ENVIRONMENTAL STUDY

Project Name: ***Alpine Hwy to No. County Blv; Connector Road** PIN: **14088**

Project No.: **S-LC49(165)** Job/Proj: **72317**

Prepared By: **Peter S. Steele**

For guidance in preparing this environmental study, refer to the UDOT Environmental Process Manual of Instruction:

http://www.udot.utah.gov/go/environmental

REQUIRED SIGNATURES

I have reviewed the information presented in this Environmental Study and I hereby attest that the document is complete and the details of the document are correct.

Reviewer (Signature): _____ **Date:** _____

Reviewer (Printed): _____

Firm/UDOT Region: _____

STATE FUNDED PROJECTS

As a result of this Environmental Study, UDOT finds that this project will NOT cause significant environmental impacts.

Approved: _____ **Date:** _____

UDOT Region Environmental Manager

1. Purpose and Need for Action

The communities of American Fork, Highland, and Cedar Hills in northern Utah County are connected by two major north-south roadways: SR-74 (the Alpine Highway) and SR-129 (North County Boulevard). East-west connections between these two roadways do not exist between SR-92 (the Timpanogos Highway) and 700 North in American Fork. This lack of connection forces substantial out-of-direction travel and delay and increases traffic on SR-92 and 700 North. A UDOT traffic study found that without a connection between the two roadways, traffic will be 8% higher on SR-92 and 33% higher on 700 North in 2040. Daily total delay will be 80 hours higher, with an additional 120 vehicle hours traveled and 5,000 vehicle miles traveled per day with no connection. The lack of connection also increases travel and response times for emergency services.

In addition, the Murdock Canal Trail, a major recreational and commuter trail, lacks a direct connection between a segment ending at Highland Glen Park on the east and a segment beginning at the Alpine Highway to the west. This forces pedestrians and cyclists using the trail into out-of-direction travel through residential neighborhoods.

The purpose of the project is to reduce delay and out-of-direction travel and increase connectivity for motorists, emergency services, cyclists, and pedestrians between SR-74 (the Alpine Highway) and SR-129 (North County Boulevard) in Utah County.

2. Description

Highland City, in cooperation with UDOT, proposes to construct a new, three-lane roadway between SR-74 (the Alpine Highway) at Canal Boulevard (9700 North, approximate milepost 2.25) and SR-129 (North County Boulevard) at Harvey Boulevard (approximate milepost 5.75). The project will consist of the construction of a three-lane roadway with shoulders, curb, gutter, sidewalk, and a structure over the American Fork River; the installation of traffic signals at the intersections with the Alpine Highway and North County Boulevard; realignment and grade-separation of the Murdock Canal and Art Dye trails to allow their free passage under the new roadway; and construction of a new segment of the Murdock Canal Trail from the current Highland Glen trailhead to the Alpine Highway. Construction will be phased, with the section from the Murdock Canal Trail to North County Boulevard constructed as a two-lane road without curb, gutter, or sidewalks. This section will be completed to its full width as the surrounding areas develop. The project also includes the reconstruction and widening of a short section of Harvey Boulevard from North County Boulevard to 4710 West in Cedar Hills. The acquisition of right-of-way will be required for the project. See project location maps in Appendix.

3. Public Hearing/Opportunity for Public Hearing

YES This project could result in public controversy or substantial impacts to adjacent properties, or substantially changes roadway geometry.

NO There are significant social, economic, environmental or other effects. If YES, a Categorical Exclusion is not applicable. Consult with UDOT Central Environmental Services.

YES UDOT/FHWA has determined that a public hearing is in the public interest.

If the answer to ANY of the above questions is YES, a public hearing or opportunity for a public hearing is required (attach documentation identifying date and location of hearing, summary of comments, and responses to substantial comments, or include certification of opportunity for hearing.)

The following types of public involvement have been provided:

YES Public Hearing in accordance with state and federal procedures

NO Opportunity for Public Hearing

NO Open House

NO Other:

YES Documentation is attached identifying the date and location of hearing, summary of comments, and responses to substantial comments; or the Certification of Opportunity for a Hearing is attached.

Comments: A public hearing was held February XX, 2019..... See public hearing materials in Appendix.

4. Right-of-Way

YES Acquisition of Right-of-Way is required.

NO The right-of-way required is significant because of its size, location, use, or relationship to remaining property and abutting properties. (If the right-of-way required is significant, the project does not qualify as a Categorical Exclusion.)

Comments: The project will require the acquisition of a total of 6.13 acres from four parcels, including one full acquisition of the home at 3826 North 4000 West in Highland. See right-of-way maps in Appendix.

5. Cultural

According to the UDOT Region NHPA/NEPA Specialist and/or the Architectural Historian, the Finding of Effect for the project is one of the following:

NO No historic properties affected

NO No adverse effect

YES Adverse effect

Project documentation for determination of eligibility and finding of effect consists of one of the following and is attached:

NO Memo from UDOT Region NEPA/NHPA Specialist and/or Architectural Historian stating a finding of No Historic Properties Affected.

YES SHPO concurrence with the Determinations of Eligibility and Finding of Effect AND memo from UDOT Region NEPA/NHPA Specialist and/or Architectural Historian stating a finding of No Adverse Effect or Adverse Effect.

YES Have letters for Native American Consultation been sent? Attach letters.

YES Have letters for federal and state agencies, CLGs, historical societies, etc. been sent? If so attach letters.

YES Do the impacts to historic properties require mitigation?

If YES, a signed Memorandum of Agreement (MOA) is attached.

Comments: The project will result in an adverse effect to one eligible historic property, 9826 North 4800 West. The property will be acquired and the house demolished. Consultation letters were sent to Native American tribes on January 23, 2019. An MOA will be developed between UDOT and the SHPO to mitigate the adverse effect. See cultural resources materials in Appendix.

6. Paleontological

NO This project is one of the 16 types of projects listed in Stipulation III of the Memorandum of Understanding (MOU) with the Utah Geological Survey (UGS) that has no effect on paleontological resources and does not require notification to the UGS. If YES, a memo from the UDOT Region NEPA/NHPA Specialist is attached (can be included in cultural memo).

For all other projects, the UGS has been notified and has responded with the following (attach UGS letter and memo from the UDOT Region NEPA/NHPA Specialist):

YES There are no known paleontological localities in the area of potential effects and the formations in the project area have a low potential for containing fossil remains (Class 1 or 2).

NO Fossil-bearing formations (Class 3-5) and/or known paleontological localities are present in the area of potential effects, but the UDOT Region NEPA/NHPA Specialist (or paleontologist) has determined that they will not be affected by the project.

NO Fossil-bearing formations (Class 3-5) and/or known paleontological localities are present in the area of potential effects and may be affected by construction activities. A survey and/or monitoring by a qualified paleontologist is required.

Comments: See paleontology letter in Appendix.

7. Threatened, Endangered, or Candidate Species

For Federally or State Funded Projects:

YES Project will have **"no effect"** to T&E species, or their critical habitats, protected under the Endangered Species Act. If YES, attach **"no effect"** memo or review/comments (in the case of local government projects) from UDOT's Wildlife Biologist.

NO Project **"may affect, but is not likely to adversely affect"** T&E species, or their critical habitats, protected under the Endangered Species Act. If YES, attach BA and "concurrence" from the U.S. Fish and Wildlife Services (USFWS). List all mitigation/conservation measures.

NO Project **"may affect, and is likely to adversely affect"** threatened and endangered species, or their critical habitats, protected under the Endangered Species Act. If YES, attach BA and USFWS BO. List all mitigation/conservation measures.

NO The USFWS has issued a **"jeopardy"** opinion regarding this project. If YES, attach BA and BO as above. This project cannot go forward without being reconsidered.

Comments: See wildlife memo in Appendix.

8. Wildlife

YES Project has the potential to affect state-sensitive species, important wildlife habitat, big game migration routes, habitat connectivity, migratory birds, or fish spawning habitat or fish passage.

Memo from UDOT Wildlife Biologist is attached.

Comments: An unoccupied raptor nest was observed during a field survey. There is potential for the nest to be affected by the project. See wildlife memo in Appendix.

9. Invasive Species

If the project involves earthwork, grading or landscaping, there is potential to introduce or spread invasive weed species.

YES Based upon location, this project has the potential to introduce or spread invasive species included on the noxious weed list of the State of Utah and the county noxious weed lists.

10. Noise

Projects that may affect noise levels to adjacent receptors include changes in roadway alignment, roadway widening and the addition of traffic lanes.

YES This project has the potential to increase noise to adjacent receptors.

YES A noise study is attached.

Comments: The project will result in a noise impact to 14 receptors. A wall along the north side of the proposed roadway extending along the southern side of Pheasant Hollow HOA Park meets the requirements of the UDOT Noise Abatement Policy. See noise study in Appendix.

11. Wetlands, Water Resources, Storm Water, and Floodplains

Wetlands and Water Resources

NO The project is a type that does not have the potential to affect or cross Waters of the United States. If YES, no concurrence letter is needed.

YES Project affects waters of the United States (e.g. wetlands, mudflats, lakes, or perennial or ephemeral streams). If NO, have a UDOT Landscape Architect provide a concurrence letter stating they agree with the determination. In order to indicate "NO" on this question, answers to the following statements must also be "NO".

YES Project impacts perennial, intermittent, or ephemeral streams that have a riparian vegetation component. If YES, a Programmatic General Permit 40 (PGP40), also known as a Stream Alteration Permit, from the Utah Division of Water Rights will be required.

NO Project exceeds the impact limitations for streams or washes indentified in the PGP40. If YES, both a PGP40 and a separate Department of the Army permit will be required.

NO Project impacts an ephemeral wash not captured under PGP40 that has an ordinary high water mark (OHWM) with a connected flow to a downstream Traditional Navigable Water and the impact below the OHWM exceeds 1/10 of an acre per crossing. If YES, a Department of the Army permit will be required.

NO Project impacts a perennial or intermittent stream below the OHWM less than 1/10 of an acre per crossing. If YES, notification to the U.S. Army Corps of Engineers will be required.

NO Project impacts navigable waters of the United States (Lake Powell, Flaming Gorge Reservoir, Bear Lake, Green River - mouth to 20 miles above Green River Station, Colorado River - mouth of Castle Creek to Cataract Canyon - 4.5 miles below mouth of Green River) below the OHWN. If YES, a Section 10 Department of the Army permit will be required.

NO Project impacts jurisdictional wetlands. If YES, a Department of Army Nationwide Permit (NWP) will be required for wetland impacts under the 1/2 acre threshold; a Letter of Permission (LOP) will be required for wetland impacts between 1/2 and 1 acre; an Individual Permit (IP) will be required for impacts greater than 1 acre.

NO Project impacts non-jurisdictional wetlands. If YES, wetland mitigation may still be required under the federal policy of "no net loss." Consult UDOT Environmental Section.

Storm Water Runoff

YES Project disturbs 1 acre or more of ground surface.

If YES, a UPDES Storm Water Discharge Permit for Construction Activities is required from the Utah Division of Water Quality.

Floodplains

NO This project requires new construction or alteration of existing structures within the FEMA designated 100-year flood plain.

If YES, a Development Permit is required from the local permit official.

Comments: A FEMA 100-year floodplain is identified within the project limits, however the proposed structure will span the floodplain, avoiding any impacts. No floodplain development permit is required. See water resources materials in Appendix.

12. Hazardous Waste

NO Has a visual inspection of the project area found substances that may be hazardous to human health and/or the environment?

YES This project involves excavation beyond or below the existing roadway footprint.

If YES to either question 1 or 2, then site investigations and coordination with DEQ may be necessary.

Comments: A review of the EPA EnviroMapper (https://www.epa.gov/emefdata/em4ef.home) and DEQ Environmental Interactive Map (https://enviro.deq.utah.gov) show no hazardous materials sites within or near the study area. See maps in Appendix.

13. Prime, Unique, Statewide, or Locally Important Farmland

Projects in areas whose land use maps indicate no current or future farming activities would not usually affect farmlands.

NO This project MAY affect Prime, Unique, Statewide, or Locally Important Farmlands.

N/A The Natural Resource Conservation Service letter and Form AD1006 are attached.

Comments: Although portions of the study area carry the soil classification Prime Farmland if Irrigated and are currently farmed, the study area is entirely within the Census-designated Provo-Orem Urbanized Area. Therefore, there are no Prime, Unique, Statewide, or Local Important Farmlands in the study area.

14. Air Quality

YES This project has the potential to increase particulate matter due to construction activities.

YES This project adds or alters roadway capacity or will result in increased traffic volumes at signalized intersections.

If YES, the Air Quality Supplement is attached.

15. Relocations

YES There may be relocations of residences or businesses as a result of this project.

Comments: The project will require one relocation, the residential property located at 9826 North 4800 West (North County Boulevard) in American Fork. See Appendix for map.

16. Land Use/Urban Policy

NO This project may affect land use or urban policy.

Comments: Portions of the state-owned property adjacent to the eastern half of the study area are slated for sale and development. Although the proposed road would be used by residents of the proposed developments, construction of the road is not required for development to occur and the absence of the road would not change the type of development that will occur.

17. Section 4(f) Properties

N/A Section 4(f) properties are impacted.

N/A An Individual Section 4(f) Evaluation AND written concurrence from UDOT Environmental Services on the Individual Section 4(f) determination is attached.

N/A A Programmatic Section 4(f) Evaluation AND written concurrence from UDOT Environmental Services on the Programmatic Section 4(f) determination is attached.

N/A The 4(f) property(s) is an historic property and the impact is considered **de minimis**.

N/A SHPO has concurred in writing on UDOT's **"no adverse effect"** determination to historic properties and has been notified of the intent to make a **de minimis** finding. Attach letter to SHPO and **de minimis** agreement letter.

N/A The 4(f) property(s) is a park, recreational area, wildlife or waterfowl refuge and the impact is considered **de minimis**.

N/A The official(s) with jurisdiction have concurred, in writing, that the project will **"not adversely affect"** the activities, features, and attributes that qualify the resource for protection under Section 4(f) and have been notified of the intent to make the **de minimis** impact finding. Letters are attached.

N/A The project sponsor has provided public notice and opportunity for public review and comment. Describe public involvement efforts in the comments below.

N/A Written concurrence from UDOT Environmental Services is attached.

18. Other Environmental Factors Considered

This Project, except as noted and explained in attachments, will have no disproportionate, serious or lasting effect on the following:

NO Visual

NO Social/Economic

NO Title VI and/or Environmental Justice

NO Natural Resources

NO Construction

NO Energy

NO Geology/Soils

NO Wild/Scenic Rivers

NO Ecology

19. Conclusion

NO This project may have substantial controversy or significant impacts.

MITIGATION COMMITMENTS

CONSTRUCTION		Responsible
Air Quality	Requirements outlined in Standard Specification 01572 titled "Dust Control and Watering" will be followed.	Contractor
Cultural	UDOT Standard Spec 01355, Parts 3.7 and 3.8	Contractor
Invasive Species	Supplemental Specification 02924S titled "Invasive Weed Control" will be included in the contract documents and outlines BMPs that will be incorporated.	Contractor
Wildlife	Complete tree removal outside the nesting season (April 15-August 30). If tree removal is needed during the nesting season, a nest survey will be required prior to any tree disturbance.	Contractor

PRELIMINARY ENGINEERING		Responsible
Relocations	Property Owners will be compensated according to the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended.	Udot Right Of Way
Water Quality	The project will disturb 1 acre or more of ground surface. Therefore, a storm water pollution prevention plan (SWPPP) must be included in the plans.	Udot Region Environmental
Water Quality 2	UPDES Permit from the Division of Water Quality must be obtained prior to construction.	Contractor

AIR OUALITY SUPPLEMENT

Revised 3/2012

A. Regional Conformity Requirements

YES This project is in a non-attainment or maintenance area for carbon monoxide (CO), particulate matter (PM10 or PM2.5), or ozone (O_3).

If NO, no additional analysis is required.

If YES, the project must be included in a Metropolitan Planning Organization (MPO) conforming Long Range Plan (LRP) and Transportation Improvement Program (TIP). There must be no substantial changes to the project's design and scope since the conformity analysis. For questions, contact the UDOT Air Quality Program Coordinator.

B. Project Level Requirement

I. Carbon Monoxide (CO)

NO The project is in a non-attainment or maintenance area and affects intersections that are at level-of-service D, E or F or those that will change to D, E or F because of increased traffic volumes related to the project.

If NO, a CO Analysis is not required.

If YES, a CO hot-spot analysis of peak emissions is required using CAL3QHC and the EPA "MOVES" model. Attach results of analysis.

___ The CO hot-spot analysis shows compliance with the NAAQS.

___ The CO hot-spot analysis shows that the project will cause or contribute to new localized CO violations of the NAAQS, will increase the frequency or severity of existing violations, or will delay attainment of the NAAQS.

If YES, revise the signal timing data and re-run the analysis. If the NAAQS are still exceeded, compare the Build CO levels with No-Build CO levels for the design year. CO levels for the project must be less than or equal to the No-Build levels for the design year; otherwise the project must be modified.

II. Particulate Matter (PM2.5 and PM 10)

NO The project is in a non-attainment or maintenance area and involves a new or expanded highway and will have a significant number of diesel vehicles or significant increase in the number of diesel vehicles. An example is a facility with more than 125,000 annual average daily traffic (AADT) and 8% (10,000) or more is truck traffic.

NO The project is in a non-attainment or maintenance area and affects intersections that are at level-of service D, E or F with a significant number of diesel vehicles or affects intersections that will change to D, E or F because of increased traffic volumes from a significant number of diesel vehicles.

If NO to both of the above, a PM analysis is not required.

If YES to either of the above, a PM hot-spot analysis of peak emissions is required using CAL3QHCR and the EPA "MOVES" model. Attach analysis results.

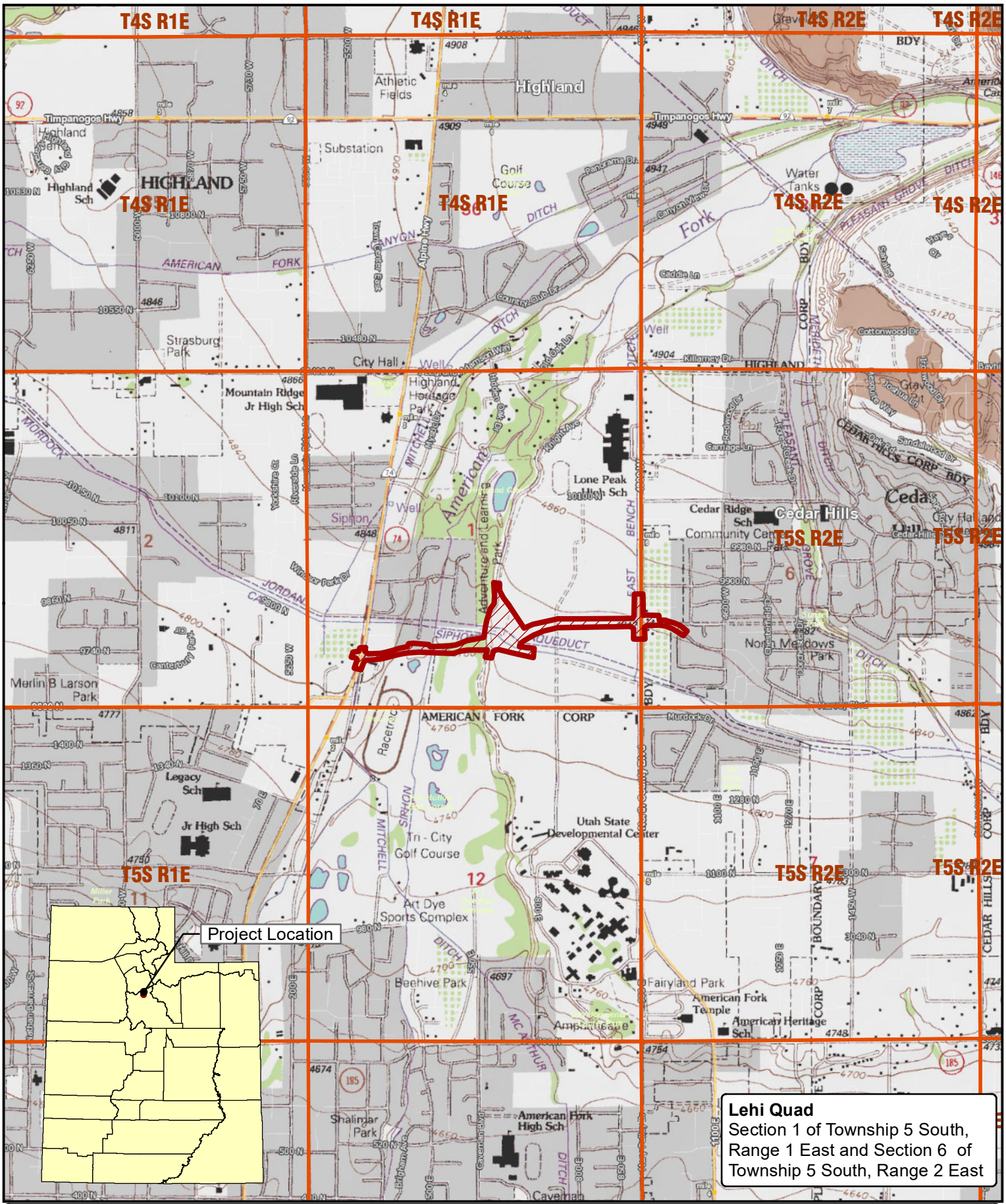
___ The PM hot-spot analysis shows compliance with the NAAQS.

___ The PM hot-spot analysis shows that the project will cause or contribute to new localized PM violations of the NAAQS, will increase the frequency or severity of existing violations, or will delay attainment of the NAAQS.

If YES, compare the Build PM levels with No-Build PM levels for the design year. PM levels for the project must be less than or equal to the No-Build levels for the design year; otherwise the project must be modified.

