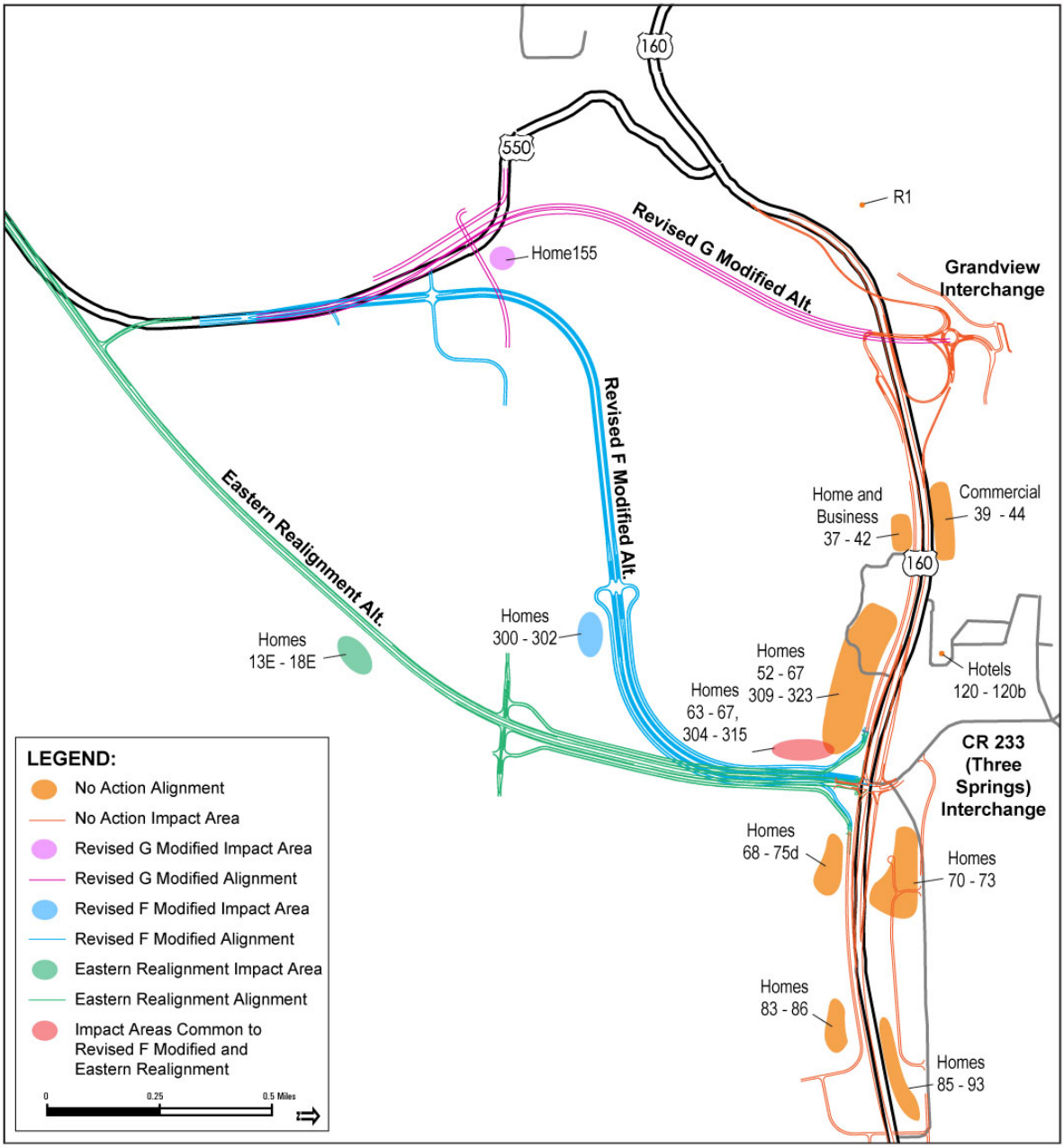
2.0 Project Description

The project is located in La Plata County, Colorado and includes the connection of US 550 to US 160, approximately a half of a mile east of Durango, Colorado. US 160 is a National Highway System route and is the only principal east-west highway in southern Colorado. It includes two westbound lanes and two eastbound lanes east of Durango in an area known as Grandview. US 550 is the principal north-south highway in the western portion of Colorado, extending from the New Mexico state line to Grand Junction. US 550 is a narrow two-lane highway with limited shoulders south of Durango and connects to US 160 at an intersection approximately 16 miles north of the New Mexico state line.

The Grandview Section includes US 160 from the west project limit at approximately mile marker 88 west of the US 160/US 550 (Grandview Interchange) intersection to the US 160/East CR 233intersection, and US 550 from south of CR 220 to US 160 (see **Figure 1**). All the alternatives in the Grandview Section include four lanes on US 160 with auxiliary lanes between the east end ramps of the Grandview Interchange and the interchange at Three Springs Interchange. The additional auxiliary lanes are needed for each of the alternatives based on updated traffic analyses.

The auxiliary lanes can be added within the right-of-way and identified footprint of the alternatives in the US 160 EIS and do not create additional impacts that have not been disclosed in the US 160 EIS.

Figure 1. Map of Project Alternatives, Showing Areas of Traffic Noise Impacts and Recommended Noise Barriers



The following alternative alignments were analyzed for noise impacts and feasibility and reasonableness of noise abatement measures.

2.1 No Action Alternative

Traffic and engineering analyses also demonstrate the need for three interchanges in the Grandview Section regardless of the location of the US 550 south connection to US 160. In the US 160 ROD, interchanges were identified at US 160/CR 233 known as Three Springs Interchange and at the Grandview Interchange, which has been built without a US 550 connection. The locations of these interchanges are shown on **Figure 1**. All of the alternatives considered for the US 550 south connections to US 160 include the existing Grandview Interchange (GVI), and single point urban interchange at Three Springs Interchange. US 550 will be four lanes throughout the entire project area addressed in this supplement.

2.2 Revised G Modified Alternative

This alternative has undergone several design variations. G Modified was the Selected Alternative in the US 160 ROD. It connects US 550 to US 160 via the Grandview trumpet interchange. During the EIS process, the alternative was modified to follow the western edge of the Webb Ranch to minimize impacts to the ranch.

Revised G Modified Alternative is the same alternative but it has been revised after completion of the US 160 ROD to avoid a gas well installed in the alignment. Revised G Modified Alternative is illustrated in **Figure 1**. The revision also takes into account the auxiliary lanes in each direction from the east limit of the GVI to the TSI. The Revised G Modified Alternative is what is considered in this document.

2.3 Revised F Modified Alternative

F Modified Alternative was the other alternative in the Grandview Section considered for detailed analysis in the US 160 EIS. The Revised F Modified Alternative is illustrated on **Figure 1**. US 550 crosses Florida Mesa and connects to US 160 at the TSI. Frontage roads parallel the alignment from US 160 south for about a mile. These roads provide local access to the properties south of US 160.

Like G Modified, F Modified Alternative also impacts a gas well on the Webb Ranch so design adjustments to avoid the gas well were considered. The feasibility of avoiding the gas well was explored and not incorporated into this alternative because a shift to the north results in the acquisition of four additional residences and a shift to the south requires acquisition of two additional residences.

Revised F Modified Alternative is the same as in the US 160 EIS except it includes the Grandview Interchange and auxiliary lanes in each direction from the east limit of the Grandview Section to the TSI. For these reasons, "Revised" has been added to the title of this alternative.

2.4 Eastern Alignment Alternative

The Eastern Alignment Alternative is shown on **Figure 1**. This alternative was developed specifically to avoid the Webb Ranch, a historic resource and Section 4(f) property. US 550 connects to TSI but has a different US 550 south alignment when compared to the Revised F Modified Alternative. Frontage roads parallels the alignment from US 160 to CR 220. These roads provide local access to the properties south of US 160.

