



**APPENDIX F:
NOISE AND VIBRATION IMPACT ASSESSMENT**

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NORTH I-25
EIS



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Noise and Vibration Impact Assessment Record of Decision Addendum

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Colorado Department of Transportation

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1.0 INTRODUCTION

The Colorado Department of Transportation (CDOT) evaluated alternative sets of improvements to the transportation system in north-central Colorado through the *North I-25 Environmental Impact Statement* (EIS). The general region covered in the EIS (**Figure 1-1**) encompassed approximately 1,300 square miles. This regional study area generally was bounded by and included U.S. Highway (US) 287, US 85, State Highway (SH) 1 and US 36 with Interstate 25 (I-25) as a central element.

The overall purpose for the EIS was to improve connectivity, functionality and capacity of transportation modes within the regional study area. This is needed because the existing highways are becoming inadequate and will underserve the expected future traffic demand in the region.

CDOT Project IM0253 179 was the EIS and examined several alternatives that would upgrade transportation infrastructure in the regional study area. The Final EIS (CDOT/Federal Highway Administration [FHWA], 2011) examined four future alternatives in detail: the No-Action Alternative; Package A; Package B; and, the Preferred Alternative. The highway and commuter rail noise impact results for each alternative were discussed in the Final EIS. The Preferred Alternative was selected through the Final EIS.

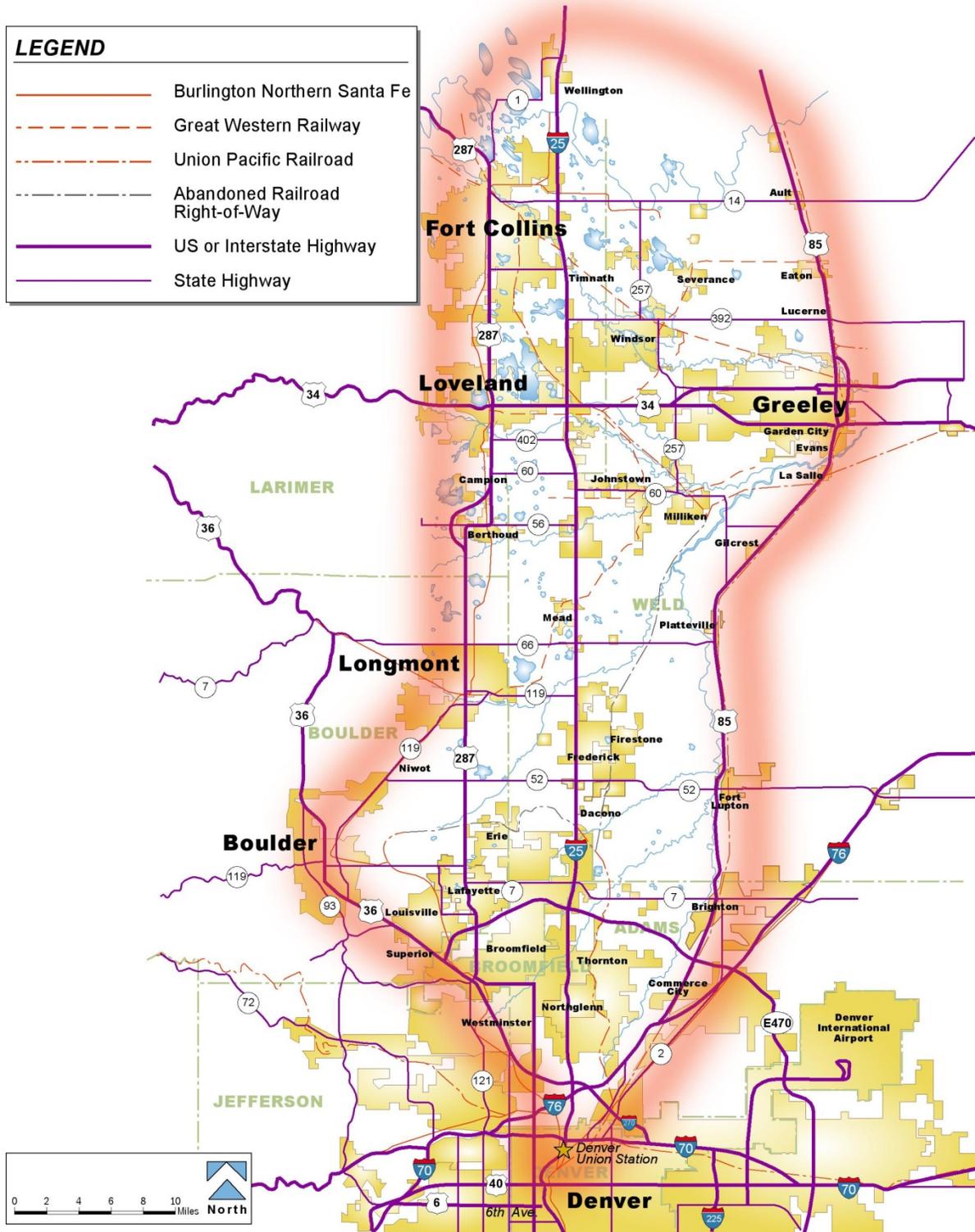
The proposed improvements included in the Preferred Alternative were so extensive that they could not reasonably be included in a single construction project, given current funding constraints. Therefore, the Preferred Alternative was divided into a series of phases that could be constructed in pieces as funding became available (CDOT/FHWA, 2011). Each phase will need to be cleared by a separate Record of Decision (ROD) prior to construction.

Phase 1 of the Preferred Alternative is the collection of proposed improvements included in the first ROD and is the subject of this addendum to the prior noise analyses. The remainder of this noise addendum describes the follow-up noise and vibration analyses performed for the Phase 1 ROD to supplement the analyses previously conducted for the Draft EIS (CDOT/FHWA, 2008) and Final EIS (CDOT/FHWA, 2011). The follow-up noise analyses were performed because new traffic noise regulations have recently been promulgated by CDOT (CDOT, 2011) and FHWA (Code of Federal Regulations Title 23 Part 772), so the previous analyses needed to be updated to comply with the changed regulations.

The information provided below is an addendum to the previous technical reports prepared for the Draft EIS and Final EIS. The addendum focuses on methods and results that are new or changed in the Phase 1 project areas since the Final EIS. Note that noise topics unchanged or untouched by Phase 1 are not discussed below but can be found in the previous technical reports. Also note that Phase 1 does not include construction of any commuter rail components (**Section 1.1**) from the Preferred Alternative; therefore, this addendum focuses on I-25 traffic noise and not rail noise/vibration.

Typically, a review of fundamentals of sound and noise are required for noise technical reports for CDOT (CDOT, 2011). This information was provided previously for the Draft EIS (CDOT/FHWA, 2008) and for brevity is not repeated in this addendum.

Figure 1-1 Regional Study Area



1.1 PREFERRED ALTERNATIVE PHASE 1

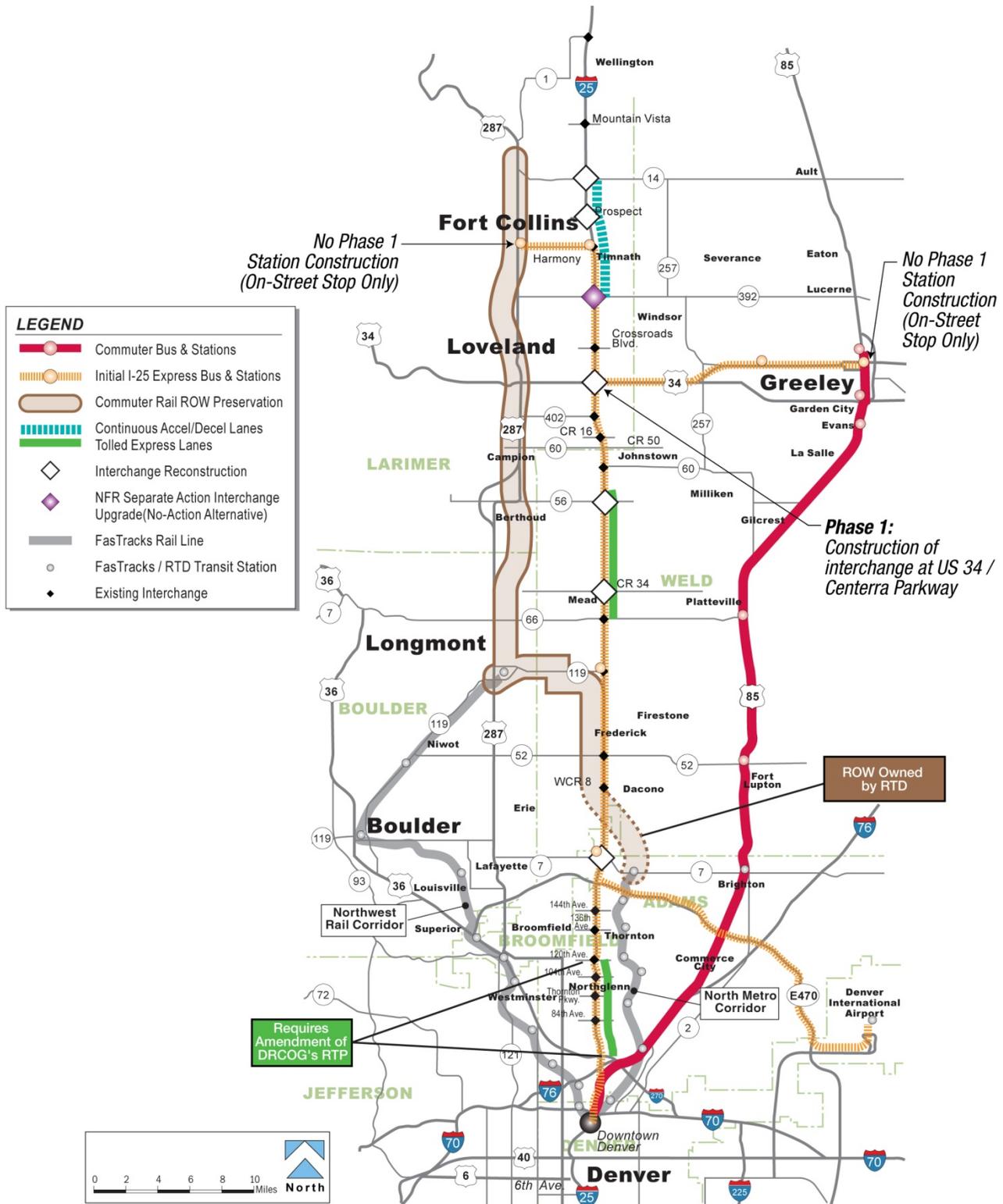
The Preferred Alternative from the Final EIS is a multi-modal solution with highway, rail transit and bus transit improvements. In summary, the Preferred Alternative includes:

- ▶ Numerous I-25 interchange reconstructions between US 36 and SH 1.
- ▶ Addition of general purpose lanes and tolled express lanes on I-25 between US 36 and SH 14.
- ▶ Commuter rail service along the Burlington Northern Santa Fe Railway tracks between Fort Collins and the FasTracks North Metro end-of-line station in Thornton (via Longmont).
- ▶ Express bus service from Fort Collins and Greeley on I-25 to downtown Denver.
- ▶ Commuter bus service on US 85 between Greeley and downtown Denver.

Phase 1 (**Figure 1-2**) of the Preferred Alternative consists of a subset of the overall improvements and will:

- ▶ Widen I-25 between SH 14 and SH 392 (approximately seven miles) with continuous acceleration/deceleration lanes.
- ▶ Widen I-25 between SH 56 and SH 66 (approximately seven miles) with one tolled express lane in each direction.
- ▶ Widen I-25 between US 36 and 120th Avenue (approximately six miles) with one buffer-separated tolled express lane in each direction and complete I-25 interchange modifications, as necessary.
- ▶ Replace and reconstruct I-25 interchanges at: SH 14, Prospect Road, SH 56, WCR 34, and SH 7. A first phase of improvements to the eastern leg of the I-25/US 34 interchange would be completed, with additional improvements in later phases.
- ▶ Replace or construct 46 structures, modify two existing structures, and rehabilitate two structures (within the footprint shown in **Figure 1-2**).
- ▶ Install six carpool lots at: I-25/SH 14, I-25/Prospect Road, I-25/Harmony Road, I-25/SH 56/WCR 44, Firestone, and I-25/SH 7.
- ▶ Purchase the new right-of-way necessary for the ultimate commuter rail configuration.
- ▶ Initiate regional express bus service on I-25 connecting Fort Collins and Greeley to downtown Denver and DIA. Construct four transit stations at: I-25/Harmony Road, US 34/SH 257, Firestone, and I-25/SH 7.
- ▶ Implement the entire commuter bus service of the Preferred Alternative on US 85 connecting Greeley to downtown Denver. This will include construction of five stations (Greeley, South Greeley, Evans, Platteville and Fort Lupton) and the purchase of five buses.

Figure 1-2 Summary of Preferred Alternative Phase 1 Improvements



1.2 ANALYSIS APPROACH

The overall purpose of this addendum was to revisit the validity of the previous results relative to the new noise guidelines and to review whether noise or vibration levels at receptors near potential Phase 1 roadway improvements may exceed applicable impact thresholds (CDOT, 2011). Abatement actions were then considered for the impacts. This is important because many properties along the study corridors may be impacted by noise or vibration from the project. Note that no commuter rail improvements are included in Phase 1, so the Federal Transit Administration guidelines for rail transit are not relevant for this addendum and are not considered further for Phase 1.

On July 13, 2010, FHWA issued a new final traffic noise rule that affects Federal and Federal-aid projects (Code of Federal Regulations Title 23 Part 772). As a result, CDOT updated their noise guidelines to conform to the new federal rule (CDOT, 2011) and to replace the 2002 guidelines (CDOT, 2002). CDOT's new rules took effect on July 13, 2011. Note that both the Draft EIS and the Final EIS were analyzed under CDOT's 2002 guidelines while the noise analysis for the Phase 1 ROD followed the 2011 noise regulations. CDOT's are the more restrictive of the regulations, so they predominated.

The primary impact thresholds of concern for this analysis are the CDOT Noise Abatement Criteria (NAC) (**Table 1-1**). Under CDOT's guidelines, equaling or exceeding the NAC is one type of noise impact and triggers an investigation of noise abatement measures. A "substantial" noise increase is the other type of noise impact and also leads to evaluation of traffic noise abatement actions. A "substantial" noise increase is defined by CDOT as the future design year noise level increasing by 10 A-weighted decibels (dBA) or more over existing levels (CDOT, 2011). The CDOT guidelines require that the one-hour equivalent noise level (L_{eq}) is used for the evaluation.

In general, the modeling input data for this addendum followed that used for the Final EIS. The work under the Final EIS used 2035 traffic volumes on the project roads to be consistent with the regional transportation plans that were current at the time. Those plans are still current, so 2035 traffic volumes were also used for the follow-up analysis. The remainder of the follow-up analysis consisted of examining the specific road improvements included under Phase 1, which reflect portions of the Preferred Alternative in the Final EIS.

Traffic on I-25 is of greatest importance for noise for Phase 1. The split for this traffic was 87 percent automobiles, 4 percent medium trucks and 9 percent heavy trucks, based on CDOT traffic count data.

Updated Traffic Noise Model (TNM) Version 2.5 software models that represented existing conditions and 2035 Phase 1 conditions were developed to assess traffic noise impacts. The model updates primarily added or modified the noise points/receptors of the earlier TNM models as required to comply with the 2011 CDOT guidelines. Note that one TNM model "point" may represent more than one actual "receptor" or property.

The 2011 CDOT guidelines fundamentally changed the way receptors are considered in noise impact analyses. For example, Land Use Categories B and C from the 2002 CDOT guidelines (the land uses of primary importance in the previous noise analyses) were substantively changed in the 2011 guidelines. The former Category B land uses, except residential, have been moved to new Categories C and E. What used to be Category C

(businesses) has been moved to new Category F. Therefore, the findings from this follow-up analysis are not directly comparable to those from the previous project noise analyses because of these fundamental changes.

Table 1-1 CDOT Noise Abatement Criteria

Land Use Category	CDOT NAC (L _{eq} dBA)	Description of Land Use Category
A	56 Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	66 Exterior	Residential
C	66 Exterior	Active sport areas, amphitheatres, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, 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	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), and warehousing.
G	Not Applicable	Undeveloped lands that are not permitted for development.

The 2011 CDOT guidelines require field verification measurements as part of a noise analysis. The previous noise measurements that were performed for the Draft EIS (CDOT/FHWA, 2008) demonstrated the validity of the TNM modeling for this project. Twelve locations were compared for the differences between measured and modeled results—they were less than 3 dBA (**Table 1-2**). No additional field noise measurements in the regional study area were gathered for the Phase 1 analysis.

Table 1-2 Previous TNM Verification Noise Model Results

Location	Measurement Leq (dBA)	Verification Model Result (dBA)	Difference (dBA)
Fort Collins Soccer Fields	68.5	69.5	1.0
Mountain Range Shadows	76.3	77.2	0.9
Johnson's Corner Campground	74.2	75.0	0.8
Weld County Road 46	61.3	59.2	2.1
Coyote Run	56.8	55.0	1.8
Summit View Apartments (behind wall)	62.2	63.1	0.9
Summit View Apartments (in front of wall)	72.4	73.1	0.7
Near University of Phoenix (behind wall)	62.4	62.6	0.2
Near University of Phoenix (in front of wall)	67.2	69.7	2.5
Wagon Wheel park-n-Ride	61.8	64.2	2.4
13000-block Grand Circle	65.8	68.6	2.8

2.0 AFFECTED ENVIRONMENT

The affected environment has not changed substantively since the Final EIS. At the south end of the project area between 128th Avenue and US 36, there are numerous densely populated residential and business areas along both the east and west sides of I-25. Along I-25 between SH 1 and 128th Avenue, there are mostly vacant lands or dispersed residential and business properties, although there are several clusters of developed properties in this area.

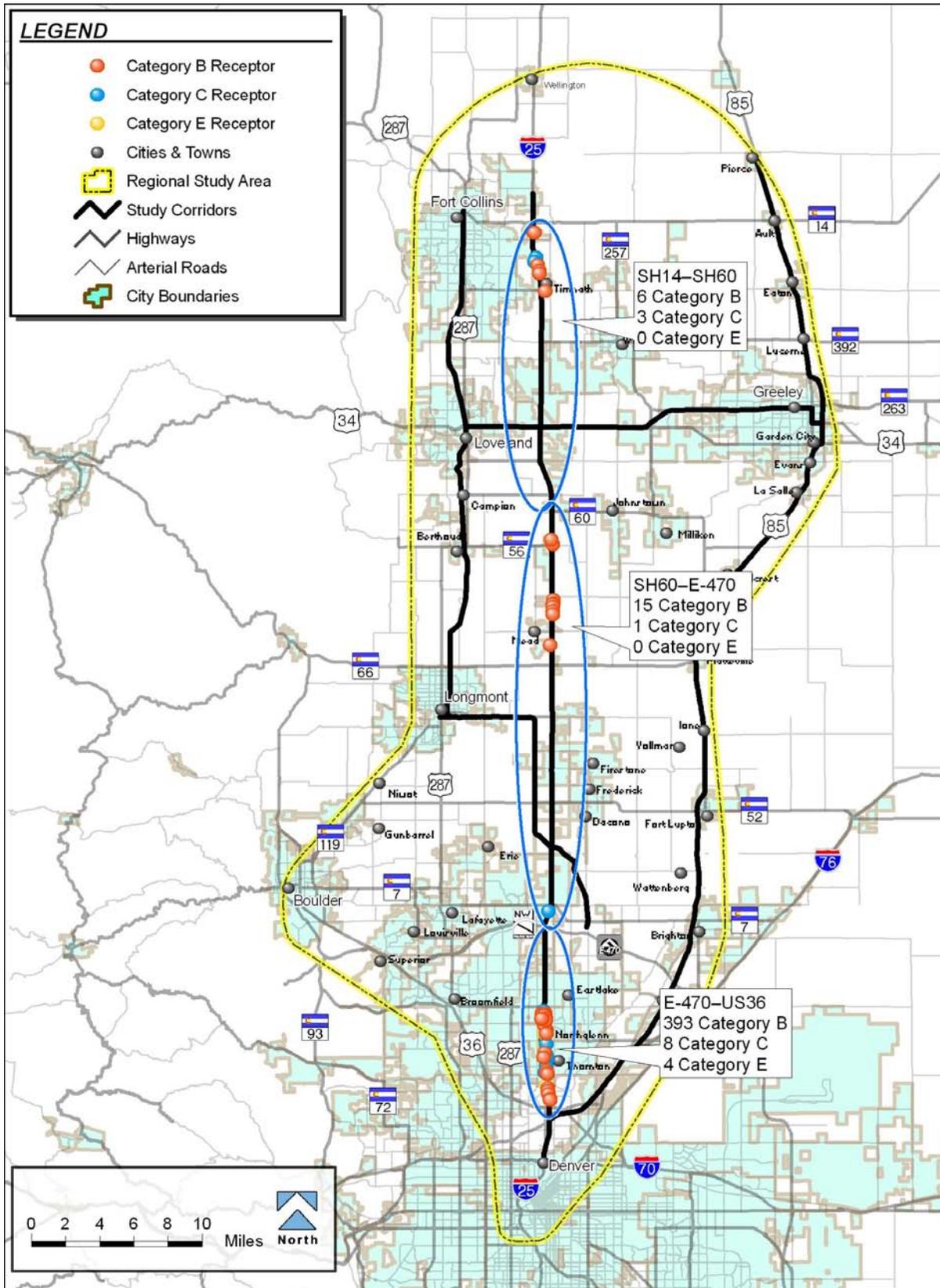
There are several existing noise barriers along I-25, primarily south of 120th Avenue, that were constructed previously by other projects to mitigate traffic noise. Any of these existing noise barriers that must be demolished to construct Phase 1 will be replaced with new noise barriers (CDOT/FHWA, 2008) to preserve the previous abatement actions. In addition, CDOT committed in the Final EIS to replacing the remaining old wooden noise barriers along I-25 in the study area with a more durable material, even if those walls would not need to be removed by Phase 1 construction (CDOT/FHWA, 2011). Note that these actions are not abatement actions for Phase 1; rather they are replacement and/or maintenance of existing infrastructure.

