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November 12, 2019

Brandon Weston
Environmental Services Director
Utah Department of Transportation
4501 South 2700 West
Salt Lake City, UT 84114-8450

Subject: Bangerter Highway (PIN 14417)
State Environmental Study Re-evaluation – 12600 South Intersection

Dear Mr. Weston,

A State Environmental Study for the subject-referenced project was completed in accordance with the UDOT Environmental Manual of Instruction and signed on December 10, 2018. This letter summarizes the anticipated impacts that would occur as a result of modifications to the proposed original design. The appendices include the supporting technical documentation and reports.

Need for Re-evaluation

A re-evaluation is needed to address potential impacts from the proposed design modifications. The original SES design included a grade-separated Single Point Urban Interchange (SPUI) at the intersection of Bangerter Highway (SR-154) and 12600 South, with the elevation of 12600 South remaining at-grade and Bangerter Highway crossing over 12600 South at approximately 28 feet above existing grade. The proposed design modifications consists of lowering 12600 South elevation by approximately 13 feet below grade and raising Bangerter Highway approximately 15 feet above existing grade. This modification was undertaken at the request of Riverton City to address concerns about visual impacts from the proposed original design.

Re-evaluation Analysis

Following is a summary of the main components of the original SES and any changes associated with the modified design and the re-evaluation of previously known and newly identified environmental resources in the project area.

Purpose and Need

The purpose of the project is to alleviate congestion and improve the operational safety of the Bangerter Highway and 12600 South intersection. The project is needed to alleviate congestion and improve safety in the project area.

The proposed design changes do not affect the original project concept or project purpose; therefore, the Purpose and Need for the project remain valid. The design changes referenced above would not change the overall project concept, nor would it affect the project's ability to meet the Purpose and Need for which it is intended.

Independent Utility

No additional transportation improvements are necessary for the proposed project to function as intended. The project would not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

Changes in Impact Status or Document Compliance

All applicable environmental resources were examined within the context of the design changes. Table 1 presents a summary of changes in environmental impacts. The changes identified are summarized in Table 1 and discussed in further detail following the table.

Table 1. Summary of Changes in Impact Status or Document Compliance

Resources	Changes in Impacts?		Summary of Changes
	Yes	No	
Land Use		X	No new impacts identified.
Farmland		X	No new impacts identified.
Social Conditions		X	No new impacts identified.
Right-of-way/Relocations		X	No new impacts identified.
Economic Conditions		X	No new impacts identified.
Pedestrians and Bicyclist		X	No new impacts identified.
Air Quality		X	No new impacts identified.
Noise	X		A new noise study was prepared in connection with the modified design due to the proposed changes in the height of the new interchange to be constructed. The modified design would have a slightly lower overall increase in sound levels to adjacent receptors and would lower the recommended height of a proposed new noise wall.
Water Resources		X	No new impacts identified.
Wetlands and Waters of the U.S.		X	No new impacts identified.
Floodplains		X	No new impacts identified.
Wildlife/Threatened and Endangered Species		X	No new impacts identified.
Cultural Resources		X	No new impacts identified.
Paleontology		X	No new impacts identified.
Hazardous Waste		X	No new impacts identified.

Resources	Changes in Impacts?		Summary of Changes
	Yes	No	
Visual Conditions	X		The modified design would lower the height of the new interchange (from approximately 28-feet to 15-feet) but would not otherwise alter the nature of the viewshed.
Energy		X	No new impacts identified.
Invasive Species		X	No new impacts identified.
Geology		X	No new impacts identified.
Construction Impacts	X		Restrictions on eastbound and westbound movements through the 12600 South intersection could occur for a period not to exceed 6 months.

Noise Impacts

A new noise study was prepared in connection with the modified design due to the proposed changes in the height of the new interchange to be constructed. See the *Bangerter Highway at 12600 South Noise Analysis* dated September 2019 in Appendix A. Under the original SES design, a 14-foot wall was recommended for the northwest corner of Bangerter Highway and 12600 South and a 13-foot wall was recommended to be replaced “in-kind” on the east side of Bangerter Highway north of 12600 South.

The modified design would have a slightly lower overall increase in sound levels (dBA) to adjacent receptors and would lower the height of a proposed new noise wall by three feet. For noise mitigation, an 11-foot wall is recommended for the northwest corner of Bangerter and 12600 South and a 13-foot wall is recommended to be replaced “in-kind” on the east side of Bangerter Highway north of 12600 South. Balloting will be conducted according to UDOT’s Noise Abatement Policy to determine whether either of the recommended walls would be constructed as part of the project.

Visual Conditions

The visual characteristics related to the original SES design were previously disclosed at community meetings and the public hearing, but was not discussed in detail in the SES. The modified design would lower the height of the new interchange from the original SES design as shown at the public meetings (reducing from approximately 28 feet to 15 feet), but would not otherwise alter the nature of the viewshed. See the visual renderings in Appendix B.

Construction Impacts

The original SES design, which kept 12600 South at approximately the same existing elevation (at grade), would not have required traffic restrictions on eastbound and westbound movements; therefore, no traffic restrictions would have been required during construction. However, since the modified design would lower 12600 South by approximately 13 feet (measured from the center of existing intersection grade), an unsafe work zone during the excavation process is created if traffic flow through the intersection were to be maintained. Therefore, restrictions on eastbound and westbound movements through the 12600 South intersection could occur for a period not to exceed 6 months.

Public Involvement

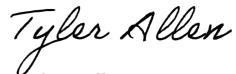
Public involvement activities will be undertaken to inform the public as to the proposed changes, including travel restrictions through the 12600 South intersection during construction, and to determine, through

balloting to be conducted according to UDOT's Noise Abatement Policy, whether the proposed noise walls would be constructed.

Conclusion

The subject environmental document has been reviewed and UDOT believes that the impacts of the proposed change to the project are not significantly different from those described in the SES. In addition, UDOT believes that there are no new circumstances or environmental concerns bearing on the proposed action or its impacts that would result in environmental impacts not previously evaluated. Therefore, the SES document for the project remains valid.

Sincerely,

A handwritten signature in black ink that reads "Tyler Allen". The signature is written in a cursive, flowing style.

Tyler Allen

Environmental Manager, Region 2
Utah Department of Transportation

APPENDIX A



BANGERTE HIGHWAY AT 12600 SOUTH NOISE ANALYSIS

PIN: 14417
PROJECT NUMBER: S-0154(86)6

PREPARED FOR:

The Utah Department of Transportation

PREPARED BY:

Horrocks Engineers

October 2019

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ACRONYMS, ABBREVIATIONS, AND DEFINITIONS

UDOT	Utah Department of Transportation
CFR	Code of Federal Regulations
dBA	A-weighted decibel
FHWA	Federal Highway Administration
L_{eq}	equivalent steady-state noise level, which in a stated period of time would contain the same acoustical energy as the time-varying noise level during the same period
$L_{eq}(h)$	energy-average of the A-weighted noise levels occurring during a 1-hour period
noise	unwanted sound
receptor	point in the model representative of several noise sensitive locations
TNM	Traffic Noise Model

NOISE STUDY

1.0 INTRODUCTION

This noise analysis was prepared in accordance with the UDOT Noise Abatement Policy, last revised June 15, 2017, consistent with federal regulation 23 CFR §772 and Utah Administrative Code R930-3.

2.0 DESCRIPTION OF PROJECT

UDOT is conducting a State Environmental Study to analyze improvements at the intersection of 12600 South and Bangerter Highway (see Figure 1).

The Utah Department of Transportation (UDOT) is proposing to construct a grade-separated Single Point Urban Interchange (SPUI) at the existing intersection of Bangerter Highway (SR-154) and 12600 South in Riverton, Utah.

The new interchange would allow for unimpeded traffic flow along Bangerter Highway. The study area is along Bangerter Highway between approximately milepost 6 to 7.5, and on 12600 South between 4150 West and 3600 West.

A reevaluation is needed to address potential impacts from the proposed design modifications to the 12600 South intersection on Bangerter Highway. The SES design includes a grade-separated Single Point Urban Interchange (SPUI) at the intersection of Bangerter Highway (SR-154) and 12600 South. In the SES, the design for the interchange had Bangerter Highway remaining at-grade crossing over a below-grade 12600 South. The modified design would retain the same configuration; however, 12600 South would be partially lowered from its existing grade and Bangerter Highway would be partially raised.

2.1 Applicability

The UDOT Noise Abatement Policy states that “noise abatement will be considered for all Type I projects where noise impacts are identified.” Type I projects are projects that include any of the following: the construction of a highway at a new location; the physical alteration of an existing highway that substantially alters its alignment; the addition of a through traffic lane; the addition of an auxiliary lane; the addition or relocation of interchange lanes or ramps; or the addition or substantial alteration of a weigh station, rest stop, ride share lot, or toll plaza. This project is considered a Type I project because of the construction of a new interchange.

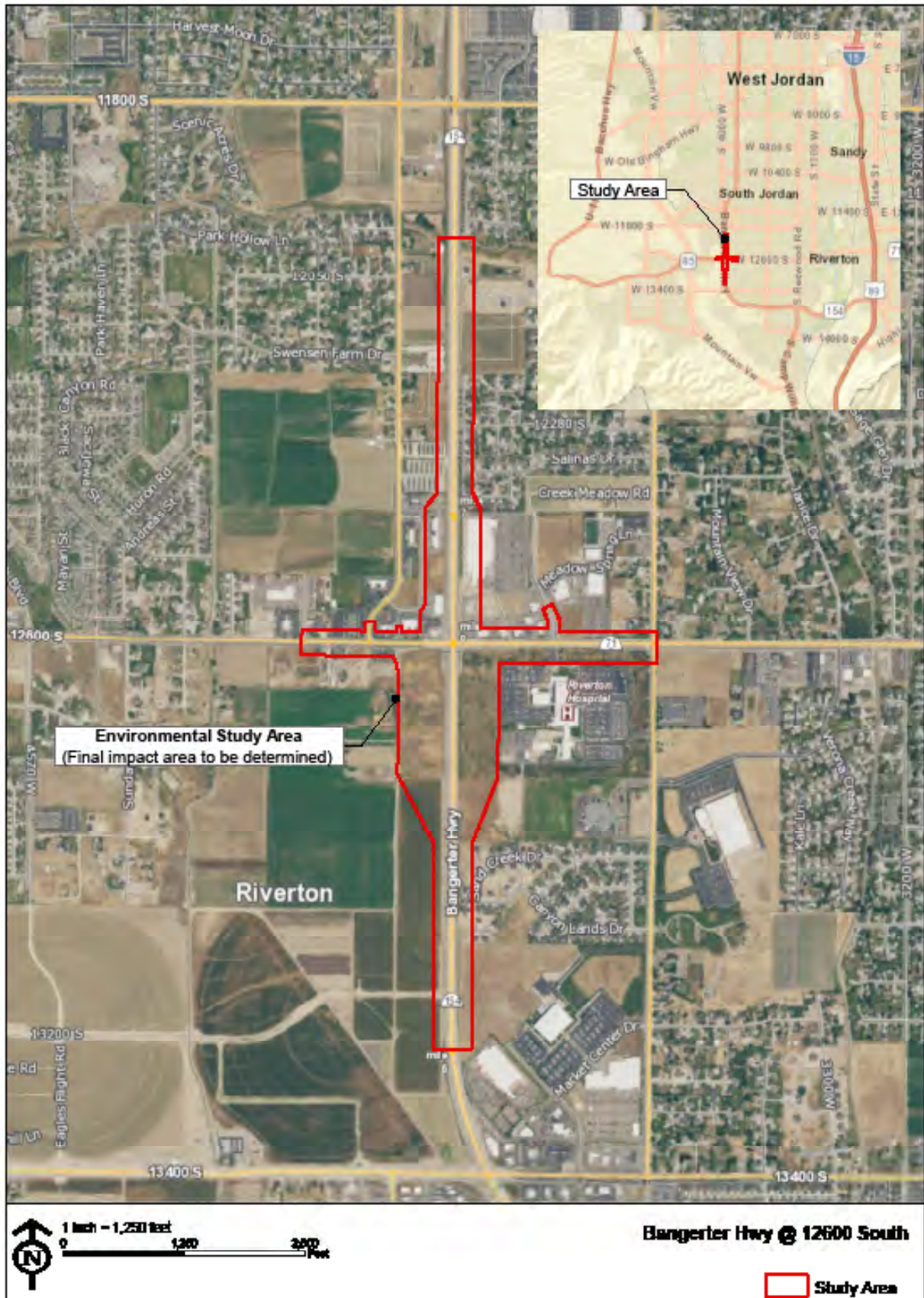


Figure 1: Study Area

3.0 ANALYSIS OF TRAFFIC NOISE IMPACTS

Traffic noise is measured in A-weighted sound levels in decibels (dBA) which most closely approximates the way the human ear hears sounds at different frequencies (see Figure 2). Since traffic noise varies over time, the sound levels for this noise analysis are expressed as “equivalent levels” or Leq, representing the average sound level over a one hour period of time. Unless noted otherwise, all sound levels in this noise analysis are expressed in the hourly equivalent noise level.

3.1 Noise Abatement Criteria

The Federal Highway Administration (FHWA) has established Noise Abatement Criteria for several categories of land use activities (see Table 1). FHWA’s noise criteria is based on sound levels that are considered to be an impact to nearby property owners, also known as receptors. Primary consideration is to be given for exterior areas where frequent human use occurs.

UDOT has developed a Noise Abatement Policy for transportation projects, which conforms to FHWA noise abatement requirements outlined in 23 CFR §772. UDOT’s Noise Abatement Criteria is the noise decibel (dBA) value reflecting the approach criteria of 1 dBA below the Noise Abatement Criteria values listed in 23 CFR §772 for each Activity Category (see Table 1).

UDOT’s Noise Abatement Policy states that a traffic noise impact occurs when either 1) the future worst case noise level is equal to or greater than the UDOT Noise Abatement Criteria for specified Activity Categories or, 2) the future worst case noise level is greater than or equal to an increase of 10 dBA over the existing noise level.

Noise impact and abatement analyses are required within Activity Categories A, B, C, D, and E (see Table 1) only when development exists or has been permitted (formal building permit issued prior to the date the final environmental decision document is approved). Activity Categories F and G include lands that are not

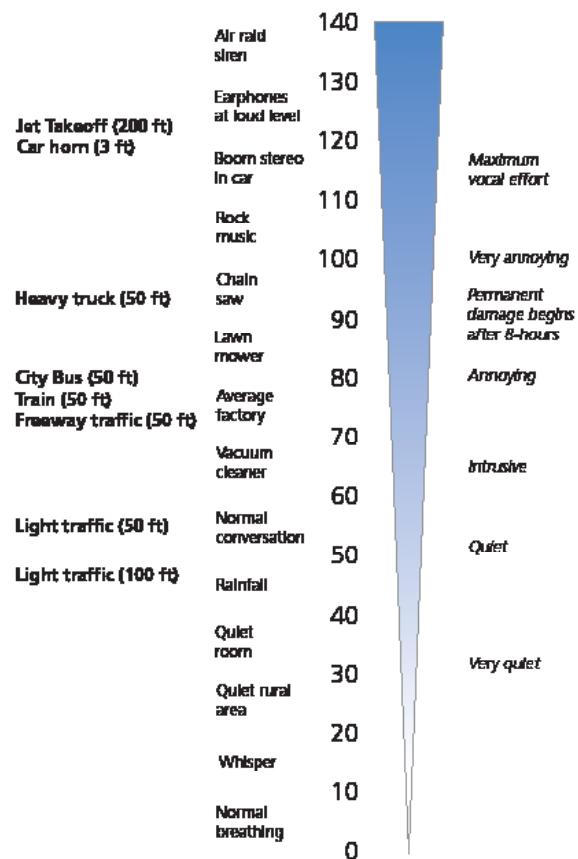


Figure 2: Sound Levels (in dBA) of Common Sounds
(Compiled from Federal Transit Administration and Environmental Protection Agency Data)

sensitive to traffic noise. There is no impact criteria for these Activity Category types and an analysis of noise impacts is not required.

For the purposes of this noise wall analysis, aerial photography and on-site visits were used to identify existing land uses and structure locations.

Table 1: Noise Abatement Criteria

Activity Category	FHWA Criteria Leq(h)	UDOT Criteria Leq(h)	Evaluation Location	Activity Description
A	57	56	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67	66	Exterior	Residential.
C	67	66	Exterior	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails and trail crossings.
D	52	51	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E	72	71	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	---	---		Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	---	---		Undeveloped lands that are not permitted.

Source: UDOT Noise Abatement Policy

3.2 Noise Sensitive Land Uses

Noise sensitive land uses within each of the Activity Categories within the study area can be seen in Table 2.

Table 2: Noise Sensitive Land Uses

Activity Category	Description of Location within Study Area
A	None
B	Residential neighborhoods within the study area
C	- Riverton Childcare at 12523 South 4150 West (outside playground) - Blooming Minds Montessori Preschool at 12447 South Crossing Drive #4 - Church of Jesus Christ of Latter-day Saints at 4080 West 12600 South (softball fields)
D	- Larkin Mortuary at 3688 West 12600 South (interior) - Church of Jesus Christ of Latter-day Saints at 4080 West 12600 South (interior)
E	Restaurants and offices within the study area
F	- Retail facilities - Self-storage facilities - Agricultural land
G	Undeveloped land within the study area

The UDOT Noise Policy states that a noise impact analysis will not be required for Activity Categories F and G. However, for Activity Category G, an estimate of the distance to the approach criteria must be provided to local governments. See Section 6 of this noise analysis for additional information.

3.3 Existing Noise

The primary source of noise in the study area is automobile and truck traffic from Bangerter Highway and 12600 South. Existing traffic sound levels for each receptor in the study area were calculated with the Traffic Noise Model (TNM) 2.5 software using existing conditions (travel lane configurations and the posted speed limit). Existing noise levels were determined using the greatest hourly traffic noise condition likely to occur on a regular basis, or Level-of-Service (LOS) C traffic volumes based on roadway capacity.

On-site measurements were taken on September 25th, 2018 with an Extech Instruments SDL600 sound level meter/data logger for a duration of 20 minutes at the locations listed in Table 3 (see Appendix A for data sheets and noise measurement locations). Recorded measurements were used to verify the accuracy of the noise model and ensure it is representative of existing conditions. To be considered accurate, the field noise measurements must be within 3 dBA of the model's predicted noise.

Table 3: Field Noise Measurements

Site #	Location	Field Noise Level (DBA)	TNM Output (dBA)	Difference
1	12207 South 3900 West	63.0	60.2	2.8
2	12234 South 3950 West	57.9	57.5	0.4
3	12417 South Crossing Dr.	69.8	68.9	0.9
4	4121 West 12600 South	67.7	67.6	0.1
5	12570 South 3600 West	64.0	62.3	1.7
6	12984 S. Sand Creek Dr.	63.0	61.1	1.9

Of the 157 receptors within the study area, 26 currently experience a noise level that exceeds the Noise Abatement Criteria (NAC). See Existing Noise Levels maps in Appendix A).

