CDOT PROJECT IM 0703-294

I-70/32nd AVENUE INTERCHANGE ENVIRONMENTAL ASSESSMENT

NOISE IMPACT ASSESSMENT REPORT

Prepared for:

Federal Highway Administration
12300 West Dakota Avenue, Suite 180
Lakewood, CO 80228

Colorado Department of Transportation
2000 South Holly Street
Denver, CO 80222

City of Wheat Ridge, Colorado
7500 West 29th Avenue
Wheat Ridge, CO 80033

Prepared by:

Felsburg Holt & Ullevig
6300 South Syracuse Way, Suite 600
Centennial, CO 80111
303/721-1440

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LIST OF ABBREVIATIONS AND ACRONYMS

CDOT	Colorado Department of Transportation
dB	decibels
dBA	A-weighted decibels
EA	Environmental Assessment
FHU	Felsburg Holt & Ullevig
FHWA	Federal Highway Administration
I-70	Interstate 70
KPH	kilometers per hour
L_{eq}	equivalent continuous sound level
LOS	level of service
MPH	miles per hour
NAC	Noise Abatement Criteria
NEPA	National Environmental Policy Act
SH	State Highway
TNM	Traffic Noise Model

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1.0 INTRODUCTION

In accordance with the National Environmental Policy Act of 1969 (NEPA) and its related regulations, the Federal Highway Administration (FHWA), as the Lead Agency, in cooperation with the Colorado Department of Transportation (CDOT) as the Applicant Agency, is preparing an Environmental Assessment (EA) for proposed improvements to the Interstate 70 (I-70)/32nd Avenue interchange (the Proposed Action). The project is proposed by the City of Wheat Ridge. The general region included in the EA project area (see **Figure 1-1**) is mostly in Wheat Ridge but also includes parts of Lakewood, Golden and Jefferson County. The project area consists of the area generally bounded by and including Ward Road, 44th Avenue, McIntyre Street and 27th/32nd Avenue. The EA considers both existing roads and possible new roads.

The purpose of the proposed improvements is to improve connectivity, functionality and capacity of some transportation infrastructure in the project area. The current facilities are becoming inadequate and will under-serve the expected future traffic demand in the area. Through the EA, CDOT Project IM 0703-294 is examining possible improvements that will upgrade some roads in the area.

The following document presents an overall analysis that was performed as part of the EA to assess potential impacts from traffic noise to properties neighboring the proposed improvements. Existing land uses bordering both existing and potential roads in the project area variable. Many residences, businesses and some undeveloped lands abut the various roads of interest in the project area. Residential areas are typically the land use most sensitive to traffic noise impacts and many residents are close to roads examined for the project (see **Figure 1-2**). Other sensitive uses include parks, schools and hospitals.

1.1 Project Description

Two future alternatives were considered in the EA, and each alternative was considered for potential traffic noise impacts. The first alternative was the No-Action Alternative where the future road layout did not include any new improvements from this project, but improvements were expected to be made to project area roads by local agency projects. The second alternative was the Proposed Action, which included the future road improvements being considered by the EA.

1.1.1 No Action Alternative

NEPA requires the evaluation of a No-Action Alternative. The No-Action Alternative includes safety and maintenance activities that are required to sustain an operational transportation system but does not include any capacity improvements. However, there are several already planned transportation improvements under other projects in the vicinity that are part of the future travel demand forecasting (see **Figure 1-3)**. These improvements from other projects include transportation improvement projects that:

A. have committed funding in the short-range future
   or
B. are considered in the six-year regional Transportation Improvement Program (TIP)
   or

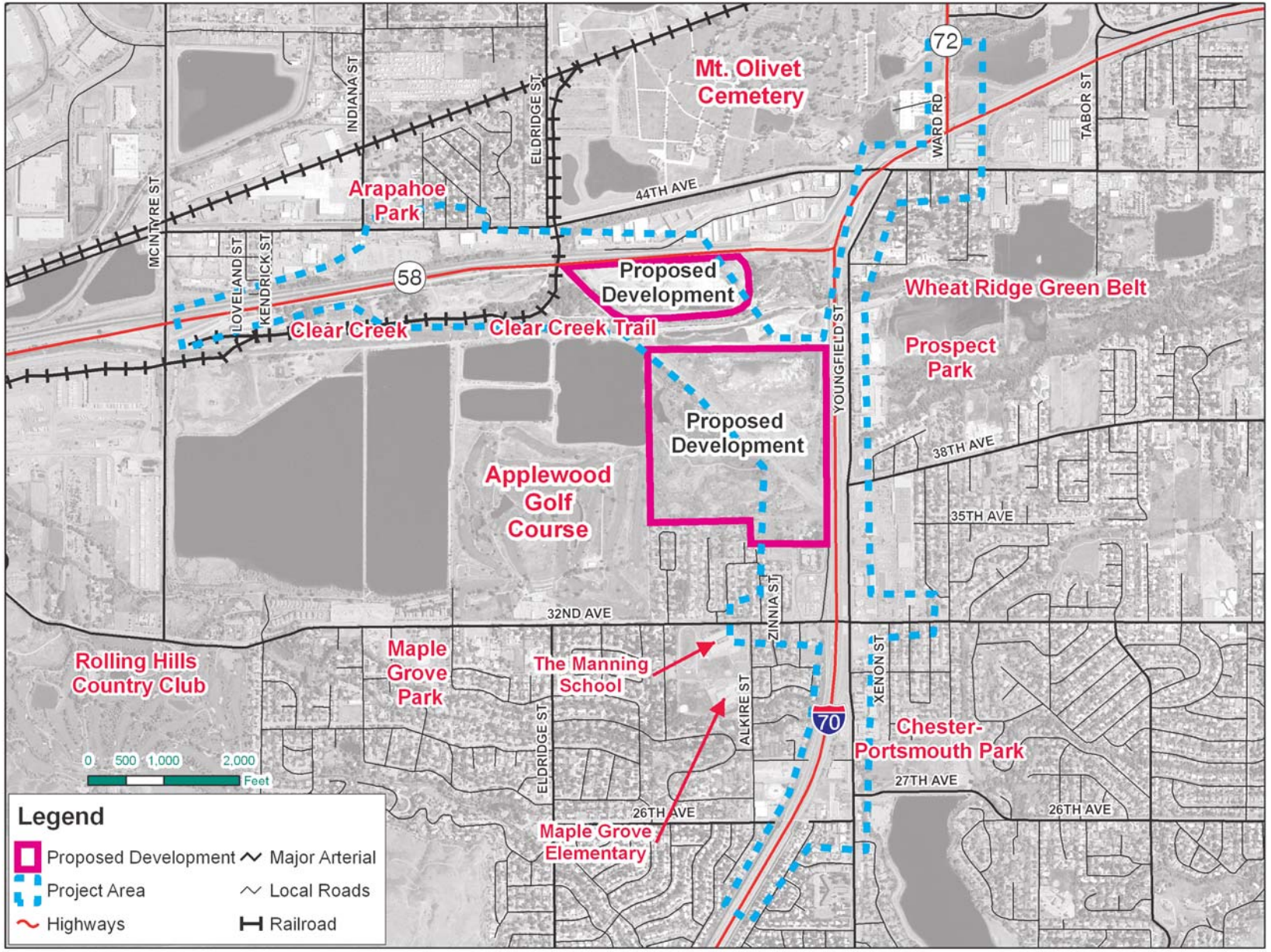
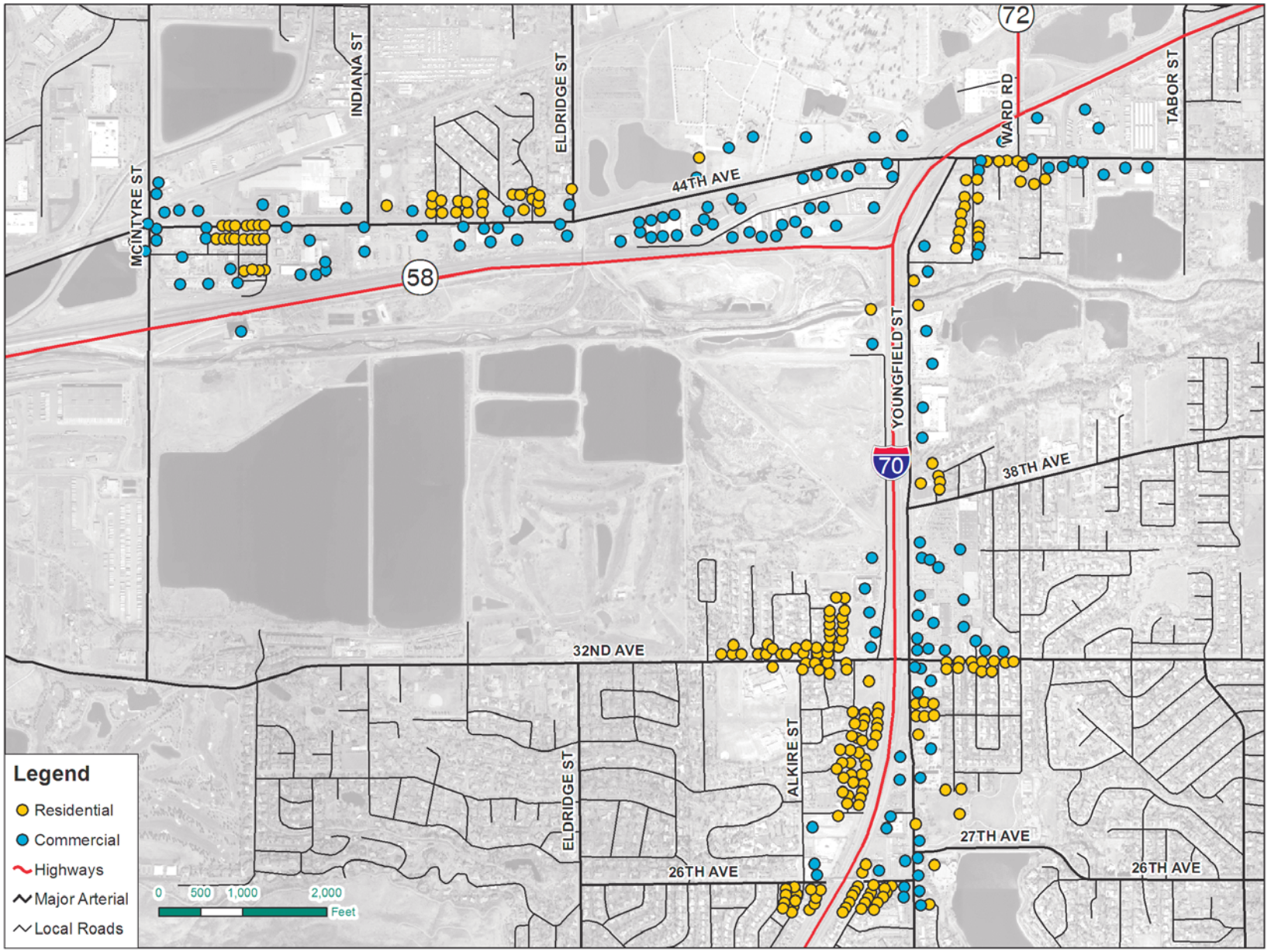


Figure 1-1

Project Area



North SOURCE: FHU 2006c

Figure 1-2

Noise Sensitive Areas along Study Corridors

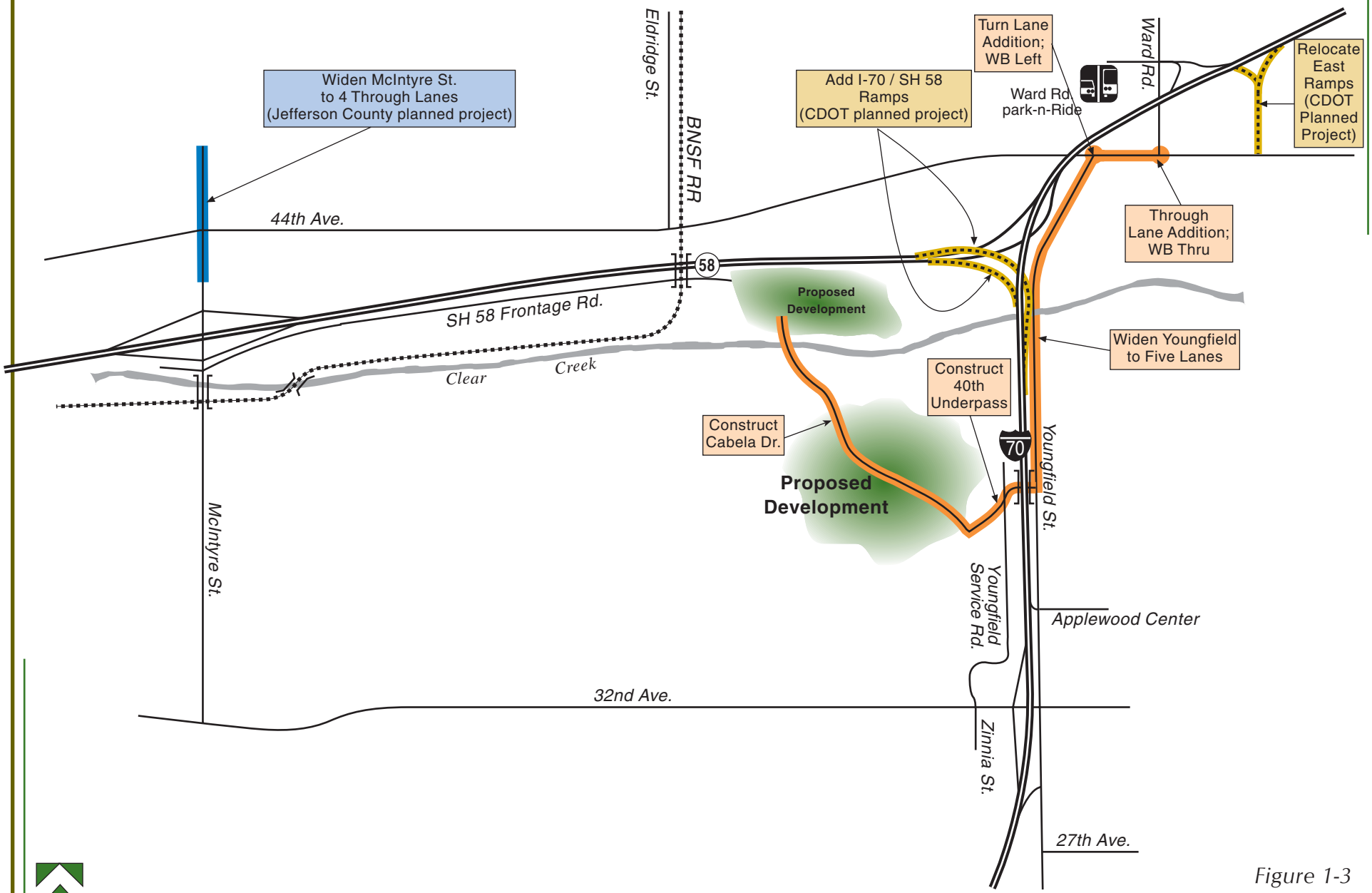


Figure 1-3

No-Action Alternative

C. have funding identified in city or county Capital Improvement Programs

These other transportation improvements generally have committed or identified funds for construction and will be made regardless of whether the Proposed Action improvements are made. Committed projects that are included in the travel demand forecasting for the No Action Alternative include:

- City of Wheat Ridge planned local agency projects
- Jefferson County planned McIntyre Street improvements
- CDOT planned I-70/State Highway 58 (SH 58) interchange improvements
- Regional Transportation District (RTD) planned Gold Line transit facility

The City of Wheat Ridge local agency projects include:

- Construction of the 40th Avenue underpass of I-70
- Widening of Youngfield Street from 38th Avenue to 44th Avenue
- Construction of Cabela Drive from 40th Avenue to the proposed development just north of Clear Creek

Improvements to McIntyre Street between approximately SH 58 and 45th Avenue are planned by Jefferson County and are included in the travel demand forecasting. These improvements consist of the widening of McIntyre Street to two through lanes in either direction from SH 58 to south of 45th Avenue and associated bicycle/pedestrian improvements. FHWA/CDOT approval is not required.

CDOT is currently preparing a Draft Environmental Impact Statement (EIS) for the proposed Northwest Corridor project. Four “build” alternatives and the “no-action” alternative are being analyzed as part of the Draft EIS process. One of the four “build” alternatives, the Combined Alternative, includes a four-lane principal arterial along McIntyre Street to SH 58 with a regional arterial/tollway along SH 93 and US 6 through Golden. As a maximum traffic scenario, the Northwest Corridor Combined Alternative traffic forecasts were included in the travel demand forecasting.

CDOT has planned I-70/SH 58 interchange improvements that are also included in the No-Action Alternative. This project includes:

- The addition of a ramp connection from I-70 eastbound to SH 58 westbound
- The addition of a ramp connection from SH 58 eastbound to I-70 westbound
- The relocation of the eastbound I-70/44th Avenue ramps farther east along I-70 to increase spacing between the ramp from SH 58 and the 44th Avenue ramps
- Relocation of the existing I-70 eastbound on-ramp from the Youngfield Street/38th Avenue intersection south to the Youngfield Street/35th Avenue intersection was also included in the I-70/SH 58 interchange improvements; however, the Proposed Action may supersede this action and relocate the ramp south to the Youngfield Street/27th Avenue intersection
- Construction of the I-70 Denver to Golden light rail Gold Line by the Regional Transportation District is also included in the No-Action Alternative

1.1.2 Proposed Action

The Proposed Action would include the No-Action Alternative actions as well as several new project-specific actions (see **Figure 1-4**). The Proposed Action consists of the following series of elements:

- **New I-70/32nd Avenue Interchange Hook Ramps**:
  - Construction of off-set hook ramps at the I-70/32nd Avenue interchange with the westbound hook ramps located north of 32nd Avenue at approximately 38th Avenue and the eastbound hook ramps located at Youngfield Street and 27th Avenue
  - Construction of a third bridge over 32nd Avenue for the I-70 westbound ramp traffic
  - Closure of the existing westbound I-70 off-ramp that exits to 32nd Avenue. The existing westbound I-70 on-ramp would remain open but access would be limited to eastbound 32nd Avenue traffic only
  - Reconstruction and restriping of Youngfield Street between 27th Avenue and approximately 30th Avenue to achieve a 5-lane roadway section

- **32nd Avenue Improvements**:
  - Widening of 32nd Avenue between approximately Alkire Street and approximately Xenon Street and the widening of Youngfield Street between approximately 35th Avenue and 30th Avenue in the vicinity of the I-70/32nd Avenue interchange
  - Connection of Cabela Drive with 32nd Avenue west of I-70 (40th Avenue to 32nd Avenue)

- **New SH 58/Cabela Drive Interchange**
  - Construction of a new diamond interchange on SH 58 west of Eldridge Street and connection of Cabela Drive to this interchange
  - Connection of Cabela Drive with 44th Avenue north of the new interchange on SH 58

- **I-70/Ward Road Interchange**:
  - Restripping of the Ward Road and westbound I-70 on-ramp intersection to add an additional southbound left turn lane onto the ramp and widen the ramp to receive this lane
  - Addition of a second right-turn land for the eastbound I-70 /Ward Road off-ramp

- **Bicycle/Pedestrian Improvements**:
  - Relocation of the Jefferson County Open Space Clear Creek trail in the vicinity of the new SH 58/Cabela Drive interchange
  - Replacement of the 32nd Avenue trail detached sidewalk along the south side of 32nd Avenue from Alkire Street to Cabela Drive with an attached sidewalk
  - Improvements to pedestrian and school safety along 32nd Avenue
  - Construction of an Americans with Disabilities Act (ADA)-compliant pedestrian bridge at 27th Avenue to replace the existing pedestrian bridge at 26th Avenue as part of the eastbound I-70 hook ramps
  - Provisions for Jefferson County Open Space Clear Creek Trail access through the development site from 32nd Avenue
  - Wider sidewalks under I-70 on the south side of 32nd Avenue to better accommodate bicycles and pedestrians

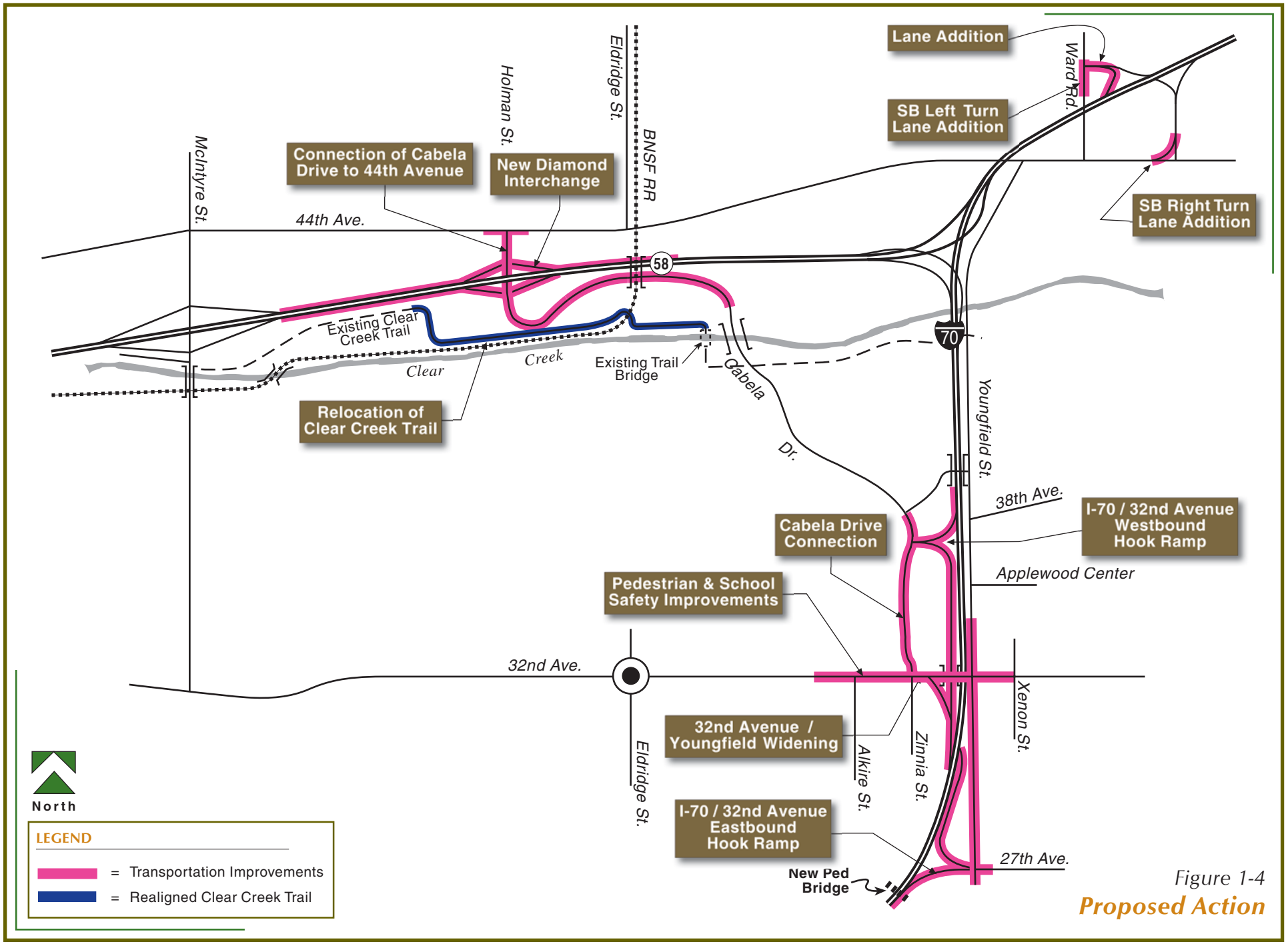


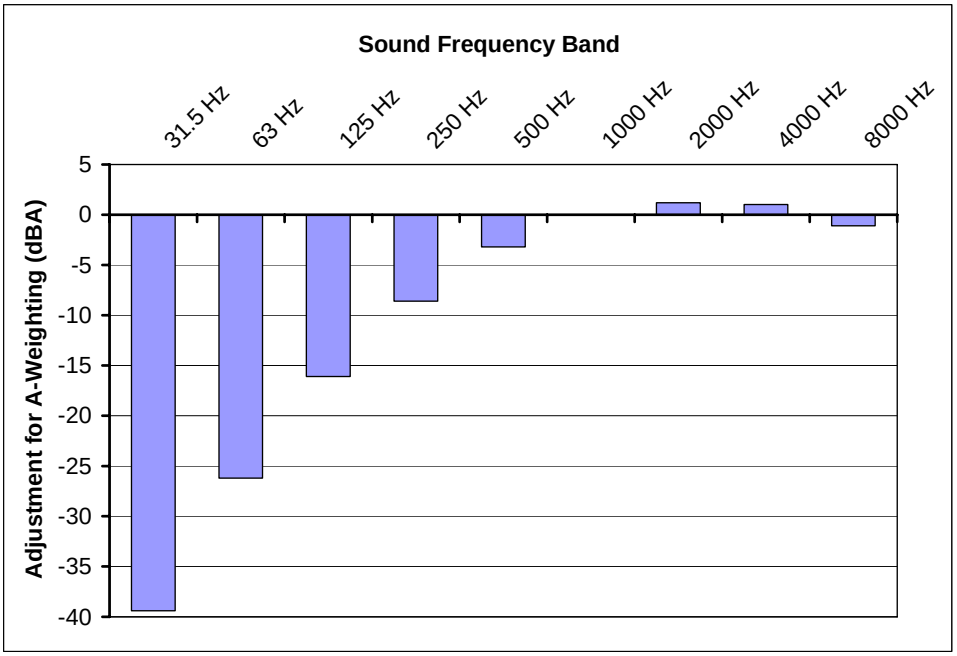
Figure 1-4
Proposed Action

1.2 Basics of Sound

Sound is created when an object vibrates and radiates part of that energy as acoustic pressure or waves through a medium, such as air, water, or a solid. Sound and noise are measured in units of decibels (dB). The dB scale is logarithmic, not linear. As an example, two identical noise sources, each producing 60 dB, will produce 63 dB when operated together. Likewise, a 10-dB increase in sound levels represents ten times as much sound energy.

The human ear can accommodate a wide range of sound energy levels, including pressure fluctuations that increase by more than a million times. The human ear is not equally receptive to all frequencies of sound-producing vibrations. A-weighting of sound levels by frequency is a method used to approximate how the human ear would perceive a sound, mostly by reducing the contribution from lower frequencies by a specified amount (see **Figure 1-5**). A-weighted sound levels are reported in dBA. Most people will not notice a difference in loudness of sound levels of less than 3 dBA, which is a two-fold change in the sound energy. Most people relate a 10-dBA change in sound levels to a doubling of sound loudness.

Figure 1-5 A-Weighting Adjustments for Sound



SOURCE: American National Standards Institute, 2001.

Sound levels diminish with distance from the source because of spreading, atmospheric absorption, interference from other objects and ground effects. "Hard" ground (such as asphalt) and "soft" ground (such as grass) transmit sound differently. “Hard” ground is more reflective and will produce louder sound levels farther from the source. With traffic noise over “hard” ground, a 3-dBA increase in noise could be caused by doubling the traffic volume or cutting the distance from the roadway in half.

Traffic noise tends to fluctuate over time in accordance with traffic volumes, vehicle types, and speeds. This fluctuation makes it difficult to describe the noise impact through a single value. Nonetheless, the FHWA and CDOT use the one-hour equivalent sound level (L_{eq}) as the metric for assessing traffic noise impacts. The L_{eq} is the "average" of the fluctuating noise levels over the time period, or the constant noise level that would produce the same sound energy over the time period as the fluctuating noise level. On busy roads and highways, the loudest traffic noise generally occurs when the largest traffic volume can travel at the highest speed, not when traffic becomes overly congested and slows. This noisiest traffic condition generally describes Level of Service (LOS) C for a highway.