Traffic data for 2005 were used for the TNM modeling for existing conditions to maintain consistency with the Draft EIS and Final EIS. The TNM model points were adjusted for the follow-up analysis to reflect current (2011) conditions and regulatory requirements. As a result, approximately 350 points in the Phase 1 construction areas (**Figure 1-2**) were modeled for traffic noise (**Appendix A**).

The TNM result for existing conditions for each model point is presented in **Appendix A**. Modeled points that represent 430 receptors were calculated to have existing traffic noise levels at or above the respective NAC during the afternoon peak hour. (Note: the “substantial noise increase” criterion does not apply to existing conditions.) Of these, 414 are Category B (residences), 12 are Category C and four are Category E. The impacted locations are summarized in **Figure 2-1**.

I-25 traffic is the predominant noise source for the highway corridor. The distance from I-25 to the locations where traffic noise levels reach the CDOT NACs varies along the length of the 60-mile-long I-25 project corridor, mostly dependent on the terrain and I-25 traffic volumes. Generally, receptors within approximately 350 feet of I-25 have a peak hour L_{eq} of at least 66 dBA and those within approximately 200 feet of I-25 are at least 71 dBA, based on the 2005 traffic data.

Figure 2-1 Impacted Receptors from Existing Conditions Traffic Noise Model



Map Document (2_1_RODExist_Impacted_Receivers_0x11.mxd) 01/2011

3.0 ENVIRONMENTAL CONSEQUENCES

To summarize the follow-up noise analysis, 2035 traffic noise levels in the areas associated with the Phase 1 improvements were evaluated through TNM modeling. Impacts from traffic noise were assessed on the basis of the predicted noise levels' relationship to the CDOT NAC (**Table 1-1**) and the magnitude of the predicted traffic noise level change from existing conditions (**Section 1.2**). If a receptor was predicted to be impacted by traffic noise, noise abatement measures were evaluated (**Section 4.0**).

Updated traffic noise models were developed using TNM as described in **Section 1.2** for Phase 1. The models included representative points and major project roads in the Phase 1 construction areas using 2035 traffic volumes and road layouts reflecting the proposed Phase 1 improvements. Refinements and updates to the previous EIS model points were incorporated to reflect any changed conditions in the corridor and meet the requirements under the new noise regulations (CDOT, 2011).

3.1 SUMMARY OF TRAFFIC NOISE IMPACTS

Noise impact results for Phase 1 are summarized in **Table 3-1** and **Figure 3-1**. Detailed noise level results are presented in **Appendix A**.

Table 3-1 Summary of Phase 1 Traffic Noise Impacts

I-25 Segment	Number of Impacted Receptors for Land Use Categories B / C / E		
	Existing (2005)	No-Action (2035)	Phase 1 (2035)
SH 14 to SH 60	6 / 3 / 0	9 / 3 / 1	8 / 4 / 1
SH 60 to E-470	15 / 1 / 0	19 / 2 / 0	19 / 2 / 0
E-470 to US 36	393 / 8 / 4	529 / 8 / 4	558 / 10 / 5
Total	414 / 12 / 4	557 / 13 / 5	585 / 16 / 6

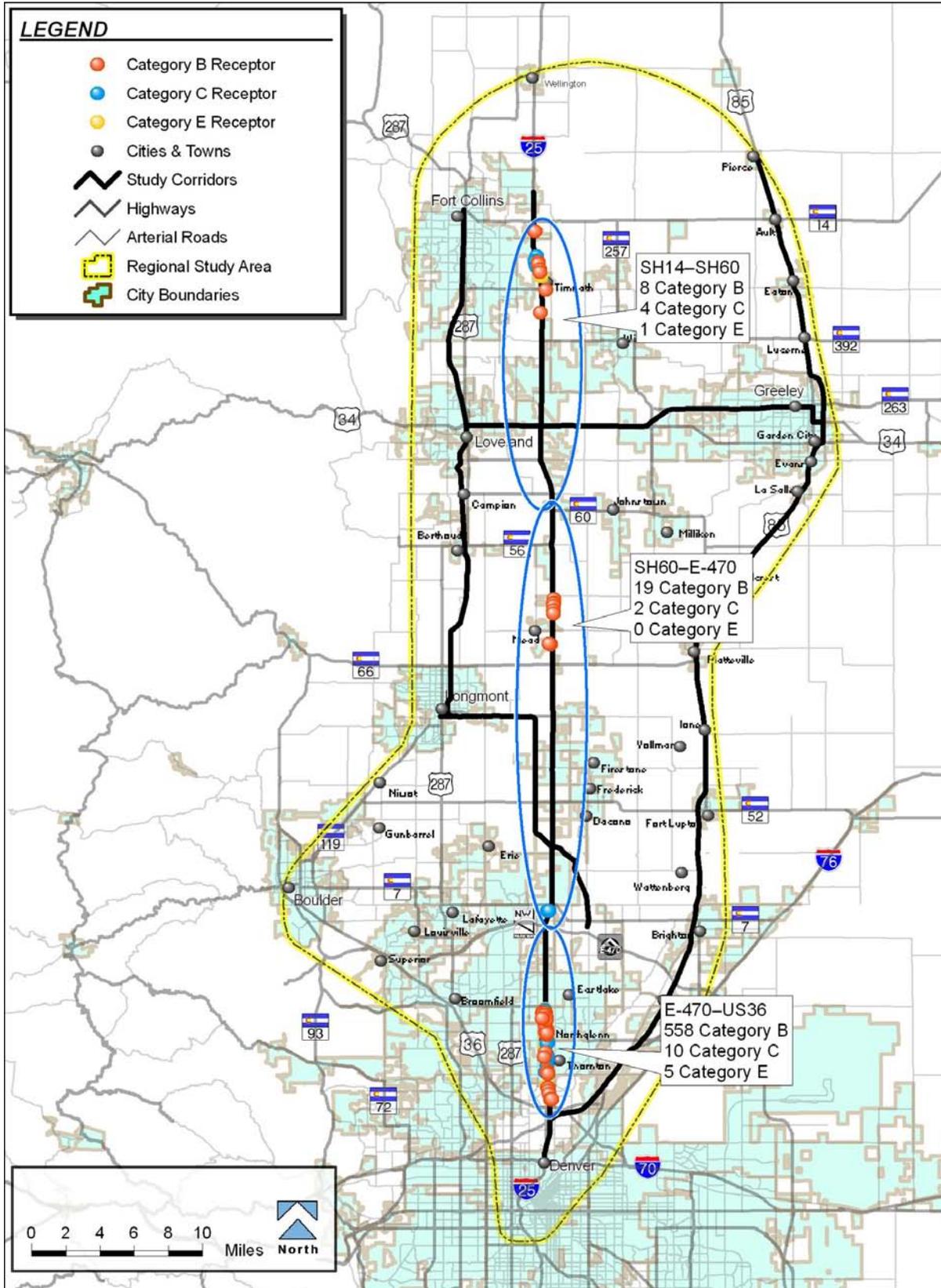
Modeled points that represented 607 discrete receptors were calculated to have 2035 traffic noise levels above the respective NAC during the afternoon peak hour. Of these, 585 were Category B properties, 16 were Category C and six were Category E. All of the impacted receptors were predicted to equal or exceed the relevant NAC; none were predicted to increase by 10 dBA or more over existing conditions. The residential areas (Category B) predicted to be impacted (**Table 3-2**) were:

- ▶ North of 120th Avenue (Larimer and Weld Counties), no major neighborhoods are impacted; only isolated/dispersed homes along I-25 – 27 receptors
- ▶ Numerous large neighborhoods abutting I-25 in CDOT Region 6 (Broomfield, Thornton, Westminster, Northglenn and Adams County) – 558 receptors

Impacted Category C receptors included Archery Range Natural Area, Arapahoe Bend Natural Area, Evergreen Cemetery, Northglenn Recreation Center, Highland Memorial Gardens, North Suburban Medical Center, Niver Creek Open Space and Civic Center Park.

The impacted Category E receptors consisted of various motels, office buildings and restaurants.

Figure 3-1 Impacted Receptors for Phase 1 (2035)



Map Document (3_1_ROOPI_Impacted_Receivers_6x11.mxd)
01/2011

Table 3-2 Description of 2035 Traffic Noise Impacts for Phase 1 Locations

Phase 1 Segment	Noise-Impacted Receptors		
	Category B	Category C	Category E
I-25—SH14 to SH392	10 dispersed rural residences	4 churches and parks	1 office building
I-25/US 34 Interchange	None	None	None
I-25—SH56 to SH66	13 dispersed rural residences	None	None
I-25/SH7 Interchange	None	2 cemetery receptors	None
I-25—120th Ave. to 104th Ave.	367 residences (Huron Heights, Huron Crossing, Stone Mtn. Apts., Greens of Northglenn, Webster Lake Terrace, Reserve at Northglenn, Northglenn)	2 parks	3 motels, offices and restaurants
I-25—104th Ave. to Thornton Pkwy.	13 residences (Knox, Northglenn)	6 cemetery and park receptors	1 office/college
I-25—Thornton Pkwy. to 84th Ave.	92 residences (Summit at Thornton)	2 parks and hospitals	None
I-25—84th Ave. to US 36	90 residences (Sherrelwood Estates, Brittany Ridge)	None	1 motel
Total Impacts	585	16	6

3.2 CONSTRUCTION NOISE

Adjoining properties in the project area would be exposed to noise from construction activities when Phase 1 is built. Construction noise differs from traffic noise in several ways:

- ▶ Construction noise lasts only for the duration of the construction event, with most construction activities in noise-sensitive areas being conducted during (daytime) hours that are less disturbing to adjacent and nearby residents;
- ▶ Construction activities generally are short-term, and depending on the nature of the construction operations, could last from seconds (e.g., a truck passing by) to months (e.g., constructing a bridge); and
- ▶ Construction noise also is intermittent and depends on the type of operation, location, and function of the equipment, and the equipment usage cycle. Traffic noise, on the other hand, is present in a more continuous fashion after construction activities are completed.

To address the temporary elevated noise levels that may be experienced during construction, standard abatement measures should be incorporated into construction contracts. These would include:

- ▶ Exhaust systems on equipment will be in good working order. Equipment will be maintained on a regular basis, and equipment may be subject to inspection by the project manager to ensure maintenance.

- ▶ Properly designed engine enclosures and intake silencers will be used where appropriate.
- ▶ New equipment will be subject to new product noise emission standards.
- ▶ Stationary equipment will be located as far from sensitive receptors as feasible.
- ▶ Most construction activities in noise sensitive areas will be conducted during hours that are less disturbing (daytime) to adjacent and nearby residents.

Construction noise from future project activities must comply with any applicable local noise regulations. Construction noise that complies with such noise regulations is viewed as not having an impact on neighboring properties. When construction is imminent, potential conflicts due to construction noise can be better determined. Individualized construction noise abatement strategies, where needed, will be developed to address specific construction noise issues.

4.0 ABATEMENT EVALUATION

Abatement evaluations for Phase 1 were performed for the follow-up analyses because areas in the construction corridors were predicted to be above the applicable CDOT NAC (**Table 3.2**). This includes multiple geographic areas and multiple land uses.

Impacted areas are not guaranteed abatement measures under CDOT's policies, but abatement measures need to be evaluated. Typically, noise barriers are the primary abatement action evaluated but other kinds of abatement were also considered. For reasons described below, barriers appeared to be the only viable abatement action and were the only abatement evaluated in detail. CDOT's minimum feasible noise reduction from abatement is 5 dBA while the design goal is a reduction of at least 7 dBA.

Previous noise abatement evaluations for the full Preferred Alternative were presented in the Final EIS (CDOT/FHWA, 2011) but were performed under the 2002 CDOT guidelines. The Phase 1 follow-up evaluation followed the 2011 CDOT guidelines and the abatement evaluation requirements are substantively different.

Numerous locations were evaluated for barrier placement (**Appendix B**). For each evaluation, hypothetical barriers protecting the impacted areas were added to the Phase 1 TNM model and the model was re-run to assess and optimize barrier effectiveness. After the minimum parameters for a feasible barrier were established in a given area (if possible), each barrier was optimized and assessed for reasonability (**Appendix C**) according to CDOT's 2011 guidance. The overall feasibility and reasonableness of each barrier determined whether the barrier was then recommended for construction.

The topography of the project corridor plays a very important role in the overall noise environment. Any significant topographic changes between I-25 and the adjoining areas will affect the traffic noise levels and also has a major impact on the constructability of noise barriers. Barriers can easily be put into a computer model, but actually placing these barriers in the real world may not always be possible. Because of topographic changes, a barrier may not be a constant height throughout its length even if the top elevation may be constant. These factors contribute to complication of the barrier evaluations.

4.1 NON-BARRIER ABATEMENT EVALUATION

These items were discussed in the previous technical report (FHU, 2008) and Final EIS (CDOT/FHWA, 2011). The previous conclusions still hold true—these kinds of abatement measures do not appear to be feasible and reasonable for I-25 and the study corridor. Therefore, non-barrier abatement measures are not recommended or discussed further.

4.2 REPLACEMENT OF EXISTING BARRIERS

Several noise abatement barriers already exist along I-25 between 120th Avenue and US 36 through actions taken under previous projects. Any of these barriers that must be demolished to construct Phase 1 will be replaced with appropriately sized and placed barriers to achieve the necessary noise reductions. In addition, any remaining CDOT wood noise barriers in the Phase 1 project corridors will be replaced with more durable materials in appropriately sized and located barriers as a long-term maintenance action.

Straightforward replacement of existing barriers will be preservation of abatement measures from previous projects and will not be mitigation under Phase 1. Therefore, these actions were not subject to feasibility and reasonableness considerations. The ultimate sizing, location and materials for these barriers will be addressed during final design and are not considered further for this follow-up analysis. The residential areas that may be affected by this include:

- ▶ Huron Heights
- ▶ Huron Crossing
- ▶ Northglenn
- ▶ Summit at Thornton
- ▶ Sherrelwood Estates
- ▶ Northview Estates
- ▶ Valley Hi
- ▶ Metro View Park
- ▶ Brittany Ridge

Note that extension of two of these existing noise barriers was considered as abatement for several noise impacts (**Section 4.3**) and to protect the remainder of some neighborhoods with incomplete barrier coverage. In these cases, feasibility and reasonableness of the entire barrier were evaluated.

4.3 REVIEW OF ABATEMENT RECOMMENDATIONS

For a traffic noise abatement action to be recommended for inclusion in a project, the abatement must be found to be both feasible and reasonable according to CDOT's guidelines (CDOT, 2011). In general terms, a barrier must be buildable and provide a substantial noise reduction to impacted receptors while also meeting the cost/benefit criterion (\$6,800/receptor/dBA). When these conditions are met, an abatement action can be recommended. Final decisions on barrier size, placement, feasibility, reasonableness and materials will be made during final design.

The traffic noise impacts described above were similar to those previously reported for the Draft EIS and the Final EIS. The same locations were calculated to be impacted, although the specifics have changed due to the new guidelines. Not surprisingly, the recommended traffic noise abatements described below are similar as well.

Several noise barriers were evaluated for the follow-up analysis; some of which were recommended for construction. The barriers evaluated were:

- ▶ Singletree Estates (Mead)
- ▶ Stone Mountain Apartments (Northglenn)
- ▶ Greens of Northglenn (Northglenn)
- ▶ Extension of Northglenn barrier (near Badding Reservoir)
- ▶ Extension of Brittany Ridge barrier (Adams County)
- ▶ Various isolated receptors throughout Phase 1 areas (Categories B, C and E)

The findings for the Phase 1 barriers are presented in **Table 4-1**. Note that barriers for several isolated receptors were examined. These were example barriers that were intended to also represent other isolated receptors such that every impacted isolated receptor was

not evaluated separately. Barriers are rarely recommended for isolated receptors because the cost/benefit criterion usually cannot be met, which is supported by the findings in **Table 4-1**.

Table 4-1 Phase 1 Traffic Noise Abatement Barrier Summary

Noise Impacted Category B, C or E Area	Barrier Height (feet)	Barrier Length (feet)	Cost Analysis (\$/receptor/dB)	Reduction (dBA)	Feasible?	Reasonable?	Recommended?	Comment
SH 14 to SH 60								
Example isolated receptor–Mulberry	12	250	17,000	8	Yes	No	No	Cost-benefit was calculated to be prohibitive.
Example isolated receptor–Harmony	12	1,100	82,000	7	Yes	No	No	Cost-benefit was calculated to be prohibitive.
SH 60 to E-470								
Example isolated receptors–WCR 38	12-16	1,400	72,000	6-7	Yes	No	No	Cost-benefit was calculated to be prohibitive.
Singletree Estates	19	3,200	54,000	7	Yes	No	No	Cost-benefit was calculated to be prohibitive.
Evergreen Cemetery	14	1,400	59,000	5-10	Yes	No	No	Cost-benefit was calculated to be prohibitive.
E-470 to US 36								
Northglenn Rec. Center	16	1,070	59,200	6-7	Yes	No	No	Cost-benefit was calculated to be prohibitive.
Stone Mountain Apts.	14	1,300	1,900	5-10	Yes	Yes	Yes	Recommended for Phase 1. New barrier.
Boondocks	10	970	15,600	7	Yes	No	No	Cost-benefit was calculated to be prohibitive.
Greens of Northglenn	12	600	1,900	8	Yes	Yes	Yes	Recommended for Phase 1. New barrier.
Highland Memorial Gardens	12	1,380	105,000	7	Yes	No	No	Cost-benefit was calculated to be prohibitive.
Northglenn and Badding Reservoir extension	11-13	2,600	6,100	8-12	Yes	Yes	Yes	Recommended for Phase 1. Covers rest of neighborhood.
Civic Center Park	12	2,400	61,000	5-10	Yes	No	No	Cost-benefit was calculated to be prohibitive.
North Suburban Medical Center	12	840	65,000	7	Yes	No	No	Cost-benefit was calculated to be prohibitive.
Niver Creek Open Space	20	1,400	180,000	7	Yes	No	No	Cost-benefit was calculated to be prohibitive.
Brittany Ridge and extension	11-14	4,700	3,300	5-10	Yes	Yes	Yes	Recommended for Phase 1. Covers rest of neighborhood.

Based on these results, the following new barriers are recommended for construction in Phase 1 (**Figure 4-1**; **Appendix C**):

- ▶ Stone Mountain apartments
- ▶ Greens of Northglenn apartments
- ▶ Northglenn with Badding Reservoir extension
- ▶ Brittany Ridge barrier extension

4.4 IMPACTED RECEPTORS AFTER RECOMMENDED ABATEMENT

For a noise abatement action to be recommended, it must be both feasible and reasonable according to the evaluation guidelines. In many of the areas with traffic noise impacts, effective noise barriers were not feasible or the cost-benefit value for an effective barrier was prohibitive (**Table 4-1**). Therefore, not all impacted areas have been recommended for noise abatement.

Overall, the recommended abatement actions would serve to reduce traffic noise impacts along I-25; however, the recommended abatement actions would not eliminate all of the calculated noise impacts. The recommended abatement measures for Phase 1 would reduce the traffic noise levels below the NAC for these receptors:

- ▶ Stone Mountain Apartments – 71 Category B receptors
- ▶ Greens of Northglenn – 19 Category B receptors
- ▶ Northglenn extension – 7 Category B receptors
- ▶ Brittany Ridge extension – 25 Category B receptors

With these barriers, an estimated 463 Category B receptors, 16 Category C receptors and 6 Category E receptors would still be impacted by traffic noise.