3.0 Noise Background and Technical Methodology

Generally, noise generated from roadway traffic is considered to be detrimental when noise levels interfere with normal outdoor conversation in the context of exterior residential and special land use activity areas. A traffic noise impact is considered to occur when any noise sensitive receptor is subjected to either 1) existing or future noise levels that approach or exceed the noise abatement criteria (NAC), or 2) future noise levels that substantially exceed the existing noise levels (CDOT, 2011). Typically this interference occurs for various land uses at thresholds defined by NAC as summarized in **Table 1**. Traffic noise analysis methodology and NAC were described in Section 3.6 of the 2006 US 160 EIS.

Table 1. CDOT Noise Abatement Criteria (NAC)

Category	L_{eq}(h), dBA*	Description of Activity Category
A	56 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	66 (Exterior)	Residential.
C	66 (Exterior)	Active sports 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	71 (Exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	NA	Agriculture, airport, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, ship yards, utilities (water resources, water treatment, electrical), and warehousing.
G	NA	Undeveloped lands that are not permitted for development.

*Hourly A-Weighted Sound Level in Decibels, Reflecting a 1 dBA "Approach" Value from FHWA Noise Abatement Criteria, 23CFR772 (CDOT, 2011)

3.1 Methodology

FHWA requires that Traffic Noise Model software version 2.5 (TNM2.5) replace use of the previously endorsed noise modeling software, STAMINA2.0. The 2006 US 160 EIS noise analyses were completed in STAMINA2.0. Because the modeling technology has changed, the 2006 US 160 EIS existing noise conditions generated by the STAMINA2.0 software have been validated by re-modeling of the original data using TNM2.5. The existing condition represents the noise levels present along the project area in the year 2001. The 2006 US 160 EIS STAMINA2.0 noise data input files were imported into TNM2.5. The data include major roadways, roadway-specific traffic volumes of automobiles and light trucks, medium trucks, and heavy trucks, noise-sensitive receptor locations, and feature elevations. All results are reported in hourly A-weighted decibels or dBA.

3.2 Regulatory Updates and Agency Coordination

Effective on July 13, 2011, CDOT revised Noise Analysis and Abatement Guidelines (CDOT, 2011) will be implemented on new projects per the new 23 CFR 772 noise regulations. Because this is a supplemental evaluation that requires a new decision document, the new regulations apply. CDOT and FHWA have approved the use of the 2011 CDOT Noise Analysis and Abatement Guidelines (CDOT, 2011) in the SDEIS, which is a newer guidance than was used for analysis and mitigation in the 2006 US 160 EIS.

3.3 Existing Condition Re-Evaluation

The noise level results of the 2006 US 160 EIS STAMINA2.0 existing condition model run were compared to those of the TNM2.5 model run. Any modeling sites with results differing by 3 dBA or less indicate that the noise levels generated by each model are considered representative and valid. The validation modeling incorporated 48 receptor locations. Of these, all but five compared locations were within the 3 dBA tolerance, a 90 percent agreement. The out-of-tolerance sites differed by between 3.1 and 5.6 dBA and involved isolated receptor locations with terrain changes; higher noise levels calculated by STAMINA2.0 compared to the current re-evaluation. Because 90 percent of sites were within valid tolerance, the existing condition noise levels are considered to consistent between the 2006 US 160 EIS and this document and no further modeling adjustments are required.

Existing 2001 Baseline noise levels range from 47.2 to 60.6 dBA, which all are below the NAC threshold considerations for impact caused by highway traffic noise. The SDEIS evaluated 138 receptor locations in the study area, augmenting the receptors evaluated in the 2006 US 160 EIS. A list of individual receptor results are discussed below. Receptor locations are illustrated on aerial photographs included in **Appendix A**.

4.0 Noise Impacts

A noise impact study was completed for the 2006 US 160 EIS Grandview segment, including the No Action, Revised G Modified (Preferred Alternative), Revised F Modified, and Eastern Realignment alternatives to determine noise impacts as a result of widening US 160 and modifying the US 550 alignment and US 160 connection. Under CDOT noise guidance (CDOT, 2011) a noise impact occurs when the hourly A-weighted noise level calculated at a noise-sensitive receptor location meets or exceeds the CDOT NAC. A noise impact also occurs when calculated 2030 noise levels are substantially higher (10 A-weighted, hourly-equivalent decibels [dBA] or more) than 2001Baseline noise levels. In these analyses, the validation TNM2.5 modeled 2001 Baseline noise levels were used for comparison.

The No Action, Revised G Modified (Preferred), Revised F Modified, and Eastern Realignment Alternatives were modeled and compared against Baseline conditions. In addition, potential noise abatement strategies were considered for abating traffic noise impacts. Noise impacts were calculated and the noise abatement analysis was performed in accordance with the standards outlined in the CDOT Noise Analysis and Abatement Guidelines (CDOT 2011). All noise levels were modeled using the federally approved TNM2.5 traffic noise model software Noise impacts are summarized in **Table 2**.

Table 2. Summary of Noise Impacts by Alternative

	No Action	Revised G Modified	Revised F Modified	Eastern Realignment
Number of dwelling units equal to or exceeding NAC	56	57	63	63
Number of dwelling units with 10 dBA or more increase	99	99	97	10
Total number of impacted dwelling units	99	104	108*	117*

* Some dwelling units experience both NAC and substantial noise increase impacts

4.1 No Action Alternative

The No Action Alternative includes several modifications to the Grandview segment of US 160:

- Four through-traffic lanes
- Grandview grade-separated interchange
- Three Springs grade-separated interchange at County Road 233
- An outside auxiliary lane along each direction connecting ramps between Grandview and Three Springs Interchanges

- Local service road improvements

The 2006 US 160 EIS discussed these changes but analyzed 2025 noise impacts for the US 160 mainline only. This analysis includes the built and projected roadway and interchange configurations that are planned to be constructed before 2030 as actions that will occur regardless of the outcome of the SEIS process.

2030 traffic representing the noisiest hour traffic volumes associated with peak seasonal traffic volumes, averaged between daily morning and afternoon peak hours. Traffic data utilized in this analysis is summarized in **Table 3**. Traffic composition remains the same used in the 2006 US 160 EIS at 95 percent automobile and light truck traffic, three percent medium truck traffic and two percent heavy truck traffic on all roadways. Posted speed limits of 60 mph on mainline US 160, 30 mph on ramps, and 30-40 mph on county and frontage roads were also utilized in the 2030 calculations. Build alternative US 550 alignments were assessed with 50 mph posted speed limits.

Table 3. 2030 Traffic Volumes Used in Alternative Modeling

Roadway Segment	Traffic Volumes (Vehicles per Hour)					
	No Action		Revised G Mod		Revised F Mod and East	
	Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound
US 160 Farmington Hill to Grandview Interchange	3273	3258	2380	3733	2970	3733
US 160 Grandview Interchange	2718	3258	2858	2565	3110	3245
US 160 East Grandview Interchange to SH 172 Interchange	2858	2913	2858	2908	3110	3388
US 160 at SH 172 Interchange and East	1351	1220	1351	1220	1351	1220
South Frontage Rd	NA		307		240	
CR 220	264	264	264	264	264	264
	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
US 550	1093	800	870	1083	1640	1315
SH 172	855	459	855	459	855	459
North Approach Rd	983	1013	983	1013	1078	1013
South Approach Rd	538	465	538	515	--	--

Under the No Action Alternative in 2030, 62 of the 122 total receptors analyzed in this document would be impacted by traffic noise. Noise results are summarized in **Table 4**. Over half of all receptors will experience a substantial 10 dBA or more increase in noise over 2001 baseline noise levels. Almost 29 percent of receptors analyzed in the project area will also experience noise levels reaching or exceeding the NAC under no build 2030 conditions.

Indirect impacts resulting from traffic noise will likely be an increase in overall background noise experienced at a greater distance away from the highway. Although not loud enough to be considered an impact by Federal or state standards, in 2030 the background noise caused by increased traffic volumes may be enough to change the character of the noise from what prior to 2001 was a predominantly rural noise setting to a more active noise environment close to the US 160 corridor and along the existing US 550 alternative corridor.