Appendix

Project Map
Public Hearing Materials
Right-of-Way/Relocation Map
Cultural Resources Materials
Paleontology Letter
Wildlife Summary and Memo
Noise Study
Water Resources Materials
Hazardous Materials Maps



Lehi Quad
Section 1 of Township 5 South, Range 1 East and Section 6 of Township 5 South, Range 2 East

Coordinate System: NAD 1983 StatePlane Utah Central FIPS 4302 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Map Created by Horrocks Engineers on 11/29/2018 8:57:42 AM

Canal Boulevard; Alpine Highway to North County Boulevard

Project Location Map

PIN 14088 - Alpine Highway to North County Boulevard; Connector Road
Preliminary Right-of-Way Acquisitions

Address	Parcel Number	Acres
Pheasant Hollow HOA Park	N/A	1.38
State of Utah (South Area)	12:004:0018	2.16
State of Utah (North Area)	12:004:0017	2.71
9826 North 4800 West, Highland	14:003:0318	1.26


ROW TAKE: 0.34 AC
DFCM - UTAH STATE
PERPETUAL EASEMENT: 0.21 AC
PHEASANT HOLLOWS HOA
ROW TAKE: 1.56 AC
PHEASANT HOLLOWS HOA
ROW TAKE: 6.88 AC
DFCM - UTAH STATE
R/W
1/4
SEC

DOEFOE to be added.

GARY R. HERBERT
Governor
SPENCER J. COX
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES
MICHAEL R. STYLER
Executive Director
Utah Geological Survey
RICHARD G. ALLIS
State Geologist/Division Director

December 10, 2018

Peter Steele
Horrocks Engineers
2162 West Grove Parkway, Suite 400
Pleasant Grove UT 84062

RE: Paleontological File Search and Recommendations for the Canal Boulevard; Alpine Highway to North County Boulevard Project, Utah County, Utah
U.C.A. 79-3-508 (Paleontological) Compliance; Request for Confirmation of Literature Search according to the UDOT/UGS Memorandum of Understanding.

Dear Peter:

I have conducted a paleontological file search for the Canal Boulevard Construction Project in response to your email of December 7, 2018. This project qualifies for treatment under the UDOT/UGS executed Memorandum of Understanding.

There are no paleontological localities recorded in our files for this project area. Quaternary and Recent alluvial and lacustrine deposits that are exposed along this project right-of-way have a low potential for yielding significant fossil localities (PFYC 1 - 2). Unless fossils are discovered as a result of construction activities, this project should have no impact on paleontological resources.

If you have any questions, please call me at (801) 537-3311.

Sincerely,

Martha Hayden

Martha Hayden
Paleontological Assistant

1594 West North Temple, Suite 3110, PO Box 146100, Salt Lake City, UT 84114-6100
telephone (801) 537-3300 • facsimile (801) 537-3400 • TTY (801) 538-7458 • *geology.utah.gov*

Memorandum

Environmental Services

DATE: December 20, 2018

TO: Craig Bown, Environmental Specialist, Horrocks

FROM: Matt Howard, Natural Resources Manager

SUBJECT: Canal Boulevard; Alpine Highway to North County Boulevard; S-LC49(165); PIN 14088

Craig,

I have reviewed the T&E Species, Utah Sensitive Species, and Migratory Bird Evaluation regarding the proposed new east/west three-lane roadway between SR-74 and SR-129 and the project's potential impacts to species protected by the Endangered Species Act (ESA) and concur with its findings. Given the level of development in the project's action area, I agree that as long as any potential nesting substrate is removed outside of the nesting period, the project would have no effect on species protected by the ESA, MBTA, or BGEPA. I have also reviewed the project to assess impacts to greater sage-grouse and have found that the project would have no impact on sage-grouse.

Sincerely,

Matt Howard
Natural Resource Manager

HORROCKS
ENGINEERS

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Pleasant Grove, Utah 84062
801-763-5100
www.horrocks.com

To: Matt Howard, UDOT Natural Resources Manager

From: Craig Bown, Horrocks Engineers Environmental Specialist

Date: December 14, 2018 **Memorandum**

Subject: T&E Species, UT Sensitive Species, & Migratory Bird Evaluation

Canal Boulevard; Alpine Highway to North County Boulevard; S-LC49(165); PIN: 14088

Project Background

Highland City, in cooperation with UDOT, proposes to construct a new, east/west three-lane roadway between SR-74 (Alpine Highway) and SR-129 (North County Boulevard) (see attached figure). New roadway connections are proposed at the existing intersections of Harvey Boulevard on the east and Canal Boulevard (9700 North) on the west. The project will consist of the construction of a three-lane roadway with shoulders, curb, gutter, sidewalk, and a structure over the American Fork River; the installation of traffic signals at the intersections with the Alpine Highway and North County Boulevard; realignment and grade-separation of the Murdock Canal and Art Dye trails to allow their free passage under the new roadway; and construction of a new segment of the Murdock Canal Trail from the current Highland Glen trailhead to the Alpine Highway. Right-of-way acquisition will be required.

Evaluation Methods

The study area has been evaluated for federally listed species and their designated critical habitat protected under the Endangered Species Act (ESA) utilizing information obtained from U.S. Fish and Wildlife Service's (USFWS) Online Information, Planning, and Conservation system (IPaC). Utah Sensitive Species with potential to occur in Utah County were also accounted for within the study area. Additionally, known location data for both federally listed and state sensitive species was obtained from the Utah Division of Wildlife Resources, Utah Natural Heritage Program (UDWR/UNHP). A field visit, species ecology, and aerial imagery were also assessed to determine potential suitable habitats.

Analyses

Study Area Habitat

The study area is located within Highland City, Utah and bound by residential developments, Fox Hollow Golf Course to the south, and some agricultural fields. Vegetation within the study area consists of turf sod, native and weedy grasses (e.g., intermediate wheatgrass, cheat grass, curly-cup gumweed, etc.), and a variety of tree species (e.g., narrowleaf cottonwood, Siberian elm, Wood's Rose, etc.) found mostly adjacent the American Fork River. The American Fork River passes through the center of the study area, north to south. Between approximately April 1 and October 31, all water of the American Fork River is diverted at the mouth of American Fork Canyon for irrigation use. The portion of the American Fork River through the study area generally has little to no flow. This also was the condition of the River observed during the field visit. The Murdock Canal is also present within the study are but it is completed piped beneath the Murdock Canal Trail.

Threatened and Endangered Species

IPaC data list five species for consideration in the study area; no associated critical habitats were identified. An evaluation of these species preferred habitats and their potential to occur within the study area can be seen in Table 1. No suitable habitat for federally listed species was identified within the study area. Additionally, based on data obtained from UDWR/UNHP there are no known occurrence of listed species within the study area.

Table 1: IPaC Species of Consideration Habitat Evaluation

Species Name	Status	Habitat [1]	Suitable Habitat within Study Area?
Mammals			
Canada lynx (Lynx canadensis)	Threatened	Prefers montane, coniferous forest that support high snowshoe hare populations.	The study area consists of mixed grasses, turf sod, and broadleaf trees. There is **no suitable habitat** within the study area.
Birds			
Yellow-billed Cuckoo (Coccyzus americanus)	Threatened	Riparian patches varying in size and shape, ranging from a relatively contiguous stand of mixed native/exotic vegetation to an irregularly shaped mosaic of dense vegetation with open areas.	Multi-layered riparian vegetation was measured at 10 acres. Therefore, in accordance with USFWS UT Field Office guidance, **no suitable habitat** has been identified within 0.5 miles of the study area.
Fishes			
June sucker (Chasmistes liorus)	Endangered	Endemic to Utah Lake and the Provo River.	Utah Lake and Provo River are not found within the study area. There is **no suitable habitat** within the study area.
Flowering Plants			
Jones Cycladenia (Cycladenia humilis var. jonesii)	Threatened	Grows in gypsiferous soils that are derived from the Summerville, Cutler, and Chinle formations; they are shallow, fine textured, and intermixed with rock fragments. The species can be found in Eriogonum-Ephedra, mixed desert shrub, and scattered pinyon-juniper communities.	The study area does not contain the required gypsiferous soil formations to support this species. **No suitable habitat** is found within the study area.
Ute Ladies'-tresses (Spiranthes diluvialis)	Threatened	Found in wet meadows, along streams, in abandoned stream meanders, and near springs, seeps, and lake shores in sandy or loamy soils with mixed gravel.	The American Fork River is present within the study area and is lined with narrowleaf cottonwoods (*populus angustifolia*) and Woods' rose (*rosa woodsia*). However, the river banks are steeply cut, covered in large cobbles, and do not provide appropriate soil types (loam or alluvial) to support Ute ladies'-tresses. Additionally, habitat adjacent the top of bank consists of upland species which are not considered habitat of the Ute ladies'-tresses. No other wet areas were identified. There is **no suitable habitat** within the study area.

[1] Sources: UDWR Utah Conservation Data Center (https://dwrcdc.nr.utah.gov/ucdc/), USFWS Environmental Conservation Online System (ECOS) Life History, and USFWS Species Fact Sheets.

Utah Sensitive Species, Migratory Birds, and Other Wildlife

A list of Utah Sensitive Species likely to occur within Utah County were compared against available habitat within study area. Based on this review, no suitable habitat is present for state sensitive species in the study area.

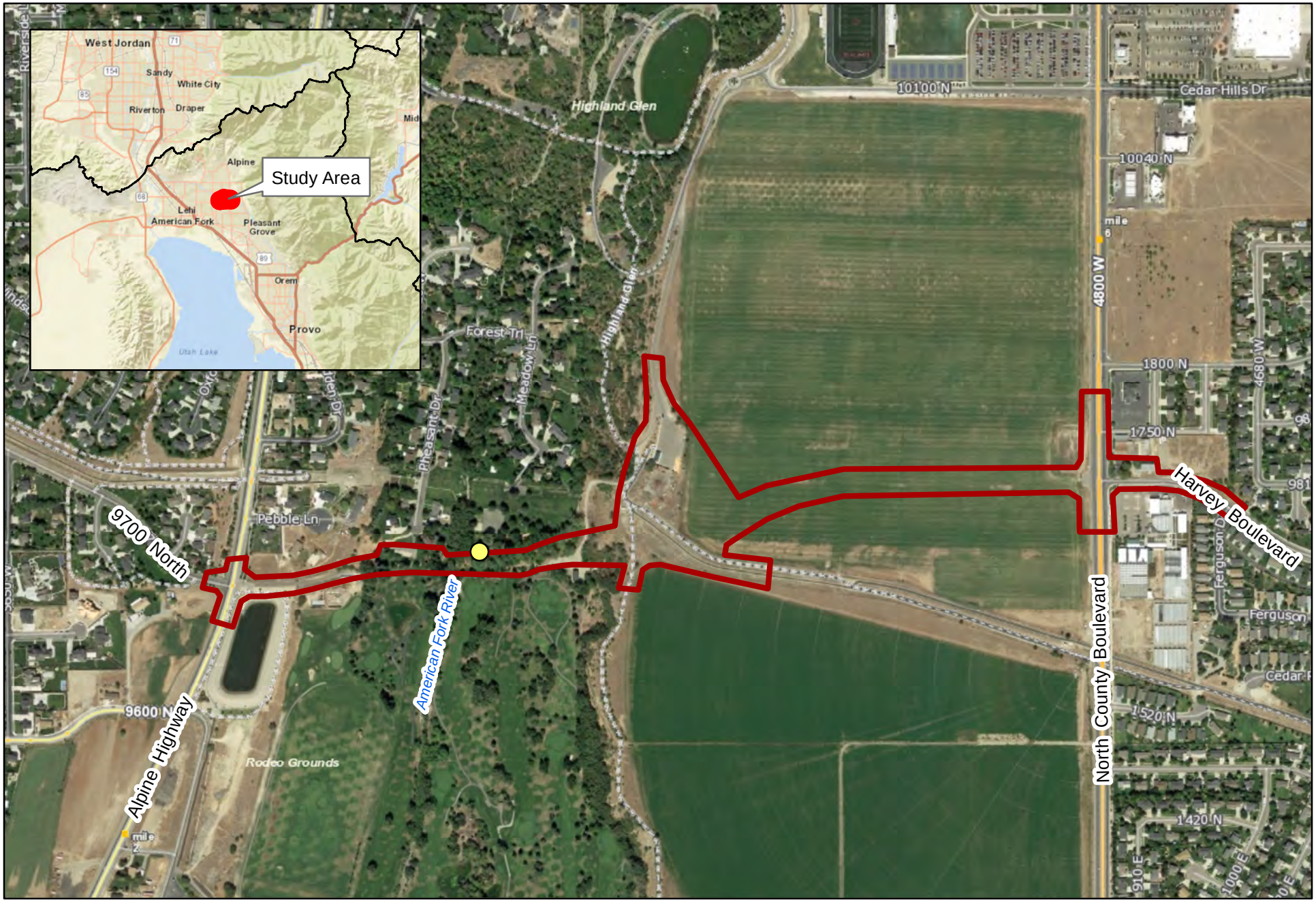
Sufficient habitat does exist within the study area to support big game species, other common small mammals, and migratory birds. Two mule deer mule deer (odocoileus hemionus) and several bird species were observed during the site visit including: dark-eyed junco (junco hyemalis), black-billed magpie (pica hudsonia), eurasian collared-dove (streptopelia decaocto), black-capped chickadee (poecile atricapillus), Woodhouse's scrub-jay (aphelocoma woodhouseii), house finch (haemorhous mexicanus), northern flicker (colaptes auratus), northern harrier (circus hudsonius), european starling (Sturnus vulgaris), ring-billed gull (larus delawarensis), and song sparrow (melospiza melodia). One unoccupied raptor nest was also observed within the study area (see attached figure).

Conclusion

There is no suitable habitat present within the study area for federally listed species or Utah sensitive species. The proposed project would require removal of migratory bird habitat (trees) during preparations for construction. However, with implementation of proper BMPs the project would not result in the “take” of bird species as defined by the Migratory Bird Treaty Act. Temporary impacts to the urban deer population would also be expected during construction.

Commitments

Complete tree removal outside the nesting season (April 15 – August 30). If tree removal is needed during the nesting season a nest survey will be required prior to any tree disturbance.



Canal Boulevard; Alpine Highway to North County Boulevard
S-LC49(165)
PIN: 14088

Observed Raptor Nest

Study Area

N

Miles

0 0.125 0.25 0.5

HORROCKS
ENGINEERS

ALPINE HIGHWAY TO NORTH COUNTY BOULEVARD CONNECTOR ROAD NOISE ANALYSIS

Project Number: S-LC49(165)

PREPARED FOR:
The Utah Department of Transportation

PREPARED BY:
Horrocks Engineers

January 2019

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ACRONYMS, ABBREVIATIONS, AND DEFINITIONS

UDOT	Utah Department of Transportation and Public Facilities
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, in partnership with Highland City and Utah County, is proposing to construct an east-west connector road in Highland, Utah. The proposed roadway, known as Canal Boulevard, would be a two lane collector class road from Alpine Highway (SR-74) to North County Boulevard (SR-129). The project also proposes to complete the Murdock Canal trail. The total length of the project is approximately 1 mile.

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 of 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 roadway on a new location.

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 land use category (see Table 1).

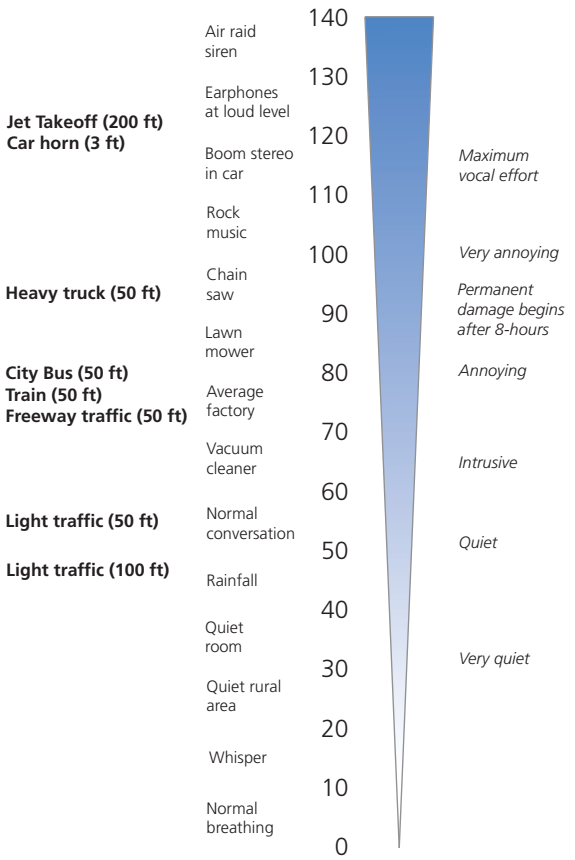


Figure 2: Sound Levels (in dBA) of Common Sounds (Compiled from Federal Transit Administration and Environmental Protection Agency Data)

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 land use 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 Land Use 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 sensitive to traffic noise. There is no impact criteria for these land use 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	• F&S Park at 9800 North Meadow Lane (playground, basketball court, tennis courts) • Fox Hollow Golf Course at 1400 North 200 East • Highland Glen Park at 4800 Knight Avenue (playground, picnic area) • Murdock Canal Trail
D	• Warenski Funeral Home at 1776 North 900 East (interior)
E	• None
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 Alpine Highway and North County Boulevard.

Because the project involves a roadway on new location, existing noise levels were established using a combination of field measurements at representative locations and noise modeling (see Table 3). Existing noise levels were established via noise modeling for receptors located adjacent to and approximately 500 feet from Alpine Highway, and for the neighborhood located adjacent to North County Boulevard. Existing traffic sound levels for receptors in this 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 established via field measurements for the remainder of the receptors.

On-site measurements were taken on November 15th and 16th, 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 for locations 8–11 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	F&S Park tennis court; 9800 North Meadow Lane	36.9	NA*	--
2	F&S Park playground; 9800 North Meadow Lane	36.2	NA*	--
3	Fox Hollow Golf Course; 1400 North 200 East	38.5	NA*	--
4	Fox Hollow Golf Course; 1400 North 200 East	40.6	NA*	--
5	Residence; 9782 North Pheasant Drive	44.5	NA*	--
6	Residence; 9773 North Pheasant Drive	37.8	NA*	--
7	Fox Hollow Golf Course; 1400 North 200 East	43.0	NA*	--
8	Residence; 9748 North 5520 West	58.4	57.1	1.3
9	Residence; 9760 North 5445 West	63.7	61.9	1.8
10	Murdock Canal Trail	39.1	41.1	-2.0
11	Residence; 9793 North 4710 West	62.0	62.2	-0.6

* This site was used to establish an existing noise baseline.

Of the 50 receptors within the study area, none currently experience a noise impact (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 an 8.0 dBA noise level increase throughout the study area. The greatest increase in noise would be 27.2 dBA at receptor 50C (see map 7 in Appendix B). Of the 50 receptors, 14 would be

impacted by Proposed Action noise levels. 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 [1]	UDOT Noise Abatement Criteria Leq(h)	Existing Noise Levels (dBA) [2]	Existing Impact	Proposed Action Noise Levels (dBA)	Projected Impact	
					≥ 10 dBA Increase From Existing Level	≥ UDOT Noise Abatement Criteria
1B	66.0	56.7	No	60.0	No	No
2B	66.0	56.4	No	59.4	No	No
3B	66.0	54.0	No	56.9	No	No
4B	66.0	56.6	No	58.4	No	No
5B	66.0	59.6	No	61.1	No	No
6B	66.0	58.3	No	60.4	No	No
7B	66.0	56.9	No	59.8	No	No
8B	66.0	44.5*	No	49.2	No	No
9B	66.0	44.5*	No	51.8	No	No
10B	66.0	44.5*	No	52.8	No	No
11B	66.0	44.5*	No	49.4	No	No
12B	66.0	44.5*	No	50.8	No	No
13B	66.0	44.5*	No	48.5	No	No
14B	66.0	44.5*	No	49.6	No	No
15B	66.0	44.5*	No	50.9	No	No
16B	66.0	37.8*	No	49.5	Yes	No
17B	66.0	37.8*	No	48.5	Yes	No
18B	66.0	37.8*	No	50.6	Yes	No
19C	66.0	36.9	No	57.8	Yes	No
20B	66.0	44.5*	No	56.2	Yes	No
21B	66.0	37.8	No	58.5	Yes	No
22B	66.0	37.8	No	55.3	Yes	No
23B	66.0	46.5	No	50.4	No	No
24B	66.0	47.0	No	51.7	No	No
25B	66.0	51.2	No	54.6	No	No
26B	66.0	54.5	No	57.5	No	No

Map Label [1]	UDOT Noise Abatement Criteria Leq(h)	Existing Noise Levels (dBA) [2]	Existing Impact	Proposed Action Noise Levels (dBA)	Projected Impact	
					≥ 10 dBA Increase From Existing Level	≥ UDOT Noise Abatement Criteria
27B	66.0	59.6	No	62.4	No	No
28B	66.0	47.3	No	55.3	No	No
29B	66.0	50.5	No	63.5	Yes	No
30B	66.0	58.1	No	62.5	No	No
31B	66.0	56.4	No	59.3	No	No
32B	66.0	56.1	No	59.5	No	No
33B	66.0	56.5	No	60.1	No	No
34B	66.0	57.0	No	60.6	No	No
35B	66.0	48.9	No	54.6	No	No
36B	66.0	52.7	No	56.5	No	No
37B	66.0	58.9	No	61.9	No	No
38C	66.0	53.1	No	56.3	No	No
39C	66.0	40.6*	No	60.0	Yes	No
40C	66.0	38.5*	No	58.9	Yes	No
41C	66.0	43.0*	No	60.7	Yes	No
42C	66.0	43.0*	No	51.8	No	No
43C	66.0	43.0*	No	50.1	No	No
44C	66.0	40.6*	No	50.1	No	No
45C	66.0	38.5*	No	50.0	Yes	No
46D	51.0	28.3	No	31.3	No	No
47E	71.0	66.9	No	69.8	No	No
48B	66.0	62.8	No	63.1	No	No
49C	66.0	36.2*	No	61.9	Yes	No
50C	66.0	36.9*	No	64.1	Yes	No

[1] 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.

*** Existing noise levels were established via field measurements for these receptors.**

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 *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 Alpine Highway, North County Boulevard, or adjacent to cross streets do 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 is located on the north side of Canal Boulevard and extends from the east side of Alpine Higway to the east side of F&S Park (see map 1 in Appendix C). The wall is approximately 1,839 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). The analysis was limited to 18 feet as that is the distance from the back-of-curb to the face of the proposed wall.