4.5 STATEMENT OF LIKELIHOOD

The items needed for the Statement of Likelihood (CDOT, 2011) have already been covered elsewhere in this document but are reiterated here for convenience. The locations where noise impacts are predicted to occur are presented in **Section 3.1**. The locations with feasible and reasonable noise abatement actions are presented in **Table 4-1**. The locations without feasible and reasonable noise abatement solutions would be all of the other Phase 1 impacted receptors (**Table 3-2** and **Appendix A**). The recommended abatement actions are described in **Section 4.3** and **Table 4-1**. The preliminary CDOT 1209 forms are presented in **Appendix C**.

5.0 VIBRATION

There are no federal or state requirements directed specifically to traffic-induced vibration. The studies that have been done to assess the impact of operational traffic-induced vibrations have shown that both measured and predicted traffic vibration levels are less than any known criteria for structural damage to buildings (FHWA, 1995). Often, normal indoor activities like closing doors have been shown to create greater levels of vibration in homes than highway traffic. Therefore, vibration from highway traffic is not a concern for Phase 1.

Vibration from road construction could be a concern, if specific construction techniques such as pile driving or blasting are used. Issues with construction-generated vibrations would depend on these types of activities occurring close to vibration-sensitive locations. At present, it is not expected that these types of construction techniques would be necessary for Phase 1, let alone occurring near sensitive properties. But, if such construction techniques are necessary at a specific location, the vibration concerns will be addressed during construction planning on a case-by-case basis and appropriate abatement action taken for the specific situation. Therefore, vibration from road construction will not be examined further in this analysis.

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6.0 REFERENCES

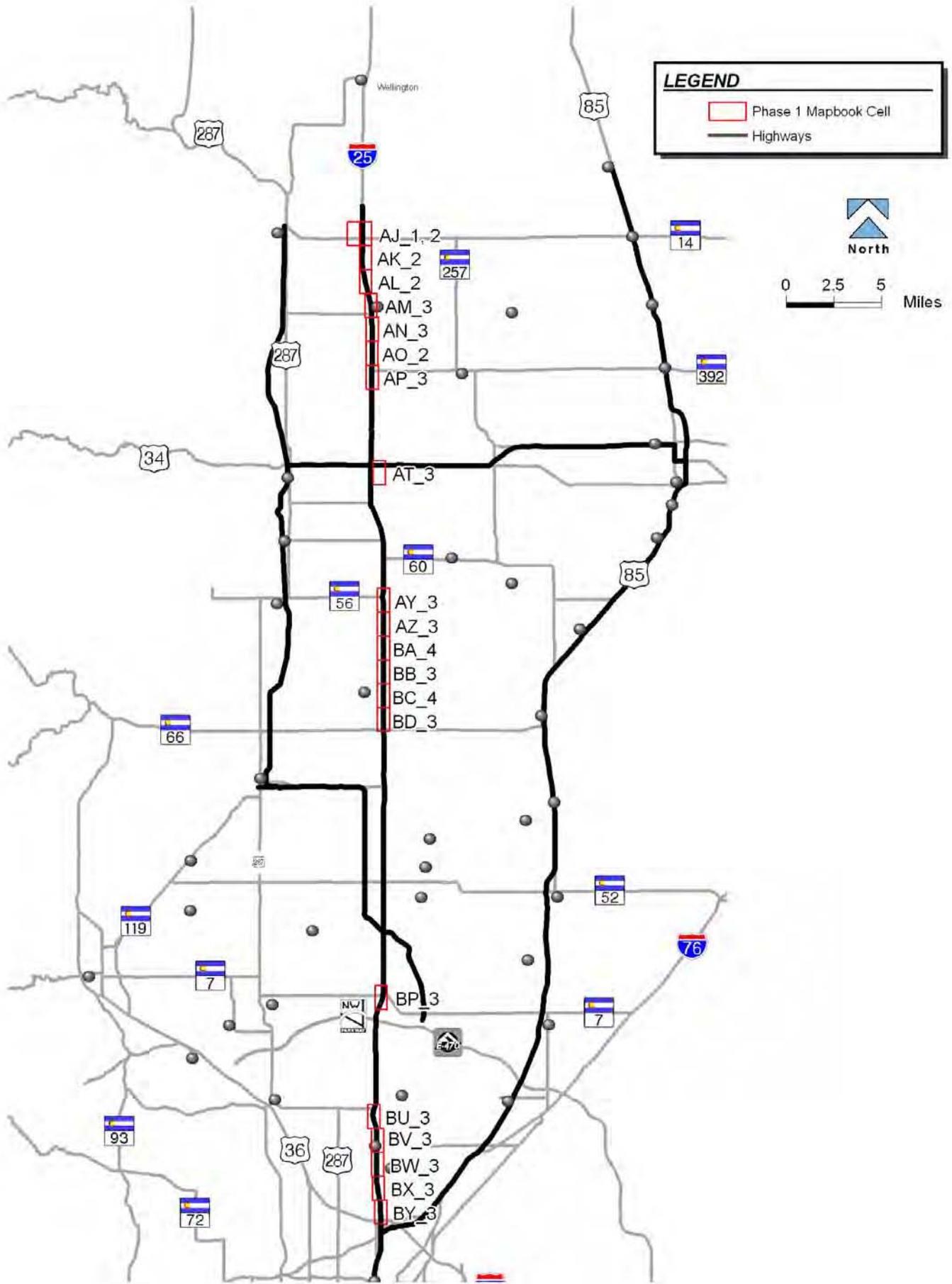
- Colorado Department of Transportation. 2002. Noise Analysis and Abatement Guidelines, December.
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- Felsburg Holt & Ullevig. 2008. North I-25 Environmental Impact Statement Traffic Noise and Vibration Technical Report, October.
- Felsburg Holt & Ullevig. 2011. North I-25 Environmental Impact Statement Traffic Noise and Vibration Impact Assessment Addendum, June.

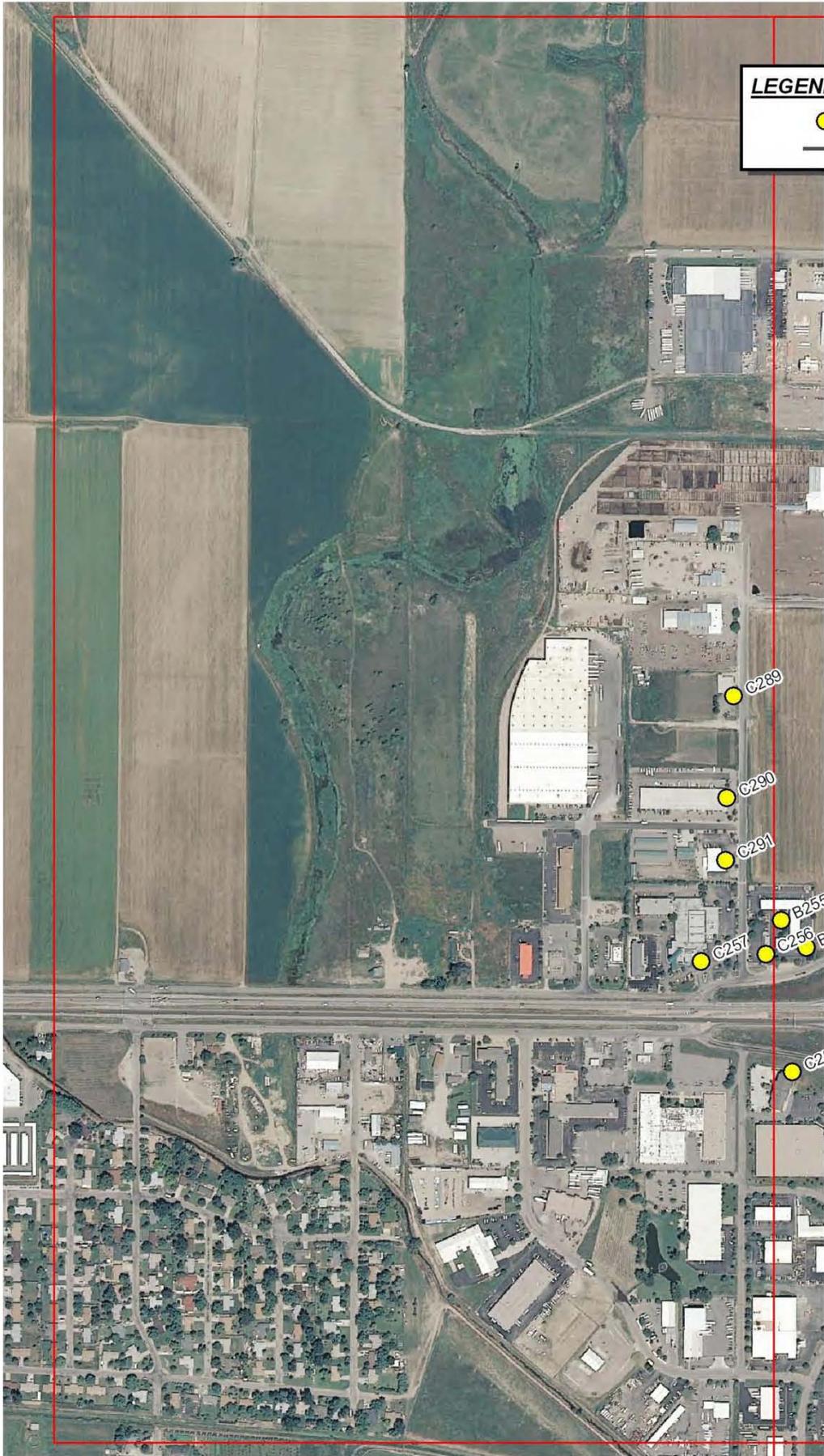
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APPENDIX A

TNM NOISE MODEL RECEIVERS AND RESULTS

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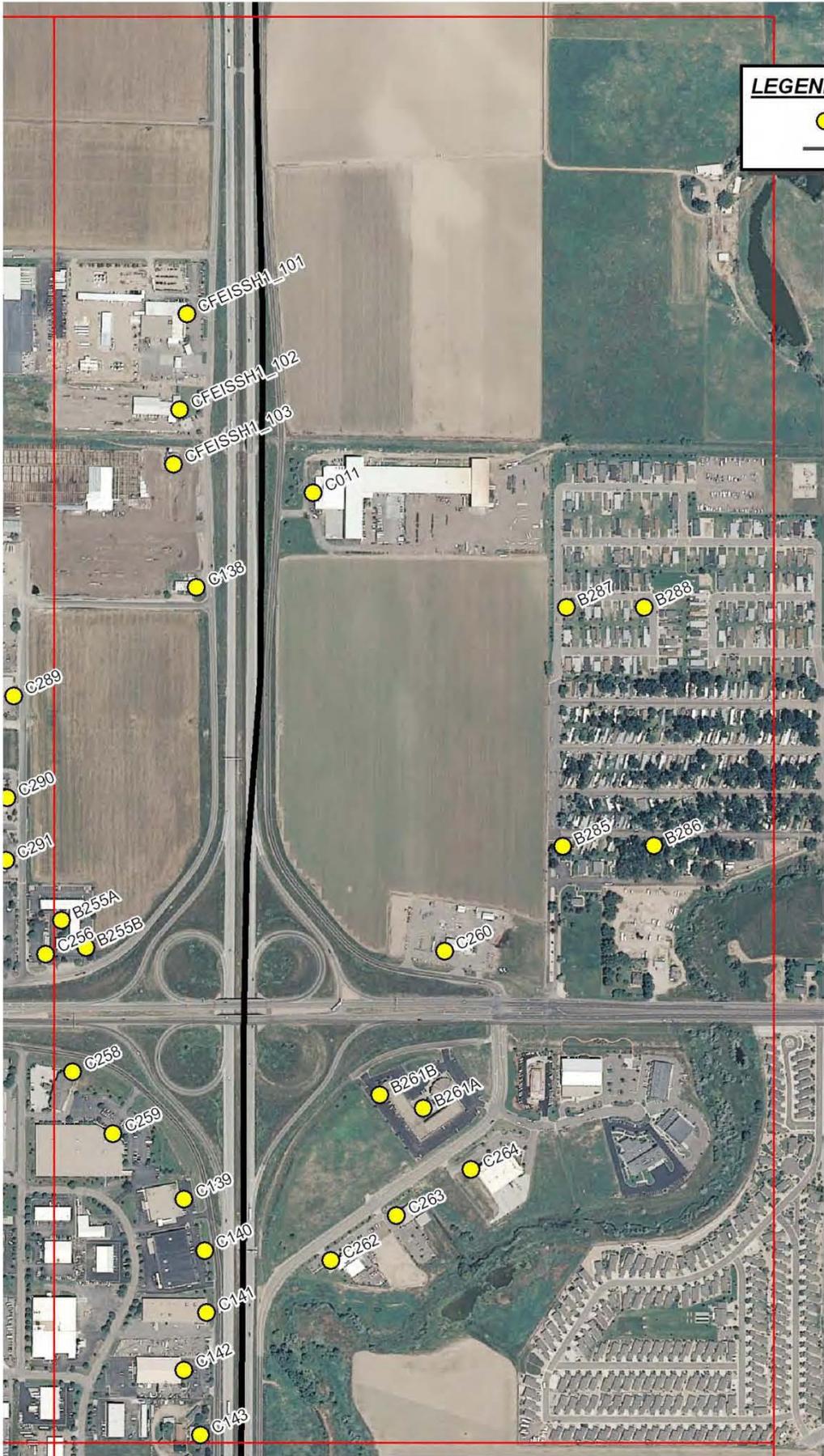
LEGEND

-  Noise Model Receptor
-  Highways



0 250 500 Feet

Mapbook Grid
AJ_1

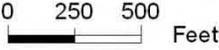


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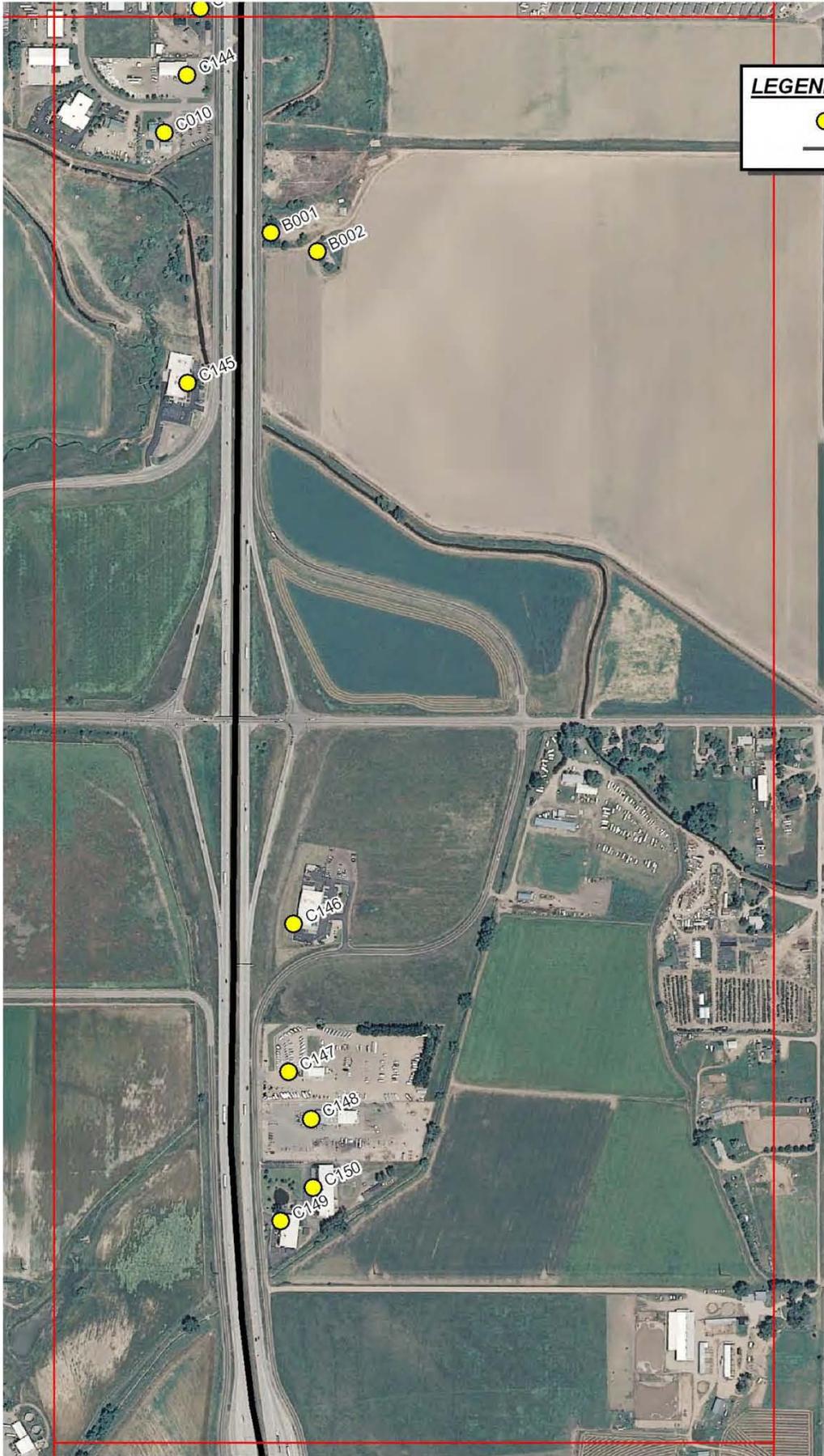
- Noise Model Receptor
- Highways



North



Mapbook Grid
AJ_2

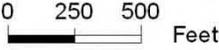


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-  Noise Model Receptor
-  Highways

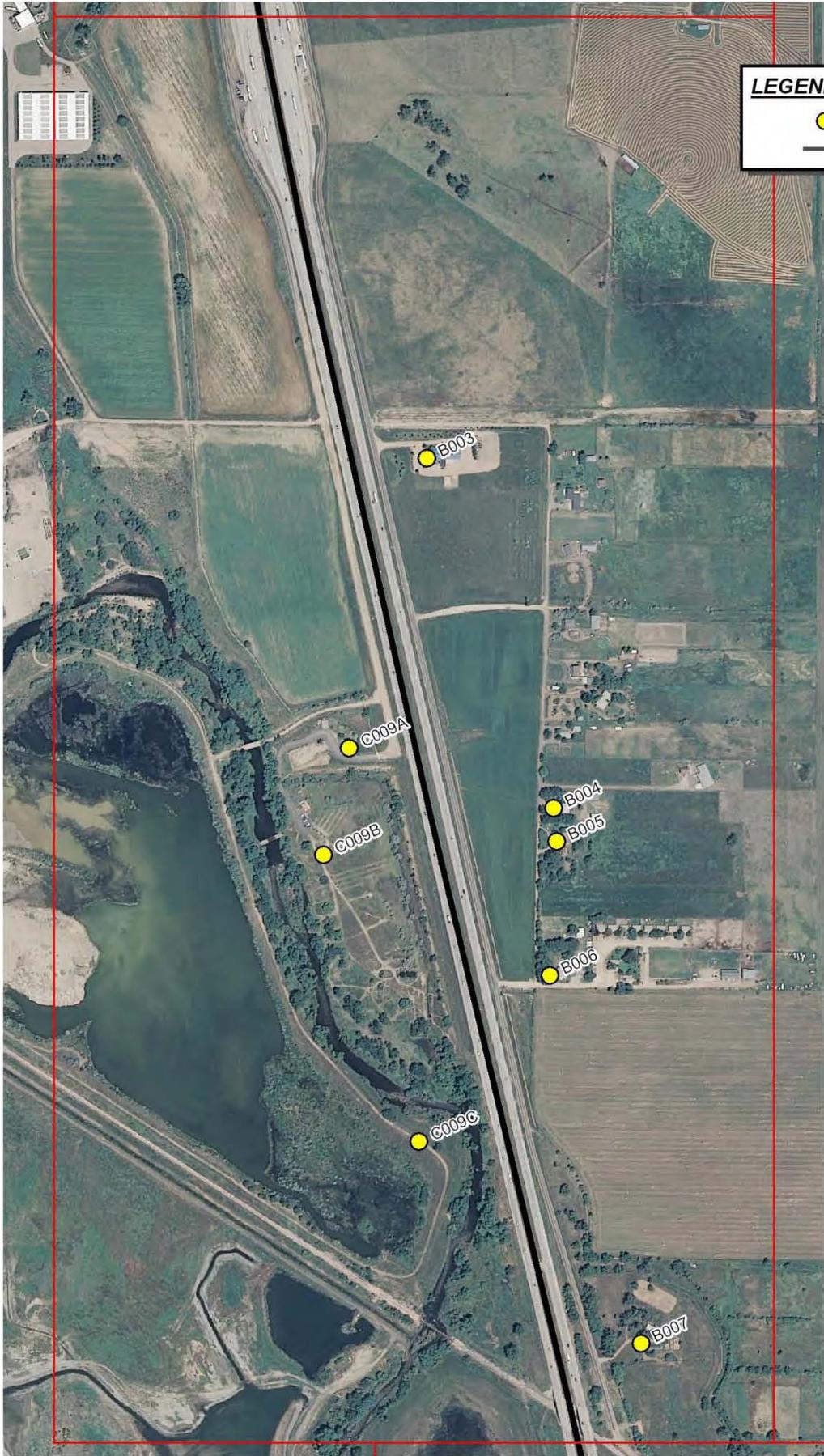


North



0 250 500 Feet

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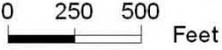


