BANGERTER 2700 WEST

BANGERTER HIGHWAY AT 2700 WEST INTERCHANGE IMPROVEMENTS

STATE ENVIRONMENTAL STUDY

PIN: 18808

Project Number: S-0154(92)0

Prepared For: Utah Department of Transportation

Prepared By: HDR

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Executive Summary

The Utah Department of Transportation (UDOT) is proposing to construct a grade-separated tight diamond interchange (TDI) at the existing intersection of Bangerter Highway and 2700 West in Bluffdale and Riverton, Utah. The project is state-funded and requires a State Environmental Study (SES) to analyze the improvements and document environmental resources, permitting, and mitigation, if required.

ALTERNATIVES

Alternatives were developed through a process that used current regional and local transportation plans, existing conditions and future (2050) conditions traffic analysis, and coordination with jurisdictional agencies including cities, school districts, and utility companies.

The current regional transportation plan for the area is the Wasatch Front Regional Council's 2019–2050 *Wasatch Front Regional Transportation Plan* (RTP). The plan indicates that Bangerter Highway will be converted to a freeway system by changing the remaining at-grade intersections into grade-separated interchanges. The 2019–2050 RTP includes proposed bicycle lanes on 2700 West from 14000 South to the Taylorsville City boundary (6600 South). In addition, the RTP and the *Bluffdale Parks, Trails, Recreation, and Open Space Master Plan* include a shared-use path adjacent to Rose Creek going from 2800 West and connecting to the Jordan River Parkway. The *Bluffdale Parks, Trails, Recreation, and Open Space Master Plan* also identifies a trail adjacent to the Utah & Salt Lake Canal. The proposed project is forward-compatible with these alternative transportation plans.

Coordination began early in the environmental process with Bluffdale City, Riverton City, and the Jordan School District. Input from these meetings helped to inform the alternatives development process by assisting in identifying design preferences, resources to avoid, and acceptable mitigation for impacts.

A Public Scoping Meeting was held in late August 2021. A Neighborhood Meeting was held in mid-April 2022, and a Public Hearing was held in late April 2022. Coordination with property owners who would be impacted by partial or full acquisitions began in March 2022.

Level of service (LOS) is a measure of the operating conditions on a road or at an intersection. Level of service is represented by a letter "grade" ranging from A (free-flowing traffic and little delay) to F (extremely congested, stop-and-go traffic and excessive delay). For roads such as Bangerter Highway, UDOT considers LOS A through D to be acceptable operating conditions and LOS E and F to be unacceptable operating conditions.

Existing conditions traffic analysis for Bangerter Highway and 2700 West shows that the Bangerter Highway at 2700 West intersection operates at level of service (LOS) E during the AM peak period and LOS D during the PM peak period (see Figure 1). Individual turning movements (left and right turns) at Bangerter Highway and 2700 West operate at LOS E and F during the AM and PM peak periods.

Intersection	LOS / Delay (sec / veh)	
	AM Peak Period	PM Peak Period
13400 South & Bangerter Hwy	E / 62	E / 60
2700 West & Bangerter Hwy	E / 74	D / 39
Redwood Rd & Bangerter Hwy	C / 27	D / 38



Figure 1. Existing Conditions: AM and PM Peak-period Intersection LOS

Future (2050) no-build conditions (without the proposed interchange) are expected to deteriorate further without improvements at Bangerter Highway and 2700 West. Traffic analysis for the AM and PM peak periods shows that the intersection at Bangerter Highway and 2700 West is expected to operate at LOS F during the AM and PM peak periods (see Figure 2). Turning movements are expected to worsen at Bangerter Highway and 2700 West; 14 of the 17 turning movements are projected to operate at LOS F during the AM and PM peak periods.

Location	2050 LOS / Delay (sec / hr)	
	AM Peak Period	PM Peak Period
13400 South & Bangerter Hwy	D / 53	D / 49
2700 West & Bangerter Hwy	F / 100	F / 129
Redwood Rd & Bangerter Hwy	F / >180	F / > 180

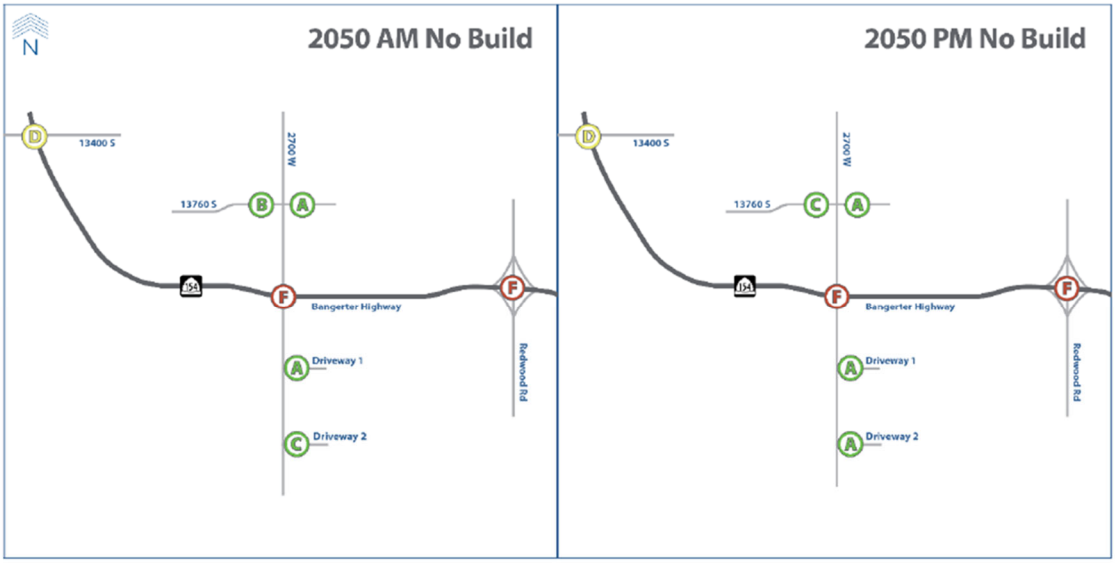


Figure 2. Future (2050) No Build Conditions: AM and PM Peak-period Intersection LOS

INTERCHANGE ALTERNATIVES

The future (2050) build conditions traffic analysis evaluated four interchange alternatives for the interchange at Bangerter Highway and 2700 West: (1) a tight diamond interchange (TDI), (2) a single-point urban interchange (SPUI), (3) a right-in/right-out (RIRO) interchange with 2700 West crossing over Bangerter and roundabouts on 2700 West to facilitate turn movements via U-turns, and (4) an overpass-only alternative with no access to or from Bangerter Highway at 2700 West. The primary measure of effectiveness used to evaluate these alternatives was intersection performance, where acceptable performance is defined as LOS D or better at the Bangerter Highway and 2700 West intersection.

The analysis for the overpass-only alternative was different from the analysis for the other alternatives. This was due to the nature of the alternative, which would remove traffic from 2700 West and reroute it to other interchanges. For this reason, the analysis for this alternative focused on impacts to the adjacent interchanges. The overpass-only alternative was eliminated from further analysis because it would have traffic impacts to the adjacent Redwood Road interchange, where 2050 AM peak-period delays would increase by as much as 68% compared to the other interchange alternatives.

The RIRO interchange is the only interchange alternative that would perform at LOS E. Additionally, the concept requires increased out-of-direction travel by motorists. Therefore, the RIRO interchange alternative was also eliminated.

Both the TDI and the SPUI would perform acceptably, at LOS D or better. Although the SPUI would generally perform slightly better than the TDI, they are both expected to operate very well and have

acceptable levels of service (see Figure 3). Both the TDI and the SPUI were carried forward in the analysis.

Location	2050 AM Peak Period[1]				2050 PM Peak Period[1]			
	TDI	SPUI	RIRO	Overpass	TDI	SPUI	RIRO	Overpass
2700 West & Bangerter Highway	D / 36	C / 26	D / 44	-- / --	C / 30	C / 32	E / 64	-- / --
13400 South & Bangerter Highway	D / 42	D / 41	D / 41	D / 52	D / 41	D / 40	D / 40	D / 42
Redwood Rd & Bangerter Highway	F / 141	F / 141	F / > 180	F / > 180	F / > 180	F / > 180	F / > 180	F / > 180

1. Average delay reported in seconds/vehicle

Figure 3. Comparison of Performance of Future (2050) Interchange Alternatives

TDI AND SPUI ALTERNATIVES

The project team analyzed Bangerter Highway going over 2700 West and 2700 West going over Bangerter Highway for both the TDI and SPUI alternatives. These alternatives were evaluated by comparing overall costs as well as impacts to environmental resources, businesses, residents, and utilities. UDOT selected the TDI with Bangerter Highway going over 2700 West as the preferred interchange alternative because it would be the most cost-effective overall and would impact fewer properties compared to the TDI with 2700 West going over Bangerter Highway and either of the two evaluated SPUI alternatives.

UDOT did not develop or evaluate any alternatives that would have Bangerter Highway below grade (with Bangerter Highway going under 2700 West) because Bluffdale City and Riverton City did not request an evaluation of this type of alternative and because there would likely be substantial increases in costs and impacts to utilities, Rose Creek, and drainage from a below-grade Bangerter Highway alternative in this location.

After selecting the TDI as the preferred interchange alternative, the interchange design and traffic analysis were further refined, and this refinement showed that the TDI alternative would perform at LOS C during the 2050 AM peak period and LOS D during the 2050 PM peak period (see Figure 4).

Intersection	LOS / Delay (sec / veh)[1]	
	AM Peak Period	PM Peak Period
13400 South & Bangerter Hwy	D / 44	D / 39
2700 West & Bangerter Hwy	C / 26	D / 30
Redwood Rd & Bangerter Hwy	F / >180	F / >180

1. Average delay reported in seconds/vehicle

Figure 4. Future (2050) Level of Service and Delay for the TDI Alternative

HORIZONTAL ALIGNMENT ALTERNATIVES

UDOT evaluated three horizontal alignment alternatives with the TDI Bangerter Over Alternative: north shift, south shift, and hybrid shift (split the Bangerter Highway alignment to both the north and south sides). UDOT selected the hybrid shift as the preferred horizonal alignment alternative (Proposed Action) because it was the most cost-effective and because the north and south shift alternatives would have greater impacts to local businesses, residences, and Rose Creek.

PROPOSED ACTION

The Proposed Action is a grade-separated TDI at Bangerter Highway and 2700 West with Bangerter Highway going over 2700 West and a hybrid shift horizonal alignment. Project work would also include the associated on- and off-ramps; minor widening and restriping on 2700 West to accommodate the turn lanes for the new grade-separated interchange; installing sidewalks on both the east and west sides of 2700 West between 13640 South and 14000 South and 5-foot-wide bicycle lanes on both the east and west sides of 2700 West between 13760 South and 14000 South; modifying utilities and storm drainage; and installing new pavement, traffic signals, advanced traffic management systems (ATMS) equipment, and roadway signs. The existing noise walls in the area would remain in place or would be replaced in kind where disturbed by the Proposed Action.

A summary of the affected environment and mitigation commitments for the various environmental resources is provided in Table 1. A full mitigation list for preliminary engineering and construction activities is provided in the *Mitigation Commitments* section.

This SES follows UDOT's Environmental Electronic Project Management (ePM) form to remain consistent with UDOT standards. This form is used for different types of environmental clearances, so some sections might not apply to the current project but are included to maintain the UDOT standard.

Table 1. Summary of Affected Environment and Mitigation Commitments for the Proposed Action

PROPOSED ACTION	MITIGATION
Right-of-way	
• Partial right-of-way (ROW) acquisition from 20 parcels and potential full ROW acquisition from 3 parcels • Approximately 2.43 acres of total property acquisition • Temporary construction easements and perpetual easements required	Compensate property owners according to the requirements of the Utah Relocation Assistance Act.
Streams	
• 1,051 linear feet of impact to Rose Creek	Relocate Rose Creek. Comply with all conditions and findings in the U.S. Army Corps of Engineers Nationwide Permit 14 and the Stream Alteration Permit from the Utah Division of Water Rights.

PROPOSED ACTION	MITIGATION
Utilities	
Utility relocations required for Jordan Valley Water Conservancy District water lines; Riverton City water and irrigation lines; South Valley Sewer District sewer lines; CenturyLink, Comcast, SIG, AT&T, First Digital, and Zayo Group fiber lines; and Rocky Mountain Power underground and overhead power lines.	Work with utility companies regarding the final design of utility relocations.
Invasive Species	
There is potential to introduce or spread invasive weeds.	Comply with UDOT Special Provision Section 02924S, *Noxious Weed Control*, requirements by properly cleaning all earth-moving construction equipment before mobilizing onto the project site and avoiding unnecessary earth disturbances.
Noise	
Noise levels with the Proposed Action would range from 38 to 69 A-weighted decibels (dBA) compared to the existing conditions of 32 to 66 dBA, and 12 of the 202 receptors would have traffic noise impacts (they would exceed noise-abatement criteria). Two of the impacted receptors would have future worst-case noise levels greater than or equal to an increase of 10 dBA over the existing noise level.	Maintain existing noise walls in the area or replace noise walls in kind where disturbed by the Proposed Action.
Visual	
The vertical alignment for 2700 West would stay at the existing grade, and Bangerter Highway would go over 2700 West, above the existing grade. The visual changes would be the elevated Bangerter Highway road and structure. This option would have visual changes similar to the Bangerter Highway interchange projects at Redwood Road, 9000 South, 7800 South, 7000 South, 6200 South, and 5400 South.	Reclaim all disturbed areas per UDOT Standard Specifications.
Construction	
Delays and temporary north-south closures of 2700 West are possible during construction of the project.	Comply with UDOT 2022 Standard Specifications.