Table 5: Summary of Wall 1

Barrier Height	Feasibility		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	16.7	No	N/A	N/A	N/A	N/A	N/A	No
12	50.0	Yes	16.7	No	N/A	N/A	N/A	No
14	83.3	Yes	33.3	No	N/A	N/A	N/A	No
16	83.3	Yes	66.7	Yes	$588,480	$388,920	No	No
18	83.3	Yes	66.7	Yes	$662,040	$388,920	No	No

[1] 5 dBA reduction for at least 50% of front-row receptors
[2] 7 dBA for at least 35% of front-row receptors
[3] Anticipated cost is less than allowable cost.

A 10 foot wall is not acoustically feasible. Wall heights ranging from 12 to 14 feet do not meet the noise abatement design goal. Wall heights ranging from 16 to 18 feet are not cost reasonable. Therefore, a wall 1,839 feet in length at this location is not recommended for balloting. Two other iterations of the wall (Wall 2 and Wall 3) were evaluated in an effort to determine if a shorter length along F&S Park would qualify for a noise barrier.

Wall 2

This wall is also located on the north side of Canal Boulevard and extends 300 feet west of Pheasant Drive to the east side of F&S Park (see map 2 in Appendix C). The wall is approximately 1,272 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	Feasibility		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	25.0	No	N/A	N/A	N/A	N/A	N/A	No
12	25.0	No	N/A	No	N/A	N/A	N/A	No
14	75.0	Yes	25.0	No	N/A	N/A	N/A	No
16	75.0	Yes	50.0	Yes	$407,040	$298,920	N/A	No
18	75.0	Yes	50.0	Yes	$457,920	$298,920	N/A	No

[1] 5 dBA reduction for at least 50% of front-row receptors
[2] 7 dBA for at least 35% of front-row receptors
[3] Anticipated cost is less than allowable cost.

Wall heights ranging from 10 to 12 feet are not acoustically feasible. A wall height of 14 feet does not meet the noise abatement design goal. Wall heights ranging from 16 to 18 feet are not cost reasonable. Therefore, a wall 1,272 feet in length at this location is not recommended for balloting.

Wall 3

This wall is also located on the north side of Canal Boulevard and extends from the west side of F&S Park to the east side of F&S Park (see map 3 in Appendix C). The wall is approximately 747 feet in length. As summarized in Table 7, walls ranging in height from 10 to 18 feet were evaluated (see Appendix D for detailed wall analyses).

Table 7: Summary of Wall 3

Barrier Height	Feasibility		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	No	N/A	N/A	N/A	No
11	50.0	Yes	50.0	Yes	$164,340	$268,920	Yes	Yes
12	50.0	Yes	50.0	Yes	$179,280	$268,920	Yes	Yes
14	50.0	Yes	50.0	Yes	$209,160	$268,920	Yes	Yes
16	50.0	Yes	50.0	Yes	$239,040	$268,920	Yes	Yes
18	100.0	Yes	100.0	Yes	$268,920	$268,920	Yes	Yes

[1] 5 dBA reduction for at least 50% of front-row receptors
[2] 7 dBA for at least 35% of front-row receptors
[3] Anticipated cost is less than allowable cost.

Walls ranging in height from 11 to 18 feet are considered both feasible and reasonable. **Therefore, an 11 foot tall wall for Wall 3 is recommended for balloting because it is the shortest wall height found to be both feasible and reasonable.**

Wall 4

This wall is located on the south side of Canal Boulevard and extends from the west side of Fox Hollow Golf Course to approximately 600 feet east of the east side of Fox Hollow Golf Course (see map 4 in Appendix C). The wall is approximately 2,045 feet in length. As summarized in Table 8, a wall eight feet in height was evaluated (see Appendix D for detailed wall analyses). The analysis was limited to 8 feet as that is the distance from the back-of-curb to the face of the proposed wall.

Table 8: Summary of Wall 4

Barrier Height	Feasibility		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]	
8	0.0	No	N/A	N/A	N/A	N/A	N/A	No

[1] 5 dBA reduction for at least 50% of front-row receptors
[2] 7 dBA for at least 35% of front-row receptors
[3] Anticipated cost is less than allowable cost.

An 8 foot wall is not acoustically feasible. Therefore, a wall 2,045 feet in length 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 01355 Environmental Compliance, Part 3.6 - Noise Control. 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 is a large parcel of undeveloped land between the east side of Fox Hollow Golf Course and North County Boulevard. Projected traffic noise levels from the edge of pavement to a level of 66 dBA and 71 dBA would occur at 50 feet and 20 feet, respectively (see Appendix E).

7.0 CONCLUSION

The Proposed Action would generally result in an 8.0 dBA noise level increase throughout the study area. Of the 50 receptors in this study, 14 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. As part of the final design phase, UDOT will conduct balloting consistent with the procedures described in UDOT's Noise Abatement Policy.

Summary of Recommended Walls

Wall 3

This wall is located on the north side of Canal Boulevard and extends from the west side of F&S Park to the east side of F&S Park (see map 3 in Appendix C). The wall is approximately 747 feet in length.

APPENDIX A: NOISE MEASUREMENT DATA AND EXISTING NOISE LEVEL MAPS

Existing Noise Impacts

Map 1 of 13

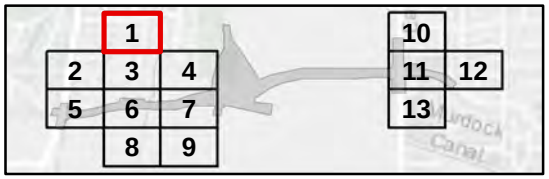
Existing Noise Impact

- No
- Noise Measurement Site

N

0 75 150

Feet



Existing Noise Impacts

Map 2 of 13

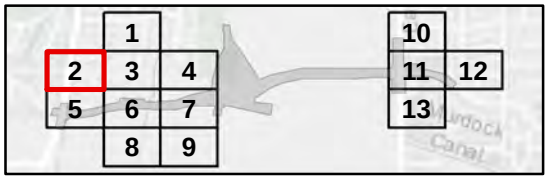
Existing Noise Impact

- No
- Noise Measurement Site

N

0 75 150

Feet



Existing Noise Impacts

Map 3 of 13

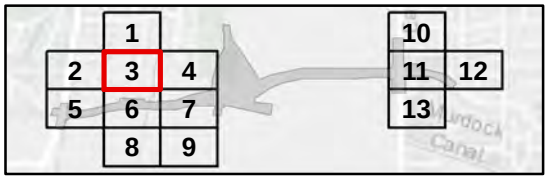
Existing Noise Impact

- No
- Noise Measurement Site

N

0 75 150

Feet



Existing Noise Impacts

Map 4 of 13

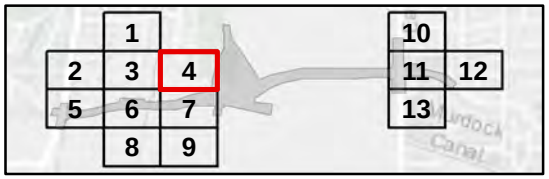
Existing Noise Impact

- No
- Noise Measurement Site

N

0 75 150

Feet



Existing Noise Impacts

Map 5 of 13

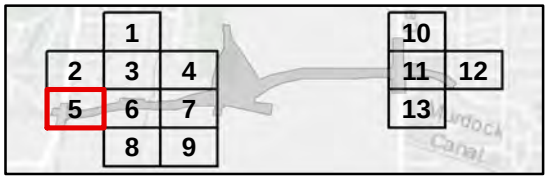
Existing Noise Impact

- No
- Noise Measurement Site

N

0 75 150

Feet



Existing Noise Impacts

Map 6 of 13

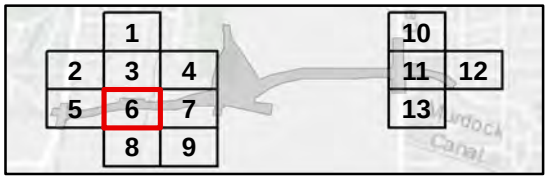
Existing Noise Impact

- No
- Noise Measurement Site

N

0 75 150

Feet



Existing Noise Impacts

Map 7 of 13

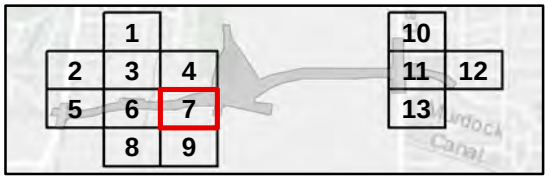
Existing Noise Impact

- No
- Noise Measurement Site

N

0 75 150

Feet



Existing Noise Impacts

Map 8 of 13

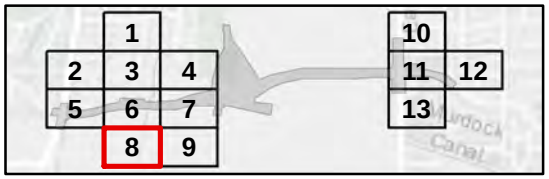
Existing Noise Impact

- No
- Noise Measurement Site

N

0 75 150

Feet



Existing Noise Impacts

Map 9 of 13

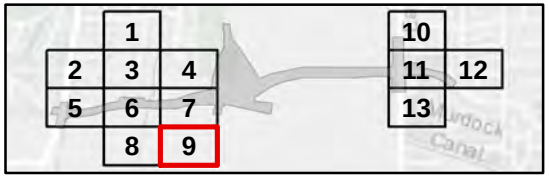
Existing Noise Impact

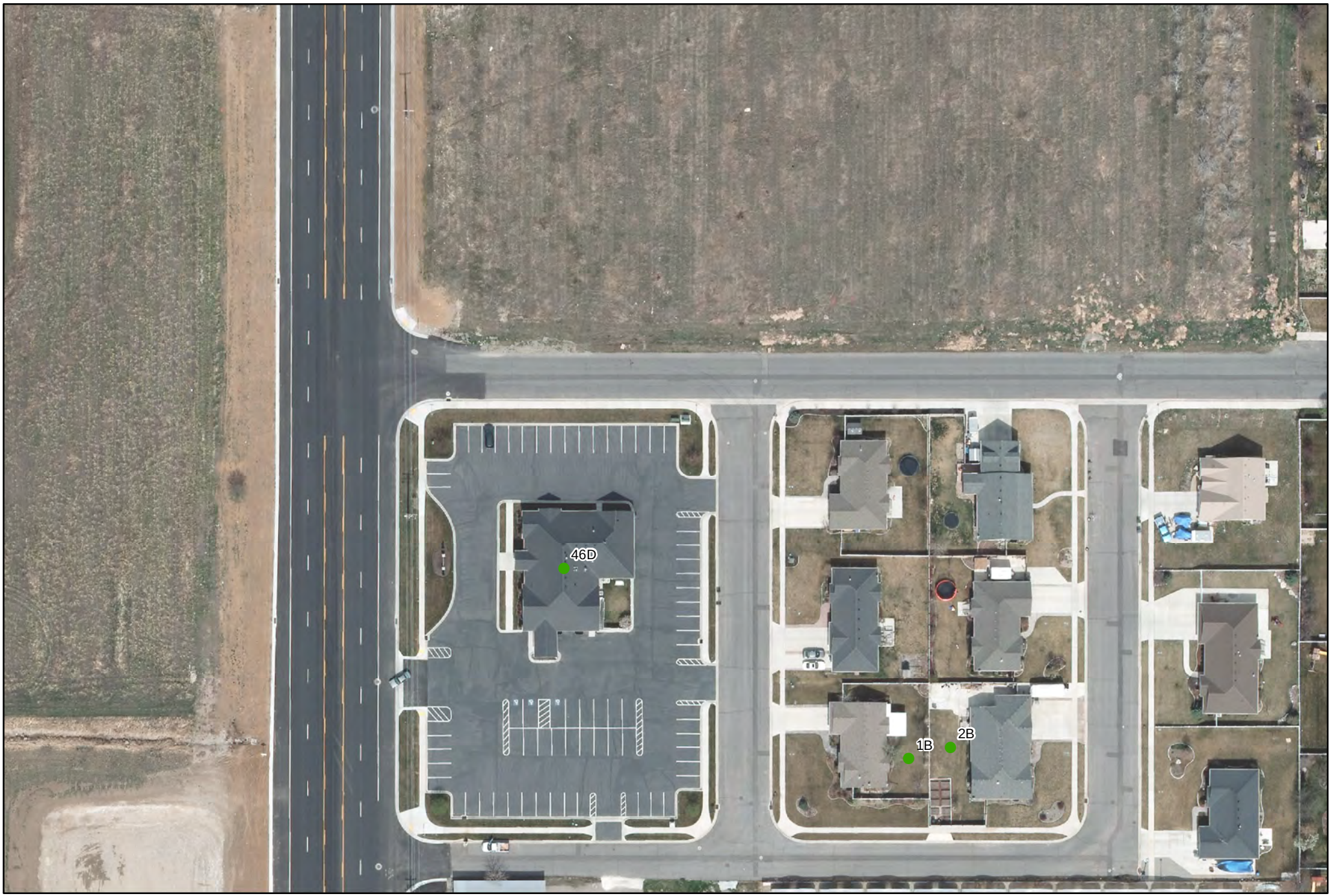
- No
- Noise Measurement Site

N

0 75 150

Feet





Existing Noise Impacts

Map 10 of 13

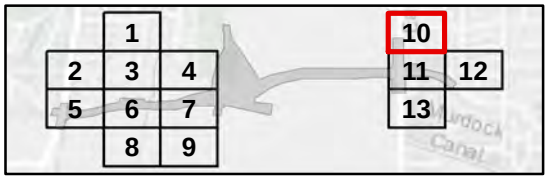
Existing Noise Impact

- No
- Noise Measurement Site

N

0 75 150

Feet



Existing Noise Impacts

Map 11 of 13

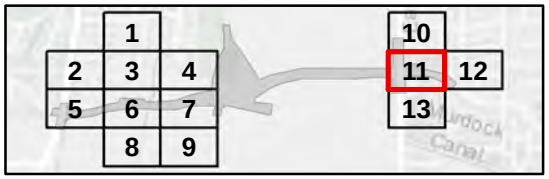
Existing Noise Impact

- No
- Noise Measurement Site

N

0 75 150

Feet



Existing Noise Impacts

Map 12 of 13

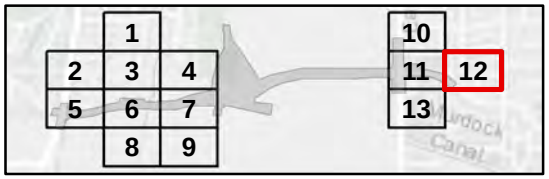
Existing Noise Impact

- No
- Noise Measurement Site

N

0 75 150

Feet



Existing Noise Impacts

Map 13 of 13

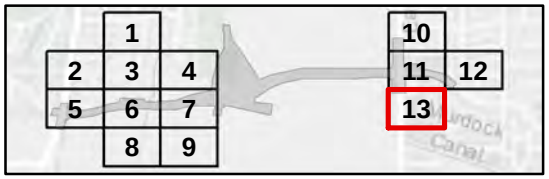
Existing Noise Impact

- No
- Noise Measurement Site

N

0 75 150

Feet



HORROCKS ENGINEERS

2162 West Grove Parkway, Ste 400
Pleasant Grove, Utah 84062
801-763-5100
www.horrocks.com

To: Elisa Albury, UDOT Environmental Program Manager

From: Nicole Tolley, Environmental Specialist

Date: November 12, 2018 **Memorandum**

Subject: Alpine Highway to North County Boulevard Connector Road

PIN: 14088, Project No.: S-LC49(165)

Noise Monitoring Location Memo

Introduction

UDOT, in partnership with Highland City and Utah County, is proposing to construct an east-west connector road in Highland, Utah. The proposed roadway, known as Canal Boulevard, would be a two lane collector class road from Alpine Highway (SR-74) to North County Boulevard (SR-129). The project also proposes to complete the Murdock Canal trail. The total length of the project is approximately 1 mile.

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 measurements.

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	• F&S Park at 9800 North Meadow Lane (playground, basketball court, tennis courts) • Fox Hollow Golf Course at 1400 North 200 East • Highland Glen Park at 4800 Knight Avenue (playground, picnic area)
D	• Warenski Funeral Hiome at 1776 North 900 East (interior)
E	• Highland Gardens at 9736 N 4800 West
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 measurements are proposed at 11 sites within the study area (see Activity Categories and Noise Monitoring Sites Maps and Table 2).

Four of these measurement sites (M8, M9, M10, and M11) will be used to create a validated traffic noise model for noise-sensitive areas where Canal Boulevard ties into Alpine Highway and North County Boulevard.

Between Alpine Highway and North County Boulevard, there are no traffic noise sources. Therefore, noise readings at seven measurement sites (M1, M2, M3, M4, M5, M6, and M7) will be used to establish baseline noise levels at noise-sensitive areas for purposes of determining the future worst case noise level increase over the existing noise level.

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	C	F&S Park tennis court; 9800 North Meadow Lane
M2	C	F&S Park playground; 9800 North Meadow Lane
M3	C	Fox Hollow Golf Course; 1400 North 200 East
M4	C	Fox Hollow Golf Course; 1400 North 200 East
M5	B	Residence; 9782 North Pheasant Drive
M6	B	Residence; 9773 North Pheasant Drive
M7	C	Fox Hollow Golf Course; 1400 North 200 East
M8	C	Residence; 9748 North 5520 West
M9	B	Residence; 9760 North 5445 West
M10	E	Highland Gardens garden center; 9736 North 4800 West
M11	B	Residence; 9793 North 4710 West

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 establish baseline noise levels and 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.