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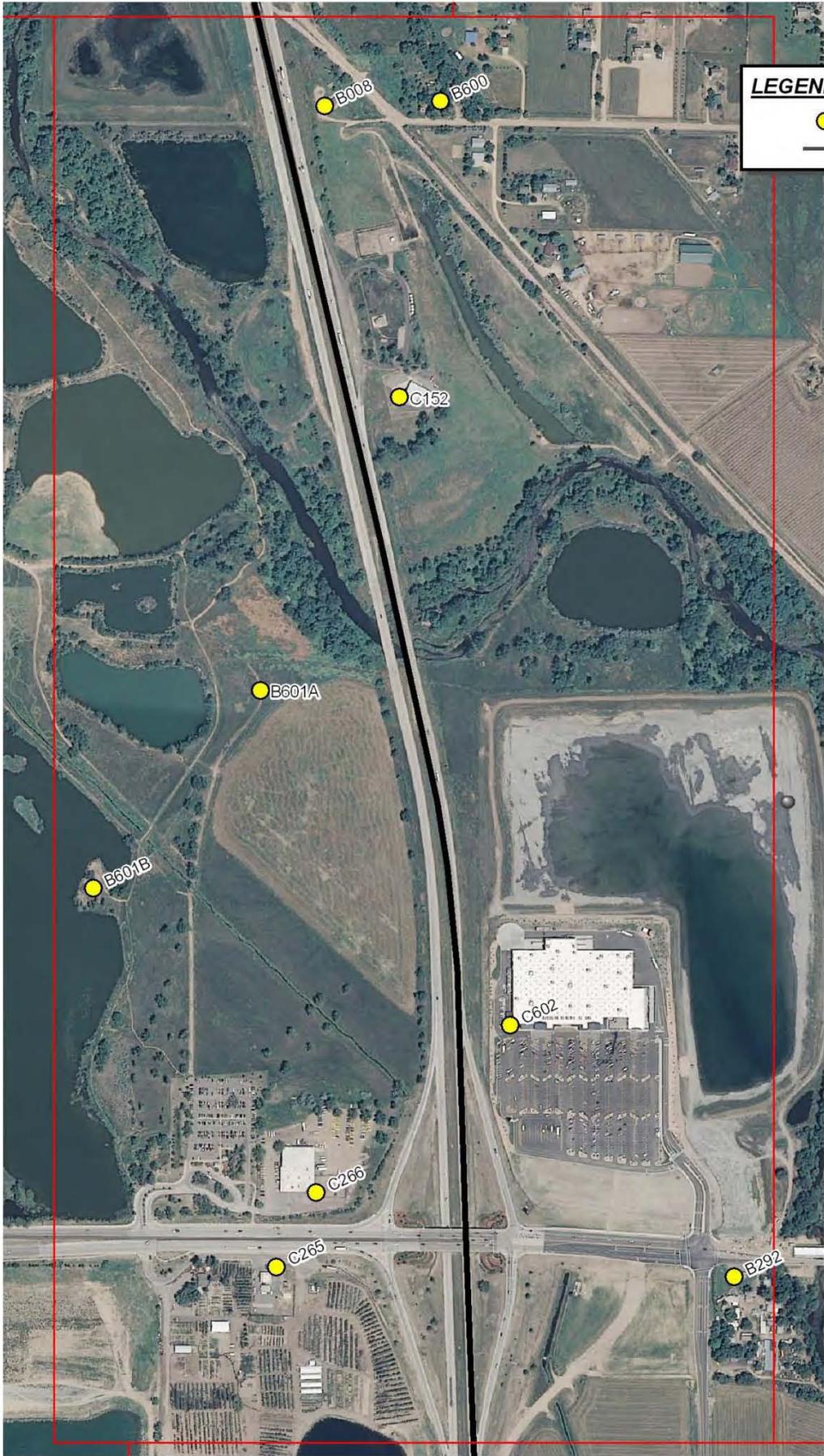
- Noise Model Receptor
- Highways



North



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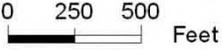


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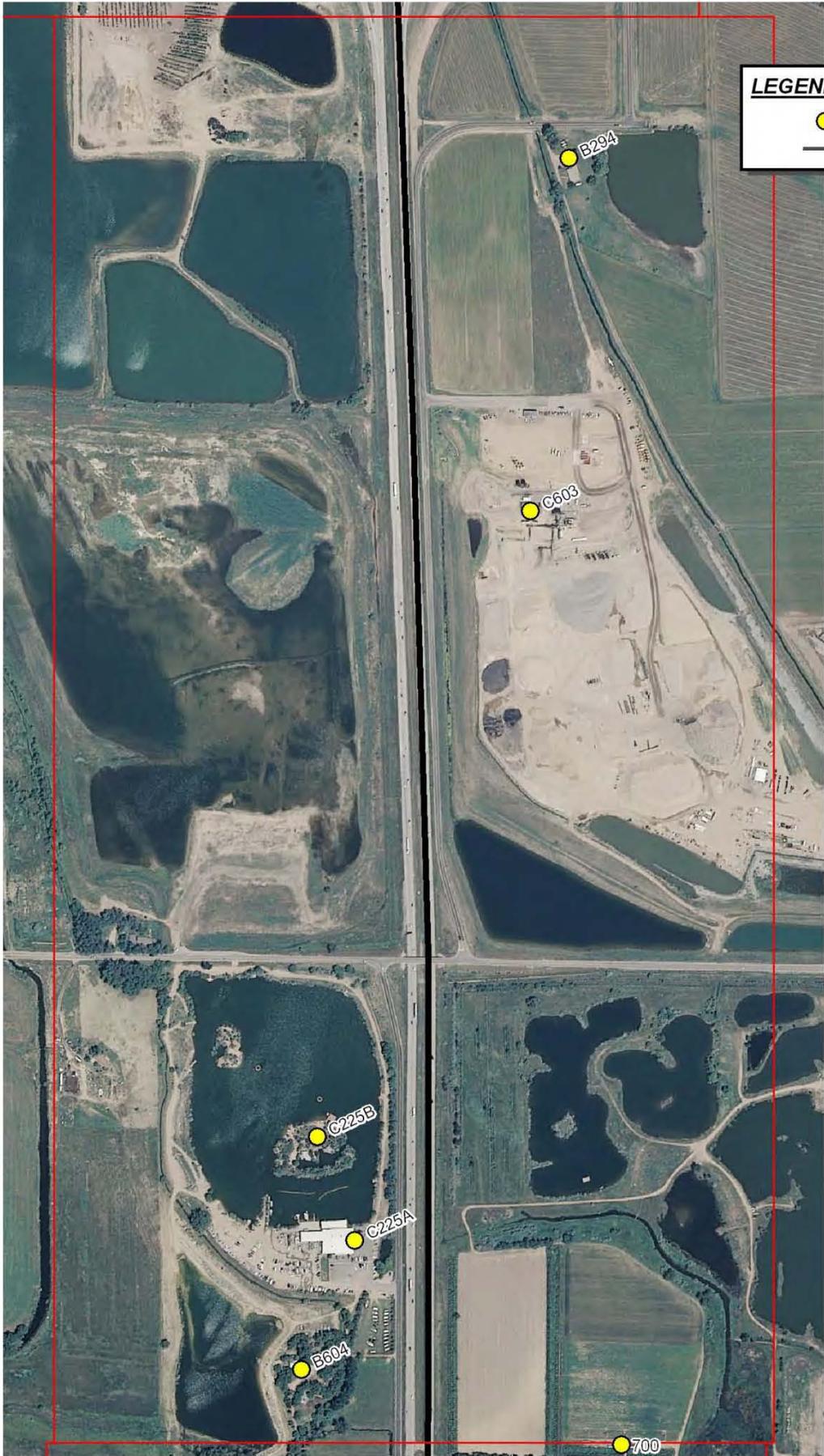
- Noise Model Receptor
- Highways



North



Mapbook Grid
AM_3



LEGEND

- Noise Model Receptor
- Highways



North

0 250 500 Feet

Mapbook Grid
AN_3



Mapbook Grid
AO_2



LEGEND

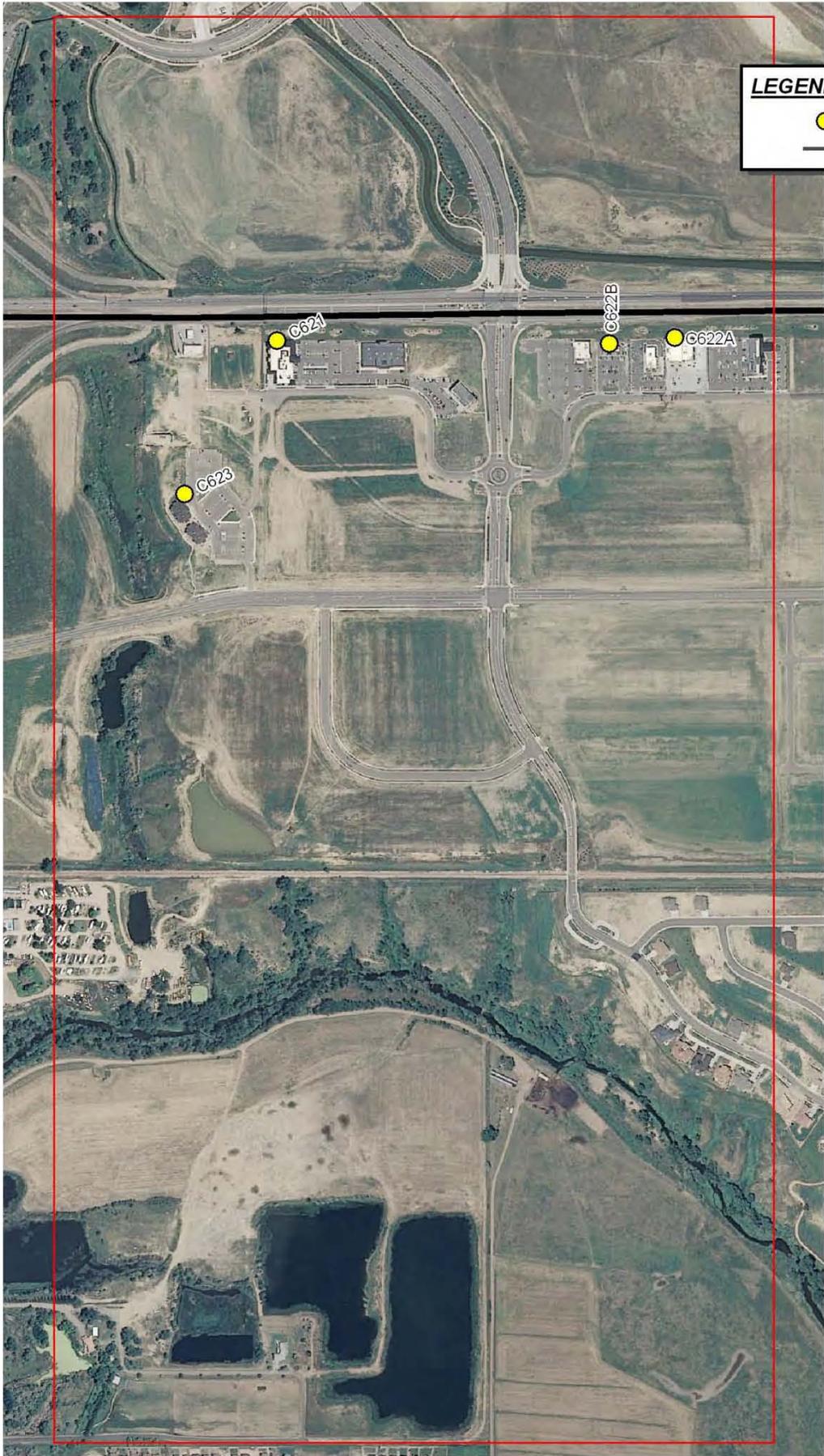
- Noise Model Receptor
- Highways



North

0 250 500 Feet

Mapbook Grid
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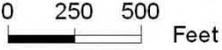


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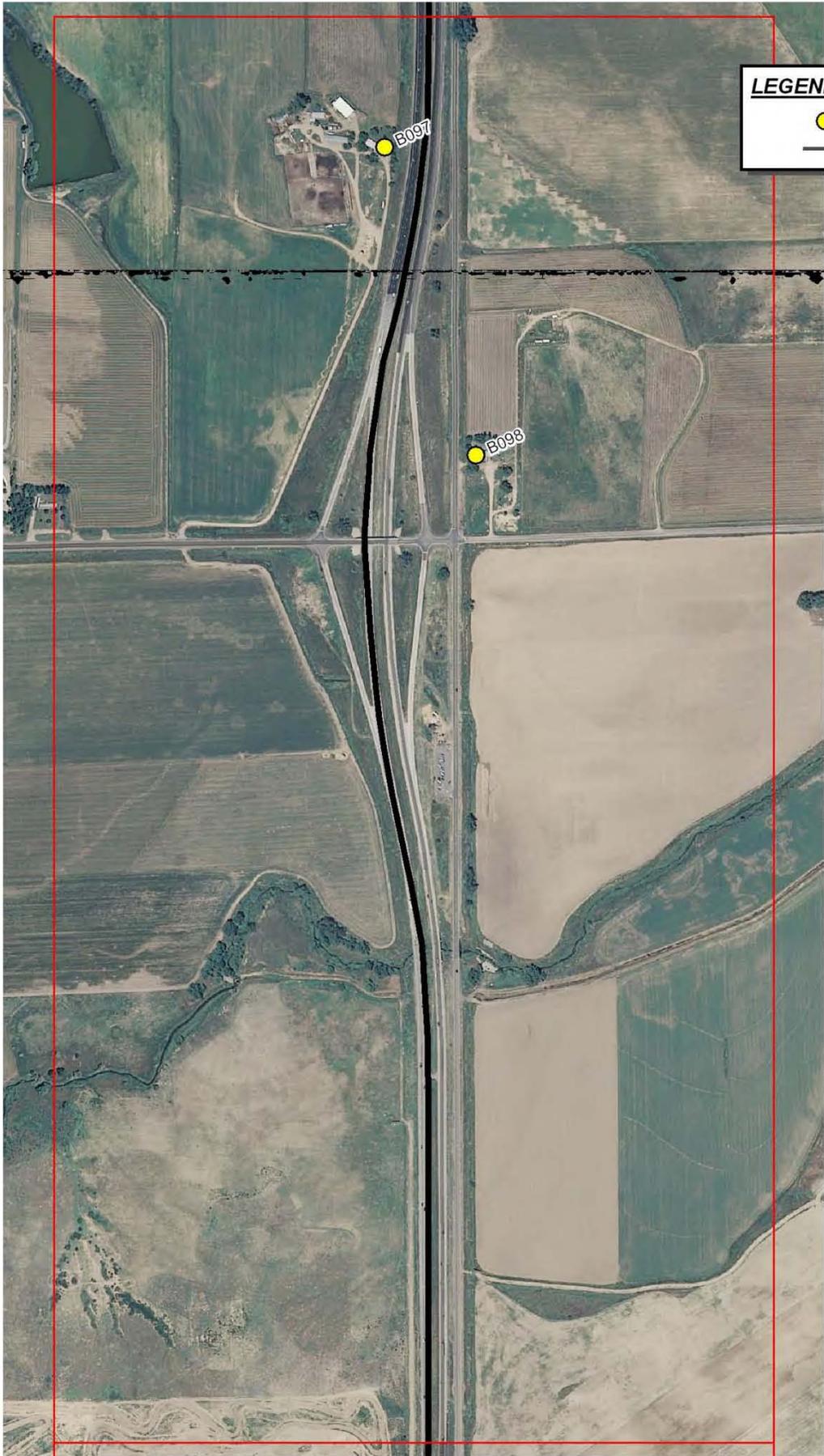
-  Noise Model Receptor
-  Highways