Environmental Study

Project Name: Bangerter Highway at 2700 West Interchange Improvements
PIN: 18808
Project Number: S-0154(92)0
Prepared by: Amy Croft, HDR

For guidance in preparing this environmental study, refer to Chapter 4 of the UDOT Environmental Process Manual of Instruction.

REQUIRED SIGNATURES
STATE FUNDED PROJECTS

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

Recommended by Brandon Weston: _____ **Date:** 07/11/2022
UDOT Environmental Services Director

Approved by Ben Huot: _____ **Date:** 07/20/2022
UDOT Program Development Director

1. PURPOSE AND NEED FOR ACTION

The Utah Department of Transportation (UDOT) is conducting a State Environmental Study (SES) to analyze improvements at the Bangerter Highway (State Route 154) and 2700 West intersection in Bluffdale and Riverton, Utah.

During the current (2021) AM and PM peak periods, drivers waiting at this intersection experience an average delay of 74 and 39 seconds, respectively. The AM peak-period delay is classified as level of service (LOS) E, and the PM peak-period delay is classified as LOS D. Traffic modeling indicates that, if no operational improvements are made at the Bangerter Highway and 2700 West intersection by 2050 (No Build Alternative), this intersection would operate at LOS F during the AM and PM peak periods. The AM peak-period delay is projected to be 123 seconds, and the PM peak-period delay is projected to be 113 seconds. For additional details, see the *Bangerter Highway at 2700 West Existing and 2050 No Build Traffic Analysis* and the *Bangerter Highway at 2700 West Future Build Traffic Analysis* in Appendix B.

The primary purpose of the project is to alleviate congestion and improve traffic operations and mobility at the Bangerter Highway and 2700 West intersection.

2. DESCRIPTION

UDOT is proposing to construct a grade-separated tight diamond interchange (TDI) at the existing intersection of Bangerter Highway and 2700 West. The new interchange would allow unimpeded traffic flow on Bangerter Highway and is projected to operate at LOS D in 2050. For more information, see the *Bangerter Highway at 2700 West Future Build Traffic Analysis* in Appendix B. The project study area is along Bangerter Highway from milepost 3.8 to 4.9 and along 2700 West between 13640 South and 14000 South (see the *Study Area Map* in Appendix A).

Project work for the Proposed Action includes a center widening of Bangerter Highway and constructing a grade-separated interchange at Bangerter Highway and 2700 West with Bangerter Highway going over 2700 West. Project work would also include the associated on- and off-ramps; minor widening and restriping on 2700 West to accommodate the turn lanes for the new grade-separated interchange; installing sidewalks on both the east and west sides of 2700 West between 13640 South and 14000 South and 5-foot-wide bicycle lanes on both the east and west sides of 2700 West between 13760 South and 14000 South; modifying utilities and storm drainage; and installing new pavement, traffic signals, advanced traffic management systems (ATMS) equipment, and roadway signs. These improvements would improve traffic flow and safety on Bangerter Highway and 2700 West. The existing noise walls in the area would remain in place or would be replaced in kind where disturbed by the Proposed Action. Right-of-way acquisition will be required for this project.

See the *Bangerter Highway at 2700 West Alternatives Memo* in Appendix B for detailed information regarding the process of determining the Proposed Action.

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
Yes	Open House
Yes	Other: Project-specific scoping meetings, website, email, hotline, neighborhood meetings, and reoccurring meetings with Riverton City, the City of Bluffdale, and Jordan School District.
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: Public Scoping Meetings were held online via Zoom webinar on August 31, 2021, from 6:00 to 7:00 PM and in person at Bluffdale Elementary School (14323 South 2700 West in Bluffdale) on September 1, 2021, from 6:00 to 7:30 PM. A total of 12 comments were received during the comment period. Legal notices were published in accordance with Utah Administrative Code Rule R930-2 and UDOT's *Environmental Process Manual of Instruction* (MOI). See the *Bangerter Highway at 2700 West Public Scoping Report* in Appendix C.

A Neighborhood Meeting was held in person at Oquirrh Hills Middle School (12949 South 2700 West in Riverton) on April 12, 2022, from 6:00 to 7:30 PM. Invitees included both commercial and residential property owners whose properties might be affected by the project to build a grade-separated interchange. Notices for the meeting were posted on the project website and hand delivered.

Public Hearing opportunities were held in person at Oquirrh Hills Middle School (12949 South 2700 West in Riverton) on April 26, 2022, from 6:00 to 7:30 PM and online via a Zoom webinar on April 27, 2022, from 6:00 to 7:00 PM. A total of 16 comments were received during the comment period from April 11, 2022, to May 11, 2022. Legal notices were published in accordance with Utah Administrative Code Rule

R930-2 and UDOT's *Environmental Manual of Instruction*. See the *Bangerter Highway at 2700 West Public Meeting Report* in Appendix C. A summary of the public hearing documentation and responses to comments is included with this report.

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 Proposed Action would require acquiring right-of-way from properties along Bangerter Highway. The amount of right-of-way acquisition required is described below. Temporary and permanent right-of-way easements are not included in the descriptions below.

The approximate amount of right-of-way acquisition required is 2.43 acres, which would affect 23 parcels. This includes 20 partial property acquisitions (17 residential properties and 3 commercial properties) and up to 3 full residential property acquisitions (shown as "potential relocations" in the *Proposed Action Map* in Appendix A).

More information regarding the locations of right-of-way acquisitions, temporary construction easements, and perpetual easements is provided in the *Proposed Action Map* in Appendix A.

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.

No	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 Proposed Action would result in a finding of **adverse effect** for 1 architectural property, **no adverse effect** for 1 architectural property, and **no adverse effect** for 1 archaeological site and a finding of **no historic properties affected** for all remaining architectural properties and archaeological sites. Therefore, the Finding of Effect for the Proposed Action is **adverse effect**. See the *Determination of Eligibility and Finding of Adverse Effect*, SHPO concurrence, and the *Memorandum of Agreement* in Appendix D.

Native American consultation was initiated through letters sent to the Eastern Shoshone Tribe of the Wind River Reservation, Shoshone-Bannock Tribes, Northwestern Band of Shoshone Nation, Uintah and Ouray Ute Tribes, and Skull Valley Band of Goshute Indians (sent December 10, 2021). In addition, notification was also sent to those tribes with whom UDOT has Section 106 Programmatic Agreements: Cedar Band of Paiutes, Shivwits Band of Paiute Indian Tribe, and Confederated Tribes of the Goshute Reservation (sent December 10, 2021). To date, none of the tribes have responded to these notifications. Any future comments will be addressed. See the *Cultural and Paleontological Clearance with Tier 1 Screening Form* and the *Tribal Notification Form* in Appendix D.

6. PALEONTOLOGICAL

Yes	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):

N/A	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).
N/A	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.
N/A	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 the *Utah Geological Survey Letter* in Appendix D.

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 the *UDOT Threatened and Endangered Species and Wildlife Concurrence Memo* and the *Biological Resources Evaluation Memo* in Appendix D.

8. WILDLIFE

No	Project will affect state conservation agreement species, big game migration routes, habitat connectivity, migratory birds, or fish spawning habitat or fish passage.

Comments: See the *UDOT Threatened and Endangered Species and Wildlife Concurrence Memo* and the *Biological Resources Evaluation Memo* in Appendix D.

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.

Comments: The project includes earthwork, which has the potential to introduce noxious weeds. See *Mitigation Commitments*.

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: This project is considered a Type I project that requires a noise study due to the construction of a new interchange. Results from the noise study are summarized below. Detailed information is provided in the *Noise Study* in Appendix D.

Overall, noise levels with the Proposed Action would range from 38 to 69 A-weighted decibels (dBA) compared to the existing conditions of 32 to 66 dBA, and 12 of the 202 receptors would have traffic noise impacts (they would exceed noise-abatement criteria). Two of the impacted receptors would have future worst-case noise levels greater than or equal to an increase of 10 dBA over the existing noise level.

There are four existing noise walls along Bangerter Highway in the study area, two of which are 15 feet tall in the northeast and northwest quadrants, one of which is 16 feet tall in the southeast quadrant, and one of which is 12 feet tall in the southwest quadrant. Segments of the existing walls in the northeast, northwest, and southeast quadrants would be removed as part of the Proposed Action. Three noise barriers were evaluated as part of the noise analysis where noise impacts would occur in the areas where the existing walls would be removed as part of the Proposed Action. Each of these three noise barriers is recommended to be replaced “in kind” consistent with UDOT’s Noise Abatement Policy. See the Proposed Action map in Appendix A.

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.

Yes	Project exceeds the impact limitation for streams or washes identified 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 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

Yes	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: The Proposed Action would impact Rose Creek, a jurisdictional resource, as well as the Utah & Salt Lake Canal and ditch D-2, both of which are likely jurisdictional resources. Impacts to Rose Creek,

the Utah & Salt Lake Canal, and ditch D-2 would require a USACE Nationwide Permit 14, and impacts to Rose Creek would additionally require a Utah Stream Alteration Permit.

The table below summarizes the linear feet (LF) and acres of Rose Creek, the Utah & Salt Lake Canal, and ditch D-2 that would be impacted by the Proposed Action.

Aquatic Feature	Linear Feet Impacted		Linear Feet Replaced	
	Existing Channel	Existing Culvert	New Channel Segment	New Culvert
Rose Creek	1,051 LF (0.250 acre)	288 LF	1,047 LF	373 LF
Utah & Salt Lake Canal (C-1)	6 LF (0.002 acre)	0 LF	0 LF	6 LF
D-2	8 LF (0.0004 acre)	0 LF	0 LF	8 LF

The footprint of the proposed interchange would be partially within a Federal Emergency Management Agency (FEMA) Special Flood Hazard Area. A floodplain development permit must be obtained from the local floodplain administrator prior to construction. A pre-project Conditional Letter of Map Revision (CLOMR) and post-project Letter of Map Revision (LOMR) are anticipated.

See the *UDOT Environmental Review for Water Resources and Wetlands, Noxious Weeds, and Visual Aesthetics* and the *Aquatic Resources Delineation Report* in Appendix D.

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 and 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 records from the Utah Department of Environmental Quality (UDEQ) did not identify any hazardous materials sites near the study area. See the *Hazardous Materials Memo* in Appendix D.

The Proposed Action would not impact any hazardous materials sites, nor would any sites affect the Proposed Action. If hazardous materials are encountered during work, all work will stop in the area of contamination according to UDOT 2022 Standard Specification 01355, and the contractor will consult with UDOT and UDEQ to determine the appropriate remedial measures. See *Mitigation Commitments*.

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.

14. AIR QUALITY

Yes	This project has the potential to increase particulate matter due to construction activities.
No	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.

Comments: An air quality review was completed for this project. The review concludes that the construction of a grade-separated interchange would improve mobility and reduce congestion, resulting in lower levels of criteria pollutants in the study area compared to not building the interchange. Best management practices should be used in all construction phases in accordance with UDOT 2022 Standard Specifications for Road and Bridge Construction. See *Mitigation Commitments* and the *Air Quality Summary* in Appendix D.

15. RELOCATIONS

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

Comments: Relocations could be required from 3 residential parcels to accommodate the Proposed Action. UDOT anticipates that 20 parcels would require partial acquisition (17 residential properties and 3 commercial properties).

16. LAND USE/URBAN POLICY

No	This project may affect land use or urban policy.

17. SECTION 4(F) PROPERTIES

Projects under the 327 NEPA Assignment MOU and the 326 CE MOU require the implementation of Section 4(f) (DOT Act of 1966). This project does not fall under either MOU category, meaning that neither MOU is applicable to this project. This section remains included to follow the UDOT EPM format.

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:

Yes Active Transportation

Comments: Current active transportation facilities include sidewalks on the east and west sides of 2700 West between 13760 South and 14000 South, and bicycle lanes in the shoulders of the east and

west sides of 2700 West between 14000 South and Bangerter Highway. An existing pedestrian structure crosses over Bangerter Highway on the east side of 2700 West and would be removed with the Proposed Action.

The Proposed Action would provide sidewalks on both the east and west sides of 2700 West between 13640 South and 14000 South and 5-foot-wide bicycle lanes on both the east and west sides of 2700 West between 13760 South and 14000 South. A 6-foot-wide shoulder would be provided on both the east and west sides of 2700 West between 13760 South and 13640 South.

In addition, the 2019–2050 RTP includes proposed bicycle lanes on 2700 West from 14000 South to the Taylorsville City boundary (6600 South). In addition, the RTP and the *Bluffdale Parks, Trails, Recreation, and Open Space Master Plan* include a shared-use path adjacent to Rose Creek going from 2800 West and connecting to the Jordan River Parkway. The *Bluffdale Parks, Trails, Recreation, and Open Space Master Plan* also identifies a trail adjacent to the Utah & Salt Lake Canal. The Proposed Action is forward-compatible with these alternative transportation plans.

Yes Visual

Comments: The Proposed Action would elevate Bangerter Highway to cross over 2700 West at the existing grade. The visual changes would include the elevated roadway and associated structure**.** This option would have visual changes similar to the Bangerter Highway interchange projects at Redwood Road, 9000 South, 7800 South, 7000 South, 6200 South, and 5400 South.