4.2 Direct Impacts Common to All Alternatives

Table 4. Summary of Traffic Noise Levels and Impacts

Receptor *	DU	2001 Baseline	2030 No Action	2030 Revised G modified	Type of Impact G	2030 Revised F Modified	Type of Impact F	2030 Eastern Realignment	Type of Impact Eastern
R1	2	50.6	60.5	60.7	SI	60.6	SI	60.6	SI
R25	5	56	62.1	NA		62.3		62.3	
R29	3	53.2	63.6	60.3		60		60	
R29a	4	59.8	72.1	68.4	NAC	68.3	NAC	68.3	NAC
R30	2	53.9	63.8	60.1		60.1		60.1	
R34	2	54.8	59.8	58.9		58.3		58.3	
R37	1	53.7	67.1	65.1	SI	65.9	SI	65.9	SI
C38	1	54.2	68.4	65.1	SI	65.7	SI	65.7	SI
C42	2	51.9	64.2	57.7		58.2		58.2	
R42a	3	52.3	64.1	56.8		57.3		57.3	
R43	1	56.3	70.3	66.4	Both	62.1		62.1	
C39	1	60.2	73	72.7	Both	73.6	Both	73.6	Both
C40	1	55.9	69.9	68.8	SI	69	SI	69	SI
C41	1	53	66.1	64.9	SI	65.2	SI	65.2	SI
R44a	1	47.2	60	63.5	SI	66	Both	66	Both
R52	1	56.7	67.5	63.3		63.9		63.9	

Table 4. Summary of Traffic Noise Levels and Impacts

Receptor *	DU	2001 Baseline	2030 No Action	2030 Revised G modified	Type of Impact G	2030 Revised F Modified	Type of Impact F	2030 Eastern Realignment	Type of Impact Eastern
R55	1	51.7	64.2	61.6		62.3	SI	62.3	SI
R56	3	50.1	63.6	62.5	SI	62.9	SI	62.9	SI
R56a	3	50.1	63.1	61.5	SI	62.1	SI	62.1	SI
C57	1	56.1	68.7	67.2	SI	67.5	SI	67.5	SI
R58	3	53	67.3	66	Both	66.5	Both	66.5	Both
R58a	2	52.1	66.6	65.8	SI	66.3	Both	66.3	Both
R58b	1	53.2	67.8	67.1	Both	67.6	Both	67.6	Both
R63	1	51.5	65.7	66.3	Both	67.5	Both	67.6	Both
R65	1	50.5	64.7	65.2	SI	69.1	Both	68.9	Both
R66	1	57.8	69.5	69.7	Both	70.8	Both	70.7	Both
R67	1	60	71.4	71.6	Both	72.3	Both	72.3	Both
R118	3	56	69.2	67.9	Both	68.3	Both	68.3	Both
R119	2	54.6	67.3	65.8	SI	66.3	Both	66.3	Both
Grand4	0	45	58.4	57.2	SI	57.9	SI	57.8	SI
R318	1	56.3	68.6	68.4	Both	69.2	Both	69.2	Both
R320	4	56.2	68.2	67.6	Both	68.4	Both	68.4	Both
R322	1	56.2	68.1	67.4	Both	67.9	Both	67.9	Both
R323	4	59.1	70.7	70.5	Both	71.3	Both	71.2	Both
R120 hotel		55.6	66.7	66.7	Both	66.9	Both	66.9	Both
R120b hotel		52.2	62.3	62.1		62.3	SI	62.3	SI
R122	1	47.2	57.5	56.9		58	SI	58	SI
R304	1	45.2	52.6	54.2		63.8	SI	65.6	SI
R305	1	44.8	52.3	53.6		62.2	SI	64.2	SI
R306	1	46.1	53.8	55.5		66.2	Both	67	Both
R307	1	45.5	52.9	54.4		62.6	SI	64.8	SI
R309	1	48.5	57.5	59.3	SI	64.2	SI	64.9	SI
R310	1	49.5	59.4	60.8	SI	62.9	SI	63.3	SI
R311	1	45.3	59.3	60.3	SI	61.9	SI	61.9	SI
R312	1	50.4	60.3	61.8	SI	67.6	Both	67.4	Both
R312a	1	46.6	59.9	61.6	SI	NA		NA	
R315	1	51	62.1	63.2	SI	64.3	SI	64.5	SI
R70	6	56	66.2	66.2	Both	66.8	Both	66.8	Both
R72	3	57	69.9	69.4	Both	70.3	Both	70.3	Both
R73	2	49.9	63.2	63.3	SI	63.8	SI	63.8	SI

Table 4. Summary of Traffic Noise Levels and Impacts

Receptor *	DU	2001 Baseline	2030 No Action	2030 Revised G modified	Type of Impact G	2030 Revised F Modified	Type of Impact F	2030 Eastern Realignment	Type of Impact Eastern
R71	4	50.9	66.3	66.4	Both	67.1	Both	67.1	Both
C121	1	49.2	64.3	64.1	SI	65.7	SI	65.7	SI
Grand2	0	52.4	52.4	69	SI	69.7	SI	69.7	SI
C89	1	61.1	74.2	74	Both	70.7		70.7	
C90	1	58.3	71.8	70.9	SI	67		67	
C91	1	55.3	55.3	63.7		60.3		60.3	
R81	2	57.8	69.1	69.5	Both	69.5	Both	69.5	Both
R81a	1	53.5	64.3	64.6	SI	64.5	SI	64.5	SI
R81b	1	50.8	61.9	62	SI	62.2	SI	62.2	SI
R82	1	60.3	70.5	70.6	Both	70.2	NAC	70.2	NAC
C116	1	53.8	53.8	64.6	SI	64.2	SI	64.2	SI
R83	1	54.6	64.7	69	Both	67.3	Both	67.3	Both
R84	1	58.9	67	69.1	Both	67	NAC	67	NAC
R86	1	55.4	66.1	68.5	SI	65.4	SI	65.4	SI
R85	1	60.8	60.8	67.3	NAC	64.4		64.4	
R87	1	59.7	59.7	70.4	Both	66.3	NAC	66.3	NAC
R88	1	60.4	60.4	71.9	Both	67.8	NAC	67.8	NAC
R92	2	62	73.9	74	Both	70.5	NAC	70.5	NAC
R93	1	54.4	63.5	63.9		60.1		60.1	
R93a	1	54.9	64.1	64.6		60.8		60.8	
R93b	1	50.5	60.2	60.7	SI	62.1	SI	62.1	SI
R93c	1	50.1	60	60.5	SI	60.7	SI	60.7	SI
C325	1	47.9	61.7	62.5	SI	63.6	SI	63.6	SI
C326	1	50	59.8	61.1	SI	63.9	SI	64.4	SI
R324	1	54.5	65.6	67	Both	67.7	Both	67.8	Both
R68	1	59.2	70.9	71.2	Both	71.8	Both	71.8	Both
R69	2	58.8	70.8	71.1	Both	71.6	Both	71.6	Both
R74	1	55.1	67.7	68.7	Both	69.2	Both	69.2	Both
C75	1	52.4	64.6	66.1	SI	66.4	SI	66.4	SI
R75d	1	52.1	64.5	66	Both	66.3	Both	66.3	Both
R75a	1	51.3	63.7	65	SI	65.3	SI	65.3	SI
R75b	1	50.9	63.3	64.5	SI	64.8	SI	64.8	SI
R75c	1	51.6	63.7	64.9	SI	65.1	SI	65.1	SI
C79	1	53.8	64.5	65.8	SI	66.2	SI	66.2	SI
R94	1	57.6	70.4	70.4	Both	70.4	Both	70.4	Both
R95	8	60.7	75.1	75.1	Both	75.1	Both	75.1	Both