3.4 Proposed Action Noise

Projected traffic noise levels for the Proposed Action were calculated with TNM 2.5 software using build conditions (travel lane configurations and traffic volumes). Noise levels were determined using the greatest hourly traffic noise conditions likely to occur on a regular basis, or LOS C traffic volumes.

The Proposed Action would generally result in a 1.0 dBA noise level increase throughout the study area. The greatest increase in noise would be 10.0 dBA at receptor 36B (see map 4 in Appendix B). This increase in noise levels is due to the removal of the existing noise wall north of 12600 South. Of the 157 receptors, 37 would be impacted by Proposed Action noise levels and qualify for UDOT noise abatement procedures. Projected future worst case noise levels and impacted receptors can be seen in the Build Noise Levels maps in Appendix B.

3.5 Summary

Table 4 shows a summary of existing and Proposed Action noise levels (the letter on the Map Label represents the activity category). Refer to the maps in Appendix A and B for receptor locations.

Table 4: Summary of Existing and Proposed Action Noise Levels

Map Label	UDOT Noise Abatement Criteria Leq(h)	Existing Noise Levels (dBA)	Existing Impact	Proposed Action Noise Levels (dBA) ¹	Projected Impact	
					≥ 10 dBA Increase From Existing Level	≥ UDOT Noise Abatement Criteria
1D ²	51.0	26.0	No	25.8	No	No
2B	66.0	63.1	No	57.8	No	No
3B	66.0	60.9	No	57.9	No	No
4E	71.0	69.5	No	71.3	No	Yes

Map Label	UDOT Noise Abatement Criteria Leq(h)	Existing Noise Levels (dBA)	Existing Impact	Proposed Action Noise Levels (dBA) ¹	Projected Impact	
					≥ 10 dBA Increase From Existing Level	≥ UDOT Noise Abatement Criteria
5E	71.0	76.4	Yes	73.9	No	Yes
6E	71.0	65.7	No	66.8	No	No
7D	51.0	27.2	No	28.8	No	No
8B	66.0	71.8	Yes	71.8	No	Yes
9B	66.0	70.0	Yes	70.8	No	Yes
10D	51.0	24.9	No	25.6	No	No
11B	66.0	65.5	No	65.1	No	No
12B	66.0	66.6	Yes	66.7	No	Yes
13B	66.0	67.8	Yes	67.9	No	Yes
14B	66.0	63.7	No	63.4	No	No
15B	66.0	69.0	Yes	68.9	No	Yes
16B	66.0	67.9	Yes	67.7	No	Yes
17B	66.0	68.2	Yes	68.0	No	Yes
18B	66.0	68.7	Yes	68.5	No	Yes
19B	66.0	68.1	Yes	68.1	No	Yes
20B	66.0	70.8	Yes	70.6	No	Yes
21B	66.0	71.4	Yes	71.2	No	Yes
22B	66.0	66.5	Yes	65.7	No	No
23B	66.0	59.6	No	59.1	No	No
24B	66.0	59.8	No	59.3	No	No
25B	66.0	60.9	No	60.8	No	No
26B	66.0	62.8	No	62.5	No	No
27B	66.0	62.1	No	61.7	No	No
28B	66.0	66.9	Yes	73.8	No	Yes
29B	66.0	63.3	No	67.3	No	Yes
30B	66.0	64.0	No	73.7	No	Yes
31B	66.0	62.2	No	66.9	No	Yes
32B	66.0	63.8	No	73.7	No	Yes
33B	66.0	61.9	No	67.2	No	Yes
34B	66.0	63.2	No	72.8	No	Yes
35B	66.0	60.7	No	66.4	No	Yes
36B	66.0	63.7	No	73.7	Yes	Yes
37B	66.0	63.8	No	72.9	No	Yes

Map Label	UDOT Noise Abatement Criteria Leq(h)	Existing Noise Levels (dBA)	Existing Impact	Proposed Action Noise Levels (dBA) ¹	Projected Impact	
					≥ 10 dBA Increase From Existing Level	≥ UDOT Noise Abatement Criteria
38B	66.0	62.9	No	68.2	No	Yes
39B	66.0	60.0	No	64.3	No	No
40B	66.0	59.8	No	65.2	No	No
41B	66.0	59.6	No	64.8	No	No
42B	66.0	63.2	No	65.4	No	No
43B	66.0	59.8	No	62.6	No	No
44B	66.0	60.3	No	62.4	No	No
45B	66.0	64.1	No	65.6	No	No
46B	66.0	64.5	No	65.3	No	No
47B	66.0	60.5	No	62.1	No	No
48B	66.0	64.8	No	65.4	No	No
49B	66.0	61.2	No	62.3	No	No
50B	66.0	66.0	Yes	66.3	No	Yes
51B	66.0	60.7	No	61.4	No	No
52B	66.0	62.8	No	63.2	No	No
53B	66.0	68.1	Yes	68.3	No	Yes
54B	66.0	67.0	Yes	67.1	No	Yes
55B	66.0	64.7	No	64.6	No	No
56B	66.0	63.5	No	63.6	No	No
57B	66.0	68.6	Yes	68.5	No	Yes
58B	66.0	64.7	No	64.0	No	No
59D	51.0	29.6	No	30.3	No	No
60B	66.0	64.0	No	64.4	No	No
61B	66.0	64.0	No	64.3	No	No
62B	66.0	65.2	No	66.0	No	Yes
63E	71.0	77.1	Yes	76.7	No	Yes
64B	66.0	63.3	No	62.5	No	No
65B	66.0	61.4	No	60.4	No	No
66B	66.0	60.5	No	59.7	No	No
67B	66.0	59.5	No	58.8	No	No
68B	66.0	59.7	No	58.9	No	No
69B	66.0	58.1	No	57.6	No	No
70B	66.0	59.6	No	59.2	No	No
71B	66.0	60.8	No	60.3	No	No

Map Label	UDOT Noise Abatement Criteria Leq(h)	Existing Noise Levels (dBA)	Existing Impact	Proposed Action Noise Levels (dBA) ¹	Projected Impact	
					≥ 10 dBA Increase From Existing Level	≥ UDOT Noise Abatement Criteria
72B	66.0	60.5	No	60.4	No	No
73B	66.0	59.1	No	59.1	No	No
74B	66.0	58.6	No	58.2	No	No
75B	66.0	59.5	No	59.0	No	No
76B	66.0	59.0	No	58.7	No	No
77B	66.0	58.9	No	58.4	No	No
78C	66.0	59.0	No	59.3	No	No
79C	66.0	58.7	No	59.1	No	No
80B	66.0	60.4	No	61.4	No	No
81B	66.0	61.3	No	65.9	No	No
82B	66.0	60.3	No	65.1	No	No
83B	66.0	60.4	No	65.2	No	No
84B	66.0	57.9	No	61.9	No	No
85B	66.0	57.7	No	61.4	No	No
86B	66.0	59.7	No	62.6	No	No
87B	66.0	58.9	No	61.1	No	No
88B	66.0	57.6	No	60.0	No	No
89B	66.0	57.2	No	59.8	No	No
90B	66.0	57.0	No	59.5	No	No
91B	66.0	56.9	No	60.3	No	No
92B	66.0	56.0	No	58.3	No	No
93B	66.0	55.9	No	58.0	No	No
94B	66.0	56.0	No	58.1	No	No
95B	66.0	56.9	No	59.2	No	No
96B	66.0	56.5	No	59.2	No	No
97B	66.0	56.2	No	58.0	No	No
98B	66.0	56.9	No	60.8	No	No
99B	66.0	56.9	No	61.4	No	No
100B	66.0	57.0	No	58.3	No	No
101B	66.0	56.3	No	57.4	No	No
102B	66.0	57.8	No	58.8	No	No
103B	66.0	56.9	No	57.6	No	No
104B	66.0	58.0	No	58.6	No	No
105B	66.0	57.0	No	57.5	No	No

Map Label	UDOT Noise Abatement Criteria Leq(h)	Existing Noise Levels (dBA)	Existing Impact	Proposed Action Noise Levels (dBA) ¹	Projected Impact	
					≥ 10 dBA Increase From Existing Level	≥ UDOT Noise Abatement Criteria
106B	66.0	55.9	No	56.7	No	No
107B	66.0	59.4	No	59.6	No	No
108B	66.0	58.5	No	59.0	No	No
109B	66.0	57.2	No	57.6	No	No
110B	66.0	57.5	No	57.7	No	No
111B	66.0	57.8	No	58.0	No	No
112B	66.0	60.3	No	60.6	No	No
113B	66.0	59.4	No	59.7	No	No
114B	66.0	60.4	No	60.7	No	No
115B	66.0	62.3	No	62.5	No	No
116B	66.0	66.9	Yes	67.2	No	Yes
117B	66.0	68.5	Yes	68.8	No	Yes
118B	66.0	63.0	No	63.1	No	No
119B	66.0	59.0	No	59.0	No	No
120B	66.0	59.0	No	59.1	No	No
121B	66.0	59.2	No	59.3	No	No
122B	66.0	61.1	No	61.0	No	No
123B	66.0	60.1	No	59.8	No	No
124B	66.0	58.7	No	58.4	No	No
125B	66.0	57.8	No	57.8	No	No
126B	66.0	56.5	No	56.2	No	No
127B	66.0	56.5	No	56.4	No	No
128B	66.0	65.5	No	65.1	No	No
129B	66.0	60.3	No	60.3	No	No
130B	66.0	60.8	No	60.8	No	No
131B	66.0	61.2	No	61.3	No	No
132B	66.0	61.3	No	61.4	No	No
133B	66.0	60.9	No	60.8	No	No
134B	66.0	61.3	No	61.1	No	No
135B	66.0	61.4	No	61.2	No	No
136B	66.0	61.5	No	61.2	No	No
137B	66.0	61.2	No	60.9	No	No
138B	66.0	61.7	No	61.0	No	No
139B	66.0	61.8	No	61.0	No	No

Map Label	UDOT Noise Abatement Criteria Leq(h)	Existing Noise Levels (dBA)	Existing Impact	Proposed Action Noise Levels (dBA) ¹	Projected Impact	
					≥ 10 dBA Increase From Existing Level	≥ UDOT Noise Abatement Criteria
140B	66.0	61.8	No	60.8	No	No
141B	66.0	61.0	No	61.6	No	No
142B	66.0	67.2	Yes	67.3	No	Yes
143B	66.0	68.7	Yes	68.8	No	Yes
144B	66.0	67.9	Yes	68.0	No	Yes
145B	66.0	62.6	No	62.7	No	No
146B	66.0	61.7	No	62.0	No	No
147B	66.0	63.1	No	63.3	No	No
148B	66.0	63.6	No	63.8	No	No
149B	66.0	63.3	No	63.4	No	No
150B	66.0	59.4	No	59.4	No	No
151B	66.0	59.5	No	59.6	No	No
152B	66.0	59.2	No	59.3	No	No
153B	66.0	57.6	No	57.6	No	No
154B	66.0	57.5	No	57.5	No	No
155B	66.0	57.4	No	57.5	No	No
156B	66.0	68.3	Yes	68.4	No	Yes
157B	66.0	68.5	Yes	68.5	No	Yes

¹ Some of the Proposed Action noise levels have a noticeable decrease from the existing level due to the grade-separation introduced by the new interchange. These receptors are lower in elevation than Bangerter Highway mainline and therefore experience a decrease in noise levels.

² Receptors with a D suffix represent the interiors of structures. Masonry buildings with double-glazed glass windows generally provide a noise reduction of approximately 35 dBA. Therefore, the interior noise levels for these buildings were estimated to be 35 dBA less than the exterior noise levels calculated by TNM.

4.0 NOISE ABATEMENT

According to the UDOT Noise Abatement Policy, specific conditions must be met before traffic noise abatement is implemented. Noise mitigation must be considered feasible and reasonable. The factors considered when determining if mitigation is feasible include:

- **Engineering Considerations:** Engineering considerations such as safety, presence of cross streets, sight distance, access to adjacent properties, wall height, topography, drainage, utilities, maintenance access and maintenance of the abatement measure must be taken into account as part of establishing feasibility. Noise abatement measures are not intended to serve as privacy fences or safety barriers. Abatement measures installed on structures will not exceed

10-feet in height measured from the top of deck or roadway to the top of the noise wall. Noise walls will not be installed on structures that require retrofitting to accommodate the noise abatement measure. Noise abatement measures will be considered if the project meets the criteria established in this policy if structure replacement is included as part of the project. Abatement measures shall be consistent with general American Association of State Highway and Transportation Officials (AASHTO) design principles.

- **Safety on Urban Non-Access Controlled Roadways:** To avoid a damaged wall from becoming a safety hazard, in the event of a failure, wall height shall be no greater than the distance from the back-of-curb to the face of proposed wall. Because the distance from the back-of-curb to the face of a proposed wall varies, wall heights which meet this safety requirement may also vary.
- **Acoustic Feasibility:** Noise abatement must be considered "acoustically feasible." This is defined as achieving at least a 5 dBA highway traffic noise reduction for at least 50% of front-row receptors.

The factors considered when determining if mitigation is reasonable include:

- **Noise Abatement Design Goal:** Every reasonable effort should be made to obtain substantial noise reductions. UDOT defines the minimum noise reduction (design goal) from proposed abatement measures to be 7 dBA or greater for at least 35% of front-row receptors.
- **Cost Effectiveness:** The cost of noise abatement measures must be deemed reasonable in order to be included in the project. Noise abatement costs are based on a fixed unit cost of \$20 per square foot, multiplied by the height and length of the wall, in addition to the cost of any other item associated with the abatement measure that is critical to safety. The fixed unit cost is based on the historical average cost of noise walls installed on UDOT projects and is reviewed at regular intervals, not to exceed five years. The cost effectiveness of abatement is determined by analyzing the cost of a wall that would provide a noise reduction of 5 dBA or more for a benefited receptor. A reasonable cost is considered to be a maximum of \$30,000 per benefited receptor (Activity Category B) and \$360 per lineal foot for Activity Categories A,C,D or E. If the anticipated cost of the noise abatement measure is less than the allowable cost, then the abatement is deemed reasonable.

The cost effectiveness calculation needs to take into account the cost of any items associated with the abatement measure that is critical to safety, such as snow storage. Therefore, the cost to construct items necessary for snow storage was taken into consideration as part of the cost effectiveness calculation.

- **Viewpoints of Property Owners and Residents:** As part of the final design phase, public balloting would take place if noise abatement measures appear to meet the criteria outlined in UDOT's Noise Abatement Policy.

4.1 Noise Barriers

For a sound wall to be effective, it must be high enough and long enough to block the view of the noise source from the receptor's perspective. The FHWA *Highway Traffic Noise Analysis and Abatement Policy and Guidance* states that a good rule of thumb is that the noise barrier should extend four times as far in each direction as the distance from the receptor to the barrier. For instance, if the receptor is 50 feet from the proposed noise barrier, the barrier needs to extend at least 200 feet on either side of the receptor in order to shield the receptor from noise traveling past the ends of the barrier.

Openings in noise walls for driveway and cross street accesses greatly reduce the effectiveness of noise walls. Therefore, impacted receptors with direct access onto 12600 South or adjacent to cross streets did not qualify for noise walls.

In an effort to provide an objective analysis of traffic noise reduction to impacted receptors, a variety of noise wall heights were considered. When multiple wall heights met noise abatement requirements, the shortest wall height found to be both feasible and reasonable was recommended for balloting. Noise walls considered for this project are discussed below.

Wall 1

This wall would be located south of 12600 South on the east side of Bangerter Highway (see map 1 in Appendix C). This wall was evaluated to mitigate impacts to receptors 12B–13B and 15B–21B. The wall would be approximately 1,416 feet in length. As summarized in Table 5, walls ranging in height from 10 to 18 feet were evaluated (see Appendix D for detailed wall analyses).

Table 5: Summary of Wall 1

Barrier Height	Feasible		Reasonable					Is Barrier Feasible & Reasonable?
	% front-row with 5 dBA reduction	Acoustically feasible? ¹	% front-row with 7 dBA reduction	Noise Abatement Design Goal? ²	Anticipated Cost	Allowable Cost	Cost Effective? ³	
10	33.3	No	N/A	N/A	N/A	N/A	N/A	No
12	22.2*	No	N/A	N/A	N/A	N/A	N/A	No
14	33.3	No	N/A	N/A	N/A	N/A	N/A	No
16	77.8	Yes	0.0	No	N/A	N/A	N/A	No
18	88.9	Yes	22.2	No	N/A	N/A	N/A	No

¹ 5 dBA reduction for at least 50% of front-row receptors

² 7 dBA reduction for at least 35% of front-row receptors

³ Anticipated cost is less than allowable cost

* The presence of an existing privacy fence in close proximity to Wall 1 caused fluctuations in reduction values (see Appendix D for detailed wall analysis).

None of the wall heights evaluated for Wall 1 met the noise abatement design goal. Therefore, a wall at this location is not recommended for balloting.

Wall 2

This wall would be located on the northwest corner of Bangerter Highway and 12600 South (see map 2 in Appendix C). This wall was evaluated to mitigate impacts to receptors 5E and 63E. The wall would be approximately 874 feet in length. As summarized in Table 6, walls ranging in height from 10 to 18 feet were evaluated (see Appendix D for detailed wall analyses).

Table 6: Summary of Wall 2

Barrier Height	Feasible		Reasonable					Is Barrier Feasible & Reasonable?
	% front-row with 5 dBA reduction	Acoustically feasible? ¹	% front-row with 7 dBA reduction	Noise Abatement Design Goal? ²	Anticipated Cost	Allowable Cost	Cost Effective? ³	
10	50.0	Yes	0.0	No	\$196,650	\$314,640	No	No
11	50.0	Yes	50.0	Yes	\$214,130	\$314,640	Yes	Yes
12	50.0	Yes	50.0	Yes	\$231,610	\$314,640	Yes	Yes
14	100.0	Yes	50.0	Yes	\$266,570	\$314,640	Yes	Yes
16	100.0	Yes	100.0	Yes	\$301,530	\$314,640	Yes	Yes
18	100.0	Yes	100.0	Yes	\$336,490	\$314,640	No	No

¹ 5 dBA reduction for at least 50% of front-row receptors

² 7 dBA reduction for at least 35% of front-row receptors

³ Anticipated cost is less than allowable cost.

A wall 10 feet in height would be acoustically feasible, however it did not meet the noise abatement design goal. Walls ranging in height from 11 to 16 feet would be acoustically feasible and reasonable. A wall 18 feet in height would be acoustically feasible and met the noise abatement design goal, however it was not cost reasonable. **Therefore, an 11 foot tall wall for Wall 2 is recommended for balloting because it was the shortest wall height found to be both feasible and reasonable.**

Wall 3

Wall 3 would replace the southern portion (796 feet) of the existing noise wall that would be removed as part of the Proposed Action construction. This wall was evaluated to mitigate impacts to receptors 28B–38B. This wall would be 796 feet in length and located on the east side of Bangerter Highway north of 12600 South (see map 3 in Appendix C). This analysis assumes that the existing 13 foot noise wall to the north would remain in place. As summarized in Table 7, a 13 foot noise wall was evaluated (see Appendix D for detailed wall analyses).