No Social/Economic

N/A Title VI and/or Environmental Justice

No Natural Resources

Yes Construction

Comments: Delays on Bangerter Highway and 2700 West are anticipated during construction of the project. Closures of 2700 West or turning movements onto or off of 2700 West could occur during construction of the project.

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

Preliminary Engineering		Responsible
Floodplains	Obtain a Floodplain Development Permit from the local floodplain administrator prior to construction.	UDOT
Invasive Species	Include UDOT Special Provision Section 02924S, *Noxious Weed Control*, in the contract documents to require that earthmoving construction equipment be properly cleaned before mobilizing onto the project site.	UDOT
Relocations	Property owners will be compensated according to the requirements of the Utah Relocation Assistance Act.	UDOT
Streams	Apply for and obtain a Stream Alteration Permit from the Utah Division of Water Rights and a Nationwide Permit 14 from the U.S. Army Corps of Engineers. Include permits in contract documents.	UDOT
Water Quality	Comply with the Utah Construction General Permit (UCGP) by preparing a Storm Water Pollution Prevention Plan (SWPPP) during the design and advertisement; provide the SWPPP to the project-awarded contractor prior to Notice to Proceed.	UDOT

Construction		Responsible
Air Quality	Follow requirements in UDOT Standard Specification 01572, *Dust Control and Watering*, and UDOT 2022 Standard Specifications 01355 1.11, *Fugitive Dust*, Parts A, B, and C, will be followed.	Contractor
Environmental	Comply with UDOT 2022 Standard Specification 01355.	Contractor
Hazardous Waste	Comply with UDOT 2022 Standard Specification 01355 regarding the treatment and disposal of hazardous materials, if encountered.	Contractor
Invasive Species	Comply with UDOT Special Provision Section 02924S, *Noxious Weed Control*, requirements before construction by cleaning all earthmoving construction equipment before mobilizing onto the project site and avoiding unnecessary earth disturbance.	Contractor
Nighttime Construction Work	Comply with UDOT 2022 Standard Specification 00555 for nighttime construction work including notification, lighting, and temporary noise permits.	Contractor
Noise	Comply with UDOT 2017 *Special Provision*, Section 00555M, *Prosecution and Progress*, to reduce the impact of construction noise on the surrounding community.	Contractor
Streams	Comply with all conditions and findings in the U.S. Army Corps of Engineers Nationwide Permit 14 and the Stream Alteration Permit from the Utah Division of Water Rights.	Contractor

Construction		Responsible
Water Quality	Comply with UCGP by finalizing the SWPPP before beginning earth-disturbing activities; implement and maintain the project SWPPP throughout project construction.	Contractor
Visual	Reclaim all disturbed areas per UDOT standard specifications.	Contractor

Environmental Commitments Signature Page

Project Name: 2700 West Bangerter Interchange Project

Project Number: S-0154(92)0 **PIN:** 18808

The purpose of this page is to ensure the environmental commitments that are made while following the environmental process are reasonable and feasible to those divisions they will affect. Frequently, as in maintenance preservation projects, UDOT Standard Specifications will provide the mitigation necessary for potential environmental impacts and only require review by the Environmental Manager. However, if special commitments exist that cannot be mitigated by current UDOT Specifications, then additional review is required from both the Project Manager and District Engineer (or Designee). This signature page is required to be included on all UDOT environmental documents regardless of type.

☐ The environmental commitments in this document can be mitigated by following current UDOT specifications.

Required Signatures:

UDOT Environmental Manager:

Signature	Printed Name	Date

☑ The environmental commitments in this document require mitigation beyond what is provided by following current UDOT specifications. Special commitments are believed to be designable, financially feasible, constructible, and maintainable.

Required Review and Signatures:

UDOT Project Manager:

Signature	Printed Name	Date
Alex Fisher-Willis	Alex Fisher-Willis	07/05/2022

District Engineer or Designee:

Signature	Printed Name	Date
Kendall Draney	Kendall Draney	07/07/2022

Appendices

Appendix A: Project Figures

- Study Area Map
- Proposed Action Map

Appendix B: Traffic and Design

- Bangerter Highway at 2700 West Existing and 2050 No Build Traffic Analysis
- Bangerter Highway at 2700 West Future Build Traffic Analysis
- Bangerter Highway at 2700 West Alternatives Memo

Appendix C: Public Involvement

- Bangerter Highway at 2700 West Public Scoping Report
- Correspondence and Coordination
- Bangerter Highway at 2700 West Public Meeting Report

Appendix D: Environmental Resources

- Right-of-Way Property Impacts
- Determination of Eligibility and Finding of Adverse Effect Letter
- SHPO Concurrence Letter
- Memorandum of Agreement
- Tribal Notification Form
- Utah Geological Survey Letter
- UDOT Threatened and Endangered Species and Wildlife Concurrence Memo and Biological Resources Evaluation Memo
- UDOT Environmental Review for Water Resources and Wetlands, Noxious Weeds, and Visual Aesthetics and Aquatic Resources Delineation Report
- Noise Study
- Hazardous Materials Memo
- Air Quality Summary

Appendix A: Project Figures

Study Area Map



Legend

- Tenth Milepost
- 2700 West - Study Area

18808: Bangerter Highway at 2700 West

Study Area

0 0.125 0.25 Miles

Appendix A: Project Figures

Proposed Action Map

PROPOSED ACTION

Existing Noise Wall - 12 ft
Remain In Place

Existing Noise Wall - 15 ft
Replace in Kind

Existing Noise Wall - 15 ft
Replace in Kind

Existing Noise Wall - 16 ft
Replace in Kind

Existing Noise Wall - 16 ft
Remain In Place

Existing Noise Wall - 15 ft
Remain In Place

Existing Noise Wall - 15 ft
Replace in Kind

Detention Basin

Detention Basin

Detention Basin

Rose Creek

Utah & Salt Lake Canal

Rocky Mountain Power Substation

North Star Academy

Midvalley Bible Church

Bangerter Highway

2700 West

ASHERWOODS CV
KAILYE LN
HACKLE LN
3200 W
3160 W
2990 W
2950 W
2860 W
2780 W
2600 W
2550 W
2200 W
SANBORN DR
CLYDESDALE CIR
SADDLE HORN DR
HOMESTEAD LN
13800 S
13680 S
13640 S
13760 S
14000 S

1105 1106 1107 1108 1109 1110 1111 1112 1113 1114 1115 1116 1117 1118 1119 1120 1121 1122 1123 1124 1125 1126 1127 1128 1129 1130 1131 1132 1133 1134 1135 1136 1137 1138 1139 1140 1141 1142 1143 1144 1145 1146 1147 1148 1149 1150 1151 1152 1153 1154 1155 1156 1157 1159 1160 1161 1162 1163 1164 1165 1166 1167 1168 1169 1170 1171 1173 1175 1216 1218 1219 1220 1221 1222 1223 1224 1225 1226 1227 1228 1229 1230 1231 1232 1233 1234 1235 1236 1237 1238 1239 1240 1241

LEGEND

- Potential Relocation
- Partial Acquisitions
- ROW Coordination Required
- Existing Noise Wall - Remain In Place
- Existing Noise Wall - Replace in Kind
- Mainline Pavement
- Rose Creek Relocation
- Rose Creek/Utah & Salt Lake Canal
- UDOT Parcels
- Detention Basins

Appendix B: Traffic and Design

Bangerter Highway at 2700 West Existing and 2050 No Build Traffic Analysis

MEMORANDUM

To: UDOT Region Two & Environmental

From: Avenue Consultants

Date: March 7, 2022

Subject: Bangerter Highway & 2700 West Existing and 2050 No Build Traffic Analysis

The Utah Department of Transportation (UDOT) is performing an environmental study for a potential new interchange on Bangerter Highway at the existing 2700 West at-grade intersection. This memorandum summarizes the traffic evaluation for existing and future (2050) no build conditions within the study area. For this analysis, the study area consists of the Bangerter Highway corridor from 13400 South to Redwood Rd and the 2700 West corridor from 13730 South to south driveway of the Saddle Back office warehouse development on the southeast corner of the Bangerter Highway intersection. The study area is illustrated in **Figure 1**.



Figure 1: Bangerter Highway & 2700 West Traffic Analysis Study Area

1 ANALYSIS METHODOLOGY

The analysis described in this memorandum utilized project traffic data, Vissim traffic operations software and the Wasatch Front Regional Council (WFRC) / Mountainland Associated of Governments (MAG) travel demand model for year 2050 traffic forecasts. This section describes how each of these tools were implemented for this project.

1.1 Travel Demand Modeling

The WFRC/MAG travel demand model (TDM) is a tool used to predict future travel and traffic volumes for the Wasatch Front area. The TDM is jointly owned and maintained by the WFRC and the MAG, which are the Metropolitan Planning Organizations for the Wasatch Front and are responsible for coordinating transportation planning in the region. WFRC is responsible for Weber, Davis, and Salt Lake Counties and MAG for Utah County. Version 8.3.1 of the TDM was used for this study.

The travel demand model has two primary inputs: land use data and transportation system data. The land use data consists of residential and employment data for the entire region. This data is prepared in geographic blocks called Traffic Analysis Zones (TAZs). The travel model inputs are prepared for a base year, which in this case was 2019, and for a future year, which in this case was 2050. A base year of 2019 was used because both travel model socioeconomic inputs and published traffic volume data are available for that year. In travel modeling, the base year always lags the current year by a few years because of the need to have land use input and calibration data.

To prepare the model for use, several TAZs were split in the study area and added corresponding roads to improve the resolution of the model in the area and to reflect local travel patterns more accurately. A figure showing the TAZ splits in the study area can be found in **Appendix A: Traffic Analysis Zones**.

To validate the model for the study area, base year model volumes were compared to published traffic volumes. Free flow speeds on some roadways in the study area were adjusted to bring the model volumes closer to the observed volumes. The most common measure for model validation purposes is the Percent Root Means Square Error (RMSE). RMSE is a measure of the accuracy of traffic assignment that measures the average error between the observed and modeled traffic volumes on roadway links with traffic counts. For model validation, traffic counts from UDOT's Traffic on Utah Highways were utilized. These counts provide Annual Average Daily Traffic (AADT) on state highways and federal aid roads. These AADTs were used to estimate Average Weekday Daily Traffic (AWDT) traffic for comparison to the travel model output using statewide traffic factors provided to UDOT. **Table 1** summarizes the RMSE for Bangerter Highway and cross streets from I-15 to I-80. Overall, 89 roadway segments were evaluated and the TAZ splits along with speed adjustments reduce the RMSE on these corridors compared to the base model.

Table 1: Bangerter Highway and Cross Streets - Percent Root Means Square Error

Vehicles per Day	# of Links	2019 WFRC Base Model	2019 Revised Model
0-9,999	16	176%	125%
10,000-19,999	7	23%	16%
20,000-29,999	16	35%	36%
30,000-49,999	28	33%	25%
50,000-59,999	8	16%	14%
60,000+	14	23%	17%
Area Wide	**89**	**32%**	**25%**

In consultation with region's cities, WFRC and MAG prepare future land use projections. These projections are used by the MPOs to develop the Regional Transportation Plan (RTP), which is the plan for the development of the future transportation system. The RTP includes a list of projects that are planned to meet future transportation needs over a 30+ year horizon.

Although WFRC coordinates with local jurisdictions in preparation of the land use projections, some adjustments were made to the 2050 projections in West Valley City and southwest Salt Lake County. Because of their proximity to the 2700 West study area, the southwest Salt Lake County adjustments are described in a little more detail.

The adjustments in southwest Salt Lake County are based on the latest approved plans for Olympia Hills and Daybreak and reflect additional households and employment beyond the RTP. A comparison of the differences is presented in **Table 2** for specific areas**.** The East Daybreak area is the only in between Bangerter Highway and Mountain View Corridor (MVC). The other areas are all west of MVC with the Midas area largely being west of Bacchus Highway and associated with land own by Rio Tinto.

Table 2: Southwest Salt Lake County Households and Employment Modifications Summary

Area	# of TAZs	2050 Households		2050 Employment	
		RTP Households	Adjusted Households	RTP Employment	Adjusted Employment
Midas	10	3,692	3,881	5,682	5,902
West Daybreak	13	6,000	8,124	11,123	10,773
East Daybreak	23	9,718	11,557	9,972	10,636
Northeast Herriman	7	6,598	6,270	1,746	1,746
Olympia Hills	2	2,769	6,801	330	2,473
Total	**55**	**28,778**	**36,633**	**28,853**	**31,530**

1.2 Traffic Operations Analysis

The Vissim software was selected for this study because it allows for the evaluation of freeways, closely spaced intersections, and the interaction between the two facilities. Vissim allows for driving behaviors to be modified, can collect travel time data for user-specified segments and can measure queue lengths at study intersections, which collectively are used to calibrate the model to observed conditions.

Existing traffic signal timing data were obtained from the UDOT Traffic Operations Center and used in modeling signalized intersections in Vissim. The intersections within the study area were modeled according to existing geometry and speeds. The study area was modeled as a network; however, the analysis was completed for each intersection independently.