Table 4. Summary of Traffic Noise Levels and Impacts

Receptor *	DU	2001 Baseline	2030 No Action	2030 Revised G modified	Type of Impact G	2030 Revised F Modified	Type of Impact F	2030 Eastern Realignment	Type of Impact Eastern
R96	4	57.4	73.9	73.9	Both	73.9	Both	73.9	Both
R97	6	61.4	71.2	71.2	NAC	71.2	NAC	71.2	NAC
R98	1	59.7	60.5	60.5		60.5		60.5	
R102	1	60.3	65.2	65.2		65.2		65.2	
R103 church	1	53.9	67.3	67.3	Both	67.3	Both	67.3	Both
R104	1	54.9	64	64		64		64	
R108	1	53.1	61.5	61.5		61.5		61.5	
R105	1	53.2	66.1	66.1	Both	66.1	Both	66.1	Both
R106	1	53.6	68.2	68.2	Both	68.2	Both	68.2	Both
R107	5	52.7	67.2	67.2	Both	67.2	Both	67.2	Both
R107b	1	54.8	69.1	69.1	Both	69.1	Both	69.1	Both
R109	1	49.7	66.6	66.6	Both	66.6	Both	66.6	Both
R110	1	50.1	63.2	63.2	SI	63.2	SI	63.2	SI
R112	1	45.9	63.4	63.4	SI	63.4	SI	63.4	SI
R114	1	39.9	62.1	62.1	SI	62.1	SI	62.1	SI
C115	1	52.5	50.1	50.1		50.1		50.1	
cemetery		55.9	53.8	53.8		53.8		53.8	
R150	1	50.1	53.2	56.3		NA		NA	
R151	1	49.5	52.2	54.6		51		NA	
R152	1	51.3	54.4	53.9		50.8		NA	
R153	1	53.3	58.4	52.4		50.2		NA	
R154	1	48.3	50.5	56		52		NA	
R155	1	51.5	56.3	65.7	SI	52.8		NA	
R156	1	59.3	55.6	59.6		62.3		49.8	
R157	1	56.8	53.8	56.1		57.0		49.2	
R300	1	40.7	45.9	45.9		64.6	SI	49.4	
R301	1	43.5	48.2	48.2		65	SI	52.5	
R302	1	42.9	47.3	47.3		58.6	SI	51.8	
R1E	1	50.5	51	NA		48.6		52.9	
R2E	1	46.7	48.8	NA		50.8		53.8	
R3E	1	43.2	47.3	NA		56.5	SI	52.1	
R4E	1	42.9	45	NA		48		47	
R5E	1	44.1	47.2	NA		51.4		50.7	
R6E	1	50.4	50.6	NA		48.5		53.8	
R7E	1	51.8	50.9	NA		48		53.6	

Table 4. Summary of Traffic Noise Levels and Impacts

Receptor *	DU	2001 Baseline	2030 No Action	2030 Revised G modified	Type of Impact G	2030 Revised F Modified	Type of Impact F	2030 Eastern Realignment	Type of Impact Eastern
R8E	1	41.9	41.8	NA		NA		56.2	SI
R9E	1	38.5	40.9	NA		NA		63.3	SI
R10E	1	44.8	44.5	NA		NA		65.6	SI
R11E	1	47.2	45.2	NA		NA		51.1	
R12E	1	36.4	49.6	NA		NA		49.2	SI
R13E	1	37	39.3	NA		NA		64.6	SI
R14E	1	36.5	38.5	NA		NA		56.2	SI
R15E	1	35.1	37.6	NA		NA		47.3	SI
R16E	1	35	37.4	NA		NA		45.8	SI
R17E	1	36.3	38.6	NA		NA		48.9	SI
R18E	1	37.1	39.4	NA		NA		53.4	SI
R19E	1	37.8	40.1	NA		NA		65.1	SI
R20E	1	44.6	46	NA		NA		48.6	
R21E	1	38.1	42.4	NA		NA		53.4	SI
R22E	1	38.9	40.9	NA		NA		48.9	SI
R23E	1	53.8	55.6	53.9		54.8		62.2	
R24E	1	61.4	63.2	59.2		61		66.8	NAC
R25E	1	60.5	62.6	63.6		66.8	NAC	56.8	
R26E	1	56.1	56.8	58.1		65.1		50.3	
R27E	1	49.2	52	51.4		56.1		46.6	

***** Receptor locations are shown on aerial photography of study area in Appendix A
SI = impact due to substantial increase of 10 dBA or more over existing noise levels
NAC = Impact due to meeting or exceeding the NAC activity category threshold
Shaded area represents receptor groupings analyzed for abatement.

US 160 traffic noise between the Grandview Interchange and East CR 233 is similar among the Revised G Modified, Revised F Modified, and Eastern Realignment Alternatives. Traffic noise levels are on average within 1-2 decibel of the Revised F Modified and Eastern Realignment Alternatives, common noise impacts occur at residential and commercial receptors along the US 160 alignment concentrated at the following localities illustrated in **Figure 1**Figure 1:

- R37-C38, C39-C44 near the intersection with County Road 232
- R52-R67, R310-R323 south of US 160 between County Road 232 and TSI
- R324, R56-R75d south of US 160 between TSI and Silverview Lane

- R70-R73c north of US 160 just west TSI and old County Road 233
- R81-R93 mixed residential and commercial receptors located along US 160 west of the County Road 233 East intersection

Noise abatement analyses for these areas (MIT 1, MIT3 and MIT4) are summarized in Section 5.0.

4.2.1 Indirect Impacts Common to All Alternatives

Indirect impacts resulting from traffic noise will likely be an increase in overall background noise experienced at a greater distance away from the highway. Although not loud enough to be considered an impact by federal or state standards, in 2030 the background noise caused by increased traffic volumes may be enough to change the character of the noise from what prior to 2001 was a predominantly rural noise setting to a more active noise environment close to the US 160 corridor and along the new US 550 alternative corridors. This change in rural noise character will likely occur with all build alternatives.

4.2.2 Direct & Indirect Impacts for Revised G Modified

Noise generated from the 2030 Revised G Modified Alternative will impact a total of 70 residential and commercial receptors along US 160 and associated interchanges, summarized in Exhibit 5. Noise levels will range from 50.1 to 75.1 dBA along the corridor the US 160. Most identified noise impacts are associated with traffic on US 160 as previously described in Impacts Common to All Alternatives. Many of the impacted sites along the US 160 corridor are industrial sites and businesses. No businesses housing noise sensitive activities such as recording studios or theaters were identified along the corridor.

The Revised G Modified Alternative is aligned south and west of most Grandview development on undeveloped ranchlands. Receptors R150-R155 located along Revised G Modified US 550 alignment near County Road 220 range from 56.0 to 65.7 dBA and will increase an average of 6 decibels from 2001 Baseline noise levels and an average of 1 - 2 decibels over No Action noise levels. The Revised G Modified Alternative will result in a substantial increase noise impact at an isolated farm residence (R155).

4.2.3 Direct & Indirect Impacts for Revised F Modified

Noise generated from the 2030 Revised F Modified Alternative will impact a total of 73 residential and commercial receptors along the US 160 corridor and associated interchanges, summarized in Exhibit 5. Noise levels will range from 50.1 to 75.1 dBA along the corridor. Most identified noise impacts are associated with traffic on US 160 as described in Impacts Common to All Alternatives. Many of the impacted sites along the US 160 corridor are industrial sites and businesses. No businesses housing noise

sensitive activities such as recording studios or theaters were identified along the corridor.

The Revised F Modified alignment crosses the central portion of the study area and affects several residences south of US 160 and the Three Springs Interchange. Noise levels at these neighborhoods range from 48 to 67.6 dBA and in most cases are more than 10 dBA over the 2001 Baseline noise levels. Although NAC thresholds have been met or exceeded at R306 and R312, the substantial increase in noise in this area also constitutes noise impacts. Noise mitigation (MIT 2) for this area is discussed in Section 5.0.

Receptors 151-155 located along the Revised F Modified US 550 alignment near CR 220 will increase an average of 1 dBA over the 2001 Baseline noise levels, and will not result in future noise impacts. Receptor R150 is identified as needed for the Revised F Modified Alternative ROW requirements and was not analyzed.

The higher traffic volumes associated with 2030 Revised F Modified Alternative will result in a NAC noise impact at an isolated farm residence (R25E).