Table 7: Summary of Wall 3

Barrier Height	Feasible		Reasonable					Is Barrier Feasible & Reasonable?
	% front-row with 5 dBA reduction	Acoustically feasible? ¹	% front-row with 7 dBA reduction	Noise Abatement Design Goal? ²	Anticipated Cost	Allowable Cost	Cost Effective? ³	
13	100.0	Yes	71.4	Yes	\$226,860	\$210,000	No	No

¹ 5 dBA reduction for at least 50% of front-row receptors

² 7 dBA reduction for at least 35% of front-row receptors

³ Anticipated cost is less than allowable cost.

A wall 13 feet in height would be acoustically feasible and meet the noise abatement design goal, however it was not cost reasonable. **Therefore, a 13 foot tall wall for Wall 3 is recommended to be replaced “in-kind”, consistent with UDOT Noise Abatement Policy: C2.d.1(e).**

Wall 4

This wall would be located on the east side of Bangerter Highway north of Wall 3 (see map 3 in Appendix C). This wall was evaluated to mitigate impacts to receptors 54B, 53B, 57B, 116B, 117B, 142B–145B, and 156B–157B. The wall would be approximately 1,342 feet in length. As summarized in Table 8, walls ranging in height from 10 to 18 feet were evaluated (see Appendix D for detailed wall analyses).

Table 8: Summary of Wall 4

Barrier Height	Feasible		Reasonable					Is Barrier Feasible & Reasonable?
	% front-row with 5 dBA reduction	Acoustically feasible? ¹	% front-row with 7 dBA reduction	Noise Abatement Design Goal? ²	Anticipated Cost	Allowable Cost	Cost Effective? ³	
10	0.0	No	N/A	N/A	N/A	N/A	N/A	No
12	12.5	No	N/A	N/A	N/A	N/A	N/A	No
14	62.5	Yes	0.0	No	N/A	N/A	N/A	No
16	62.5	Yes	12.5	No	N/A	N/A	N/A	No
18	62.5	Yes	12.5	No	N/A	N/A	N/A	No

¹ 5 dBA reduction for at least 50% of front-row receptors

² 7 dBA reduction for at least 35% of front-row receptors

³ Anticipated cost is less than allowable cost.

Walls ranging in height from 10 to 12 feet were not acoustically feasible. Walls ranging in height from 14 to 18 feet in height were acoustically feasible, however they did not meet the noise abatement design goal. Therefore, a wall at this location is not recommended for balloting.

Wall 5

This wall would be located on the west side of Bangerter Highway north of Wall 2 (see map 3 in Appendix C). This wall was evaluated to mitigate impacts to receptor 62B. The wall would be approximately 814 feet in length. As summarized in Table 9, walls ranging in height from 10 to 18 feet were evaluated (see Appendix D for detailed wall analyses).

Table 9: Summary of Wall 5

Barrier Height	Feasible		Reasonable					Is Barrier Feasible & Reasonable?
	% front-row with 5 dBA reduction	Acoustically feasible? ¹	% front-row with 7 dBA reduction	Noise Abatement Design Goal? ²	Anticipated Cost	Allowable Cost	Cost Effective? ³	
10	0.0	No	N/A	N/A	N/A	N/A	N/A	No
12	0.0	No	N/A	N/A	N/A	N/A	N/A	No
14	0.0	No	N/A	N/A	N/A	N/A	N/A	No
16	100.0	Yes	0.0	No	N/A	N/A	N/A	No
18	100.0	Yes	0.0	No	N/A	N/A	N/A	No

¹ 5 dBA reduction for at least 50% of front-row receptors

² 7 dBA reduction for at least 35% of front-row receptors

³ Anticipated cost is less than allowable cost.

Walls ranging in height from 10 to 14 feet were not acoustically feasible. Walls ranging in height from 16 to 18 feet in height were acoustically feasible, however they did not meet the noise abatement design goal. Therefore, a wall at this location is not recommended for balloting.

5.0 CONSTRUCTION IMPACTS

Construction noise impacts are considered temporary and will be minimized through adherence to UDOT Standard Specification 01355M (Environmental Compliance) and Special Provision 00555M (Prosecution and Progress). Extended disruption of normal activities is not anticipated, since no receptors are expected to be exposed to construction noise for a long duration of time.

6.0 INFORMATION FOR LOCAL OFFICIALS

According to the UDOT Noise Abatement Policy, an estimated distance from the edge of pavement to where the worst hour Leq(h) levels of 66 dBA and 71 dBA occurs must be provided to local governments for land uses with Activity Category G. Within the study area there are three areas of undeveloped land on the west side of Bangerter Highway and one area on the east side of Bangerter Highway.

The first area is located on the west side of Bangerter Highway between 12600 South and 13400 South. According to Riverton City, no active building permits have been issued for this area. Projected traffic noise levels from the edge of pavement to a level of 66 dBA and 71 dBA would occur at between 271 and 379 feet and 142 and 153 feet, respectively (see Appendix E).

The second area is located on the east side of Bangerter Highway between 13400 South and Sand Oak Circle. According to Riverton City, no active building permits have been issued for this area. Projected traffic noise levels from the edge of pavement to a level of 66 dBA and 71 dBA would occur at 237 feet and 144 feet, respectively (see Appendix E).

The third area is located on the west side of Bangerter Highway between 12111 South and 12300 South. While this parcel has been subdivided for residential building, no active building permits have been issued for the lots directly adjacent to Bangerter Highway, as coordinated with Riverton City. Projected traffic noise levels from the edge of pavement to a level of 66 dBA to 71 dBA would occur at 294 feet and 143 feet, respectively (see Appendix E).

The fourth area is located on the west side of Bangerter Highway between 12009 South and 12111 South. According to Riverton City, no active building permits have been issued for this area. Projected traffic noise levels from the edge of pavement to a level of 66 dBA and 71 dBA would occur at 287 feet and 151 feet, respectively (see Appendix E).

7.0 CONCLUSION

The Proposed Action would generally result in a 1.0 dBA noise level increase throughout the study area. Of the 157 receptors in this study, 37 would be impacted by Proposed Action noise levels. Recommended noise walls within the study area that met the requirements of the UDOT Noise Abatement Policy are discussed below. The final decision to build a noise barrier will be made upon completion of the project design, the public involvement process, and concurrence with the UDOT Noise Policy. A barrier identified as recommended for balloting is a barrier that has been shown to be both feasible and reasonable. However, that finding is not a commitment to build a barrier.

Summary of Recommended Walls

Wall 2

This wall would be located on the northwest corner of Bangerter Highway and 12600 South (see map 2 in Appendix C). The wall would be approximately 847 feet in length and is intended to mitigate noise impacts to receptors 5E and 63E with a proposed height of 11 feet. Due to elevation adjustments of Bangerter Highway and 12600 South from the State Environmental Study (SES) to this study, the recommended height of Wall 2 in this study differs from the 14-foot tall wall recommended in the SES.

Wall 3

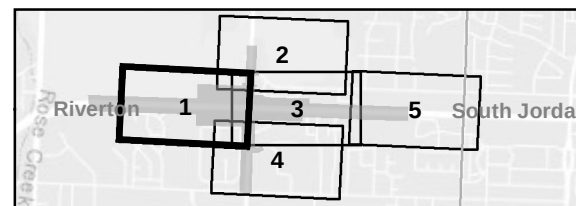
Wall 3 would replace the existing noise wall that would be removed as part of the Proposed Action construction. This wall would be located on the east side of Bangerter Highway north of 12600 South (see map 3 in Appendix C). The wall would be approximately 796 feet in length and 13 feet tall and would be replaced "in kind", consistent with UDOT Noise Abatement Policy: C.2.d.1(e). The recommendation of Wall 3 to be replace "in-kind" is consistent with the recommendation in the SES.

APPENDIX A: NOISE MEASUREMENT DATA AND EXISTING NOISE IMPACTS MAPS



Existing Noise Levels

- Exceeds NAC
- Does Not Exceed NAC
- Measurement Location
- Existing Noise Wall



Bangerter Highway at 12600 South
Existing Noise Levels



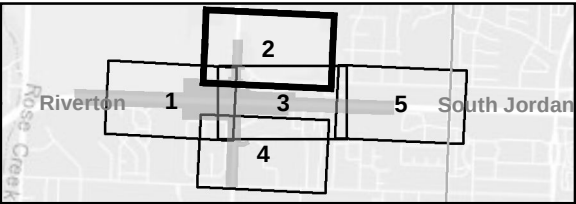
0 0.5 1 Miles

Map 1 of 5



Existing Noise Levels

- Exceeds NAC
- Does Not Exceed NAC
- Measurement Location
- Existing Noise Wall



Bangerter Highway at 12600 South

Existing Noise Levels

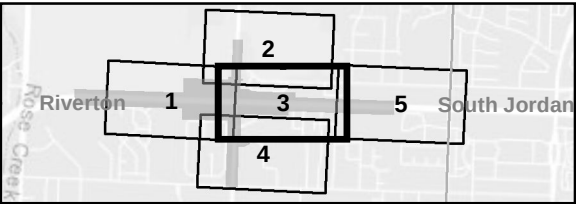
0 0.5 1 Miles

Map 2 of 5



Existing Noise Levels

- Exceeds NAC
- Does Not Exceed NAC
- Measurement Location
- Existing Noise Wall

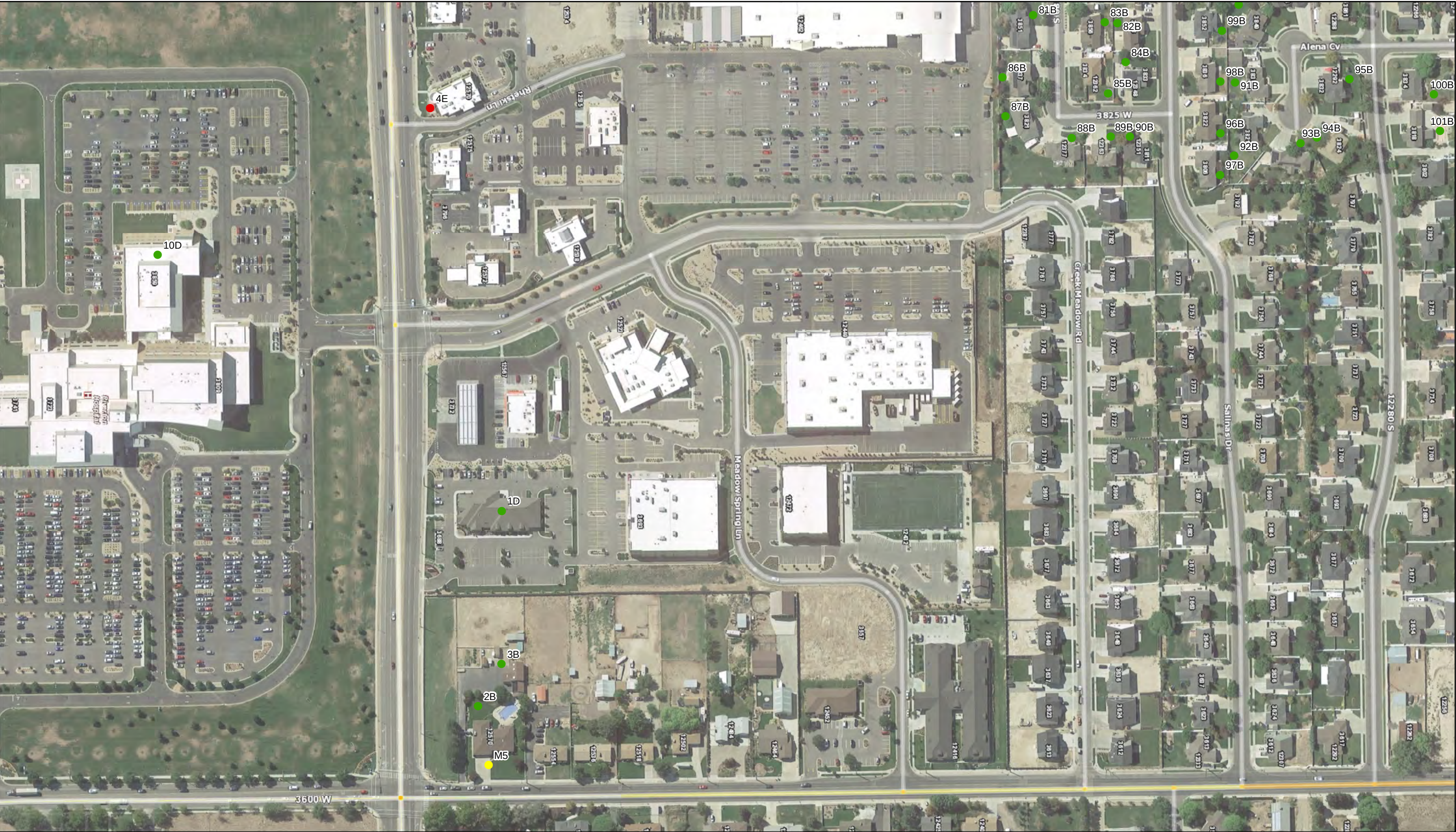


Bangerter Highway at 12600 South

Existing Noise Levels

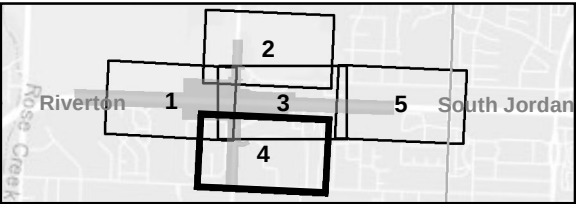
0 0.5 1 Miles

Map 3 of 5



Existing Noise Levels

- Exceeds NAC
- Does Not Exceed NAC
- Measurement Location
- Existing Noise Wall



Bangerter Highway at 12600 South
Existing Noise Levels

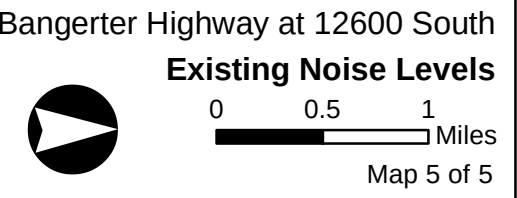
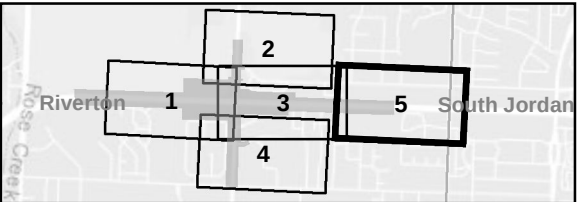


0 0.5 1 Miles



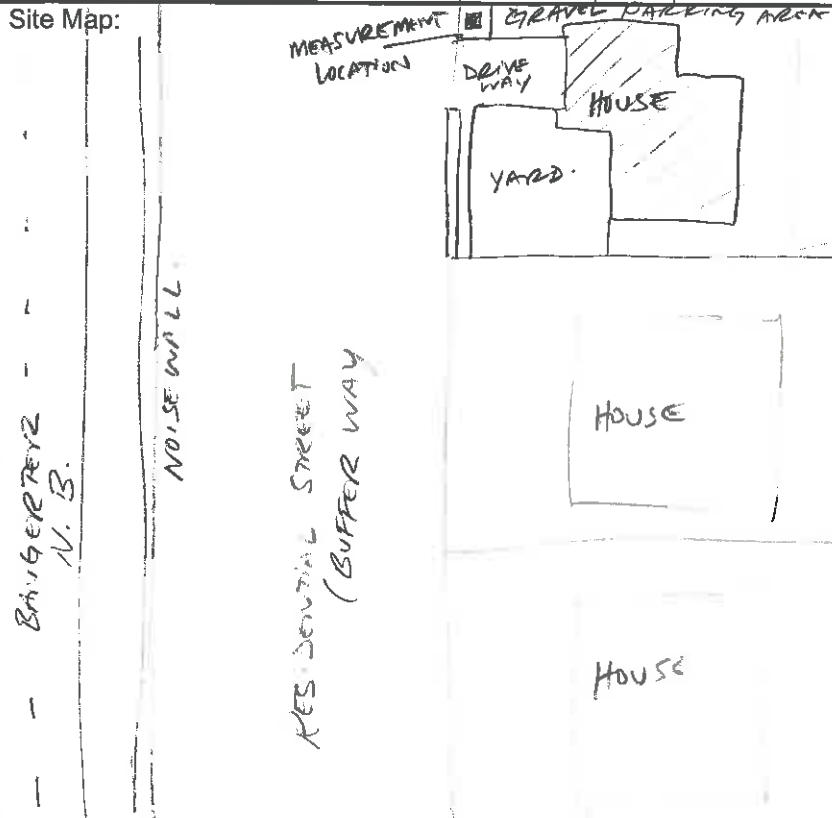
Existing Noise Levels

- Exceeds NAC
- Does Not Exceed NAC
- Measurement Location
- Existing Noise Wall



Test No.:	Project Name: <u>Bangerter Hwy 1200 S</u>	Project No.:	Sheet <u> </u> of <u> </u>
Date: <u>7/25/18</u>	Location: <u>M1</u>	Relative elevation to road:	
Time Started: <u>4:02pm</u>	Weather Conditions: <u>Partly cloudy, breezy</u>	Site Conditions:	
Time Ended: <u>4:24pm</u>	<u>108°F 20% humidity</u>		
Calibration	<u>0-30mph winds</u>	Date file was downloaded:	
Pre: <u>94.0 JBA</u>		File name:	
Post: <u>94.0 JBA</u>			

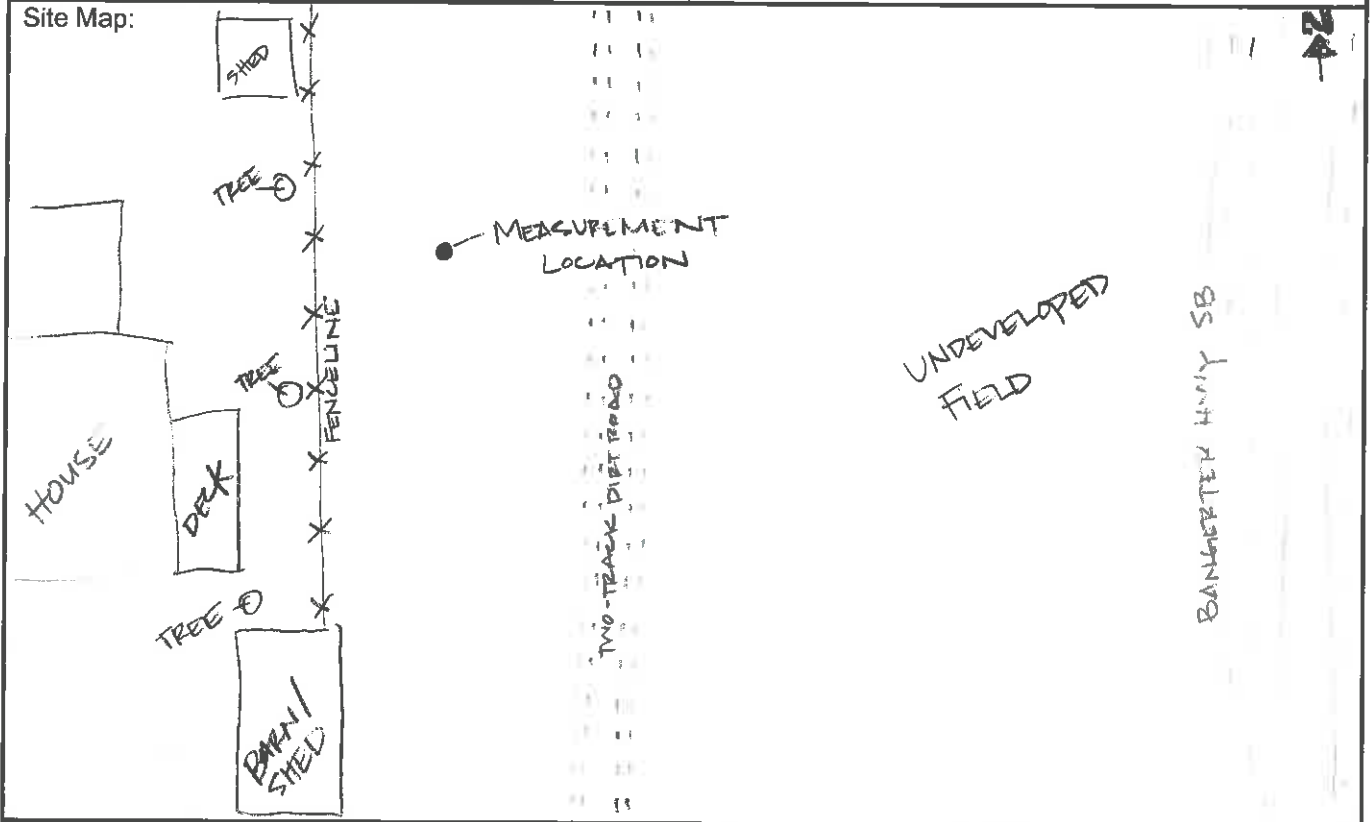
Site Map:



Vehicle Type	Traffic count (vehicles/ 5 min)					
Automobiles						
Heavy Trucks						
Medium Trucks						
Busses/Motorcycles						

Elapsed Time (min)	Comments	Elapsed Time (min)	Comments
1 <u>4:06pm</u>	<u>Tractor Reverse Signal</u>	11	
2		12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	

Test No.:	Project Name: <u>Bangerter Hwy 126005</u>	Project No.:	Sheet <u> </u> of <u> </u>
Date: <u>9/25/18</u>	Location: <u>M2</u>	Relative elevation to road:	
Time Started: <u>2:58pm</u>	Weather Conditions:	Site Conditions:	
Time Ended: <u>3:20pm</u>	<u>Breezy & Sunny</u>		
Calibration	<u>66°F 21% Humidity</u>		
Pre: <u>94.0 dBA</u>	<u>2-2.5 mph winds</u>	Date file was downloaded:	
Post: <u>93.9 dBA</u>		File name:	



Vehicle Type	Traffic count (vehicles/ 5 min)					
Automobiles						
Heavy Trucks						
Medium Trucks						
Busses/Motorcycles						

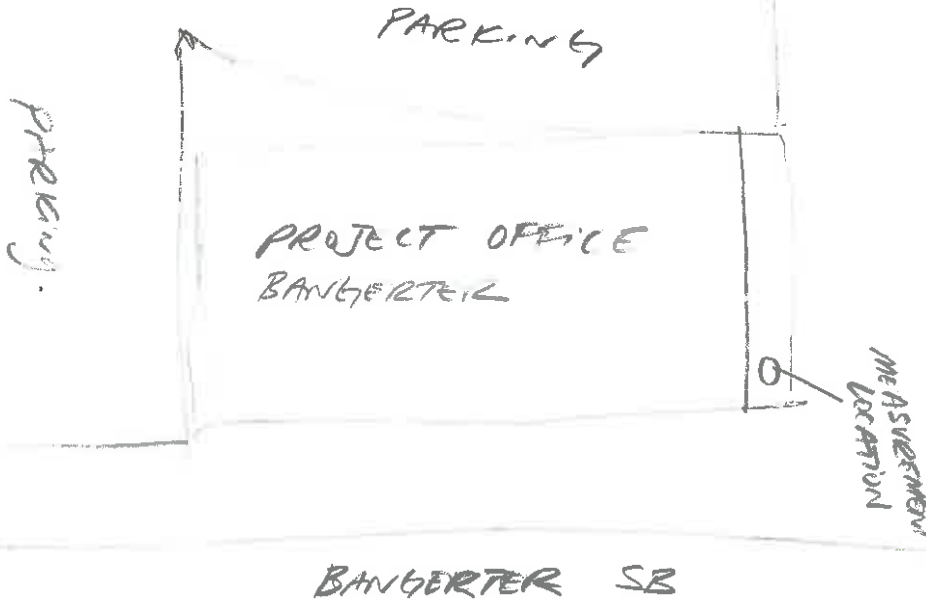
Elapsed Time (min)	Comments	Elapsed Time (min)	Comments
1 <u>2:58pm</u>	<u>dog bark</u>	11	
2 <u>2:59pm</u>	<u>dog barks</u>	12	
3		13	
4 <u>3:02pm</u>	<u>dog bark</u>	14	
5 <u>3:03pm</u>	<u>dog bark</u>	15	
6		16	
7		17	
8		18	
9		19	
10		20	

BANGOR PROJECT OFFICE

Test No.: 1	Project Name: BANGOR	Project No.:	Sheet ___ of
Date: 9/25/18	Location: BANG. PROJECT OFFICE	Relative elevation to road:	
Time Started: 11:47	Weather Conditions: BREEZY, SUNNY	Site Conditions:	
Time Ended: 12:09	Wind: 1.5-1.5 MPH		
Calibration: 44	63°F		
Pre: 94	23% Humidity	Date file was downloaded:	
Post: 93.7		File name:	

Site Map:

MEASUREMENT LOCATION 3



Vehicle Type	Traffic count (vehicles/ 5 min)					
Automobiles						
Heavy Trucks						
Medium Trucks						
Busses/Motorcycles						

Elapsed Time (min)	Comments	Elapsed Time (min)	Comments
1 11:57 (10 mins)	2 HEAVY TRUCKS	11	
2 10 mins	1 SCHOOL BUS	12	
3 12:00	TRUCK HORN	13	
4 12:03	BUS	14	
5 12:04	MOTORCYCLE	15	
6 12:04	TRUCK BRAKES	16	
7		17	
8		18	
9		19	
10		20	

Test No.: 4	Project Name: BANG / 12600	Project No.:	Sheet __ of
Date: 9/25	Location: M#4	Relative elevation to road:	
Time Started: 2:18 PM	Weather Conditions:	Site Conditions:	
Time Ended: 2:33 PM	66 F / 21% HUMIDITY		
Calibration	BUSY WINDS		
Pre: 94.0	2-3 MPH	Date file was downloaded:	
Post: 93.9		File name:	

Site Map:

12600 SO W.B.

MEDIAN

12600 SOUTH E.B.

SMALL HOUSE (VACANT)



M4

GRAVEL DRIVE

GRAVEL

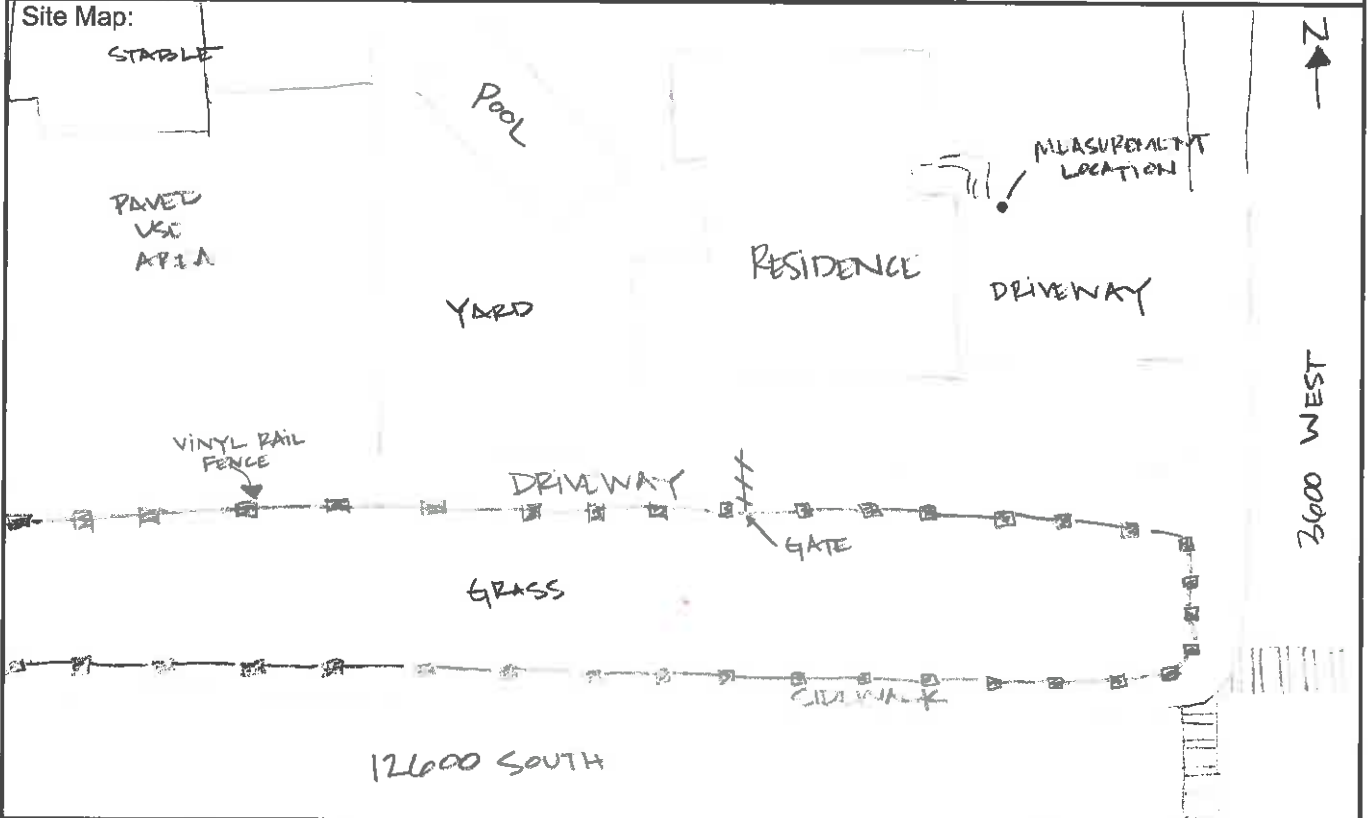
HOUSE

BARN

Vehicle Type	Traffic count (vehicles/ 5 min)					
Automobiles						
Heavy Trucks						
Medium Trucks						
Busses/Motorcycles						

Elapsed Time (min)	Comments	Elapsed Time (min)	Comments
1 2:16	CAR BACKING UP	11	
2	NEAR METER	12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	

Test No.:	Project Name: <u>Bangerter Hwy 12600</u>		Project No.:	Sheet <u> </u> of <u> </u>
Date: <u>9/25/18</u>	Location: <u>MS</u>		Relative elevation to road:	
Time Started: <u>4:41pm</u>	Weather Conditions:		Site Conditions: <u>LANDOWNER NOT HOME AND BACKYARD FENCED OFF</u>	
Time Ended: <u>5:01pm</u>	68°F 20% humidity		JAY RENDLESBACHER	
Calibration	1.5 - 5.0 mph winds		Date file was downloaded:	
Pre: <u>94.0 dBA</u>			File name:	
Post: <u>94.0 dBA</u>				



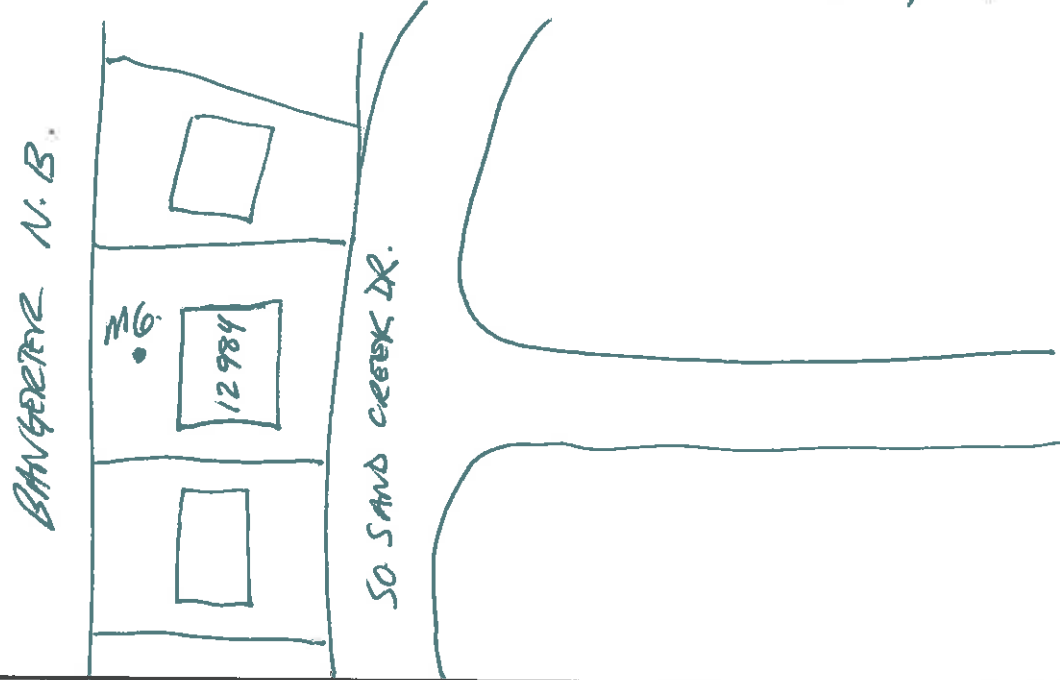
Vehicle Type	Traffic count (vehicles/ 5 min)					
Automobiles						
Heavy Trucks						
Medium Trucks						
Busses/Motorcycles						

Elapsed Time (min)	Comments	Elapsed Time (min)	Comments
1		11	
2		12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	

Test No.: 2	Project Name: BANG. 12600 SO.	Project No.:	Sheet ___ of
Date:	Location: M-6 BACKYARD	Relative elevation to road:	
Time Started: 1:02	Weather Conditions: WARMER - LESS BREEZY.	Site Conditions:	
Time Ended: 1:23	65F°		
Calibration			
Pre: 94.0	21% HUMIDITY	Date file was downloaded:	
Post: 93.8-93.9		File name:	

Site Map:

LEONARD.
BACK YARD OF RESIDENT, "MIKE" (NO LAST NAME GIVEN) 12984
AMENABLE AND AWARE OF OTHER SURVEYING GOING ON. SOUTH
SAND CREEK DR.



Vehicle Type	Traffic count (vehicles/ 5 min)					
Automobiles						
Heavy Trucks						
Medium Trucks						
Busses/Motorcycles						

Elapsed Time (min)	Comments	Elapsed Time (min)	Comments
1	NO NOTICE OUT OF ORDINARY	11	
2	TRAFFIC.	12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	

To: Elisa Albury, UDOT Environmental Program Manager
From: Nicole Tolley, Environmental Specialist
Date: August 27, 2018
Subject: Bangerter Highway @ 12600 South
PIN: 14417, Project No.: S-0154(86)6

Memorandum

Noise Monitoring Location Memo

Introduction

UDOT is proposing to construct a grade-separated Single Point Urban Interchange (SPUI) at the existing intersection of Bangerter Highway (SR-154) and 12600 South. The new interchange would allow for unimpeded traffic flow along Bangerter Highway and improved LOS operations into the year 2040. The project area is along Bangerter Highway between approximate milepost 6 to 7.5, and on 12600 South between 4150 West and 3600 West (see attached study area map). The project includes: construction of a grade-separated interchange with exit/entrance ramps from Bangerter Highway to 12600 South; utility and storm drainage modifications; and installation of new pavement, traffic signals, ATMS equipment, and roadway signage. To accommodate the proposed upgrades, the existing pedestrian bridge over Bangerter Highway would be permanently removed and is not anticipated to be reconstructed due to the lack of use. This project would also require right-of-way acquisition.

In accordance with the UDOT Noise Abatement Policy, this project is a Type I Project and requires a traffic noise analysis.

Noise Sensitive Land Uses

Noise sensitive land uses include land uses within Activity Categories A, B, C, D, and E. See Table 1 for a description of the noise sensitive land uses within the study area. See attached Activity Categories and Noise Monitoring Site Maps for the activity categories where the study team is proposing to take noise measurement.

Table 1: Description of Activity Categories within the Study Area

Activity Category	Description of Location within Study Area
A	None
B	Residential neighborhoods within the study area
C	- Riverton Hospital (outside playground) - Blooming Minds Montessori Preschool at 12447 South Crossing Drive #4 (outside playground) - Church of Jesus Christ of Latter-Day Saints at 4080 West 12600 South (softball fields)
D	- Larkin Mortuary at 3688 West 12600 South (interior) - Church of Jesus Christ of Latter-Day Saints at 12173 South 4000 West (interior)
E	Restaurants and Offices within the study area
F (noise impact analysis not required)	- Retail Facilities - Self-storage facilities - Agricultural land
G (noise impact analysis not required)	Undeveloped land within the study area

Noise Monitoring Sites

Noise measurement are proposed at 6 sites along the study corridor (see Activity Categories and Noise Monitoring Sites Maps and Table 2). These measurements will be used to create a validated traffic noise model for noise-sensitive areas near the project. Noise-sensitive areas are defined as areas where frequent exterior human use occurs and where a lowered noise level would be of benefit.