1.2.1 Traffic Volumes / Data Collection

Turning movement counts were collected on Thursday, April 27, 2021, for the AM (7:00-9:00) and PM (4:00-6:00) peak periods at the study intersections shown in **Figure 2**. To account for reduced volumes due to the Covid-19 pandemic, two different approaches were utilized. The first was to simply compare the 2021 traffic intersection counts to pre-pandemic counts at that same location. Generally, the volume for each turning movement were compared between the available counts and the large volume was selected for use. The second approach was used at locations for which previous intersection counts were unavailable. In these cases, volume adjustment factors were developed using current and historic traffic volume data obtained from UDOT's Automated Traffic Signal Performance Measures (ATSPM) system. These data showed that the 2021 count volumes were approximately 12% lower than pre-pandemic volumes for the AM peak hour and 5% lower for the PM peak hour. Thus, the 2021 volumes were increased by 12% and 5% for the AM and PM peak hours, respectively.

The adjusted turning movement traffic volumes were balanced throughout the study area so that the volume exiting one intersection was the same as the volume arriving at the next intersection to create the existing AM and PM peak hour volumes to be used for the traffic analysis. A figure showing the existing intersection traffic volumes can be found in **Appendix B: Peak Hour Traffic Volumes**.

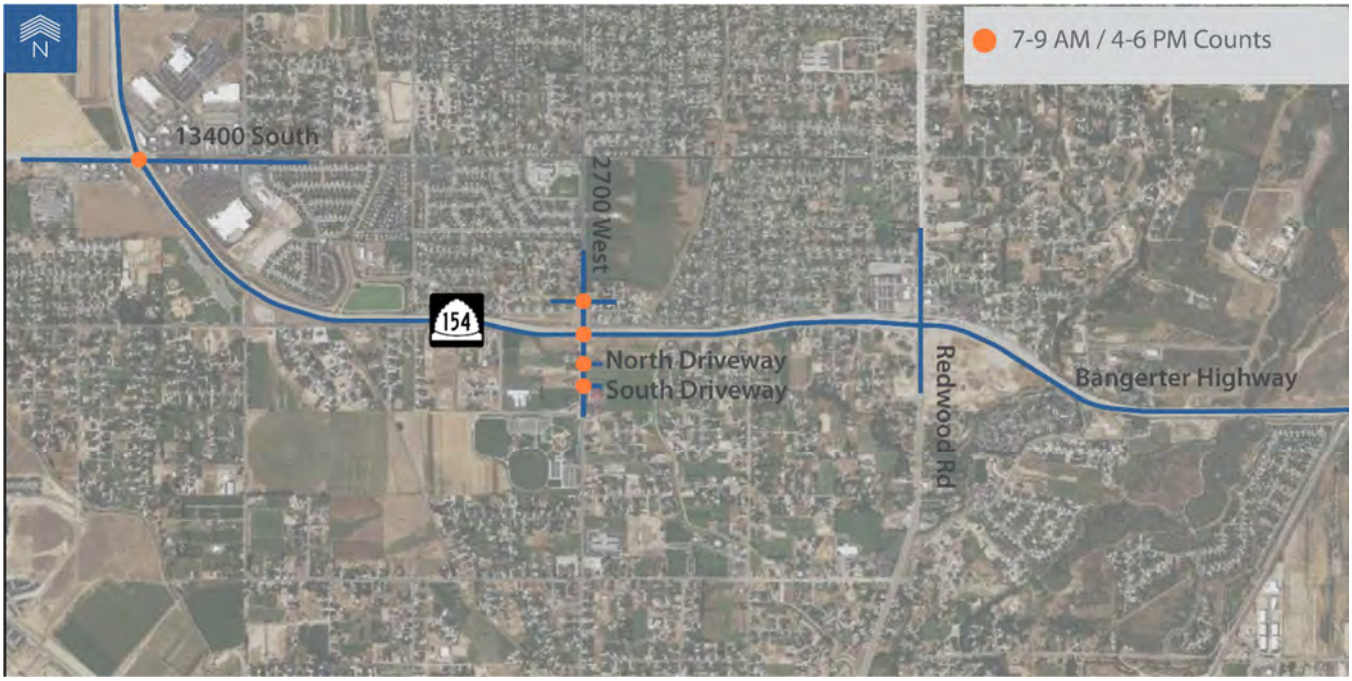


Figure 2: Intersection Turning Movement Count Locations

The future AM and PM peak hour volumes were developed for year 2050 using principles described in the National Highway Cooperative Research Program (NCHRP) Report 255 document. The forecast peak period intersection volumes were developed from the existing peak hour traffic volumes and data from the WFRC/MAG travel demand model. The travel model was run for the base year (2019) and for the future year (2050) and the difference between these models was used to estimate the traffic growth, which was applied to the existing traffic volumes. The future volumes were then balanced to ensure the correct number of inbound and outbound vehicles on each leg of the intersection. Included in Appendix B: Peak Hour Traffic Volumes are figures presenting the resulting 2050 No Build traffic volumes used for the traffic analysis.

1.2.2 Measures of Effectiveness

The operational analysis is based upon Vissim output correlated to the *Highway Capacity Manual (HCM), 6th Edition* methodologies, which describes how transportation system performance can be measured and ranked by level of service (LOS). LOS is measured quantitatively and reported on a scale from A to F, with A representing the best performance and F the worst.

The primary measure of effectiveness for this study was intersection performance. For intersections LOS is based on average vehicle delay measured in seconds per vehicle. Delay and LOS are determined for each turning movement, approach, and the overall intersection. For signalized intersections, the overall intersection LOS is most commonly reported. For unsignalized intersections, the LOS for the approach with worst delay is most commonly reported. **Table 3** provides details regarding LOS criteria thresholds for intersections.

Table 3. Intersection Level of Service Criteria

Level of Service	Traffic Conditions	Average Delay (seconds/vehicle)	
		Unsignalized	Signalized
A	Free Flow Operations / Insignificant Delay	0 ≤ 10	0 ≤ 10
B	Smooth Operations / Short Delays	>10.0 and ≤ 15.0	> 10 and ≤ 20
C	Stable Operations / Acceptable Delays	>15.0 and ≤ 25.0	> 20 and ≤ 35
D	Approaching Unstable Operations / Tolerable Delays	>25.0 and ≤ 35.0	> 35 and ≤ 55
E	Unstable Operations / Significant Delays Begin	>35.0 and ≤ 50.0	> 55 and ≤ 80
F	Very Poor Operations / Excessive Delays Occur	> 50.0	> 80

Source: Highway Capacity Manual, 6th Edition, *Transportation Research Board National Research Council, Washington D.C*

Another important measure of effectiveness is 95th percentile queue length for each turning movement and is the vehicle queue distance that will only be exceeded five percent of the time during the analysis period and helps identify issues such as queuing between intersections and queues that exceed their turning movement storage.

1.2.3 Model Calibration

Vissim model calibration focused on matching observed queues, travel times, and vehicle behavior to observed conditions. The objective of the model calibration was to obtain the best match possible between model results and the field data. The traffic model calibration focused on matching traffic volumes, observed queues, and vehicle behavior to existing travel patterns within the study area. During the Vissim calibration, model outputs were compared against field data to determine if the model output reflected observed traffic conditions and driving behaviors were adjusted as necessary to replicate existing travel times, delays, and queues.

It was determined through the calibration effort that the Vissim parameters for additive and multiplicative part of safety distance needed to be increased to replicate existing queues and travel times along east-west approaches of Bangerter Highway & 2700 West. Look ahead distances, priority rules, and conflict areas were also used to help mimic existing driver behavior between intersections and driveways to prevent unrealistic gridlocked conditions in the model.

2 EXISTING AND 2050 NO BUILD ANALYSIS RESULTS

The analysis results presented in this section include intersection delay, intersection LOS, and 95th percentile queue lengths. For each Vissim analysis (e.g., Existing Conditions, 2050 No Build), the model was run enough times to produce statistically significant results (10 times with a GEH statistic of less than 5) and the results averaged.

2.1 Existing Conditions

The estimated existing delay and LOS for the study intersections are shown in **Table 4**, while **Figure 3** shows similar information. During the AM peak hour, the intersection of 2700 West & Bangerter Highway operates at LOS E. During PM peak hour it operates at LOS D.

Table 4. Existing Intersection Level of Service and Delay

Intersection	LOS / Delay (sec / veh)	
	AM Peak Hour	PM Peak Hour
13400 South & Bangerter Hwy	E / 62	E / 60
2700 West & Bangerter Hwy	E / 74	D / 39
Redwood Rd & Bangerter Hwy	C / 27	D / 38
2700 West & 13730 South	A / 6 (EB)[1]	A / 6 (EB)[1]
2700 West & North Driveway	A / 4 (WB)[1]	A / 3 (WB)[1]
2700 West & South Driveway	A / 9 (WB)[1]	A / 8 (WB)[1]
[1]For unsignalized intersections, the approach with the highest delay is reported		



Figure 3: Existing AM and PM Peak Hour Intersection LOS

Individual intersection turning movements of LOS E or F at Bangerter Highway & 2700 West are summarized in **Table 5**. For the AM peak hour, there are five movements at LOS E or F and six during the PM peak hour. Details of the existing delay and LOS for each intersection turning movement is summarized in **Appendix C: Existing Intersection Movement Level of Service**.

Table 5. Existing 2700 West & Bangerter Hwy Movement Level of Service at LOS E/F

Location	AM Peak Hour		PM Peak Hour	
	Movement	LOS / Delay[1]	Movement	LOS / Delay[1]
2700 West & Bangerter Hwy	Northbound Through	E / 62	Northbound Left	E / 63
2700 West & Bangerter Hwy	Eastbound Left	F / 145	Northbound Through	E / 76
2700 West & Bangerter Hwy	Eastbound Through	F / 117	Southbound Left	F / 84
2700 West & Bangerter Hwy	Eastbound Right	F / 83	Southbound Through	E / 78
2700 West & Bangerter Hwy	Westbound Left	F / 87	Eastbound Left	F / 110
2700 West & Bangerter Hwy	-	-	Westbound Left	F / 110

1. Average delay reported in seconds/vehicle

Estimated 95th percentile queue lengths are presented in **Table 6** for the three Bangerter Highway intersections in the study area. At 2700 West, there is substantial queuing of approximately 3,500 feet for the eastbound approach during the AM peak hour and of over 2,000 feet for the westbound approach during the PM peak hour. Queueing of nearly 1,600 feet occurs on the northbound approach at 13400 South.

Table 6. Existing 95th Percentile Queue Lengths

Intersection	Approach	AM Existing (feet)	PM Existing (feet)
13400 South & Bangerter Hwy	Northbound	1,575	850
13400 South & Bangerter Hwy	Southbound	575	475
13400 South & Bangerter Hwy	Eastbound	875	450
13400 South & Bangerter Hwy	Westbound	175	475
2700 West & Bangerter Hwy	Eastbound	3,450	625
2700 West & Bangerter Hwy	Westbound	325	2,175
Redwood Rd & Bangerter Hwy	Northbound	250	300
Redwood Rd & Bangerter Hwy	Southbound	175	400
Redwood Rd & Bangerter Hwy	Eastbound	75	75
Redwood Rd & Bangerter Hwy	Westbound	300	600

2.2 2050 No Build Conditions

For the 2050 No Build evaluation, the traffic analysis focused on the 2700 West & Bangerter Highway intersection. The 2050 analysis assumes that all projects in the WFRC RTP will be built with the exception of the Bangerter interchange at 2700 West, which is the subject of this study. As previously stated, the future 2050 volumes were forecast using the TDM. Planned transportation projects near the study area are shown in **Appendix D: Planned Transportation Projects** and include:

- Mountain View Corridor (MVC) as a freeway *(RTP Project R-S-102 & R-S-103)*
- Reversible lanes on 12600 South between Bangerter Hwy and Mountain View Corridor (MVC) (*RTP Project R-S-68)*
- 13400 South as a local expressway between MVC and Bangerter Hwy *(RTP Project R-S-74)*
- 13800 South connection between 4170 West and MVC Frontage Road *(RTP Project R-S-75)*
- Bangerter Highway as a freeway except for 2700 West
- Redwood Road widening to seven lanes from Bangerter Highway to Porter Rockwell Boulevard *(RTP Project R-S-122)*
- 14000 South connection between 3600 West and 2700 West *(RTP Project R-S-76)*

As presented in **Table 7**, by 2050 the signalized intersection at 2700 West and Bangerter Highway is anticipated to operate at LOS F with extreme delays in both the AM and PM peak hours if no changes are made to the intersection. Intersection LOS for the 2050 No Build AM and PM peak hours for the 2700 West study intersections is shown in **Figure 4**.