1.3 Noise Analysis Approach

The purpose of the noise analysis was to assess traffic noise on properties near the proposed project roads and conclude whether noise impacts may occur and whether noise mitigation considerations are necessary in the project design. The analysis presented in the following sections included major roads that would be changed or built by the project; it did not include residential neighborhood streets.

The overall traffic noise analysis was based on measurements of existing noise conditions and on computer modeling of traffic noise for both existing (2005) and expected future (2030) traffic conditions. Current conditions and both future alternatives being considered in the EA were examined. Felsburg Holt & Ullevig (FHU) performed measurements of existing traffic noise at several locations in the project area in 2005. These results are presented in **Appendix A**. Computer modeling was used to predict the existing and the expected future average traffic noise, focusing on potential impacts to the most sensitive receivers. The noise levels were compared to applicable noise criteria levels to assess for and identify impacted areas. The efficacy of various mitigation measures for the impacted areas were evaluated and select mitigation actions were recommended, as appropriate. Presently, there are residences, motels, churches, parks and businesses near potential project roads (see **Figure 1-2**).

1.4 Vibration

There are no Federal 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 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 than highway traffic. Therefore, vibration from highway traffic is not a significant concern within the EA and will not be examined further in this analysis.

Vibration from road construction could be a concern, if specific construction techniques such as pile driving or blasting are used. Concerns about construction-generated vibrations would depend on these types of activities occurring very close to vibration-sensitive locations. At present, it is not expected that these types of construction techniques will be necessary for the EA alternatives. If such construction techniques are necessary at a specific location, the vibration concerns can be addressed on a case-by-case basis and appropriate mitigation action taken for the specific situation. Therefore, vibration from road construction will not be examined further in this analysis.

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2.0 NOISE IMPACT ANALYSIS METHODS

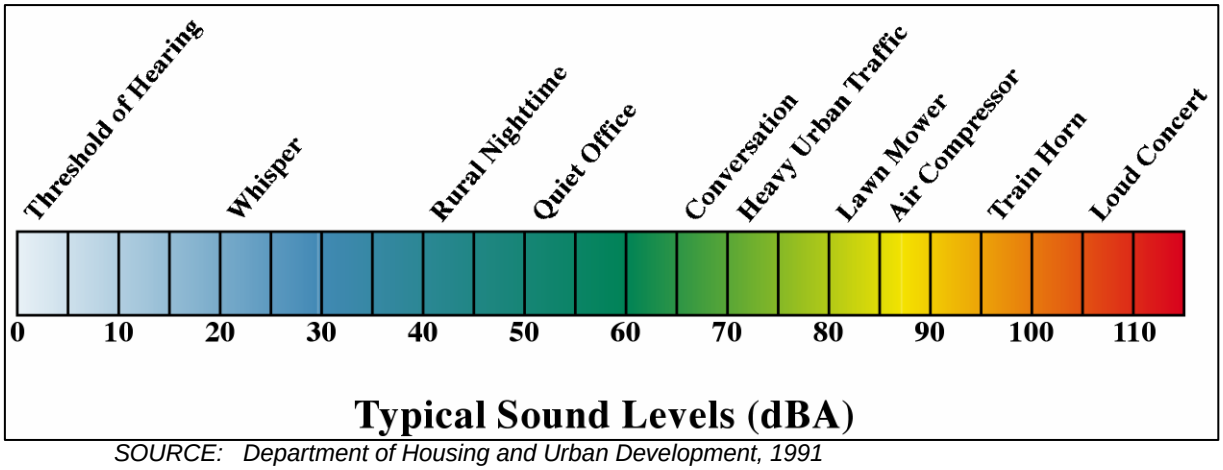
Noise impacts were evaluated through a combination of measurements and computer modeling. Potential impact from traffic noise was assessed on the basis of the noise levels' relationship to CDOT's Noise Abatement Criteria (NAC) (see **Table 2-1**). The CDOT NAC for residences and other Category B receivers is an exterior L_{eq} of 66 dBA, and for commercial areas (Category C) is an L_{eq} of 71 dBA for the peak hour. Under CDOT guidelines, equaling or exceeding the NAC is viewed as a noise impact and triggers an investigation of noise mitigation measures. For further comparison, typical noise levels are shown in the following figure (see **Figure 2-1**).

Table 2-1 Noise Abatement Criteria

Land Use Category	CDOT NAC (L_{eq})	Description of Land Use Category
A	56 dBA exterior	Tracts of land in which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is to continue to serve its intended purpose. Such areas could include amphitheaters, particular parks, or open spaces which are recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
B	66 dBA Exterior	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, picnic areas, playgrounds, active sports areas, and parks.
C	71 dBA Exterior	Developed lands, properties or activities not included in categories A and B above.
D	None	Undeveloped lands.
E	51 dBA Interior	Residences, motels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

SOURCE: CDOT, 2002

Figure 2-1 Typical Noise Levels



SOURCE: Department of Housing and Urban Development, 1991

A "substantial" noise increase would also be considered a noise impact and lead to evaluation of traffic noise mitigation actions. A "substantial" noise increase is indicated if the future noise level is expected to increase by 10 dBA or more over existing levels at any location modeled. For the noise impact discussion, the "peak hour" refers to the highest traffic noise hour, which may or may not correspond to the hour of most traffic. Traffic noise can actually decrease during rush hour due to lower vehicle speeds from overloaded and congested roads.

2.1 Noise Measurements

Short-term (10-minute) traffic noise measurements were performed in the afternoon at eight locations in the project area (see **Section 3.1**) to document existing ambient conditions across the project area. These locations included residential, park, commercial and undeveloped areas along the project corridors. Actual traffic counts, including the number of large trucks, were collected when traffic was visible during the noise measurement periods (see **Appendix A**). This approach spreads the measurements over a variety of locations in the project area and adjacent to a range of road types.

The EA noise measurements were performed using a Svantek 945A Type 1 sound level meter calibrated at the site with a Norsonic 1251 calibrator. Measurements were made during meteorological conditions, including wind speed, that were acceptable according to FHWA guidance.

2.2 Noise Modeling

Computer modeling was performed for both current conditions and expected future conditions. Modeling is used because day-to-day variations in traffic or weather conditions that affect noise levels cannot be captured or quantified by brief noise measurements alone, and because future noise levels can not be measured before they exist. Modeling results represent typical average traffic conditions.

The ultimate purpose of the models is to show whether future traffic noise levels caused by the proposed project would be high enough to impact neighboring properties and whether noise mitigation should be provided for any such impacts within the study area. The traffic noise modeling software used for the analyses was FHWA's Traffic Noise Model (TNM) Version 2.5.

The existing traffic conditions that were modeled included the current road configurations and traffic volumes. Two 2030 traffic conditions were modeled based on projected 2030 traffic and the corresponding roads for each alternative (see **Section 1.1**). The conditions examined in these analyses used LOS C traffic volumes for I-70 and the afternoon peak hour traffic volumes for the smaller highways and arterials, as it generally had more traffic than the morning peak hour.

TNM was used to calculate noise levels at approximately 350 discrete receiver locations at major buildings or parks within about 500 feet of a model roadway (see **Appendix B**). The modeled roadways were those roads that would be built or changed by the Proposed Action. The same receiver locations were used in each model for consistency.

The computer noise models require a considerable amount of input data regarding the geometry of the roadways as well as traffic volumes, vehicle mix and speeds. Detailed traffic studies were completed for the project corridors (FHU 2005) to provide traffic volumes. The existing road/street layout was mapped and used for the existing conditions model. Known local agency projects (see **Section 1.1.1**) were added to the existing conditions model roads to create the future No-Action Alternative model. The roadway additions and changes for the Proposed Action (see **Section 1.1.2**) were also modeled to assess the possible noise impacts. In general, the following data were used in the models:

- **Units**- meters and kilometers per hour
- **Current Roadway Alignments**- XY coordinates from CAD files and aerial photographs
- **Future Roadway Alignments**- XY coordinates from CAD files
- **Vehicle Speeds**-ranged from 56-100 kilometers per hour (KPH) (35-60 miles per hour [MPH]), depending on road type
- **Traffic Volumes**- from traffic study (LOS C for I-70, PM peak hour for rest, **Appendix C**)
- **Vehicle Mix**-from noise measurement vehicle count data
- **Elevations**- from ground surface contours of the project area and proposed road designs; receivers 5 feet tall
- **Barriers**- structure and terrain barriers used as needed to emulate the existing area; mitigation barriers were added where appropriate for mitigation evaluation

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3.0 EXISTING CONDITIONS

The existing traffic noise conditions were assessed through a combination of measurements and modeling. The traffic noise assessment focused on the major roads that are of importance to the proposed project.

3.1 Noise Measurements

The short-term noise measurements (see **Appendix A**) were performed at eight locations (see **Figure 3-1**) in the afternoon within the project area to document existing ambient conditions (see **Table 3-1**). These locations included residential, park, commercial and undeveloped areas along important project traffic corridors.

The results (see **Table 3-1**) indicate that the traffic noise environment did not exceed the applicable CDOT NAC at any of the measurement locations during the measurement periods. However, some results were close to the NAC (Location 8) and may reach or exceed the NAC under different traffic conditions. In addition, some of the results were meant to be representative of traffic noise levels for other land uses that are nearby (Location 6) and may exceed the NAC for the adjacent properties.

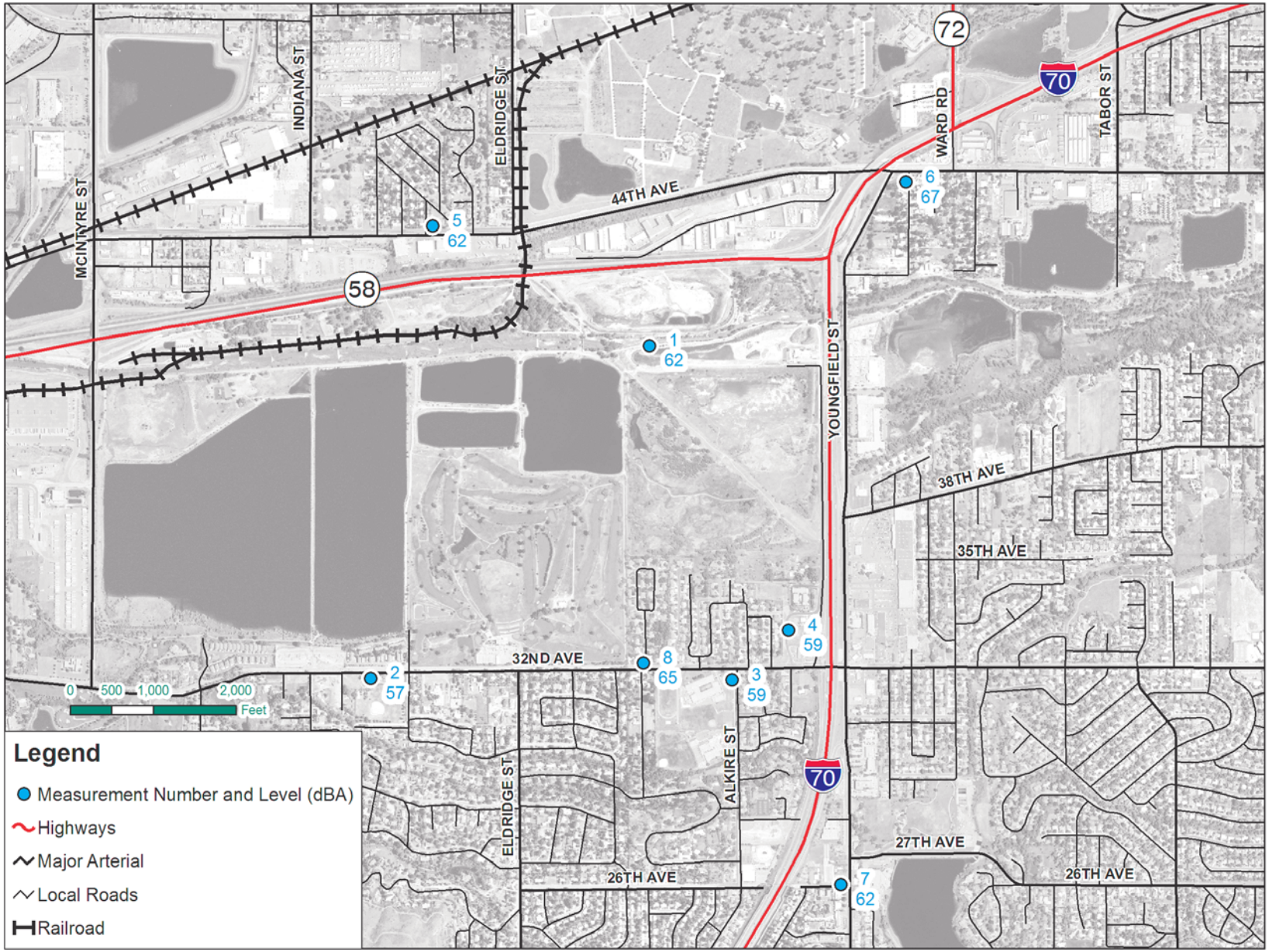
Table 3-1 Noise Measurement Results

Location Number	Location	L_{eq} (dBA)	Land Use Category	CDOT NAC (dBA)
1	Clear Creek bike path	62	B	66
2	Arbor House (14600 W. 32nd Ave.)	57	B	66
3	Manning School (13200 W. 32nd Ave.)	59	B	66
4	3200 block Youngfield Service Rd.	59	C	71
5	14300 block W. 44th Ave.	62	B	66
6	4300 block N. Xenon St.	67	D	None
7	12800 block W. 26th Ave.	62	C	71
8	13500 block W. 32nd Ave.	65	B	66

SOURCE: FHU field data

3.2 Verification Model

As a check on noise model parameters, the traffic conditions observed during the noise measurement episodes were used to construct a verification model. The intent was to check the accuracy of calculated noise levels through a model that reflected the road alignment, traffic volumes and receiver locations at the time of field measurement. A close match between measurements and model results would ensure that the models were providing accurate noise results.



North

SOURCE: FHU 2006c

Figure 3-1

Noise Measurement Locations

The verification model utilized the areas where noise level measurements were made near roads of interest (see **Figure 3-1**). The model was constructed in TNM using the same approach as the alternatives models (see **Section 2.2**).

In general, the results were in close agreement, as the measured and modeled results for most noise measurement locations differed by 2 dBA or less (see **Table 3-2**). Location 4 probably differed by more because of unique terrain complexities involving I-70 that resulted in overprediction of noise. Overall, the results were acceptable according to CDOT guidelines.

Table 3-2 Verification Noise Model Results

Measurement Location	Measured Sound Level (dBA)	Sound Level from TNM Model (dBA)	Difference (dBA)
2	57	57	0
3	59	57	-2
4	59	63	4
5	62	64	2
6	67	69	2
7	62	63	1
8	65	64	-1

SOURCE: FHU field data and modeling results

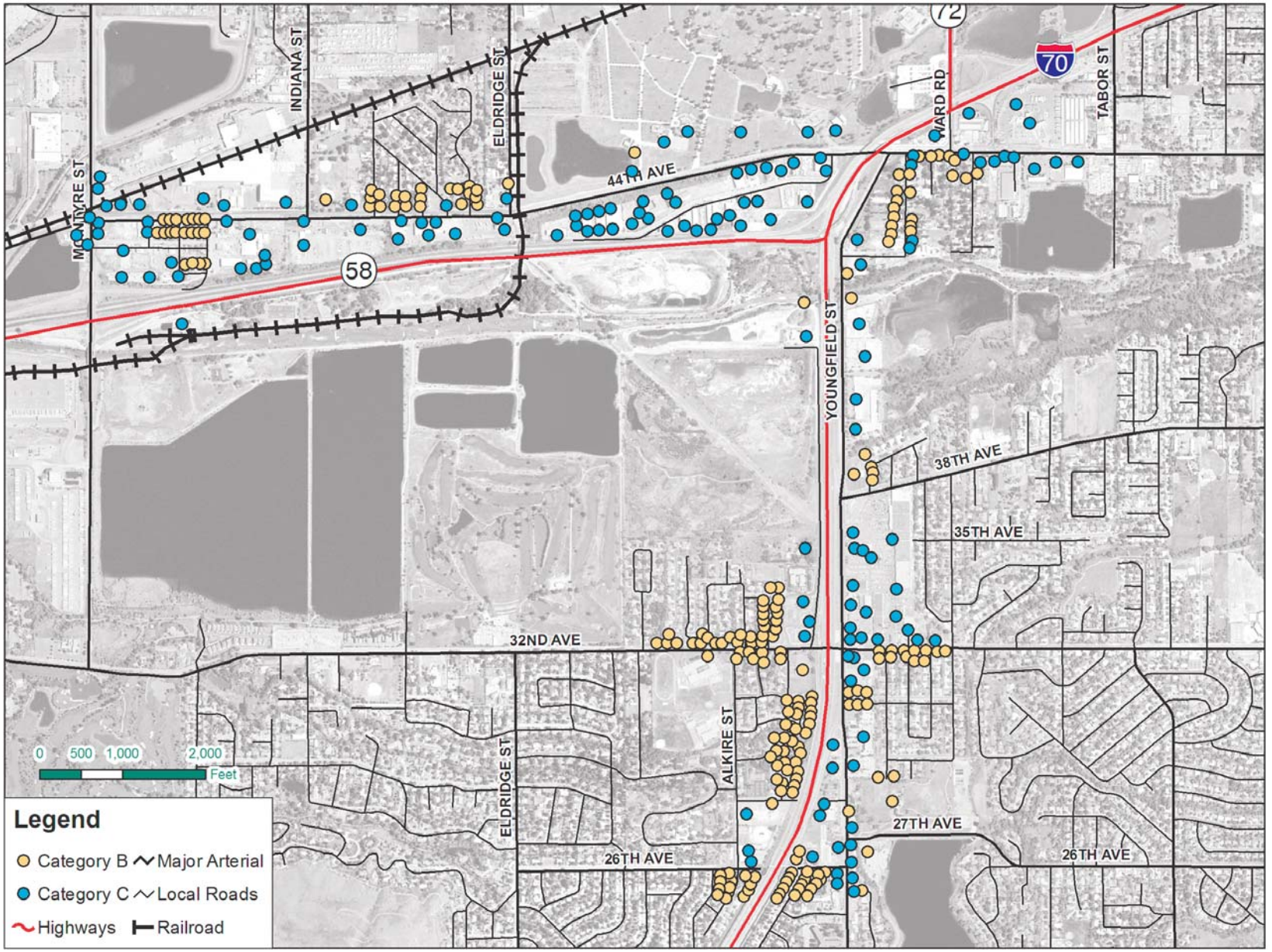
3.3 Existing Noise Barriers

There currently are several traffic noise barriers in the project area that are protecting numerous homes. There is a barrier on the west side of I-70 beginning about 31st Avenue and extending south out of the Study Area. There is a barrier on the east side of I-70 beginning about 27th Avenue and extending south to the end of the Study Area. There is a barrier on the southeast side of I-70 beginning about Tabor Street and extending to the northeast out of the Study Area. There is a barrier on the west side of the Youngfield Service Road north of 32nd Avenue. More information on these barriers is provided in **Section 5.2**.

3.4 Noise Model Results

A noise model was developed (see **Section 2.2**) to evaluate existing conditions on a broader basis than allowed by the measurements alone. This traffic model used the major existing roads that could be affected by the project, with existing (2005) traffic volumes and road layouts. More than 350 noise receivers were modeled (see **Figure 3-2**) and the calculated results for all the receivers are presented in **Appendix D**.

Fifty of the model receivers were calculated to have existing traffic noise at or above the respective NAC during the PM peak hour (see **Figure 3-3** and **Table 3-3**). These included both Category B properties (homes and churches) and Category C properties (business). The areas currently equaling or exceeding the Category B NAC include:



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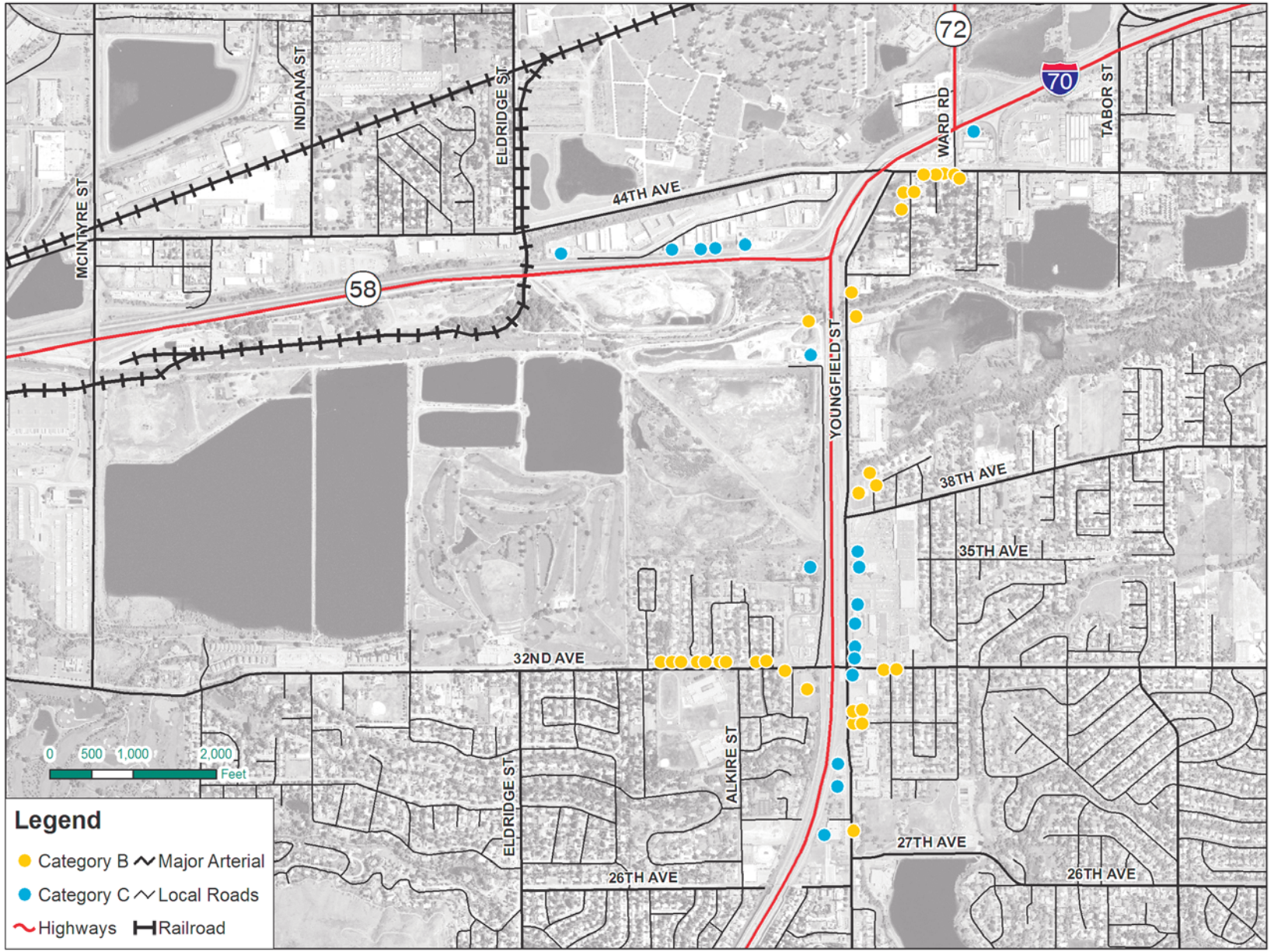
SOURCE: FHU 2006c

Figure 3-2

Noise Model Receiver Locations



North SOURCE: FHU 2006c

Figure 3-3

Noise Impacted Areas from Existing Conditions Model

- Ten homes along 32nd Avenue west of I-70 in Applewood
- Two homes along 32nd Avenue east of I-70 in Maple Grove
- Four homes along 31st Avenue
- Two homes along 38th Drive
- Two homes along Youngfield Street
- Eight homes along 44th Avenue in Nicholas Gardens
- Ridgeview Baptist Church along Youngfield Street
- Applewood Community Church along 32nd Avenue
- A short portion of the Clear Creek bike path (two locations modeled)

Noise levels were estimated to equal or exceed the CDOT Category C NAC for 13 businesses along I-70 and five businesses along SH 58. Category C areas by definition are less sensitive to traffic noise than Category B areas.

The existing conditions model results agree with the measurement results; in that noise along 32nd Avenue is near/above the Category B NAC and noise at I-70/44th Avenue is above the Category B NAC.

Table 3-3 Existing Conditions Noise Model Impacted Receivers

Model Receiver	Existing Noise Level (dBA)	Predicted 2030 No-Action Noise Level (dBA)	Predicted 2030 Proposed Action Noise Level (dBA)	Land Use *
B001	70.6	71.7	70.6	Category B: 12700 block 31st Ave.
B002	70.9	72.0	71.0	Category B: 12700 block 31st Ave.
B030	65.7	66.0	65.9	Category B: 2800 block Zang Way.
B033	65.8	66.1	66.0	Category B: 2800 block Zang Way.
B034	68.2	68.7	67.6	Category B: 12900 block 32nd Ave.
B039	73.7	74.3	74.3	Category B: 4100 block Youngfield St.
B048	67.9	68.6	68.1	Category B: 12700 block 31st Ave.
B049	67.7	68.4	67.7	Category B: 12700 block 31st Ave.
B070	65.6	66.1	65.6	Category B: 12600 block 31st Ave.
B150	72.5	73.0	72.9	Category B: 3800 block Youngfield St.
B192	64.0	65.9	65.5	Category B: 15300 block 44th Ave.
B193	64.1	66.0	65.6	Category B: 15300 block 44th Ave.
B194	63.9	65.8	65.5	Category B: 15300 block 44th Ave.
B195	64.0	65.9	65.5	Category B: 15200 block 44th Ave.
B196	64.5	66.4	66.0	Category B: 15200 block 44th Ave.
B197	64.5	66.4	66.0	Category B: 15200 block 44th Ave.
B198	64.4	66.3	65.9	Category B: 15200 block 44th Ave.
B215	64.9	66.7	66.3	Category B: 4400 block Holman St.
B218	64.6	66.4	66.3	Category B: 4400 block Holman St.
B222	64.7	66.5	66.1	Category B: 4400 block Gladiola St.
B228	64.6	66.4	65.9	Category B: 4400 block Gladiola St.