Table 2: Noise Monitoring Sites

Map ID	Activity Category	Address and Description of Site
M1	B	Residence; 12207 South 3900 West, Riverton, UT
M2	B	Residence; 12233 South 4000 West, Riverton, UT
M3	E	Outdoor seating and tables at office building; 12537 South Crossing Drive, Riverton, UT
M4	B	Residence; 4121 West 12600 South, Riverton, UT
M5	B	Residence; 12570 South 3600 West, Riverton, UT
M6	B	Residence; 12984 Sand Creek Drive, Riverton, UT

Noise Measurement Procedures

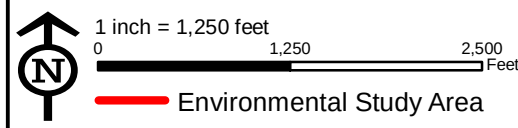
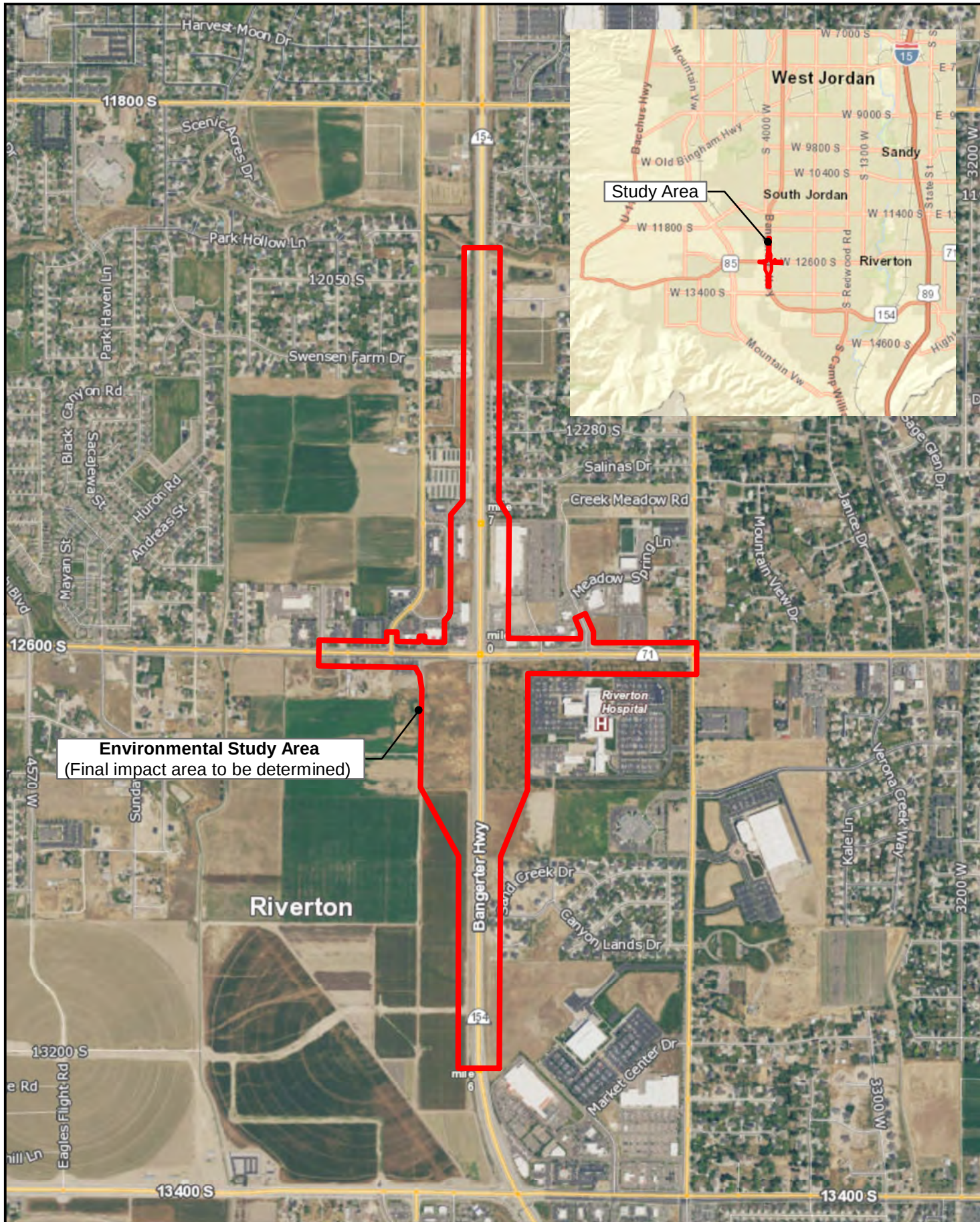
Noise measurements will be taken with an Extech Instruments SDL600 sound level meter/data logger for a duration of 20 minutes at each location. Data will be gathered for noise measurements to construct a validated noise model, including collecting traffic volumes (from UDOT Performance Measurement System, measurement site traffic counts, and mobile traffic cameras), vehicle mixes (defined by axles), and speeds; noting weather conditions; recording foliage types and density; identifying noise sources other than traffic; and recording any abnormal events which, if included in the data, would skew the results. Sketches showing monitoring locations will be prepared and photographs of the measurement area will be taken.

Noise Modeling Procedures

Noise modeling will be completed using the FHWA's Traffic Noise Model (TNM, v2.5) since the newer version of TNM (v3.0) is not currently available for use at this time.

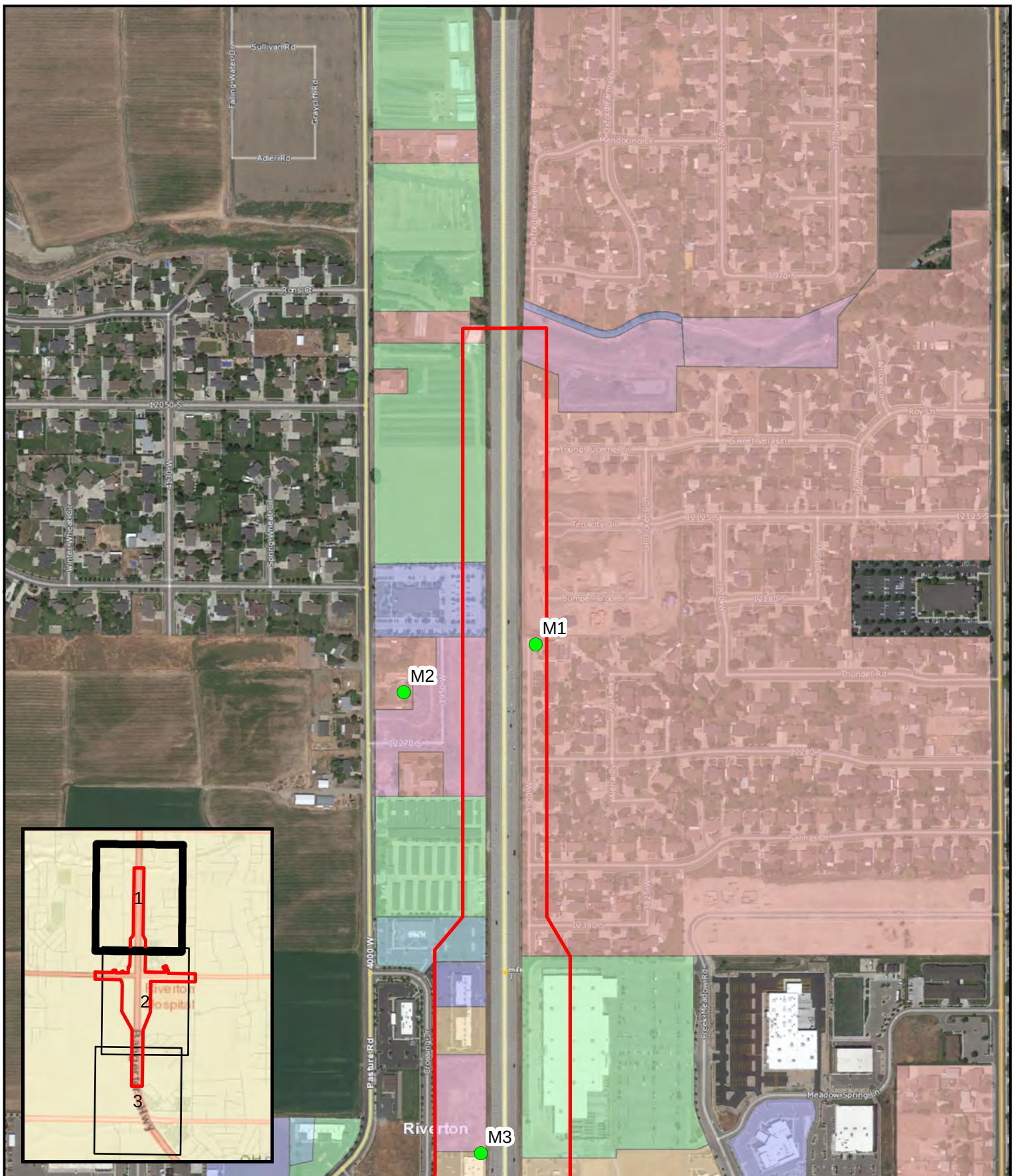
UDOT Noise Policy

The noise analysis will comply with the most recent version of the UDOT Noise Abatement Policy released June 2017.

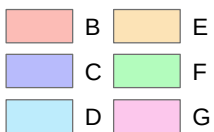


Bangerter Hwy @ 12600 South

Environmental Study Area

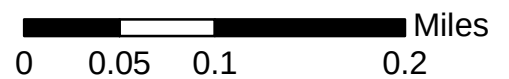


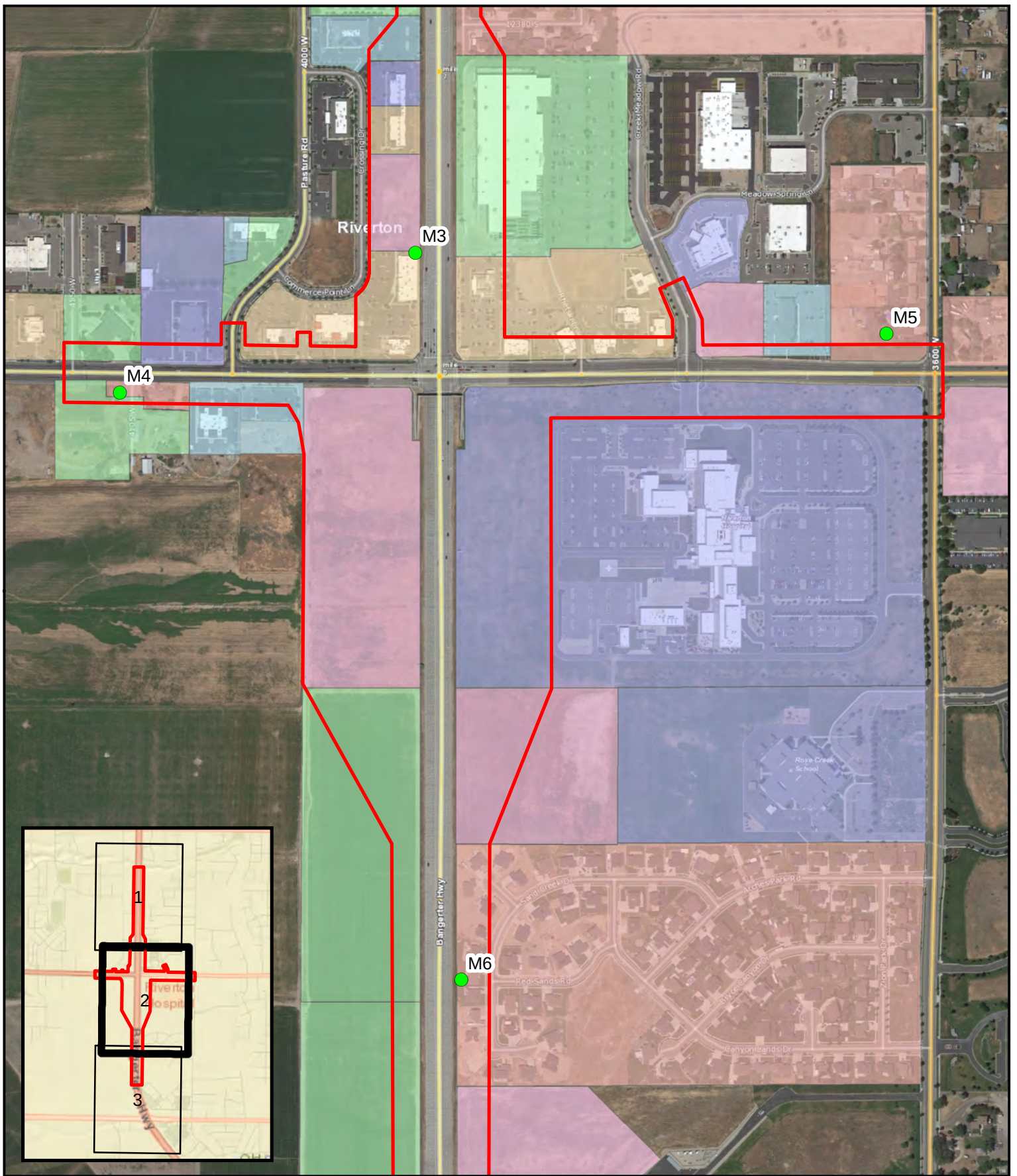
Measurement Location
Activity Category



Bangerter Hwy @ 12600 South
Noise Monitoring Sites

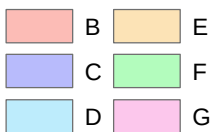
1 inch = 533 feet



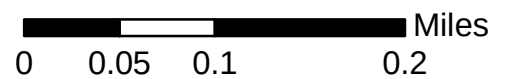


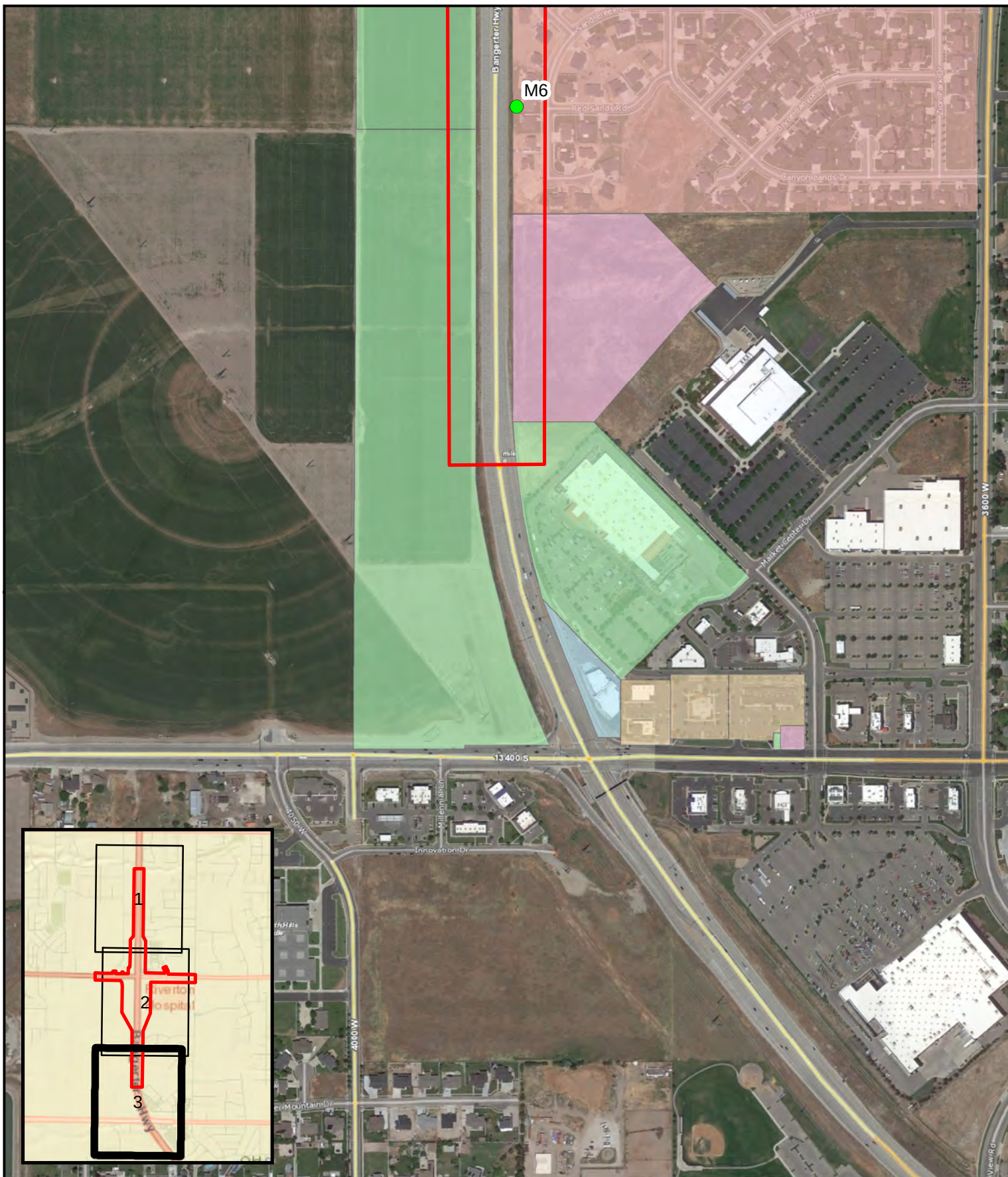
● Measurement Location
Activity Category