Table 7. 2050 No Build Intersection Level of Service & Delay

Location	2050 LOS / Delay (sec / hr)	
	AM Peak Hour	PM Peak Hour
13400 South & Bangerter Hwy	D / 53	D / 49
2700 West & Bangerter Hwy	F / 100	F / 129
Redwood Rd & Bangerter Hwy	F / >180	F / > 180

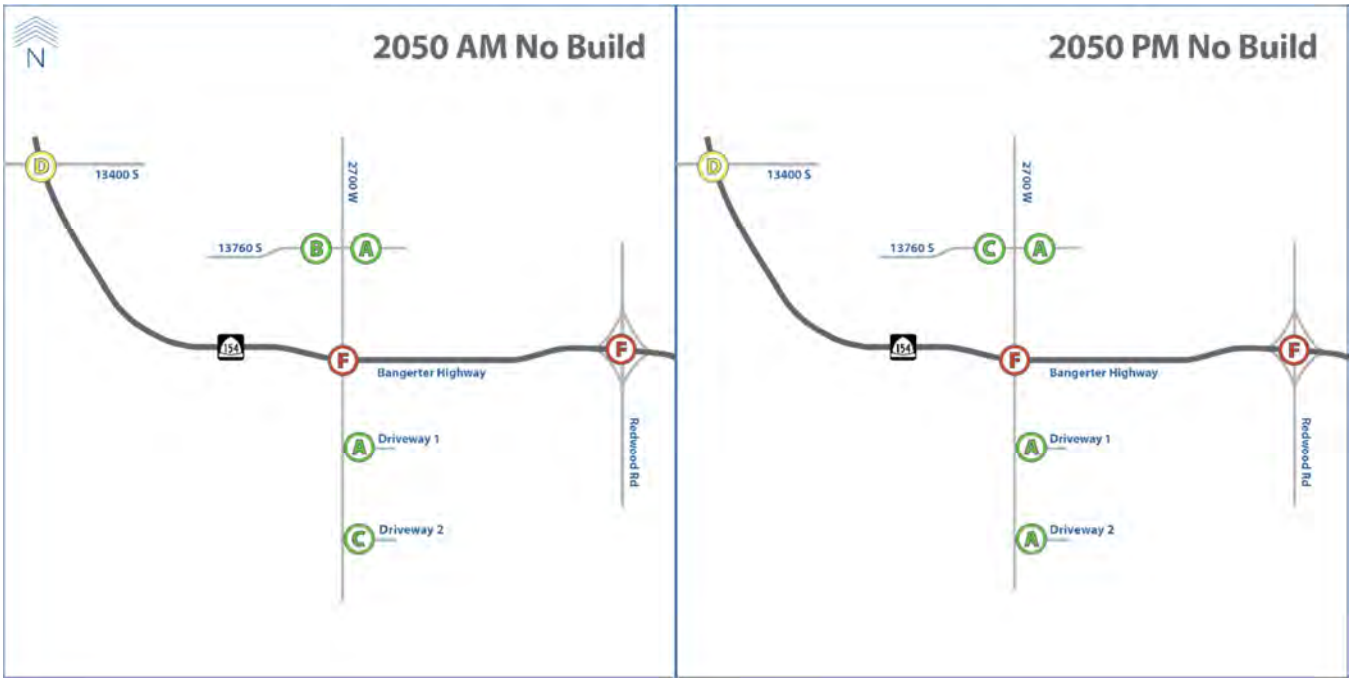


Figure 4: 2050 No Build AM and PM Peak Hour Intersection LOS

Individual turning movements at 2700 West and Bangerter Highway that are expected to operate at LOS E or F in the 2050 No Build alternative are summarized in **Table 8**. For the AM peak hour, eight of the twelve possible movements are expected to operate at LOS E or F. For PM peak hour, nine of the twelve possible movements are expected to operate at LOS E or F. Some of the movements would have extreme delays of over three minutes per vehicle. Details of the 2050 No Build delay and LOS for each intersection turning movement are summarized in **Appendix E: 2050 No Build Intersection Movement Level of Service**.

Table 8. 2050 No Build 2700 West & Bangerter Hwy Movement Level of Service at LOS E/F

Location	AM Peak Hour		PM Peak Hour	
	Movement	2050 No Build LOS / Delay[1]	Movement	2050 No Build LOS / Delay[1]
2700 West & Bangerter Hwy	Northbound Left	F / 92	Northbound Left	E / 75
2700 West & Bangerter Hwy	Northbound Through	F / 147	Northbound Through	F / 89
2700 West & Bangerter Hwy	Southbound Left	F / 120	Southbound Left	F / 110
2700 West & Bangerter Hwy	Southbound Through	E / 71	Southbound Through	F / 93
2700 West & Bangerter Hwy	Eastbound Left	F / >180	Eastbound Left	F / 97
2700 West & Bangerter Hwy	Eastbound Through	F / 150	Eastbound Through	E / 68
2700 West & Bangerter Hwy	Eastbound Right	F / 124	Westbound Left	F / > 180
2700 West & Bangerter Hwy	Westbound Left	F / 107	Westbound Through	F / > 180
2700 West & Bangerter Hwy	-	-	Westbound Right	F / 178

1. Average delay reported in seconds/vehicle

The 95th percentile queue lengths presented in **Table 9** are of the approaches with the longest queue lengths from the 2050 No Build analysis. The largest difference between the Existing and 2050 No Build conditions occur on the eastbound and westbound approaches at Bangerter Highway with an average increase of nearly 2,000

feet. The eastbound queue increases by approximately 2,000 feet to 5,450 feet during the AM peak hour. This ***results in queues backing to almost the 13400 South interchange***. The westbound approach queue increases by approximately 2,500 feet to 4,650 feet for the PM peak hour, ***which results in queues backing to the ramps at the Redwood Road Interchange***. North-south queues on 2700 West would also substantially increase, particularly during AM peak hour, which shows an increase of approximately 800 feet to 1,300 feet. With increased traffic demand and queue lengths, traffic operations are expected to dramatically deteriorate within the study area.

Table 9. Existing and 2050 No Build 95th Percentile Queue Lengths

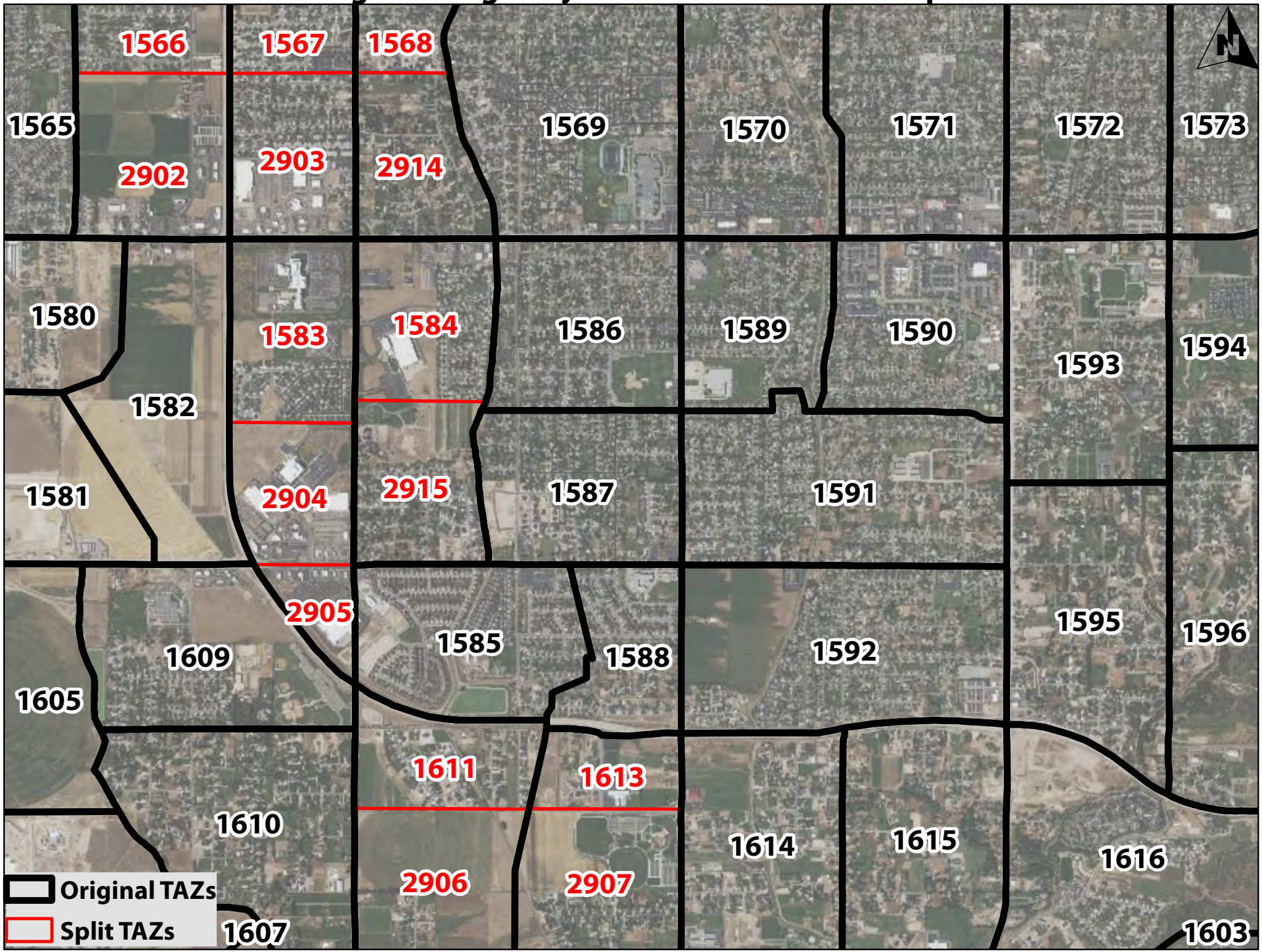
Intersection	Approach	AM Peak Hour			PM Peak Hour		
		Existing (feet)	2050 No Build (feet)	Change 2021-2050 (feet)	Existing (feet)	2050 No Build (feet)	Change 2021-2050 (feet)
2700 West & Bangerter Hwy	Northbound	225	1,275	+1,050	250	675	+425
2700 West & Bangerter Hwy	Southbound	475	800	+325	650	1,250	+600
2700 West & Bangerter Hwy	Eastbound	3,450	5,425	+1,975	625	2,500	+1,875
2700 West & Bangerter Hwy	Westbound	325	1,900	+1,575	2,175	4,650	+2,475

3 CONCLUSION

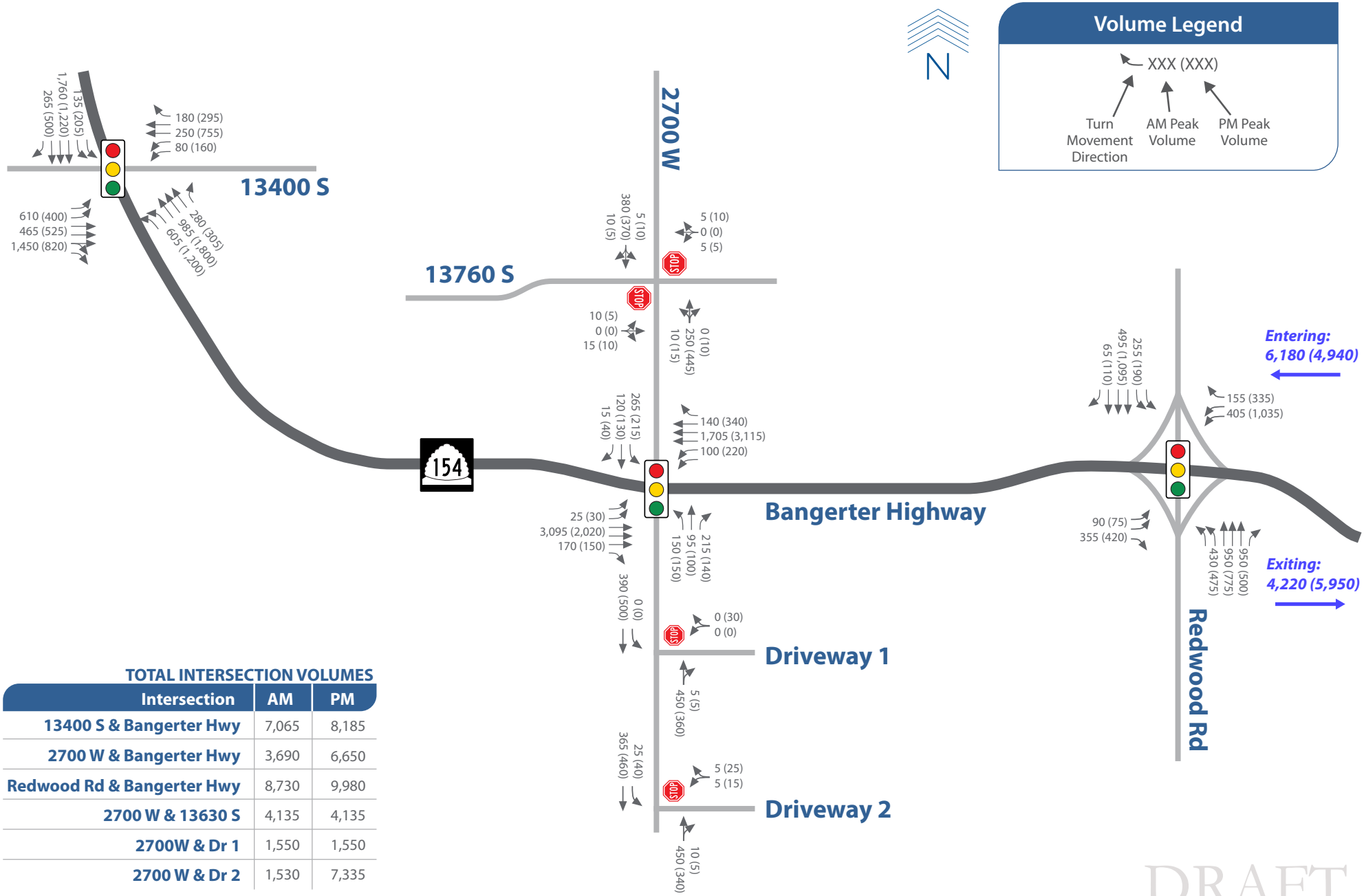
The analysis shows that there are existing movements at the 2700 West and Bangerter Hwy intersection that operate at LOS E and F. With no intersection modifications, delays at that intersection are anticipated to more than triple by 2050, such that nine out of twelve intersection turning movements would be expected to operate at LOS E or F in both the AM and PM peak hours under 2050 No Build conditions. Queues on both Bangerter Highway and 2700 West would extend through the adjacent interchanges in the peak directions in both the AM and PM peak hours.