4.2.4 Direct & Indirect Impacts for Eastern Realignment

Noise generated from the 2030 Eastern Realignment Alternative will impact a total of 83 residential and commercial receptors along the US 160 corridor and associated interchanges, summarized in Exhibit 5. Noise levels will range from 56.6 to 73.9 dBA along the corridor. Most identified noise impacts are associated with traffic on US 160 as previously described in Impacts Common to All Alternatives. Many of the impacted sites along the US 160 corridor are industrial sites and businesses which do not house noise sensitive activities such as recording studios or theaters.

The Eastern Realignment crosses the central portion of the study area and affects several residences south of US 160 and the TSI. Noise levels at these neighborhoods range from 47 to 67.4 dBA. Most receptors will experience 2030 noise levels more than 10 dBA over the 2001 baseline noise levels. Although NAC thresholds have been met or exceeded at R306 and R312, the substantial increase in noise in this area also constitutes noise impacts.

The Eastern Realignment Alternative will run beside a neighborhood of seven receptors, R13E through R19E located in the central portion of the study area near Dreamy Draw and Craig Lane. This area will experience substantial increase impacts averaging 15 decibels over the 2001 Baseline noise levels. Noise levels for these receptors will remain below NAC thresholds. Several other isolated homes located along the US 550 Eastern Realignment will experience an average 5 decibel increase in noise levels over baseline while five isolated homes, R8E, R9E, R10E, R12E, and R21E

will experience substantial impact increases over baseline of 10 decibels or more. Mitigation analyses for these impacted receptors are described under MIT 6 in Section 5.0.

5.0 Mitigation

CDOT Noise Analysis and Abatement Guidelines (CDOT, 2011) prescribes that all noise mitigation must meet feasibility and reasonableness criteria to be constructed. To summarize, feasibility requires that a substantial noise reduction of at least 5 dBA can be achieved by the abatement measure. Noise walls should form a continuous barrier without gaps, and the wall must not cause safety or critical maintenance issues to be considered feasible. Examples of safety and maintenance concerns are chronic winter icing of travel lanes caused by the wall shadow or impairment of egress visibility from a driveway to the roadway.

Reasonableness noise barrier criteria are measures used to evaluate social and economic aspects of noise abatement.

- Minimum barrier noise reduction design goal of 7 dBA
- Cost Benefit Index of cost per receiver per decibel of noise reduction less than $6800
- Benefited person's desire for noise barrier

The 2006 US 160 EIS discusses the possible types of abatement that can be considered for mitigation, but for this document the only noise walls are considered due to terrain and ROW constraints.

Abatement considerations have been re-evaluated utilizing TNM2.5. Noise mitigation recommended in this document has been preliminarily optimized by assessment of varying wall lengths and heights, and variable siting. Most areas analyzed for abatement considered placing walls at multiple locations, such as adjacent to mainline, between mainline and ramps, and adjacent to frontage or service roads as terrain and access allow. The most effective noise barrier placement is represented in the noise abatement analysis summary in **Table 5**.

5.1 Summary of Mitigation Common to All Action Alternatives

Three areas (MIT 1, MIT3 and MIT4) along the US 160 corridor share common impacts and abatement evaluations among the three build alternatives due to roadway improvements that will be constructed regardless of the outcome of this SDEIS.

5.2 Summary of Mitigation for Revised G Modified, Revised F Modified and Eastern Realignment

One area of mitigation consideration results from construction of Revised F Modified Alternative (MIT 2). Because the Revised F Modified and Eastern Realignment Alternatives configuration and traffic are the same immediately south of the Three Springs Interchange, the mitigation consideration for this area is the same described in MIT 2n and MIT2s.

Farther south however, noise levels at R300 to R302 range from 57.6 to 63.9 in Revised F Modified and 49.2 to 51.9 in the Eastern Alignment, and are substantially higher than the 2001 baseline noise levels. Abatement measures evaluated under MIT 2c would provide a similar response to noise reductions needed to provide feasible and reasonable noise mitigation.

Mitigation consideration was analyzed for one area unique to the Eastern Realignment (MIT6).

These areas were analyzed for abatement consideration and are discussed in detail below and are summarized in **Table 5**. The rationale for addressing noise abatement at isolated, individual receptors and commercial properties is summarized in Section 5.4.

Table 5. Summary of Noise Abatement Analyses

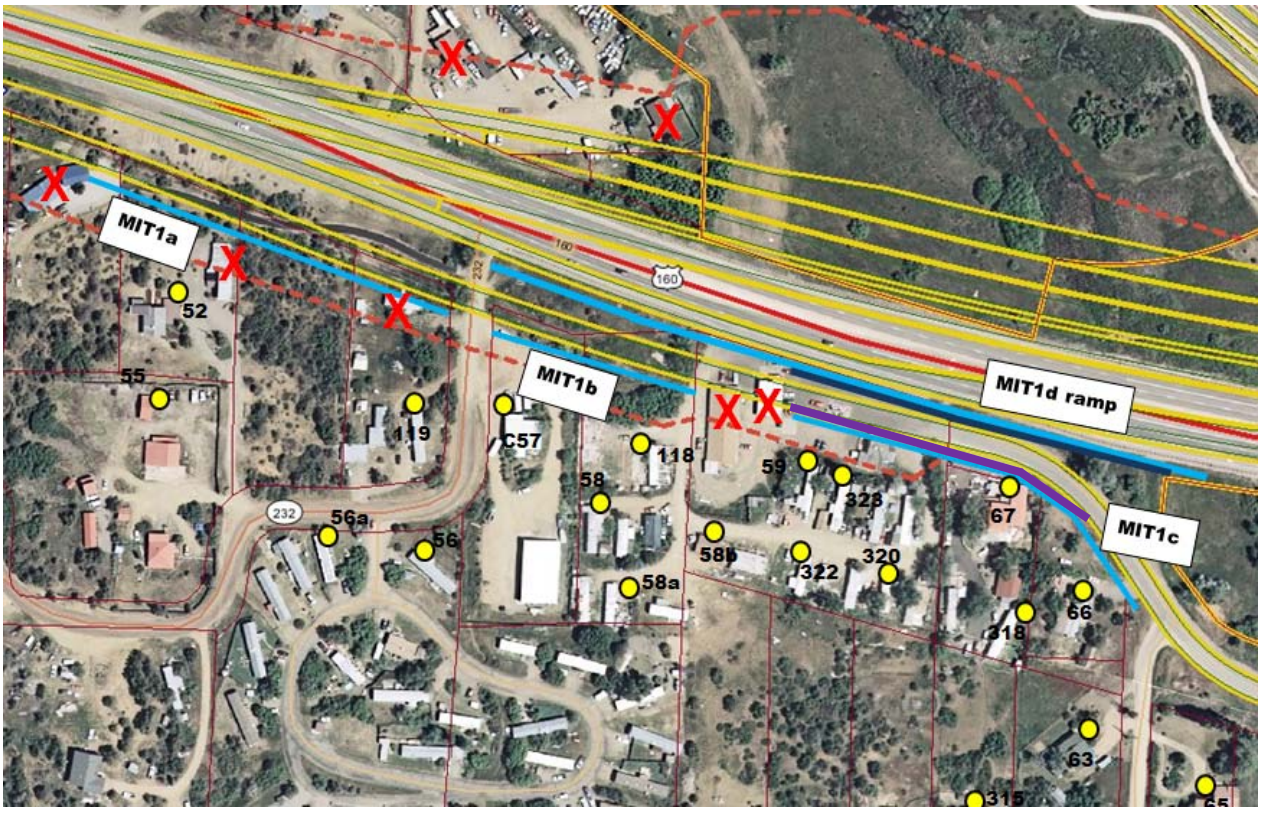
Receptors Analyzed Mitigation Common to Build Alternatives	Barrier ID	7dBA Design GoalReduction?	Dwelling Units	Total Leq Reduction (dBA)	Barrier Height (ft)	Barrier Length (ft)	Barrier Unit Cost	Cost Benefit Index	CBI Criteria Met?
R52,R55,R56, C57,R58, R118, R119	MIT 1a,b, c	Yes	11	54.2	14	626	$45	$7,276	No
R318, R320, R322, R323, R62, R67	MIT 1c	Yes	11	28.4	13	490	$45	$10,093	No
R52,R55,R56, C57,R58, R118, R119, R318, R320, R322, R323, R62, R67	MIT 1d	Yes	18	56.7	18	1020	$45	$14,571	No
R324, R68, R69, R74, C75, R75a-d	MIT 3a	No	9		12	900	$45		NA
R70, R71, R72, R73	MIT 3b	Yes	15	57.6	12	900	$45	$8,438	No
R83, R84, R86	MIT 4a	Yes	3	23.9	12	1110	$45	$25,079	No
R81, R81a-b, R82, C116	MIT 4b1	No	5		12	585	$45		NA
R85, R87, R88, R92	MIT 4b2-4	Yes	6	7.3	12	475	$45	$35,137	No
Mitigation Revised F Modified Alternative									
R304, R305, R306, R307	MIT 2n	No	4				$45		NA
R309, R310, R311, R312, R315	MIT 2s	No	5				$3045		NA
R300, R301, R302	MIT 2c	No	3		20	900	$3045		NA
Mitigation Eastern Realignment Alternative									
R13 -R18	MIT6	Yes	6	7.1	12	460	$45	$58310	No