Activity Category & Noise Monitoring Sites

Map 1 of 11

Measurement Activity Category

- B
- C

N

0 15 30

Feet

UT

Activity Category & Noise Monitoring Sites

Map 2 of 11

Measurement Activity Category

- B
- C

N

0 15 30

Feet

UT

Activity Category & Noise Monitoring Sites

Map 3 of 11

Measurement Activity Category

- B
- C

N

0 15 30

Feet

UT

Activity Category & Noise Monitoring Sites

Map 4 of 11

Measurement Activity Category

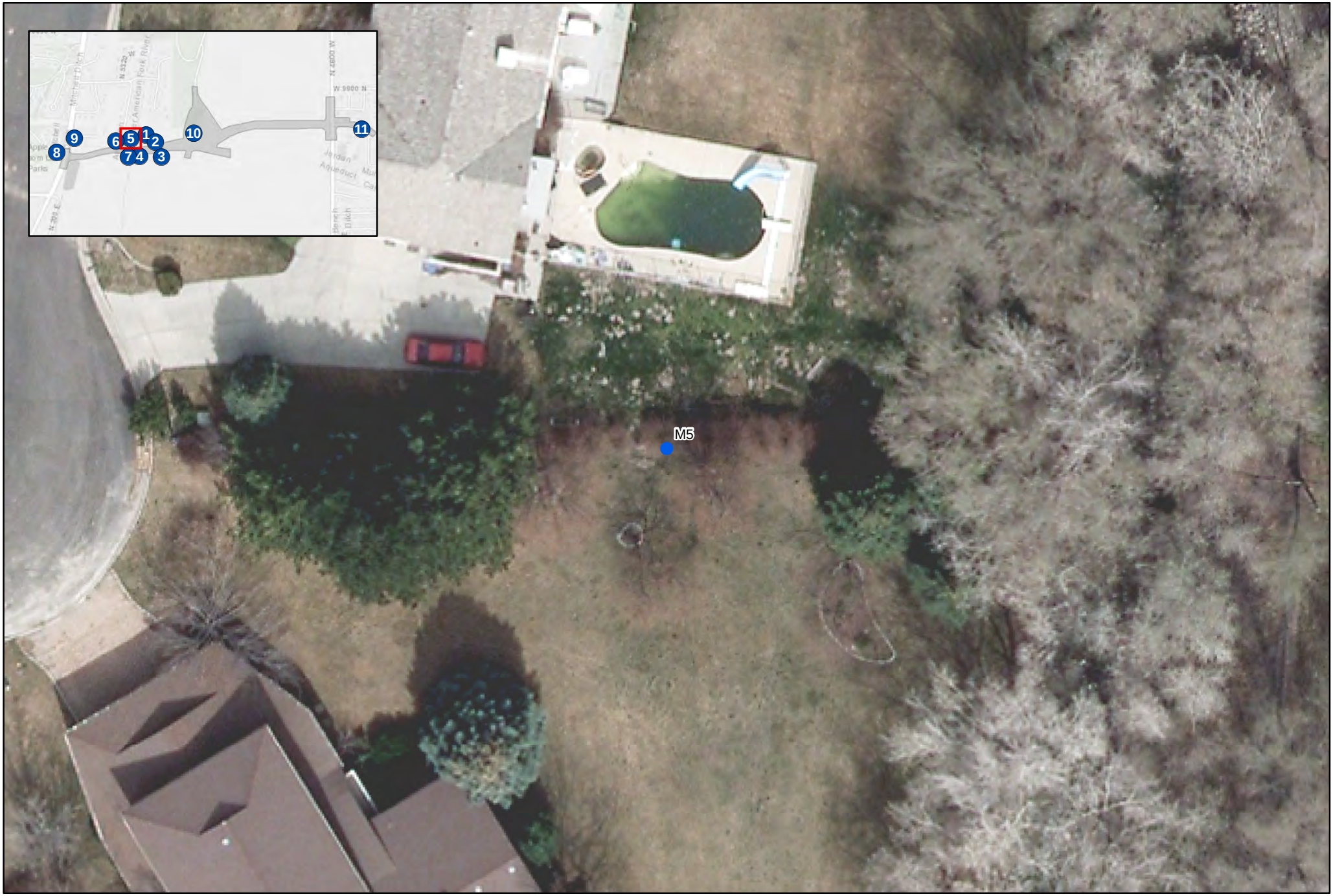
- B
- C

N

0 15 30

Feet

UT



Activity Category & Noise Monitoring Sites

Map 5 of 11

Measurement Activity Category

- B
- C

N

0 15 30

Feet

UT

Activity Category & Noise Monitoring Sites

Map 6 of 11

Measurement Activity Category

- B
- C

N

0 15 30

Feet

UT

Activity Category & Noise Monitoring Sites

Map 7 of 11

Measurement Activity Category

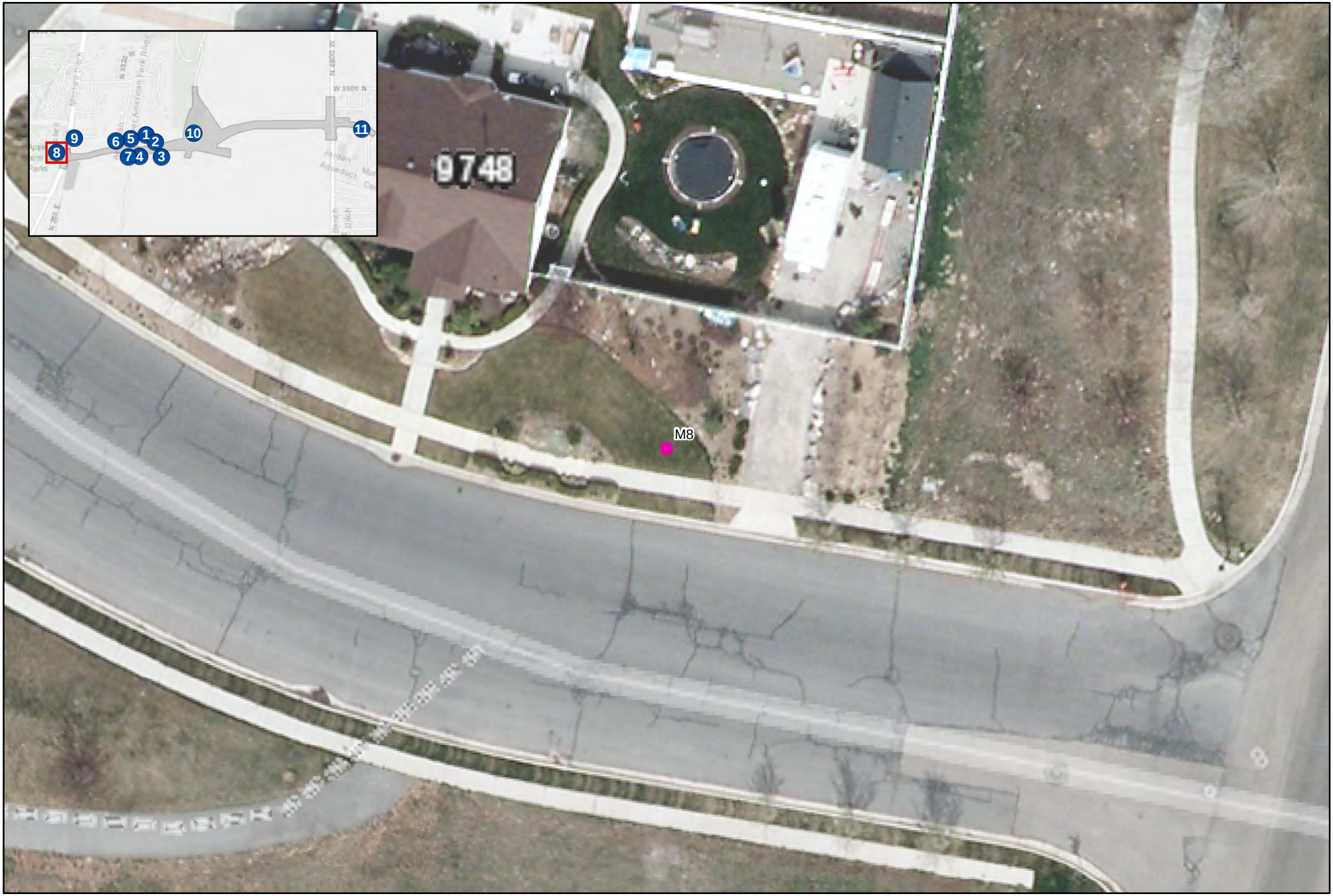
- B
- C

N

0 15 30

Feet

UT



Activity Category & Noise Monitoring Sites

Map 8 of 11

Measurement Activity Category

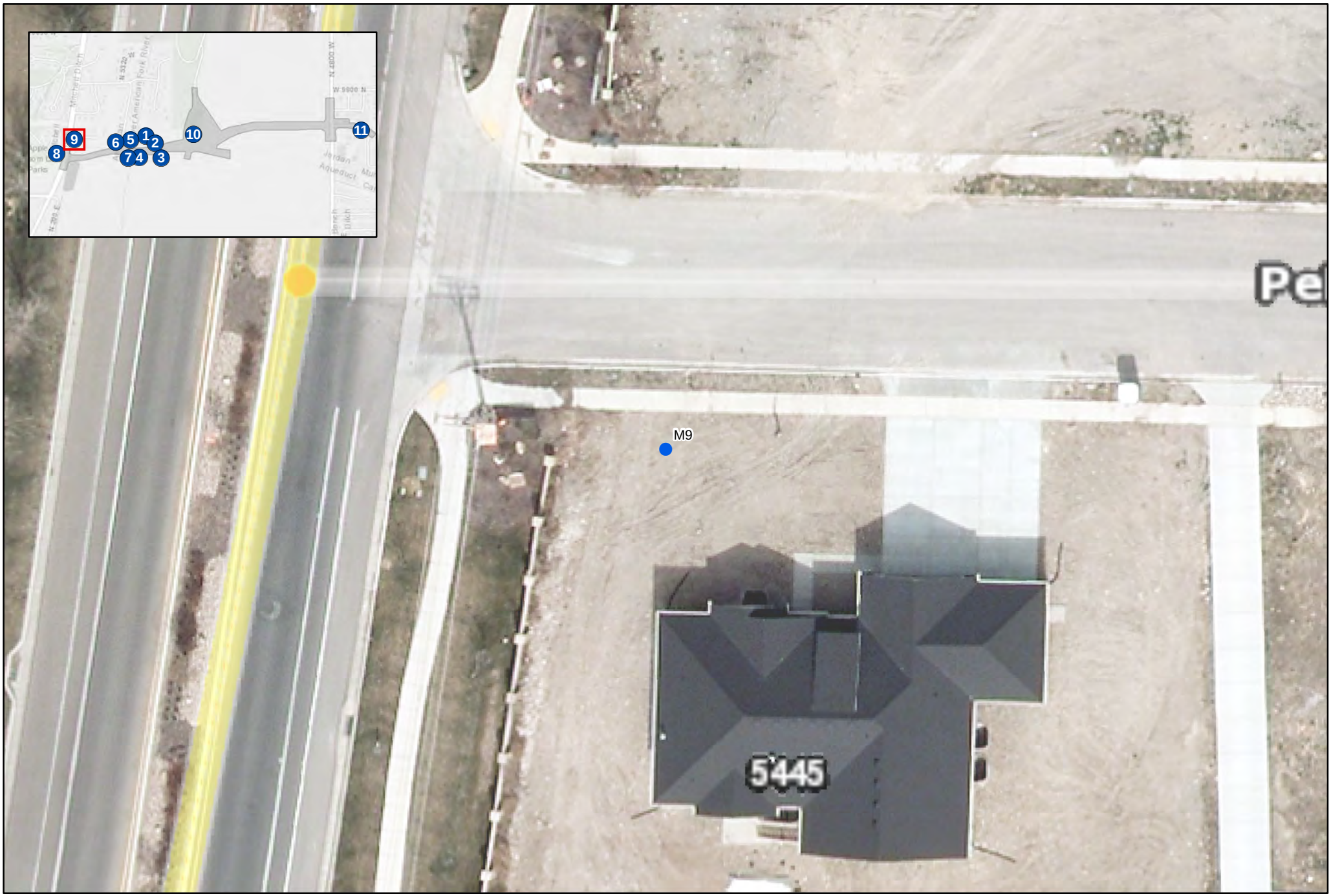
- B
- C

N

0 15 30

Feet

UT



Activity Category & Noise Monitoring Sites

Map 9 of 11

Measurement Activity Category

- B
- C

N

0 15 30

Feet

UT

Activity Category & Noise Monitoring Sites

Map 10 of 11

Measurement Activity Category

- B
- C

N

0 15 30

Feet

UT

Activity Category & Noise Monitoring Sites

Map 11 of 11

Measurement Activity Category

- B
- C

N

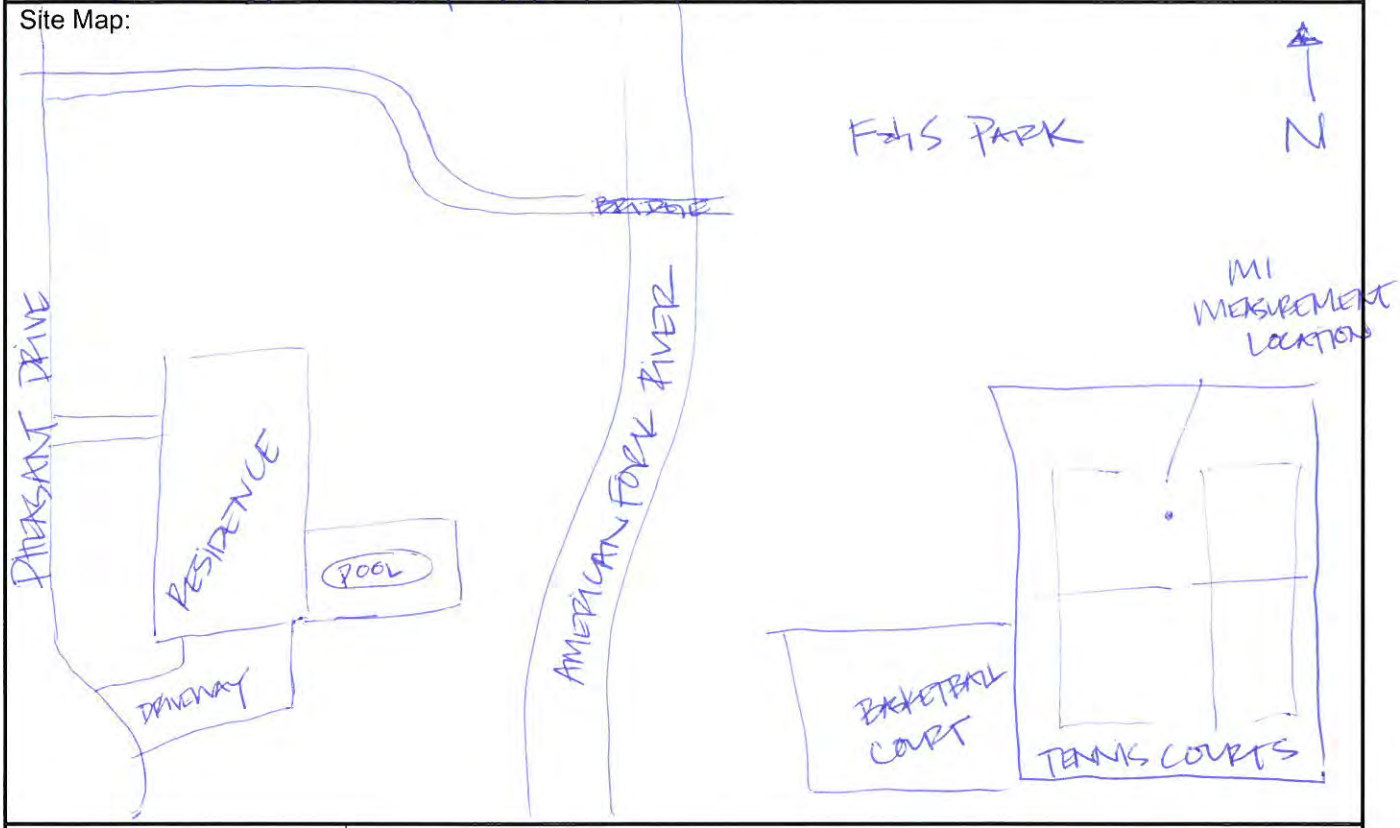
0 15 30

Feet

UT

Test No.:	Project Name: Alpine Hwy	Project No.:	Sheet__of
Date: 11/15/18	Location: M1	Relative elevation to road:	
Time Started: 1:04pm	Weather Conditions: Partly cloudy 49°F 39% humidity 0.0 mph wind	Site Conditions:	
Time Ended: 1:25pm			
Calibration		Date file was downloaded:	
Pre: 94.0 dBA		File name:	
Post: 93.3 dBA			

Site Map:

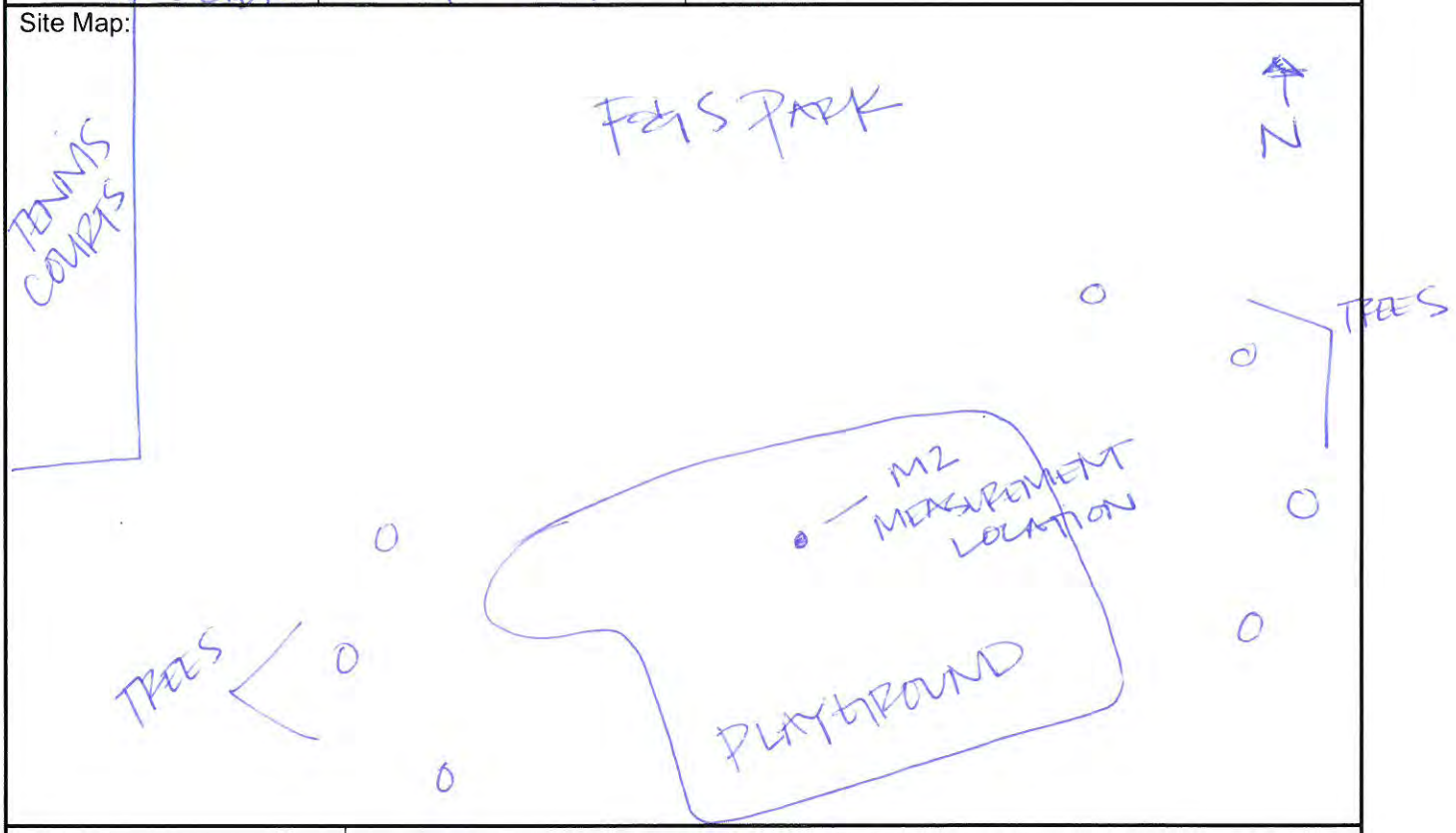


Vehicle Type	Traffic count (vehicles/ 5 min)					
Automobiles						
Heavy Trucks						
Medium Trucks						
Busses/Motorcycles						

Elapsed Time (min)	Comments	Elapsed Time (min)	Comments
1		11 1:15pm	Bird chirps (chickadee)
2 1:06pm	Dog barks (distant)	12	
3 1:07pm	Dog barks	13	
4 1:08pm	Bird chirps (flicker)	14 1:18pm	Helicopter
5		15	
6 1:10pm	Bird chirps (flicker)	16	
7		17	
8		18 1:22pm	toilets flushing
9		19	
10		20 1:24pm	Woodpecker

Test No.:	Project Name: Alpine Hwy	Project No.:	Sheet__of
Date: 11/15/18	Location: M2	Relative elevation to road:	
Time Started: 1:54pm	Weather Conditions: Partly cloudy 49°F 38% humidity 0.0mph wind	Site Conditions:	
Time Ended: 2:15pm			
Calibration		Date file was downloaded:	
Pre: 94.0 dBA		File name:	
Post: 93.5 dBA			

Site Map:

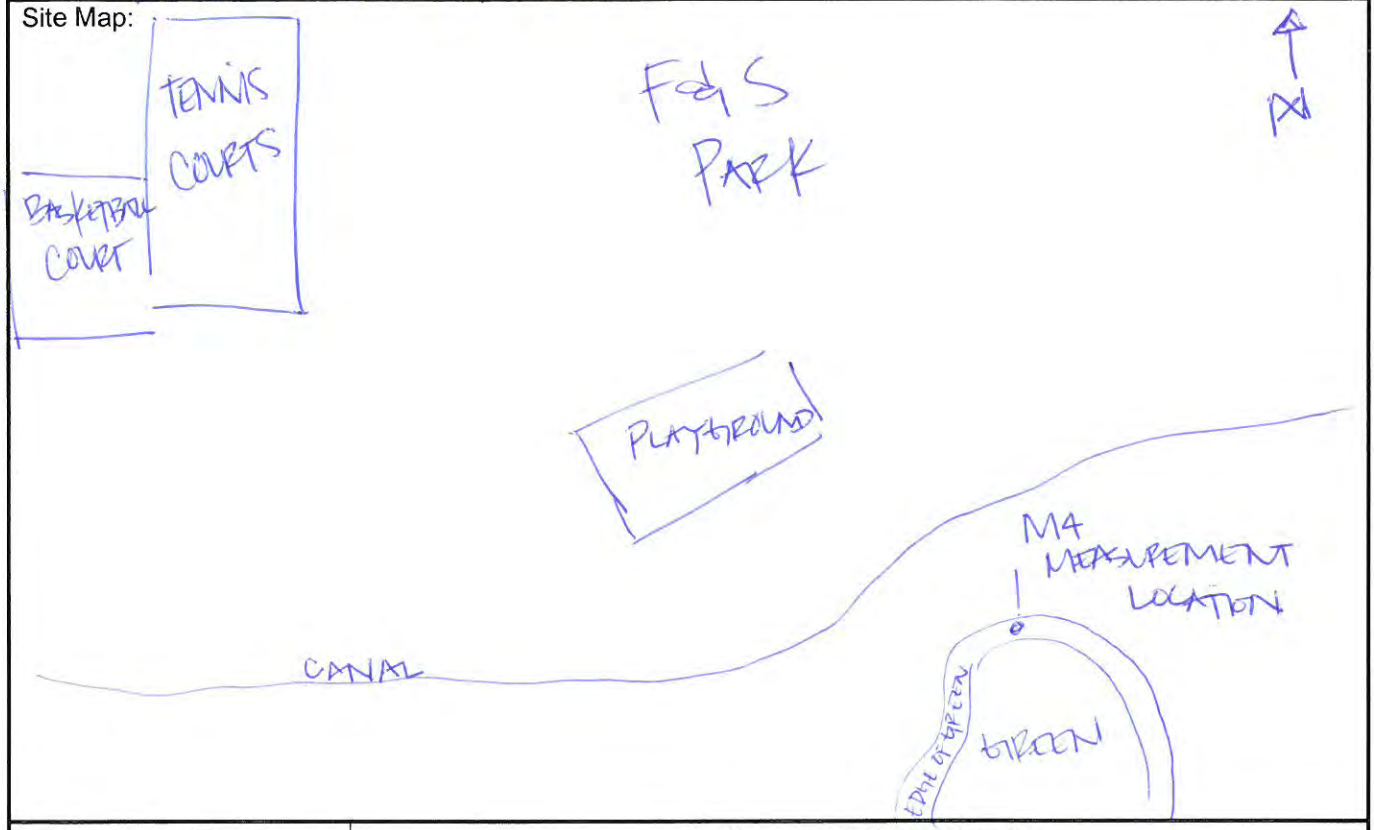


Vehicle Type	Traffic count (vehicles/ 5 min)					
Automobiles						
Heavy Trucks						
Medium Trucks						
Busses/Motorcycles						

Elapsed Time (min)	Comments	Elapsed Time (min)	Comments
1		11	
2		12	
3		13 2:07pm	Truck on gravel road
4		14	
5		15 2:09pm	toilers laughing/cheering
6		16	
7		17	
8		18	
9		19	
10		20	

Test No.:	Project Name: Alpine Hwy	Project No.:	Sheet__of
Date: 11/16/16	Location: M3	Relative elevation to road:	
Time Started: 2:55pm	Weather Conditions:	Site Conditions:	
Time Ended: 3:16pm	Sunny		
Calibration	53° F		
Pre: 94.0 dBA	29% humidity	Date file was downloaded:	
Post: 94.1 dBA	0.0 mph wind	File name:	

Site Map:

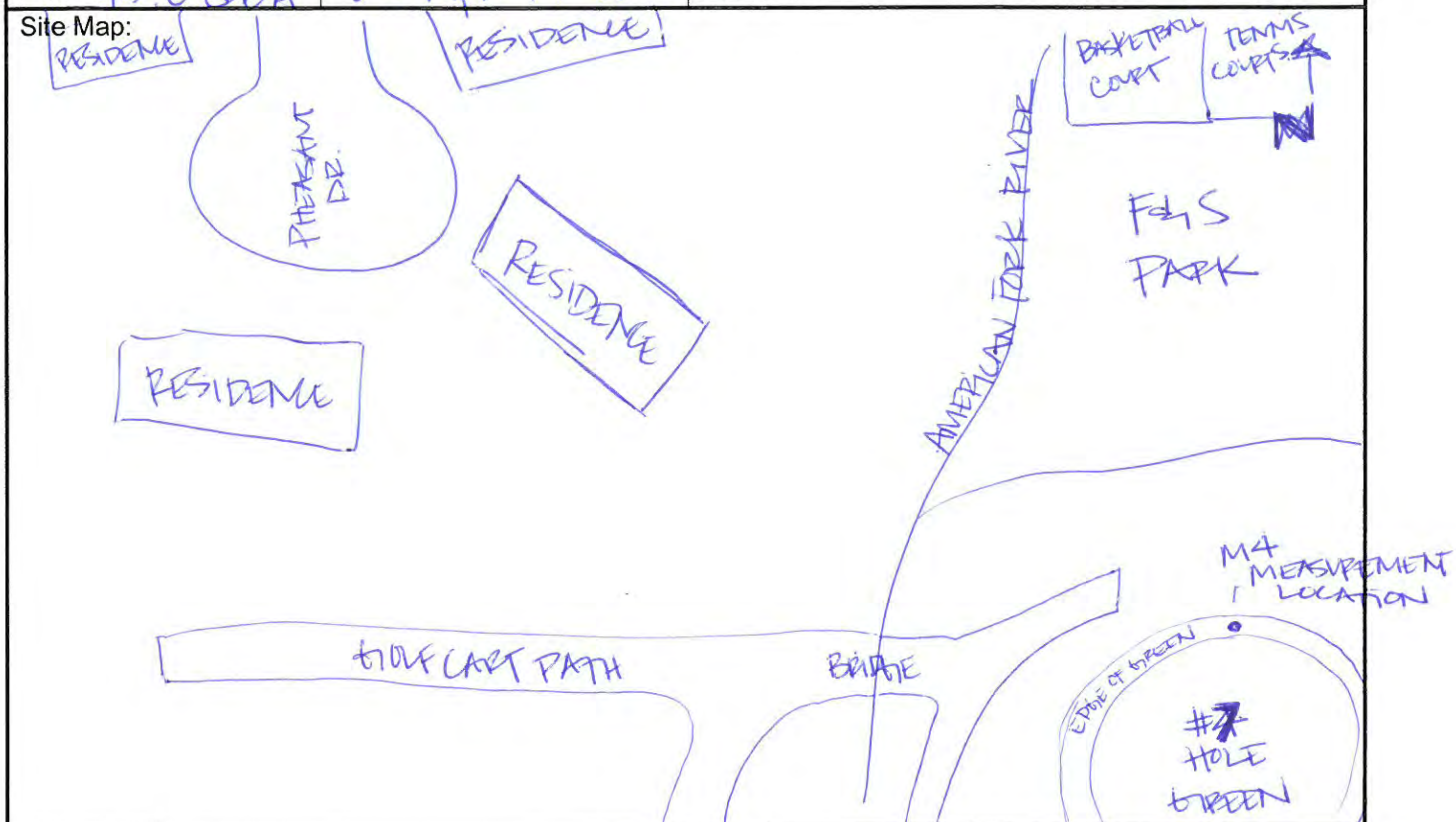


Vehicle Type	Traffic count (vehicles/ 5 min)					
Automobiles						
Heavy Trucks						
Medium Trucks						
Busses/Motorcycles						

Elapsed Time (min)	Comments	Elapsed Time (min)	Comments
1 2:54pm	Dog barks	11	
2		12	
3		13	
4		14 3:09pm	golfers talking on the green
5		15 3:10pm	
6		16	
7 3:02pm	golfers yelling	17	
8		18	
9 3:04pm	golfers yelling	19	
10 3:05pm		20	

Test No.:	Project Name: Alpine Hwy		Project No.:	Sheet__of
Date: 11/16/18	Location: M4		Relative elevation to road:	
Time Started: 2:06pm	Weather Conditions: Sunny 53° F 33% humidity 0.0 mph wind		Site Conditions:	
Time Ended: [illegible]				
Calibration 2:49pm				
Pre: 94.0 dBA			Date file was downloaded:	
Post: 93.0 dBA			File name:	

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		11 2:17pm	golf cart
2 2:08pm	golfers talking	12 2:18pm	Lawn mower on #7 green.
3 2:09pm	golfers talking near meter	13	
4		14	
5 2:11pm		15	
6		16	
7		17 2:22pm	... golfer yelled "Fore!"
8		18	
9 2:15pm	golfer talking near meter.	19	
10		20 2:24pm	golfer talking next to meter

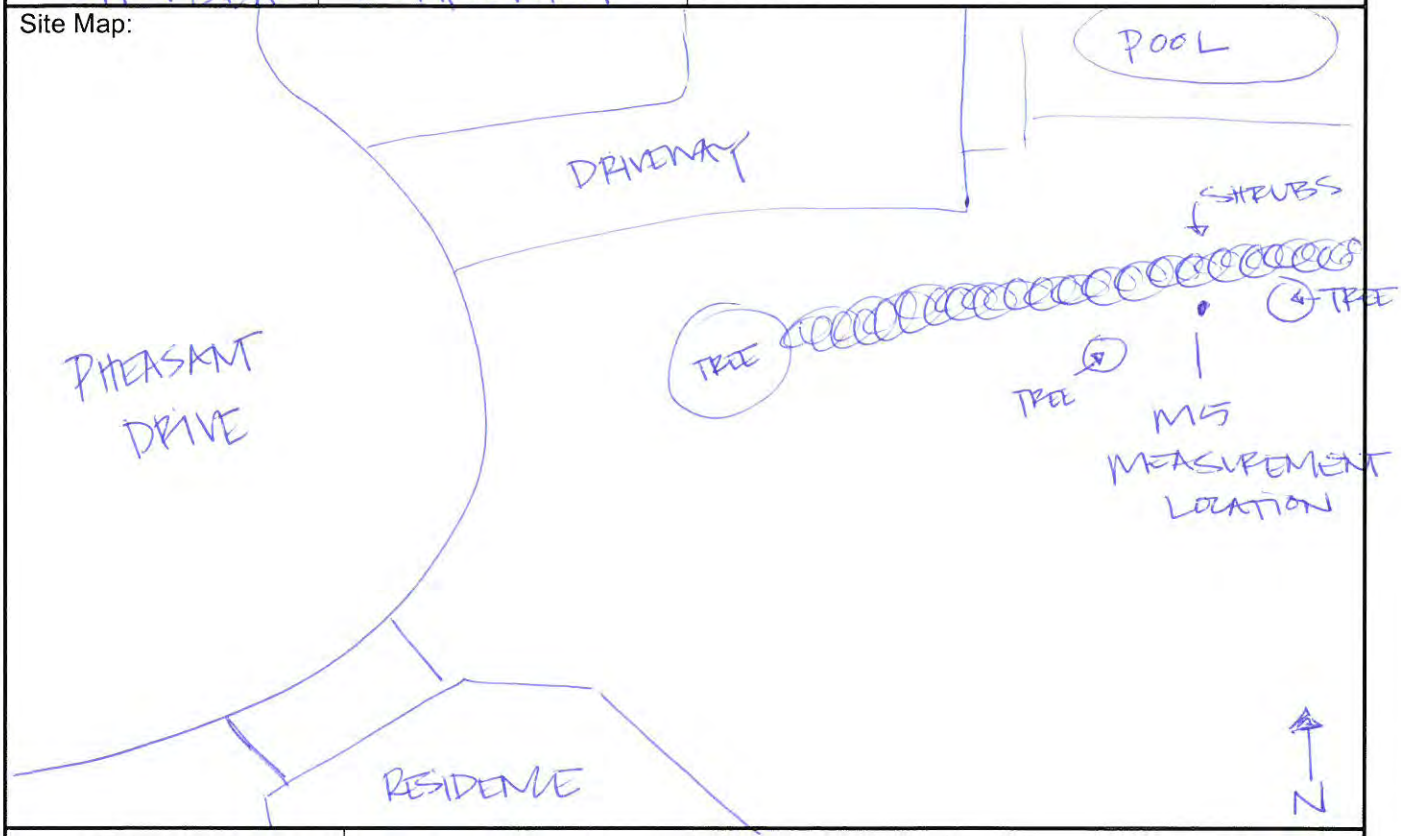
2:30pm " " INTO " "

2:34pm golfer talking near meter

2:41pm golf cart radio

Test No.:	Project Name: Alpine Hwy	Project No.:	Sheet__of
Date: 11/15/18	Location: MS	Relative elevation to road:	
Time Started: 12:38pm	Weather Conditions: Partly cloudy 46° F 43% humidity 0 mph wind	Site Conditions:	
Time Ended: 12:59pm			
Calibration		Date file was downloaded:	
Pre: 94.0 dBA		File name:	
Post: 94.6 dBA			

Site Map:

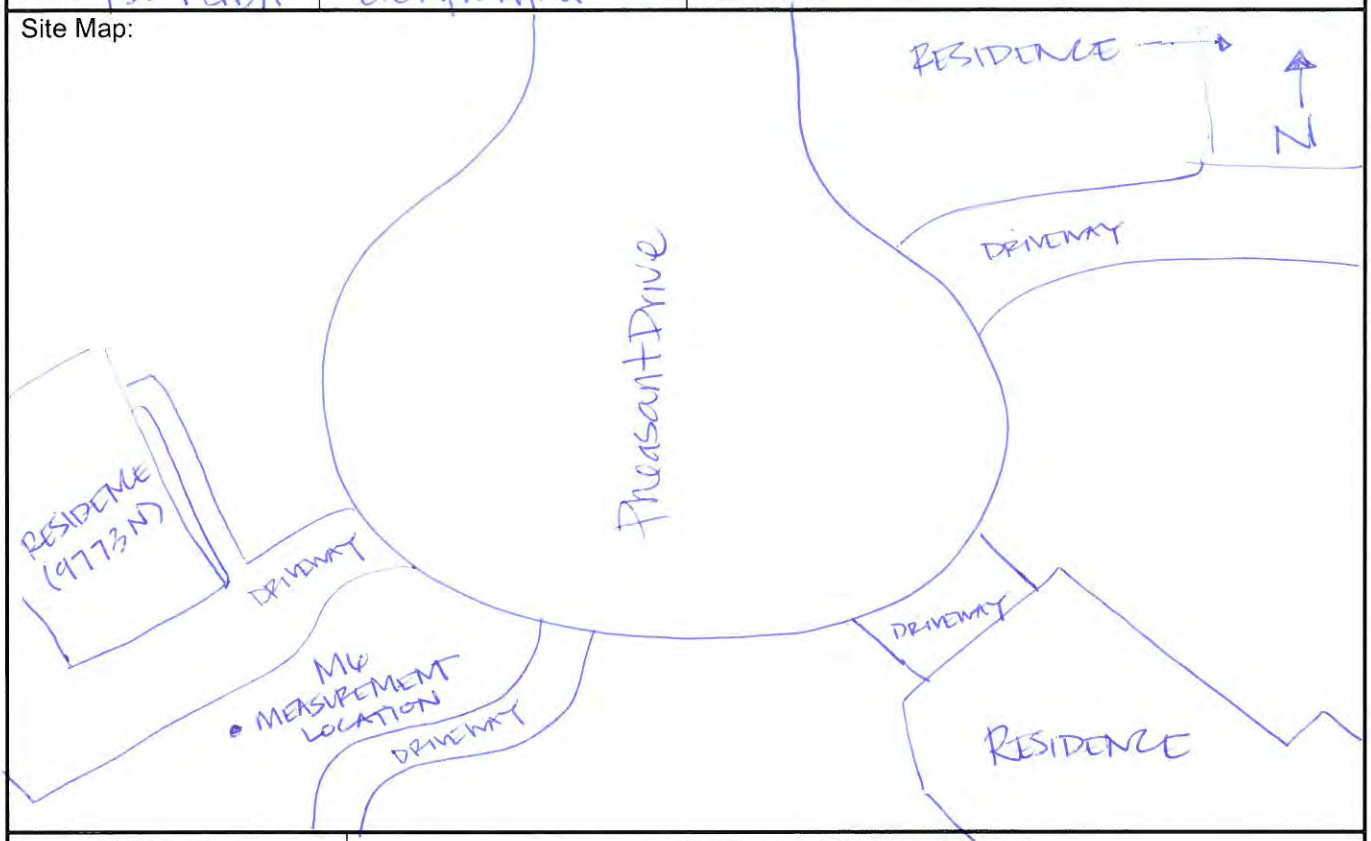


Vehicle Type	Traffic count (vehicles/ 5 min)					
Automobiles						
Heavy Trucks						
Medium Trucks						
Busses/Motorcycles						

Elapsed Time (min)	Comments	Elapsed Time (min)	Comments
1		11	
2		12	
3		13	
4 12:42pm	Man yelling / car doors	14 12:52pm	Car door / car ignition
5		15	
6 12:44pm	Construction equipment	16	
7		17	
8		18	
9		19 12:57pm	Truck
10		20 12:58pm	Bird Chirps

Test No.:	Project Name: Alpine Hwy	Project No.:	Sheet__of
Date: 11/15/18	Location: M6	Relative elevation to road:	
Time Started: 12:12pm	Weather Conditions: Partly cloudy 46°F 43% humidity 0.0mph wind	Site Conditions:	
Time Ended: 12:33pm			
Calibration			
Pre: 94.0 dBA		Date file was downloaded:	
Post: 93.9 dBA		File name:	

Site Map:

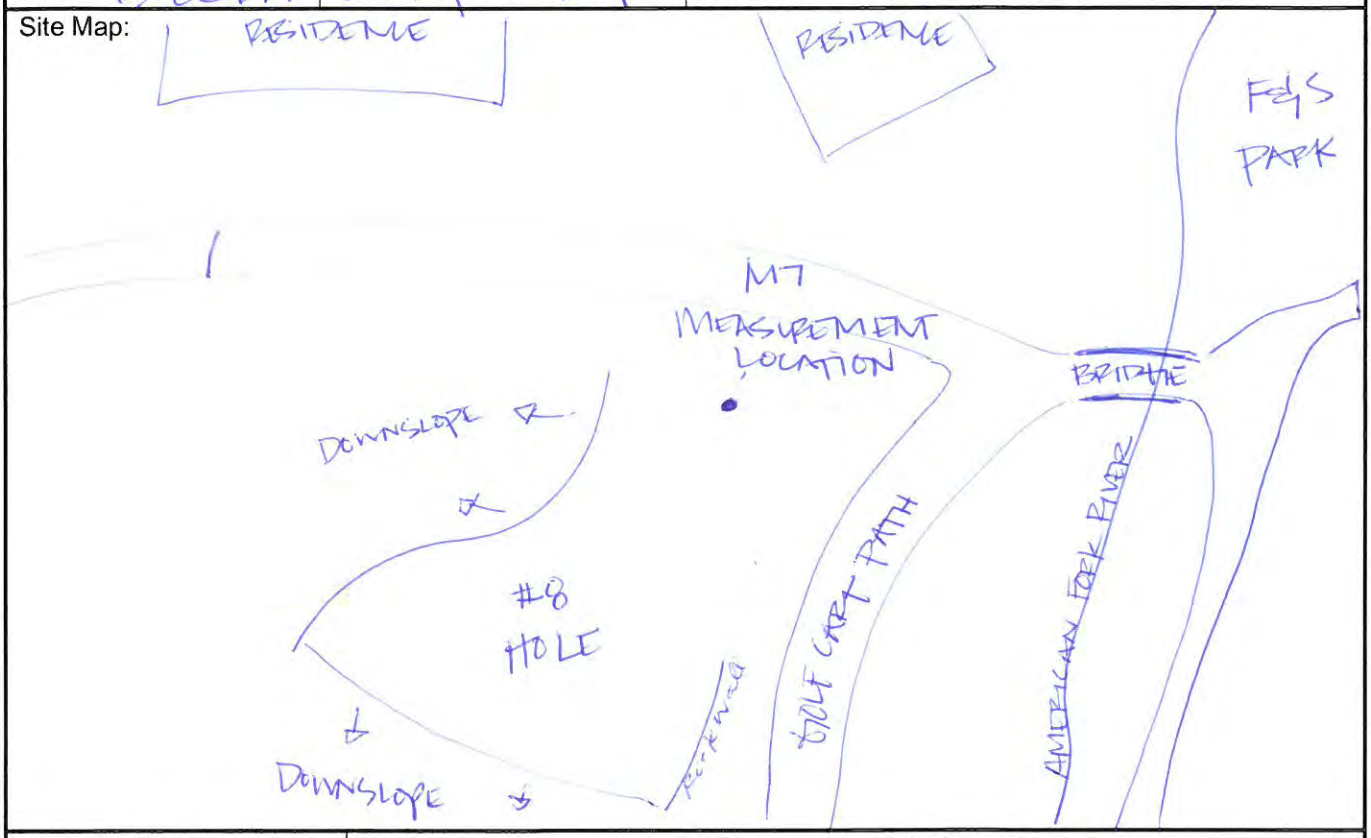


Vehicle Type	Traffic count (vehicles/ 5 min)					
Automobiles						
Heavy Trucks						
Medium Trucks						
Busses/Motorcycles						

Elapsed Time (min)	Comments	Elapsed Time (min)	Comments
1		11	
2		12	
3		13	
4		14 12:24pm	Bird chirps
5		15	
6		16 12:28pm	Dog barks (distant)
7		17	
8		18	
9		19	
10		20 12:32pm	Bird chirps

Test No.:	Project Name: Alpine Army		Project No.:	Sheet__of
Date: 11/16/18	Location: MT		Relative elevation to road:	
Time Started: 1:41pm	Weather Conditions: Sunny 51° F 34% humidity 0.0 mph wind		Site Conditions:	
Time Ended: 2:02pm				
Calibration				
Pre: 94.0 dBA			Date file was downloaded:	
Post: 93.8 dBA			File name:	

Site Map:

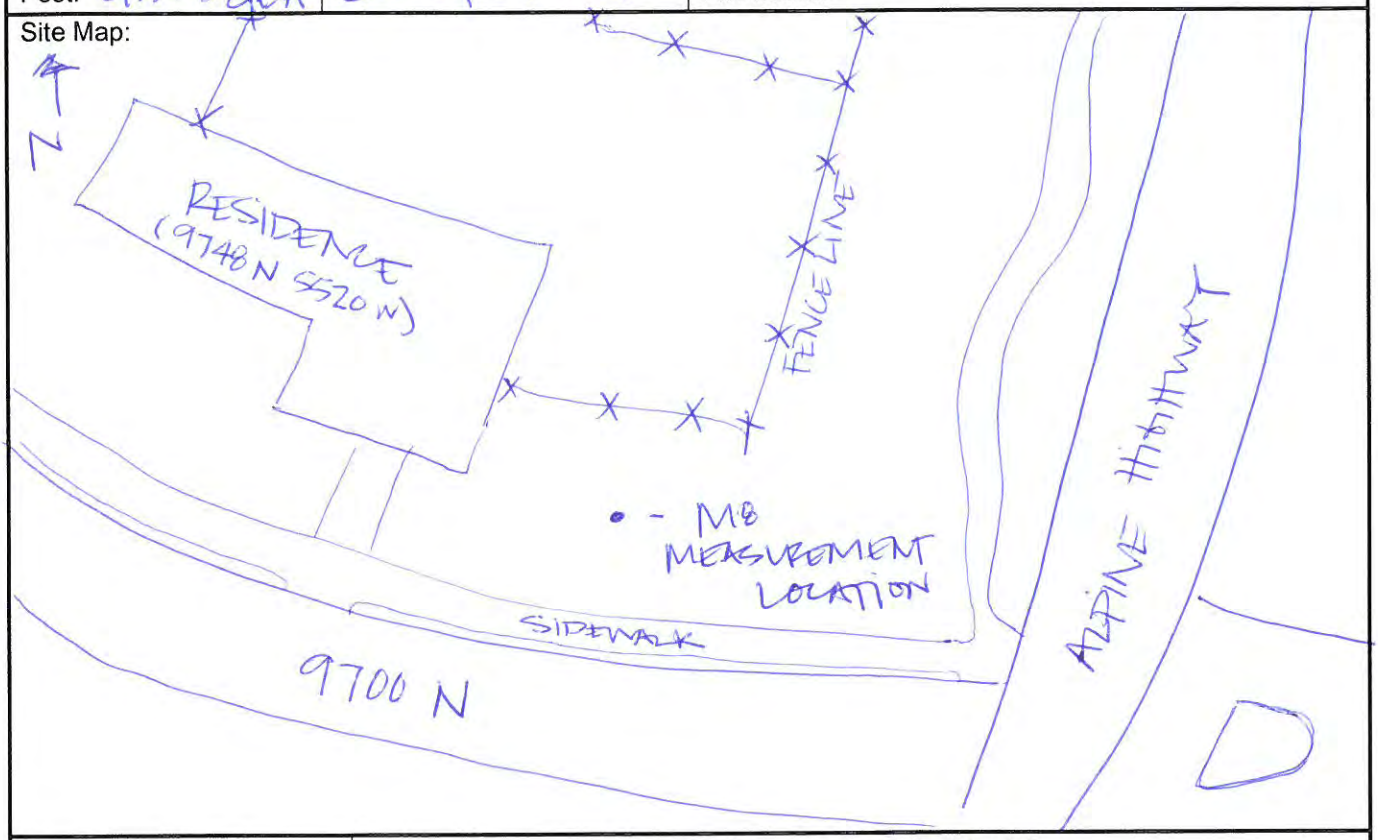


Vehicle Type	Traffic count (vehicles/ 5 min)					
Automobiles						
Heavy Trucks						
Medium Trucks						
Busses/Motorcycles						

Elapsed Time (min)	Comments	Elapsed Time (min)	Comments
1		11	
2 1:43pm	Men talking near meter	12	
3		13 1:54pm	golfers talking near meter
4		14	
5		15	
6		16	
7		17	
8 1:49pm	golfer yelled "FORE!"	18	
9 1:50pm	golfers talking loudly	19	
10 1:57pm	Loudspeaker announcement	20	

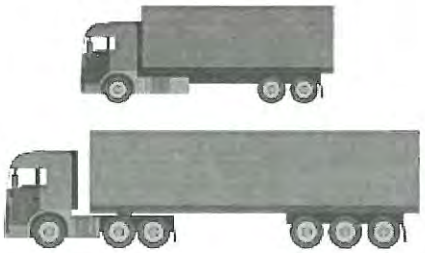
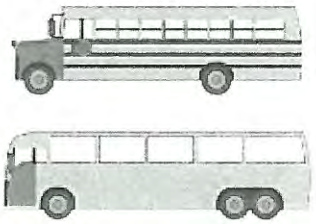
Test No.:	Project Name: Alpine hwy	Project No.:	Sheet__of
Date: 11/10/18	Location: M8	Relative elevation to road:	
Time Started: 12:37pm	Weather Conditions: Sunny 51°F 37% humidity 0.0mph wind	Site Conditions:	
Time Ended: 12:58pm			
Calibration		Date file was downloaded:	
Pre: 94.0 dBA		File name:	
Post: 93.5 dBA			