APPENDIX A: TRAFFIC ANALYSIS ZONES

Bangerter Highway & 2700 West Area TAZ Splits



APPENDIX B: PEAK HOUR TRAFFIC VOLUMES



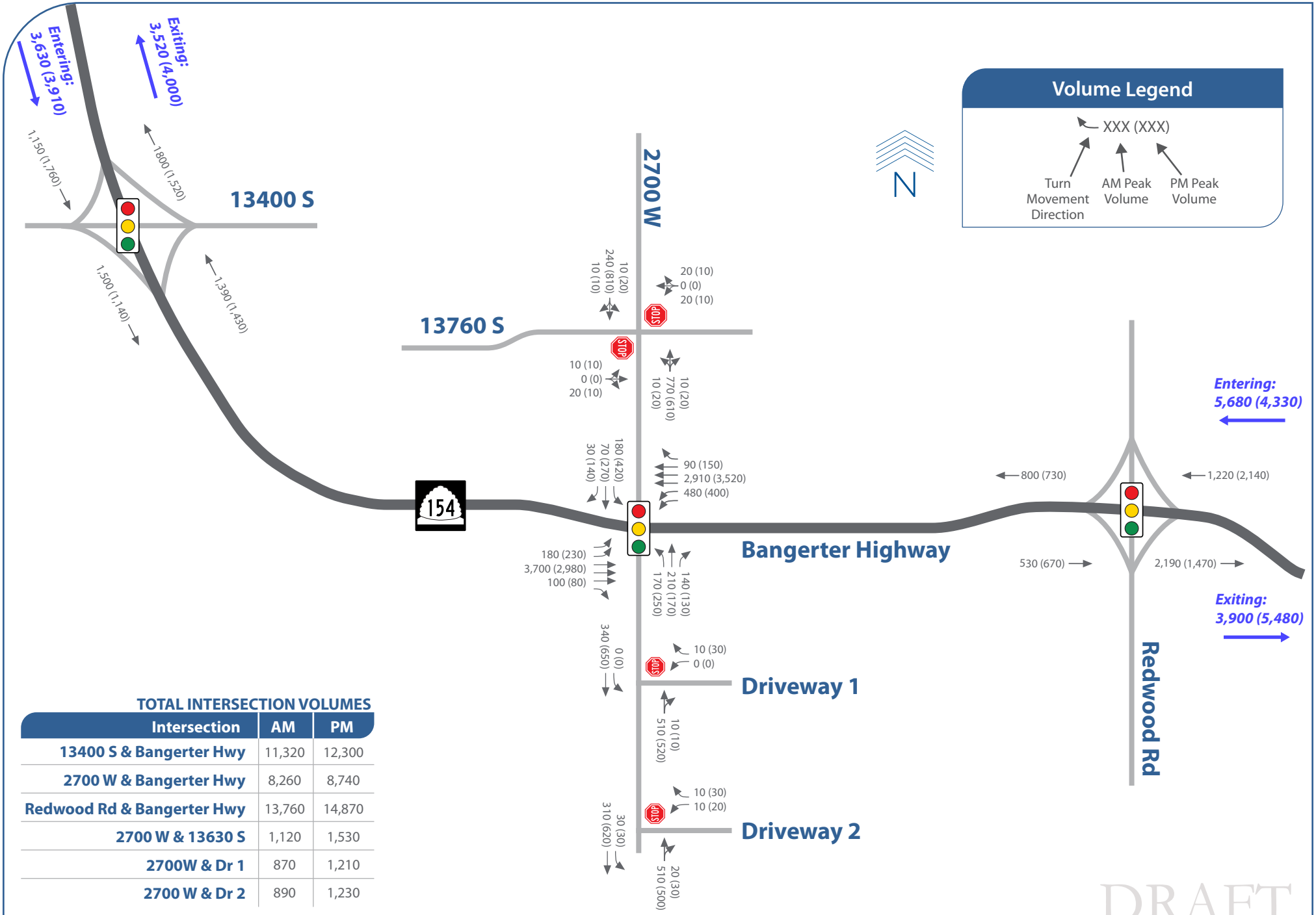
TOTAL INTERSECTION VOLUMES

Intersection	AM	PM
13400 S & Bangerter Hwy	7,065	8,185
2700 W & Bangerter Hwy	3,690	6,650
Redwood Rd & Bangerter Hwy	8,730	9,980
2700 W & 13630 S	4,135	4,135
2700W & Dr 1	1,550	1,550
2700 W & Dr 2	1,530	7,335

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Existing Peak Hour Traffic Volumes

2700 South & Bangerter Highway Environmental Study



TOTAL INTERSECTION VOLUMES

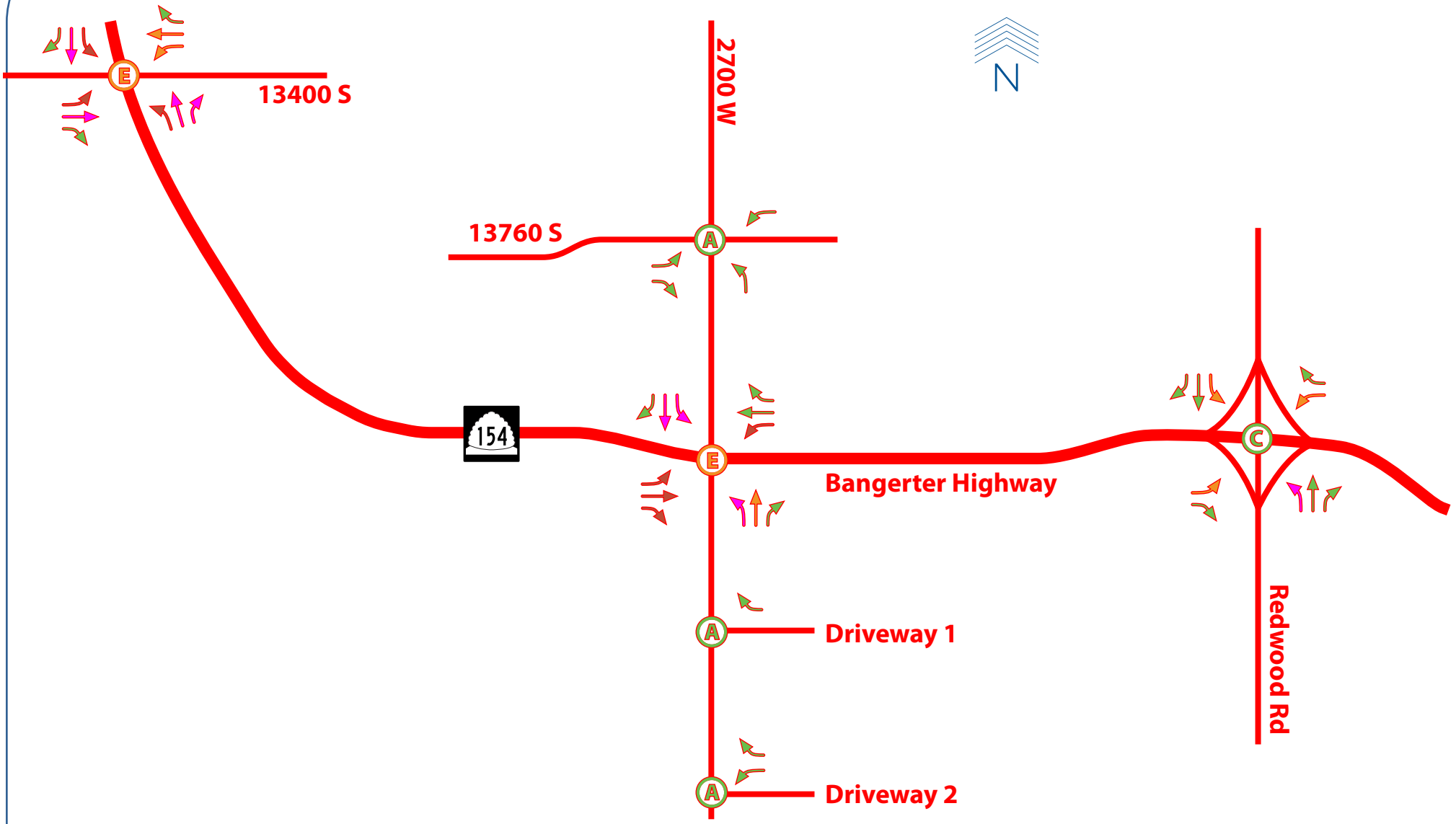
Intersection	AM	PM
13400 S & Bangerter Hwy	11,320	12,300
2700 W & Bangerter Hwy	8,260	8,740
Redwood Rd & Bangerter Hwy	13,760	14,870
2700 W & 13630 S	1,120	1,530
2700W & Dr 1	870	1,210
2700 W & Dr 2	890	1,230

DRAFT

2050 No Build Peak Hour Traffic Volumes

2700 South & Bangerter Highway Environmental Study

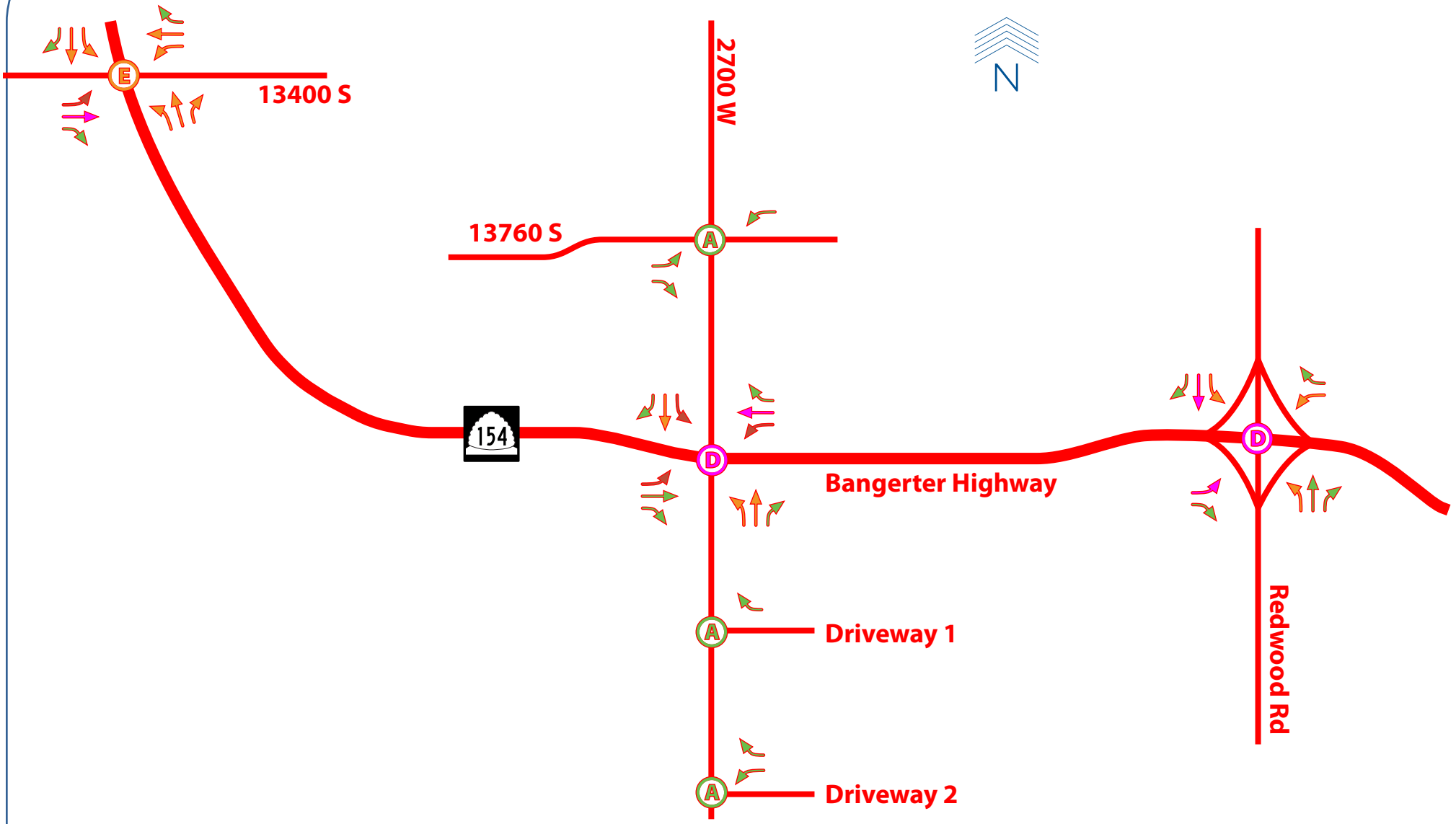
APPENDIX C: EXISTING LEVEL OF SERVICE RESULTS



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Existing AM Intersection Level of Service

2700 South & Bangerter Highway Environmental Study



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Existing PM Intersection Level of Service