North



Mapbook Grid
AT_3

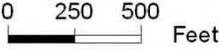


LEGEND

- Noise Model Receptor
- Highways



North

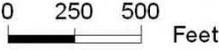


Mapbook Grid
AY_3



LEGEND

-  Noise Model Receptor
-  Highways



Mapbook Grid
AZ_3



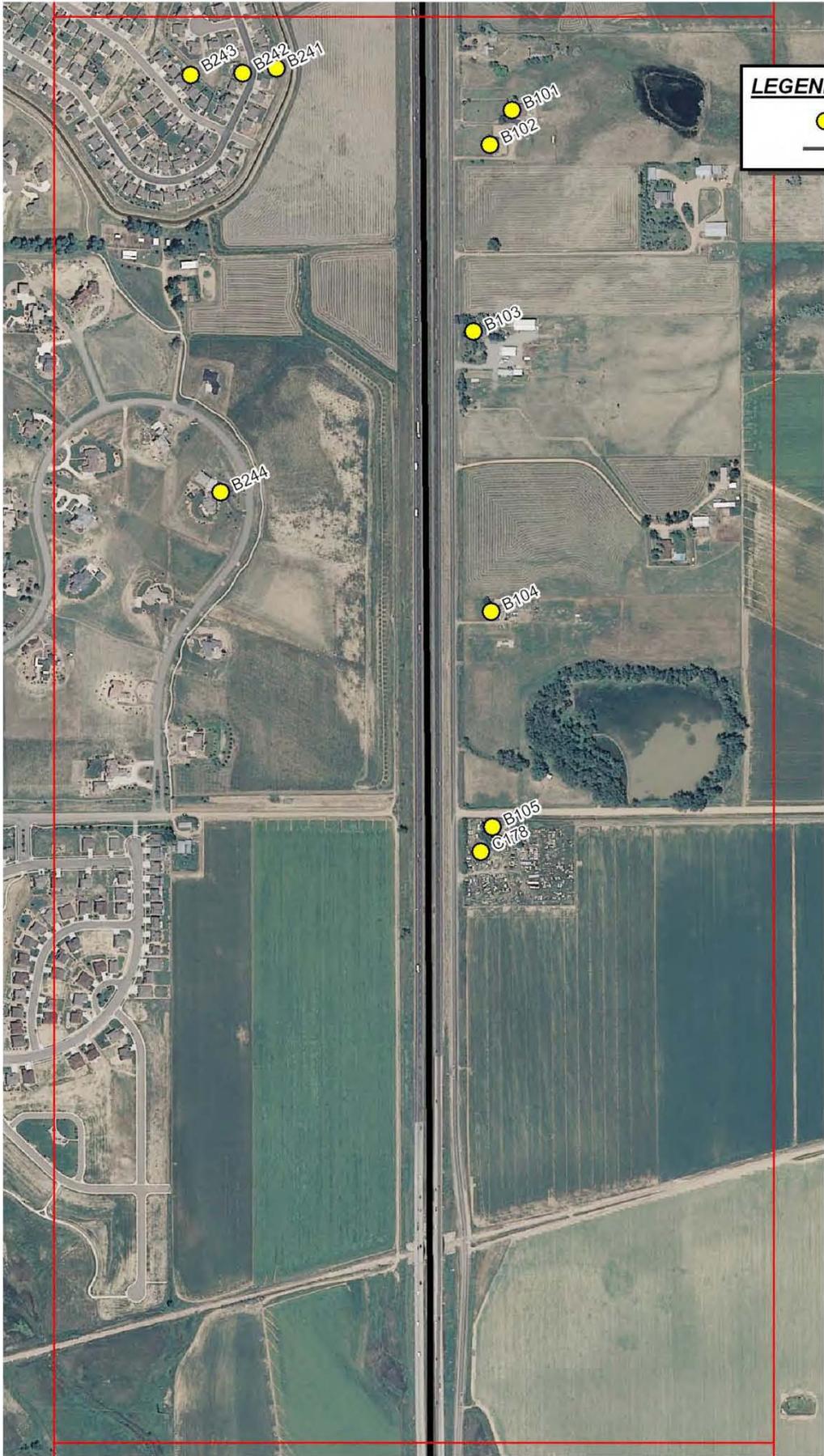
LEGEND

-  Noise Model Receptor
-  Highways



0 250 500 Feet

Mapbook Grid
BA_4

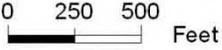


LEGEND

- Noise Model Receptor
- Highways

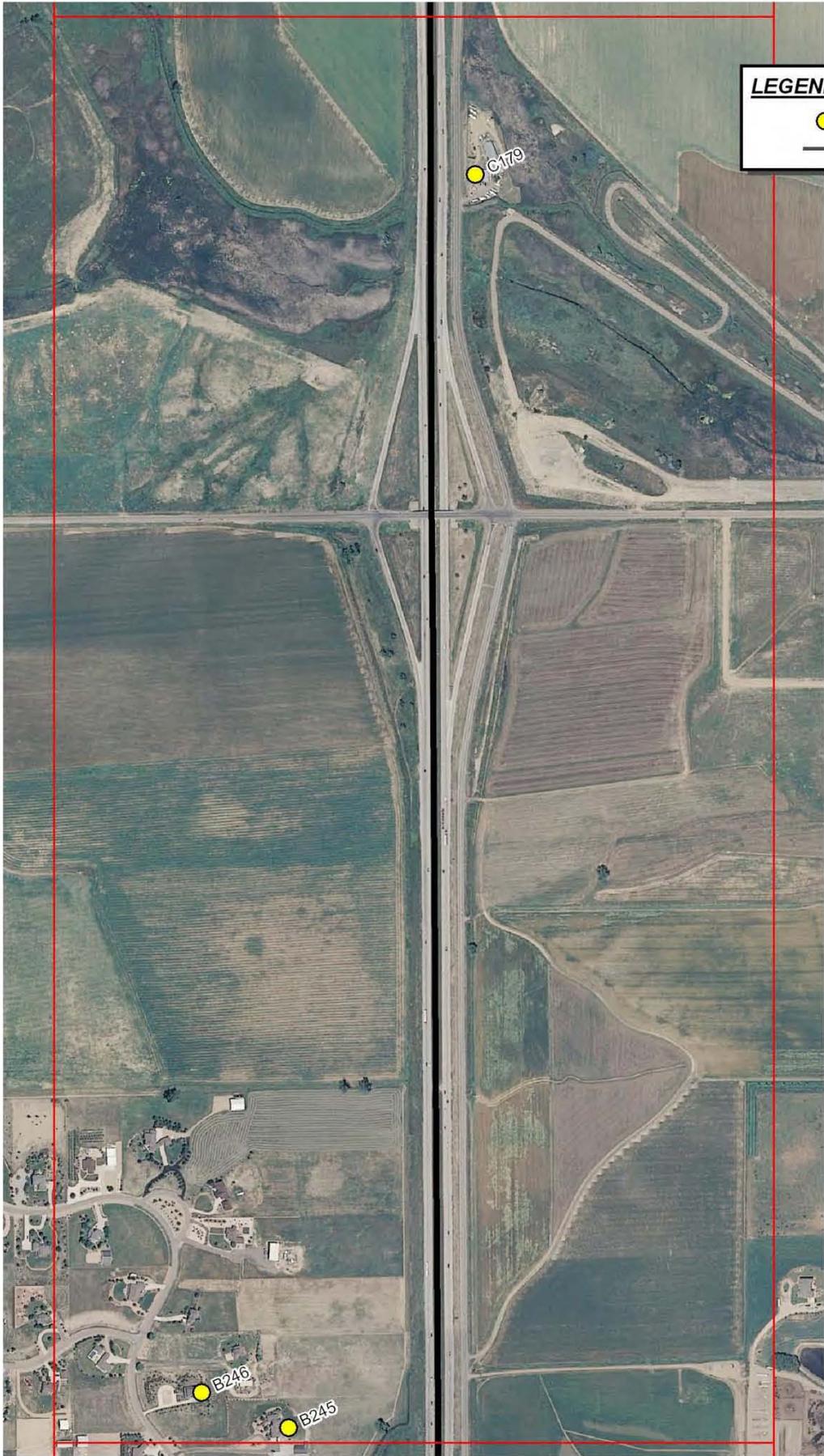


North



0 250 500 Feet

Mapbook Grid
BB_3

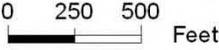


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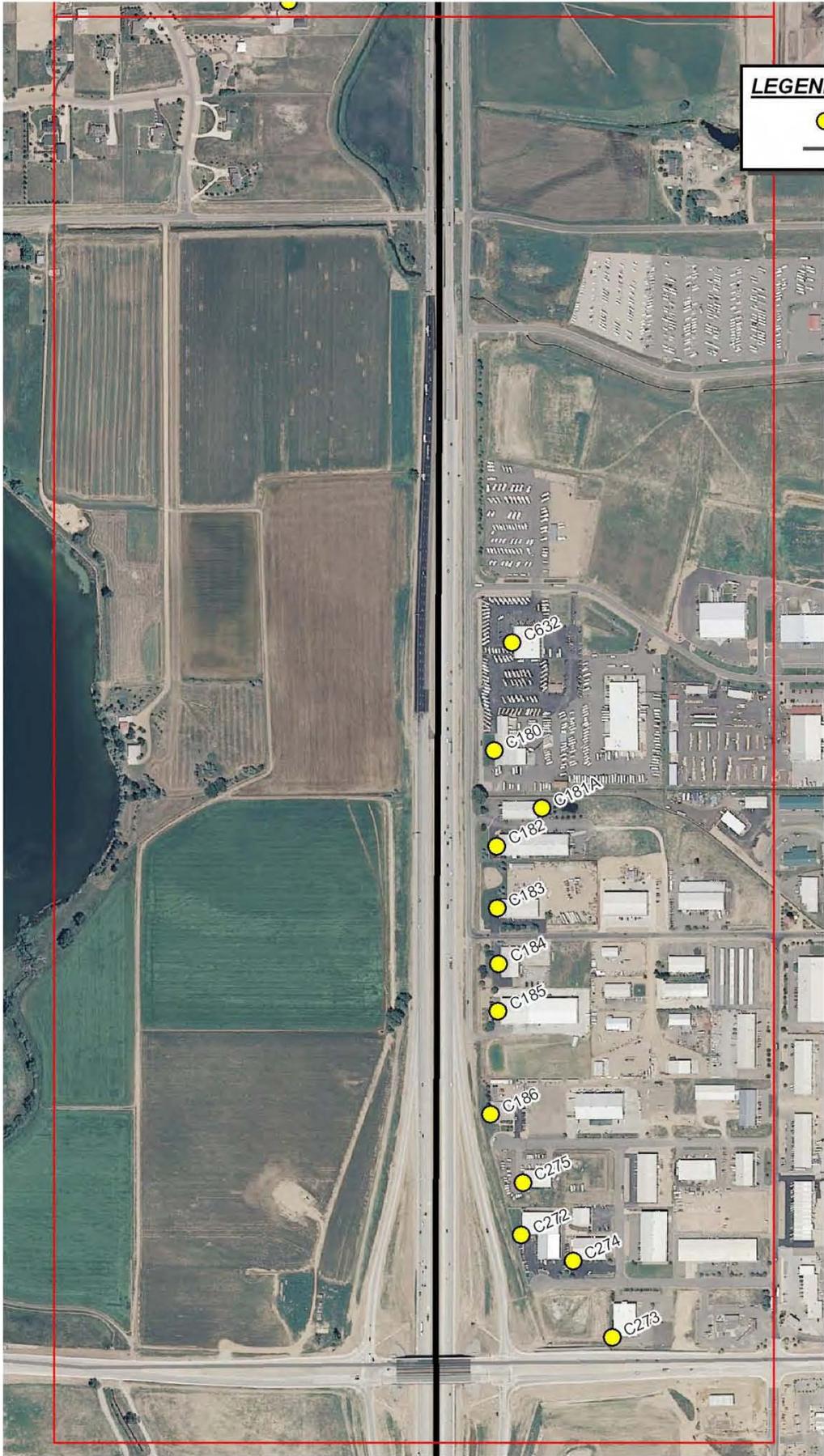
- Noise Model Receptor
- Highways



North



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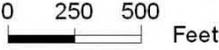


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- Highways

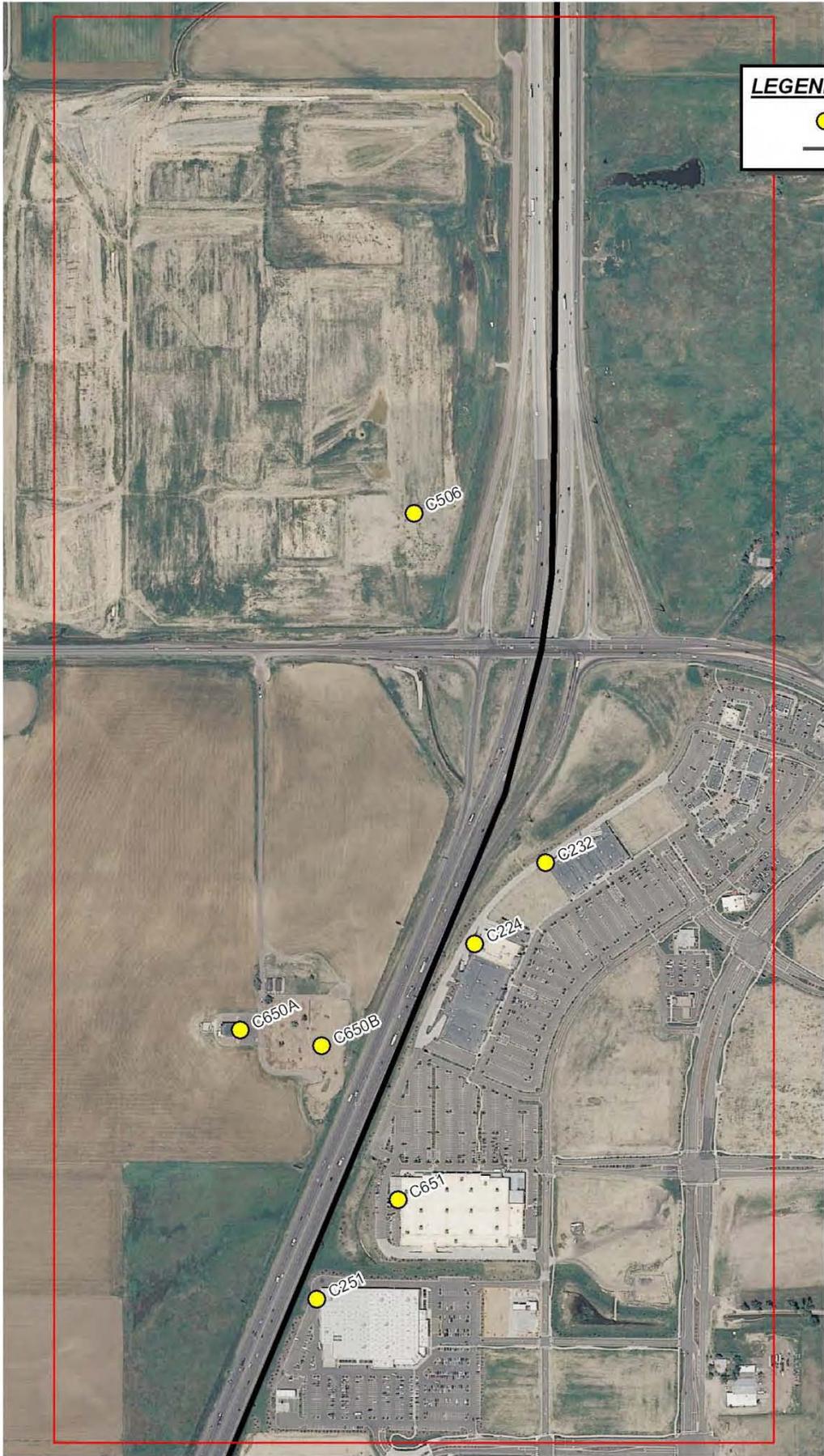


North



0 250 500 Feet

Mapbook Grid
BD_3



LEGEND

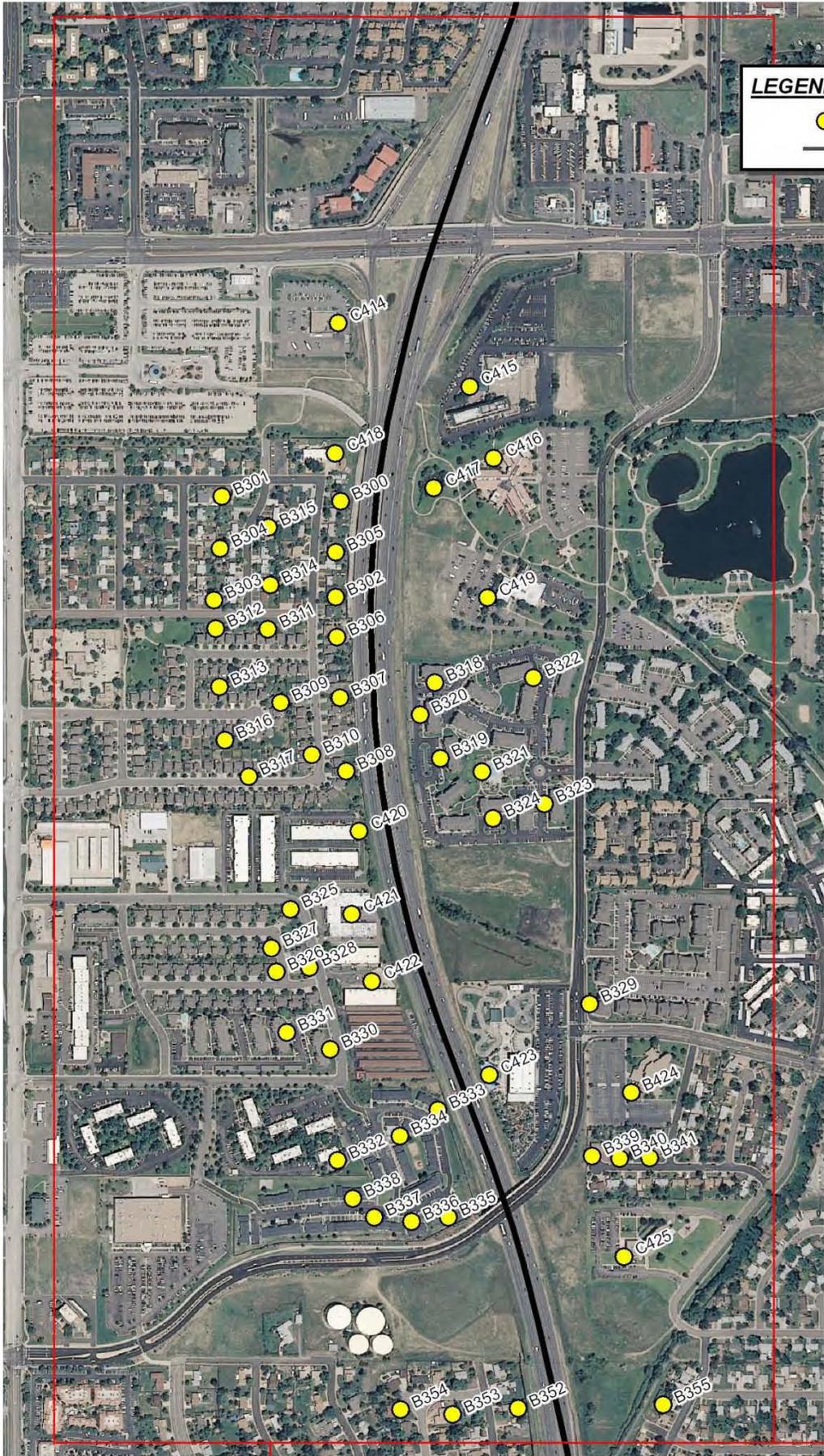
-  Noise Model Receptor
-  Highways



North

0 250 500 Feet

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BP_3

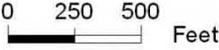


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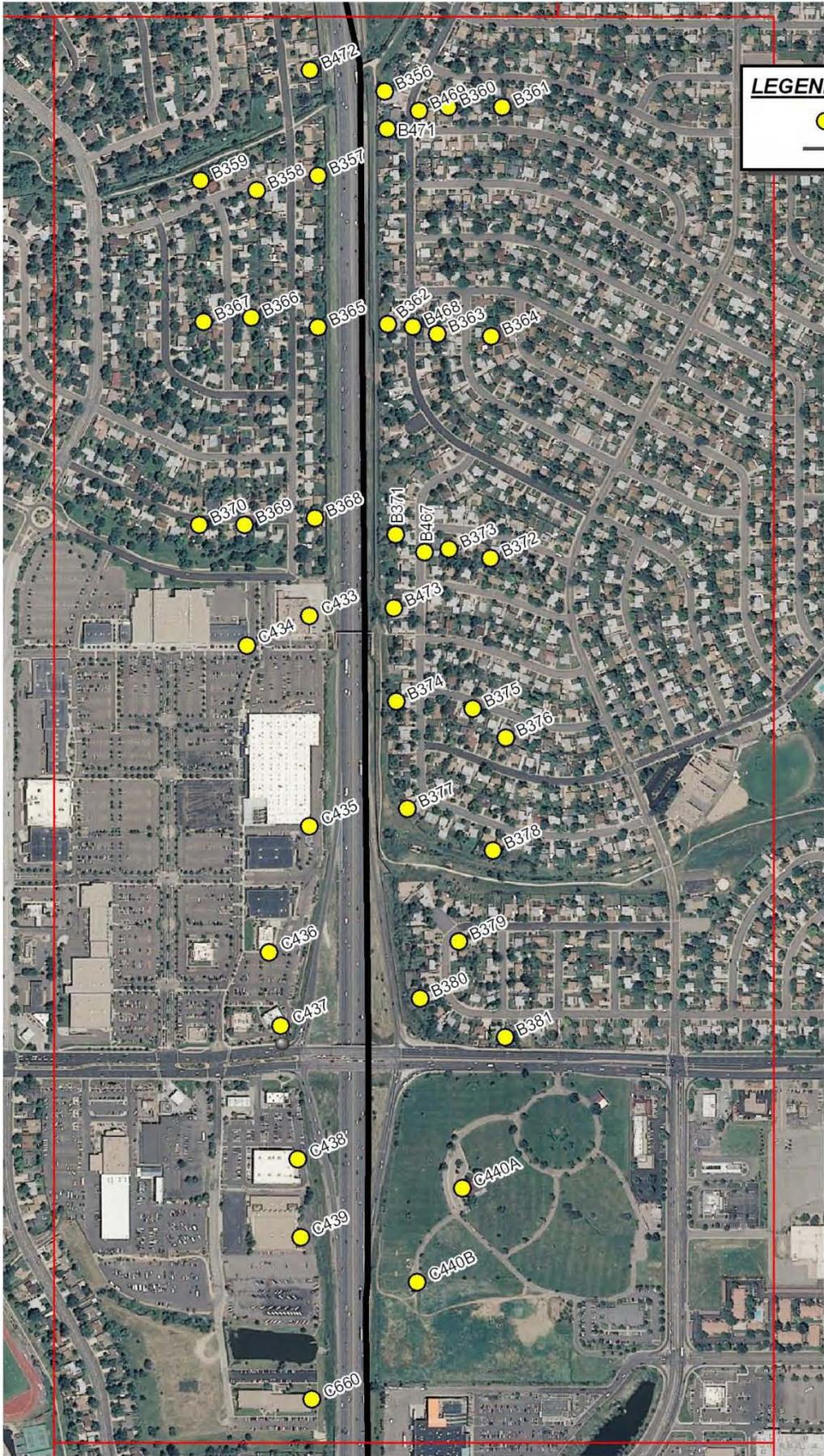
- Noise Model Receptor
- Highways



North



Mapbook Grid
BU_3

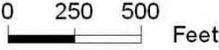


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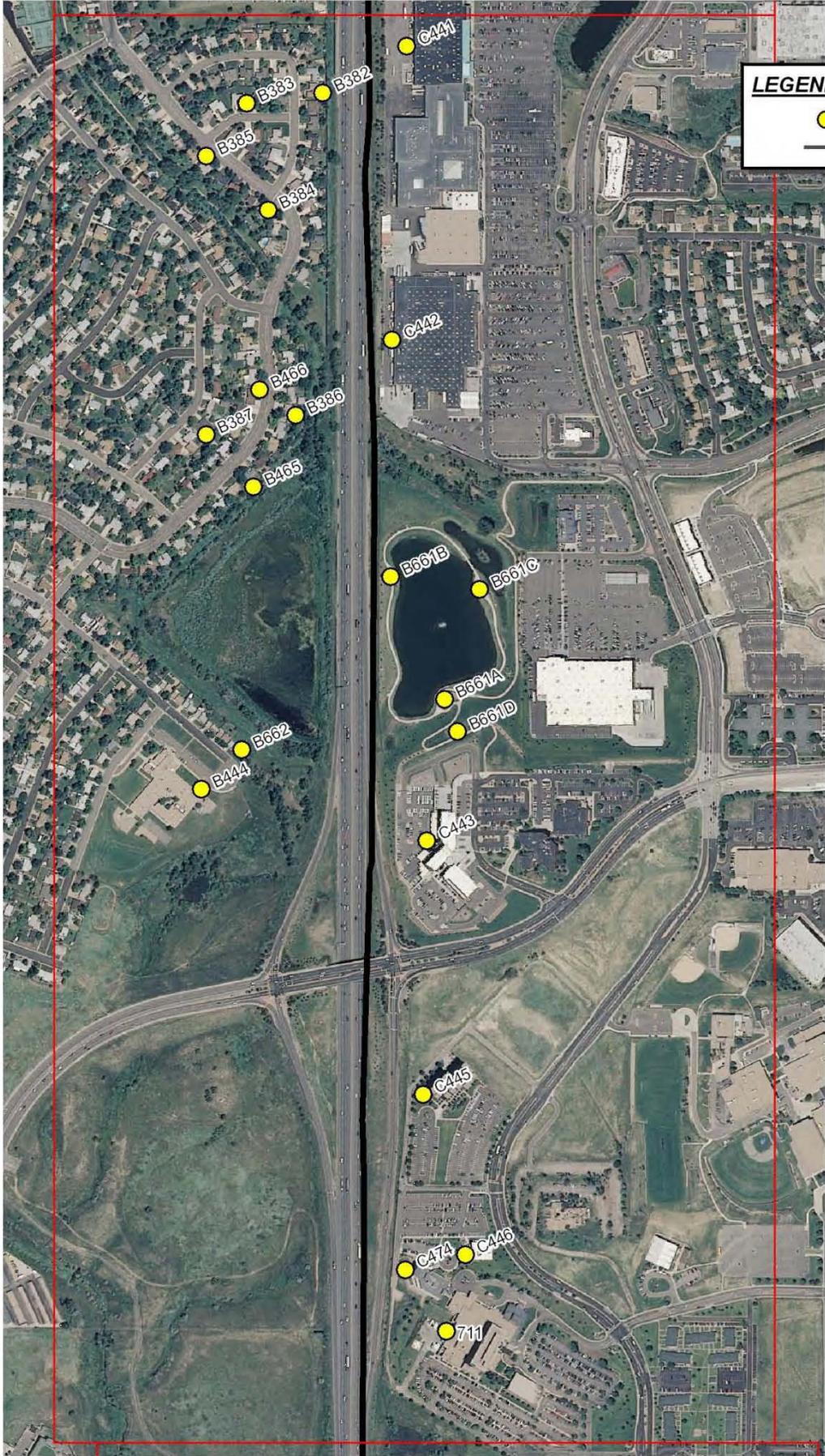
- Noise Model Receptor
- Highways