Model Receiver	Existing Noise Level (dBA)	Predicted 2030 No-Action Noise Level (dBA)	Predicted 2030 Proposed Action Noise Level (dBA)	Land Use *
B235	64.9	66.7	66.1	Category B: 4400 block Gardenia St.
B352	69.3	70.4	70.3	Category B: 12400 block 44th Ave.
B353	68.9	69.8	69.7	Category B: 12400 block 44th Ave.
B354	67.2	68.0	67.9	Category B: 12300 block 44th Ave.
B357	68.9	69.9	69.8	Category B: 12400 block 44th Ave.
B358	69.2	70.1	70.0	Category B: 12500 block 44th Ave.
B372	68.1	68.2	68.2	Category B: 4300 block Xenon St.
B373	66.8	67.0	67.0	Category B: 4300 block Xenon St.
B377	66.5	66.4	66.5	Category B: 4300 block Xenon St.
B462	66.0	67.8	67.1	Category B: 13400 block 32nd Ave.
B463	66.3	68.1	67.3	Category B: 3200 block Beech Ct.
B464	66.6	68.4	67.6	Category B: 3200 block Beech Ct.
B466	66.9	68.7	67.9	Category B: 3200 block Arbutus St.
B467	66.8	68.6	67.8	Category B: 3200 block Arbutus St.
B470	66.7	68.5	67.8	Category B: 13200 block 32nd Ave.
B471	66.8	68.6	67.9	Category B: 13200 block 32nd Ave.
B473	65.9	67.7	66.9	Category B: 3200 block Alkire Ct.
B474	66.8	68.6	67.9	Category B: 3200 block Alkire Ct.
B478	64.9	66.5	65.8	Category B: 13100 block 32nd Ave.
B479	65.1	66.6	65.9	Category B: 13100 block 32nd Ave.
B482	65.2	66.6	66.1	Category B: 3100 block Zinnia Ct
B483	67.2	68.4	68.2	Category B: 3100 block Zinnia St.
B484	66.3	68.0	67.4	Category B: 3200 block Zinnia Ct
B489	65.3	66.0	66.3	Category B: 3100 block Zinnia St.
B494	60.8	62.0	67.5	Category B: 3300 block Youngfield St.
B502	69.6	69.9	69.9	Category B: 12600 block 38th Dr.
B503	66.0	66.2	66.3	Category B: 12600 block 38th Dr.
B511	67.6	68.8	68.7	Category B: 12600 block 32nd Ave.
B516	66.3	67.8	67.5	Category B: 12500 block 32nd Ave.
B526	65.0	66.7	66.3	Category B: 12500 block 32nd Ave.
B527	65.4	67.1	66.8	Category B: 3100 Wright St.
B533	64.9	66.5	66.4	Category B: 3100 Ward Ct.
B539	68.5	69.7	70.3	Category B: 2800 block Youngfield St.
B900	66.2	66.2	66.2	Category B: Clear Creek bike path
B901	66.4	66.0	66.1	Category B: Clear Creek bike path
C035	71.9	72.4	73.4	Category C: 3400 block Youngfield Rd.
C109	68.8	71.2	70.5	Category C: 4300 McIntyre St.
C117	70.6	71.4	71.9	Category C: 15000 block 44th Ave.
C120	71.3	72.3	72.9	Category C: 13600 block 43rd Dr.
C126	73.6	60.8	61.1	Category C: 13200 block 43rd Dr.
C127	73.5	60.5	60.9	Category C: 13200 block 43rd Dr.
C130	72.3	60.7	61.1	Category C: 13100 block 43rd Dr.

Model Receiver	Existing Noise Level (dBA)	Predicted 2030 No-Action Noise Level (dBA)	Predicted 2030 Proposed Action Noise Level (dBA)	Land Use *
C131	72.1	73.2	72.7	Category C: 3100 block Youngfield St.
C132	73.5	73.8	74.1	Category C: 2800 block Youngfield St.
C133	69.9	70.3	72.1	Category C: 2800 block Youngfield St.
C134	72.1	72.4	74.0	Category C: 2800 block Youngfield St.
C136	76.5	76.9	76.6	Category C: 3000 block Youngfield St.
C141	71.6	72.7	72.2	Category C: 3200 block Youngfield St.
C142	71.5	72.6	72.1	Category C: 3200 block Youngfield St.
C143	71.6	72.8	72.4	Category C: 3200 block Youngfield St.
C144	70.1	70.8	71.1	Category C: 12900 block 43rd Dr.
C151	72.4	72.5	72.5	Category C: 4100 block Youngfield Service Rd
C153	72	72.8	72.6	Category C: 3500 block Youngfield St.
C154	71.6	72.3	72.1	Category C: 3400 block Youngfield St.
C155	71.3	72.2	71.8	Category C: 3400 block Youngfield St.
C156	70.2	71.1	70.4	Category C: 3100 block Youngfield St.
C159	72.8	61.1	61.5	Category C: 13300 block 43rd Dr.
C277	71.5	72.8	72.8	Category C: 12300 block 44th Ave.
C355	70.8	71.6	71.6	Category C: 12300 44th Ave.

* As shown in Table 2-1.
SOURCE: FHU modeling results

4.0 POTENTIAL FUTURE NOISE IMPACTS

The alternatives being considered for the project were described in **Section 1.1**. The traffic noise modeling effort was conducted as described in **Section 2.2** to assess whether future noise levels along the project corridors for the alternatives will exceed the relevant CDOT NAC or cause a substantial noise increase. If so, noise mitigation measures protecting these areas were considered and evaluated following CDOT guidelines (see **Section 5**).

4.1 Modeled Noise Levels

Noise models were constructed as described in **Section 2.2**. Traffic model runs were made for the major project roads using predicted future (2030) traffic volumes and road layouts for both the No-Action and Proposed Action Alternative. The model noise results are tabulated in **Appendix D** and summarized below.

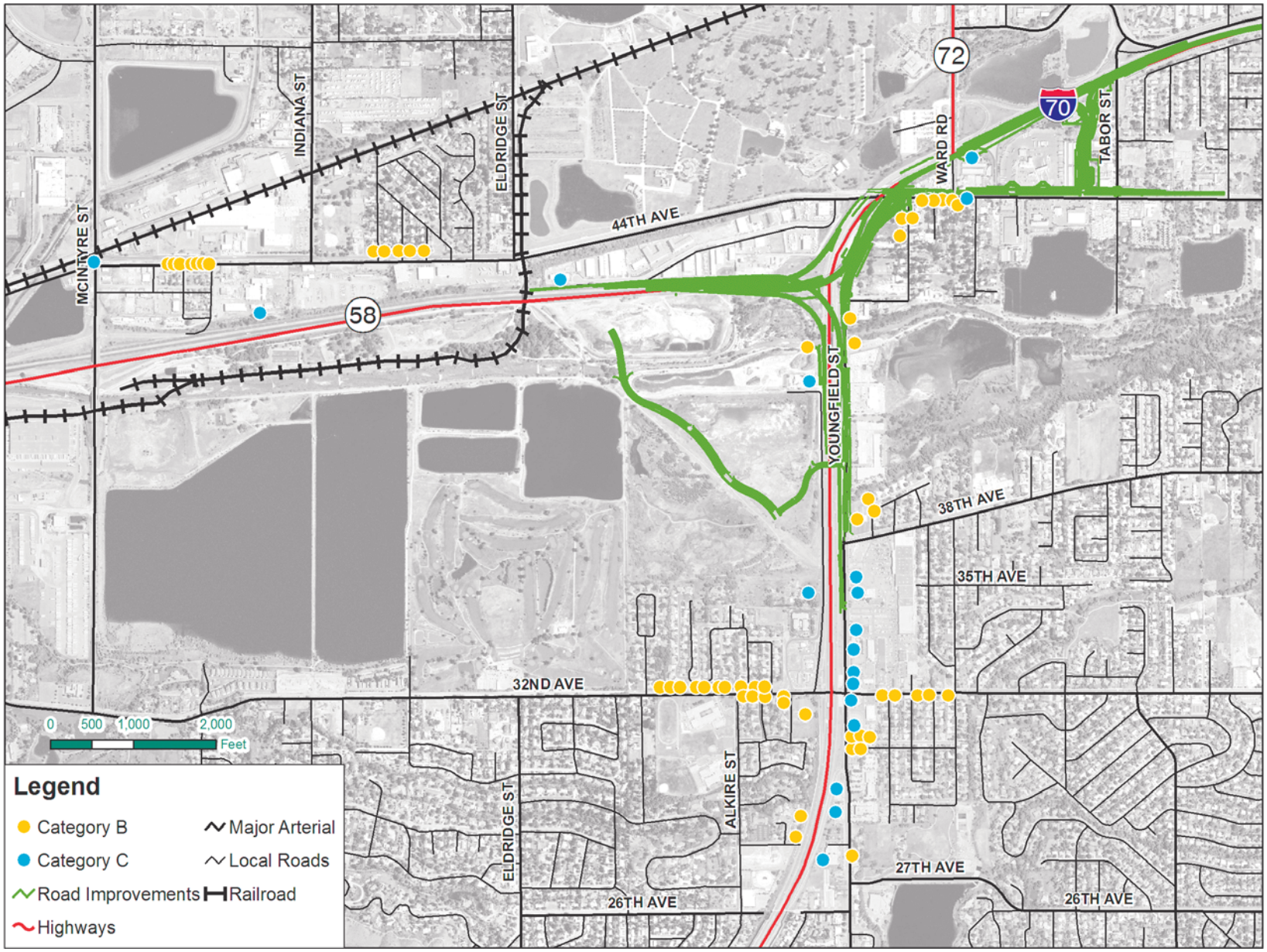
4.1.1 2030 No-Action Alternative Noise Model Results

Model results for the 2030 No-Action Alternative (see **Figure 4-1**) are very similar to the existing conditions results. The traffic noise patterns are similar with the future noise levels pushed out a bit farther from the roads due to increased traffic volumes, so the impacted areas are slightly larger overall.

Seventy-three of the model receivers were calculated to have traffic noise above the respective NAC during the PM peak hour (see **Figure 4-1** and **Table 3-3**). These included both Category B properties (homes and churches) and Category C (business) properties. The areas impacted were:

- Fifteen homes along 32nd Avenue west of I-70 in Applewood
- Five homes along 32nd Avenue east of I-70 in Maple Grove
- Five homes along 31st Avenue east of Youngfield Street
- Two homes on the 2800 block of Zang Way west of I-70 in Applewood
- Two homes along 38th Drive
- Two homes along Youngfield Street
- Eight homes along 44th Avenue in Nicholas Gardens
- Twelve homes alont 44th Avenue in Fairmount (two groups)
- Ridgeview Baptist Church along Youngfield Street
- Applewood Community Church along 32nd Avenue
- A short portion of the Clear Creek bike path (two locations modeled)

Noise levels were estimated to exceed the CDOT Category C NAC for 14 businesses along I-70, one business along 44th Avenue, one business along McIntyre Street and two businesses along SH 58. None of the receivers were predicted to increase by 10 dBA or more. Category C areas by definition are less sensitive to traffic noise than Category B areas.



North SOURCE: FHU 2006c

Figure 4-1

Noise Impacted Areas from 2030 No Action Model

4.1.2 2030 Proposed Action Traffic Model Results

Model results for the 2030 Proposed Action (see **Figure 4-2** and **Table 3-3**) are also similar to the existing conditions results. The traffic noise patterns are similar with the future noise levels pushed out a bit farther from the roads due to increased traffic volumes, so the impacted areas are slightly larger overall in 2030.

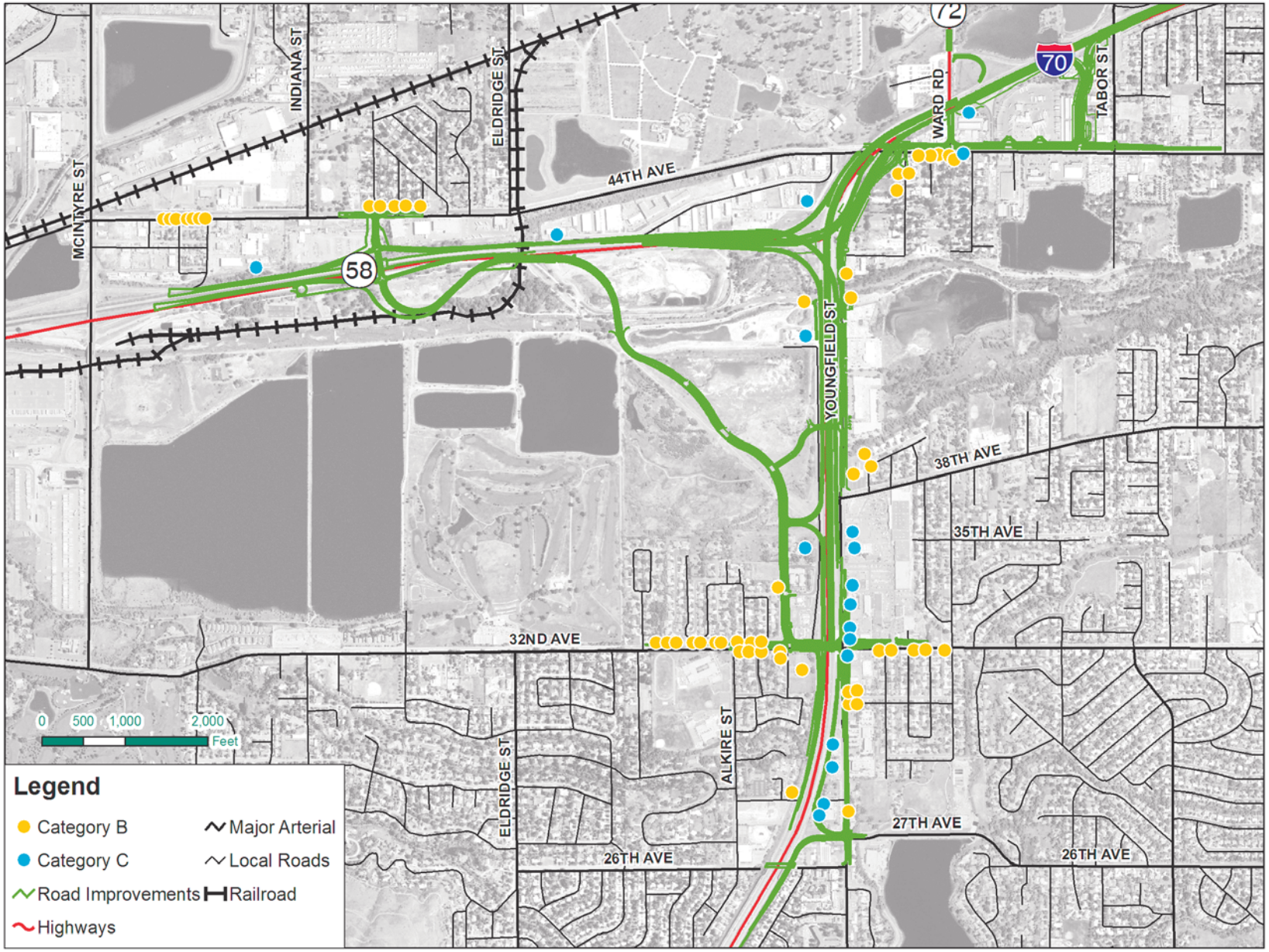
It should be noted that the Proposed Action would install hook ramps to eastbound I-70 at about 27th Avenue (see **Figure 1-4**). This would require removal of approximately 1000 feet of an existing noise barrier on the southeast side of I-70. The Proposed Action must necessarily include replacement of the removed noise barrier with a comparably functioning barrier, so the Proposed Action includes a new approximately 900-foot section of replacement barrier that curves to the northwest and follows the new off ramp (see **Figure 4-3**). The replacement barrier would have the same top elevation as the existing barrier and would be about 12.5 feet tall. For the analysis, this was viewed as replacement of an existing feature and not a new mitigation measure, so this was part of the base case of the Proposed Action.

Seventy-two of the model receivers were calculated to have traffic noise above the respective NAC during the PM peak hour (see **Figure 4-2**). The receivers included both Category B properties (homes and churches) and Category C (business) properties. More information on the impacted receivers is presented in **Table 3-3**. The areas impacted were:

- Fifteen homes along 32nd Avenue west of I-70 in Applewood
- Five homes along 32nd Avenue east of I-70 in Maple Grove
- Four homes along 31st Avenue
- One home on the 2800 block of Zang Way west of I-70 in Applewood
- One home along Cabela Drive in Applewood
- Two homes along 38th Drive
- Two homes along Youngfield Street
- Eight homes along 44th Avenue in Nicholas Gardens
- Twelve homes along 44th Avenue in Fairmount (two groups)
- Ridgeview Baptist Church along Youngfield Street
- Applewood Community Church along 32nd Avenue
- A short portion of the Clear Creek bike path (two locations modeled)

Noise levels were estimated to exceed the CDOT Category C NAC for 14 businesses along I-70, one business along 44th Avenue, one business along McIntyre Street and two businesses along SH 58. None of the receivers were predicted to increase by 10 dBA or more. Category C areas by definition are less sensitive to traffic noise than Category B areas.

The Proposed Action in 2030 is predicted to impact twenty-two more receivers than the existing conditions and one fewer receiver than the No-Action Alternative. Sixty-nine of the 72 impacted receivers under the Proposed Action are shared with the No-Action Alternative. In general, the traffic noise environment would be nearly identical under either the No-Action or Proposed Action Alternative.

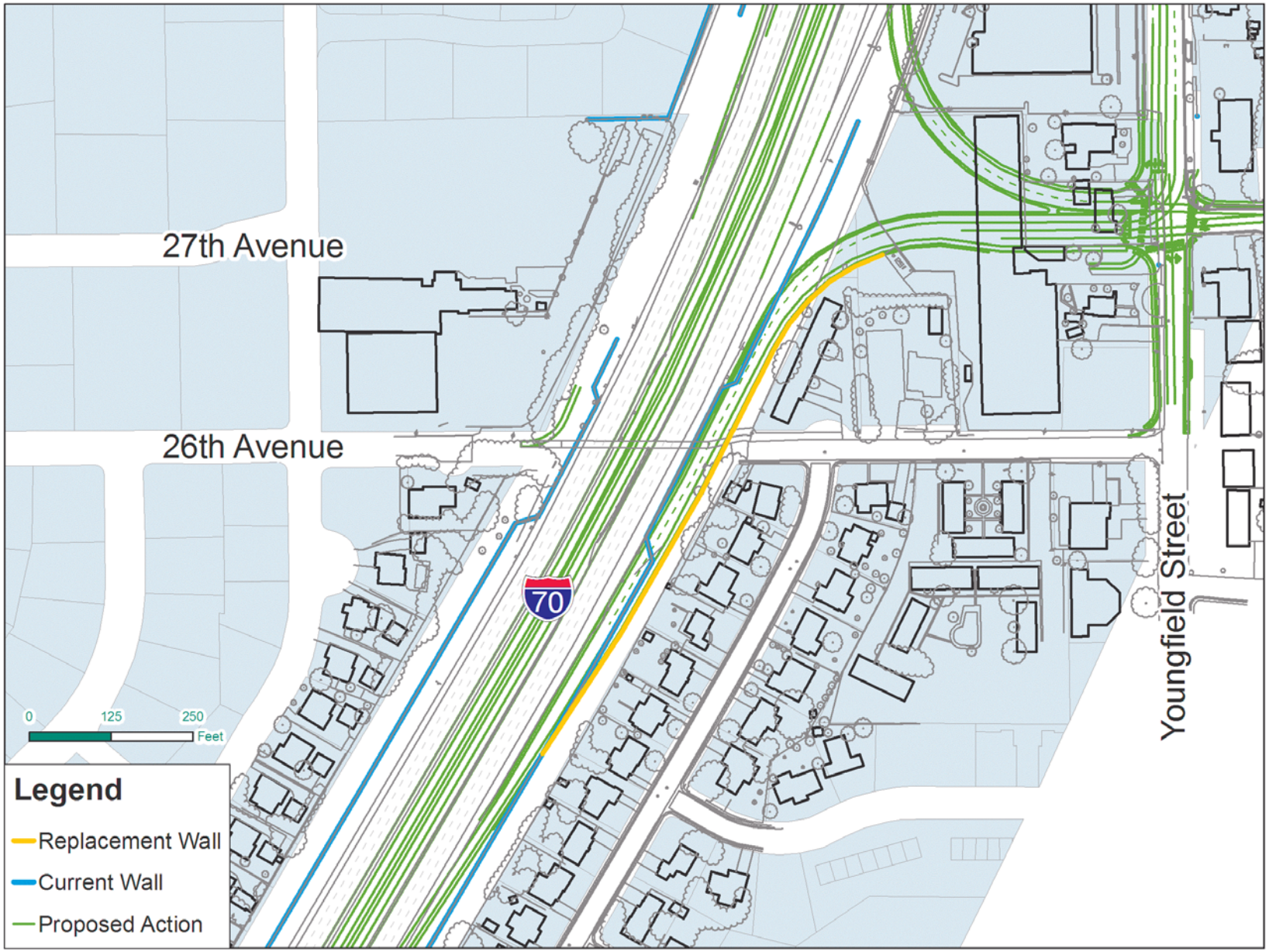


North

SOURCE: FHU 2006c

Figure 4-2

Noise Impacted Areas from 2030 Proposed Action Model



North

SOURCE: FHU 2006c

Figure 4-3

Replacement Barrier for Proposed I-70 Ramp

4.2 Construction Noise

Adjoining properties in the project area could be exposed to noise from road construction activities when the proposed project 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 hours that are least disturbing to adjacent and nearby residents
- Construction activities generally are of a short-term nature, and depending on the nature of the construction operations, could last from seconds (e.g., a truck passing a receiver) to months (e.g., constructing a bridge)
- Construction noise 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.

The project corridors do pass near several residential areas. To address the temporary elevated noise levels that may be experienced during construction, standard mitigation measures should be incorporated into construction contracts. These would include:

- Exhaust systems on equipment would be in good working order. Equipment would 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 would be used where appropriate
- New equipment would be subject to new product noise emission standards
- Stationary equipment would be located as far from sensitive receivers as possible
- Most construction activities in noise sensitive areas would be conducted during hours that are least disturbing to adjacent and nearby residents

5.0 MITIGATION EVALUATION

The traffic noise results indicated that 72 receivers will meet or exceed the CDOT NAC under the Proposed Action. Therefore, traffic noise mitigation measures for those areas were investigated. It is important to note that impacted areas are not guaranteed mitigation measures, but mitigation measures must be evaluated.

Traffic noise impacts affected multiple geographic areas and multiple land uses. Several types of mitigation were considered. Noise barriers are a common mitigation action and were evaluated, but other kinds of mitigation were also considered. The overall feasibility and reasonableness of noise reduction actions that provide a minimum acceptable mitigation benefit for the impacted receivers were evaluated and these actions were then either recommended or disregarded.

For reasons described below, barriers appeared to be the only viable mitigation action and were the only mitigation evaluated in detail. CDOT's goal for noise barriers is a reduction of 10 dBA with a minimum reduction of 5 dBA.

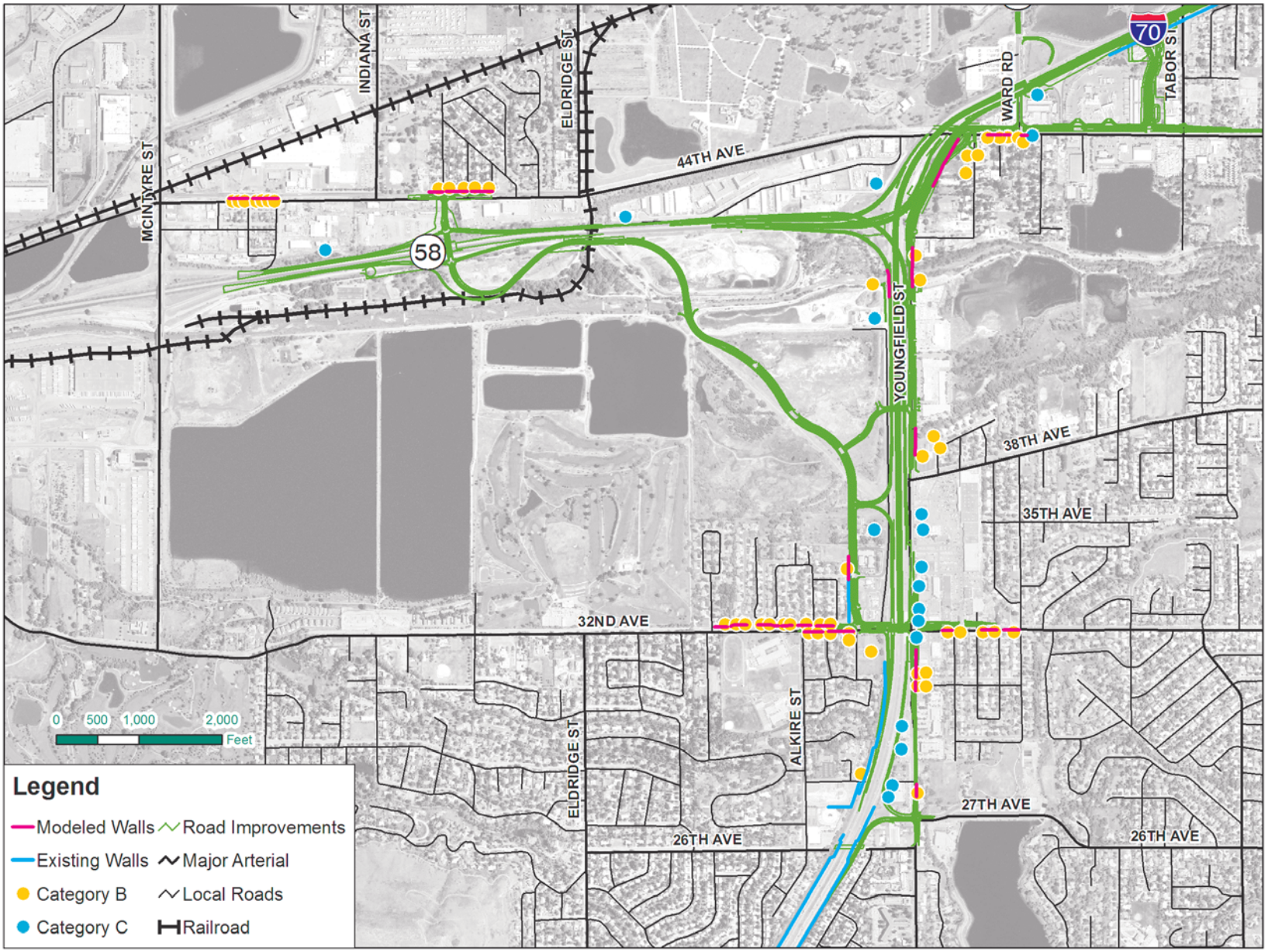
5.1 Non-Barrier Mitigation Evaluation

CDOT guidelines require the evaluation of several non-noise-barrier mitigation alternatives. For a variety of reasons that are described below, none of these alternatives appear to be viable for the project.

Traffic management measures, such as lane closures or reduced speeds, do not appear to be reasonable for the roads of primary interest to the project. One of the reasons for the proposed improvements to roads in this area is to enhance regional traffic flow. Some of the major sources of traffic noise in the project area are I-70 and SH 58, which are freeway-class roads.

The next class of roads in the project area are important arterial streets. Closing lanes during construction would be counterproductive to improving traffic flow. While reducing vehicle speeds on these roads could reduce traffic noise, it would not be consistent with the function of I-70 and SH 58. Vehicle speeds on streets such as Youngfield Street or 32nd Avenue are not high to begin with.

Reducing traffic speeds on Youngfield and 32nd Avenue could reduce traffic noise, but the benefit would likely be small and overwhelmed by noise from nearby I-70 or SH 58. The impacted receivers along 32nd Avenue are very close to the street, so small reductions in traffic noise from slower vehicle speeds would not provide meaningful benefits. Existing noise walls are shown in **Figure 5-1**.



North

SOURCE: FHU 2006c

Figure 5-1

Locations of Noise Mitigation Barriers Evaluated

Changes in horizontal alignments of the roads near the impacted receivers is limited within the project corridors. The impacted Category B receivers are in areas that are reasonably fully developed. Therefore, possible horizontal realignments of roads are constrained by the development of the land adjacent to the project corridors. Moving the roads horizontally away from impacted receivers could reduce noise impacts in some areas but could transfer the impacts to other neighboring areas and require disruptions of adjoining property uses. In addition, the Proposed Action does not look to change the I-70 or SH 58 mainlines, so it is not reasonable to consider relocating these major highways for noise mitigation.