5.3 Abatement Analyses

Mitigation Area 1

The noise-impacted receptors included within Mitigation Area 1 (MIT 1) are affected under all build alternatives. Because the traffic and Three Springs Intrchange configurations in this part of the project area are similar among all build alternatives, a common noise abatement analysis was undertaken. Noise abatement was analyzed for receptors located along US 160 between the western gore of the US 160 to County Road 233 ramp where the highest density of residences are located. Locally, final construction of the TSI ramp and service road modifications will require demolition/relocation of several frontage receptors as noted by a red x. The proposed roadway configuration of the Revised G Modified Alternative is overlain in yellow on an aerial photographic base map. The roadway footprint (cut and fill slopes) is delineated in this and subsequent exhibits by an orange dashed line. Multiple walls (blue) were evaluated for feasible noise reduction at the identified receptors, highlighted by yellow symbols in **Figure 2**.

Figure 2. Location of analyzed MIT 1 noise barriers



Wall locations were analyzed along the service road for mitigation scenario MIT 1 and included 3 walls, referred to as a, b, and c (MIT 1a,b,c) and along the shoulder of the US 160 to County Road 233 ramp (MIT 1d). Walls MIT 1a-c were sited to allow continued roadway access at County Road 232 and at a consolidated driveway access near R59. **Table 6** tabulates the wall variables used to assess the cost-benefit index reasonableness for each feasible wall configuration.

Table 6. Mitigation analyses for MIT 1 walls

MIT 1 wall	Wall Length (ft)	Wall Height (ft)	Unit Cost ($/sq.ft)	Total Decibel Reduction (dBA)	Cost Benefit Index
1c	626	13	$45	28.5	$12,849
1c	626	14	$45	54.2	$7,276
1c	490	13	$45	28.4	$10,093
1d	1020	16	$45	0	NA
1d	1020	18	$45	56.7	$14,571
1d	550	18	$45	0	NA

A wall composed of all three segments allowed for access points at County Road 232, consolidated driveway near R59, and ended at local road: MIT 1a was evaluated at 580 feet long, wall MIT 1b at 280 feet long, and wall MIT 1c at 626 feet long. Walls were evaluated at heights varying from 12 feet to 14 feet. Walls MIT 1a and MIT 1b did not provide sufficient noise reduction of 5 dBA to be considered feasible under CDOT guidelines. However, MIT 1c did provide adequate design goal noise reduction and was further evaluated for reasonable cost benefit. A wall of 626 feet length and 14 feet height resulted in a cost-benefit index of unreasonableness at $7,276. Wall MIT 1c dimensions were further optimized to 490 feet in length (illustrated in purple in **Figure 2**) but still achieved an unreasonable cost-benefit index of $10,093. Noise reduction data for each mitigation analysis is captured for MIT 1 in datasheets in Appendix B of this addendum.

Because of the local terrain and access issues associated with a wall located along the service road, another noise barrier location, MIT 1d was evaluated along the outside shoulder of the US 160 to County Road 233 Ramp. While this wall location provides effective noise reduction by being located adjacent to the higher volume ramp traffic source (than at the service road), a barrier at this location only partially blocks the elevated, faster moving mainline traffic. Of several wall dimensions evaluated, an 18 foot tall, 550 foot long wall (illustrated in dark blue in Exhibit 7) would provide the required 5 decibel design goal noise reduction but not a reasonable cost-benefit index. Due to limited ramp elevation information, no further wall dimension refinement was attempted.

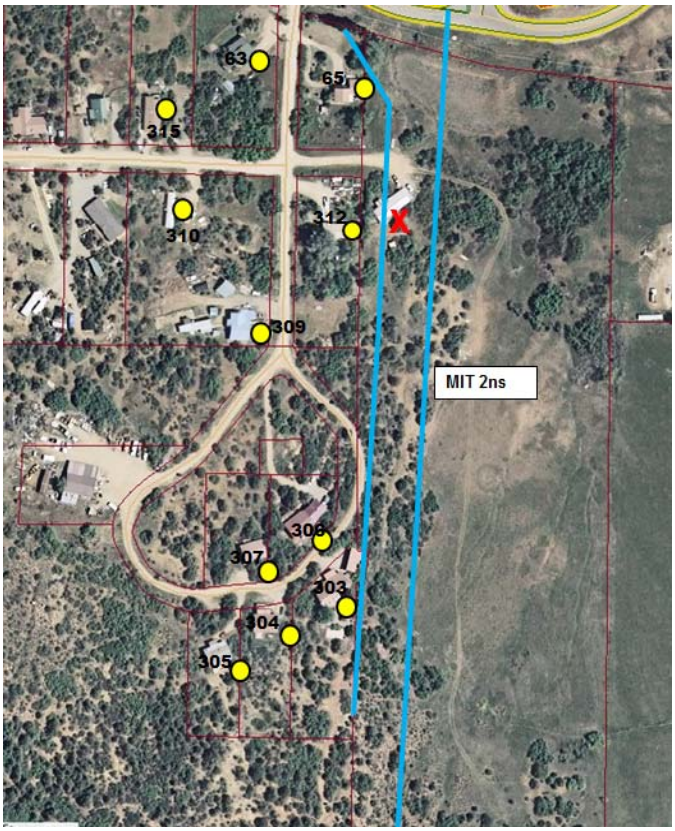
Recommendation: No noise abatement measures were recommended for this mitigation evaluation area.

Mitigation Area 2

Noise abatement measures for both the Revised F Modified and Eastern Realignment Alternatives were analyzed south of the TSI where the several residences are located. The construction of the TSI – US 550 connection under Revised F Modified and associated service road modifications will require demolition/relocation of some frontage receptors as noted by a red x. Receptors and noise barriers assessed for noise – impacted area MIT 2 are shown in **Figure 3**.

Wall locations were analyzed along the service road for mitigation scenario MIT 2 and included walls along the shoulder of the US 550 and the US 550 service roads (MIT 2ns).

Figure 3. Location of analyzed MIT 2ns abatement



Wall lengths varied from 650 to 1620 feet, and heights were varied between 16 and 20 feet. Because of terrain issues, only the northern two-thirds of the noise-impacted area can achieve the required 5 decibel feasible noise reduction (MIT 2n). A wall 20 feet high and 900 feet long would not however, provide the required 7 dBA design goal noise reduction necessary to meet reasonableness criteria.