North



Mapbook Grid
BV_3

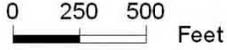


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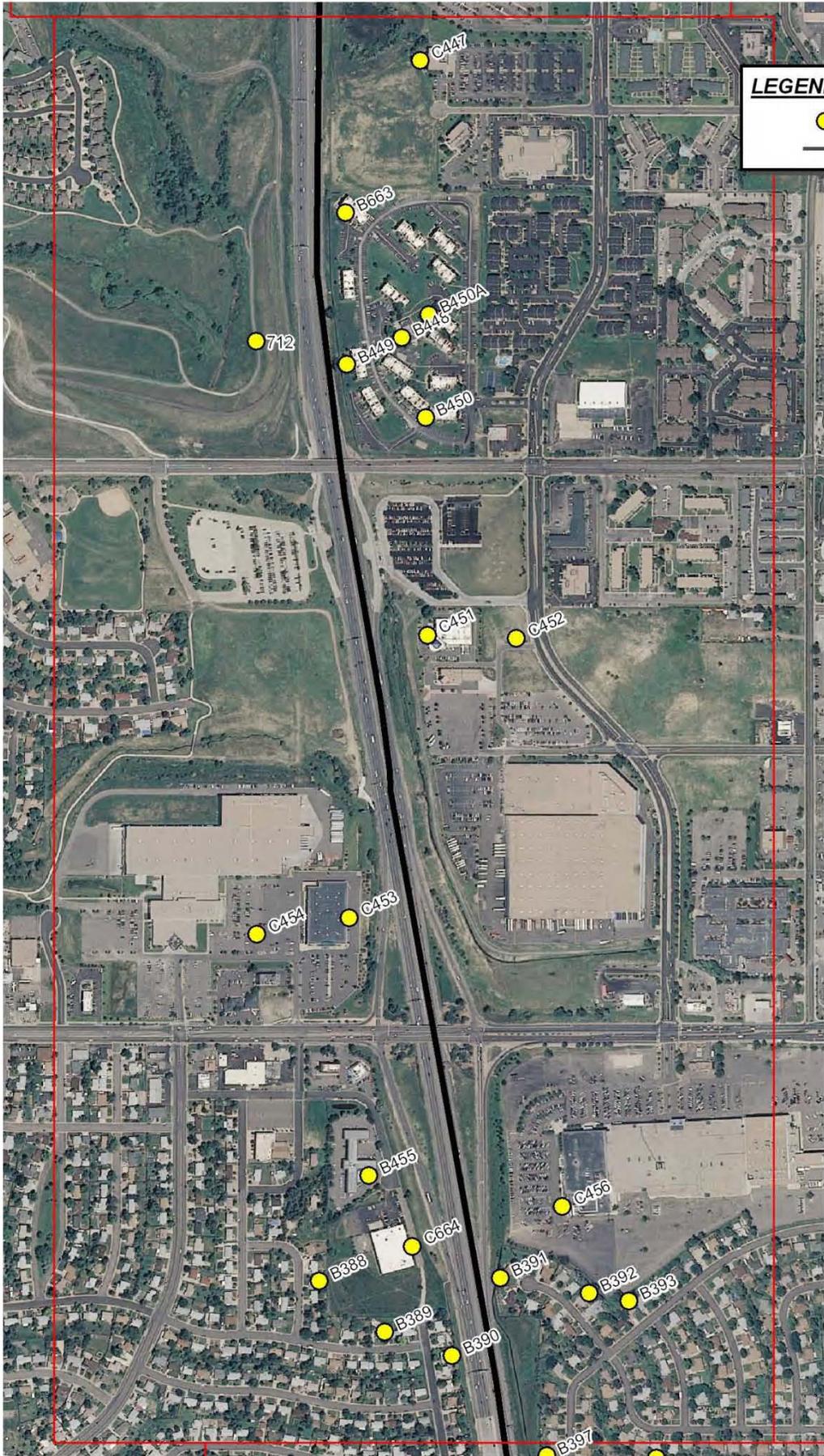
- Noise Model Receptor
- Highways



North



Mapbook Grid
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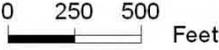


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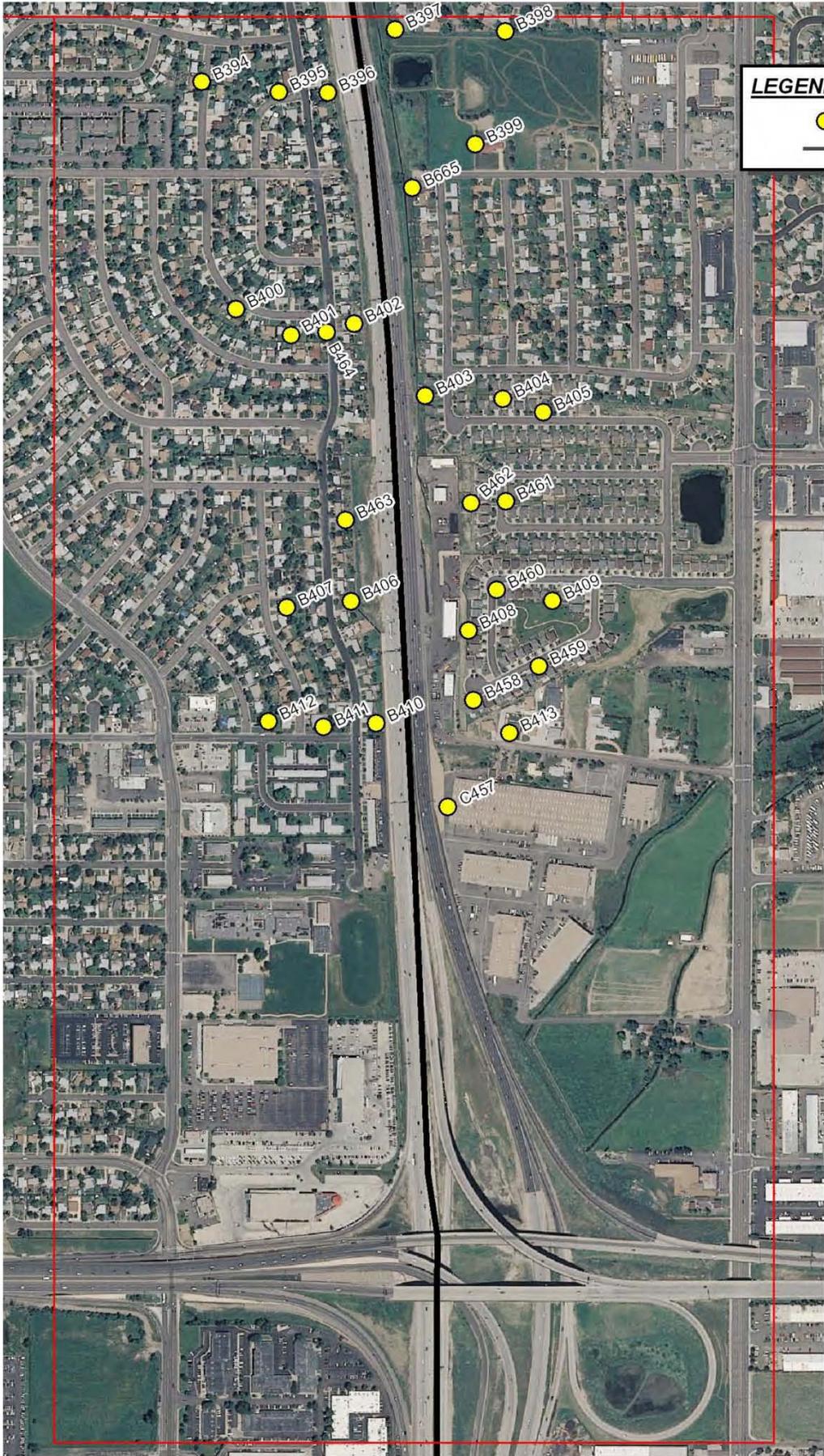
- Noise Model Receptor
- Highways



North



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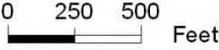


LEGEND

- Noise Model Receptor
- Highways



North



Mapbook Grid
BY_3

Receptor	NAC (dBA)	Existing Leq (dBA)	2035 No Action Leq (dBA)	2035 Phase 1 Leq (dBA)	2035 Phase 1 Result
700	66	58.8	61.2	64.8	----
711	66	64.2	64.7	65.8	----
712	66	67.9	68.4	68.2	Impacted
B001	66	75.8	78.6	79.6	Impacted
B002	66	67.2	70.7	71.4	Impacted
B003	66	69.0	71.1	70.7	Impacted
B004	66	63.6	66.9	65.2	----
B005	66	64.0	67.2	66.0	Impacted
B006	66	67.6	70.2	71.8	Impacted
B007	66	70.2	72.3	75.2	Impacted
B008	66	66.6	68.7	67.9	Impacted
B097	66	76.8	77.9	----	Removed
B098	66	66.8	70.7	----	Removed
B099	66	70.8	72.2	73.0	Impacted
B101	66	66.2	67.7	67.7	Impacted
B102	66	69.4	71.3	69.6	Impacted
B103	66	74.1	75.7	75.4	Impacted
B104	66	70.5	72.1	72.8	Impacted
B105	66	71.4	73.3	74.1	Impacted
B241	66	61.4	62.5	65.8	----
B242	66	59.6	60.8	63.6	----
B243	66	56.9	58.3	60.8	----
B244	66	54.9	56.7	58.3	----
B245-1	66	62.6	64.2	64.9	----
B245-2	66	67.1	68.6	70.8	Impacted
B246-1	66	58.7	60.2	61.9	----
B246-2	66	61.9	63.5	66.0	Impacted
B255A	71	60.0	63.4	65.5	----
B255B	71	63.2	67.5	66.4	----
B261A	71	60.8	64.7	64.5	----
B261B	71	61.4	64.4	65.1	----
B285	66	53.7	56.8	59.9	----
B286	66	51.4	54.6	56.3	----
B287	66	51.9	54.9	57.7	----
B288	66	50.0	53.1	55.7	----
B292	66	66.1	69.6	70.4	Impacted
B294	66	61.2	63.6	63.7	----
B300	66	63.4	64.3	64.6	----
B301	66	55.3	56.9	57.5	----
B302	66	64.9	65.7	66.2	Impacted
B303	66	53.9	55.2	55.9	----
B304	66	54.1	55.5	56.0	----
B305	66	63.6	64.4	64.8	----
B306	66	65.4	66.1	67.0	Impacted
B307	66	66.4	67.0	68.3	Impacted

Receptor	NAC (dBA)	Existing Leq (dBA)	2035 No Action Leq (dBA)	2035 Phase 1 Leq (dBA)	2035 Phase 1 Result
B308	66	66.3	66.9	67.1	Impacted
B309	66	57.6	58.3	58.6	----
B310	66	61.0	61.7	62.1	----
B311	66	58.3	59.4	59.4	----
B312	66	54.2	55.3	56.1	----
B313	66	53.6	54.6	55.1	----
B314	66	57.9	59.1	59.6	----
B315	66	57.5	58.7	59.1	----
B316	66	56.8	57.5	57.2	----
B317	66	58.3	59.0	60.2	----
B318-1	66	69.4	70.1	72.4	Impacted
B318-3	66	73.5	74.2	74.7	Impacted
B319-1	66	70.7	71.3	73.8	Impacted
B319-3	66	73.6	74.3	74.9	Impacted
B320-1	66	74.5	75.2	76.2	Impacted
B320-3	66	75.5	76.2	76.9	Impacted
B321	66	64.7	65.4	66.8	Impacted
B322-1	66	60.7	61.4	62.9	----
B322-3	66	67.3	68.0	68.7	Impacted
B323-1	66	61.1	61.6	63.0	----
B323-3	66	67.4	68.0	68.7	Impacted
B324-1	66	64.2	64.8	66.1	Impacted
B324-3	66	70.2	70.8	71.4	Impacted
B325	66	62.6	63.2	64.0	----
B326	66	60.0	60.6	61.5	----
B327	66	59.8	60.4	61.3	----
B328	66	63.5	64.2	64.9	----
B329-1	66	61.4	61.8	62.5	----
B329-3	66	67.4	67.8	68.4	Impacted
B330-1	66	63.6	64.2	65.0	----
B330-3	66	69.1	69.7	69.9	Impacted
B331-1	66	59.8	60.4	61.5	----
B331-3	66	67.0	67.6	67.7	Impacted
B332	66	59.4	60.1	60.9	----
B333	66	76.4	77.0	77.7	Impacted
B334	66	67.4	68.0	68.4	Impacted
B335	66	71.1	70.5	70.5	Impacted
B336	66	66.1	65.5	65.0	----
B337	66	62.7	63.2	62.3	----
B338	66	60.7	61.3	61.1	----
B339-1	66	65.3	62.6	64.0	----
B339-2	66	69.2	66.9	67.6	Impacted
B340	66	63.1	61.3	62.1	----
B341	66	60.9	59.6	60.6	----
B352	66	67.8	68.5	68.6	Impacted

Receptor	NAC (dBA)	Existing Leq (dBA)	2035 No Action Leq (dBA)	2035 Phase 1 Leq (dBA)	2035 Phase 1 Result
B353	66	63.4	63.8	64.0	----
B354	66	60.2	60.6	60.8	----
B355	66	61.2	61.6	61.1	----
B356	66	63.5	64.3	62.9	----
B357	66	65.5	66.2	66.8	Impacted
B358	66	63.0	63.6	63.7	----
B359	66	58.6	59.2	59.6	----
B360	66	58.9	59.4	59.0	----
B361	66	57.8	58.0	57.5	----
B362	66	67.1	67.9	68.1	Impacted
B363	66	62.7	63.4	63.8	----
B364	66	59.7	60.3	59.3	----
B365	66	65.5	66.3	66.8	Impacted
B366	66	62.3	63.0	63.2	----
B367	66	58.1	58.7	59.1	----
B368	66	65.8	66.4	67.0	Impacted
B369	66	61.1	61.8	62.6	----
B370	66	58.7	59.3	60.1	----
B371	66	68.5	69.2	69.6	Impacted
B372	66	58.2	58.9	59.5	----
B373	66	62.0	62.6	63.1	----
B374	66	65.0	65.7	66.2	Impacted
B375	66	59.2	59.9	60.3	----
B376	66	56.5	57.2	57.6	----
B377	66	64.4	65.3	65.3	----
B378	66	57.0	58.1	58.2	----
B379	66	58.8	60.2	60.4	----
B380	66	59.9	62.0	61.7	----
B381	66	60.9	64.1	63.7	----
B382	66	63.5	64.5	65.7	----
B383	66	62.1	62.8	63.8	----
B384	66	62.3	62.9	63.3	----
B385	66	59.0	59.7	60.6	----
B386	66	71.4	72.0	73.3	Impacted
B387	66	61.0	61.4	62.6	----
B388	66	62.4	64.1	64.6	----
B389	66	63.8	65.2	66.2	Impacted
B390	66	67.5	68.9	68.9	Impacted
B391	66	63.2	64.6	64.8	----
B392	66	58.0	59.7	59.5	----
B393	66	56.4	58.1	57.9	----
B394	66	57.5	58.7	57.8	----
B395	66	61.1	62.4	61.6	----
B396	66	69.1	70.4	70.3	Impacted
B397	66	63.8	65.0	64.7	----

Receptor	NAC (dBA)	Existing Leq (dBA)	2035 No Action Leq (dBA)	2035 Phase 1 Leq (dBA)	2035 Phase 1 Result
B398	66	56.5	57.8	57.2	----
B399	66	59.3	60.6	60.5	----
B400	66	55.3	56.6	55.9	----
B401	66	61.1	62.3	61.5	----
B402	66	66.0	67.2	66.5	Impacted
B403	66	62.7	63.9	65.1	----
B404	66	55.1	56.3	56.4	----
B405	66	54.6	55.9	55.5	----
B406	66	64.8	66.1	65.4	----
B407	66	59.3	60.5	60.0	----
B408	66	68.3	69.6	70.8	Impacted
B409	66	59.4	60.6	60.0	----
B410	66	64.3	65.5	64.7	----
B411	66	60.2	61.3	61.3	----
B412	66	56.6	57.9	58.3	----
B413	66	64.5	65.7	66.0	Impacted
B424	66	61.0	59.9	60.8	----
B444	66	60.7	61.3	61.8	----
B448-1	66	61.4	62.1	62.4	----
B448-3	66	65.8	66.5	66.3	Impacted
B449-1	66	65.6	66.4	66.6	Impacted
B449-3	66	77.1	77.9	77.2	Impacted
B450-1	66	63.0	63.8	62.6	----
B450-3	66	67.2	68.0	67.3	Impacted
B450A-1	66	60.8	61.4	62.0	----
B450A-3	66	65.3	66.0	65.8	----
B455-1	71	67.7	69.6	70.9	----
B455-2	71	71.4	73.1	73.2	Impacted
B458-1	66	68.7	69.9	71.8	Impacted
B458-2	66	72.3	73.6	73.2	Impacted
B459-1	66	61.6	62.8	63.4	----
B459-2	66	65.6	66.8	67.4	Impacted
B460	66	64.6	65.9	64.2	----
B461	66	59.2	60.4	58.1	----
B462	66	59.7	60.9	60.7	----
B463	66	62.1	63.5	62.6	----
B464	66	62.6	63.9	63.1	----
B465	66	65.1	65.4	65.6	----
B466	66	62.8	63.2	64.3	----
B467	66	65.4	66.0	66.4	Impacted
B468	66	65.2	66.0	66.4	Impacted
B469	66	61.7	62.3	61.3	----
B471	66	63.1	63.8	63.3	----
B472	66	67.0	67.7	67.3	Impacted
B473	66	67.1	67.8	68.0	Impacted

Receptor	NAC (dBA)	Existing Leq (dBA)	2035 No Action Leq (dBA)	2035 Phase 1 Leq (dBA)	2035 Phase 1 Result
B600	66	59.6	61.4	65.1	----
B601A	66	60.7	63.3	65.2	----
B601B	66	52.6	55.2	57.4	----
B604	66	64.8	67.3	68.7	Impacted
B605	66	60.7	63.2	64.1	----
B661A	66	66.7	66.4	68.4	Impacted
B661B	66	75.0	75.7	76.5	Impacted
B661C	66	64.6	64.4	65.9	----
B661D	66	66.5	66.4	67.9	Impacted
B662-1	66	64.1	65.1	66.1	Impacted
B662-2	66	68.1	69.0	69.8	Impacted
B663-1	66	65.3	65.9	66.2	Impacted
B663-3	66	74.5	75.0	75.3	Impacted
B665	66	63.3	64.5	64.8	----
C009A	66	68.5	71.0	74.1	Impacted
C009B	66	62.6	65.0	66.3	Impacted
C009C	66	64.0	66.4	67.1	Impacted
C010	99	68.8	71.5	72.4	----
C011	99	64.2	68.4	70.0	----
C138	99	71.2	74.4	72.9	----
C139	99	71.2	74.0	70.6	----
C140	99	76.6	79.4	77.8	----
C141	99	77.2	80.0	80.7	----
C142	99	71.9	74.7	75.8	----
C143	99	75.5	78.2	78.8	----
C144	99	72.4	75.1	76.4	----
C145	99	71.6	74.3	75.5	----
C146	99	69.3	72.0	73.0	----
C147	99	71.5	74.0	75.5	----
C148	99	67.9	69.9	71.6	----
C149	99	74.0	76.6	77.2	----
C150	99	67.8	70.0	71.8	----
C152	71	70.7	73.2	75.1	Impacted
C154	99	72.7	75.5	76.8	----
C178	99	73.4	75.3	75.5	----
C179	99	74.2	76.3	69.7	----
C180	99	73.8	75.1	76.9	----
C181A	99	67.2	68.7	71.8	----
C182	99	73.5	74.9	77.0	----
C183	99	73.4	74.7	76.4	----
C184	99	71.8	73.2	75.9	----
C185	99	71.0	72.7	75.8	----
C186	99	72.4	74.9	77.6	----
C224	99	76.5	78.2	79.1	----
C225A	99	68.8	71.5	74.3	----