Changes in vertical alignments are also limited by physical constraints. I-70 and SH 58 are major traffic noise sources in the project area and the Proposed Action does not look to change the I-70 or SH 58 mainlines, so they will not change in elevation. An overriding constraint with the other vertical alignments is that the project roads must tie back into the connecting roads in the project area in a reasonable manner. Wholesale changes in project road elevations could have secondary impacts on connecting roads that would not be reasonable or desirable. There presently are (and expected to be in the future) many connections to Youngfield Street and 32nd Avenue that must be maintained that would be affected by road elevation changes. Impacts to underground utilities are another consideration. Therefore, there are not believed to be any meaningful vertical realignment opportunities to reduce traffic noise that have not already been included in the Proposed Action.

For the impacted receivers, there generally is no available undeveloped land within the project corridor that could be used for a noise buffer zone or a vegetative planting area that would provide meaningful noise reduction. Often, prior land development has been purposely near the roads for access, which left little or no space for a buffer. None of the privately-owned buildings are calculated to be so severely impacted by traffic noise that noise insulation measures are justified.

Pavement types and surfaces can affect traffic noise. Quieter pavement types will be preferred for the project when minimum requirements for safety, durability, etc. are also met. However, this cannot be counted as a mitigation action under the noise reduction evaluation because it is not permanent.

5.2 Noise Barrier Evaluation

The existing noise barriers and locations evaluated for new noise barrier placement are shown in **Figure 5-1**. To permit the evaluations, barriers protecting the impacted areas were developed for the computer models and the models were re-run to assess barrier effectiveness. After the minimum parameters for an effective barrier were established in a given area for a feasible barrier (if possible), each barrier was processed through a reasonability assessment according to CDOT guidance. Barriers can easily be put into a computer model, but actually constructing these barriers in the real world may not always be feasible. The feasibility and reasonableness of each barrier determined whether specific barriers were recommended.

The topography of the project corridor plays a very important role in the overall noise environment. There are some topographic changes from project roads to the adjoining areas in the Study Area, and this has a significant impact on the effectiveness and constructability of noise barriers. Because of the topographic changes, a model barrier may not be a constant

height throughout its length even though the top elevation may be constant. These factors contribute to complication of the barrier evaluations.

It is also important to note that the noise barriers could be either earth berms or constructed walls. Either material can be an effective noise barrier. However, berms require considerably more space to construct than walls. Throughout the study area, the impacted receivers tend to be rather close to the project roads. In many places, the minimum barrier may be rather tall (15-25 feet), which requires considerable space for a berm. Barriers more than 25 feet tall were considered to be not feasible because of the impracticality of such large barriers. Often, the road may be considerably higher in elevation than the receivers. This combination of constraints usually makes earth berms impractical or impossible choices for the noise barriers.

Physical placement of the barriers is also a consideration. In many places in the Study Area, there would be long-term ownership, access, maintenance and cost concerns if a mitigation measure is on private property. Therefore, the noise barriers evaluated in this analysis were intended to be located on road right-of-way.

CDOT guidelines state that a traffic noise mitigation action is unreasonable if the cost is more than $4,000 per receiver per decibel of noise reduction. Isolated receivers (e.g., dispersed homes) are a special case worth noting in this context. For a wall protecting a single receiver to be reasonable, the barrier can be no more than about 670 square feet, if it reduces noise by 5 dBA, or no more than about 1300 square feet if it reduces noise by 10 dBA (assuming $30 per square foot of wall). It is a rare situation where barriers of small size provide that much noise reduction. Therefore, it is nearly always unreasonable to construct barriers for isolated receivers and such barriers were not recommended for this project. The barrier evaluations and recommendations that were performed (see **Appendix E**) are described below.

5.2.1 32nd Avenue West of I-70

Fifteen homes along 32nd Avenue between I-70 and the Braun Court were predicted to be impacted by traffic noise under the Proposed Action. Most of the homes were north of 32nd Avenue. These homes were generally lower or even in elevation with 32nd Avenue. There are numerous driveways and streets connecting with 32nd Avenue in this area that would prevent a continuous noise barrier along 32nd Avenue, so eight barrier segments were examined (see **Figure 5-1**). Generally, each barrier segment would protect no more than two front-row homes and would provide a noise reduction benefit to none beyond the front row.

There are serious safety concerns with these barriers. The barriers would cause serious sight-line problems for drivers exiting the neighborhoods onto 32nd Avenue from seven unsignalized streets or driveways within approximately 1,500 feet. Also, the barriers would have to be very close to some of the homes as there is little space between some homes and 32nd Avenue. Therefore, these barriers were found to be infeasible because of safety concerns, but were still evaluated for reasonability.

For the homes north of 32nd Avenue, 9-foot barriers throughout this neighborhood would allow the CDOT goal of a 10 dBA noise reduction to be reached for parts of the yards of three of the receivers, but not for the entire properties because of the barrier gaps. For the best case with these barriers, it was calculated that the cost/benefit would be about $3,600 per receiver per decibel of noise reduction, which is reasonable according to CDOT guidelines. For the impacted

homes south of 32nd Avenue, a 12-foot barrier could provide up to 7 dBA of noise reduction for parts of the yards of impacted receivers, but could not benefit the entire properties because of the necessary barrier gaps. None of these barriers are being recommended because of the safety issues and overall ineffectiveness in protecting the entire impacted properties.

5.2.2 32nd Avenue East of I-70

Five homes along 32nd Avenue between I-70 and Ward Road were predicted to be impacted by traffic noise under the Proposed Action. All of the homes were south of 32nd Avenue. These homes were generally even in elevation with 32nd Avenue. There are numerous driveways and streets connecting with 32nd Avenue in this area that would prevent a continuous noise barrier along 32nd Avenue, so three barrier segments were examined (see **Figure 5-1**). Generally, each barrier segment would protect no more than two front-row homes and would benefit none beyond them.

There are serious safety concerns with these barriers. The barriers would cause serious sight-line problems for drivers exiting the neighborhoods onto 32nd Avenue from unsignalized streets, alleys or driveways. Also, the barriers would have to be very close to some of the homes as there is little space between some homes and 32nd Avenue. The barriers would not protect the entire impacted properties because of the many barrier gaps. Therefore, these barriers were found to be infeasible because of safety concerns, but were still evaluated for reasonability.

The CDOT goal of 10 dBA noise reduction could not be achieved for any of the receivers given the gaps in the barriers. The CDOT minimum noise reduction of 5 dBA could be achieved for two receivers (and two others would receive at least 3 dBA) behind 12-foot barriers. It was calculated that the cost/benefit for these barriers would be about $5,700 per receiver per decibel of noise reduction, which is unreasonable according to CDOT guidelines.

5.2.3 31st Avenue East of Youngfield Street

Four homes along the 12700 block of 31st Avenue were predicted to be impacted by traffic noise under the Proposed Action. These homes were generally even in elevation with the nearby streets. The intersection of Youngfield Street and 31st Avenue would prevent a continuous noise barrier along Youngfield Street to protect these homes, so two barrier segments were examined (see **Figure 5-1**). Each barrier segment would protect no more than one front-row home along Youngfield Street and would benefit none beyond them. Barriers along 31st Avenue were not possible because that is the only access to the homes.

The CDOT goal of 10 dBA noise reduction could not be achieved for any of the receivers given the gaps in the barriers. The CDOT minimum noise reduction of 5 dBA could be achieved for two receivers with a combination of 9-foot and 12-foot barriers. It was calculated that the barriers would be about $6,500 per receiver per decibel of noise reduction, which is unreasonable according to CDOT guidelines. Therefore, these barriers are not being recommended.

5.2.4 2800 Block Zang Way

One home on the 2800 block of Zang Way west of I-70 was predicted to equal the CDOT Category B NAC under the Proposed Action. This represents a calculated increase of 0.3 dBA

over existing conditions, which is very small. This home is already behind a wall along I-70 that would not be changed by the Proposed Action. This barrier is already providing a substantial (10 dBA) traffic noise reduction to this home. Therefore, the existing wall is providing adequate mitigation and no changes to the existing wall are being recommended.

5.2.5 Cabela Drive

One home on the 13100 block of 33rd Avenue west of the proposed Cabela Drive was predicted to be impacted by traffic noise under the Proposed Action. This home may be slightly higher in elevation than the nearby streets. A wall approximately 10-feet tall currently exists south of this home along the Youngfield Service Road. A continuation of the existing noise barrier to the north was examined (see **Figure 5-1**). This barrier would be along the right of way of the future Cabela Drive of the Proposed Action. It was calculated that a 13-foot tall 140-foot long extension to the existing noise barrier could provide the CDOT goal of a 10 dBA noise reduction. Given that the existing barrier is 10 feet tall, a 10-foot tall extension was also examined. A 10-foot tall extension was calculated to provide a 9 dBA noise reduction and to be $4,800 per receiver per decibel of noise reduction. Even though this is slightly above the CDOT threshold at $4,800 per receiver per decibel, the 10-foot tall barrier extension is being recommended.

5.2.6 12600 Block 38th Drive

Two homes on the 12600 block of 38th Drive were predicted to be impacted by traffic noise under the Proposed Action. These homes were generally even to higher in elevation than the nearby streets. These homes are separated from I-70 and Youngfield Street by the Ridgeview Baptist Church property. Because the street right-of-way is the preferred location for these noise barriers, a barrier along Youngfield Street was examined (see **Figure 5-1**). Because of topographic changes along Youngfield Street, the test barrier was up to 50 feet tall. Neither the CDOT goal of 10 dBA noise reduction nor the minimum of 5 dBA noise reduction could be achieved for the receiver. Therefore, this barrier is not being recommended.

It should be noted that a barrier between the homes and the Ridgeview Baptist Church property could provide a 5-10 dBA noise reduction. However, this barrier location would present ownership/access concerns and would not be cost effective (about $15,000 per decibel). This barrier is not being recommended and this information has been provided for fullness of disclosure.

5.2.7 4100 Block Youngfield Street

One residential property on the 4100 block of Youngfield Street and one on the 2800 block were predicted to be impacted by traffic noise under the Proposed Action. These properties are isolated residential receivers. These properties are generally even in elevation with Youngfield Street and lower than I-70. The driveways to these properties from Youngfield Street would prevent a continuous noise barrier.

For the 4100 block, two barrier segments totaling 140 feet along Youngfield Street for this property were examined (see **Figure 5-1**). The CDOT goal of a 10 dBA noise reduction could not be achieved for the receiver with barriers 20 feet tall or less. The CDOT minimum noise reduction of 5 dBA could be achieved with 13-foot barriers. It was calculated that the barrier

would be about $5,500 per receiver per decibel of noise reduction, which is unreasonable according to CDOT guidelines.

The 2800-block property is large enough that the driveway could conceivably be relocated and allow a continuous barrier to be constructed. However, an irrigation ditch on the property that is near the house would severely constrain driveway rerouting to the point that it is not really feasible. The existing driveway is so near the house that a multi-segmented barrier would not be effective.

Barriers at either property are not being recommended. There are safety concerns with these barriers. The barriers would cause sight-line problems for drivers exiting the residences onto Youngfield Street from an unsignalized driveway. Therefore, these barriers are not being recommended because of safety concerns and ineffectiveness in benefiting the entire impacted property.

5.2.8 44th Avenue East of I-70

Eight homes near 44th Avenue between I-70 and Ward Road were predicted to be impacted by traffic noise under the Proposed Action. All of the homes were south of 44th Avenue. These homes were generally even in elevation with the nearby streets but lower in elevation than I-70. There are numerous driveways and streets connecting the various streets in this area that would prevent a continuous noise barrier, so four barrier segments were examined (see **Figure 5-1**). The largest barrier was along Youngfield Street for three homes on the 4300 block of Xenon Street. Three smaller barriers were generally for the 12400 block along 44th Avenue that typically would protect no more than two front-row homes.

The traffic noise environment in this area was complex with numerous highways and streets in the area at different elevations. Some homes were affected by traffic noise from several roads at different elevations that would require multiple barriers at multiple elevations. Some of these homes were set back a considerable distance from the right-of-way of the noisy roads, thus reducing the effectiveness of barriers. The area along 44th Avenue required so many gaps for driveways that the effectiveness of barriers was severely compromised. Neither the CDOT goal of 10 dBA noise reduction nor the minimum of 5 dBA noise reduction could be achieved for the receivers with what was considered to be a reasonable arrangement of barriers. Therefore, barriers are not being recommended.

5.2.9 44th Avenue West of I-70

Twelve homes along 44th Avenue in the Fairmount area were predicted to be impacted by traffic noise under the Proposed Action. The homes were in two groups along 44th Avenue: 14500-14700 blocks and 15200-15300 blocks (see **Figure 4-2**). These homes were generally even in elevation with 44th Avenue.

There are numerous driveways and streets connecting the various roads in this area that would prevent continuous noise barriers, particularly for the 15200-15300 blocks where most homes have a “U” shaped driveway connecting to 44th Avenue. For evaluation purposes, it was considered that the front access to the homes in the 15200-15300 blocks could be blocked by barriers and access provided through the parallel alley at the rear of the homes, but this arrangement did not appear to be truly feasible. Five barrier segments over both areas were

examined (see **Figure 5-1**). Each barrier segment would typically protect no more than three front-row homes.

The barriers could not protect the entire impacted properties because of the many necessary gaps in the barriers. There are also safety concerns with these barriers. The barriers would cause sight-line problems for drivers exiting the neighborhoods onto 44th Avenue from unsignalized streets. Also, the barriers would have to be very close to some of the homes as there is little space between some homes and 44th Avenue. The barriers would not protect the entire impacted properties because of the many barrier gaps.

For the 15200-15300 blocks, barriers could not feasibly be placed between the impacted homes and 44th Avenue. For the 14500-14700 blocks, three barrier segments totaling 12 feet by 650 feet could provide up to 6 dBA of traffic noise reduction for parts of the impacted yards, but can not protect the entire impacted property. For the best case with these barriers, it was calculated that the cost/benefit would be about $5,200 per receiver per decibel of noise reduction, which is unreasonable according to CDOT guidelines. Therefore, these barriers are not being recommended because of infeasibility and poor performance.

5.2.10 Churches

Traffic noise at Ridgeview Baptist Church and Applewood Community Church was predicted to exceed the Category B NAC under the Proposed Action. The predominant uses at these properties occur on Sunday mornings, which are not during the peak traffic hours modeled. The churches are not known to include significant exterior activities or to contain exterior facilities, which is the purpose of the Category B NAC. Interior activities are covered by Category E. Normal building construction is more than adequate to reduce the interior noise at these properties from traffic to less than the Category E NAC. Therefore, no barriers are being recommended for either church property.

5.2.11 Clear Creek Bike Path

Traffic noise on the Clear Creek bike path in the immediate vicinity of I-70 was predicted to exceed the Category B NAC under the Proposed Action. The impact was calculated to extend approximately 250 feet from I-70, depending on the terrain. Because the road right-of-way is the preferred location for these noise barriers, barriers along either side of I-70 were examined (see **Figure 5-1**). A test barrier on the west side of I-70 that was 20 feet tall and 430 feet long was calculated to provide less than 4 dBA of noise reduction to receiver B900. A test barrier on the east side of I-70 that was 20 feet tall and 380 feet long was calculated to provide 4 dBA of noise reduction to receiver B901. Neither the CDOT goal of 10 dBA noise reduction nor the minimum of 5 dBA noise reduction could be achieved for either receiver. Very large barriers would be necessary to reduce traffic noise by 5 dBA or more for the relatively small length of bike path affected. Even if the test barriers described above did provide 5 dBA of noise reduction, the estimated cost is in excess of $45,000 per receiver per decibel, well above CDOT's guideline of $4,000. Therefore, no barriers are being recommended for the bike path.

5.2.12 Various Commercial Sites

Several commercial properties were described in **Section 4.1** that were calculated to exceed the Category C NAC. The properties were generally along I-70/Youngfield Street with some

businesses along SH 58. However, businesses tend not to want noise barriers as they could obstruct advertising or site recognition and could cause site access problems. One of the impacted business owners explicitly said this at a public meeting. Most of these businesses are in areas with numerous curb cuts that would need to be maintained for property access and would compromise the effectiveness of any noise barriers. Normally, commercial areas do not have noise-sensitive exterior property uses. Typically, noise barriers are recommended for commercial areas only under extraordinary conditions, but no such conditions were observed for the affected properties. As is often the case with commercial areas, the mitigation costs tend to be excessive for the benefit that would be provided. Therefore, no mitigation is recommended for any of the affected commercial properties.

5.3 Summary of Noise Barriers

The recommendations provided in Section 5.2 and summarized here are based on assumed specific project road designs. If the final designs in the future differ from that used in these evaluations, corresponding adjustments to the mitigation evaluations may be required. From the feasibility and reasonableness evaluations for the barriers, traffic noise barriers are recommended for the following locations:

- Rebuild the existing barrier along I-70 near 27th Avenue that must be removed for the proposed eastbound I-70 hook ramps (this is replacement of an existing structure)
- Extend the existing noise wall along Youngfield Service Road (Cabela Drive) another 140 feet to the north

The overall model noise barrier findings are summarized in **Table 5-1**. Estimated traffic noise reductions from barriers that are recommended are summarized in **Table 5-2**.

Table 5-1 Noise Mitigation Barrier Summary

Noise Impacted Area (Category B)	Barrier Height (feet)	Barrier Length (feet)	$/dB/Receiver	Feasible?[1]	Reasonable?[1]	Recommended?	Comment
32nd Ave. west of I-70	9	1,400	3,600	No	Yes	No	This was a series of 8 barrier segments along 32nd Ave. Too many gaps for streets and driveways are required for these to be effective barriers.
32nd Ave. east of I-70	10	500	5,800	No	No	No	This was a series of 3 barrier segments along 32nd Ave. Too many gaps for streets and driveways are required for these to be effective barriers.
31st Avenue east of Youngfield	9	230	6,000	No	No	No	Was not effective in reducing noise.
2800 block Zang Way	--	--	--	--	--	--	There is already a satisfactory noise barrier along I-70 protecting this home that will not be changed. No other mitigation is necessary.
Cabela Drive	10	140	4,800	Yes	Yes	Yes	Recommended for the Proposed Action.
12600 block 38th Drive	13-50	325	could not calculate	No	No	No	Was not effective in reducing noise.
4100 block Youngfield Street	13	140	5,500	No	No	No	This was a pair of barriers. Could produce a driving hazard.
2800 block Youngfield Street	--	--	--	No	No	No	Gap in barrier precluded effective noise reduction.
44th Ave. east of I-70	13-20	950	could not calculate	No	No	No	This was a series of 4 barrier segments along 44th Ave. and Youngfield St. It was not effective in reducing noise.
44th Ave. (14500-14700 blocks)	12	650	5,200	No	No	No	Gaps in barrier precluded effective noise reduction.
44th Ave. (15200-15300 blocks)	--	--	--	No	No	No	Access to homes precludes a traffic noise barrier.

[1] According to CDOT criteria.
SOURCE: FHU modeling results

Table 5-2 Noise Mitigation Reductions from Recommended Barriers

Model Receiver	2030 Proposed Action Noise Level (dBA)		
	Without Barrier	With Barrier	Reduction
B494	68	59	9
B495	64	62	2

SOURCE: FHU modeling results

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6.0 REFERENCES

American National Standards Institute. 2001. S1.4-1983 (R 2001) with Amendment S1.4A-1985, *Specification for Sound Level Meters*.

Colorado Department of Transportation (CDOT). December 1, 2002. *Noise Analysis and Abatement Guidelines*,

Colorado Department of Transportation (CDOT). 2005 highway traffic count data.

Department of Housing and Urban Development. September, 1991. *The Noise Guidebook*.

Federal Highway Administration. June 1995. *Highway Traffic Noise Analysis and Abatement Policy and Guidance*.

Federal Highway Administration. July 8, 1982. U.S. Code of Federal Regulations, Title 23, Part 772. *Procedures for Abatement of Highway Traffic Noise and Construction Noise*.

Felsburg Holt & Ullevig (FHU). December 2005. Traffic data for the I-70/32nd Avenue EA.

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APPENDIX A NOISE MEASUREMENT DATA

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FELSBURG HOLT & ULLEVIG
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6300 S. Syracuse, Suite 600
Centennial, CO 80111

Ph. 303.721.1440
Fax 303.721.0832

Date: 6-9-05

Project #: 04-180

Noise Measurement Worksheet

Meter: SVAN 945A (SN 4884)

Project: Cabela's

Measurement by: dt

Calibration: 112.7 dBA

Post Check: 112.4 dBA

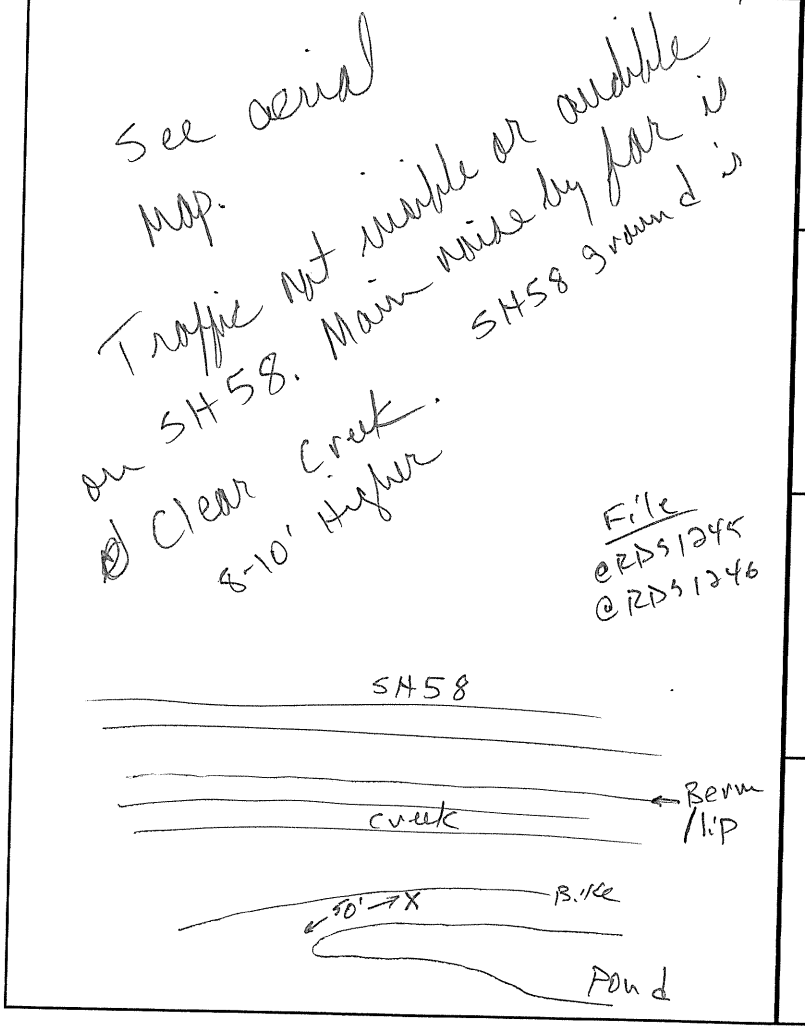
Start Time	Duration	Leq	Maximum	Minimum
1515	10/10 min	62.2/62.5 dBA	65.9/64.8 dBA	60.8/60.9 dBA
Avg/Max Wind	Wind Direction	R. Humidity		
1/5 mph	NNE	41 %		

Site Diagram

Temp. 69

Traffic Counts

Cars	Med. Truck	Hvy. Truck
Not Visible		



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2

Date: 6-9-05

Project #: 04-180

Noise Measurement Worksheet

Meter: SVAN 945A (SN 4884)

Project: Cabela's

Measurement by: dt

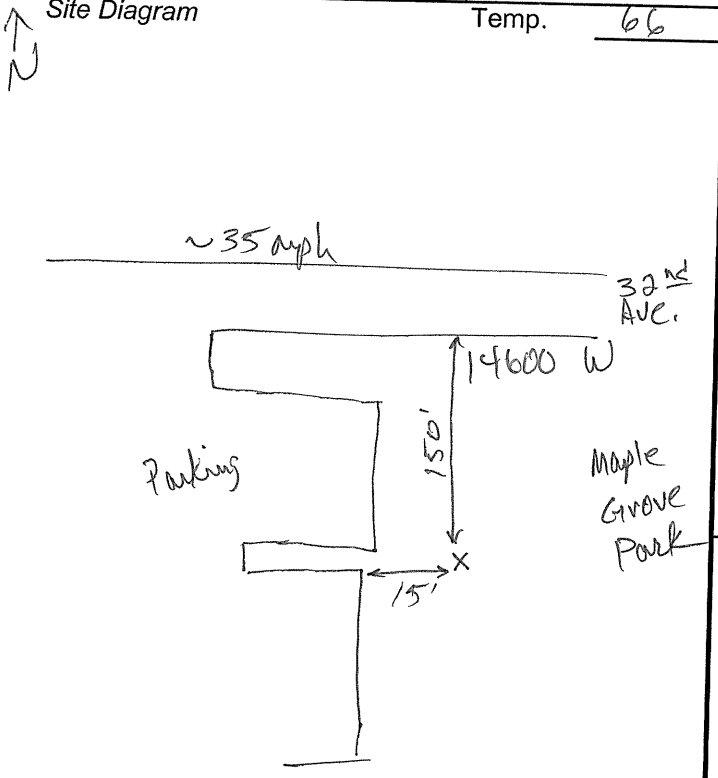
Calibration: 112.7 dBA

Post Check: 112.4 dBA

Start Time	Duration	Leq	Maximum	Minimum
1600	10/10 min	54.8/58.8 dBA	63.8/77.3 dBA	45.4/45.2 dBA
Avg/Max Wind	**Wind Direction**	**R. Humidity**	**Traffic Counts**	
0/12 mph	W	50 %	Cars	Med. Truck / Hvy. Truck
		Temp. 66	20, 20, 20, 20, 20, 20 (120)	1 (1) / 1 (1)
			20, 20, 20, 20, 20, 20, 2 (122)	11 (2) / 1 (1)

#1

Site Diagram



Files
@RDS1247
@RDS1248

started running toward end 2nd.