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		11	
2		12	
3		13	
4		14	
5		15	
6		16 12:53pm	garbage truck on 9700N.
7 12:44pm	man talking	17	
8		18	
9 12:46pm	Heavy truck on Alpine hwy	19 12:56pm	Heavy truck on 9700N.
10		20	

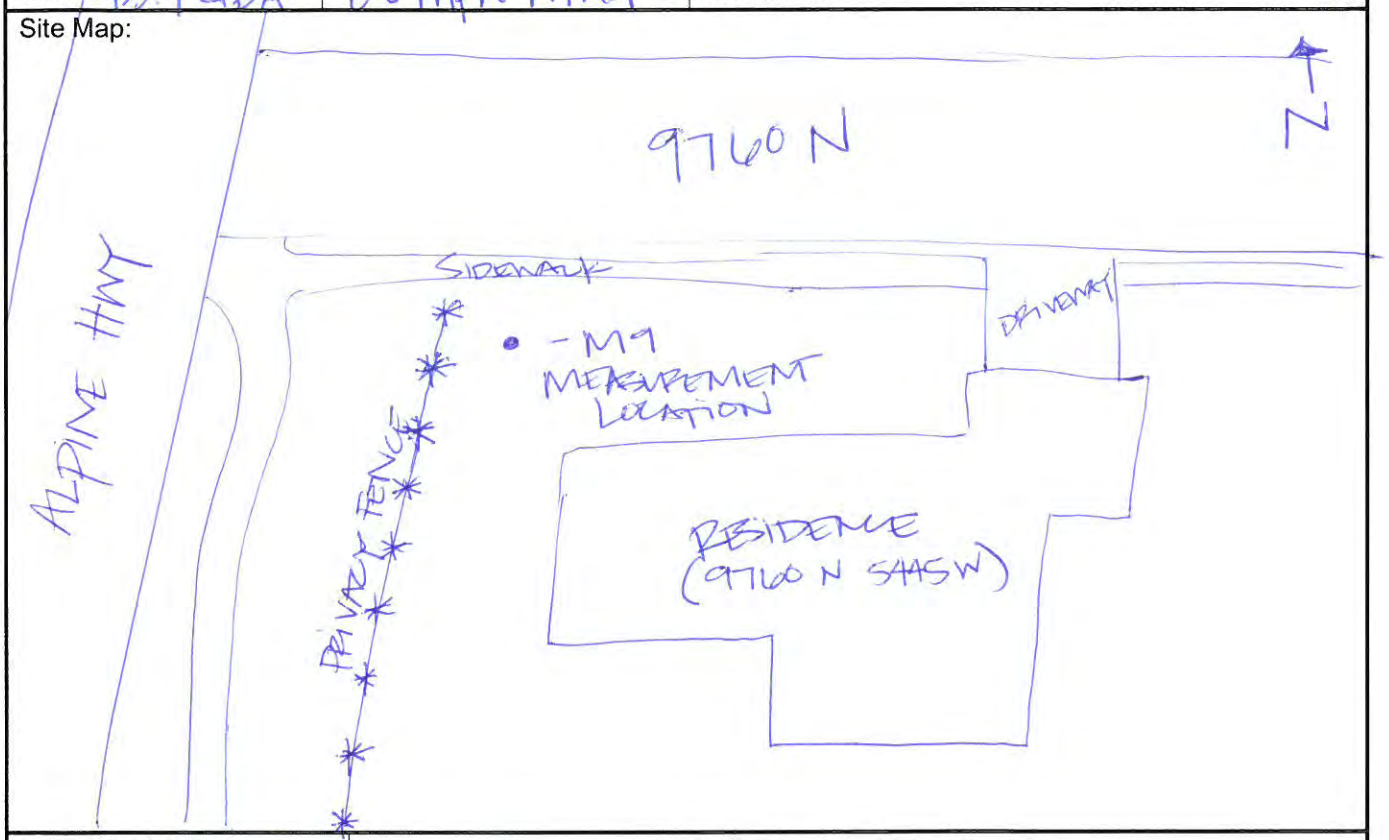
Automobiles (includes cargo vans & light trucks)		Medium Trucks (2 axles, 6 tires)		Heavy Trucks (3 or more axles)		Buses (More than 9 passengers)		Motorcycles	
									
NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
~~4~~	10 12 10 10 7				2		2 1		

Project: Alpine Hwy Count Location: M18 (SB Alpine Hwy)

Time Started: 12:47pm Time Ended: 12:57pm Date: 11/16/18

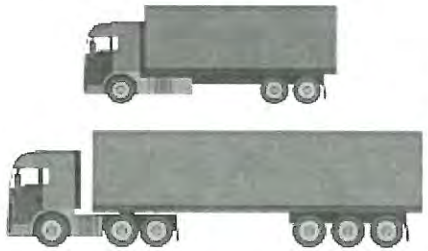
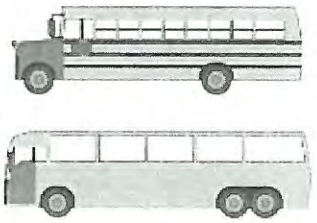
Test No.:	Project Name: Alpine Hwy	Project No.:	Sheet__of
Date: 11/16/18	Location: M9	Relative elevation to road:	
Time Started: 1:01pm	Weather Conditions: Sunny 51° F 36% humidity 0.0 mph wind	Site Conditions:	
Time Ended: 1:27pm			
Calibration			
Pre: 94.0 dBA		Date file was downloaded:	
Post: 93.7 dBA		File name:	

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		11	
2		12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	

Automobiles (includes cargo vans & light trucks)		Medium Trucks (2 axles, 6 tires)		Heavy Trucks (3 or more axles)		Buses (More than 9 passengers)		Motorcycles	
									
NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
20 20 20 11						1			

Project: Alpine Hwy

Count Location: M9 (Alpine Hwy NB)

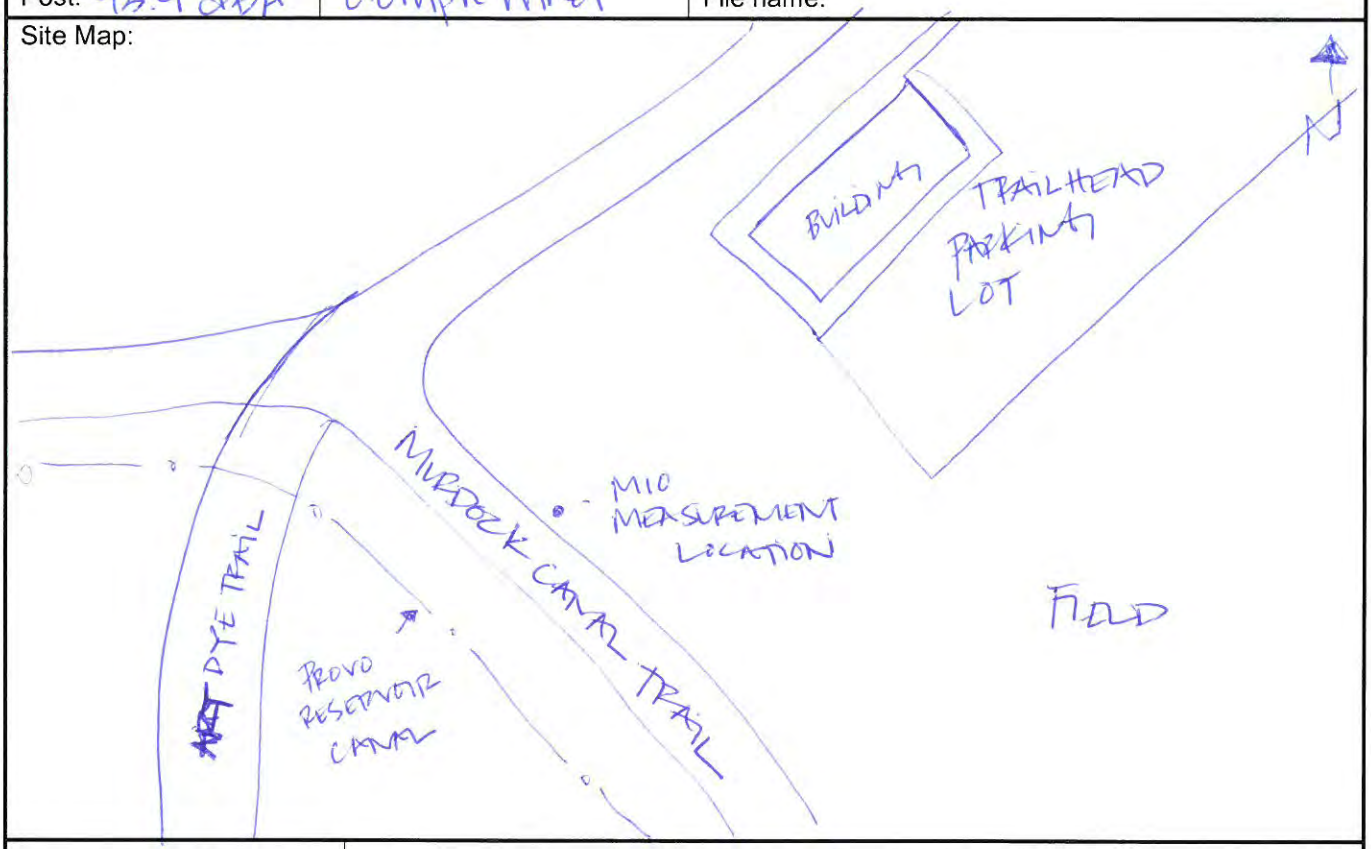
Time Started: 1:16pm

Time Ended: 1:26pm

Date: 11/16/18

Test No.:	Project Name: Alpine Hwy	Project No.:	Sheet__of
Date: 11/15/18	Location: M10	Relative elevation to road:	
Time Started: 2:46pm	Weather Conditions: Partly cloudy 51° F 31% humidity 0.0mph wind	Site Conditions:	
Time Ended: 3:01pm			
Calibration		Date file was downloaded:	
Pre: 94.0 dBA		File name:	
Post: 93.9 dBA			

Site Map:

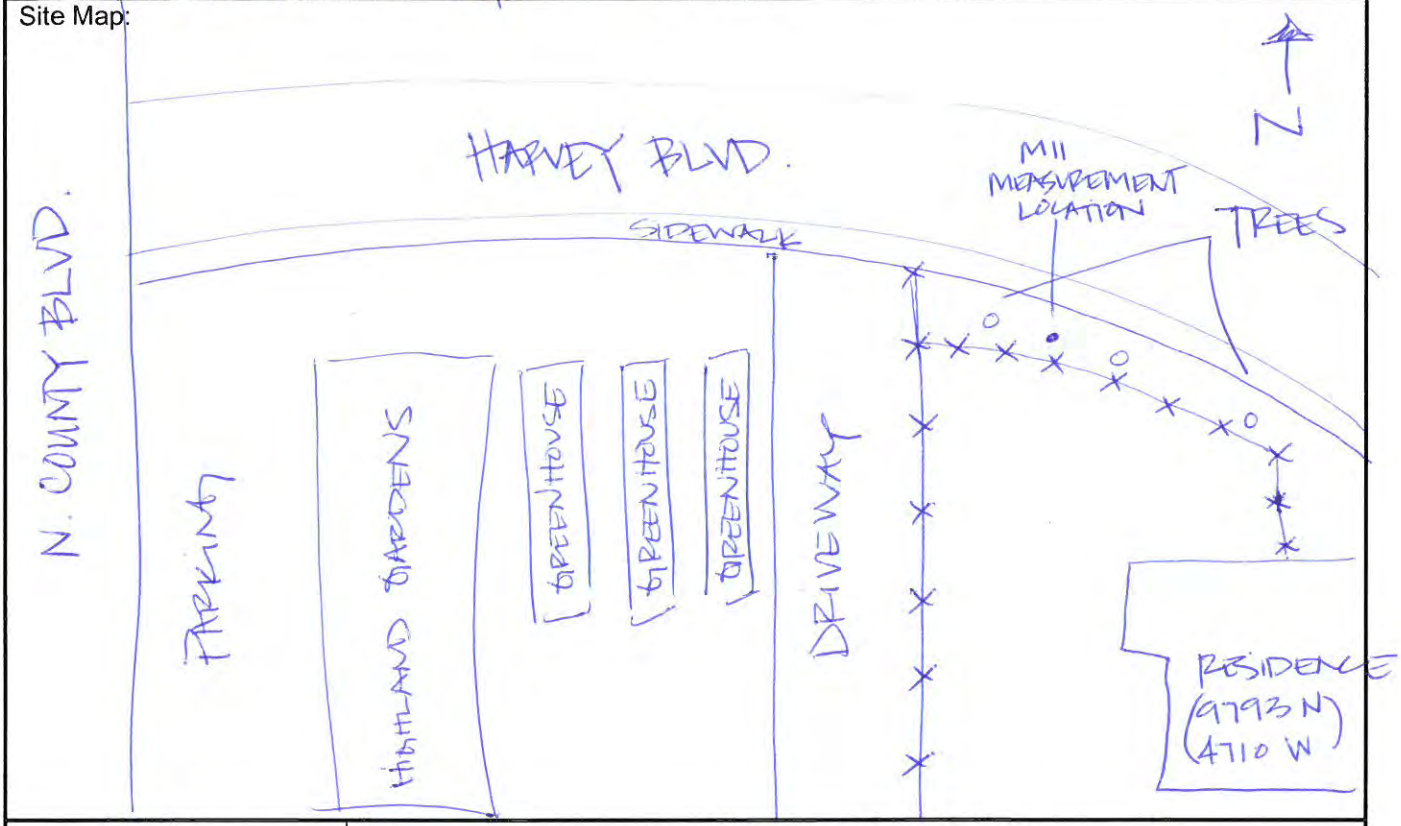


Vehicle Type	Traffic count (vehicles/ 5 min)					
Automobiles						
Heavy Trucks						
Medium Trucks						
Busses/Motorcycles						

Elapsed Time (min)	Comments	Elapsed Time (min)	Comments
1		11	
2		12	
3 2:43pm	Magpie calls	13	
4		14 2:54pm	Biker on trail.
5		15	
6		16	
7 2:47pm	Biker on trail	17	
8		18	
9 2:49pm	Biker on trail	19	
10		20	

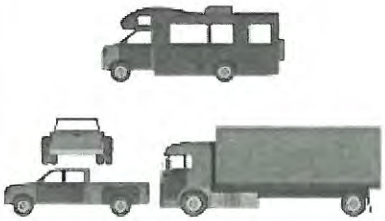
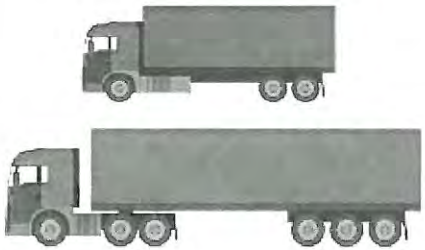
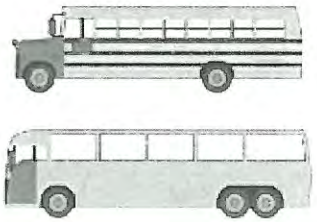
Test No.:	Project Name: Alpine hwy	Project No.:	Sheet__of
Date: 11/14/18	Location: M11	Relative elevation to road:	
Time Started: 11:45am	Weather Conditions: sunny 46°F 42% humidity mph wind	Site Conditions:	
Time Ended: 12:09pm			
Calibration			
Pre: 94.0 dBA		Date file was downloaded:	
Post: 93.7 dBA		File name:	

Site Map:



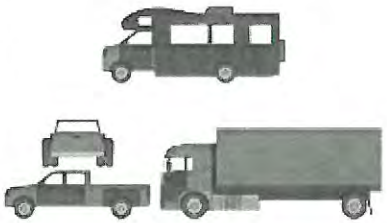
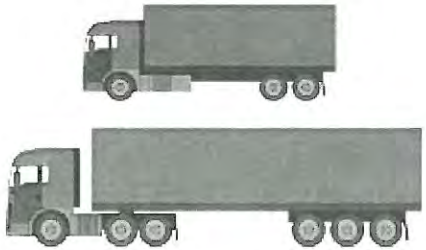
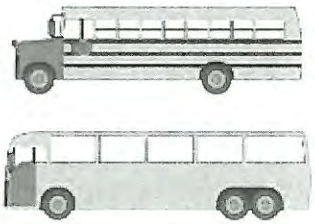
Vehicle Type	Traffic count (vehicles/ 5 min)					
Automobiles						
Heavy Trucks						
Medium Trucks						
Busses/Motorcycles						

Elapsed Time (min)	Comments	Elapsed Time (min)	Comments
1 11:53	drill	11	
2 11:58	truck on dirt road	12	
3 11:59	drill & heavy truck	13	
4 12:05	bus on Harvey Blvd.	14	
5 12:09	me on gravel	15	
6		16	
7		17	
8		18	
9		19	
10		20	

Automobiles (includes cargo vans & light trucks)		Medium Trucks (2 axles, 6 tires)		Heavy Trucks (3 or more axles)		Buses (More than 9 passengers)		Motorcycles	
									
NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
20 6 20 20 25 17 4 10 10 22 5				1		2			

Project: Alpine Hwy Count Location: M11 (N. County Blvd NB ~~Harvey Blvd.~~)

Time Started: 11:58 am Time Ended: 12:08 pm Date: 11/16/18

Automobiles (includes cargo vans & light trucks)		Medium Trucks (2 axles, 6 tires)		Heavy Trucks (3 or more axles)		Buses (More than 9 passengers)		Motorcycles	
									
NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
	22 9 13 36 10 20 25		2 1		1				

Project: Alpine Hwy Count Location: M11 (N. County Blvd. SB)