Receptor	NAC (dBA)	Existing Leq (dBA)	2035 No Action Leq (dBA)	2035 Phase 1 Leq (dBA)	2035 Phase 1 Result
C225B	71	64.2	66.7	69.3	----
C232	99	66.8	68.9	71.8	----
C240	99	64.2	65.6	66.8	----
C251	99	72.7	74.8	75.0	----
C256	71	63.2	67.1	67.5	----
C257	71	63.2	66.6	67.0	----
C258	71	65.2	68.9	66.7	----
C259	99	63.6	66.5	65.1	----
C260	99	63.5	68.7	67.0	----
C262	71	66.5	70.8	70.3	----
C263	71	63.4	68.9	66.5	----
C264	71	60.7	66.0	64.1	----
C265	99	64.0	67.4	66.9	----
C266	99	62.3	65.3	64.9	----
C272	99	66.6	66.9	69.2	----
C273	99	63.0	63.2	62.5	----
C274	99	60.6	61.8	63.2	----
C275	99	65.8	67.1	69.5	----
C289	99	56.5	59.7	62.5	----
C290	99	56.5	59.6	65.2	----
C291	99	57.3	60.3	65.1	----
C414	71	64.4	66.1	66.4	----
C415	71	68.8	70.0	71.8	Impacted
C416	66	64.3	65.3	66.5	Impacted
C417	66	69.6	70.3	70.5	Impacted
C418	66	64.0	65.2	65.9	----
C419	71	63.1	63.9	65.4	----
C420	99	76.6	77.2	78.1	----
C421	99	70.1	70.8	71.0	----
C422	99	70.0	70.6	70.6	----
C423	71	73.3	73.9	73.7	Impacted
C425	66	64.6	64.7	65.6	----
C433	71	73.4	74.1	75.1	Impacted
C434	99	64.5	65.1	66.5	----
C435	99	74.6	75.5	76.6	----
C436	71	64.2	65.4	66.9	----
C437	71	65.3	67.5	67.7	----
C438	99	74.0	75.0	75.6	----
C439	99	72.9	73.8	75.4	----
C440A	66	64.6	65.2	66.8	Impacted
C440B	66	69.0	69.6	71.6	Impacted
C441	99	69.2	69.7	69.6	----
C442	99	70.2	70.3	69.2	----
C443	66	66.7	68.0	69.7	Impacted
C445	71	63.9	65.9	66.2	----

Receptor	NAC (dBA)	Existing Leq (dBA)	2035 No Action Leq (dBA)	2035 Phase 1 Leq (dBA)	2035 Phase 1 Result
C446	71	64.1	64.8	65.7	----
C447	71	64.8	64.8	67.0	----
C451	99	69.4	70.1	72.0	----
C452	99	62.4	63.2	64.3	----
C453	99	72.3	73.5	74.7	----
C454	99	62.1	63.9	64.7	----
C456	99	57.8	60.4	59.7	----
C457	99	71.0	72.3	69.6	----
C474	66	70.0	70.9	71.6	Impacted
C506	99	63.3	66.0	69.1	----
C602	99	68.3	71.0	71.4	----
C603	99	63.8	66.3	66.4	----
C606	99	60.9	63.8	63.4	----
C621	99	64.7	68.2	59.8	----
C622A	99	68.6	72.3	60.3	----
C622B	71	67.8	71.4	58.5	----
C623	71	56.4	58.1	57.7	----
C631	99	67.2	68.6	73.0	----
C632	99	71.5	73.0	74.9	----
C650A	66	65.1	67.3	68.0	Impacted
C650B	66	74.3	76.6	76.8	Impacted
C651	99	67.7	69.7	69.6	----
C660	71	73.3	74.2	76.0	Impacted
C664	99	73.8	75.3	75.6	----
CFEISSH1_101	99	68.0	71.2	69.1	----
CFEISSH1_102	99	67.3	70.6	68.6	----
CFEISSH1_103	99	67.3	70.5	68.4	----
F222	99	72.8	74.3	----	Removed

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**APPENDIX B
TRAFFIC NOISE ABATEMENT BARRIERS
EVALUATED**

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Figure B-1. Barrier near Mulberry Road/SH 14