Distant thunder

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3

Date: 6-9-05

Project #: 04-180

Noise Measurement Worksheet

Meter: SVAN 945A (SN 4884)

Project: Cabela's

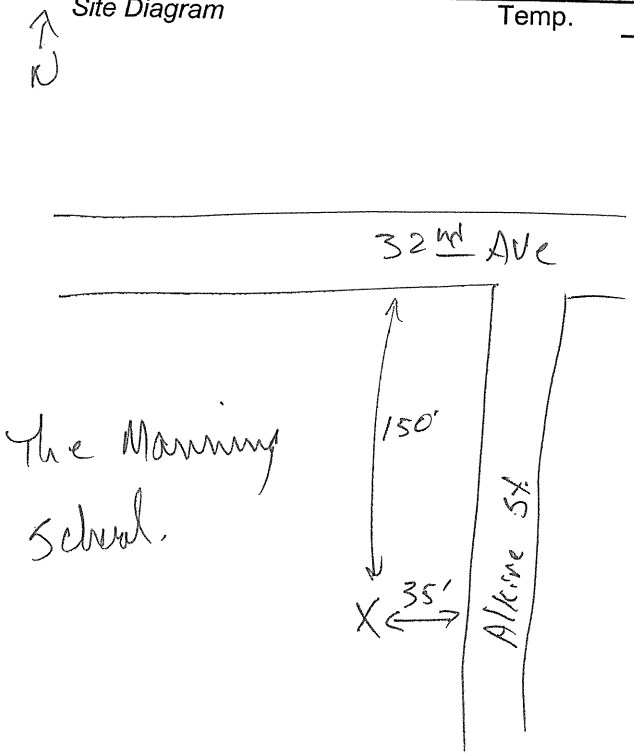
Measurement by: dt

Calibration: 112.5 dBA

Post Check: 112.6 dBA

Start Time	Duration	Leq	Maximum	Minimum
1645	10/10 min	60.9 / 59.4 dBA	75.3 / 66.8 dBA	53.8 / 51.0 dBA
Avg/Max Wind	Wind Direction	R. Humidity	Temp.	
0 / 6 mph	SW	76 %	~~59~~ 72	

Site Diagram



A little thunder you 1st run. Less to an 2nd.
A little rain at beginning of 2nd

Files
@ 2DS 1249
@ 2DS 1250

Traffic Counts

Cars	Med. Truck	Hvy. Truck	
20 20 20 14 20 20 20 20 20 (174)	111 (3)	(6)	#1
20 20 20 20 20 7 20 20 20 (167)	(0)	1 (1)	#2

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Fax 303.721.0832

4

Date: 6-9-05

Project #: 04-180

Noise Measurement Worksheet

Meter: SVAN 945A (SN 4884)

Project: Cabela's

Calibration: 112.6 dBA

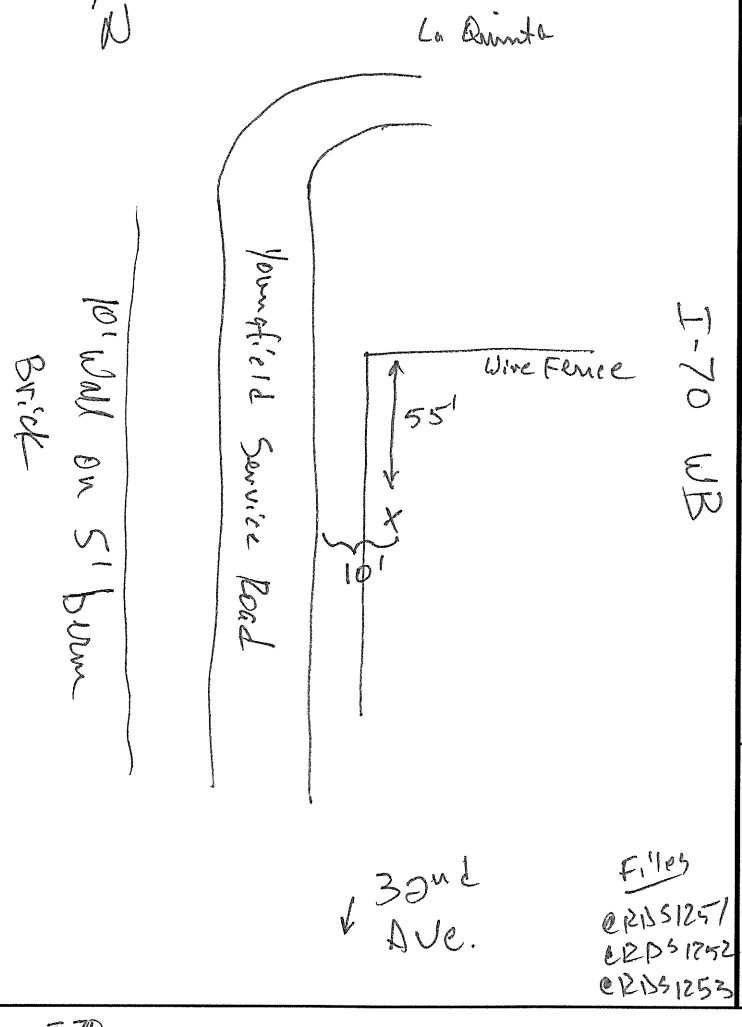
Measurement by: dt

Post Check: 112.7 dBA

Start Time	Duration	Leq	Maximum	Minimum
1720	10 / 10 min	59.3 / 59.3 dBA	70.5 / 72.0 dBA	52.1 / 51.9 dBA
Avg/Max Wind	**Wind Direction**	**R. Humidity**	**Traffic Counts**	
0 / 3 mph	N	86 %	WB Cars	Med. Truck / Hvy. Truck

Site Diagram

Temp. 72



Files
ERDS1251
ERDS1252
ERDS1253

WB Cars

			Med. Truck	Hvy. Truck	
50 50 / 50 50 / 50 50 / 50 50 / 50 50 / 50 50 / 50 41	(691)		HHT 1 / (6)	HHT HHT / 111 / (13)	#1
50 50 / 50 50 / 50 50 / 50 50 / 50 50 / 50 50 / 50 1	(601)		1 / (1)	HHT / HHT / (10)	#2
Local Road: HHT HHT / HHT 1 / 1	(13)				#1
HHT HHT HHT / 11	(17)				#2

I-70 EB is backed up.
WB is Free Flowing

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5

Date: 9.27.05

Project #: 04-180

Noise Measurement Worksheet

Meter: SVAN 945A (SN 4884)

Project: Cabela's

Measurement by: dt

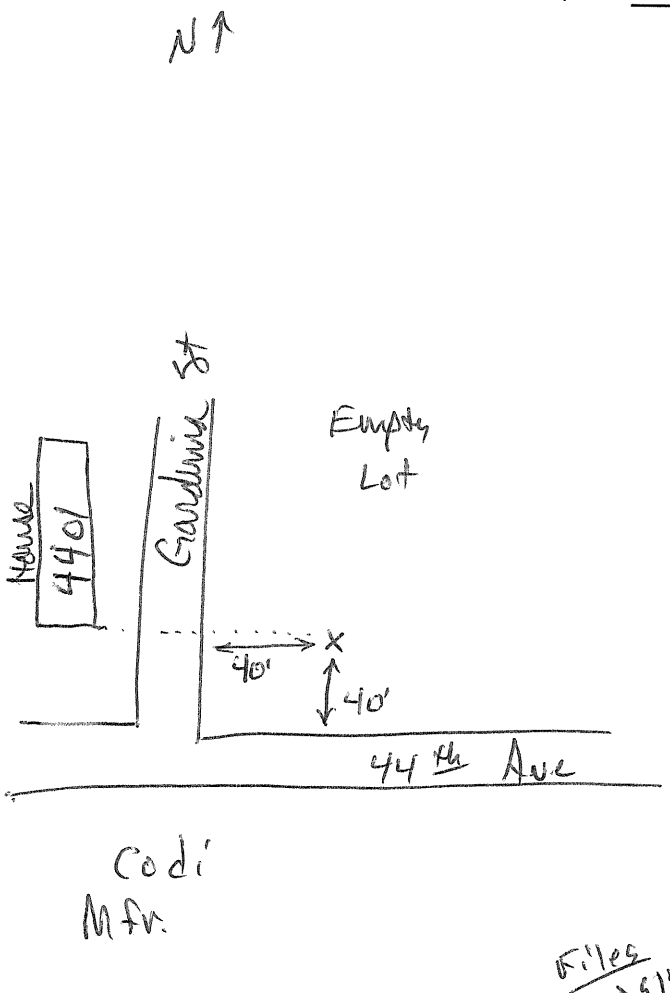
Calibration: 112.9 dBA

Post Check: 113.0 dBA

Start Time	Duration	Leq	Maximum	Minimum
1540	10/10 min	62.3 / 101.9 dBA	74.3 / 83.7 dBA	49.7 / 43.9 dBA

Avg/Max Wind	Wind Direction	R. Humidity	Temp.
0 / 8 mph	W	16 %	80

Site Diagram



Codi Mfr.

Files @ RDS/419 @ RDS/420

On 44th Traffic Counts

	Cars	Med. Truck	Hvy. Truck
#1	20, 20, 20, 20, 20, 4 (104)	III (3)	IIII (4)
#2	20, 20, 20, 15 (75)	IIII (5)	II (2)

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6

Date: 9-27-05

Project #: 04-180

Noise Measurement Worksheet

Meter: SVAN 945A (SN 4884)

Project: Cahalin

Measurement by: dt

Calibration: 113.8 dBA

Post Check: 113.7 dBA

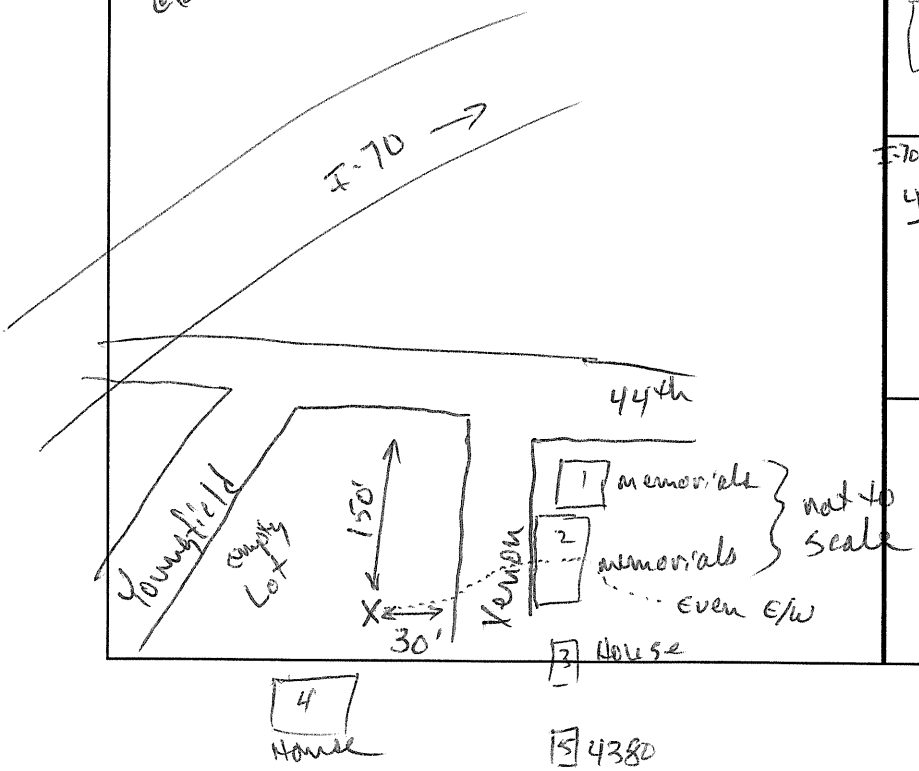
Start Time	Duration	Leq	Maximum	Minimum
1620	10/10 min	66.8 / 66.7 dBA	73.0 / 72.7 dBA	62.4 / 62.8 dBA

Avg/Max Wind	Wind Direction	R. Humidity
0 / 7 mph	SW	26 %

Temp. 79

Traffic Counts		
Cars	Med. Truck	Hvy. Truck
Traffic is too complex to count. I-70 + 44th + Xenon + Youngfield		
EB I-70	11	
	1111 1111	1111
100 in 1:20	(2)	(8) /
100 in 1:16	0	6
I-70 WB not visible 44th		
50 in 1:43	no trucks	

Files @ 20514931 @ 20514932



14 1/3
12 1/30

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7

Date: 9-27-05

Project #: 04-180

Noise Measurement Worksheet

Meter: SVAN 945A (SN 4884)

Project: Corridors

Measurement by: dt

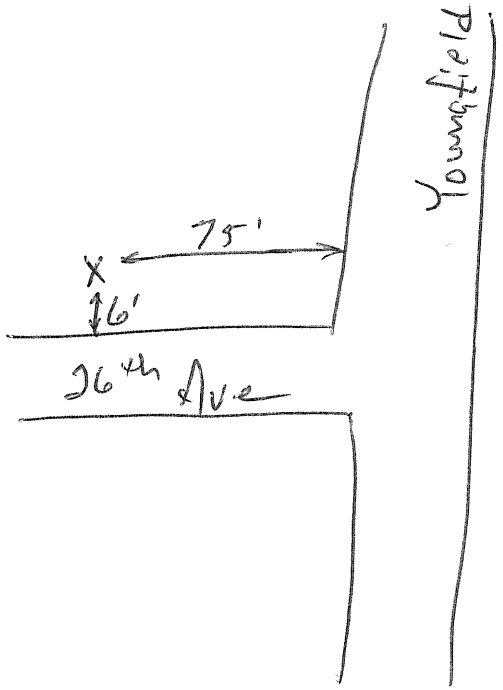
Calibration: 112.7 dBA

Post Check: 112.7 dBA

Start Time	Duration	Leq	Maximum	Minimum
1700	10/10 min	61.6/62.6 dBA	72.3 / 81.0 dBA	51.3/53.6 dBA

Avg/Max Wind	Wind Direction	R. Humidity	Traffic Counts		
0 / 6 mph	S	45 %	Cars	Med. Truck	Hvy. Truck

Site Diagram Temp. 87



#1: 25 25 25 25 25 25 25 25 25 12 (237) | (0) | 11 (2)

#2: 25 25 25 25 25 25 25 25 25 25 25 14 (264) | (0) | 1 (1)

Files @RDS1433 @RDS1434

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8

Date: 9-27-05

Project #: 04-180

Noise Measurement Worksheet

Meter: SVAN 945A (SN 4884)

Project: Cabela

Measurement by: dt

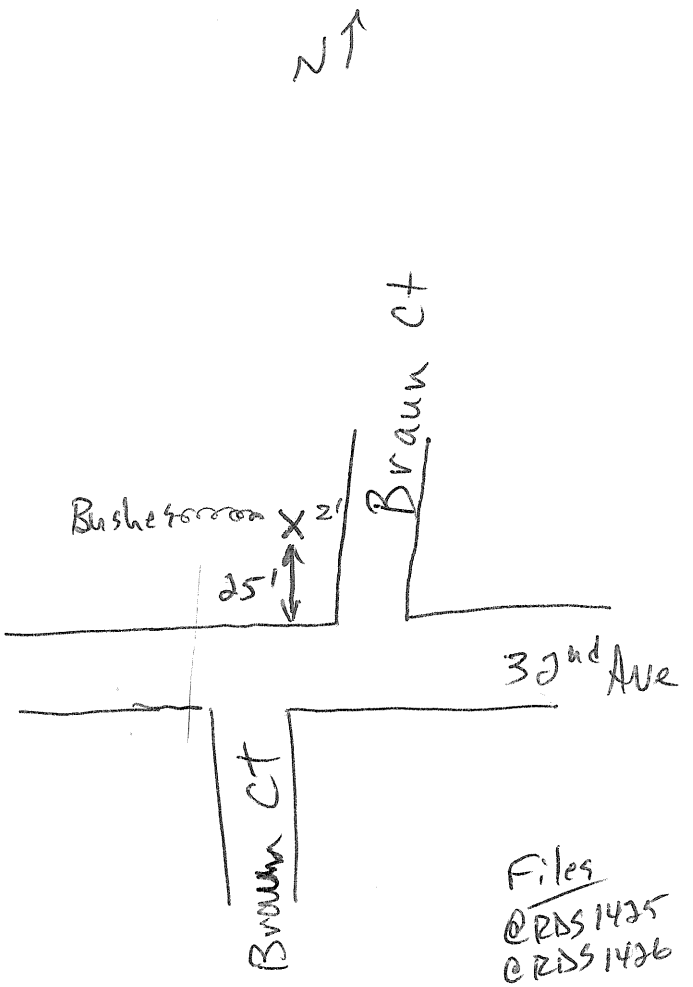
Calibration: 112.6 dBA

Post Check: 112.7 dBA

Start Time	Duration	Leq (edited 64.0)	Maximum	Minimum
1745	10/5 min	65.3 / ~~68.9~~ dBA	78.4 / 91.3 dBA	48.7 / 44.2 dBA
Avg/Max Wind	**Wind Direction**	**R. Humidity**		
0 / 8 mph	SE	36 %		

Site Diagram

Temp. 74



Traffic Counts (30nd)

Cars	Med. Truck	Hvy. Truck	
30 30 30 30 30 — 13 — 163 — 10 min	11 — (2)	1 — (1)	#1
30 30 30 15 stopped early — (105) — 7:02 min	1 (1)	(0)	#2
	+ thunder - 1 @ 14 min		

First run was fine.
2nd run a bit iffy. Stopped for rain.

APPENDIX B NOISE MODEL RECEIVER MAPS

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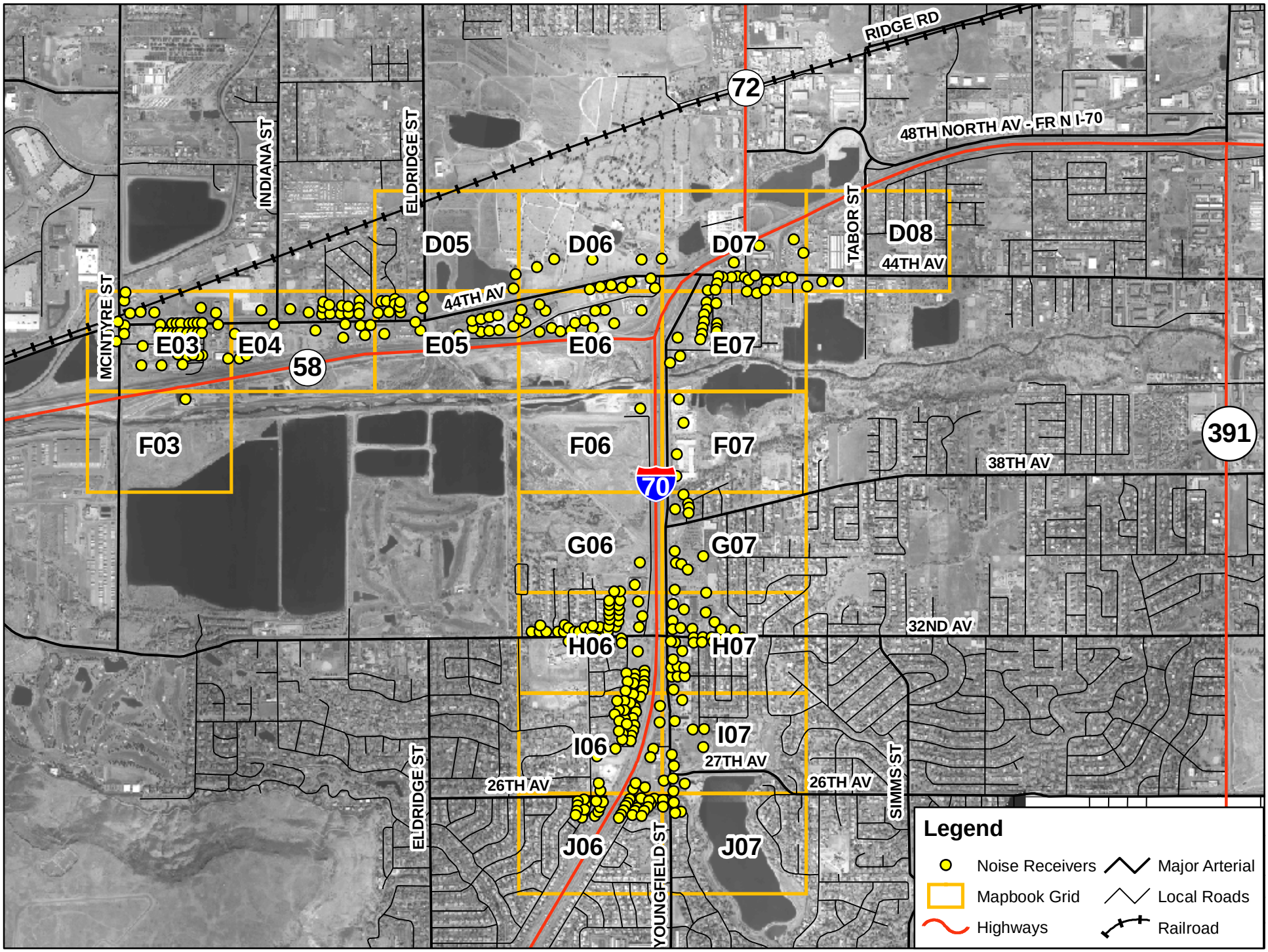

RIDGE RD
72
48TH NORTH AV - FR N I-70
INDIANA ST
ELDRIDGE ST
TABOR ST
D05
D06
D07
D08
44TH AV
MCINTYRE ST
E03
E04
58
E05
E06
E07
F03
F06
F07
70
391
38TH AV
G06
G07
32ND AV
H06
H07
I06
I07
27TH AV
26TH AV
26TH AV
SIMMS ST
ELDRIDGE ST
J06
YOUNGFIELD ST
J07
Legend
Noise Receivers
Mapbook Grid
Highways
Major Arterial
Local Roads
Railroad

Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet
0 50 100 200

D05

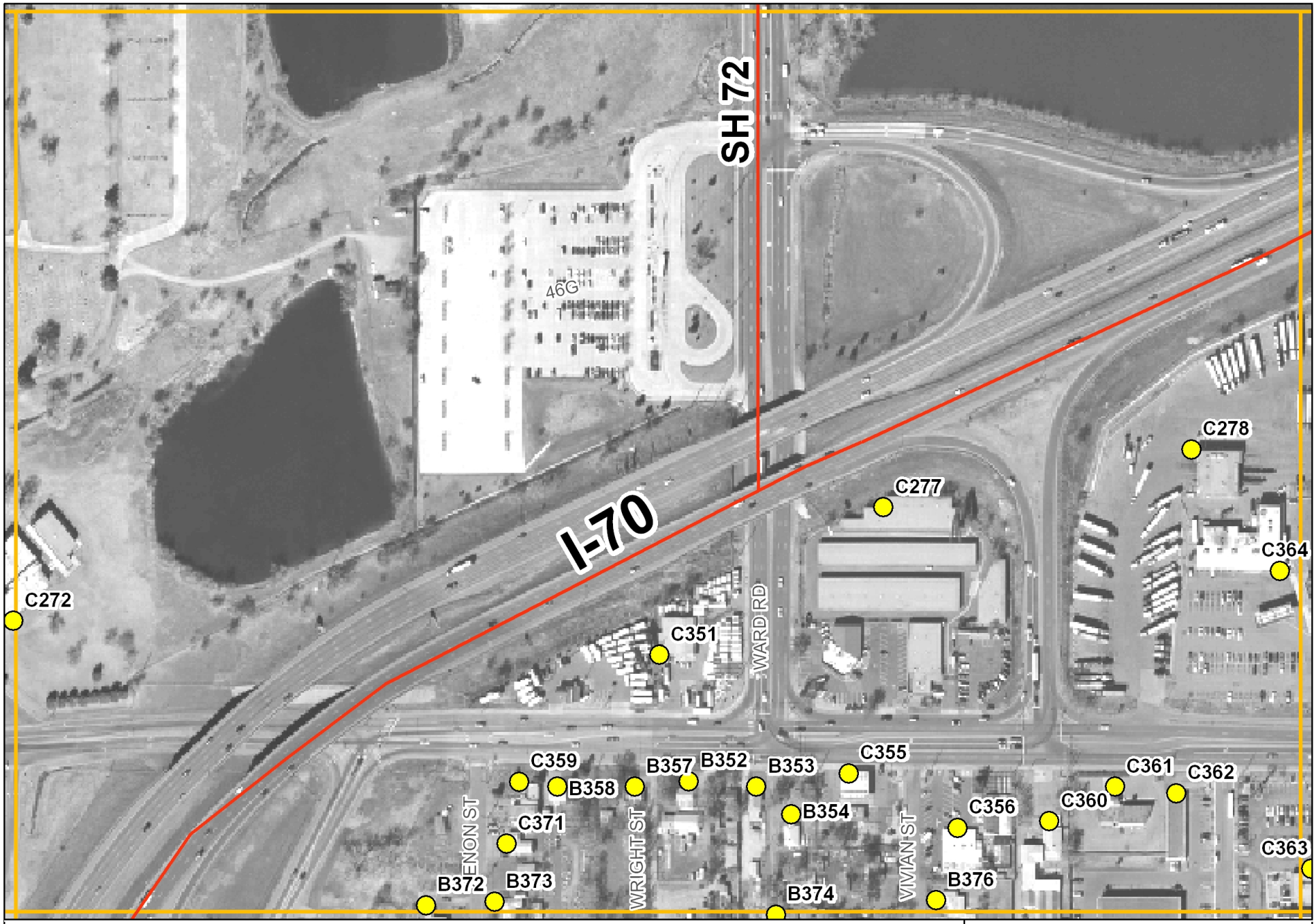
Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet

0 50 100 200

D06



Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet

0 50 100 200

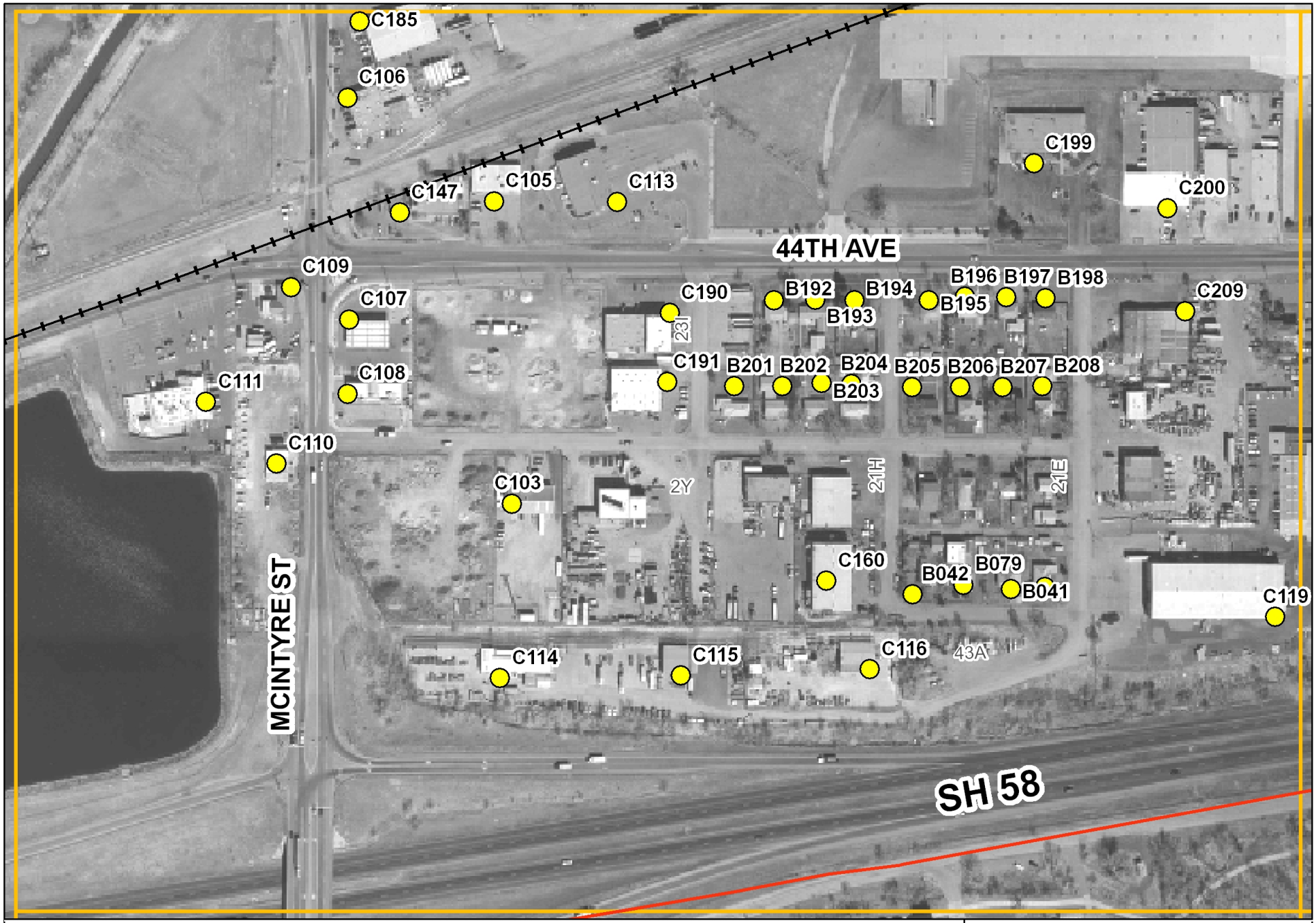
D07

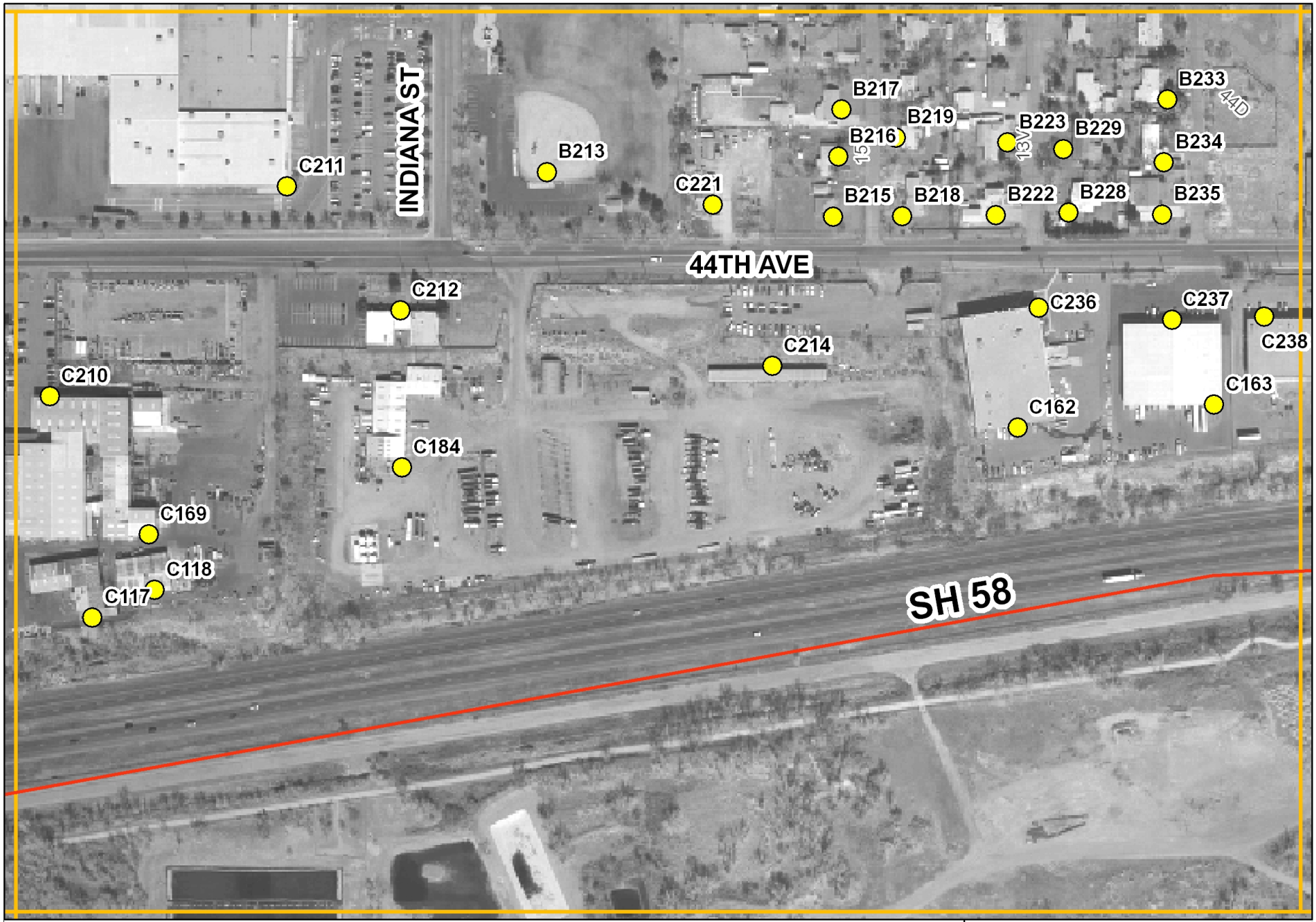
Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet
0 50 100 200

D08


C185
C106
C147
C105
C113
C199
C200
44TH AVE
C109
C107
C190
B192
B194
B196
B197
B198
C209
B193
B195
231
C191
B201
B202
B204
B205
B206
B207
B208
B203
C111
C108
C110
C103
2Y
21H
21E
C160
B042
B079
B041
C119
MCINTYRE ST
C114
C115
C116
43A
SH 58
Legend
Noise Receivers
Mapbook Grid
Highways
Railroad
Feet
0 50100 200
E03

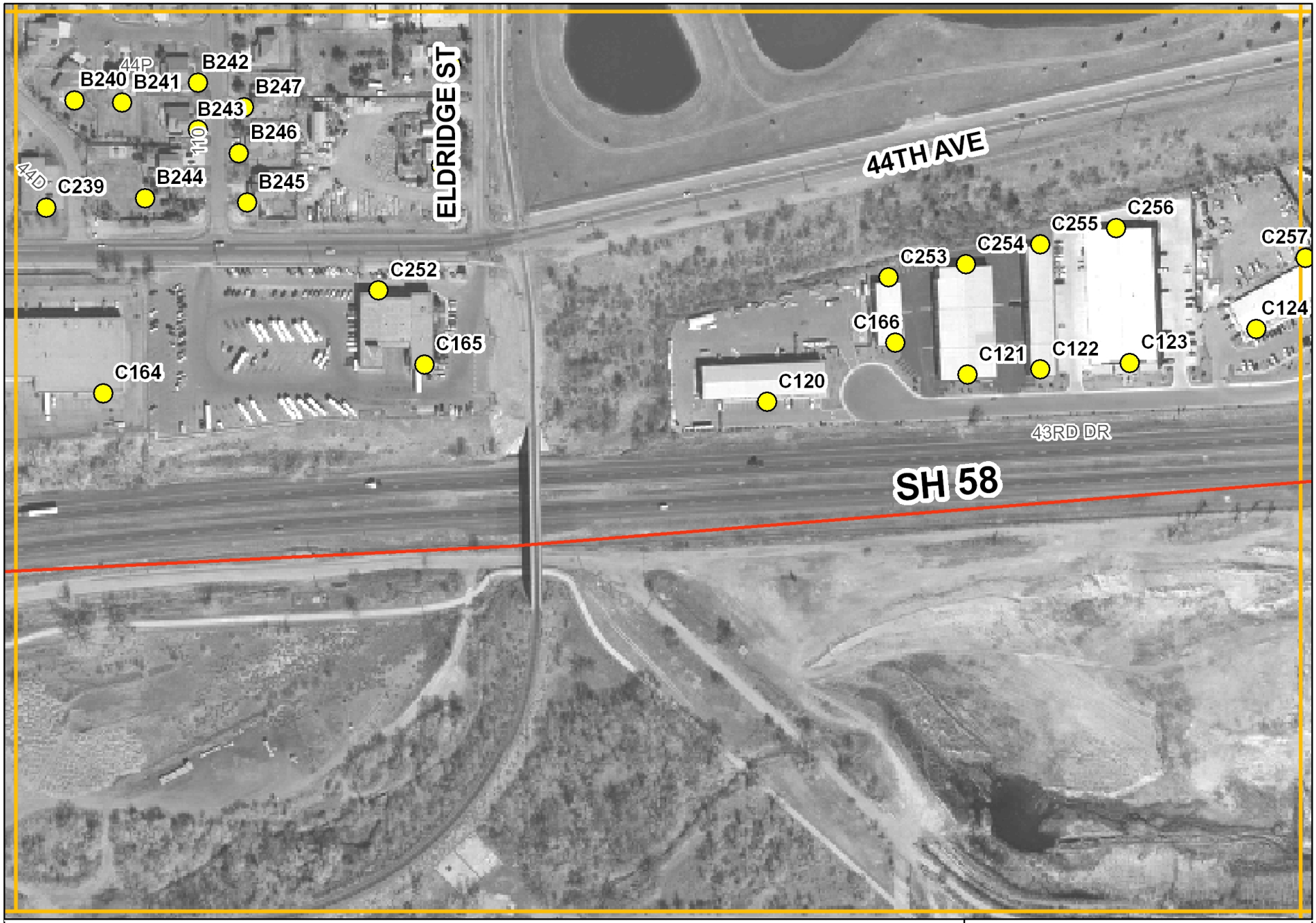


Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet
0 50 100 200

E04



Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet
0 50 100 200

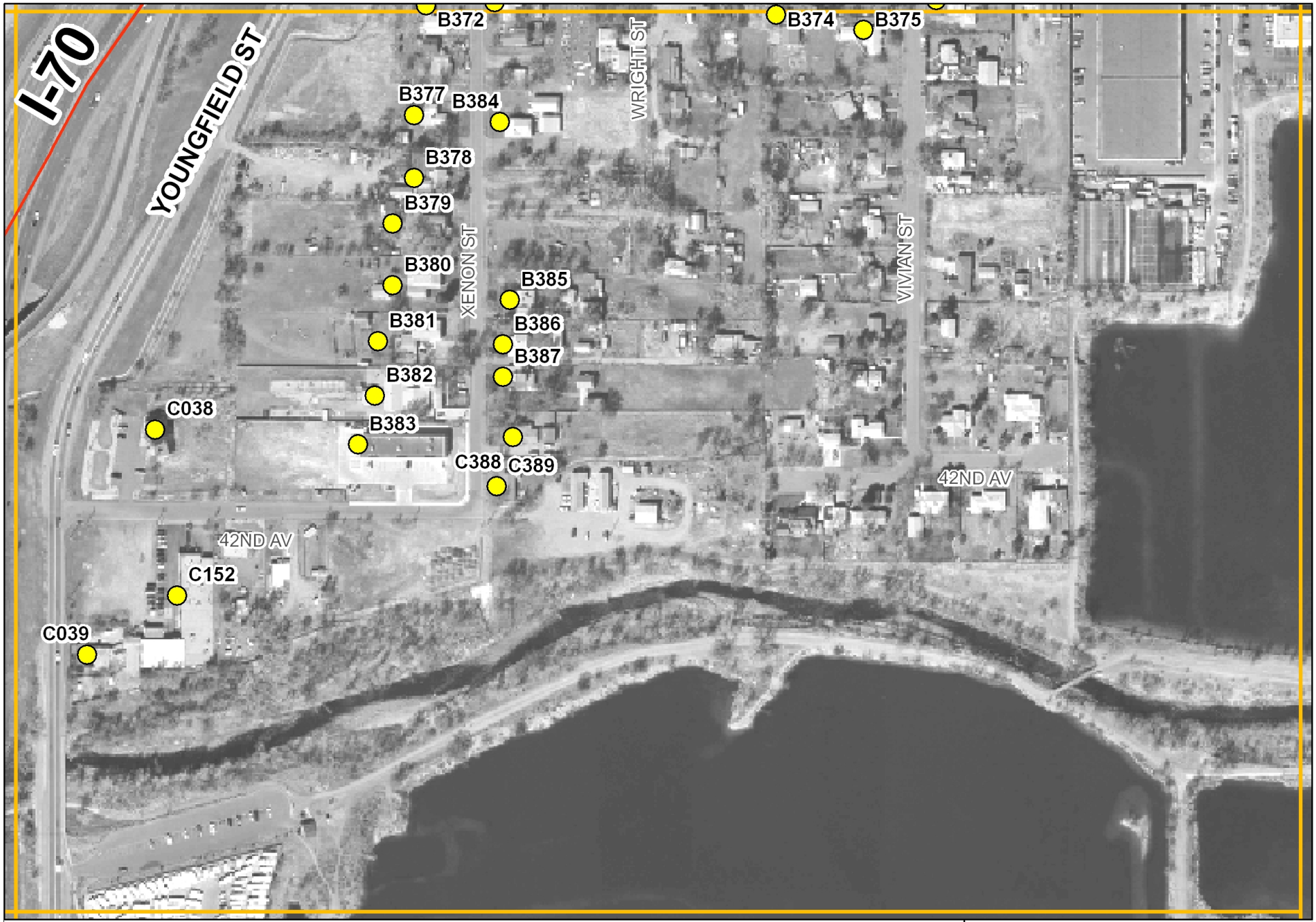
E05

Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet
0 50 100 200

E06



Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet
0 50 100 200

E07

Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet
0 50 100 200

F03

Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet
0 50 100 200

F06

Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet
0 50 100 200

F07

Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet
0 50 100 200

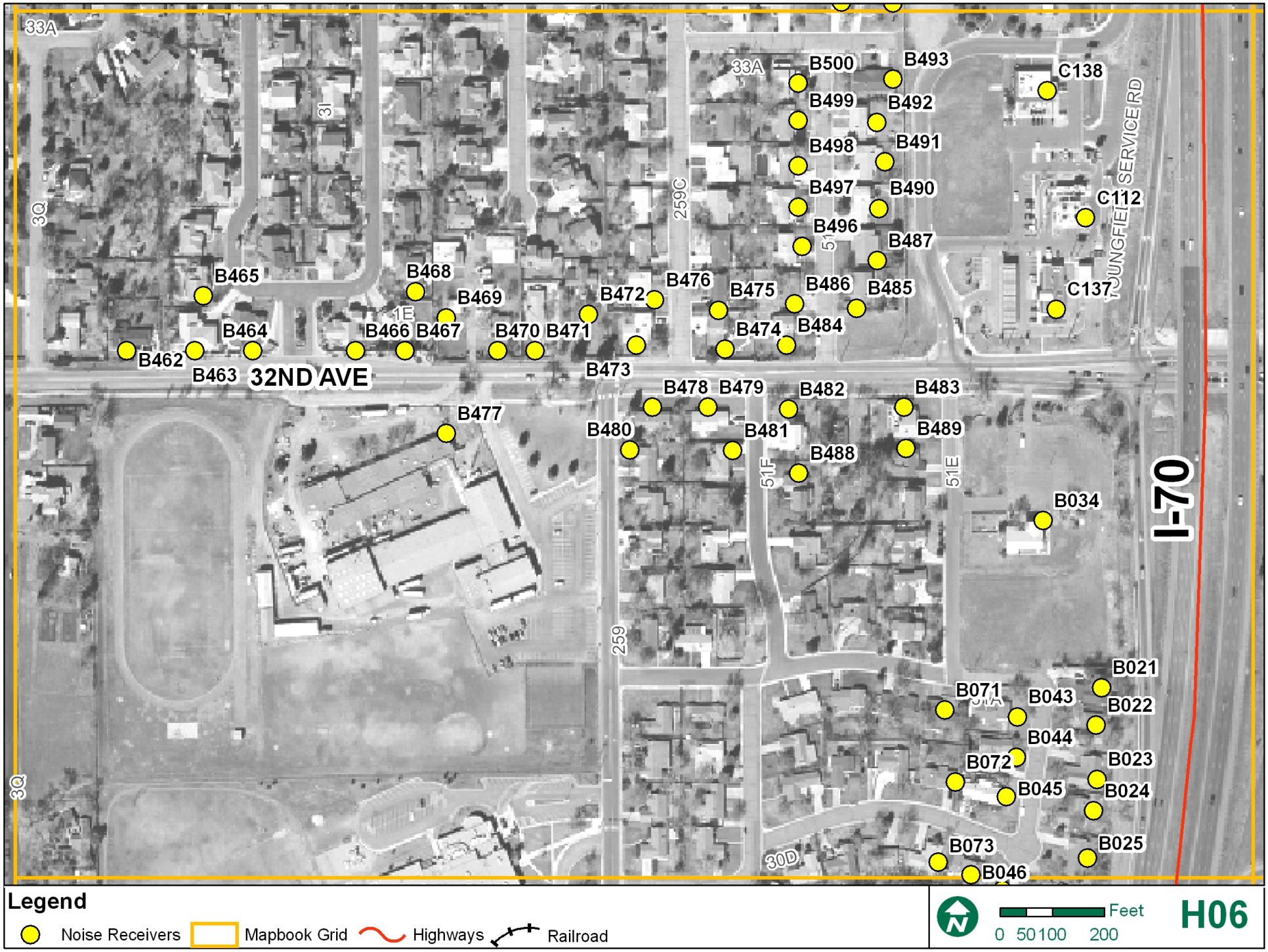
G06

Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet
0 50 100 200

G07

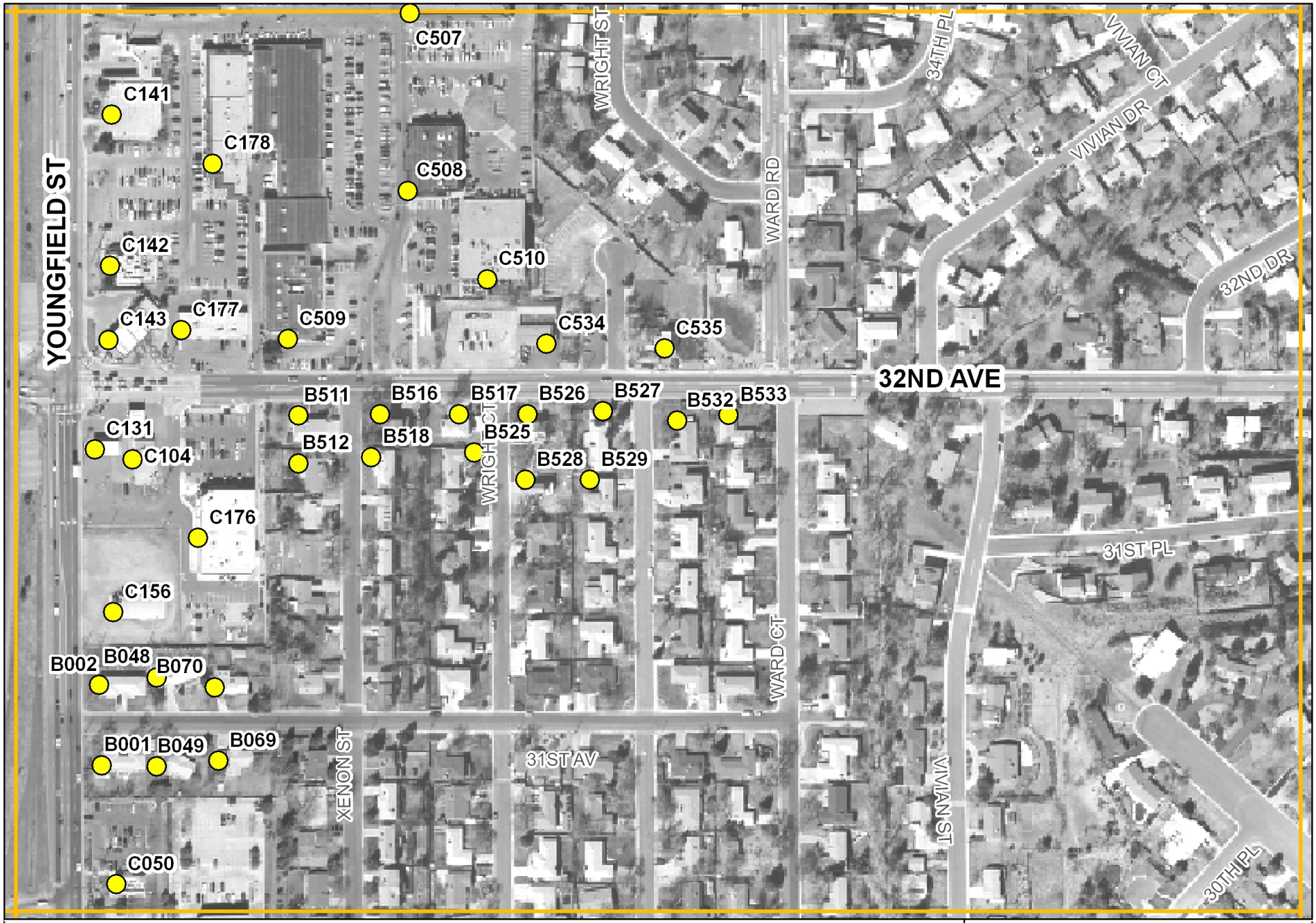


Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet
0 50 100 200

H06



Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet
0 50 100 200

H07

Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet
0 50 100 200

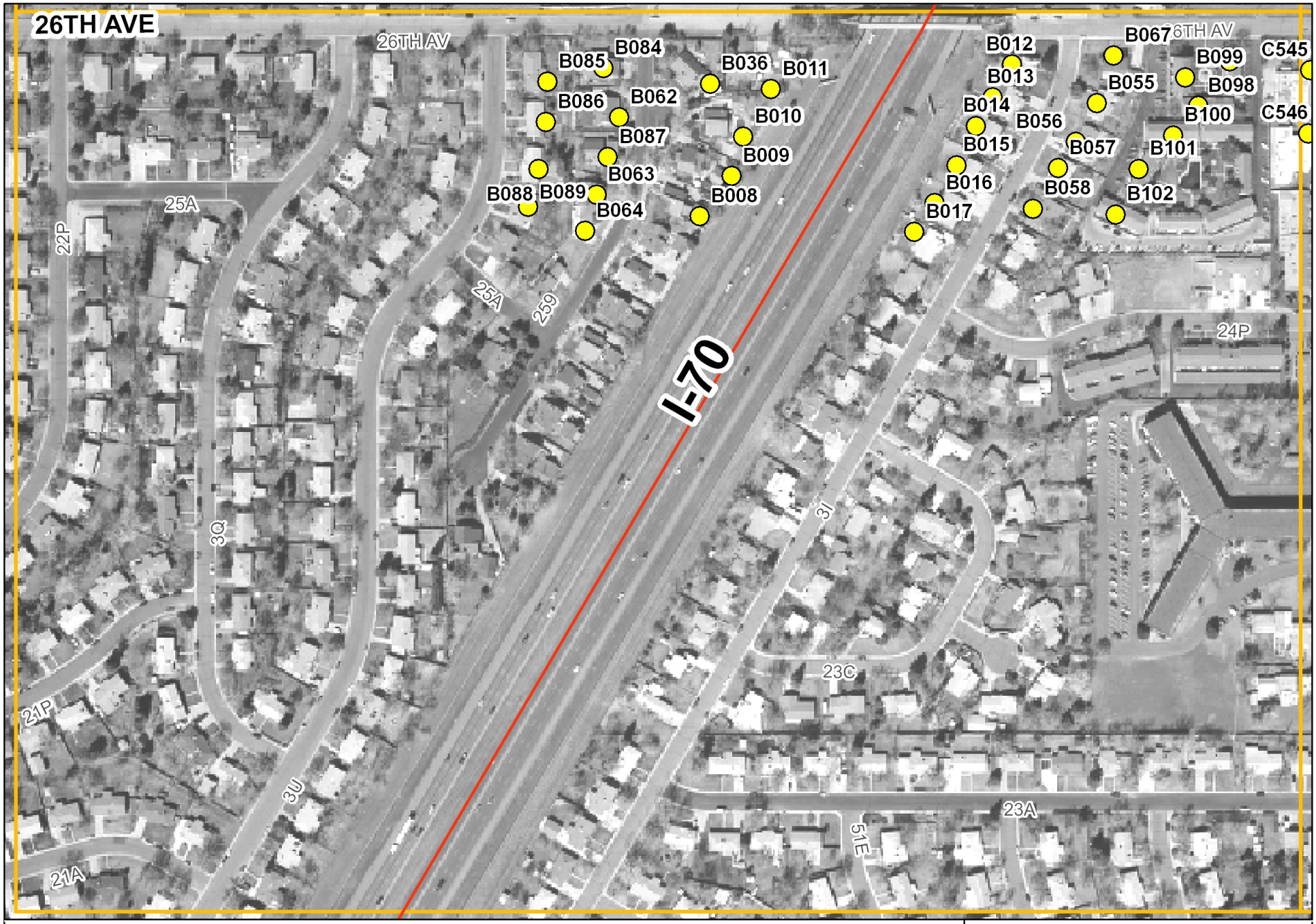
I06

Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet
0 50100 200

I07



Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet
0 50 100 200

J06

Legend

Noise Receivers | Mapbook Grid | Highways | Railroad

Feet
0 50 100 200

J07

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APPENDIX C NOISE MODEL TRAFFIC DATA

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Road	Cars	Medium Trucks	Heavy Trucks	Speed (KPH)
2005 Existing Traffic Model Data				
32 Ave East A	677	8	13	56
32 Ave East B	677	8	13	56
32 Ave East C	736	9	14	56
32 Ave East D	502	6	10	56
32 Ave to WB I70	596	7	12	72
32 Ave West A	652	20	2	56
32 Ave West B	924	11	18	56
32 Ave West C	559	7	11	56
32 Ave West D	559	7	11	56
44th Ave East A	190	2	4	56
44th Ave East B	595	7	12	56
44th Ave East C	1138	14	22	56
44th Ave East D	1491	18	29	56
44th Ave East E	603	7	12	56
44th Ave West A	734	9	14	56
44th Ave West B	1491	18	29	56
44th Ave West C	847	10	17	56
44th Ave West D	547	7	11	56
44th Ave West E	175	2	4	56
Hwy 58 East A	1118	14	22	100
Hwy 58 East B	1134	71	108	100
Hwy 58 EB Ramp OFF	177	11	17	72
Hwy 58 EB Ramp ON	352	4	7	72
Hwy 58 WB Ramp OFF	479	30	45	56
Hwy 58 WB Ramp ON	181	2	4	56
Hwy 58 West A	874	55	83	100
Hwy 58 West B	920	11	18	100
I-70 E B	4332	92	156	100
I-70 E C	4222	85	146	100
I-70 E D	4541	96	163	100
I-70 EB A	4332	92	156	100
I-70 EB Ramp to Youngfield	439	9	16	72
I-70 WB Ramp TO 32	393	8	14	72
I-70 WB Ramp to WARD	879	19	32	72
I-70 West A	4541	96	163	100
I-70 West B	4075	86	146	100
I-70 West C	4265	90	153	100
McIntrye St SB A	837	3	26	56
McIntrye St SB B	492	6	9	56
McIntyre St NB A	480	6	9	56
McIntyre St NB B	920	11	18	56
Ramp 44TH TO I70	1048	13	21	72
Ramp I70 EB 44TH	875	19	31	72
RTD IN	40	1	10	40
RTD OUT	44	1	10	56
WARD N Ramp to 70 WB	696	9	14	72
Ward Rd North A	1728	21	34	56
Ward Rd North B	2254	28	44	56
Ward Rd South A	1718	21	34	56

Road	Cars	Medium Trucks	Heavy Trucks	Speed (KPH)
Ward Rd South B	1410	17	28	56
Youngfield Service Rd	259	3	5	56
Youngsfield NB A	614	19	2	56
Youngsfield NB B	1074	13	21	56
Youngsfield NB C	1083	13	21	56
Youngsfield NB D	1012	13	20	56
Youngsfield Ramp to 70 EB	330	4	6	72
Youngsfield SB A	768	10	15	56
Youngsfield SB B	762	9	15	56
Youngsfield SB C	594	7	12	56
Youngsfield SB D	696	9	14	56

2030 No Action Alternative Traffic Model Data

32 Ave East A	940	12	18	56
32 Ave East B	940	12	18	56
32 Ave East D	736	9	14	56
32 Ave EB C	1444	18	28	56
32 Ave to WB I70	891	11	17	72
32 Ave WB B	1022	13	20	56
32 Ave WB C	911	11	18	56
32 Ave WB D	911	11	18	56
32 Ave West A	1015	32	3	56
40th	2175	68	7	56
44th Ave East A	210	3	5	56
44th Ave EB B	964	12	19	56
44th Ave EB C	1638	21	32	56
44th Ave EB D	1851	23	36	56
44th Ave EB E-2	1148	14	23	56
44th Ave WB A	1085	13	21	56
44th Ave WB B	1618	20	32	56
44th Ave WB C	1507	19	29	56
44th Ave West D	906	11	17	56
44th Ave West E	195	3	5	56
44TH TO EB I-70	950	12	18	72
Cabelas	725	23	2	64
EB 58 TO WB I-70	339	4	7	80
EB I-70 TO 44TH	762	16	27	72
EB I-70 TO WB 58	534	11	20	80
frontage road	279	8	1	64
Hwy 58 East A	1221	15	24	100
Hwy 58 East C	1158	14	23	80
Hwy 58 EB B	1496	19	30	100
Hwy 58 EB Ramp OFF	426	5	8	72
Hwy 58 EB Ramp ON	703	9	14	72
Hwy 58 WB A	2161	27	42	100
Hwy 58 WB Ramp OFF	1095	14	21	72
Hwy 58 WB Ramp ON	363	5	7	72
Hwy 58 West B	1429	18	28	100
I-70 E B	4541	96	163	100