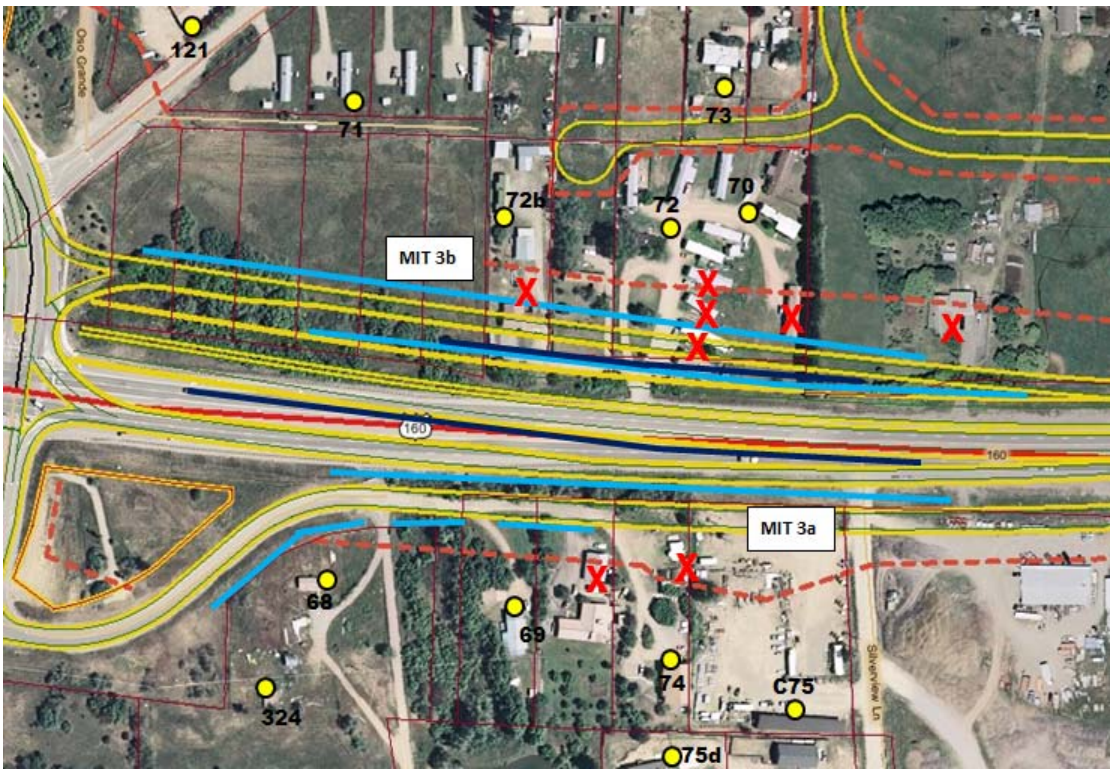
Noise abatement was considered for three residences R300 - R302 located farther south along the Revised F Modified US 550 alignment (MIT 2c) which are shown in Figure 1. A service road is situated between the residences and the US 550 mainline at this location. Although a wall of 895 feet length and 20 foot height could provide the required feasible noise reduction, the 7 dBA design goal could not be met by a wall at this location and the wall is considered to not be reasonable.

Recommendation: No noise abatement measures were recommended for this mitigation evaluation area.

Mitigation Area 3

The noise-impacted receptors included within Mitigation Area 3 are affected under all build alternatives. Because the traffic and TSI configurations in this part of the project area are similar among all build alternatives, a common noise abatement analysis was undertaken. Noise abatement was analyzed for receptors located along both sides of US 160 between County Road 233 and Silverview Lane. Locally, final construction of the TSI ramp and service road modifications will require demolition/relocation of several frontage receptors as noted by a red x. The proposed roadway configuration is overlain in yellow on an aerial photographic base map. Multiple walls (blue) were evaluated for feasible noise reduction at the identified receptors, highlighted by yellow symbols in **Figure 4**.

Figure 4. Location of analyzed MIT 3 noise barriers



East of the TSI and south of US 160, abatement was analyzed along the service road, along the shoulder of the County Road 233 to US 160 ramp, and along the south shoulder of the US 160 mainline (MIT 3a). A continuous noise barrier could not be constructed along the service road due to multiple driveway accesses. Walls analyzed under MIT 3a were sited to allow continued access at receptors R68, R69, and R74. Barriers assessed at this location did not provide the minimum 5 decibels to be considered feasible.

Walls sited along the shoulder of the US 160 ramps (MIT 3a and MIT 3b) provided insufficient noise reduction to be considered feasible.

Optimally, only MIT 3b walls evaluated along the US 160 mainline provided the 7 decibel design goal noise reduction to be considered reasonable under CDOT guidelines. Further analyses show that a continuous noise barrier along the southern shoulder of the westbound mainline would result in an excessively high cost-benefit index of $8,438 and thus considered unreasonable. **Table 7** tabulates the wall variables used to assess feasible noise reduction, and then cost-benefit index reasonableness for each wall configuration.

Table 7. Mitigation analyses for MIT 3 walls

MIT 3 wall	Wall Length (ft)	Wall Height (ft)	Unit Cost ($/sq.ft)	Total Decibel Reduction (dBA)	Cost Benefit Index
3a	900	12	$45	0	NA
3b	900	12	$45	57.6	$8,438

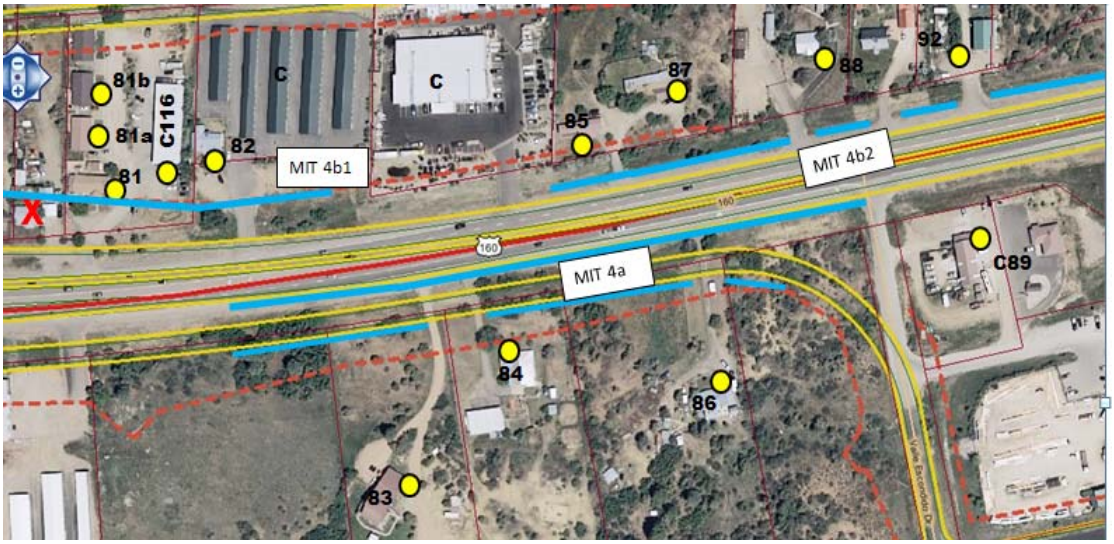
Recommendation: No noise abatement measures were recommended for this mitigation evaluation area.

Mitigation Area 4

The noise-impacted receptors included within Mitigation Area 4 are affected under all build alternatives. Because the traffic and roadway configurations in this part of the project area are similar among all build alternatives, a common noise abatement analysis was undertaken. Noise abatement was analyzed for receptors located along US 160 between Silverview Lane and Valle Escondido Drive. The proposed roadway configuration is overlain in yellow on an aerial photographic base map. Walls (blue) were evaluated for feasible noise reduction at the identified receptors, highlighted by yellow symbols in **Figure 5**.

South of US 160 and the service road, three residences, R83, R84 and R86 will be impacted. A continuous noise wall could not be constructed along the service road due to multiple driveways accessing the service road. Noise barriers (MIT 4a) along the service road could not provide sufficient noise reduction to the residences to be considered feasible under CDOT guidelines.