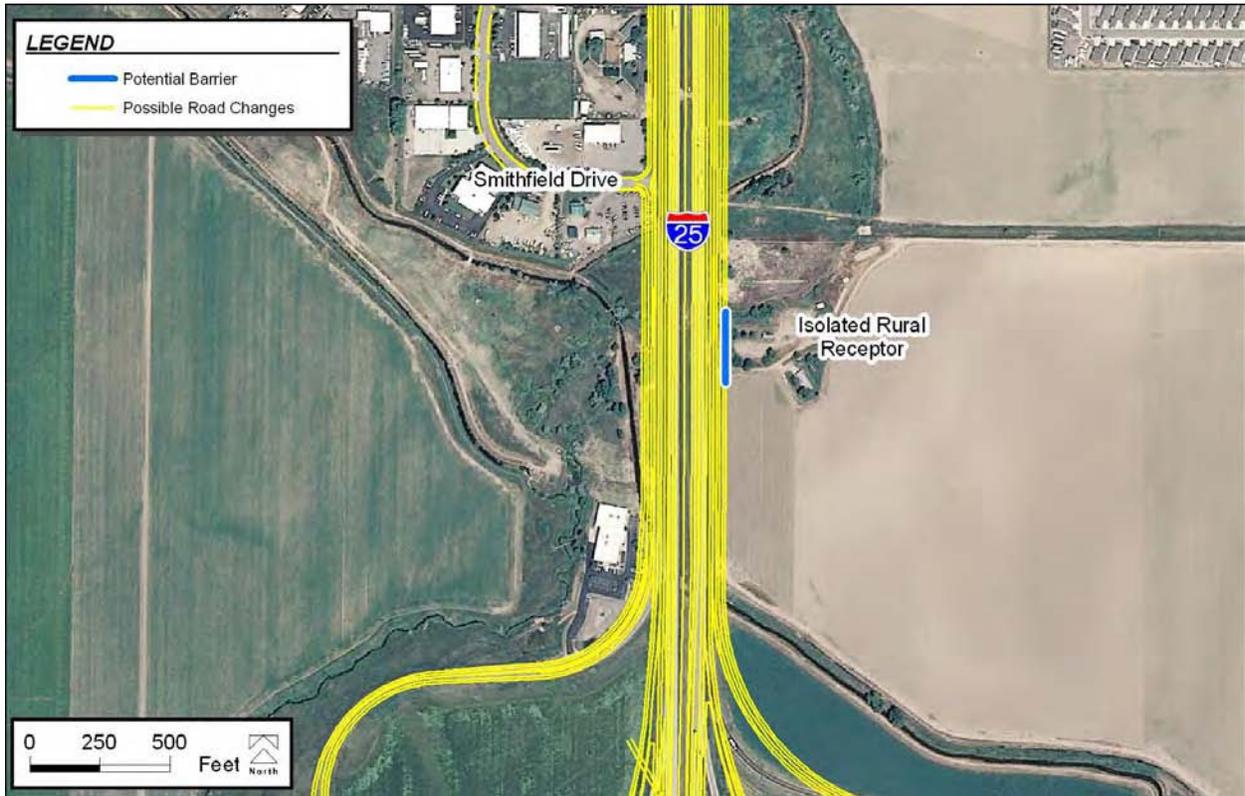


Figure B-2. Barrier near Harmony Road

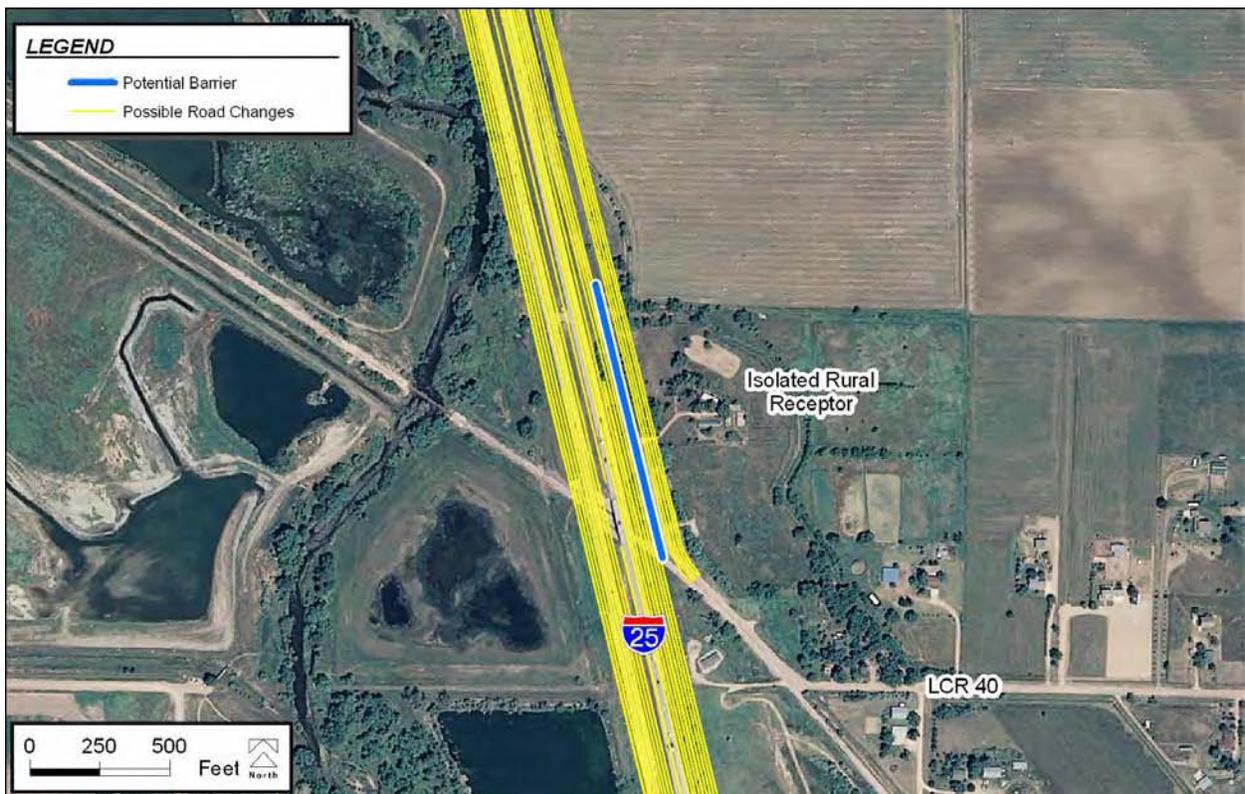


Figure B-3. Barrier near Weld County Road 38

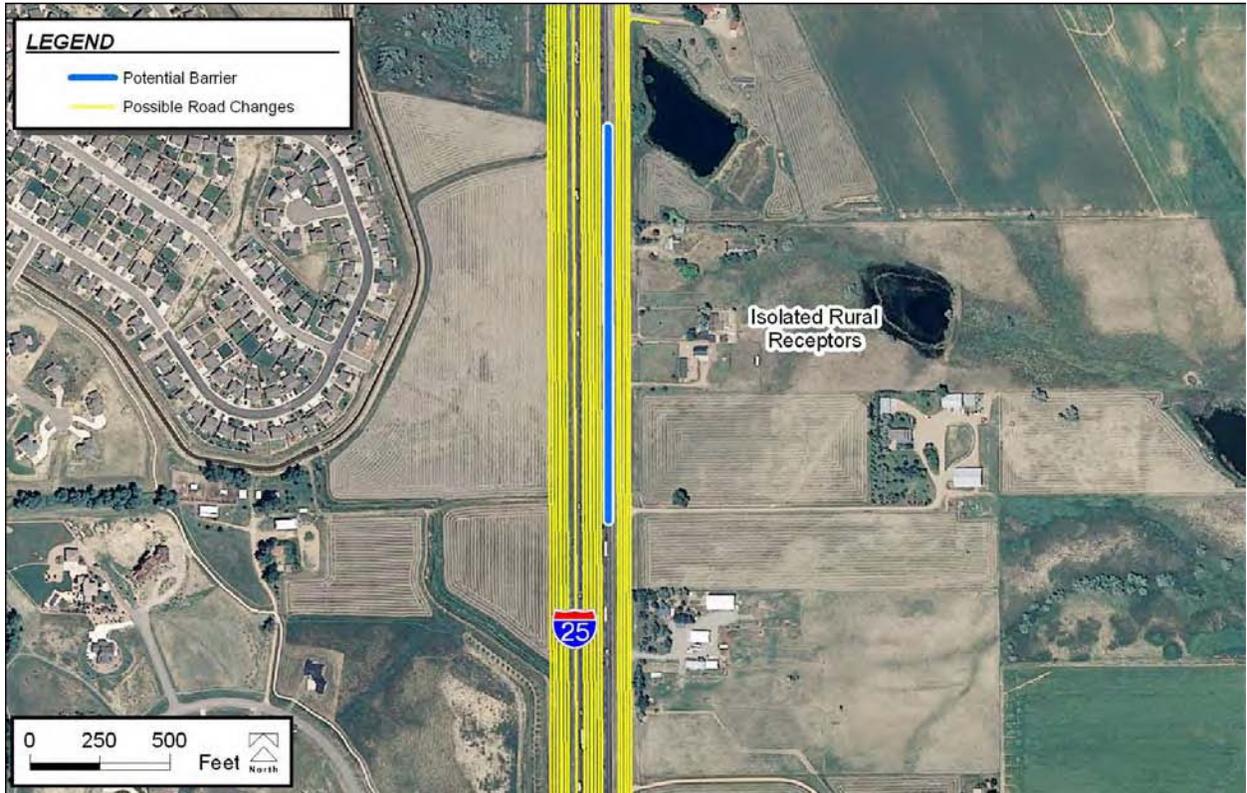


Figure B-4. Barrier at Singletree Estates

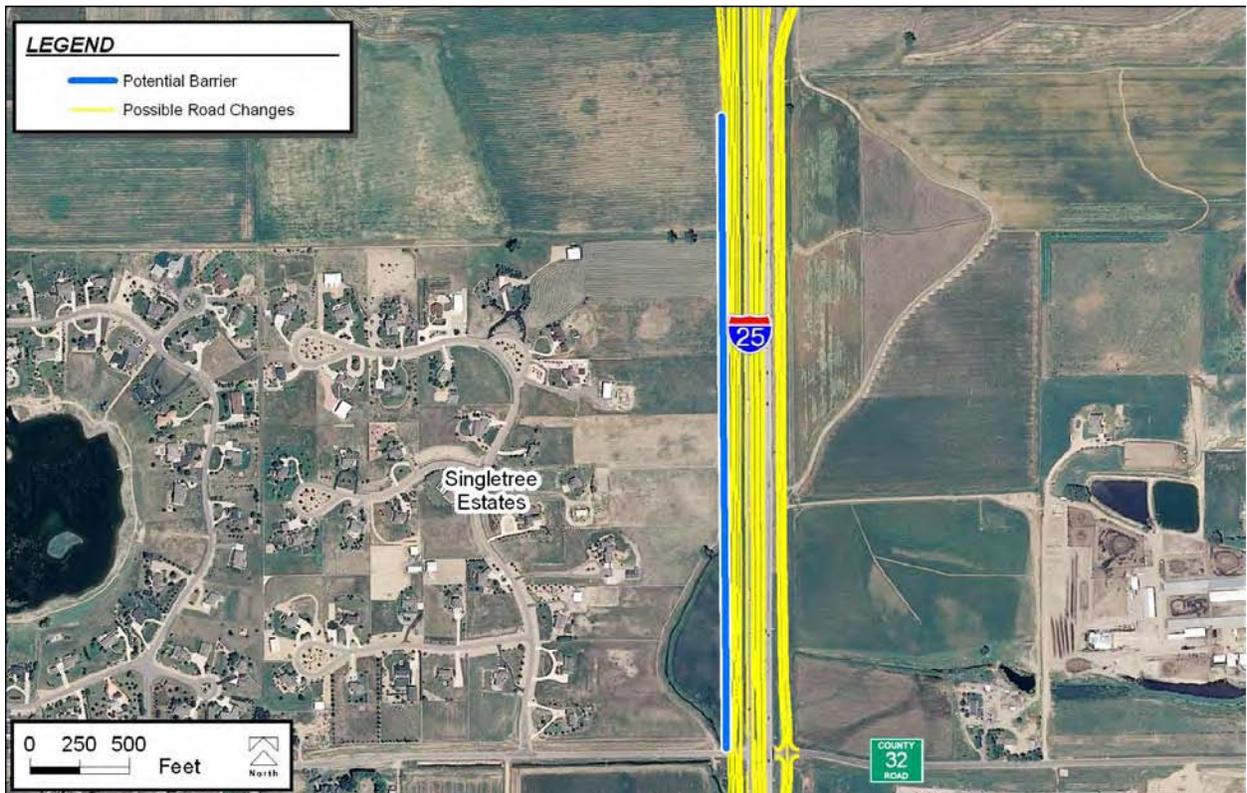


Figure B-5. Barrier at Evergreen Cemetery



Figure B-6. Barriers at Northglenn Rec. Center and Stone Mountain Apartments



Figure B-7. Barriers at Greens of Northglenn and Boondocks



Figure B-8. Barrier at Highland Memorial Gardens

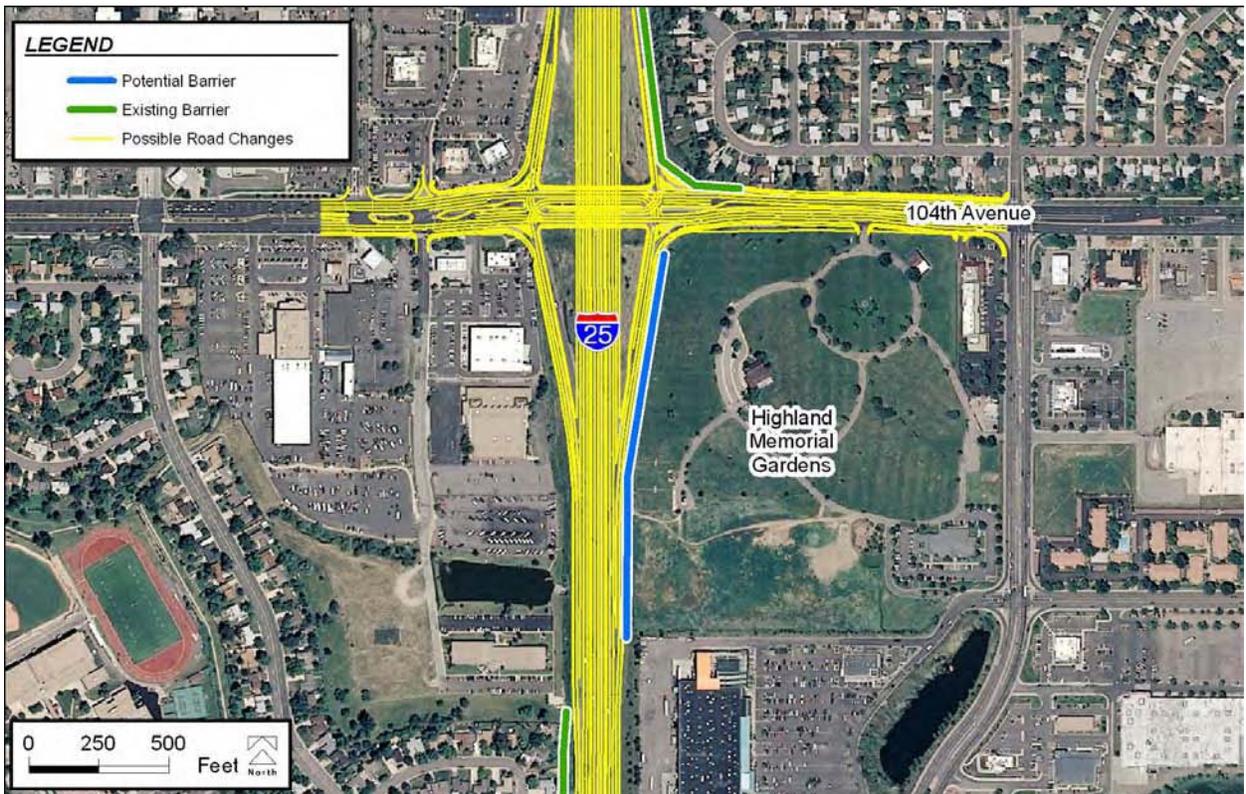


Figure B-9. Barriers at Civic Center Park and Badding Reservoir Extension



Figure B-10. Barrier near North Suburban Medical Center

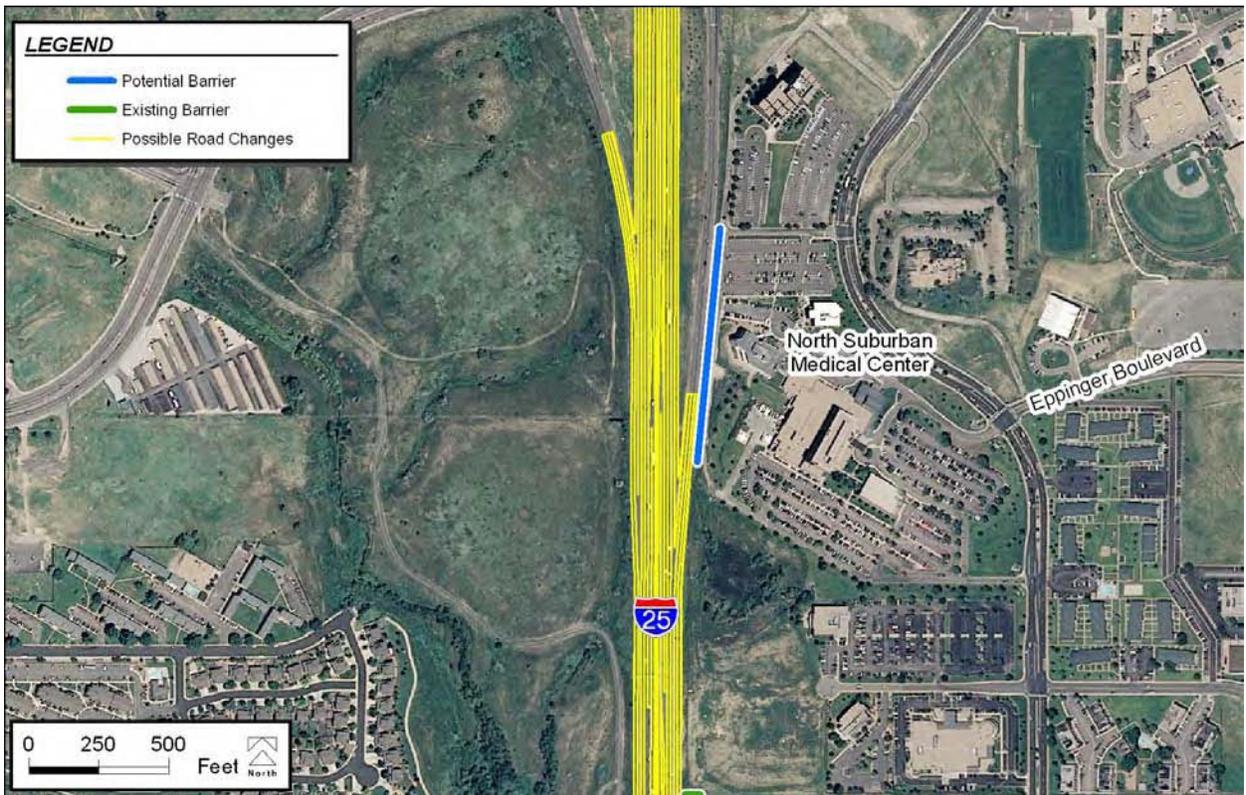


Figure B-11. Barrier at Niver Creek Open Space

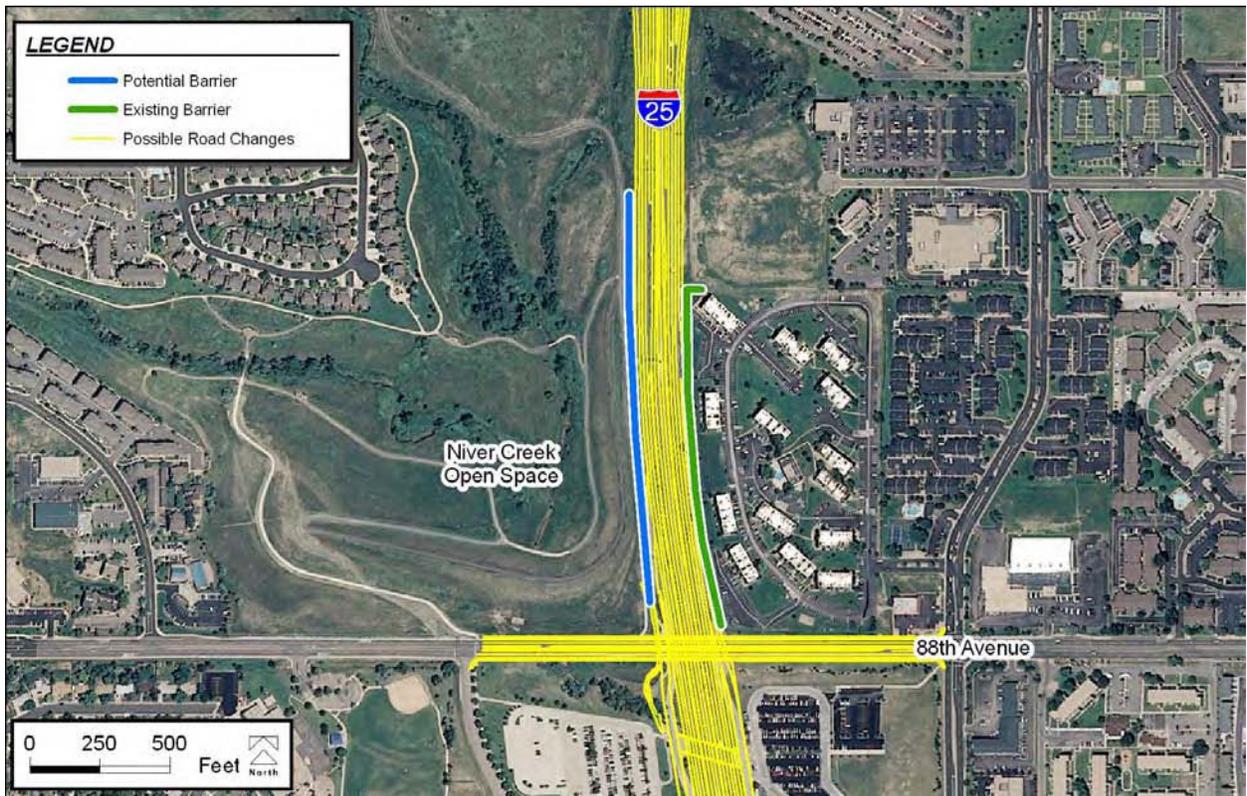
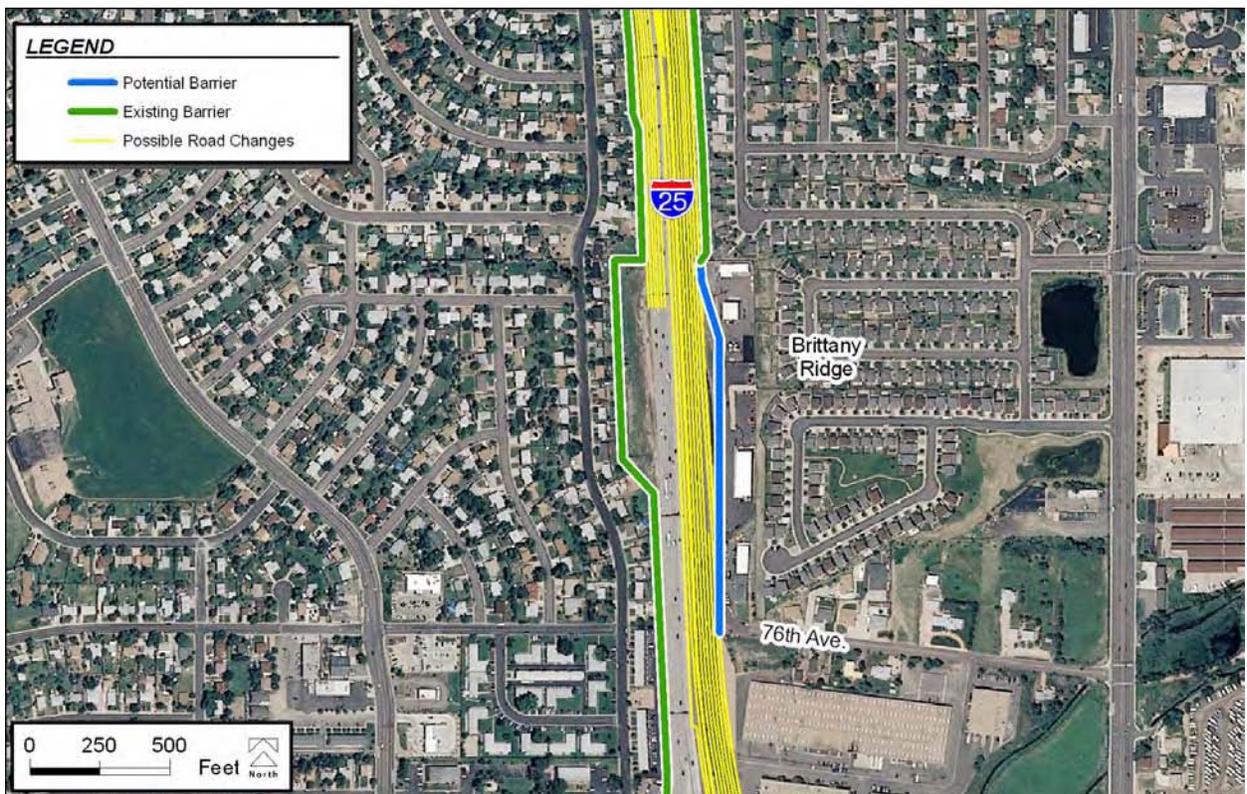


Figure B-12. Barrier at Brittany Ridge Extension



APPENDIX C CDOT 1209 EVALUATION FORMS

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Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

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

STIP # _____ Date of Analysis: 7-20-11

Project Name & Location: N. I-25 Near Mulberry (Isolated receptor)

A. FEASIBILITY:

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

B. REASONABLENESS:

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

C. INSULATION CONSIDERATION:

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

D. ADDITIONAL CONSIDERATIONS:

This is a "best case" situation for an isolated receptor for N. I-25. A barrier 12 ft tall by 250 ft long gave 8 dBA reduction. Even so, it is well above the cost index and is not recommended.

E. STATEMENT OF LIKELIHOOD:

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

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

The cost index was too high at \$17,000, so abatement is not recommended.

Completed by: Dave [signature] Date: 7-20-11



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

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

STIP # _____ Date of Analysis: 7-20-11

Project Name & Location: N. I-25 Isolated Receptor near Harmony Rd.

A. FEASIBILITY:

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

B. REASONABLENESS:

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

C. INSULATION CONSIDERATION:

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

D. ADDITIONAL CONSIDERATIONS:

This is an example case for isolated receptors for N. I-25. A barrier 12ft by 1100ft gave 7dBA of noise reduction. The cost is well above the cost index.

E. STATEMENT OF LIKELIHOOD:

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

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

The cost index was too high at \$82,000 and is not recommended.

Completed by: Dale T. Wehrhane Date: 7-20-11



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

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

STIP # _____ Date of Analysis: 7-20-11

Project Name & Location: N. I-25 Isolated receptor near WCR 38

A. FEASIBILITY:

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

B. REASONABLENESS:

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

C. INSULATION CONSIDERATION:

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

D. ADDITIONAL CONSIDERATIONS:

This is an example isolated receptor for N. I-25. A barrier 12-16 ft tall by 1400 ft long gave 6-7 dBA reduction for 3 homes. The cost is well above the cost index.

E. STATEMENT OF LIKELIHOOD:

- Are noise mitigation measures feasible?
 YES NO
- Are noise mitigation measures reasonable?
 YES NO
- Is insulation of buildings both feasible and reasonable?
 YES NO
- Shall noise abatement measures be provided?
 YES NO

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

The cost index was too high at \$72,000 and abatement is not recommended.

Completed by: Dale Ticeburn Date: 7-20-11



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

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

STIP # _____ Date of Analysis: 7-20-11

Project Name & Location: N. I-25 Singletree Estates (WCR 32)

A. FEASIBILITY:

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

B. REASONABLENESS:

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

C. INSULATION CONSIDERATION:

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

D. ADDITIONAL CONSIDERATIONS:

Singletree Estates near WCR 32. A barrier 19 ft by 3200 ft gave 7 dBA reduction, including 3rd floor decks. The cost was well above the cost index though.

E. STATEMENT OF LIKELIHOOD:

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

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

The cost index was too high at \$54,000 and abatement is not recommended.

Completed by: Dale Tischler Date: 7-20-11



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

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

STIP # _____ Date of Analysis: 7-20-11

Project Name & Location: N. I-25 Evergreen Cemetery (SH7)

A. FEASIBILITY:

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

B. REASONABLENESS:

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

C. INSULATION CONSIDERATION:

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

D. ADDITIONAL CONSIDERATIONS:

Cemetery near SH7. A barrier 14 ft by 1400 ft gave 5-10 dBA reduction. The cost was well above the cost index though.

E. STATEMENT OF LIKELIHOOD:

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

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

the cost index was too high at \$59,000 and abatement is not recommended.

Completed by: Dale Tinschuh Date: 7-20-11



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

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

STIP # _____ Date of Analysis: 7-20-11

Project Name & Location: N. I-25 Northglenn Rec. Center + Ramada

A. FEASIBILITY:

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

B. REASONABLENESS:

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

C. INSULATION CONSIDERATION:

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

D. ADDITIONAL CONSIDERATIONS:

Rec. center and hotel near 120th Ave. A barrier 16ft by 1070 ft gave 6-7 dBA of reduction. The cost was well above the cost index though.

E. STATEMENT OF LIKELIHOOD:

- Are noise mitigation measures feasible?
 YES NO
- Are noise mitigation measures reasonable?
 YES NO
- Is insulation of buildings both feasible and reasonable?
 YES NO
- Shall noise abatement measures be provided?
 YES NO

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

The cost index was too high at \$59,200 and abatement is not recommended.

Completed by: Dale Tiedebach Date: 7-20-11



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

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

STIP # _____ Date of Analysis: 7-20-11

Project Name & Location: N. I-25 Stone Mtn. Apartments

A. FEASIBILITY:

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

B. REASONABLENESS:

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

C. INSULATION CONSIDERATION:

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

D. ADDITIONAL CONSIDERATIONS:

A barrier 14 ft by 1300 ft gave 5-10 dBA of reduction, including 2nd floor balconies. The cost was below the cost index.

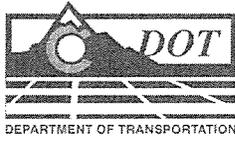
E. STATEMENT OF LIKELIHOOD:

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

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

the cost index was low at \$1,900 and abatement is recommended.

Completed by: Dale Trebuch Date: 7-20-11



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

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

STIP # _____ Date of Analysis: 7-20-11

Project Name & Location: N. I-25 Boondocks

A. FEASIBILITY:

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

B. REASONABLENESS:

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

C. INSULATION CONSIDERATION:

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

D. ADDITIONAL CONSIDERATIONS:

A commercial rec. center. A barrier 10ft by 970ft gave 7 dBA of reduction. The cost was well above the cost index though.

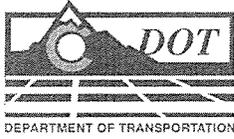
E. STATEMENT OF LIKELIHOOD:

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

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

The cost index was too high at \$15,600 and abatement is not recommended.

Completed by: Jane T. Schubert Date: 7-20-11



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

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

STIP # _____ Date of Analysis: 7-20-11

Project Name & Location: N. I-25 Greens of Northglenn

A. FEASIBILITY:

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

B. REASONABLENESS:

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

C. INSULATION CONSIDERATION:

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

D. ADDITIONAL CONSIDERATIONS:

A barrier 12 ft by 600 ft gave 8 dBA of reduction. The cost was below the cost index.

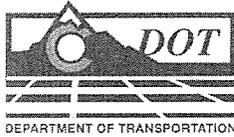
E. STATEMENT OF LIKELIHOOD:

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

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

the cost index was too low at \$1,900 and abatement is recommended.

Completed by: Dale T. [Signature] Date: 7-20-11



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

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

STIP # _____ Date of Analysis: 7-20-11

Project Name & Location: N. I-25 Highland Memorial Gardens

A. FEASIBILITY:

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

B. REASONABLENESS:

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

C. INSULATION CONSIDERATION:

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

D. ADDITIONAL CONSIDERATIONS:

Cemetery near 104th Ave. A barrier 12 ft by 1380 ft gave 7 dBA of reduction. The cost was well above the cost index though.

E. STATEMENT OF LIKELIHOOD:

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

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

the cost index was too high at \$105,000 and abatement is not recommended.

Completed by: Dale T. Michael Date: 7-20-11



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

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

STIP # _____ Date of Analysis: 7-20-11

Project Name & Location: N. I-25 Badding Reservoir Extension

A. FEASIBILITY:

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

B. REASONABLENESS:

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

C. INSULATION CONSIDERATION:

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

D. ADDITIONAL CONSIDERATIONS:

This barrier would be an extension of an existing barrier to cover more of Northglenn. A barrier extension 12 ft by 1040 ft would give 8 dBA of reduction. The cost was well above the cost index.

E. STATEMENT OF LIKELIHOOD:

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

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

The cost index was too high at \$10,600 and abatement is not recommended.

Completed by: Jake T. [Signature] Date: 7-20-11



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

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

STIP # _____ Date of Analysis: 7-20-11

Project Name & Location: N.I. 25 Thornton Civic Center Park

A. FEASIBILITY:

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

B. REASONABLENESS:

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

C. INSULATION CONSIDERATION:

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

D. ADDITIONAL CONSIDERATIONS:

A barrier 12 ft by 2,400 ft would give 5-10 dBA of reduction. The cost would be well above the cost index though.

E. STATEMENT OF LIKELIHOOD:

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

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

The cost index was too high at \$61,000 and abatement is not recommended.

Completed by: Dale T. Treshank Date: 7-20-11



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

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

STIP # _____ Date of Analysis: 7-20-11

Project Name & Location: I-25 N. Suburban Medical Center

A. FEASIBILITY:

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

B. REASONABLENESS:

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

C. INSULATION CONSIDERATION:

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

D. ADDITIONAL CONSIDERATIONS:

A barrier 12 ft by 840 ft would give 7 dBA of reduction. The cost would be well above the cost index though. Normal wall construction (-25dBA) would put interior noise below the Category D NAC of 51 dBA (~47 dBA).

E. STATEMENT OF LIKELIHOOD:

- Are noise mitigation measures feasible?
 YES NO
- Are noise mitigation measures reasonable?
 YES NO
- Is insulation of buildings both feasible and reasonable?
 YES NO
- Shall noise abatement measures be provided?
 YES NO

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

The cost index was too high at \$65,000 and abatement is not recommended.

Completed by: Jake T. [Signature] Date: 7-20-11



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

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

STIP # _____ Date of Analysis: 7-20-11

Project Name & Location: N. I-25 N:ver Creek Open Space

A. FEASIBILITY:

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

B. REASONABLENESS:

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

C. INSULATION CONSIDERATION:

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

D. ADDITIONAL CONSIDERATIONS:

A barrier 20 ft by 1400 ft would give a reduction of 7 dB. The cost would be well above the cost index though.

E. STATEMENT OF LIKELIHOOD:

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

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

The cost index was too high at \$180,000 and abatement is not recommended.

Completed by: Dale T. [Signature] Date: 7-20-11



Noise Analysis and Abatement Guidelines

COLORADO DEPARTMENT OF TRANSPORTATION NOISE ABATEMENT DETERMINATION WORKSHEET

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

STIP # _____ Date of Analysis: 7-20-11

Project Name & Location: N. I-25 Brittany Ridge Extension

A. FEASIBILITY:

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

B. REASONABLENESS:

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

C. INSULATION CONSIDERATION:

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

D. ADDITIONAL CONSIDERATIONS:

This barrier would be an extension of an existing barrier to cover more of Brittany Ridge. A barrier extension 10-14 ft by 1200 ft would give 5-7 dBA of reduction. The cost would be below the cost index.

E. STATEMENT OF LIKELIHOOD:

- Are noise mitigation measures feasible?
 YES NO
- Are noise mitigation measures reasonable?
 YES NO
- Is insulation of buildings both feasible and reasonable?
 YES NO
- Shall noise abatement measures be provided?
 YES NO

F. ABATEMENT DECISION DESCRIPTION AND JUSTIFICATION:

The cost index was low at \$5,100 and abatement is recommended.

Completed by: Dale Trinchick Date: 7-20-11

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