Bangerter Hwy @ 12600 South
Noise Monitoring Sites

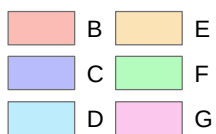


1 inch = 533 feet



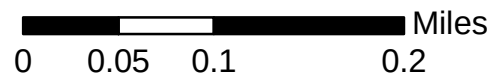


Measurement Location
Activity Category

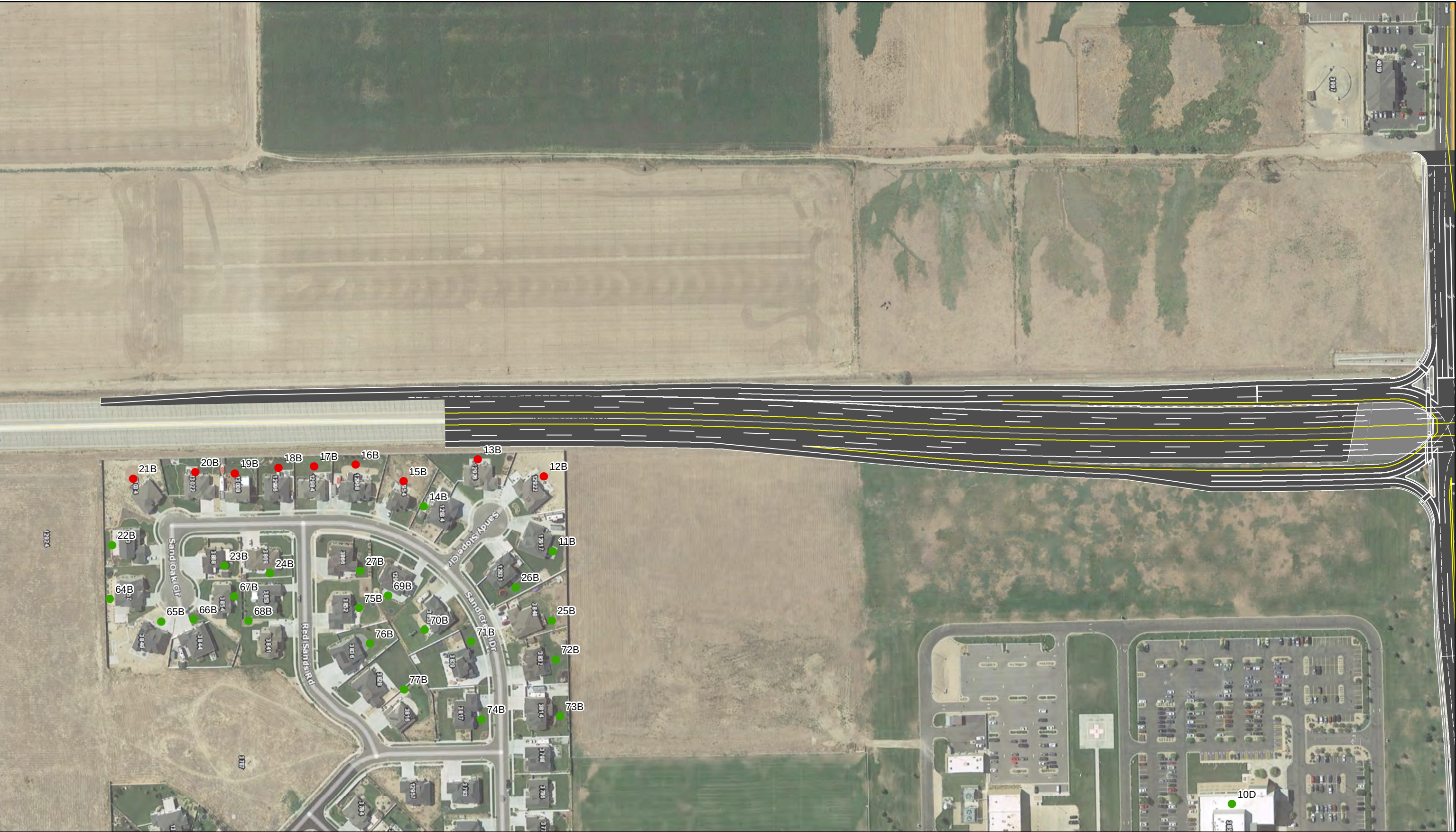


Bangerter Hwy @ 12600 South
Noise Monitoring Sites

1 inch = 533 feet

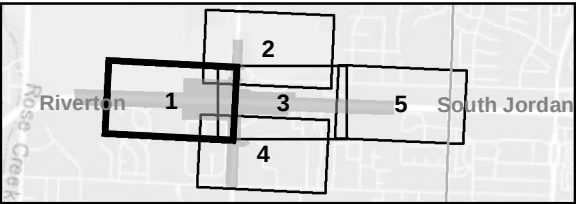


APPENDIX B: BUILD NOISE IMPACTS MAPS



Build Noise Impact

- Yes
- No
- Existing Noise Wall



Bangerter Highway at 12600 South
Build Noise Levels

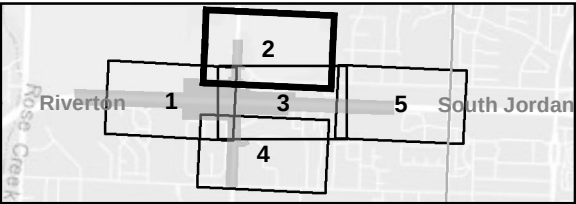


0 0.5 1 Miles



Build Noise Impact

- Yes
- No
- Existing Noise Wall

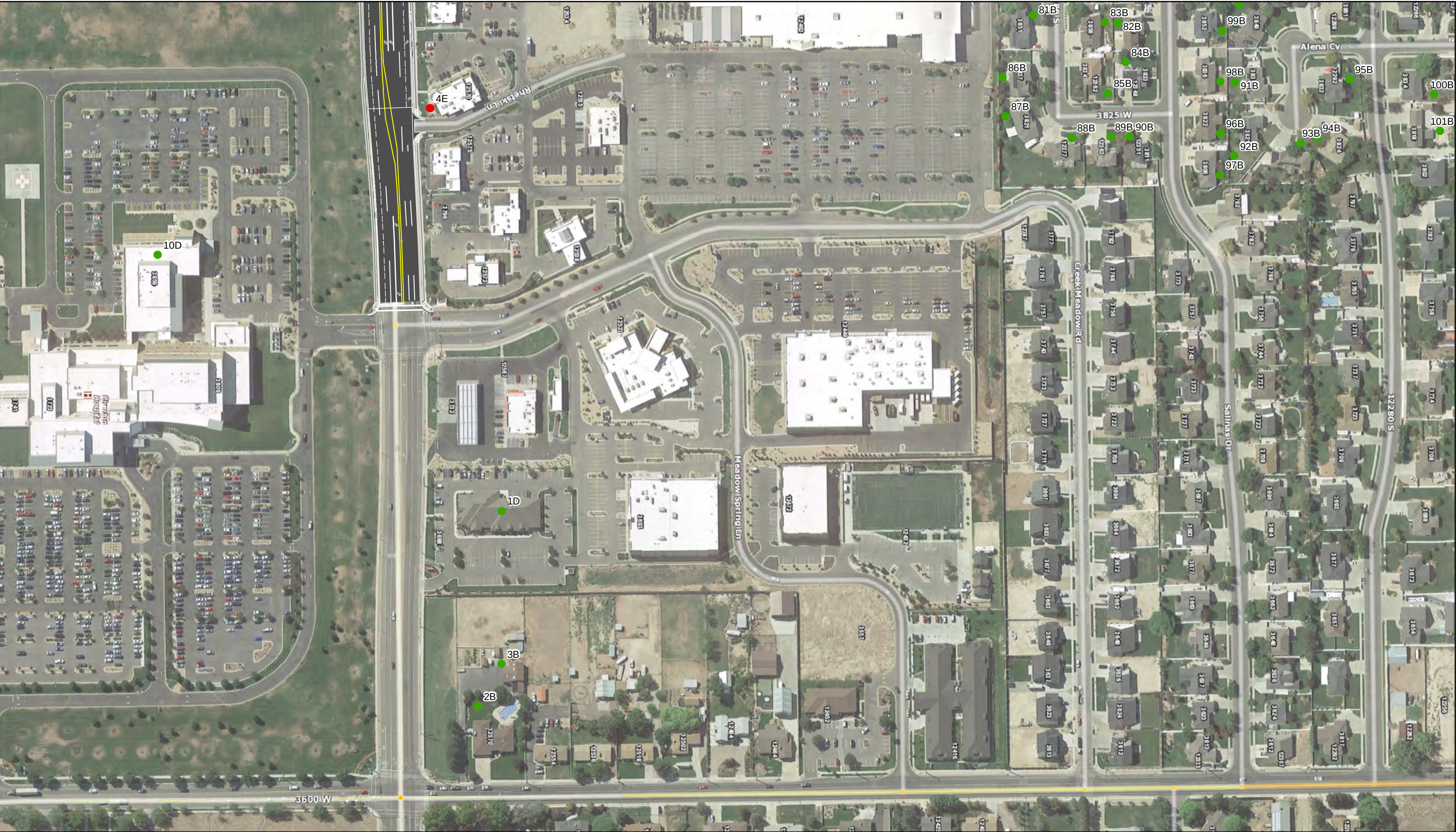


Bangerter Highway at 12600 South

Build Noise Levels

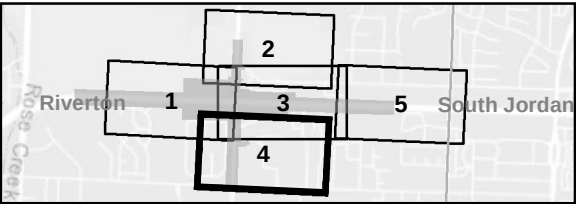
0 0.5 1 Miles

Map 2 of 5



Build Noise Impact

- Yes
- No
- Existing Noise Wall



Bangerter Highway at 12600 South

Build Noise Levels

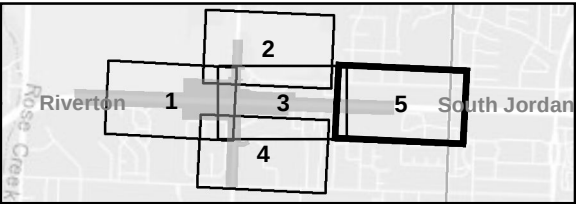
0 0.5 1 Miles

Map 4 of 5



Build Noise Impact

- Yes
- No
- Existing Noise Wall



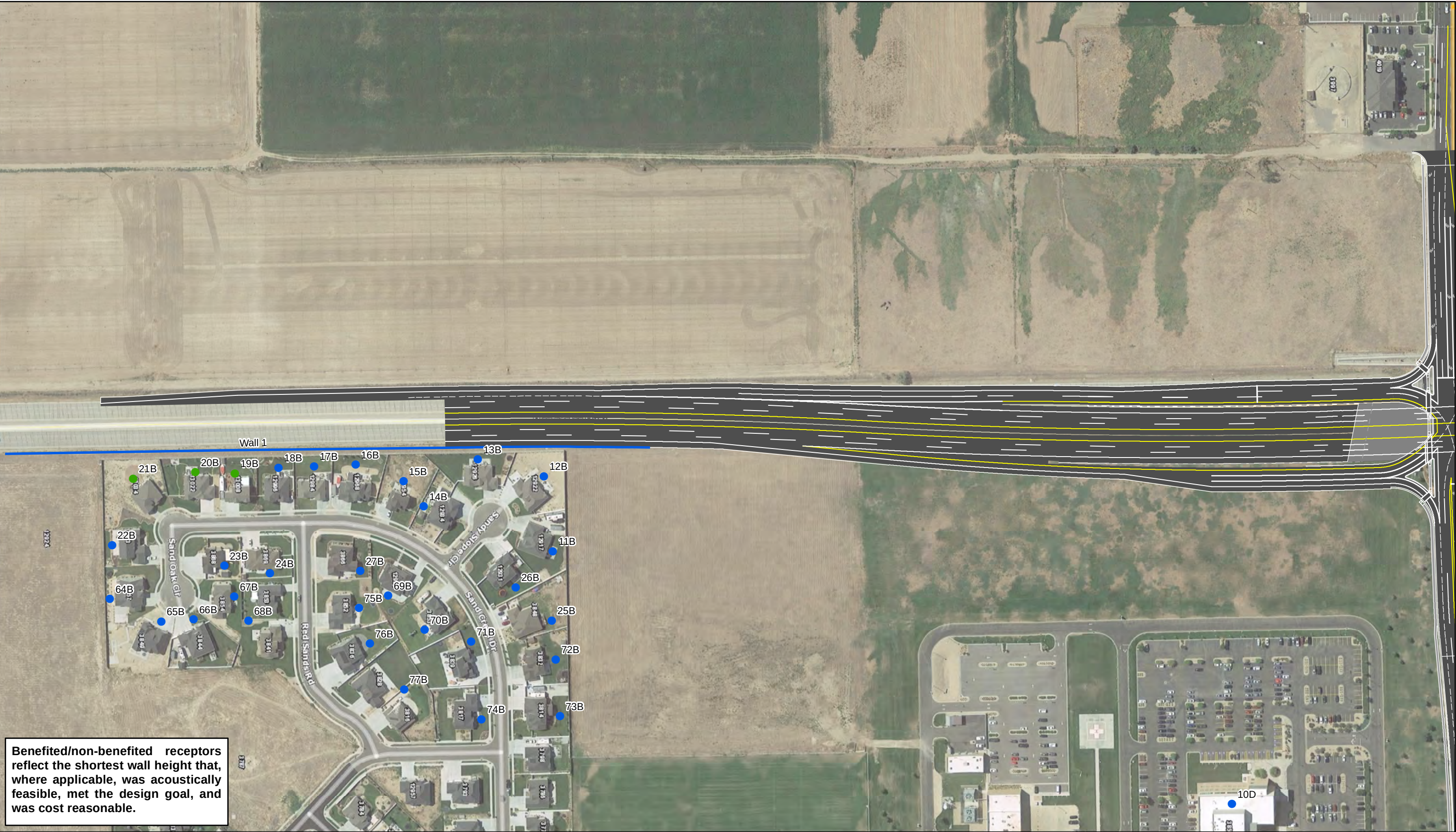
Bangerter Highway at 12600 South

Build Noise Levels

0 0.5 1 Miles

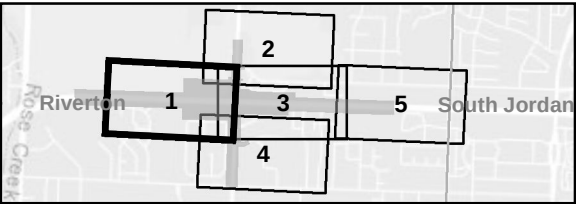
Map 5 of 5

APPENDIX C: NOISE WALL MAPS



Benefited/non-benefited receptors reflect the shortest wall height that, where applicable, was acoustically feasible, met the design goal, and was cost reasonable.

- Feasible and Reasonable
- Not Feasible and Reasonable
- Replace In-Kind
- Existing
- Benefited Receptor
- Non-benefited Receptor



Bangerter Highway at 12600 South
Noise Walls

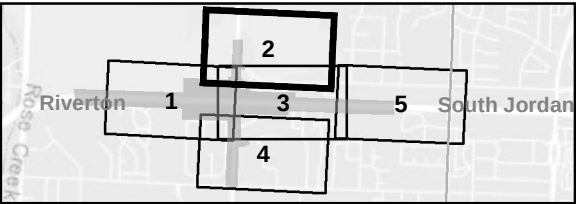


0 0.5 1 Miles



Benefited/non-benefited receptors reflect the shortest wall height that, where applicable, was acoustically feasible, met the design goal, and was cost reasonable.

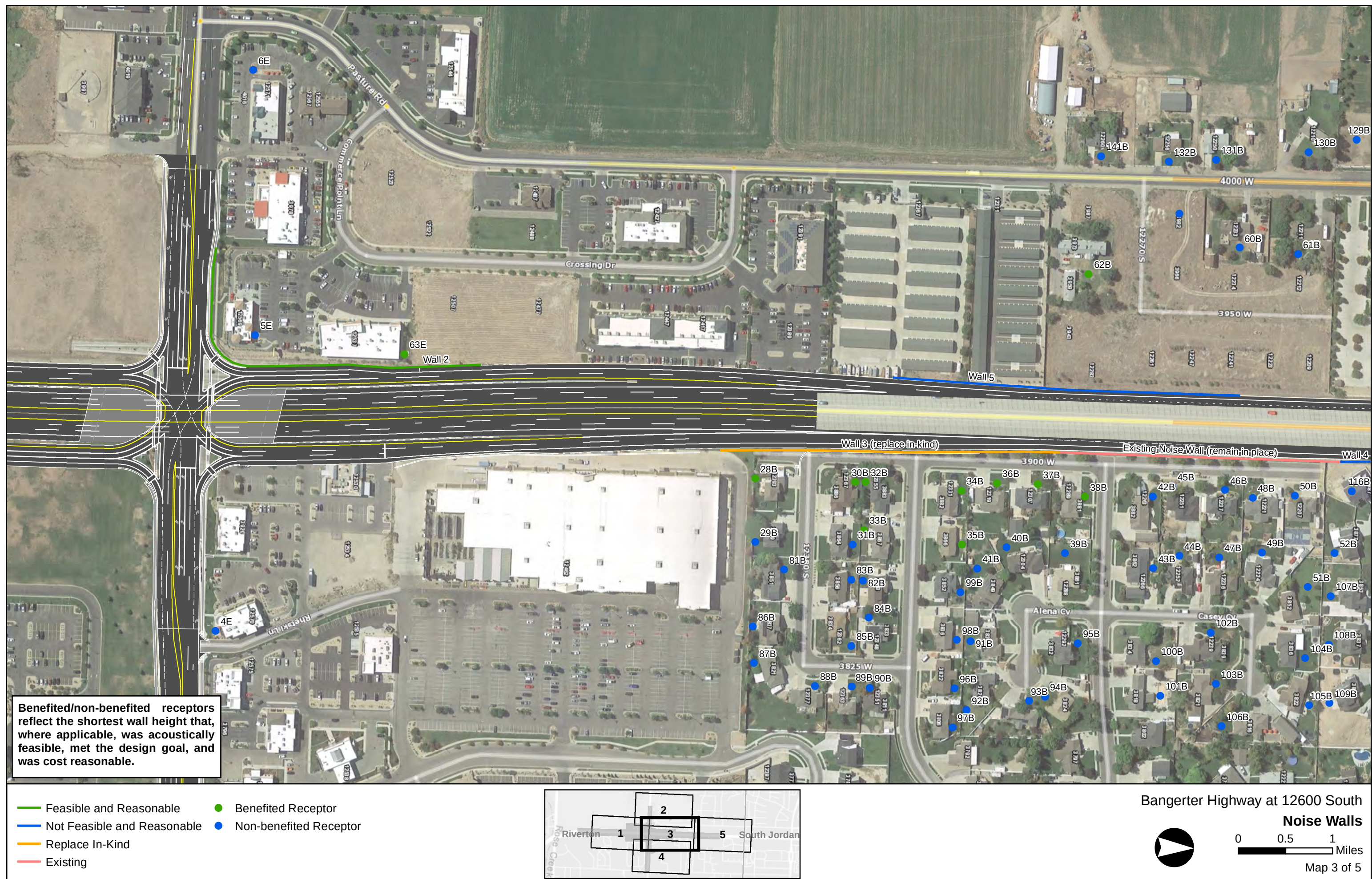
- Feasible and Reasonable
- Not Feasible and Reasonable
- Replace In-Kind
- Existing
- Benefited Receptor
- Non-benefited Receptor

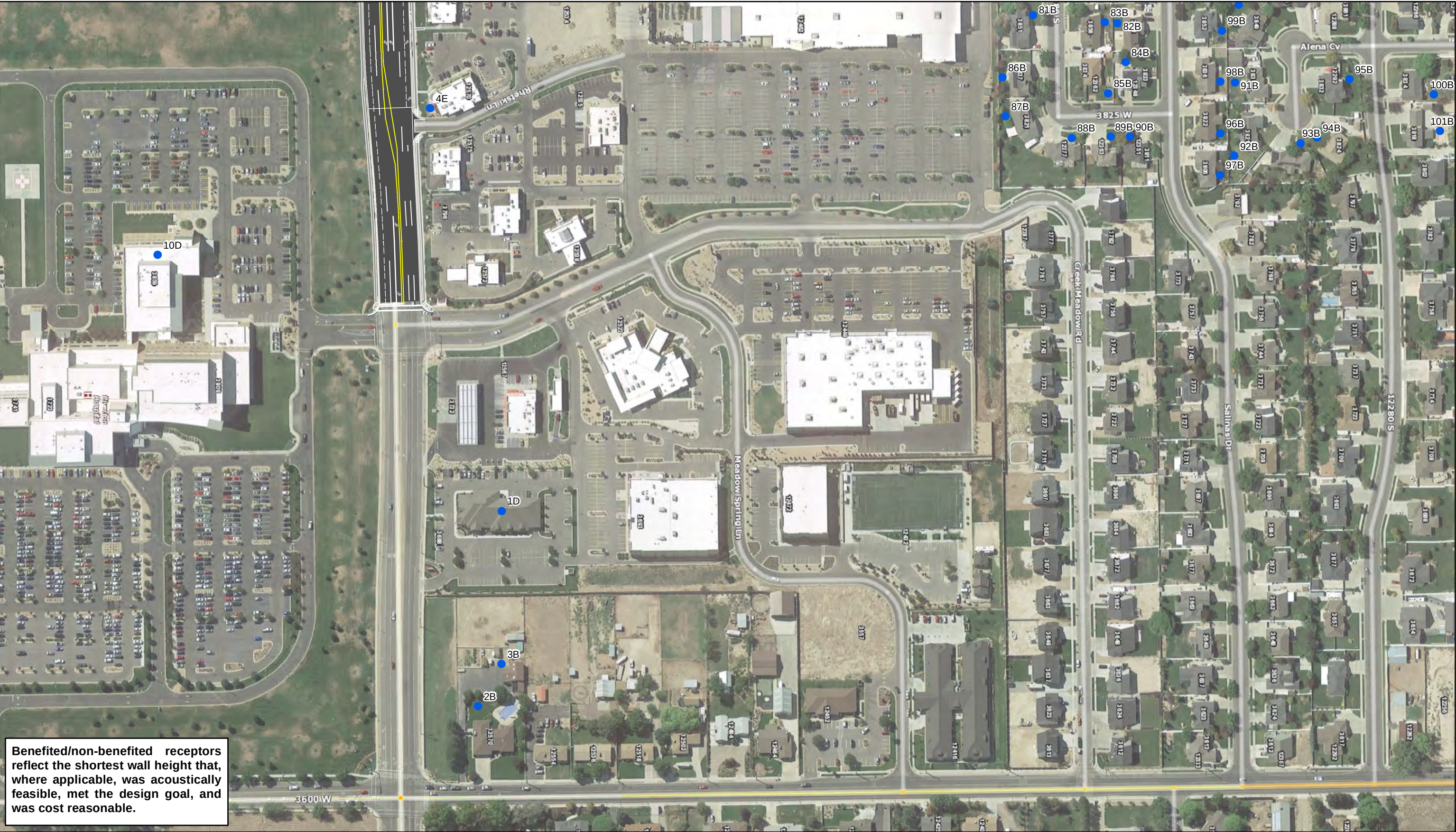


Bangerter Highway at 12600 South
Noise Walls

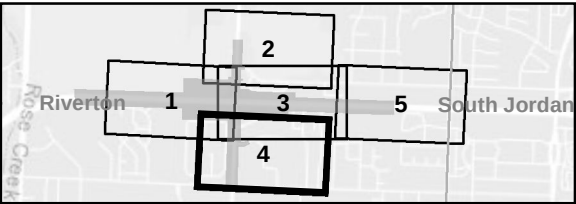


0 0.5 1 Miles





- Feasible and Reasonable
- Not Feasible and Reasonable
- Replace In-Kind
- Existing
- Benefited Receptor
- Non-benefited Receptor