Time Started: 11:47am Time Ended: 11:57am Date: 11/16/18

APPENDIX B: BUILD NOISE LEVELS MAPS

Build Noise Impacts

Map 1 of 13

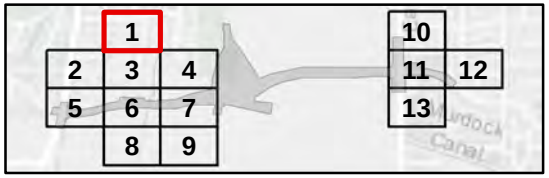
Build Noise Impact

- Yes
- No

N

0 75 150

Feet



Build Noise Impacts

Map 2 of 13

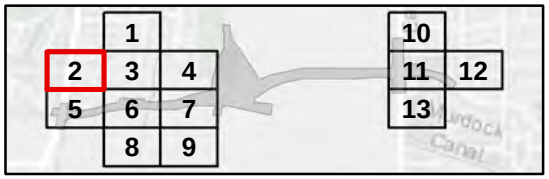
Build Noise Impact

- Yes
- No

N

0 75 150

Feet



Build Noise Impacts

Map 3 of 13

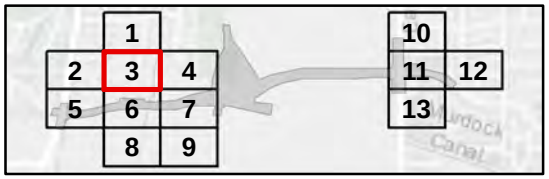
Build Noise Impact

- Yes
- No

N

0 75 150

Feet



Build Noise Impacts

Map 4 of 13

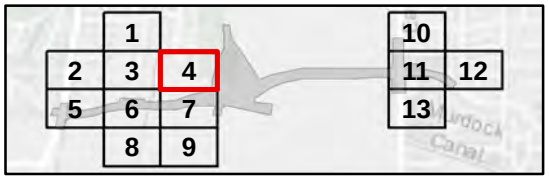
Build Noise Impact

- Yes
- No

N

0 75 150

Feet



Build Noise Impacts

Map 5 of 13

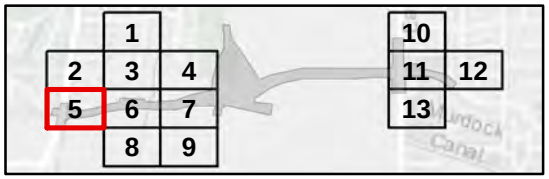
Build Noise Impact

- Yes
- No

N

0 75 150

Feet



Build Noise Impacts

Map 6 of 13

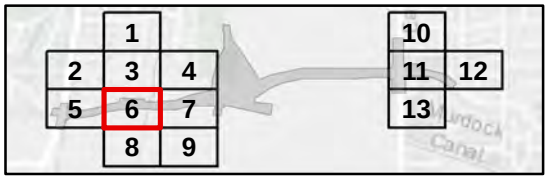
Build Noise Impact

- Yes
- No

N

0 75 150

Feet



Build Noise Impacts

Map 7 of 13

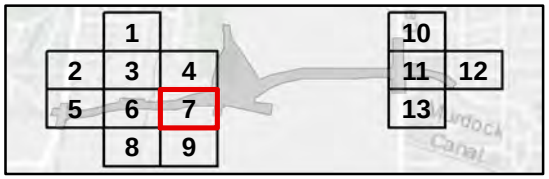
Build Noise Impact

- Yes
- No

N

0 75 150

Feet



Build Noise Impacts

Map 8 of 13

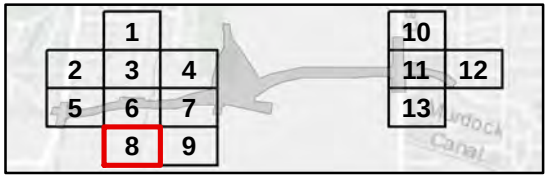
Build Noise Impact

- Yes
- No

N

0 75 150

Feet



Build Noise Impacts

Map 9 of 13

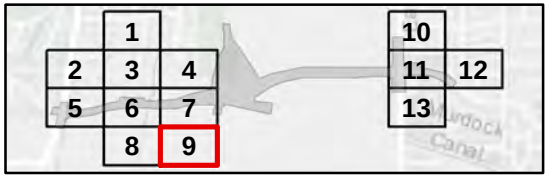
Build Noise Impact

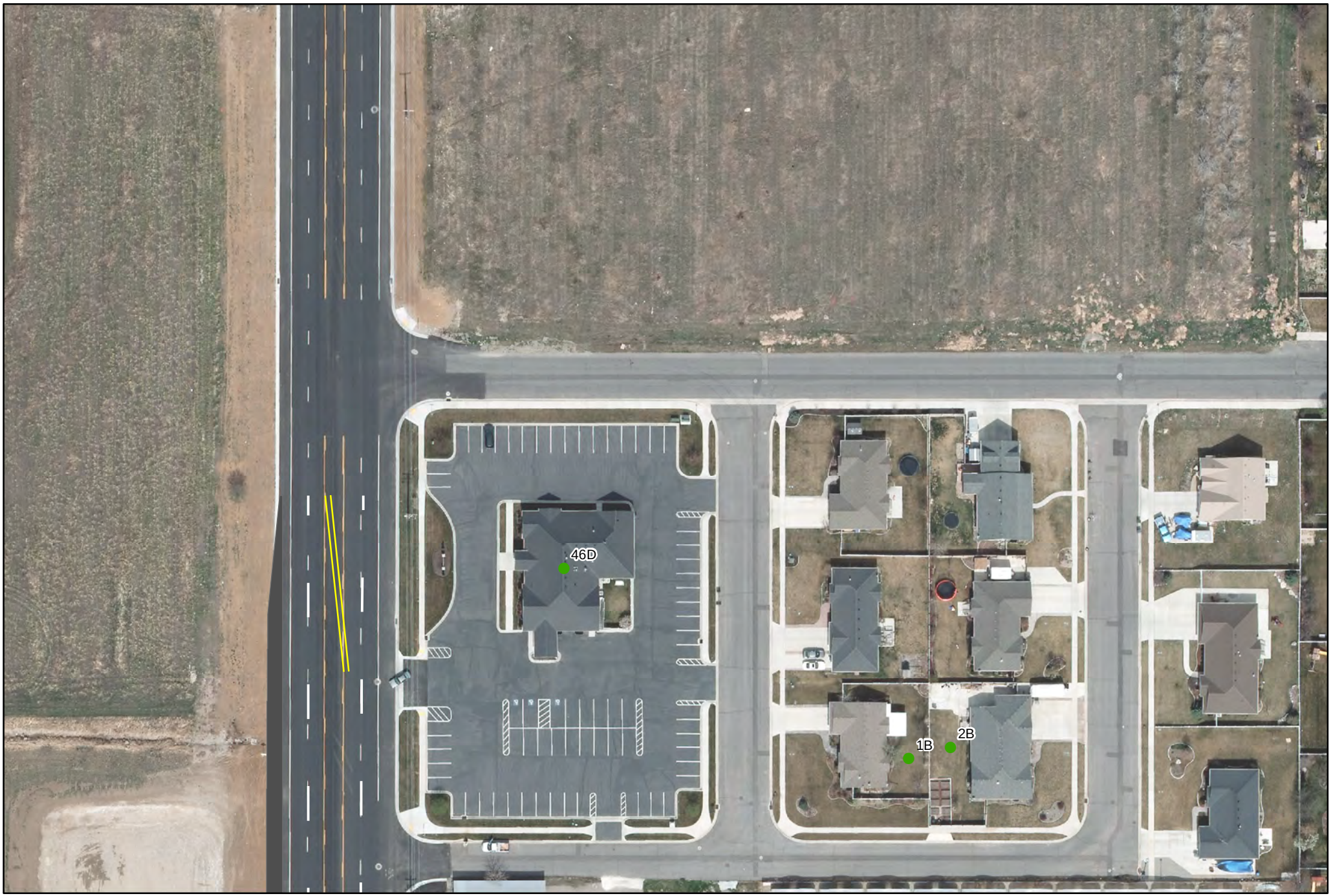
- Yes
- No

N

0 75 150

Feet





Build Noise Impacts

Map 10 of 13

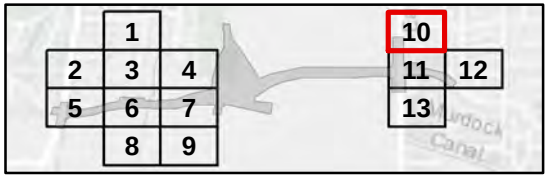
Build Noise Impact

- Yes
- No

N

0 75 150

Feet



Build Noise Impacts

Map 11 of 13

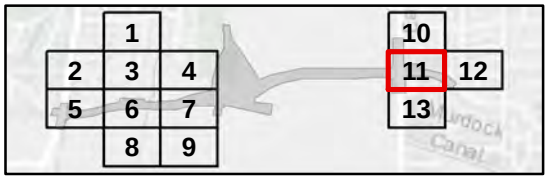
Build Noise Impact

- Yes
- No

N

0 75 150

Feet



Build Noise Impacts

Map 12 of 13

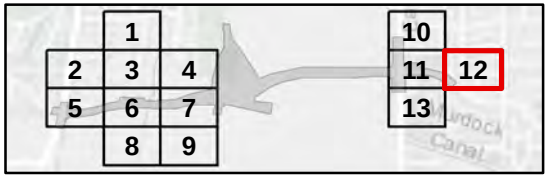
Build Noise Impact

- Yes
- No

N

0 75 150

Feet



Build Noise Impacts

Map 13 of 13

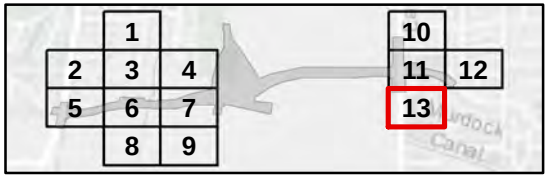
Build Noise Impact

- Yes
- No

N

0 75 150

Feet



APPENDIX C: NOISE WALL MAPS

Wall 1

Build Noise Impact

- Yes
- No

Not Feasible and Reasonable

N

0 150 300

Feet

UT

Wall 2

Build Noise Impact

- Yes
- No

Not Feasible and Reasonable

N

0 150 300

Feet

UT

Wall 3

Build Noise Impact

- Yes
- No

Recommended Noise Wall (Feasible and Reasonable)

N

0 150 300

Feet

UT

Wall 4

Build Noise Impact

- Yes
- No

Not Feasible and Reasonable

N

0 175 350

Feet

UT

APPENDIX D: NOISE WALL ANALYSES

Wall 1 (North Side of Canal Blvd.)

Total Wall Length	1839	ft
Length of Activity Category C/E Land Use:	747	ft
Wall Cost per sq ft:	$20	
# of First Row Receivers:	6	

Name	# of DU	Category	1st Row	# of 1st Row	10-ft Wall	Design Goal	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors (Category B)	12-ft Wall	Design Goal	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors (Category B)	14-ft Wall	Design Goal	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors (Category B)	16-ft Wall	Design Goal	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors (Category B)	18-ft Wall	Design Goal	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors (Category B)
9	1	B		0	0.6	No	No	No	0	No	0	0	1.1	No	No	No	0	No	0	0	1.4	No	No	No	0	No	0	0	1.7	No	No	No	0	No	0	0	2.4	No	No	No	0	No	0	0
10	1	B		0	0.8	No	No	No	0	No	0	0	1.6	No	No	No	0	No	0	0	2	No	No	No	0	No	0	0	2.4	No	No	No	0	No	0	0	3.4	No	No	No	0	No	0	0
19	1	C		0	3.2	No	No	No	0	No	0	0	4.6	No	No	No	0	No	0	0	5.3	No	Yes	No	0	No	0	0	6.1	No	Yes	No	0	No	0	0	7	Yes	Yes	No	0	No	0	0
20	1	B	Yes	1	3.3	No	No	No	0	No	0	0	4.7	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	6.6	No	Yes	No	0	Yes	1	1
21	1	B	Yes	1	4.8	No	No	No	0	No	0	0	5.9	No	Yes	No	0	Yes	1	1	6.5	No	Yes	No	0	Yes	1	1	7	Yes	Yes	Yes	1	Yes	1	1	7.4	Yes	Yes	Yes	1	Yes	1	1
22	1	B		0	2.7	No	No	No	0	No	0	0	4.5	No	No	No	0	No	0	0	5.1	No	Yes	No	0	No	0	1	5.6	No	Yes	No	0	No	0	1	6	No	Yes	No	0	No	0	1
29	1	B	Yes	1	4	No	No	No	0	No	0	0	6.1	No	Yes	No	0	Yes	1	1	7.1	Yes	Yes	Yes	1	Yes	1	1	7.9	Yes	Yes	Yes	1	Yes	1	1	8.4	Yes	Yes	Yes	1	Yes	1	1
30	1	C	Yes	1	1.1	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	1.8	No	No	No	0	No	0	0
49	1	C	Yes	1	3.2	No	No	No	0	No	0	0	4.8	No	No	No	0	No	0	0	5.8	No	Yes	No	0	Yes	1	0	7.6	Yes	Yes	Yes	1	Yes	1	0	8.9	Yes	Yes	Yes	1	Yes	1	0
50	1	C	Yes	1	7.2	Yes	Yes	Yes	1	Yes	1	0	8.2	Yes	Yes	Yes	1	Yes	1	0	9.1	Yes	Yes	Yes	1	Yes	1	0	9.9	Yes	Yes	Yes	1	Yes	1	0	10.7	Yes	Yes	Yes	1	Yes	1	0

Feasibility Factors:					
# of First-Row 5 dBA Reduction:	1	3	5	5	5
% of First-Row 5 dBA Reduction:	16.7%	50.0%	83.3%	83.3%	83.3%
Acoustic Feasibility (5 dBA reduction for 50% of front-row):	**No**	**Yes**	**Yes**	**Yes**	**Yes**
Reasonableness Factors:					
# of First-Row Design Goal:	1	1	2	4	4
% of First-Row Design Goal:	16.7%	16.7%	33.3%	66.7%	66.7%
Noise Abatement Design Goal (7 dBA reduction for 35% of front-row):	**No**	**No**	**No**	**Yes**	**Yes**
# of Benefited (Category B):	0	2	4	4	4
Cost of Noise Wall (Length x Height x $20/sq ft):	$367,800.00	$441,360.00	$514,920.00	$588,480.00	$662,040.00
Anticipated Cost of Noise Abatement:	$367,800.00	$441,360.00	$514,920.00	$588,480.00	$662,040.00
Activity Category B Allowable Cost ($30,000 per benefitted receptor):	$0.00	$60,000.00	$120,000.00	$120,000.00	$120,000.00
Activity Category C Allowable Cost ($360/linear ft):	$268,920.00	$268,920.00	$268,920.00	$268,920.00	$268,920.00
Allowable Cost:	$268,920.00	$328,920.00	$388,920.00	$388,920.00	$388,920.00
Difference between Anticipated Cost and Allowable Cost:	-$98,880.00	-$112,440.00	-$126,000.00	-$199,560.00	-$273,120.00
Cost Effective (Anticipated Cost < Allowable Cost):	**No**	**No**	**No**	**No**	**No**
Feasible and Reasonable:	**No**	**No**	**No**	**No**	**No**

Wall 2 (North Side of Canal Blvd.)

Total Wall Length: 1272 ft
Length of Activity Category C/E Land Use: 747 ft
Wall Cost per sq ft: $20
# of First Row Receivers: 4

Name	# of DU	Category	1st Row	# of 1st Row	10-ft Wall	Design Goal	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors (Category B)	12-ft Wall	Design Goal	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors (Category B)	14-ft Wall	Design Goal	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors (Category B)	16-ft Wall	Design Goal	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors (Category B)	18-ft Wall	Design Goal	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors (Category B)
9	1	B		0	0.6	No	No	No	0	No	0	0	1.1	No	No	No	0	No	0	0	1.3	No	No	No	0	No	0	0	1.6	No	No	No	0	No	0	0	2.2	No	No	No	0	No	0	0
10	1	B		0	0.9	No	No	No	0	No	0	0	1.6	No	No	No	0	No	0	0	2	No	No	No	0	No	0	0	2.3	No	No	No	0	No	0	0	3.3	No	No	No	0	No	0	0
19	1	C		0	3.3	No	No	No	0	No	0	0	4.6	No	No	No	0	No	0	0	5.4	No	Yes	No	0	No	0	0	6	No	Yes	No	0	No	0	0	6.9	No	Yes	No	0	No	0	0
20	1	B	Yes	1	3.2	No	No	No	0	No	0	0	4.6	No	No	No	0	No	0	0	5.2	No	Yes	No	0	Yes	1	1	5.7	No	Yes	No	0	Yes	1	1	6.2	No	Yes	No	0	Yes	1	1
21	1	B	Yes	1	3.6	No	No	No	0	No	0	0	4.1	No	No	No	0	No	0	0	4.4	No	No	No	0	No	0	0	4.6	No	No	No	0	No	0	0	4.8	No	No	No	0	No	0	0
22	1	B		0	2.1	No	No	No	0	No	0	0	3.3	No	No	No	0	No	0	0	3.7	No	No	No	0	No	0	0	3.9	No	No	No	0	No	0	0	4.1	No	No	No	0	No	0	0
49	1	C	Yes	1	3.3	No	No	No	0	No	0	0	4.9	No	No	No	0	No	0	0	6	No	Yes	No	0	Yes	1	0	7.6	Yes	Yes	Yes	1	Yes	1	0	8.9	Yes	Yes	Yes	1	Yes	1	0
50	1	C	Yes	1	7.3	Yes	Yes	Yes	1	Yes	1	0	8.3	Yes	Yes	Yes	1	Yes	1	0	9.1	Yes	Yes	Yes	1	Yes	1	0	10	Yes	Yes	Yes	1	Yes	1	0	10.7	Yes	Yes	Yes	1	Yes	1	0

Feasibility Factors:

# of First-Row 5 dBA Reduction:	1	1	3	3	3
% of First-Row 5 dBA Reduction:	25.0%	25.0%	75.0%	75.0%	75.0%
Acoustic Feasibility (5 dBA reduction for 50% of front-row):	**No**	**No**	**Yes**	**Yes**	**Yes**

Reasonableness Factors:

# of First-Row Design Goal:	1	1	1	2	2
% of First-Row Design Goal:	25.0%	25.0%	25.0%	50.0%	50.0%
Noise Abatement Design Goal (7 dBA reduction for 35% of front-row):	**No**	**No**	**No**	**Yes**	**Yes**
# of Benefited (Category B):	0	0	1	1	1
Cost of Noise Wall (Length x Height x $20/sq ft):	$254,400.00	$305,280.00	$356,160.00	$407,040.00	$457,920.00
Anticipated Cost of Noise Abatement:	$254,400.00	$305,280.00	$356,160.00	$407,040.00	$457,920.00
Activity Category B Allowable Cost ($30,000 per benefitted receptor):	$0.00	$0.00	$30,000.00	$30,000.00	$30,000.00
Activity Category C Allowable Cost ($360/linear ft):	$268,920.00	$268,920.00	$268,920.00	$268,920.00	$268,920.00
Allowable Cost:	$268,920.00	$268,920.00	$298,920.00	$298,920.00	$298,920.00
Difference between Anticipated Cost and Allowable Cost:	$14,520.00	-$36,360.00	-$57,240.00	-$108,120.00	-$159,000.00
Cost Effective (Anticipated Cost < Allowable Cost):	**Yes**	**No**	**No**	**No**	**No**
Feasible and Reasonable:	**No**	**No**	**No**	**No**	**No**

Wall 3 (North Side of Canal Blvd.)

Total Wall Length	747	ft
Length of Activity Category C/E Land Use:	747	ft
Wall Cost per sq ft:	$20	
# of First Row Receivers:	2	

Name	# of DU	Category	1st Row	# of 1st Row	10-ft Wall	Design Goal	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors (Category B)	11-ft Wall	Design Goal	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors (Category B)
9	1	B		0	0.5	No	No	No	0	No	0	0	0.7	No	No	No	0	No	0	0
10	1	B		0	0.7	No	No	No	0	No	0	0	1	No	No	No	0	No	0	0
19	1	C		0	2.5	No	No	No	0	No	0	0	3.1	No	No	No	0	No	0	0
49	1	C	Yes	1	2.9	No	No	No	0	No	0	0	3.9	No	No	No	0	No	0	0
50	1	C	Yes	1	6.6	No	Yes	No	0	Yes	1	0	7	Yes	Yes	Yes	1	Yes	1	0

Name	# of DU	Category	1st Row	# of 1st Row	12-ft Wall	Design Goal	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors (Category B)	14-ft Wall	Design Goal	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors (Category B)
9	1	B		0	0.9	No	No	No	0	No	0	0	1.1	No	No	No	0	No	0	0
10	1	B		0	1.4	No	No	No	0	No	0	0	1.7	No	No	No	0	No	0	0
19	1	C		0	3.4	No	No	No	0	No	0	0	3.9	No	No	No	0	No	0	0
49	1	C	Yes	1	4.5	No	No	No	0	No	0	0	5.4	No	Yes	No	0	Yes	1	0
50	1	C	Yes	1	7.4	Yes	Yes	Yes	1	Yes	1	0	8	Yes	Yes	Yes	1	Yes	1	0

Name	# of DU	Category	1st Row	# of 1st Row	16-ft Wall	Design Goal	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors (Category B)	18-ft Wall	Design Goa	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reductio	# 1st Row 5 dBA Reductio	# Benefited Receptors
9	1	B		0	1.4	No	No	No	0	No	0	0	2	No	No	No	0	No	0	0
10	1	B		0	1.9	No	No	No	0	No	0	0	2.9	No	No	No	0	No	0	0
19	1	C		0	4.4	No	No	No	0	No	0	0	5	No	Yes	No	0	No	0	0
49	1	C	Yes	1	7.1	Yes	Yes	Yes	1	Yes	1	0	8.3	Yes	Yes	Yes	1	Yes	1	0
50	1	C	Yes	1	8.7	Yes	Yes	Yes	1	Yes	1	0	9.2	Yes	Yes	Yes	1	Yes	1	0

	10-ft Wall	11-ft Wall	12-ft Wall	14-ft Wall	16-ft Wall	18-ft Wall
Feasibility Factors:						
# of First-Row 5 dBA Reduction:	1	1	1	2	2	2
% of First-Row 5 dBA Reduction:	50.0%	50.0%	50.0%	100.0%	100.0%	100.0%
Acoustic Feasibility (5 dBA reduction for 50% of front-row):	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Reasonableness Factors:						
# of First-Row Design Goal:	0	1	1	1	2	2
% of First-Row Design Goal:	0.0%	50.0%	50.0%	50.0%	100.0%	100.0%
Noise Abatement Design Goal (7 dBA reduction for 35% of front-row):	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
# of Benefited (Category B):	0	0	0	0	0	0
Cost of Noise Wall (Length x Height x $20/sq ft):	$149,400.00	$164,340.00	$179,280.00	$209,160.00	$239,040.00	$268,920.00
Anticipated Cost of Noise Abatement:	$149,400.00	$164,340.00	$179,280.00	$209,160.00	$239,040.00	$268,920.00
Activity Category B Allowable Cost ($30,000 per benefitted receptor):	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Activity Category C Allowable Cost ($360/linear ft):	$268,920.00	$268,920.00	$268,920.00	$268,920.00	$268,920.00	$268,920.00
Allowable Cost:	$268,920.00	$268,920.00	$268,920.00	$268,920.00	$268,920.00	$268,920.00
Difference between Anticipated Cost and Allowable Cost:	$119,520.00	$104,580.00	$89,640.00	$59,760.00	$29,880.00	$0.00
Cost Effective (Anticipated Cost < Allowable Cost):	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Feasible and Reasonable:	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Wall 4 (South Side of Canal Blvd.)