Figure 5. Location of analyzed MIT 4 noise barriers



Moving the noise barrier to a location along the eastbound mainline shoulder required a wall 1110 feet long and 12 feet high to provide reasonable design goal noise reduction of 7 decibels. However, the limited number of receptors for such a long wall, diluted the cost-benefit index to $25,079, and is therefore considered unreasonable. Results are tabulated in **Table 5**.

Two groups of receptors were considered for abatement north of US 160 in Mitigation Area 4. The first, MIT 4b1 evaluated abatement for residential and commercial receptors R81, R81a, R81b, R82, and C116. All access to these receptors was presumed to be relocated to a new local roadway planned to the north of R81b. Because of terrain, the noise barrier was located uphill at the cut-slope edge rather than along the shoulder of the mainline to maximize noise reduction for the receptors. However, noise reductions were insufficient to reach the 5 decibel feasible criteria.

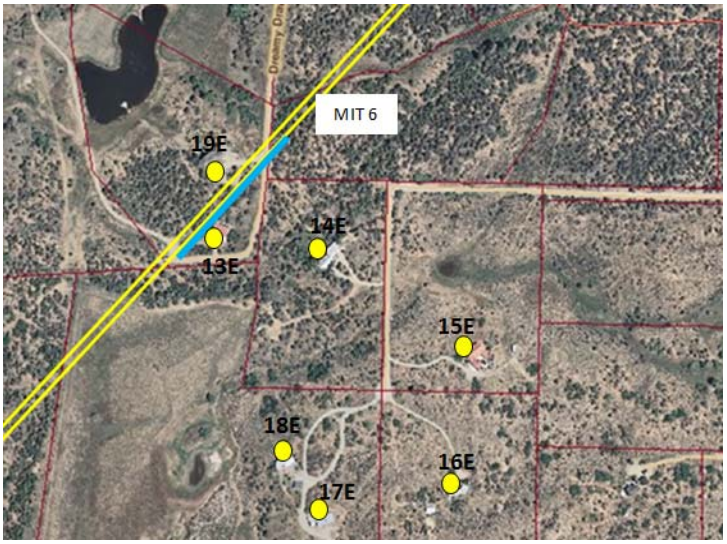
Residential receptors R85, R87, R88, R92, and R93 were evaluated for noise abatement as MIT4b2. A continuous wall could not be built along this section of the US 160 mainline due to multiple driveway entrances. By consolidating some driveways to minimize wall gaps, a 7 decibel design goal noise reduction could be achieved. However, the cost-benefit index for MIT4b2 of $35,137 exceeded the reasonable threshold of $6800 (**Table 5)**.

Recommendation: No noise abatement measures were recommended for this mitigation evaluation area.

Mitigation Area 6

Noise impacts caused by the Eastern Realignment Alternative noise abatement were analyzed approximately 2 miles south of the Three Springs Interchange and US 160 mainline where the several residences are located. Receptors and noise barriers assessed for Mitigation Area 6 are shown in **Figure 6**.

Figure 6. Location of analyzed MIT 6 noise barriers



Currently there are local low traffic volume roads, Dreamy Draw and Craig Lane, servicing this widely dispersed neighborhood. The introduction of a 4-lane highway to this rural setting will substantially increase noise levels. A noise barrier of varying dimensions was evaluated at a location along the northbound shoulder. Because it is not clear how the local road network and highway access will be accommodated, the noise barrier was presumed to be continuous. Several evaluated wall dimensions provided feasible noise reduction. None of the walls however were below the cost-benefit index of $6800. Cost-benefit calculations for these walls are tabulated in **Table 8**. Although feasible noise reduction could be achieved by the proposed barrier, the resulting cost-benefit index was unreasonable.

Table 8. Mitigation analyses for MIT 6 walls

MIT 6 wall	Wall Length (ft)	Wall Height (ft)	Unit Cost ($/sq.ft)	Total Decibel Reduction (dBA)	Cost Benefit Index
6	900	12	$45	8.1	$60,000
6	600	12	$45	0	NA
6	460	12	$45	0	NA
6	460	14	$45	0	NA
6	460	20	$45	7.1	$58,310

Recommendation: No noise abatement was recommended for these receptors.

5.4 Isolated and Commercial Impacts

Abatement measures are effective when designed to benefit multiple receptors that are situated closely together. Individual receptors that are widely separated from other receptors may require the similar noise barrier lengths and heights as a local group of homes to achieve the minimum design goal of 7 dBA noise reduction to be reasonable for construction. The individual receptor cost benefit index for a wall of sufficient height and length to provide feasible and reasonable noise reduction for isolated, single receptor sites is greater than the maximum allowable $6800 reasonableness criteria. Thus, for isolated impacted receptors, no noise mitigation is recommended.

Non-noise sensitive commercial receptors have been addressed for abatement in accordance with their NAC E or F classification. Industrial sites and businesses without an outdoor activity area were not considered for noise abatement.

A summary of isolated receptors and commercial receptors analyzed in this manner are described in **Table 9**.

Table 9. Rationale for Isolated Receptors and Commercial Sites

Isolated Receptor Locations	Rationale for Mitigation Consideration
R37, C38, R42,R42a-b, R43	No abatement considered for these receptors. Each site is located uphill of US 160, US 160 ramps and service road. The roadways are flanked by steep cut-slopes or retaining walls varying from 30 feet to 10 feet vertically. Driveway access will require gaps in barrier which will decrease the noise reduction effectiveness of the barrier, therefore; noise barriers at these locations would not be feasible.
R44a	Isolated residence located behind commercial buildings and barns. Cost benefit index for a wall of sufficient length and height to provide feasible and reasonable noise reduction would be greater than $6800 per receiver per decibel.
C120, C121	These NAC E hotels are located at a distance from US 160 such that a noise barrier capable of providing feasible and reasonable noise reduction to hotel would be preclusively tall and would block commercially valuable view from roadway.
C89, C90, C91	These commercial receptors are located uphill of roadway and ramps making a barrier preclusively tall to provide feasible and reasonable noise reduction. A barrier in front of these 3 businesses would require a consolidated road access creating a gap in the barrier, and would block valuable commercial view from roadway. There are no identified outdoor human activities areas associated with commercial sites, which are the normal focus of FHWA traffic noise impact concern. Therefore, these commercial receptors were not considered for noise abatement under this mitigation analysis.
C79, C325, C326	C79 is an industrial site classified as NAC F requiring no noise impact analysis. Receptors C325 and C326 are commercial properties located along the CR 233 (Three Springs) Interchange southeast service road and would be impacted by both Revised F Modified and Eastern Realignment alternatives due to substantial noise increase only; noise levels are far below NAC C 71 decibel threshold. There are no identified outdoor human activities areas associated with commercial sites, which are the normal focus of FHWA traffic noise impact concern. Therefore, C325 and C326 were not considered for noise abatement under this mitigation analysis.

Table 9. Rationale for Isolated Receptors and Commercial Sites

Isolated Receptor Locations	Rationale for Mitigation Consideration
R122, R155, R8E, R9E, R10E, R12E, R21E, R25E	Isolated receptor cost benefit index for a wall of sufficient length and height to provide feasible and reasonable noise reduction would be greater than $6800 per receiver per decibel. Thus, for these isolated impacted receptors, no noise mitigation is recommended.

6.0 Recommendations: Statement of Likelihood

This SDEIS does not recommend construction of noise barriers for the Revised G Modified (Preferred), the Revised F Modified or the Eastern Realignment alternatives.

Noise abatement evaluated at MIT2, MIT3, MIT4, and MIT6 sites were determined to not be feasible and reasonable under 2011 CDOT Analysis and Abatement Guidelines (CDOT, 2011) noise abatement criteria, and no mitigation is recommended for these sites.

Isolated receptor locations noted above were determined to not meet the cost-benefit index reasonableness criteria for feasible and reasonable abatement and no mitigation is recommended at these sites

Appendix A:
BASEMAPS AND RECEPTOR LOCATION

Appendix B:
TNM MODELING

Note:
(TNM Run Files are available electronically as requested)

Appendix C:
CDOT NOISE ABATEMENT WORKSHEETS