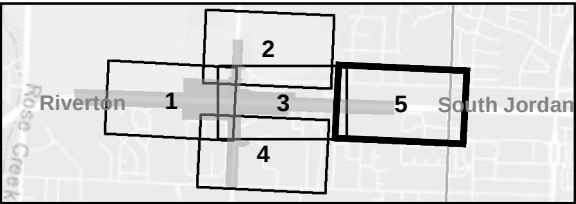
Bangerter Highway at 12600 South
Noise Walls



0 0.5 1 Miles



- Feasible and Reasonable
- Not Feasible and Reasonable
- Replace In-Kind
- Existing
- Benefited Receptor
- Non-benefited Receptor



Bangerter Highway at 12600 South
Noise Walls



0 0.5 1 Miles

APPENDIX D: NOISE WALL ANALYSES

Noise Wall 1

Total Wall Length: 1416 ft

Wall Cost per sq ft: \$20

Cost of items critical to safety: \$25 (\$25/ft for snow storage)

of First Row Receivers: 9

Name	# of DU	Relocation	1st Row	# of 1st Row	10-ft Wall	Design Goal	Benefitted	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefitted Receptors	12-ft Wall	Design Goal	Benefitted	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefitted Receptors	14-ft Wall	Design Goal	Benefitted	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefitted Receptors	16-ft Wall	Design Goal	Benefitted	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefitted Receptors	18-ft Wall	Design Goal	Benefitted	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefitted Receptors
11B	1			0	1.7	No	No	No	0	No	0	0	2.3	No	No	No	0	No	0	0	2.5	No	No	No	0	No	0	0	2.6	No	No	No	0	No	0	0	2.8	No	No	No	0	No	0	0
12B	1		Yes	1	2.3	No	No	No	0	No	0	0	3.1	No	No	No	0	No	0	0	3.8	No	No	No	0	No	0	0	4.4	No	No	No	0	No	0	0	4.8	No	No	No	0	No	0	0
13B	1		Yes	1	6.1	No	Yes	No	0	Yes	1	1	3.6	No	No	No	0	No	0	0	3.5	No	No	No	0	No	0	0	4.4	No	No	No	0	No	0	0	5	No	Yes	No	0	Yes	1	1
14B	1			0	1	No	No	No	0	No	0	0	2.5	No	No	No	0	No	0	0	3.2	No	No	No	0	No	0	0	3.7	No	No	No	0	No	0	0	4.2	No	No	No	0	No	0	0
15B	1		Yes	1	1.8	No	No	No	0	No	0	0	4.1	No	No	No	0	No	0	0	5.1	No	Yes	No	0	Yes	1	1	5.9	No	Yes	No	0	Yes	1	1	6.6	No	Yes	No	0	Yes	1	1
16B	1		Yes	1	5.8	No	Yes	No	0	Yes	1	1	3.4	No	No	No	0	No	0	0	4.6	No	No	No	0	No	0	0	5.6	No	Yes	No	0	Yes	1	1	6.5	No	Yes	No	0	Yes	1	1
17B	1		Yes	1	5.4	No	Yes	No	0	Yes	1	1	3.3	No	No	No	0	No	0	0	4.3	No	No	No	0	No	0	0	5.1	No	Yes	No	0	Yes	1	1	5.7	No	Yes	No	0	Yes	1	1
18B	1		Yes	1	3.3	No	No	No	0	No	0	0	3.5	No	No	No	0	No	0	0	4.5	No	No	No	0	No	0	0	5.4	No	Yes	No	0	Yes	1	1	6.1	No	Yes	No	0	Yes	1	1
19B	1		Yes	1	2.9	No	No	No	0	No	0	0	3.8	No	No	No	0	No	0	0	4.6	No	No	No	0	No	0	0	5.4	No	Yes	No	0	Yes	1	1	6	No	Yes	No	0	Yes	1	1
20B	1		Yes	1	3.8	No	No	No	0	No	0	0	5.1	No	Yes	No	0	Yes	1	1	6.1	No	Yes	No	0	Yes	1	1	6.8	No	Yes	No	0	Yes	1	1	7.5	Yes	Yes	Yes	1	Yes	1	1
21B	1		Yes	1	3.3	No	No	No	0	No	0	0	5.2	No	Yes	No	0	Yes	1	1	6	No	Yes	No	0	Yes	1	1	6.6	No	Yes	No	0	Yes	1	1	7	Yes	Yes	Yes	1	Yes	1	1
22B	1			0	2.5	No	No	No	0	No	0	0	3.6	No	No	No	0	No	0	0	4	No	No	No	0	No	0	0	4.3	No	No	No	0	No	0	0	4.5	No	No	No	0	No	0	0
23B	1			0	1.3	No	No	No	0	No	0	0	2.5	No	No	No	0	No	0	0	2.9	No	No	No	0	No	0	0	3.2	No	No	No	0	No	0	0	3.5	No	No	No	0	No	0	0
24B	1			0	1.1	No	No	No	0	No	0	0	2.3	No	No	No	0	No	0	0	2.7	No	No	No	0	No	0	0	3.1	No	No	No	0	No	0	0	3.3	No	No	No	0	No	0	0
25B	1			0	1.2	No	No	No	0	No	0	0	1.6	No	No	No	0	No	0	0	1.7	No	No	No	0	No	0	0	1.8	No	No	No	0	No	0	0	1.9	No	No	No	0	No	0	0
26B	1			0	1.3	No	No	No	0	No	0	0	1.8	No	No	No	0	No	0	0	2	No	No	No	0	No	0	0	2.2	No	No	No	0	No	0	0	2.4	No	No	No	0	No	0	0
27B	1			0	1.2	No	No	No	0	No	0	0	2.4	No	No	No	0	No	0	0	2.8	No	No	No	0	No	0	0	3.2	No	No	No	0	No	0	0	3.6	No	No	No	0	No	0	0
64B	1			0	2	No	No	No	0	No	0	0	2.6	No	No	No	0	No	0	0	2.9	No	No	No	0	No	0	0	3	No	No	No	0	No	0	0	3.2	No	No	No	0	No	0	0
65B	1			0	1.4	No	No	No	0	No	0	0	2.1	No	No	No	0	No	0	0	2.4	No	No	No	0	No	0	0	2.6	No	No	No	0	No	0	0	2.7	No	No	No	0	No	0	0
66B	1			0	1.1	No	No	No	0	No	0	0	1.9	No	No	No	0	No	0	0	2.1	No	No	No	0	No	0	0	2.4	No	No	No	0	No	0	0	2.5	No	No	No	0	No	0	0
67B	1			0	0.6	No	No	No	0	No	0	0	1.5	No	No	No	0	No	0	0	1.8	No	No	No	0	No	0	0	2	No	No	No	0	No	0	0	2.2	No	No	No	0	No	0	0
68B	2			0	0.9	No	No	No	0	No	0	0	1.7	No	No	No	0	No	0	0	2	No	No	No	0	No	0	0	2.2	No	No	No	0	No	0	0	2.4	No	No	No	0	No	0	0
69B	1			0	1.2	No	No	No	0	No	0	0	2.1	No	No	No	0	No	0	0	2.4	No	No	No	0	No	0	0	2.6	No	No	No	0	No	0	0	2.8	No	No	No	0	No	0	0
70B	1			0	0.6	No	No	No	0	No	0	0	1.2	No	No	No	0	No	0	0	1.3	No	No	No	0	No	0	0	1.5	No	No	No	0	No	0	0	1.6	No	No	No	0	No	0	0
71B	1			0	1.1	No	No	No	0	No	0	0	1.8	No	No	No	0	No	0	0	2	No	No	No	0	No	0	0	2.3	No	No	No	0	No	0	0	2.4	No	No	No	0	No	0	0
72B	1			0	1.2	No	No	No	0	No	0	0	1.5	No	No	No	0	No	0	0	1.7	No	No	No	0	No	0	0	1.8	No	No	No	0	No	0	0	1.9	No	No	No	0	No	0	0
73B	1			0	1	No	No	No	0	No	0	0	1.4	No	No	No	0	No	0	0	1.5	No	No	No	0	No	0	0	1.6	No	No	No	0	No	0	0	1.7	No	No	No	0	No	0	0
74B	1			0	0.8	No	No	No	0	No	0	0	1.4	No	No	No	0	No	0	0	1.6	No	No	No	0	No	0	0	1.7	No	No	No	0	No	0	0	1.9	No	No	No	0	No	0	0
75B	1			0	1	No	No	No	0	No	0	0	1.8	No	No	No	0	No	0	0	2.1	No	No	No	0	No	0	0	2.3	No	No	No	0	No	0	0	2.5	No	No	No	0	No	0	0
76B	1			0	1	No	No	No	0	No	0	0	1.8	No	No	No	0	No	0	0	2.1	No	No	No	0	No	0	0	2.2	No	No	No	0	No	0	0	2.4	No	No	No	0	No	0	0
77B	2			0	0.8	No	No	No	0	No	0	0	1.5	No	No	No	0	No	0	0	1.8	No	No	No	0	No	0	0	2	No	No	No	0	No	0	0	2.1	No	No	No	0	No	0	0

Feasibility Factors:					3					7					8				
# of First-Row 5 dBA Reduction:					33.3%					77.8%					88.9%				
Acoustic Feasibility (5 dBA reduction for 50% of front-row):					No					Yes					Yes				
Reasonableness Factors:					0					0					2				
# of First-Row Design Goal:					0.0%					0.0%					22.2%				
Noise Abatement Design Goal (7 dBA reduction for 35% of front-row):					No					No					No				
# of Benefitted:					3					7					8				
Cost of Noise Wall (Length x Height x \$20/sq ft):					\$283,200.00					\$459,120.00					\$509,760.00				
Cost of any other items critical to safety:					\$35,400.00					\$35,400.00					\$35,400.00				
Anticipated Cost of Noise Abatement:					\$318,600.00					\$431,880.00					\$488,520.00				
Allowable Cost (\$30,000 per benefitted receptor):					\$90,000.00					\$90,000.00					\$210,000.00				
Cost Effective (Anticipated Cost < Allowable Cost):					No					No					No				
Feasible and Reasonable:					No					No					No				

Noise Wall 3

Length796ftAssumes existing 13-ft Noise Wall to north will remain in place

Wall Cost per sq ft:\$20

Cost of items critical to safety:\$25(\$25/ft for snow storage)

of First Row Receivers:7

Name	# of DU	Relocation	1st Row	# of 1st Row	13-ft Wall	Design Goal	Benefited	1st Row Design	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors
28B	1		Yes	1	6.1	No	Yes	No	0	Yes	1	1
29B	1			0	2.5	No	No	No	0	No	0	0
30B	1		Yes	1	8.8	Yes	Yes	Yes	1	Yes	1	1
31B	1			0	4.0	No	No	No	0	No	0	0
32B	1		Yes	1	8.9	Yes	Yes	Yes	1	Yes	1	1
33B	1			0	4.5	No	No	No	0	No	0	0
34B	1		Yes	1	8.7	Yes	Yes	Yes	1	Yes	1	1
35B	1			0	4.7	No	No	No	0	No	0	0
36B	1		Yes	1	9.3	Yes	Yes	Yes	1	Yes	1	1
37B	1		Yes	1	8.6	Yes	Yes	Yes	1	Yes	1	1
38B	1		Yes	1	5.0	No	Yes	No	0	Yes	1	1
39B	1			0	3.3	No	No	No	0	No	0	0
40B	1			0	3.8	No	No	No	0	No	0	0
41B	1			0	3.8	No	No	No	0	No	0	0
81B	1			0	2.9	No	No	No	0	No	0	0
82B	1			0	3.7	No	No	No	0	No	0	0
83B	1			0	3.6	No	No	No	0	No	0	0
84B	1			0	2.5	No	No	No	0	No	0	0
85B	1			0	2.0	No	No	No	0	No	0	0
86B	1			0	1.5	No	No	No	0	No	0	0
87B	1			0	1.2	No	No	No	0	No	0	0
88B	1			0	1.6	No	No	No	0	No	0	0
89B	1			0	1.7	No	No	No	0	No	0	0
90B	1			0	1.8	No	No	No	0	No	0	0
91B	1			0	1.8	No	No	No	0	No	0	0
92B	1			0	1.5	No	No	No	0	No	0	0
93B	1			0	1.2	No	No	No	0	No	0	0
94B	1			0	1.2	No	No	No	0	No	0	0
95B	1			0	1.3	No	No	No	0	No	0	0
96B	1			0	2.0	No	No	No	0	No	0	0
97B	1			0	1.6	No	No	No	0	No	0	0
98B	1			0	2.3	No	No	No	0	No	0	0
99B	1			0	3.0	No	No	No	0	No	0	0

Feasibility Factors:			
# of First-Row 5 dBA Reduction:			7
% of First-Row 5 dBA Reduction:			100.0%
Acoustic Feasibility (5 dBA reduction for 50% of front-row):			Yes
Reasonableness Factors:			
# of First-Row Design Goal:			5
% of First-Row Design Goal:			71.4%
Noise Abatement Design Goal (7 dBA reduction for 35% of front-row):			Yes
# of Benefited:			7
Cost of Noise Wall (Length x Height x \$20/sq ft):			\$206,960.00
Cost of any other items critical to safety:			\$19,900.00
Anticipated Cost of Noise Abatement:			\$226,860.00
Allowable Cost (\$30,000 per benefitted receptor):			\$210,000.00
Cost Effective (Anticipated Cost < Allowable Cost):			No
Feasible and Reasonable:			No

Noise Wall 4

Total Wall Length:1342ft

Wall Cost per sq ft:\$20

Cost of items critical to safety:\$25(\$25/ft for snow storage)