Total Wall Length	2045	ft
Length of Activity Category C/E Land Use:	2045	ft
Wall Cost per sq ft:	$20	
# of First Row Receivers:	3	

Name	# of DU	Category	1st Row	# of 1st Row	8-ft Wall	Design Goal	Benefited	1st Row Design Goal	# 1st Row Design Goal	1st Row 5 dBA Reduction	# 1st Row 5 dBA Reduction	# Benefited Receptors (Category B)
39	1	C	Yes	1	0	No	No	No	0	No	0	0
40	1	C	Yes	1	0	No	No	No	0	No	0	0
41	1	C	Yes	1	0	No	No	No	0	No	0	0
44	1	C		0	0	No	No	No	0	No	0	0
45	1	C		0	0	No	No	No	0	No	0	0

Feasibility Factors:

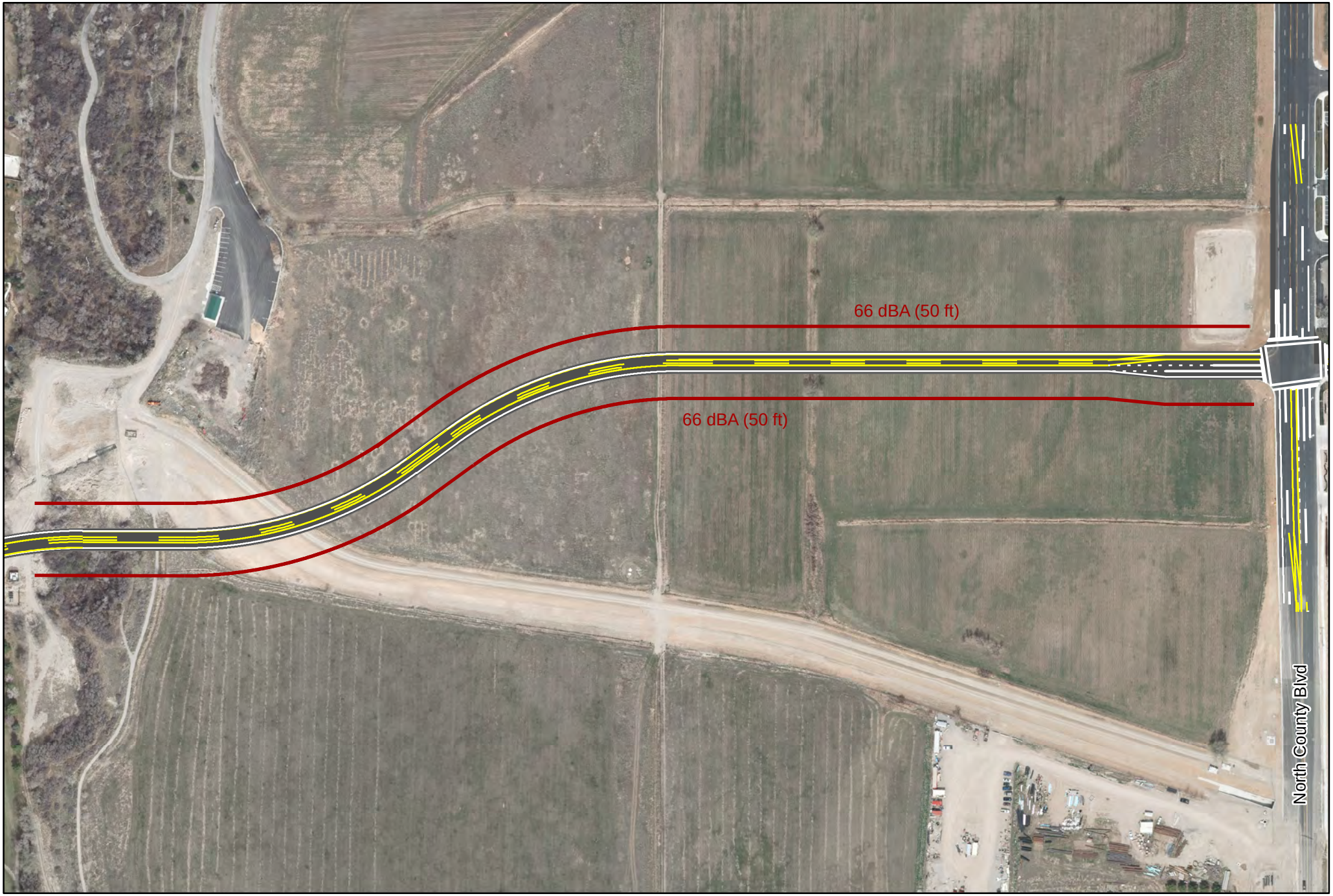
# of First-Row 5 dBA Reduction:	0
% of First-Row 5 dBA Reduction:	0.0%
Acoustic Feasibility (5 dBA reduction for 50% of front-row):	**No**

Reasonableness Factors:

# of First-Row Design Goal:	0
% of First-Row Design Goal:	0.0%
Noise Abatement Design Goal (7 dBA reduction for 35% of front-row):	**No**

Feasible and Reasonable: **No**

APPENDIX E: NOISE LEVELS ON UNDEVELOPED LAND



Undeveloped Land

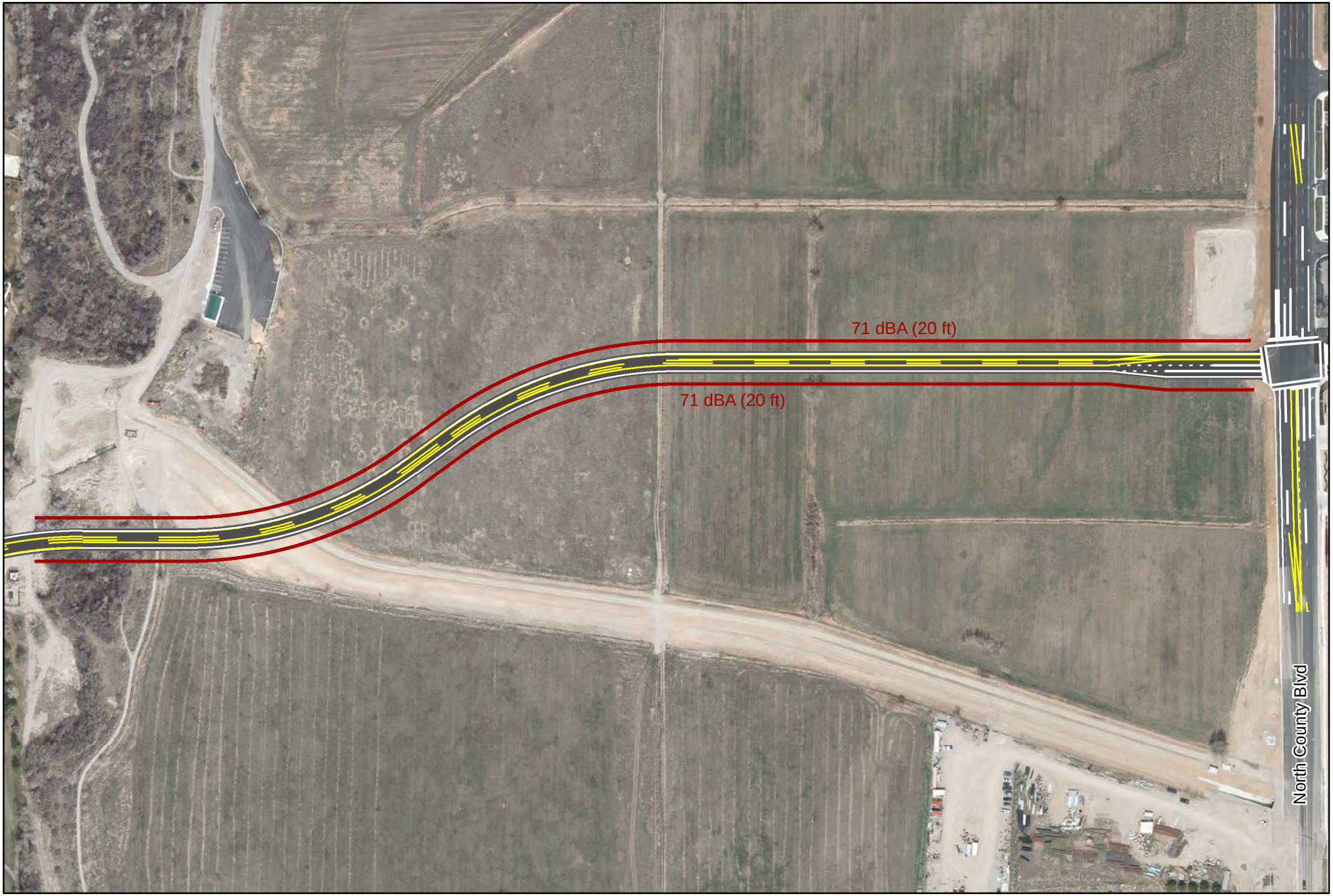
66 dBA Contour

N

0 225 450

Feet

UT



Undeveloped Land

71 dBA Contour

N

0 225 450

Feet

UT

MEMORANDUM *UTAH DEPARTMENT OF TRANSPORTATION*

Date: Monday, January 28, 2019

To: Nathan Clarke
Environmental Specialist, Horrocks Engineers

From: Dan Bolin
UDOT Landscape Architect

CC: File

Re: **ENVIRONMENTAL REVIEW, WETLANDS & WATER RESOURCES**
S-LC49(1656), Canal Boulevard; Alpine Highway to North County Boulevard, Utah County, Utah (PIN 14088)

Project Scope of Work

Highland City, in cooperation with UDOT, proposes to construct a new, three-lane roadway between SR-74, the Alpine Highway at Canal Boulevard (9700 North) and SR-129, North County Boulevard, at Harvey Boulevard. The project will consist of the construction of a three-lane roadway with shoulders, curb, gutter, sidewalk, and a structure over the American Fork River; the installation of traffic signals at the intersections with the Alpine Highway and North County Boulevard; realignment and grade separation of the Murdock Canal and Art Dye trails to allow their free passage under the new roadway; and construction of a new segment of the Murdock Canal Trail from the current Highland Glen trailhead to the Alpine Highway. The acquisition of right-of-way will be required for the project.

Invasive Species – ePM Categorical Exclusion, Environmental Study (Section 9)

Invasive weed species including Canada thistle (*Cirsium arvense*) were identified within the project limits. however, the proposed project involves earthwork that increases the potential to introduce or spread invasive weed species identified on the noxious weed list for the State of Utah and/or county list. Therefore, UDOT Special Provision Section 02924S INVASIVE WEED CONTROL is to be included in the bid set for this project. Best Management Practices (BMPs) that require all earthmoving construction equipment to be cleaned before mobilizing on the construction site, which minimize the potential spread of invasive weed species, are to be implemented.

Mitigation Commitments:

1. **UDOT Special Provision Section 02924S INVASIVE WEED CONTROL will be included in the contract documents to require that all earthmoving construction equipment be properly cleaned prior to mobilizing onto the project site. (UDOT Responsible)**
2. **The Contractor is to clean all earthmoving construction equipment before mobilizing onto the project site and avoid unnecessary earth disturbance throughout construction. (Contractor Responsible)**
3. **Spray noxious weeds located within the project limits before starting earth disturbing activities and if they appear during construction. Use selective, and non-selective herbicides as appropriate. (Contractor Responsible)**

Wetland and Water Resources – ePM Categorical Exclusion, Environmental Study (Section 11)

Horrocks Engineers has evaluated this project for waters of the U.S. (WoUS), including wetlands and streams regulated by US Army Corps of Engineers (USACE) and other waters under the jurisdiction of the State of Utah. Ryan Pitts and Nathan Clarke, of Horrocks Engineers, visited the site on November 2, 2018. A wetland delineation was conducted in accordance with standards set by the U.S. Army Corps of Engineers. The delineation determined that no wetlands exist within the project limits. The Murdock Canal does cross the project limits, however is piped in this area, so it will not be impacted. The American Fork River, however, will need to be crossed by the project. The study area was expanded in December and the additional

areas were evaluated. Impacts to the American fork river increased slightly, but do not change the aquatic resource permitting requirements. A Utah Stream Alteration/PGP 10 permit will be required for this project.

This project will impact more than one (1) acre of earth and is required to comply with the Utah Pollutant Discharge Elimination System (UPDES) Utah Construction General Permit (UCGP).

A FEMA 100-year floodplain is identified within the project limits, however the proposed structure will span the floodplain, avoiding any impacts. No floodplain development permit is required.

Mitigation Commitments:

1. **A Utah Stream Alteration permit must be obtained from the Utah Division of Water Rights. (UDOT Responsible).**
2. **A Storm Water Prevention Plan (SWPPP) will be needed to comply with the Utah Pollutant Discharge Elimination System (UPDES).**

Visual Aesthetics – ePM Categorical Exclusion, Environmental Study (Section 18)

This proposed project has limited disturbance areas and will not have significant visual impacts.

Mitigation Commitments:

1. **Visual: Reclaim all disturbed areas per UDOT standard specifications (Resource Comment).**

HORROCKS ENGINEERS

2162 West Grove Parkway, Ste 400
Pleasant Grove, Utah 84062
801-763-5100
www.horrocks.com

Prepared

By: Nathan Clarke, Environmental Specialist

Date: December 11, 2018 **Memorandum**

Subject: Water Resources

Canal Boulevard; Alpine Highway to North County Boulevard project. PIN 14088, Project No. S-LC49(1656).

Introduction

Highland City, in cooperation with UDOT, proposes to construct a new, three-lane roadway between SR-74, the Alpine Highway at Canal Boulevard (9700 North) and SR-129, North County Boulevard, at Harvey Boulevard. The project will consist of the construction of a three-lane roadway with shoulders, curb, gutter, sidewalk, and a structure over the American Fork River; the installation of traffic signals at the intersections with the Alpine Highway and North County Boulevard; realignment and grade-separation of the Murdock Canal and Art Dye trails to allow their free passage under the new roadway; and construction of a new segment of the Murdock Canal Trail from the current Highland Glen trailhead to the Alpine Highway. The acquisition of right-of-way will be required for the project.

Purpose and Need

The communities of American Fork, Highland, and Cedar Hills in northern Utah County are connected by two major north-south roadways: SR-74, the Alpine Highway and SR-129, North County Boulevard. Connections between these two roadways do not exist between SR-92, the Timpanogos Highway and 700 North in American Fork. This lack of connection forces substantial out-of-direction travel and delay and increases traffic on SR-92 and 700 North. A UDOT traffic study found that without a connection between the two roadways, traffic will be 8% higher on SR-92 and 33% higher on 700 North in 2040. Daily total delay will be 80 hours higher, with an additional 120 vehicle hours traveled and 5,000 vehicle miles traveled per day with no connection.

In addition, the Murdock Canal Trail, a major recreational and commuter trail, lacks a direct connection between a segment ending at Highland Glen Park on the east and a segment beginning at the Alpine Highway to the west. This forces pedestrians and cyclists using the trail into out-of-direction travel through residential neighborhoods.

The purpose of the project is to reduce delay and out-of-direction travel and increase connectivity for motorists, cyclists, and pedestrians between SR-74, the Alpine Highway and SR-129, North County Boulevard in Utah County.

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Methodology

Ryan Pitts and Nathan Clarke, of Horrocks Engineers, visited the site on November 2, 2018. A wetland delineation was conducted in accordance with standards set by the U.S. Army Corps of Engineers, and the area was also evaluated for floodplains, noxious weeds, and stormwater.

Results/Conclusion

Wetlands and other Waters of the U.S.

No wetlands and one other Waters of the U.S., totaling 0.03-acres and 98 linear feet, was identified within the delineation study area. The American Fork River is the main hydrology source within the study area. The Murdock Canal does cross through the study area on the south and west sides of the agricultural fields. This part of the canal is not an open water feature, but is completely piped through the study area. The project would likely impact a Waters of the U.S. (the American Fork River), which would require a joint Department of the Army permit and State Stream Alteration permit.

Floodplains

The proposed roadway crosses through the 100-year floodplain of the American Fork River. At this time, the proposed bridge is going to span the floodplain resulting in no impacts. However, hydraulic analyses will be performed to confirm that no impacts to the floodplain would occur. If it is determined there would be impacts to the floodplain (a rise in the base flood elevation), proper steps will be taken with Highland City and FEMA to obtain a floodplain development permit.

Noxious Weeds

Canada thistle *(Cirsium arvense),* which is on the State's Noxious Weed list, was observed in the study area during the site visit. The Project would include roadway construction and would involve a substantial amount of ground disturbance, which would provide opportunities for the movement of invasive species. Based on the location, the construction has the potential to introduce or spread invasive species included on the noxious weeds lists of the State of Utah. To minimize the movement of invasive species, the Contractor will be required to comply with UDOT's Special Provision 02924S - Invasive Weed Control.

Stormwater

Because the project will disturb more than one acre of ground, a Construction Storm Water (UPDES) permit will need to be obtained from the Utah Division of Water Quality.

The pictures below show examples of what was observed in the area.

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Figure 1- Looking south at American Fork River

Figure 2 - Looking east near Fox Hollow Golf Course

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Figure 3- Looking east at Murdock Canal Trail

Figure 4- Looking west across agricultural fields

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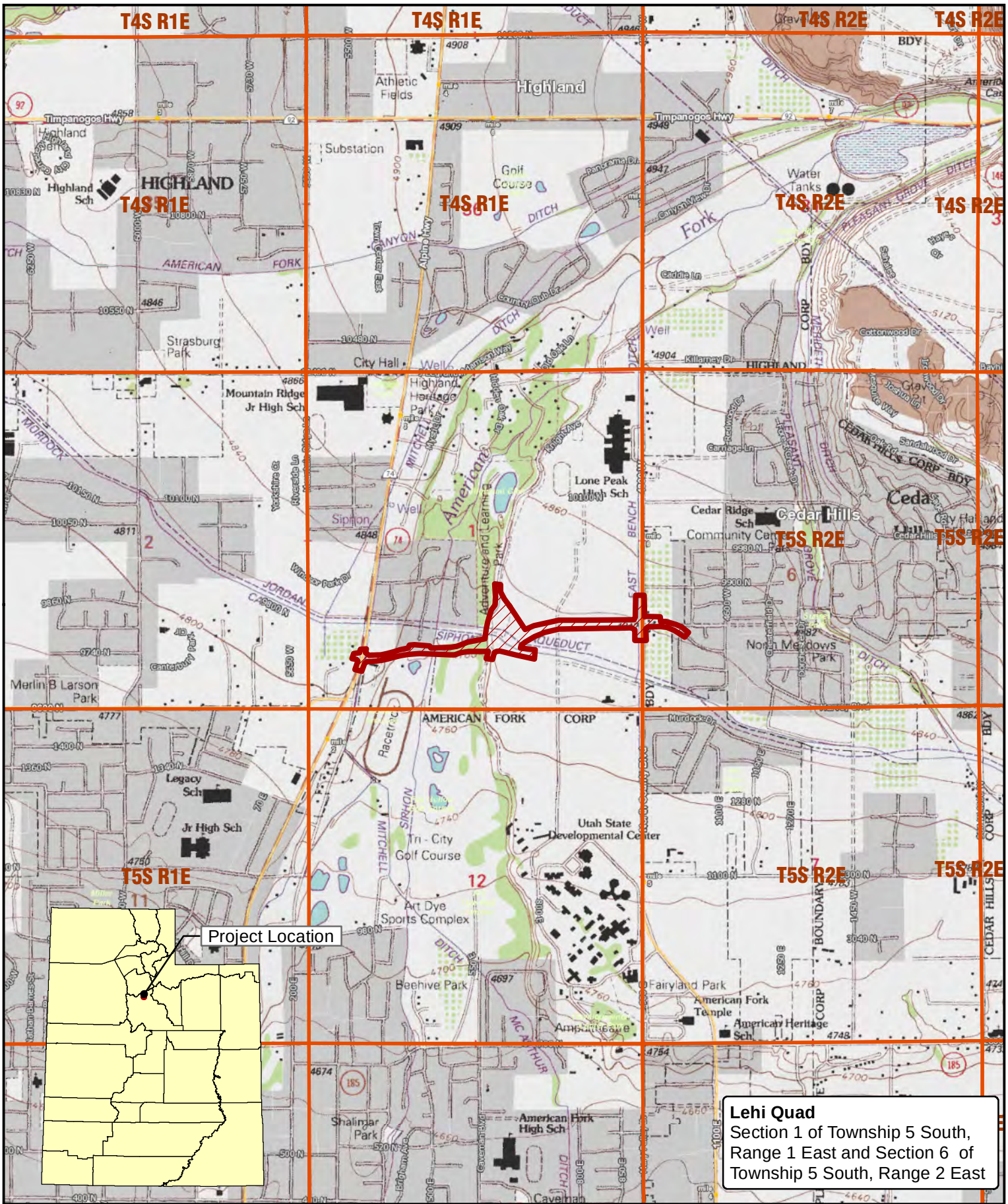
Appendix A: Maps



Coordinate System: NAD 1983 StatePlane Utah Central FIPS 4302 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Map Created by Horrocks Engineers on 11/29/2018 8:57:42 AM

Canal Boulevard; Alpine Highway to North County Boulevard

Project Location Map

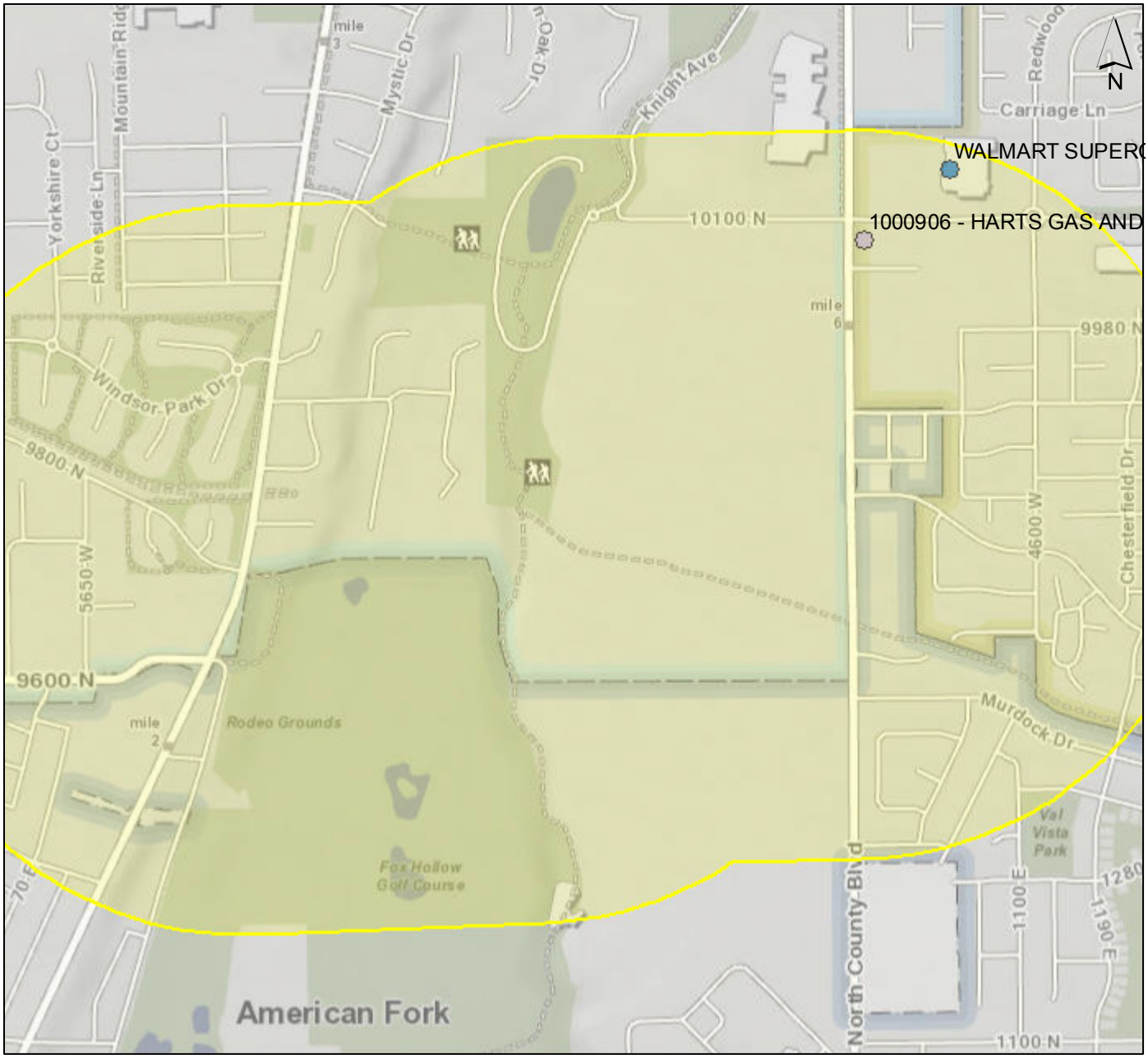
Study Area

1 inch = 2,000 feet

0 2,000 4,000 Feet

N

Printed from the Utah DEQ Interactive Map



1/7/2019

1:18,056

- Hazardous Waste and Used Oil
- Underground Storage Tanks

0 0.125 0.25 0.5 mi

0 0.225 0.45 0.9 km