2700 South & Bangerter Highway Environmental Study

2700 West Bangerter Environmental

VISSIM Volume, Queue, and Delay Results

Existing AM

LOS Category: Signalized

1: 2700 W & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	150	143	95%	50	225	50	D
NBT	95	96	101%	25	175	62	E
NBR	215	214	100%	25	250	25	C
NB	**460**	**453**	**98%**			**41**	D
SBL	265	261	98%	100	475	53	D
SBT	120	122	102%	25	150	52	D
SBR	15	14	93%	0	25	5	A
SB	**400**	**397**	**99%**			**51**	D
EBL	25	21	84%	0	50	145	F
EBT	3,095	2,981	96%	1,475	3,450	117	F
EBR	170	173	102%	0	50	83	F
EB	**3,290**	**3,175**	**97%**			**115**	F
WBL	100	99	99%	50	175	87	F
WBT	1,705	1,717	101%	50	325	16	B
WBR	140	140	100%	0	100	5	A
WB	**1,945**	**1,956**	**101%**			**19**	B
Total	**6,095**	**5,981**	**98%**			**74**	E

Node Letter: U VISSIM ID: 2700

LOS Category: Unsignalized

2: East 13630 S & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	5	4	80%	0	0	6	A
WB	**5**	**4**	**80%**			**6**	A
Total	**5**	**4**	**80%**			**6**	A

Node Letter: UA VISSIM ID: 3402

LOS Category: Unsignalized

3: West 13630 S & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	10	10	100%	0	0	1	A
NB	**10**	**10**	**100%**			**1**	A
EBL	10	9	90%	0	25	8	A
EBR	15	16	107%	0	0	7	A
EB	**25**	**25**	**100%**			**7**	A
Total	**35**	**35**	**100%**			**6**	A

Node Letter: UA VISSIM ID: 3403

LOS Category: Unsignalized

4: Dr 1 & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	10	9	90%	0	25	4	A
WB	**10**	**9**	**90%**			**4**	A
Total	**10**	**9**	**90%**			**4**	A

Node Letter: UB VISSIM ID: 3404

Existing PM

LOS Category: Signalized

1: 2700 W & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	150	146	97%	50	250	63	E
NBT	100	100	100%	50	175	76	E
NBR	140	137	98%	0	100	14	B
NB	**390**	**383**	**98%**			**49**	D
SBL	215	209	97%	150	650	84	F
SBT	130	135	104%	50	225	78	E
SBR	40	38	95%	0	25	6	A
SB	**385**	**382**	**99%**			**74**	E
EBL	30	31	103%	25	75	110	F
EBT	2,020	2,037	101%	125	625	24	C
EBR	150	154	103%	0	50	7	A
EB	**2,200**	**2,222**	**101%**			**24**	C
WBL	220	221	100%	100	225	110	F
WBT	3,115	3,128	100%	575	2,175	41	D
WBR	340	334	98%	0	125	24	C
WB	**3,675**	**3,683**	**100%**			**43**	D
Total	**6,650**	**6,670**	**100%**			**39**	D

Node Letter: U VISSIM ID: 2700

LOS Category: Unsignalized

2: East 13630 S & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	10	8	80%	0	0	5	A
WB	**10**	**8**	**80%**			**6**	A
Total	**10**	**8**	**80%**			**6**	A

Node Letter: UA VISSIM ID: 3402

LOS Category: Unsignalized

3: West 13630 S & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	15	16	107%	0	75	3	A
NB	**15**	**16**	**107%**			**3**	A
EBL	5	4	80%	0	25	10	A
EBR	10	9	90%	0	0	7	A
EB	**15**	**13**	**87%**			**8**	A
Total	**30**	**29**	**97%**			**5**	A

Node Letter: UA VISSIM ID: 3403

LOS Category: Unsignalized

4: Dr 1 & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	30	28	93%	0	25	3	A
WB	**30**	**28**	**93%**			**3**	A
Total	**30**	**28**	**93%**			**3**	A

Node Letter: UB VISSIM ID: 3404

Existing AM

LOS Category: Unsignalized

5: Dr 2 & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBL	5	4	80%	0	25	11	B
WBR	5	5	100%	0	25	7	A
WB	**10**	**9**	**90%**			**9**	**A**
Total	**10**	**9**	**90%**			**9**	**A**

Node Letter: UC VISSIM ID: 3405

LOS Category: Signalized

6: 13400 S & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	605	561	93%	525	1,575	283	F
NBT	985	991	101%	75	275	43	D
NBR	280	278	99%	50	250	38	D
NB	**1,870**	**1,830**	**98%**			**116**	**F**
SBL	135	135	100%	50	125	93	F
SBT	1,760	1,770	101%	175	575	43	D
SBR	265	254	96%	0	0	3	A
SB	**2,160**	**2,159**	**100%**			**41**	**D**
EBL	610	597	98%	175	575	136	F
EBT	465	455	98%	75	350	44	D
EBR	1,450	1,469	101%	0	175	9	A
EB	**2,525**	**2,521**	**100%**			**46**	**D**
WBL	80	77	96%	25	100	69	E
WBT	250	245	98%	50	175	61	E
WBR	180	184	102%	0	0	1	A
WB	**510**	**506**	**99%**			**41**	**D**
Total	**7,065**	**7,016**	**99%**			**62**	**E**

Node Letter: T VISSIM ID: 134

Existing PM

LOS Category: Unsignalized

5: Dr 2 & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBL	15	14	93%	0	25	11	B
WBR	25	24	96%	0	25	7	A
WB	**40**	**38**	**95%**			**8**	**A**
Total	**40**	**38**	**95%**			**8**	**A**

Node Letter: UC VISSIM ID: 3405

LOS Category: Signalized

6: 13400 S & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	1,200	1,203	100%	300	850	78	E
NBT	1,800	1,799	100%	275	725	72	E
NBR	305	297	97%	150	625	56	E
NB	**3,305**	**3,299**	**100%**			**73**	**E**
SBL	205	202	99%	50	150	65	E
SBT	1,220	1,227	101%	175	475	66	E
SBR	500	495	99%	0	0	3	A
SB	**1,925**	**1,924**	**100%**			**50**	**D**
EBL	400	393	98%	150	450	171	F
EBT	525	522	99%	75	300	48	D
EBR	820	824	100%	0	75	4	A
EB	**1,745**	**1,739**	**100%**			**55**	**D**
WBL	160	167	104%	50	125	69	E
WBT	755	744	99%	150	475	64	E
WBR	295	297	101%	0	0	2	A
WB	**1,210**	**1,208**	**100%**			**50**	**D**
Total	**8,185**	**8,170**	**100%**			**60**	**E**

Node Letter: T VISSIM ID: 134

Existing AM

LOS Category: Signalized

7: Redwood Rd & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	430	447	104%	75	250	46	D
NBT	950	946	100%	50	225	19	B
NBR	950	935	98%	0	0	4	A
NB	**2,330**	**2,328**	**100%**			**18**	**B**
SBL	255	261	102%	50	175	68	E
SBT	495	489	99%	25	150	31	C
SBR	65	65	100%	0	0	1	A
SB	**815**	**815**	**100%**			**41**	**D**
EBL	90	90	100%	25	75	61	E
EBR	355	346	97%	0	0	6	A
EB	**445**	**436**	**98%**			**17**	**B**
WBL	405	406	100%	100	300	64	E
WBR	155	158	102%	0	100	13	B
WB	**560**	**564**	**101%**			**50**	**D**
Total	**4,150**	**4,143**	**100%**			**27**	**C**

Node Letter: V VISSIM ID: 3401

Existing PM

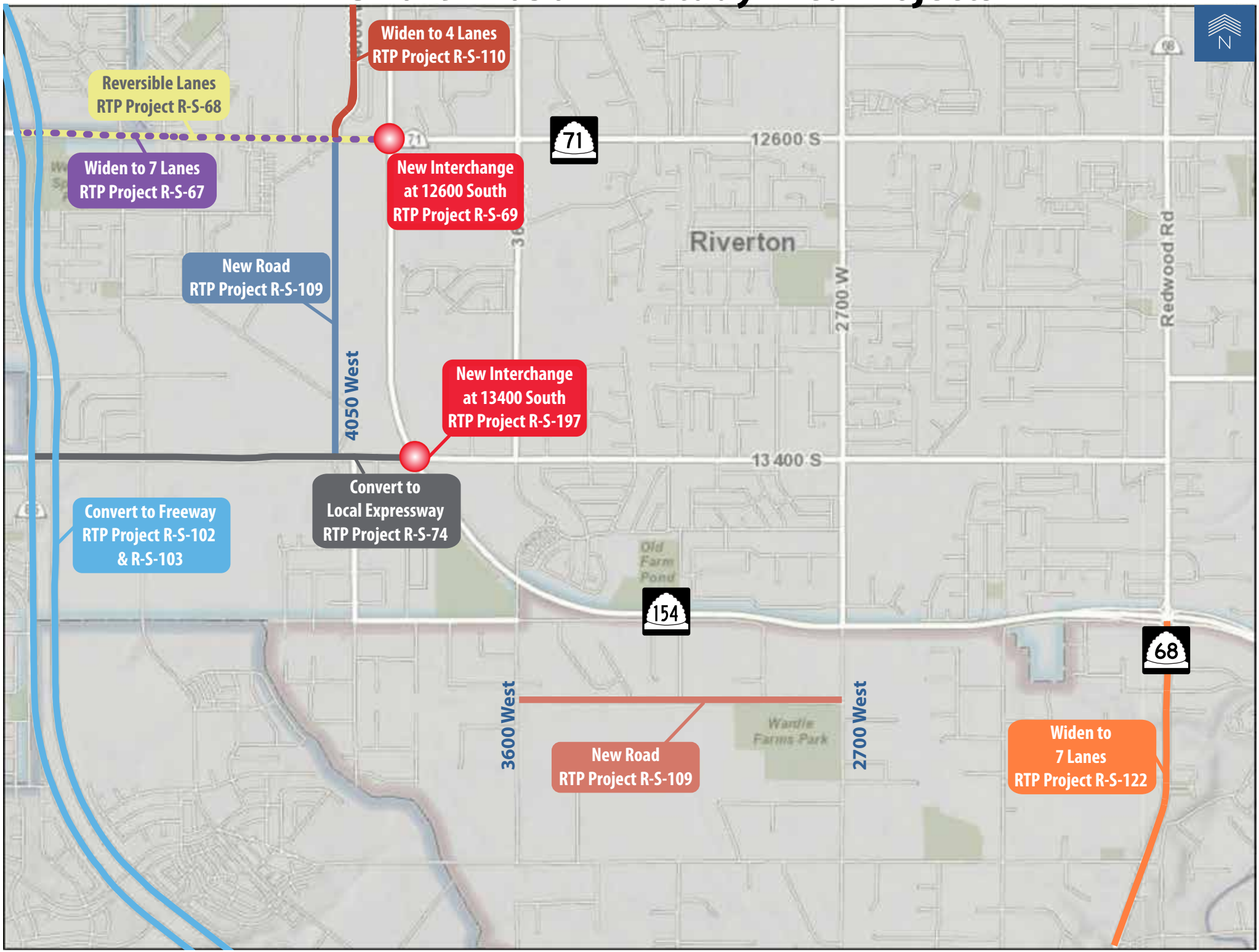
LOS Category: Signalized

7: Redwood Rd & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	475	487	103%	100	300	56	E
NBT	775	766	99%	50	250	29	C
NBR	500	493	99%	0	0	2	A
NB	**1,750**	**1,746**	**100%**			**29**	**C**
SBL	190	190	100%	50	150	74	E
SBT	1,095	1,094	100%	125	400	46	D
SBR	110	111	101%	0	0	4	A
SB	**1,395**	**1,395**	**100%**			**47**	**D**
EBL	75	71	95%	25	75	51	D
EBR	420	431	103%	0	0	6	A
EB	**495**	**502**	**101%**			**12**	**B**
WBL	1,035	1,039	100%	200	600	59	E
WBR	335	334	100%	25	150	22	C
WB	**1,370**	**1,373**	**100%**			**50**	**D**
Total	**5,010**	**5,016**	**100%**			**38**	**D**