Road	Cars	Medium Trucks	Heavy Trucks	Speed (KPH)
I-70 E D	4541	96	163	100
I-70 EB A	4541	96	163	100
I-70 EB C	4541	96	163	100
I-70 EB Ramp to Youngfield	525	11	19	72
I-70 WB A	4541	96	163	100
I-70 WB B	4541	96	163	100
I-70 WB C	4541	96	163	100
I-70 WB Ramp TO 32	705	15	25	72
I-70 WB Ramp to WARD	1168	24	42	72
McIntrye St SB A	1541	19	30	56
McIntrye St SB B	925	12	18	56
McIntyre St NB A	567	7	11	56
McIntyre St NB B	1851	23	36	56
RTD IN	30	1	10	56
RTD OUT	50	1	10	56
WARD N Ramp to 70 WB	673	8	13	72
Ward Rd NB B	2204	27	43	56
Ward Rd North A	1759	22	34	56
Ward Rd SB B	1861	23	36	56
Ward Rd South A	1764	22	35	56
Youngfield Service Rd	422	5	8	56
Youngfield Service Rd2	422	5	8	56
Youngsfield NB A	940	12	18	56
Youngsfield NB B	1831	23	36	56
Youngsfield NB C	2442	31	47	56
Youngsfield NB D	1575	20	30	56
Youngsfield Ramp to 70 EB	838	11	16	72
Youngsfield SB A	1332	17	26	56
Youngsfield SB B	1299	16	25	56
Youngsfield SB C	1129	14	22	56
Youngsfield SB D	877	11	17	56

2030 Proposed Action Alternative Traffic Model Data

32 Ave East A	751	9	15	56
32 Ave East B	751	9	15	56
32 Ave East C	1124	14	22	56
32 Ave East D	688	9	13	56
32 Ave to WB I70	131	2	3	72
32 Ave West A	1015	32	3	56
32 Ave West B	1323	16	26	56
32 Ave West C	770	10	15	56
32 Ave West D	770	10	15	56
40th	754	23	2	56
44th Ave East A	210	3	5	56
44th Ave East B	858	11	17	56
44th Ave East C	1628	20	32	56
44th Ave East D	1841	23	36	56
44th Ave East E-2	1148	14	23	56
44th Ave West A	1085	13	21	56

Road	Cars	Medium Trucks	Heavy Trucks	Speed (KPH)
44th Ave West B	1618	20	32	56
44th Ave West C	1240	15	24	56
44th Ave West D	833	10	16	56
44th Ave West E	195	3	5	56
44TH TO EB I-70	940	12	18	72
Cab N	804	10	16	56
Cab to EB 58	506	6	10	72
Cab to WB 58	213	3	4	72
Cab to WB I-70	707	9	14	72
Cabelas Dr	1900	59	6	56
Cabelas	1044	32	3	64
EB 58 to Cab	286	4	6	72
EB 58 TO WB I-70	300	4	6	80
EB I-70 TO 44TH	762	16	27	72
EB I-70 TO WB 58	610	13	22	80
EB I-70 to Young	454	10	16	72
Hwy 58 East A	1265	16	25	100
Hwy 58 East B	1599	20	31	100
Hwy 58 East C	1521	19	30	80
Hwy 58 EB Ramp OFF	320	4	6	72
Hwy 58 EB Ramp ON	654	8	13	72
Hwy 58 WB Ramp OFF	819	10	16	72
Hwy 58 WB Ramp ON	296	4	6	72
Hwy 58 West A	2519	31	49	100
Hwy 58 West B	1478	18	29	100
I-70 E B	4541	96	163	100
I-70 E C	4541	96	163	100
I-70 E D	4541	96	163	100
I-70 EB A	4541	96	163	100
I-70 WB Ramp to WARD	908	19	33	72
I-70 West A	4541	96	163	100
I-70 West B	4541	96	163	100
I-70 West C	4541	96	163	100
McIntrye St SB A	1352	17	27	56
McIntrye St SB B	940	12	18	56
McIntyre St NB A	833	10	16	56
McIntyre St NB B	1434	18	28	56
Roadway135	732	9	14	72
RTD IN	30	1	10	56
RTD OUT	50	1	10	56
WARD N Ramp to 70 WB	673	8	13	72
Ward Rd North A	1759	22	34	56
Ward Rd North B	2204	27	43	56
Ward Rd South A	1764	22	35	56
Ward Rd South B	1594	20	31	56
WB I-70 to Cab	601	13	22	72
Young to EB I-70	504	6	10	72
Youngsfield NB A	1168	14	23	56
Youngsfield NB B	1192	15	23	56
Youngsfield NB C	1550	19	30	56

Road	Cars	Medium Trucks	Heavy Trucks	Speed (KPH)
Youngsfield NB D	1599	20	31	56
Youngsfield SB A	1235	15	24	56
Youngsfield SB B	1129	14	22	56
Youngsfield SB C	1395	17	27	56
Youngsfield SB D	1013	13	20	56

APPENDIX D NOISE MODEL RESULTS

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		Existing Conditions		2030 No Action		2030 Proposed Action	
Receiver	NAC	Noise Level	Status	Noise Level	Status	Noise Level	Status
B001	66	70.6	Exceed	71.7	Exceed	70.6	Exceed
B002	66	70.9	Exceed	72	Exceed	71	Exceed
B008	66	63.9	----	64.1	----	64.1	----
B009	66	64.7	----	64.9	----	65	----
B010	66	64	----	64.3	----	64.3	----
B011	66	65	----	65.3	----	65.3	----
B012	66	62.1	----	62.4	----	62.3	----
B013	66	62.2	----	62.5	----	62.5	----
B014	66	62.2	----	62.4	----	62.4	----
B015	66	62.7	----	63	----	63	----
B016	66	62.7	----	62.9	----	62.9	----
B017	66	62.5	----	62.8	----	62.8	----
B021	66	65	----	65.4	----	64.7	----
B022	66	64.5	----	64.9	----	64.3	----
B023	66	63.9	----	64.3	----	63.9	----
B024	66	63.7	----	64.1	----	63.8	----
B025	66	64.7	----	65.1	----	64.8	----
B026	66	64.8	----	65.1	----	64.8	----
B027	66	65	----	65.3	----	65.3	----
B028	66	65.1	----	65.4	----	65.3	----
B029	66	64.5	----	64.8	----	64.7	----
B030	66	65.7	----	66	Exceed	65.9	----
B031	66	65.2	----	65.5	----	65.4	----
B032	66	65.1	----	65.4	----	65.4	----
B033	66	65.8	----	66.1	Exceed	66	Exceed
B034	66	68.2	Exceed	68.7	Exceed	67.6	Exceed
B036	66	62.9	----	63.2	----	63.2	----
B039	66	73.7	Exceed	74.3	Exceed	74.3	Exceed
B040	66	64.4	----	64.9	----	65.1	----
B041	66	64.1	----	64.8	----	64.9	----
B042	66	63.3	----	64.2	----	64.2	----
B043	66	64.7	----	65.1	----	64.3	----
B044	66	64.3	----	64.7	----	64.2	----
B045	66	63.6	----	64	----	63.7	----
B046	66	63.2	----	63.5	----	63.8	----
B047	66	63.2	----	63.6	----	63.6	----
B048	66	67.9	Exceed	68.6	Exceed	68.1	Exceed
B049	66	67.7	Exceed	68.4	Exceed	67.7	Exceed
B051	66	63.9	----	64.2	----	64.2	----
B052	66	63.3	----	63.6	----	63.5	----
B053	66	62.6	----	62.9	----	62.9	----
B054	66	62.3	----	62.6	----	62.5	----
B055	66	61.3	----	61.6	----	60.4	----
B056	66	60.7	----	61.1	----	60.1	----
B057	66	61	----	61.3	----	60.4	----
B058	66	60.5	----	60.8	----	60.3	----
B062	66	60.1	----	60.3	----	60.4	----
B063	66	60.2	----	60.5	----	60.6	----
B064	66	60.4	----	60.6	----	60.7	----

		Existing Conditions		2030 No Action		2030 Proposed Action	
Receiver	NAC	Noise Level	Status	Noise Level	Status	Noise Level	Status
B067	66	61.8	----	62.2	----	60.6	----
B069	66	64.7	----	65.2	----	64.5	----
B070	66	65.6	----	66.1	Exceed	65.6	----
B071	66	63.4	----	63.8	----	62.8	----
B072	66	63.3	----	63.7	----	62.7	----
B073	66	62.7	----	63	----	63	----
B074	66	62.5	----	62.8	----	62.7	----
B075	66	62.1	----	62.4	----	62.3	----
B076	66	60.7	----	61.1	----	60.9	----
B077	66	59.6	----	59.9	----	59.8	----
B078	66	60.7	----	61	----	61	----
B079	66	63.2	----	63.9	----	64	----
B080	66	61.5	----	61.8	----	61.6	----
B081	66	61.4	----	61.7	----	61.6	----
B082	66	60.5	----	60.7	----	60.7	----
B083	66	63.7	----	64	----	63.9	----
B084	66	59.3	----	59.5	----	59.5	----
B085	66	58	----	58.2	----	58.2	----
B086	66	58.3	----	58.5	----	58.6	----
B087	66	60.1	----	60.4	----	60.4	----
B088	66	58.5	----	58.8	----	58.8	----
B089	66	58.6	----	58.8	----	58.9	----
B097	66	60.2	----	61.1	----	62.2	----
B098	66	59.8	----	60.5	----	61.2	----
B099	66	60.3	----	60.9	----	61.4	----
B100	66	59.4	----	59.9	----	60.4	----
B101	66	59.5	----	60	----	59.1	----
B102	66	59	----	59.5	----	58.3	----
B140	66	59.8	----	60.5	----	60.9	----
B150	66	72.5	Exceed	73	Exceed	72.9	Exceed
B188	66	63.1	----	63.4	----	62.4	----
B189	66	63.4	----	63.7	----	62	----
B192	66	64	----	65.9	Exceed	65.5	Exceed
B193	66	64.1	----	66	Exceed	65.6	Exceed
B194	66	63.9	----	65.8	Exceed	65.5	Exceed
B195	66	64	----	65.9	Exceed	65.5	Exceed
B196	66	64.5	----	66.4	Exceed	66	Exceed
B197	66	64.5	----	66.4	Exceed	66	Exceed
B198	66	64.4	----	66.3	Exceed	65.9	Exceed
B201	66	57.9	----	59.1	----	58.9	----
B202	66	58.1	----	59.2	----	59	----
B203	66	58.3	----	59.3	----	59.2	----
B204	66	58.4	----	59.4	----	59.2	----
B205	66	58.7	----	59.5	----	59.4	----
B206	66	59	----	59.6	----	59.5	----
B207	66	59.2	----	59.8	----	59.7	----
B208	66	59.4	----	60	----	59.9	----
B213	66	60.1	----	61.7	----	61.3	----
B215	66	64.9	----	66.7	Exceed	66.3	Exceed

		Existing Conditions		2030 No Action		2030 Proposed Action	
Receiver	NAC	Noise Level	Status	Noise Level	Status	Noise Level	Status
B216	66	58.9	----	60.2	----	60.1	----
B217	66	56.3	----	57.3	----	57.3	----
B218	66	64.6	----	66.4	Exceed	66.3	Exceed
B219	66	57.7	----	58.8	----	58.9	----
B222	66	64.7	----	66.5	Exceed	66.1	Exceed
B223	66	58.1	----	59.3	----	59.1	----
B228	66	64.6	----	66.4	Exceed	65.9	Exceed
B229	66	58.5	----	59.8	----	59.4	----
B233	66	55.7	----	56.7	----	56.4	----
B234	66	59.7	----	61	----	60.5	----
B235	66	64.9	----	66.7	Exceed	66.1	Exceed
B240	66	55.1	----	56.2	----	56	----
B241	66	55.5	----	56.6	----	56.7	----
B242	66	55.3	----	56.2	----	56.1	----
B243	66	57.2	----	58.3	----	58.4	----
B244	66	63.3	----	65	----	64.7	----
B245	66	64.2	----	65.8	----	65.6	----
B246	66	58.9	----	60.2	----	60.3	----
B247	66	56.4	----	57.4	----	57.4	----
B251	66	54.8	----	55.7	----	55.9	----
B261	66	55.3	----	55.7	----	55.8	----
B352	66	69.3	Exceed	70.4	Exceed	70.3	Exceed
B353	66	68.9	Exceed	69.8	Exceed	69.7	Exceed
B354	66	67.2	Exceed	68	Exceed	67.9	Exceed
B357	66	68.9	Exceed	69.9	Exceed	69.8	Exceed
B358	66	69.2	Exceed	70.1	Exceed	70	Exceed
B372	66	68.1	Exceed	68.2	Exceed	68.2	Exceed
B373	66	66.8	Exceed	67	Exceed	67	Exceed
B374	66	63.9	----	64.2	----	64.2	----
B375	66	62.8	----	63	----	63	----
B376	66	63	----	62.9	----	63	----
B377	66	66.5	Exceed	66.4	Exceed	66.5	Exceed
B378	66	65.7	----	65.8	----	65.9	----
B379	66	65.3	----	65.3	----	65.4	----
B380	66	64.7	----	64.8	----	64.8	----
B381	66	64.1	----	64.2	----	64.3	----
B382	66	63.4	----	63.6	----	63.7	----
B383	66	63.2	----	63.4	----	63.5	----
B384	66	65.1	----	65.1	----	65.2	----
B385	66	62.3	----	62.3	----	62.4	----
B386	66	61.9	----	61.8	----	61.9	----
B387	66	61.6	----	61.3	----	61.3	----
B462	66	66	Exceed	67.8	Exceed	67.1	Exceed
B463	66	66.3	Exceed	68.1	Exceed	67.3	Exceed
B464	66	66.6	Exceed	68.4	Exceed	67.6	Exceed
B465	66	58.6	----	60.1	----	59.7	----
B466	66	66.9	Exceed	68.7	Exceed	67.9	Exceed
B467	66	66.8	Exceed	68.6	Exceed	67.8	Exceed
B468	66	58.2	----	59.8	----	60.3	----

		Existing Conditions		2030 No Action		2030 Proposed Action	
Receiver	NAC	Noise Level	Status	Noise Level	Status	Noise Level	Status
B469	66	61.2	----	62.9	----	63.3	----
B470	66	66.7	Exceed	68.5	Exceed	67.8	Exceed
B471	66	66.8	Exceed	68.6	Exceed	67.9	Exceed
B472	66	61.2	----	62.8	----	63.4	----
B473	66	65.9	----	67.7	Exceed	66.9	Exceed
B474	66	66.8	Exceed	68.6	Exceed	67.9	Exceed
B475	66	61.5	----	62.9	----	63.4	----
B476	66	60.2	----	61.6	----	62.2	----
B477	66	60.8	----	62.2	----	62.8	----
B478	66	64.9	----	66.5	Exceed	65.8	Exceed
B479	66	65.1	----	66.6	Exceed	65.9	Exceed
B480	66	59.9	----	61.2	----	61.5	----
B481	66	60.9	----	62.1	----	62.2	----
B482	66	65.2	----	66.6	Exceed	66.1	Exceed
B483	66	67.2	Exceed	68.4	Exceed	68.2	Exceed
B484	66	66.3	Exceed	68	Exceed	67.4	Exceed
B485	66	61.5	----	62.8	----	63.4	----
B486	66	61.2	----	62.6	----	63.1	----
B487	66	57.6	----	58.6	----	59.2	----
B488	66	61.4	----	62.1	----	62.1	----
B489	66	65.3	----	66	Exceed	66.3	Exceed
B490	66	56.9	----	57.7	----	58.9	----
B491	66	55.8	----	56.6	----	58.4	----
B492	66	56.1	----	57.2	----	59	----
B493	66	54.2	----	55.7	----	57.8	----
B494	66	60.8	----	62	----	67.5	Exceed
B495	66	59	----	60	----	64.4	----
B496	66	58.4	----	59.5	----	59.7	----
B497	66	57.7	----	58.8	----	59.3	----
B498	66	57.5	----	58.5	----	59.4	----
B499	66	57.1	----	58.1	----	59.6	----
B500	66	56.9	----	58	----	60.2	----
B502	66	69.6	Exceed	69.9	Exceed	69.9	Exceed
B503	66	66	Exceed	66.2	Exceed	66.3	Exceed
B504	66	64.3	----	64.5	----	64.6	----
B505	66	64.1	----	64.2	----	64.1	----
B511	66	67.6	Exceed	68.8	Exceed	68.7	Exceed
B512	66	63.9	----	64.7	----	64.9	----
B516	66	66.3	Exceed	67.8	Exceed	67.5	Exceed
B517	66	64.3	----	65.9	----	65.6	----
B518	66	62.5	----	63.6	----	63.9	----
B525	66	60.4	----	61.8	----	61.8	----
B526	66	65	----	66.7	Exceed	66.3	Exceed
B527	66	65.4	----	67.1	Exceed	66.8	Exceed
B528	66	58.3	----	59.5	----	59.5	----
B529	66	57.9	----	59.1	----	59.4	----
B532	66	64.1	----	65.7	----	65.5	----
B533	66	64.9	----	66.5	Exceed	66.4	Exceed
B536	66	56	----	56.4	----	56.8	----

		Existing Conditions		2030 No Action		2030 Proposed Action	
Receiver	NAC	Noise Level	Status	Noise Level	Status	Noise Level	Status
B537	66	54.6	----	55.1	----	55.2	----
B538	66	55.3	----	55.8	----	56.2	----
B539	66	68.5	Exceed	69.7	Exceed	70.3	Exceed
B542	66	59.1	----	60.1	----	61.1	----
B547	66	58.9	----	60.8	----	60.4	----
B900	66	66.2	Exceed	66.2	Exceed	66.2	Exceed
B901	66	66.4	Exceed	66	Exceed	66.1	Exceed
B902	66	54.7	----	58.6	----	59.8	----
C035	71	71.9	Exceed	72.4	Exceed	73.4	Exceed
C038	71	68.9	----	70	----	70.1	----
C050	71	69.8	----	70.6	----	70	----
C068	71	66	----	67	----	68	----
C103	71	58	----	59.3	----	59	----
C104	71	70	----	70.9	----	70.7	----
C105	71	61.6	----	63.7	----	63.3	----
C106	71	57.6	----	60	----	59.3	----
C107	71	67.5	----	70.1	----	69.3	----
C108	71	67.2	----	69.9	----	69.1	----
C109	71	68.8	----	71.2	Exceed	70.5	----
C110	71	65.6	----	68.1	----	67.3	----
C111	71	58.5	----	61.7	----	61.1	----
C112	71	68.7	----	69.4	----	69.6	----
C113	71	61.7	----	63.8	----	63.4	----
C114	71	61.1	----	62.6	----	61.9	----
C115	71	63.3	----	65	----	64.7	----
C116	71	66.5	----	67.8	----	67.8	----
C117	71	70.6	----	71.4	Exceed	71.9	Exceed
C118	71	69.7	----	70.4	----	70.9	----
C119	71	69.7	----	70.5	----	70.9	----
C120	71	71.3	Exceed	72.3	Exceed	72.9	Exceed
C121	71	70.2	----	66	----	66.6	----
C122	71	70.1	----	63.8	----	64.3	----
C123	71	70.2	----	62.5	----	63	----
C124	71	67.9	----	59.8	----	60.2	----
C125	71	70.5	----	59.5	----	59.9	----
C126	71	73.6	Exceed	60.8	----	61.1	----
C127	71	73.5	Exceed	60.5	----	60.9	----
C128	71	67.9	----	58.9	----	59.1	----
C129	71	68	----	64.6	----	65.1	----
C130	71	72.3	Exceed	60.7	----	61.1	----
C131	71	72.1	Exceed	73.2	Exceed	72.7	Exceed
C132	71	73.5	Exceed	73.8	Exceed	74.1	Exceed
C133	71	69.9	----	70.3	----	72.1	Exceed
C134	71	72.1	Exceed	72.4	Exceed	74	Exceed
C135	71	64.7	----	64.9	----	65	----
C136	71	76.5	Exceed	76.9	Exceed	76.6	Exceed
C137	71	69.3	----	70	----	70.3	----
C138	71	66.9	----	67.6	----	70.4	----
C141	71	71.6	Exceed	72.7	Exceed	72.2	Exceed

		Existing Conditions		2030 No Action		2030 Proposed Action	
Receiver	NAC	Noise Level	Status	Noise Level	Status	Noise Level	Status
C142	71	71.5	Exceed	72.6	Exceed	72.1	Exceed
C143	71	71.6	Exceed	72.8	Exceed	72.4	Exceed
C144	71	70.1	----	70.8	----	71.1	Exceed
C147	71	63.7	----	66.4	----	65.9	----
C148	71	67.1	----	67.2	----	67.2	----
C149	71	66.3	----	66.3	----	66.2	----
C151	71	72.4	Exceed	72.5	Exceed	72.5	Exceed
C152	71	67	----	67.7	----	67.7	----
C153	71	72	Exceed	72.8	Exceed	72.6	Exceed
C154	71	71.6	Exceed	72.3	Exceed	72.1	Exceed
C155	71	71.3	Exceed	72.2	Exceed	71.8	Exceed
C156	71	70.2	----	71.1	Exceed	70.4	----
C157	71	62.6	----	62.9	----	60.6	----
C158	71	63.7	----	63.9	----	64	----
C159	71	72.8	Exceed	61.1	----	61.5	----
C160	71	61.8	----	62.8	----	62.7	----
C161	71	62	----	63.9	----	62.8	----
C162	71	67.6	----	68.1	----	66.8	----
C163	71	68.1	----	68.6	----	68	----
C164	71	68.9	----	69.5	----	70	----
C165	71	68.5	----	69.1	----	69.7	----
C166	71	67.1	----	65	----	65.6	----
C167	71	65.6	----	58.9	----	59.3	----
C168	71	66.6	----	59.2	----	59.4	----
C169	71	65.2	----	65.5	----	65.8	----
C174	71	66.2	----	67.1	----	67.1	----
C175	71	64	----	64.4	----	63.8	----
C176	71	67	----	67.5	----	67.2	----
C177	71	68.8	----	69.6	----	69.6	----
C178	71	67.2	----	67.8	----	67.7	----
C179	71	69.1	----	69.7	----	69.4	----
C180	71	66.5	----	67	----	66.7	----
C181	71	63.4	----	60.9	----	61.1	----
C182	71	63.2	----	59.8	----	60	----
C183	71	62.1	----	57.4	----	57.5	----
C184	71	63.1	----	63.3	----	62.9	----
C185	71	54.3	----	56.5	----	55.9	----
C186	71	65	----	63.2	----	63.3	----
C187	71	58.5	----	58.8	----	58.9	----
C190	71	62.8	----	64.7	----	64.3	----
C191	71	57.7	----	59.1	----	58.8	----
C199	71	58	----	59.7	----	59.4	----
C200	71	63.1	----	65	----	64.7	----
C209	71	63.2	----	64.9	----	64.5	----
C210	71	60.4	----	60.5	----	60.6	----
C211	71	61.6	----	63.2	----	62.8	----
C212	71	63.1	----	64.3	----	63.8	----
C214	71	62.1	----	62.3	----	61.2	----
C221	71	63.9	----	65.7	----	64.9	----

		Existing Conditions		2030 No Action		2030 Proposed Action	
Receiver	NAC	Noise Level	Status	Noise Level	Status	Noise Level	Status
C236	71	64.6	----	65.7	----	65	----
C237	71	64.3	----	65.2	----	64.5	----
C238	71	64.7	----	65.6	----	65.3	----
C239	71	64.5	----	66.2	----	65.8	----
C250	71	60.6	----	62	----	61.9	----
C252	71	66.1	----	67.2	----	67.3	----
C253	71	63.9	----	62.2	----	62.7	----
C254	71	63.5	----	60.9	----	61.3	----
C255	71	63	----	59.9	----	60.3	----
C256	71	62.7	----	59.3	----	59.6	----
C257	71	63.7	----	58.3	----	58.6	----
C258	71	61.9	----	57.6	----	57.8	----
C259	71	61.2	----	57.7	----	57.7	----
C260	71	61.1	----	61.9	----	61.7	----
C262	71	55.4	----	55.7	----	55.7	----
C263	71	55.3	----	55.6	----	55.6	----
C264	71	58.9	----	59.1	----	59.1	----
C265	71	61.1	----	60.3	----	60.2	----
C266	71	61.8	----	61.4	----	61.3	----
C267	71	62.1	----	62.2	----	62.1	----
C268	71	62.9	----	62.8	----	62.8	----
C269	71	64.5	----	64.9	----	64.8	----
C270	71	68.3	----	68.8	----	68.8	----
C271	71	64.3	----	64.5	----	64.5	----
C272	71	66.3	----	66.3	----	66.3	----
C277	71	71.5	Exceed	72.8	Exceed	72.8	Exceed
C278	71	69.6	----	70.7	----	70.7	----
C351	71	69.7	----	70.4	----	70.3	----
C355	71	70.8	----	71.6	Exceed	71.6	Exceed
C356	71	65.8	----	66.1	----	66.2	----
C359	71	69.6	----	70.5	----	70.4	----
C360	71	65.3	----	66.3	----	66.4	----
C361	71	66.9	----	69.3	----	69.4	----
C362	71	65.6	----	68.6	----	68.6	----
C363	71	60.6	----	62.7	----	62.9	----
C364	71	63.3	----	65.5	----	65.5	----
C365	71	62.5	----	65.4	----	65.4	----
C366	71	62.4	----	65.2	----	65.1	----
C371	71	67.7	----	68.1	----	68	----
C388	71	60.3	----	60.5	----	60.6	----
C389	71	60.7	----	61.1	----	61.1	----
C390	71	70.1	----	70.4	----	70.6	----
C501	71	67.9	----	64.6	----	64.6	----
C506	71	59.8	----	60.2	----	60.3	----
C507	71	60.3	----	60.7	----	60.2	----
C508	71	60.3	----	60.9	----	60.6	----
C509	71	66.2	----	67.2	----	67.3	----
C510	71	59.3	----	60.2	----	60.5	----
C534	71	63.9	----	65.5	----	65.3	----

		Existing Conditions		2030 No Action		2030 Proposed Action	
Receiver	NAC	Noise Level	Status	Noise Level	Status	Noise Level	Status
C535	71	64.3	----	66	----	65.8	----
C540	71	65	----	66.1	----	68.1	----
C541	71	65.6	----	66.9	----	68.2	----
C543	71	65	----	66.4	----	68.6	----
C544	71	64	----	65.3	----	66.3	----
C545	71	63.7	----	65	----	65.8	----
C546	71	63.4	----	64.7	----	65.4	----
C548	71	63.3	----	64.7	----	65.4	----

APPENDIX E NOISE MITIGATION EVALUATION FORMS

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COLORADO DEPARTMENT OF TRANSPORTATION
NOISE ABATEMENT DETERMINATION

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

Project # IM 0703-314	Project code (SA#)	STIP #	Project Location: 32nd West of I-70

A. FEASIBILITY:

1. Can a continuous noise barrier or berm be constructed? ☐ YES ☑ NO
2. Can a substantial noise reduction be achieved by constructing a noise barrier or berm?...
   10 dBA: ☐ YES ☐ NO 7-10 dBA: ☑ YES ☐ NO 5-7 dBA: ☑ YES ☐ NO
3. Are there any "fatal flaw" safety or maintenance issues involving the proposed noise barrier or berm? ☑ YES ☐ NO

B. REASONABLENESS:

		EXTREMELY REASONABLE	REASONABLE	MARGINALLY REASONABLE	UNREASONABLE
1.	Cost Benefit Index (per receiver per dBA)	☐ Less than $3000	☑ $3000-$3750	☐ $3750-$4000	☐ More than $4000
2.	Average Build Noise Level	☐ 70 dBA or More	☑ 66 - 70 dBA	☐ 63 - 66 dBA	☐ Less than 63 dBA
3.	Impacted persons' desires	☐ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
4.	Development Type (Category B*)	☑ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
5.	Development Existence (15 years or more)	☑ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
6.	Build Noise Level vs. Existing Noise Level	☐ Greater than 10 dBA	☐ 5 - 10 dBA	☑ 0 - 5 dBA	☐ Noise Level Decrease

***Category B – Residential, School, Hospital, Park, Picnic/Active Sports Area, Motel, Church, Library**

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 public or non-profit buildings? ☐ YES ☑ NO
   b. If yes, is it reasonable and feasible to provide insulation for these buildings? ☐ YES ☐ NO
3. a. Is private residential property affected by a 30 dB(A) or more noise level increase? ☐ YES ☑ NO
   b. Are private residences impacted by 75 dB(A) or more? ☐ YES ☑ NO

D. ADDITIONAL CONSIDERATIONS:

The barrier here must have many gaps for streets. Even so, parts of the properties will get 5-10 dBA reduction. Would require 7 separate segments. 9 ft tall by 1400 ft long. Cost was about $3600 per.