of First Row Receivers:8

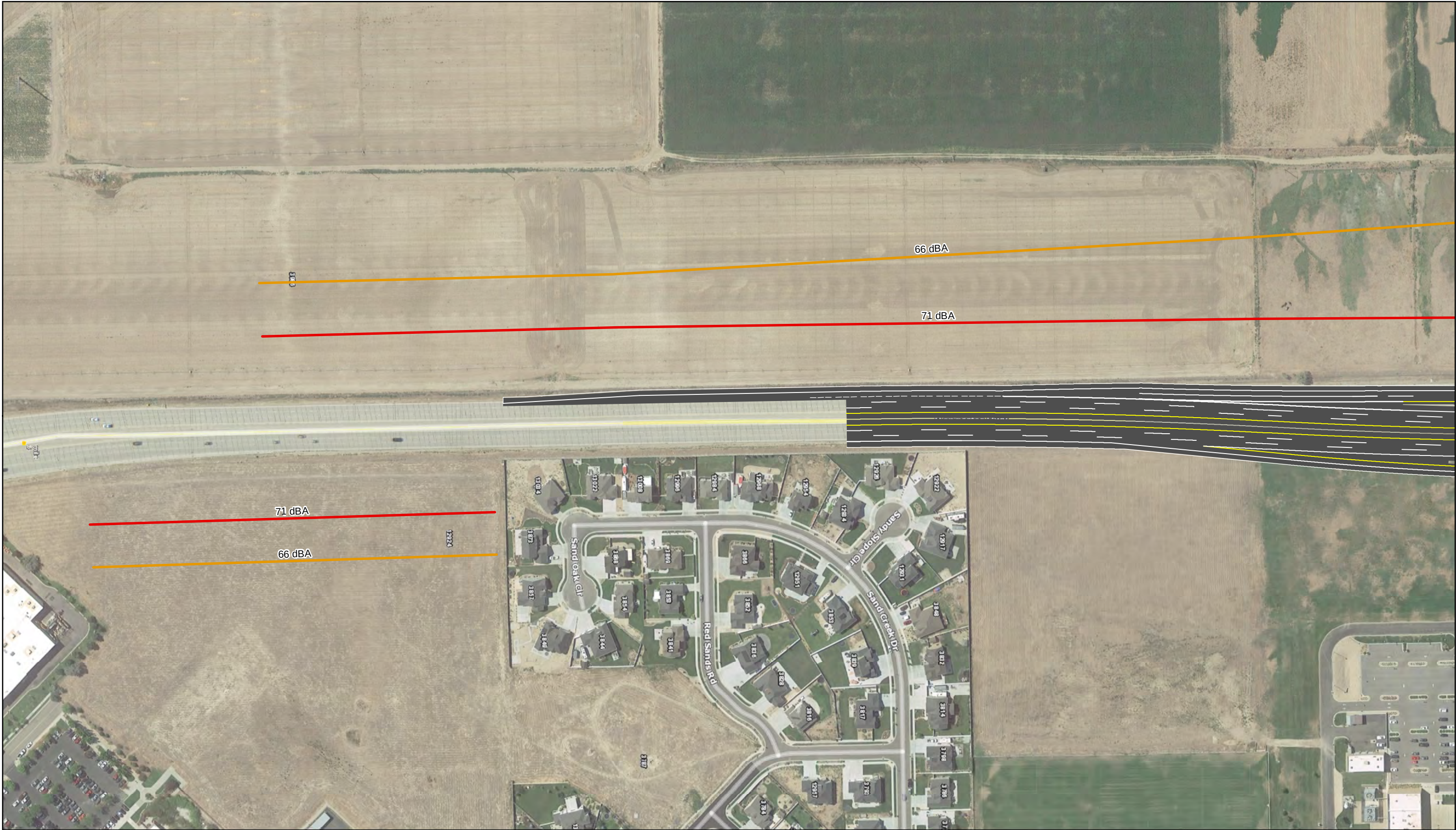
Name	# of DU	Relocation	1st Row	# of 1st Row	10-ft Wall	Design Goal	Benefited	1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA	# Benefited Receptors	12-ft Wall	Design Goal	Benefited	1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors	14-ft Wall	Design Goal	Benefited	1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors	16-ft Wall	Design Goal	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	18-ft Wall	Design Goal	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction
51B		1		0	0.4	No	No	No	No	0	0	0.6	No	No	No	No	0	0	0.9	No	No	No	No	0	0	0.9	No	No	No	0	No	1.0	No	No	No	0	No
52B		1		0	0.6	No	No	No	No	0	0	0.8	No	No	No	No	0	0	1.1	No	No	No	No	0	0	1.2	No	No	No	0	No	1.3	No	No	No	0	No
53B		1	Yes	1	2.2	No	No	No	No	0	0	3.6	No	No	No	No	0	0	4.2	No	No	No	No	0	0	4.6	No	No	No	0	No	4.9	No	No	No	0	No
54B		1		0	2.4	No	No	No	No	0	0	4.3	No	No	No	No	0	0	5.0	No	Yes	No	No	0	1	5.7	No	Yes	No	0	No	6.2	No	Yes	No	0	No
55B		1		0	2.4	No	No	No	No	0	0	3.8	No	No	No	No	0	0	4.3	No	No	No	No	0	0	4.8	No	No	No	0	No	5.2	No	Yes	No	0	No
56B		1		0	1.4	No	No	No	No	0	0	2.1	No	No	No	No	0	0	3.3	No	No	No	No	0	0	3.7	No	No	No	0	No	4.0	No	No	No	0	No
57B		1	Yes	1	4.5	No	No	No	No	0	0	5.8	No	Yes	No	Yes	1	1	6.5	No	Yes	No	Yes	1	1	7.0	Yes	Yes	Yes	1	Yes	7.4	Yes	Yes	Yes	1	Yes
104B		1		0	0.4	No	No	No	No	0	0	0.6	No	No	No	No	0	0	0.9	No	No	No	No	0	0	1.0	No	No	No	0	No	1.1	No	No	No	0	No
105B		1		0	0.4	No	No	No	No	0	0	0.6	No	No	No	No	0	0	1.0	No	No	No	No	0	0	1.1	No	No	No	0	No	1.2	No	No	No	0	No
107B		1		0	0.5	No	No	No	No	0	0	0.8	No	No	No	No	0	0	1.1	No	No	No	No	0	0	1.3	No	No	No	0	No	1.3	No	No	No	0	No
108B		1		0	0.5	No	No	No	No	0	0	0.8	No	No	No	No	0	0	1.2	No	No	No	No	0	0	1.3	No	No	No	0	No	1.4	No	No	No	0	No
109B		1		0	0.4	No	No	No	No	0	0	0.7	No	No	No	No	0	0	1.1	No	No	No	No	0	0	1.2	No	No	No	0	No	1.3	No	No	No	0	No
110B		1		0	0.6	No	No	No	No	0	0	1.0	No	No	No	No	0	0	1.5	No	No	No	No	0	0	1.7	No	No	No	0	No	1.8	No	No	No	0	No
111B		1		0	0.7	No	No	No	No	0	0	1.1	No	No	No	No	0	0	1.8	No	No	No	No	0	0	2.0	No	No	No	0	No	2.1	No	No	No	0	No
112B		1		0	1.1	No	No	No	No	0	0	1.7	No	No	No	No	0	0	2.6	No	No	No	No	0	0	2.8	No	No	No	0	No	3.0	No	No	No	0	No
113B		1		0	0.8	No	No	No	No	0	0	1.2	No	No	No	No	0	0	1.8	No	No	No	No	0	0	2.0	No	No	No	0	No	2.2	No	No	No	0	No
114B		1		0	0.8	No	No	No	No	0	0	1.3	No	No	No	No	0	0	2.0	No	No	No	No	0	0	2.2	No	No	No	0	No	2.3	No	No	No	0	No
115B		1		0	1.0	No	No	No	No	0	0	1.5	No	No	No	No	0	0	2.2	No	No	No	No	0	0	2.5	No	No	No	0	No	2.6	No	No	No	0	No
116B		1	Yes	1	0.7	No	No	No	No	0	0	1.1	No	No	No	No	0	0	1.3	No	No	No	No	0	0	1.4	No	No	No	0	No	1.5	No	No	No	0	No
117B		1	Yes	1	2.3	No	No	No	No	0	0	3.1	No	No	No	No	0	0	3.7	No	No	No	No	0	0	4.0	No	No	No	0	No	4.3	No	No	No	0	No
118B		1		0	1.6	No	No	No	No	0	0	2.5	No	No	No	No	0	0	3.3	No	No	No	No	0	0	3.7	No	No	No	0	No	4.0	No	No	No	0	No
119B		1		0	1.2	No	No	No	No	0	0	1.9	No	No	No	No	0	0	2.9	No	No	No	No	0	0	3.3	No	No	No	0	No	3.6	No	No	No	0	No
120B		1		0	0.9	No	No	No	No	0	0	1.5	No	No	No	No	0	0	2.4	No	No	No	No	0	0	2.6	No	No	No	0	No	2.8	No	No	No	0	No
121B		1		0	0.9	No	No	No	No	0	0	1.5	No	No	No	No	0	0	2.4	No	No	No	No	0	0	2.7	No	No	No	0	No	2.9	No	No	No	0	No
122B		1		0	1.0	No	No	No	No	0	0	1.6	No	No	No	No	0	0	2.5	No	No	No	No	0	0	2.8	No	No	No	0	No	3.0	No	No	No	0	No
123B		1		0	1.0	No	No	No	No	0	0	1.5	No	No	No	No	0	0	2.3	No	No	No	No	0	0	2.6	No	No	No	0	No	2.8	No	No	No	0	No
124B		1		0	0.8	No	No	No	No	0	0	1.2	No	No	No	No	0	0	1.9	No	No	No	No	0	0	2.2	No	No	No	0	No	2.3	No	No	No	0	No
125B		1		0	0.8	No	No	No	No	0	0	1.2	No	No	No	No	0	0	2.0	No	No	No	No	0	0	2.2	No	No	No	0	No	2.3	No	No	No	0	No
126B		1		0	0.7	No	No	No	No	0	0	1.1	No	No	No	No	0	0	1.8	No	No	No	No	0	0	2.0	No	No	No	0	No	2.1	No	No	No	0	No
127B		1		0	0.7	No	No	No	No	0	0	1.0	No	No	No	No	0	0	1.6	No	No	No	No	0	0	1.8	No	No	No	0	No	1.9	No	No	No	0	No
142B		1		0	2.2	No	No	No	No	0	0	3.8	No	No	No	No	0	0	4.4	No	No	No	No	0	0	4.9	No	No	No	0	No	5.3	No	Yes	No	0	No
143B		1	Yes	1	3.3	No	No	No	No	0	0	4.4	No	No	No	No	0	0	5.3	No	Yes	No	Yes	1	1	5.9	No	Yes	No	0	Yes	6.5	No	Yes	No	0	Yes
144B		1	Yes	1	3.0	No	No	No	No	0	0	4.3	No	No	No	No	0	0	5.1	No	Yes	No	Yes	1	1	5.7	No	Yes	No	0	Yes	6.3	No	Yes	No	0	Yes
145B		1		0	1.8	No	No	No	No	0	0	3.4	No	No	No	No	0	0	4.0	No	No	No	No	0	0	4.5	No	No	No	0	No	4.9	No	No	No	0	No
146B		1		0	1.3	No	No	No	No	0	0	2.0	No	No	No	No	0	0	2.9	No	No	No	No	0	0	3.2	No	No	No	0	No	3.5	No	No	No	0	No
147B		1		0	1.6	No	No	No	No	0	0	2.2	No	No	No	No	0	0	3.2	No	No	No	No	0	0	3.5	No	No	No	0	No	3.8	No	No	No	0	No
148B		1		0	1.6	No	No	No	No	0	0	2.6	No	No	No	No	0	0	3.2	No	No	No	No	0	0	3.5	No	No	No	0	No	3.8	No	No	No	0	No
149B		1		0	1.7	No	No	No	No	0	0	2.7	No	No	No	No	0	0	3.5	No	No	No	No	0	0	3.9	No	No	No	0	No	4.3	No	No	No	0	No
150B		1		0	1.5	No	No	No	No	0	0	2.1	No	No	No	No	0	0	3.0	No	No	No	No	0	0	3.3	No	No	No	0	No	3.6	No	No	No	0	No
151B		1		0	1.1	No	No	No	No	0	0	1.6	No	No	No	No	0	0	2.5	No	No	No	No	0	0	2.8	No	No	No	0	No	3.0	No	No	No	0	No
152B		1		0	1.0	No	No	No	No	0	0	1.6	No	No	No	No	0	0	2.5	No	No	No	No	0	0	2.8	No	No	No	0	No	3.0	No	No	No	0	No
153B		1		0	0.8	No	No	No	No	0	0	1.3	No	No	No	No	0	0	2.0	No	No	No	No	0	0	2.2	No	No	No	0	No	2.4	No	No	No	0	No
154B		1		0	0.8	No	No	No	No	0	0	1.2	No	No	No	No	0	0	1.9	No	No	No	No	0	0	2.1	No	No	No	0	No	2.3	No	No	No	0	No
155B		1		0	0.7	No	No	No	No	0	0	1.1	No	No	No	No	0	0	1.8	No	No	No	No	0	0	2.0	No	No	No	0	No	2.2	No	No	No	0	No
156B		1	Yes	1	3.4	No	No	No	No	0	0	4.6	No	No	No	No	0	0	5.5	No	Yes	No	Yes	1	1	6.2	No	Yes	No	0	Yes	6.9	No	Yes	No	0	Yes
157B		1	Yes	1	3.3	No	No	No	No	0	0	4.5	No	No	No	No	0	0	5.5	No	Yes	No	Yes	1	1	6.3	No	Yes	No	0	Yes	6.9	No	Yes	No	0	Yes

Feasibility Factors:		0	1	5	5	5
# of First-Row 5 dBA Reduction:		0	1	5	5	5
% of First-Row 5 dBA Reduction:		0.0%	12.5%	62.5%	62.5%	62.5%
Acoustic Feasibility (5 dBA reduction for 50% of front-row):		No	No	Yes	Yes	Yes
Reasonableness Factors:						
# of First-Row Design Goal:		0	0	0	1	1
% of First-Row Design Goal:		0.0%	0.0%	0.0%	12.5%	12.5%
Noise Abatement Design Goal (7 dBA reduction for 35% of front-row):		No	No	No	No	No
# of Benefited:		0	1	6	6	8
Cost of Noise Wall (Length x Height x \$20/sq ft):		\$268,400.00	\$322,080.00	\$375,760.00	\$429,440.00	\$483,120.00
Cost of any other items critical to safety:		\$33,550.00	\$33,550.00	\$33,550.00	\$33,550.00	\$33,550.00
Anticipated Cost of Noise Abatement:		\$301,950.00	\$355,630.00	\$409,310.00	\$462,990.00	\$516,670.00
Allowable Cost (\$30,000 per benefitted receptor):		\$0.00	\$30,000.00	\$180,000.00	\$180,000.00	\$240,000.00
Cost Effective (Anticipated Cost < Allowable Cost):		No	No	No	No	No
Feasible and Reasonable:		No	No	No	No	No

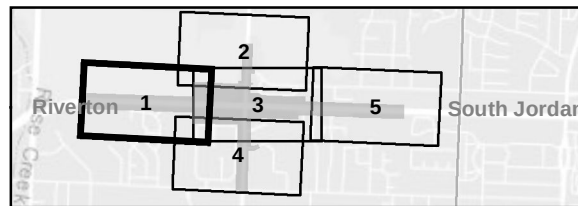
Total Wall Length	814	ft
Length of Activity Category C Land Use:	0	ft
Wall Cost per sq ft:	\$20	
Cost of items critical to safety:	\$25	(\$25/ft for snow storage)
# of First Row Receivers:	1	

Feasibility Factors:					
# of First-Row 5 dBA Reduction:	0	0	0	1	1
% of First-Row 5 dBA Reduction:	0.0%	0.0%	0.0%	100.0%	100.0%
Acoustic Feasibility (5 dBA reduction for 50% of front-row):	No	No	No	Yes	Yes
Reasonableness Factors:					
# of First-Row Design Goal:	0	0	0	0	0
% of First-Row Design Goal:	0.0%	0.0%	0.0%	0.0%	0.0%
Noise Abatement Design Goal (7 dBA reduction for 35% of front-row):	No	No	No	No	No
Cost of Noise Wall (Length x Height x \$20/sq ft):	\$162,800.00	\$195,360.00	\$227,920.00	\$260,480.00	\$293,040.00
Cost of any other items critical to safety:	\$20,350.00	\$20,350.00	\$20,350.00	\$20,350.00	\$20,350.00
Anticipated Cost of Noise Abatement:	\$183,150.00	\$215,710.00	\$248,270.00	\$280,830.00	\$313,390.00
Activity Category C Allowable Cost (\$360/linear ft):	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Allowable Cost:	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Cost Effective (Anticipated Cost < Allowable Cost):	No	No	No	No	No
Feasible and Reasonable:					
	No	No	No	No	No

APPENDIX E: NOISE LEVELS ON UNDEVELOPED LAND



— 66 dBA Contour
— 71 dBA Contour



Bangerter Highway at 12600 South
Undeveloped Land

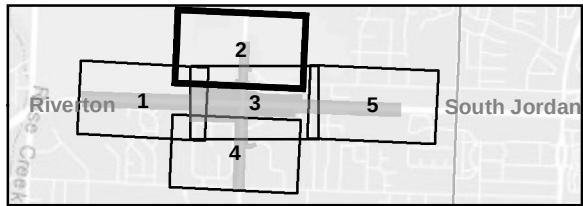


0 0.5 1 Miles

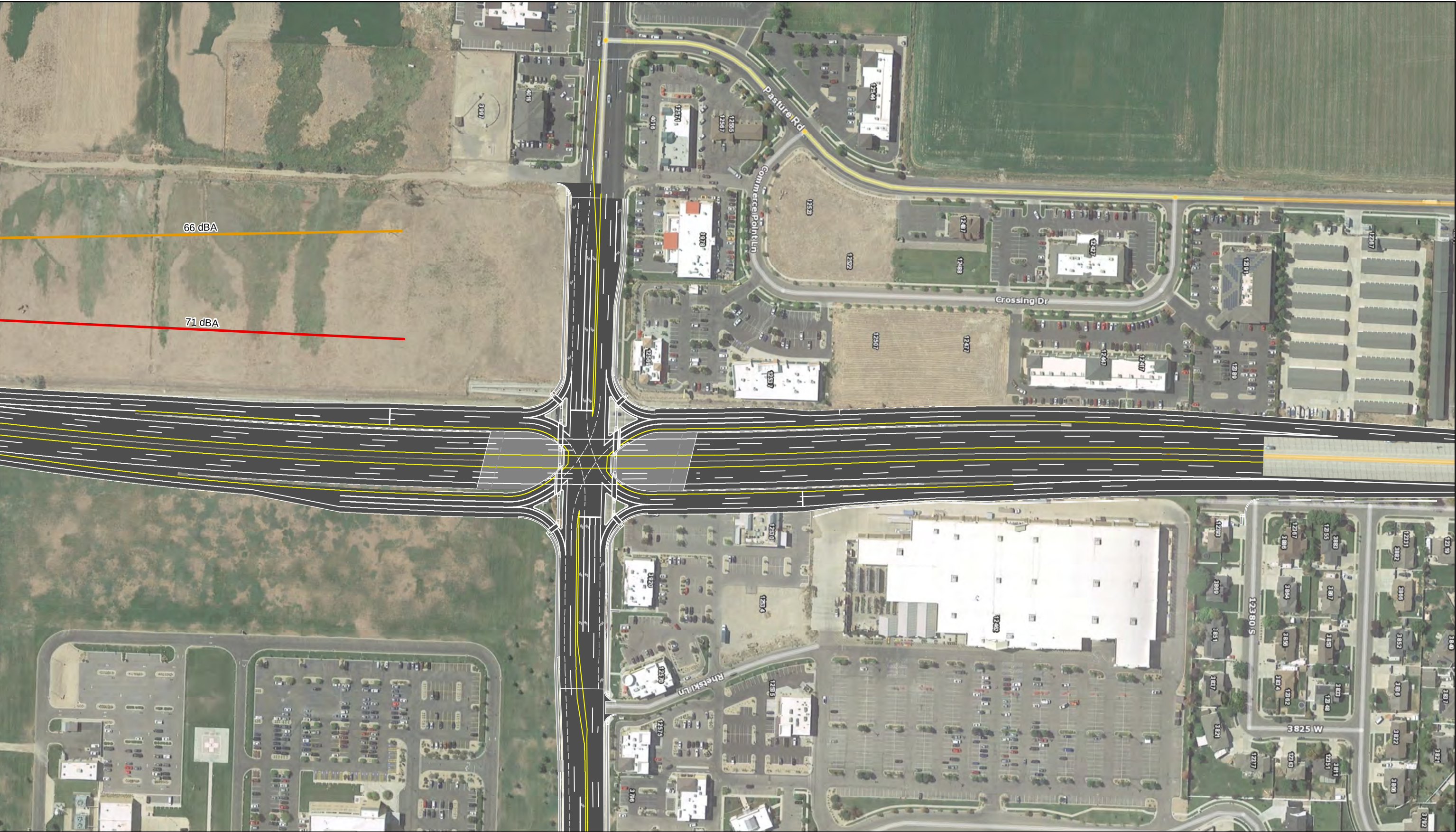
Map 1 of 5



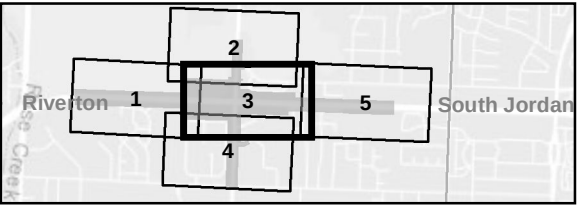
66 dBA Contour
71 dBA Contour



Bangerter Highway at 12600 South
Undeveloped Land
0 0.5 1 Miles
Map 2 of 5



66 dBA Contour
71 dBA Contour



Bangerter Highway at 12600 South

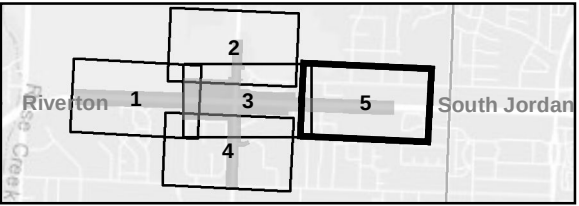
Undeveloped Land

0 0.5 1 Miles

Map 3 of 5



— 66 dBA Contour
— 71 dBA Contour



Bangerter Highway at 12600 South

Undeveloped Land

0 0.5 1 Miles

Map 5 of 5

APPENDIX B





BANGERTER
THREE
Looking West



BANGERTER
THREE
Looking East