E. DECISION:

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 mitigation measures be provided? ☐ YES ☑ NO

F. DECISION DESCRIPTION AND JUSTIFICATION These barriers could represent safety problems. They would block sight lines for 7 access points at unsignalized intersections within 1500 ft on 32nd Avenue. Many houses are very close to 32nd Ave., leaving little room for options. These barriers are not recommended because of the sight line concerns.

Completed by: Dale Tuttle	Date: 3-13-06

CDOT Form #1209 12/02

COLORADO DEPARTMENT OF TRANSPORTATION
NOISE ABATEMENT DETERMINATION

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

Project # IM 0703-294	Project code (SA#)	STIP #	Project Location: 32nd & East of I-70

A. FEASIBILITY:

1. Can a continuous noise barrier or berm be constructed? ☐ YES ☑ NO
2. Can a substantial noise reduction be achieved by constructing a noise barrier or berm?... for 2 of 7
   10 dBA: ☐ YES ☐ NO 7-10 dBA: ☐ YES ☐ NO 5-7 dBA: ☑ YES ☐ NO
3. Are there any "fatal flaw" safety or maintenance issues involving the proposed noise barrier or berm? ☑ YES ☐ NO

B. REASONABLENESS:

		EXTREMELY REASONABLE	REASONABLE	MARGINALLY REASONABLE	UNREASONABLE
1.	Cost Benefit Index (per receiver per dBA)	☐ Less than $3000	☐ $3000-$3750	☐ $3750-$4000	☑ More than $4000
2.	Average Build Noise Level	☐ 70 dBA or More	☑ 66 - 70 dBA	☐ 63 - 66 dBA	☐ Less than 63 dBA
3.	Impacted persons' desires	☐ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
4.	Development Type (Category B*)	☑ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
5.	Development Existence (15 years or more)	☑ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
6.	Build Noise Level vs. Existing Noise Level	☐ Greater than 10 dBA	☐ 5 - 10 dBA	☑ 0 - 5 dBA	☐ Noise Level Decrease

***Category B – Residential, School, Hospital, Park, Picnic/Active Sports Area, Motel, Church, Library**

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 public or non-profit buildings? ☐ YES ☑ NO
   b. If yes, is it reasonable and feasible to provide insulation for these buildings? ☐ YES ☐ NO
3. a. Is private residential property affected by a 30 dB(A) or more noise level increase? ☐ YES ☑ NO
   b. Are private residences impacted by 75 dB(A) or more? ☐ YES ☑ NO

D. ADDITIONAL CONSIDERATIONS: Two of 7 impacted receivers could receive the minimum mitigation. The barrier would be in 2 segments (for vehicle access), and some properties could not receive a barrier. The two receiver segments totaled 12 ft. by 375 ft. Cost was $5700 per. Parts of yards are unprotected.

E. DECISION:

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 mitigation measures be provided? ☐ YES ☑ NO

F. DECISION DESCRIPTION AND JUSTIFICATION these barriers could represent safety problems. they would block sight lines at unsignalized intersections on 32nd Ave. Many of the impacted homes in the neighborhood would not benefit. these barriers are not recommended.

Completed by: Dale Tuttle	Date: 3-13-06

CDOT Form #1209 12/02

COLORADO DEPARTMENT OF TRANSPORTATION
NOISE ABATEMENT DETERMINATION

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

Project # IM 0703-394	Project code (SA#)	STIP #	Project Location: 31st East of Youngfield

A. FEASIBILITY:

1. Can a continuous noise barrier or berm be constructed? ☐ YES ☑ NO
2. Can a substantial noise reduction be achieved by constructing a noise barrier or berm?... for some
   10 dBA: ☐ YES ☐ NO 7-10 dBA: ☐ YES ☐ NO 5-7 dBA: ☑ YES ☐ NO
3. Are there any "fatal flaw" safety or maintenance issues involving the proposed noise barrier or berm? ☑ YES ☐ NO

B. REASONABLENESS:

		EXTREMELY REASONABLE	REASONABLE	MARGINALLY REASONABLE	UNREASONABLE
1.	Cost Benefit Index (per receiver per dBA)	☐ Less than $3000	☐ $3000-$3750	☐ $3750-$4000	☑ More than $4000
2.	Average Build Noise Level	☑ 70 dBA or More	☐ 66 - 70 dBA	☐ 63 - 66 dBA	☐ Less than 63 dBA
3.	Impacted persons' desires	☐ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
4.	Development Type (Category B*)	☑ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
5.	Development Existence (15 years or more)	☑ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
6.	Build Noise Level vs. Existing Noise Level	☐ Greater than 10 dBA	☐ 5 - 10 dBA	☑ 0 - 5 dBA	☐ Noise Level Decrease

***Category B – Residential, School, Hospital, Park, Picnic/Active Sports Area, Motel, Church, Library**

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 public or non-profit buildings? ☐ YES ☑ NO
   b. If yes, is it reasonable and feasible to provide insulation for these buildings? ☐ YES ☐ NO
3. a. Is private residential property affected by a 30 dB(A) or more noise level increase? ☐ YES ☑ NO
   b. Are private residences impacted by 75 dB(A) or more? ☐ YES ☑ NO

D. ADDITIONAL CONSIDERATIONS: Would need 2 segments with a gap for 31st Ave. Only 2 of 5 receivers would benefit. Barriers are 9 x 115 and 12 x 115. Would create sight line problems for 31st Ave. Cost would be about $6500 per.

E. DECISION:

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 mitigation measures be provided? ☐ YES ☑ NO

F. DECISION DESCRIPTION AND JUSTIFICATION

These barriers are not very effective and do not provide much benefit. Would only protect parts of the properties. These barriers are not recommended.

Completed by: Debi Tiedtke	Date: 3-13-06

CDOT Form #1209 12/02

COLORADO DEPARTMENT OF TRANSPORTATION
NOISE ABATEMENT DETERMINATION

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

Project # IM 0703-334	Project code (SA#)	STIP #	Project Location: Cabela's Drive

A. FEASIBILITY:

1. Can a continuous noise barrier or berm be constructed? ☒ YES ☐ NO
2. Can a substantial noise reduction be achieved by constructing a noise barrier or berm?...
   10 dBA: ☐ YES ☐ NO 7-10 dBA: ☒ YES ☐ NO 5-7 dBA: ☐ YES ☐ NO
3. Are there any "fatal flaw" safety or maintenance issues involving the proposed noise barrier or berm? ☐ YES ☒ NO

B. REASONABLENESS:

	EXTREMELY REASONABLE	REASONABLE	MARGINALLY REASONABLE	UNREASONABLE
1. Cost Benefit Index (per receiver per dBA)	☐ Less than $3000	☐ $3000-$3750	☐ $3750-$4000	☒ More than $4000
2. Average Build Noise Level	☐ 70 dBA or More	☒ 66 - 70 dBA	☐ 63 - 66 dBA	☐ Less than 63 dBA
3. Impacted persons' desires	☐ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
4. Development Type (Category B*)	☒ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
5. Development Existence (15 years or more)	☒ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
6. Build Noise Level vs. Existing Noise Level	☐ Greater than 10 dBA	☒ 5 - 10 dBA	☐ 0 - 5 dBA	☐ Noise Level Decrease

***Category B – Residential, School, Hospital, Park, Picnic/Active Sports Area, Motel, Church, Library**

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 public or non-profit buildings? ☐ YES ☒ NO
   b. If yes, is it reasonable and feasible to provide insulation for these buildings? ☐ YES ☐ NO
3. a. Is private residential property affected by a 30 dB(A) or more noise level increase? ☐ YES ☒ NO
   b. Are private residences impacted by 75 dB(A) or more? ☐ YES ☒ NO

D. ADDITIONAL CONSIDERATIONS: This barrier could be an extension to an existing barrier. A 10 ft by 150 ft extension gives 9 dB benefit to one home. Cost would be about $4800 per.

E. DECISION:

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 mitigation measures be provided? ☒ YES ☐ NO

F. DECISION DESCRIPTION AND JUSTIFICATION

This barrier is an extention of an existing barrier and for a home right next to the new Cabela's Drive. Cost is just above the CDOT threshold. This barrier extension is being recommended.

Completed by:	Date:
Dale Tuchscherer	1-9-06

CDOT Form #1209 12/02

COLORADO DEPARTMENT OF TRANSPORTATION
NOISE ABATEMENT DETERMINATION

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

Project # IM 0703-294	Project code (SA#)	STIP #	Project Location: 38th Drive

A. FEASIBILITY:

1. Can a continuous noise barrier or berm be constructed? ☑ YES ☐ NO
2. Can a substantial noise reduction be achieved by constructing a noise barrier or berm?...
   10 dBA: ☐ YES ☑ NO 7-10 dBA: ☐ YES ☑ NO 5-7 dBA: ☐ YES ☑ NO
3. Are there any "fatal flaw" safety or maintenance issues involving the proposed noise barrier or berm? ☐ YES ☑ NO

B. REASONABLENESS:

		EXTREMELY REASONABLE	REASONABLE	MARGINALLY REASONABLE	UNREASONABLE
1.	Cost Benefit Index (per receiver per dBA)	☐ Less than $3000	☐ $3000-$3750	☐ $3750-$4000	☐ More than $4000
2.	Average Build Noise Level	☐ 70 dBA or More	☑ 66 - 70 dBA	☐ 63 - 66 dBA	☐ Less than 63 dBA
3.	Impacted persons' desires	☐ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
4.	Development Type (Category B*)	☑ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
5.	Development Existence (15 years or more)	☑ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
6.	Build Noise Level vs. Existing Noise Level	☐ Greater than 10 dBA	☐ 5 - 10 dBA	☑ 0 - 5 dBA	☐ Noise Level Decrease

***Category B – Residential, School, Hospital, Park, Picnic/Active Sports Area, Motel, Church, Library**

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 public or non-profit buildings? ☐ YES ☑ NO
   b. If yes, is it reasonable and feasible to provide insulation for these buildings? ☐ YES ☐ NO
3. a. Is private residential property affected by a 30 dB(A) or more noise level increase? ☐ YES ☑ NO
   b. Are private residences impacted by 75 dB(A) or more? ☐ YES ☑ NO

D. ADDITIONAL CONSIDERATIONS: This barrier would need to be along Youngfield, a distance from the home which compromises effectiveness. Ground to north drops dramatically. A 10-50 ft tall barrier did not give 5 dB reduction. Cost could not be calculated. A church is between the home and barrier.

E. DECISION:

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 mitigation measures be provided? ☐ YES ☑ NO

F. DECISION DESCRIPTION AND JUSTIFICATION

No barrier is being recommended for this location.

Completed by: Julie Tuchek **Date:** 1-9-06

CDOT Form #1209 12/02

COLORADO DEPARTMENT OF TRANSPORTATION
NOISE ABATEMENT DETERMINATION

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

Project # IM 0703-394	Project code (SA#)	STIP #	Project Location: 4160 Youngfield St.

A. FEASIBILITY:

1. Can a continuous noise barrier or berm be constructed? ☐ YES ☑ NO
2. Can a substantial noise reduction be achieved by constructing a noise barrier or berm?...
   10 dBA: ☐ YES ☐ NO 7-10 dBA: ☐ YES ☐ NO 5-7 dBA: ☑ YES ☐ NO
3. Are there any "fatal flaw" safety or maintenance issues involving the proposed noise barrier or berm? ☑ YES ☐ NO

B. REASONABLENESS:

	EXTREMELY REASONABLE	REASONABLE	MARGINALLY REASONABLE	UNREASONABLE
1. Cost Benefit Index (per receiver per dBA)	☐ Less than $3000	☐ $3000-$3750	☐ $3750-$4000	☑ More than $4000
2. Average Build Noise Level	☑ 70 dBA or More	☐ 66 - 70 dBA	☐ 63 - 66 dBA	☐ Less than 63 dBA
3. Impacted persons' desires	☐ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
4. Development Type (Category B*)	☑ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
5. Development Existence (15 years or more)	☑ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
6. Build Noise Level vs. Existing Noise Level	☐ Greater than 10 dBA	☐ 5 - 10 dBA	☑ 0 - 5 dBA	☐ Noise Level Decrease

***Category B – Residential, School, Hospital, Park, Picnic/Active Sports Area, Motel, Church, Library**

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 public or non-profit buildings? ☐ YES ☑ NO
   b. If yes, is it reasonable and feasible to provide insulation for these buildings? ☐ YES ☐ NO
3. a. Is private residential property affected by a 30 dB(A) or more noise level increase? ☐ YES ☑ NO
   b. Are private residences impacted by 75 dB(A) or more? ☐ YES ☑ NO

D. ADDITIONAL CONSIDERATIONS: This property is an isolated residence. Appeared that 2 homes were on site. Driveway meant there had to be a gap in the barrier. Could not get 10 dB reduction even at 30 ft tall. Total barrier 13 ft by 140 ft gave 5 dB reduction. Cost was $5500 per.

E. DECISION:

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 mitigation measures be provided? ☐ YES ☑ NO

F. DECISION DESCRIPTION AND JUSTIFICATION Barriers here would create sight line problems for the residents accessing Youngfield. This is an isolated residence in a commercial area, so the cost is unreasonable. These barriers are not recommended.

Completed by: Dale Tuchsen	**Date:** 3-13-06

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COLORADO DEPARTMENT OF TRANSPORTATION
NOISE ABATEMENT DETERMINATION

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

Project # IM 0703-394	Project code (SA#)	STIP #	Project Location: 44th East of I-70

A. FEASIBILITY:

1. Can a continuous noise barrier or berm be constructed? ☐ YES ☒ NO
2. Can a substantial noise reduction be achieved by constructing a noise barrier or berm?...
   10 dBA: ☐ YES ☒ NO 7-10 dBA: ☐ YES ☒ NO 5-7 dBA: ☐ YES ☒ NO
3. Are there any "fatal flaw" safety or maintenance issues involving the proposed noise barrier or berm? ☐ YES ☒ NO

B. REASONABLENESS:

		EXTREMELY REASONABLE	REASONABLE	MARGINALLY REASONABLE	UNREASONABLE
1.	Cost Benefit Index (per receiver per dBA)	☐ Less than $3000	☐ $3000-$3750	☐ $3750-$4000	☐ More than $4000
2.	Average Build Noise Level	☐ 70 dBA or More	☒ 66 - 70 dBA	☐ 63 - 66 dBA	☐ Less than 63 dBA
3.	Impacted persons' desires	☐ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
4.	Development Type (Category B*)	☐ More than 75%	☒ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
5.	Development Existence (15 years or more)	☒ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
6.	Build Noise Level vs. Existing Noise Level	☐ Greater than 10 dBA	☐ 5 - 10 dBA	☒ 0 - 5 dBA	☐ Noise Level Decrease

***Category B – Residential, School, Hospital, Park, Picnic/Active Sports Area, Motel, Church, Library**

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 public or non-profit buildings? ☐ YES ☒ NO
   b. If yes, is it reasonable and feasible to provide insulation for these buildings? ☐ YES ☐ NO
3. a. Is private residential property affected by a 30 dB(A) or more noise level increase? ☐ YES ☒ NO
   b. Are private residences impacted by 75 dB(A) or more? ☐ YES ☒ NO

D. ADDITIONAL CONSIDERATIONS: Looked at homes along 44th & Youngfield together. Barriers along 44th had to have too many gaps for driveways to be effective. Along Youngfield, had to block both at-grade Youngfield AND elevated I-70. Complex traffic noise with noise coming from several directions & elevations. Could not find reasonable barrier arrangement that gave 5 dB reduction.

E. DECISION:

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 mitigation measures be provided? ☐ YES ☒ NO

F. DECISION DESCRIPTION AND JUSTIFICATION

Could not come up with a reasonable set of effective barriers, to comply. Barriers are not being recommended.

Completed by: Dale Tuchsch **Date:** 1-9-06

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COLORADO DEPARTMENT OF TRANSPORTATION
NOISE ABATEMENT DETERMINATION

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

Project # IM 0703-394	Project code (SA#)	STIP #	Project Location: Clear Creek Bike Path

A. FEASIBILITY:

1. Can a continuous noise barrier or berm be constructed? ☒ YES ☐ NO
2. Can a substantial noise reduction be achieved by constructing a noise barrier or berm?...
   10 dBA: ☐ YES ☐ NO 7-10 dBA: ☐ YES ☐ NO 5-7 dBA: ☐ YES ☒ NO
3. Are there any "fatal flaw" safety or maintenance issues involving the proposed noise barrier or berm? ☐ YES ☒ NO

B. REASONABLENESS:

		EXTREMELY REASONABLE	REASONABLE	MARGINALLY REASONABLE	UNREASONABLE
1.	Cost Benefit Index (per receiver per dBA)	☐ Less than $3000	☐ $3000-$3750	☐ $3750-$4000	☒ More than $4000
2.	Average Build Noise Level	☐ 70 dBA or More	☒ 66 - 70 dBA	☐ 63 - 66 dBA	☐ Less than 63 dBA
3.	Impacted persons' desires	☐ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
4.	Development Type (Category B*)	☒ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
5.	Development Existence (15 years or more)	☒ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
6.	Build Noise Level vs. Existing Noise Level	☐ Greater than 10 dBA	☐ 5 - 10 dBA	☒ 0 - 5 dBA	☐ Noise Level Decrease

***Category B – Residential, School, Hospital, Park, Picnic/Active Sports Area, Motel, Church, Library**

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 public or non-profit buildings? ☐ YES ☒ NO
   b. If yes, is it reasonable and feasible to provide insulation for these buildings? ☐ YES ☐ NO
3. a. Is private residential property affected by a 30 dB(A) or more noise level increase? ☐ YES ☒ NO
   b. Are private residences impacted by 75 dB(A) or more? ☐ YES ☒ NO

D. ADDITIONAL CONSIDERATIONS: This was a receiver for a bike path under I-70. A 30 ft by 430 ft barrier did not produce a 5 dB noise reduction 300 ft from I-70. Could not reach the minimum reduction, even with a barrier that would clearly be too costly.

E. DECISION:

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 mitigation measures be provided? ☐ YES ☒ NO

F. DECISION DESCRIPTION AND JUSTIFICATION A very large barrier in this position was not effective. The people using the bike path would be exposed to I-70 noise for a very brief period. This barrier is not being recommended.

Completed by:	Date:
Dale Tuchscherer	3-13-06

CDOT Form #1209 12/02

COLORADO DEPARTMENT OF TRANSPORTATION
NOISE ABATEMENT DETERMINATION

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

Project # IM 0703-194	Project code (SA#)	STIP #	Project Location: 14500-14700 W. 44th Ave.

A. FEASIBILITY:

1. Can a continuous noise barrier or berm be constructed? ☐ YES ☒ NO
2. Can a substantial noise reduction be achieved by constructing a noise barrier or berm?...
   10 dBA: ☐ YES ☐ NO 7-10 dBA: ☐ YES ☐ NO 5-7 dBA: ☒ YES ☐ NO
3. Are there any "fatal flaw" safety or maintenance issues involving the proposed noise barrier or berm? ☒ YES ☐ NO

B. REASONABLENESS:

		EXTREMELY REASONABLE	REASONABLE	MARGINALLY REASONABLE	UNREASONABLE
1.	Cost Benefit Index (per receiver per dBA)	☐ Less than $3000	☐ $3000-$3750	☐ $3750-$4000	☒ More than $4000
2.	Average Build Noise Level	☐ 70 dBA or More	☒ 66 - 70 dBA	☐ 63 - 66 dBA	☐ Less than 63 dBA
3.	Impacted persons' desires	☐ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
4.	Development Type (Category B*)	☒ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
5.	Development Existence (15 years or more)	☒ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
6.	Build Noise Level vs. Existing Noise Level	☐ Greater than 10 dBA	☐ 5 - 10 dBA	☒ 0 - 5 dBA	☐ Noise Level Decrease

***Category B – Residential, School, Hospital, Park, Picnic/Active Sports Area, Motel, Church, Library**

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 public or non-profit buildings? ☐ YES ☒ NO
   b. If yes, is it reasonable and feasible to provide insulation for these buildings? ☐ YES ☐ NO
3. a. Is private residential property affected by a 30 dB(A) or more noise level increase? ☐ YES ☒ NO
   b. Are private residences impacted by 75 dB(A) or more? ☐ YES ☐ NO

D. ADDITIONAL CONSIDERATIONS:

Barriers are not really feasible because of gaps for streets. Checked the segmented barriers anyhow. Segmented barriers only protect part of an impacted property, not the whole property. These barriers are not very effective, plus poor sight lines.

E. DECISION:

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 mitigation measures be provided? ☐ YES ☒ NO

F. DECISION DESCRIPTION AND JUSTIFICATION

Barriers would have to be discontinuous and therefore would not be very effective. Barriers are not recommended.

Completed by:	Date:
Dale Tuttle	4/20/06

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COLORADO DEPARTMENT OF TRANSPORTATION
NOISE ABATEMENT DETERMINATION

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

Project # IM 0703-294	Project code (SA#)	STIP #	Project Location: 15200-15300 W. 44th Ave.

A. FEASIBILITY:

1. Can a continuous noise barrier or berm be constructed? ☐ YES ☒ NO
2. Can a substantial noise reduction be achieved by constructing a noise barrier or berm?...
   10 dBA: ☐ YES ☐ NO 7-10 dBA: ☐ YES ☐ NO 5-7 dBA: ☐ YES ☒ NO
3. Are there any "fatal flaw" safety or maintenance issues involving the proposed noise barrier or berm? ☒ YES ☐ NO

B. REASONABLENESS:

	EXTREMELY REASONABLE	REASONABLE	MARGINALLY REASONABLE	UNREASONABLE
1. Cost Benefit Index (per receiver per dBA)	☐ Less than $3000	☐ $3000-$3750	☐ $3750-$4000	☐ More than $4000
2. Average Build Noise Level	☐ 70 dBA or More	☐ 66 - 70 dBA	☐ 63 - 66 dBA	☐ Less than 63 dBA
3. Impacted persons' desires	☐ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
4. Development Type (Category B*)	☐ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
5. Development Existence (15 years or more)	☐ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
6. Build Noise Level vs. Existing Noise Level	☐ Greater than 10 dBA	☐ 5 - 10 dBA	☐ 0 - 5 dBA	☐ Noise Level Decrease

***Category B – Residential, School, Hospital, Park, Picnic/Active Sports Area, Motel, Church, Library**

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 public or non-profit buildings? ☐ YES ☒ NO
   b. If yes, is it reasonable and feasible to provide insulation for these buildings? ☐ YES ☐ NO
3. a. Is private residential property affected by a 30 dB(A) or more noise level increase? ☐ YES ☒ NO
   b. Are private residences impacted by 75 dB(A) or more? ☐ YES ☐ NO

D. ADDITIONAL CONSIDERATIONS:

Most of these houses have 2 front access points to 44th Ave. from a "U" shaped driveway. All of these houses could have access from the alley in the rear, in theory, but this would really mess up property access.

E. DECISION:

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 mitigation measures be provided? ☐ YES ☒ NO

F. DECISION DESCRIPTION AND JUSTIFICATION

Barriers would have to be discontinuous because of local streets, and for driveways. Unless property access were limited to alley access, no barriers are even possible. This limitation was viewed as a fatal flaw. Barriers are not recommended.

Completed by:	Date:
Dale Tuchman	4/20/06

CDOT Form #1209 12/02

COLORADO DEPARTMENT OF TRANSPORTATION
NOISE ABATEMENT DETERMINATION

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

Project # IM 0703-194	Project code (SA#)	STIP #	Project Location: 2800 Youngfield St.

A. FEASIBILITY:

1. Can a continuous noise barrier or berm be constructed? ☐ YES ☒ NO
2. Can a substantial noise reduction be achieved by constructing a noise barrier or berm?...
   10 dBA: ☐ YES ☐ NO 7-10 dBA: ☐ YES ☐ NO 5-7 dBA: ☐ YES ☒ NO
3. Are there any "fatal flaw" safety or maintenance issues involving the proposed noise barrier or berm? ☒ YES ☐ NO

B. REASONABLENESS:

	EXTREMELY REASONABLE	REASONABLE	MARGINALLY REASONABLE	UNREASONABLE
1. Cost Benefit Index (per receiver per dBA)	☐ Less than $3000	☐ $3000-$3750	☐ $3750-$4000	☐ More than $4000
2. Average Build Noise Level	☐ 70 dBA or More	☐ 66 - 70 dBA	☐ 63 - 66 dBA	☐ Less than 63 dBA
3. Impacted persons' desires	☐ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
4. Development Type (Category B*)	☐ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
5. Development Existence (15 years or more)	☐ More than 75%	☐ 50% - 75%	☐ 25% - 50%	☐ Less than 25%
6. Build Noise Level vs. Existing Noise Level	☐ Greater than 10 dBA	☐ 5 - 10 dBA	☐ 0 - 5 dBA	☐ Noise Level Decrease

***Category B – Residential, School, Hospital, Park, Picnic/Active Sports Area, Motel, Church, Library**

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 public or non-profit buildings? ☐ YES ☒ NO
   b. If yes, is it reasonable and feasible to provide insulation for these buildings? ☐ YES ☐ NO
3. a. Is private residential property affected by a 30 dB(A) or more noise level increase? ☐ YES ☒ NO
   b. Are private residences impacted by 75 dB(A) or more? ☐ YES ☐ NO

D. ADDITIONAL CONSIDERATIONS: This is an isolated home with a driveway to Youngfield right next to the house. Gap for driveway means a barrier is not effective. Property is large enough that driveway could be relocated north to allow a continuous barrier. Irrigation ditch precludes this because access would be complicated.

E. DECISION:

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 mitigation measures be provided? ☐ YES ☒ NO

F. DECISION DESCRIPTION AND JUSTIFICATION

This is a relatively large property with the home very close to Youngfield. Irrigation ditch greatly complicates access relocation that would allow an effective barrier. An effective barrier does not work with current property access. Barrier is not recommended.

Completed by:	Date:
Barb Gschwind	4/20/04

CDOT Form #1209 12/02