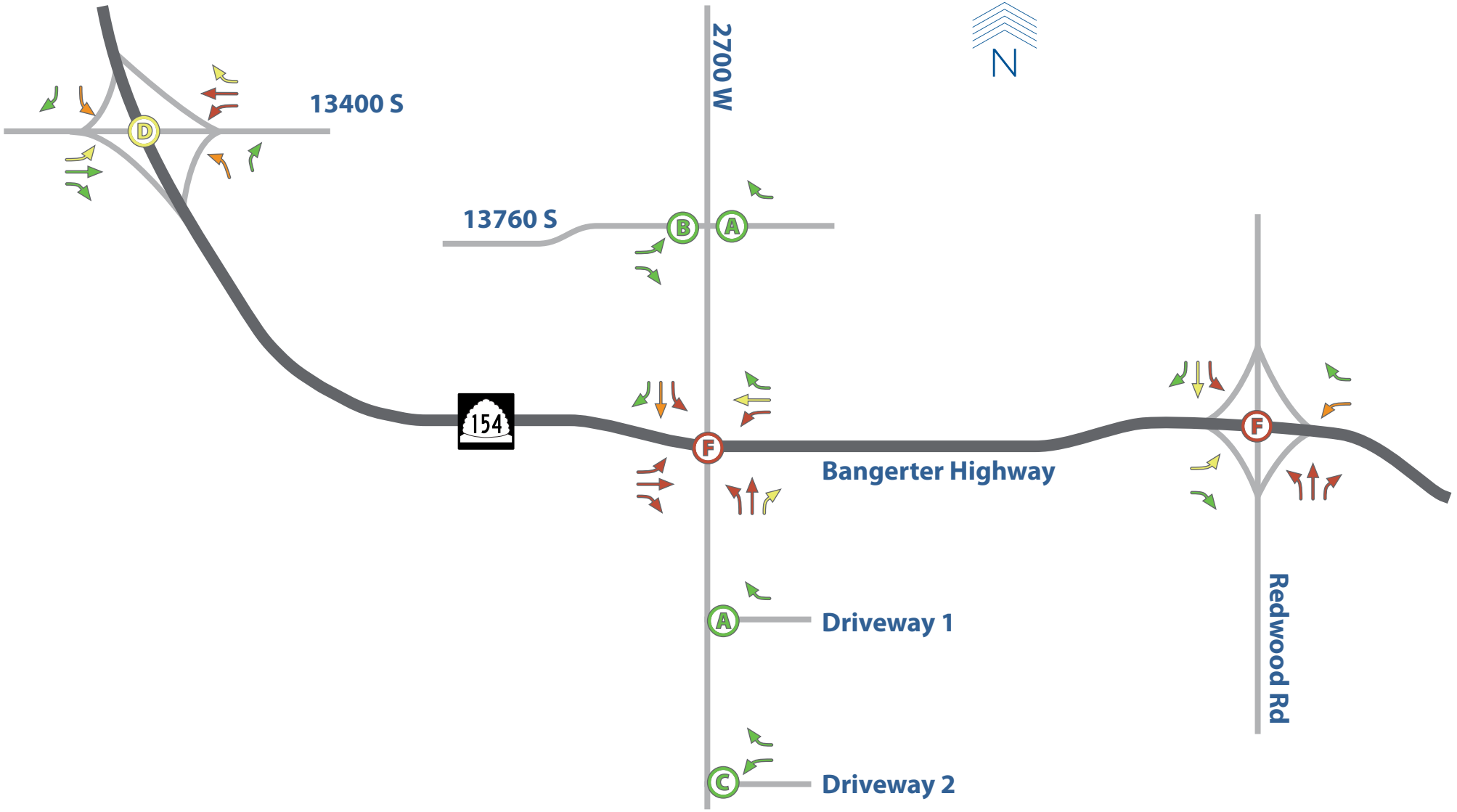
Node Letter: V VISSIM ID: 3401

APPENDIX D: PLANNED TRANSPORTATION PROJECTS

WFRC 2019 -2050 RTP Study Area Projects



APPENDIX E: 2050 NO BUILD LEVEL OF SERVICE RESULTS



DRAFT

2050 No Build AM Intersection Level of Service

2700 South & Bangerter Highway Environmental Study



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2050 No Build PM Intersection Level of Service

2700 South & Bangerter Highway Environmental Study

2700 West Bangerter Environmental

VISSIM Volume, Queue, and Delay Results

2050NoBldAM

LOS Category: Signalized

1: 2700 West & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	170	134	79%	200	1,250	92	F
NBT	210	175	83%	1,000	1,275	147	F
NBR	140	112	80%	275	1,275	44	D
NB	**520**	**421**	**81%**			**102**	**F**
SBL	180	172	96%	200	800	120	F
SBT	70	66	94%	25	100	71	E
SBR	30	31	103%	0	25	6	A
SB	**280**	**269**	**96%**			**95**	**F**
EBL	100	94	94%	25	125	182	F
EBT	3,700	3,438	93%	3,050	5,425	150	F
EBR	180	167	93%	0	50	124	F
EB	**3,980**	**3,699**	**93%**			**150**	**F**
WBL	90	85	94%	50	150	107	F
WBT	2,910	2,761	95%	550	1,900	45	D
WBR	480	463	96%	25	250	28	C
WB	**3,480**	**3,309**	**95%**			**44**	**D**
Total	**8,260**	**7,698**	**93%**			**100**	**F**

Node Letter: E VISSIM ID: 2700

LOS Category: Unsignalized

2: East_13630W&2700W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	20	19	95%	0	0	6	A
WB	**20**	**19**	**95%**			**6**	**A**
Total	**20**	**19**	**95%**			**6**	**A**

Node Letter: F VISSIM ID: 3402

LOS Category: Unsignalized

3: West_13630W&2700W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	10	9	90%	0	0	3	A
NB	**10**	**9**	**90%**			**3**	**A**
EBL	10	10	100%	0	25	15	B
EBR	20	18	90%	0	0	18	C
EB	**30**	**28**	**93%**			**17**	**C**
Total	**40**	**37**	**93%**			**14**	**B**

Node Letter: F VISSIM ID: 3403

LOS Category: Unsignalized

4: Dr 1 & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	10	8	80%	0	25	3	A
WB	**10**	**8**	**80%**			**3**	**A**
Total	**10**	**8**	**80%**			**3**	**A**

Node Letter: G VISSIM ID: 3404

2050NoBldPM

LOS Category: Signalized

1: 2700 West & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	250	242	97%	150	675	75	E
NBT	170	171	101%	125	525	89	F
NBR	130	125	96%	25	100	19	B
NB	**550**	**538**	**98%**			**66**	**E**
SBL	420	265	63%	1,125	1,250	110	F
SBT	270	172	64%	1,025	1,250	93	F
SBR	140	89	64%	0	75	9	A
SB	**830**	**526**	**63%**			**88**	**F**
EBL	80	78	98%	25	100	97	F
EBT	2,980	2,942	99%	750	2,500	68	E
EBR	230	226	98%	0	75	37	D
EB	**3,290**	**3,246**	**99%**			**67**	**E**
WBL	150	131	87%	50	175	242	F
WBT	3,520	2,881	82%	3,050	4,650	207	F
WBR	400	331	83%	25	200	178	F
WB	**4,070**	**3,343**	**82%**			**206**	**F**
Total	**8,740**	**7,653**	**88%**			**129**	**F**

Node Letter: E VISSIM ID: 2700

LOS Category: Unsignalized

2: East_13630W&2700W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	10	9	90%	0	0	5	A
WB	**10**	**9**	**90%**			**6**	**A**
Total	**10**	**9**	**90%**			**5**	**A**

Node Letter: F VISSIM ID: 3402

LOS Category: Unsignalized

3: West_13630W&2700W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	20	18	90%	0	200	16	C
NB	**20**	**18**	**90%**			**16**	**C**
EBL	10	9	90%	0	25	23	C
EBR	10	8	80%	0	0	37	E
EB	**20**	**17**	**85%**			**30**	**D**
Total	**40**	**35**	**88%**			**23**	**C**

Node Letter: F VISSIM ID: 3403

LOS Category: Unsignalized

4: Dr 1 & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	30	29	97%	0	25	6	A
WB	**30**	**29**	**97%**			**6**	**A**
Total	**30**	**29**	**97%**			**6**	**A**

Node Letter: G VISSIM ID: 3404

2050NoBldAM

LOS Category: Unsignalized

5: Dr 2 & 2700 W

Delay / LOS

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Analysis Period 900-4500	
WBL	10	9	90%	0	25	18	C
WBR	10	8	80%	0	25	19	C
WB	**20**	**17**	**85%**			**19**	**C**
Total	**20**	**17**	**85%**			**18**	**C**

Node Letter: H VISSIM ID: 3405

LOS Category: Signalized

6: 13400 South & Bangerter

Delay / LOS

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Analysis Period 900-4500	
NBL	1,090	1,048	96%	175	500	69	E
NBR	300	284	95%	0	0	14	B
NB	**1,390**	**1,332**	**96%**			**57**	**E**
SBL	270	267	99%	100	325	57	E
SBR	880	880	100%	75	300	24	C
SB	**1,150**	**1,147**	**100%**			**32**	**C**
EBL	1,360	1,259	93%	200	725	44	D
EBT	640	600	94%	75	425	31	C
EBR	1,410	1,318	93%	0	0	8	A
EB	**3,410**	**3,177**	**93%**			**27**	**C**
WBL	90	84	93%	25	150	87	F
WBT	640	551	86%	525	875	233	F
WBR	440	404	92%	0	0	49	D
WB	**1,170**	**1,039**	**89%**			**149**	**F**
Total	**7,120**	**6,695**	**94%**			**53**	**D**

Node Letter: B VISSIM ID: 134

LOS Category: Signalized

7: Redwood Road & Bangerter

Delay / LOS

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Analysis Period 900-4500	
NBL	700	500	71%	200	325	395	F
NBT	1,970	1,389	71%	7,400	8,700	413	F
NBR	1,750	1,206	69%	6,475	8,700	458	F
NB	**4,420**	**3,095**	**70%**			**428**	**F**
SBL	440	440	100%	175	725	105	F
SBT	880	870	99%	125	575	52	D
SBR	100	99	99%	0	0	3	A
SB	**1,420**	**1,409**	**99%**			**65**	**E**
EBL	110	107	97%	25	75	37	D
EBR	420	395	94%	0	0	6	A
EB	**530**	**502**	**95%**			**13**	**B**
WBL	860	852	99%	175	550	60	E
WBR	360	353	98%	50	300	31	C
WB	**1,220**	**1,205**	**99%**			**52**	**D**
Total	**7,590**	**6,211**	**82%**			**239**	**F**

Node Letter: I VISSIM ID: 3401

2050NoBldPM

LOS Category: Unsignalized

5: Dr 2 & 2700 W

Delay / LOS

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Analysis Period 900-4500	
WBL	20	19	95%	0	50	12	B
WBR	30	31	103%	0	50	10	A
WB	**50**	**50**	**100%**			**10**	**A**
Total	**50**	**50**	**100%**			**10**	**A**

Node Letter: H VISSIM ID: 3405

LOS Category: Signalized

6: 13400 South & Bangerter

Delay / LOS

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Analysis Period 900-4500	
NBL	1,150	968	84%	75	250	33	C
NBR	280	237	85%	0	0	9	A
NB	**1,430**	**1,205**	**84%**			**29**	**C**
SBL	500	509	102%	275	750	67	E
SBR	1,260	1,267	101%	225	675	43	D
SB	**1,760**	**1,776**	**101%**			**50**	**D**
EBL	1,000	976	98%	400	1,025	99	F
EBT	880	882	100%	75	400	26	C
EBR	1,000	992	99%	0	0	4	A
EB	**2,880**	**2,850**	**99%**			**43**	**D**
WBL	140	143	102%	50	225	69	E
WBT	940	928	99%	350	775	103	F
WBR	520	514	99%	0	0	15	B
WB	**1,600**	**1,585**	**99%**			**71**	**E**
Total	**7,670**	**7,416**	**97%**			**49**	**D**

Node Letter: B VISSIM ID: 134

LOS Category: Signalized

7: Redwood Road & Bangerter

Delay / LOS

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Analysis Period 900-4500	
NBL	570	579	102%	125	400	71	E
NBT	1,360	1,350	99%	125	450	43	D
NBR	1,010	1,011	100%	0	0	7	A
NB	**2,940**	**2,940**	**100%**			**36**	**D**
SBL	460	304	66%	1,525	2,450	478	F
SBT	2,300	1,472	64%	2,325	2,450	405	F
SBR	160	99	62%	0	0	353	F
SB	**2,920**	**1,875**	**64%**			**414**	**F**
EBL	100	89	89%	0	75	42	D
EBR	570	542	95%	0	0	9	A
EB	**670**	**631**	**94%**			**13**	**B**
WBL	1,620	1,259	78%	7,150	7,525	430	F
WBR	520	404	78%	50	275	412	F
WB	**2,140**	**1,663**	**78%**			**425**	**F**
Total	**8,670**	**7,109**	**82%**			**225**	**F**

Node Letter: I VISSIM ID: 3401



Appendix B: Traffic and Design

Bangerter Highway at 2700 West Future Build Traffic Analysis

MEMORANDUM

To: UDOT Region Two & Environmental

From: Avenue Consultants

Date: March 7, 2022

Subject: Bangerter Highway & 2700 West Future Build Conditions Traffic Analysis

The Utah Department of Transportation (UDOT) is performing an environmental study for a potential new interchange on Bangerter Highway at the existing 2700 West at-grade intersection. This memorandum summarizes the traffic evaluation for existing and future (2050) no build conditions within the study area. For this analysis, the study area consists of the Bangerter Highway corridor from 13400 South to Redwood Rd and the 2700 West corridor from 13730 South to south driveway of the Saddle Back office warehouse development on the southeast corner of the Bangerter Highway intersection. The study area is illustrated in **Figure 1**.



Figure 1: Bangerter Highway & 2700 West Traffic Analysis Study Area

1 ANALYSIS METHODOLOGY

The analysis described in this memorandum utilized project traffic data, Vissim traffic operations software and the Wasatch Front Regional Council (WFRC) / Mountainland Associated of Governments (MAG) travel demand model for year 2050 traffic forecasts. This section describes how each of these tools were implemented for this project.

1.1 Travel Demand Modeling

The WFRC/MAG travel demand model (TDM) was the primary tool used to predict future travel and traffic volumes within the study area. WFRC and MAG are the Metropolitan Planning Organizations (MPOs) for the Wasatch Front and are responsible for coordinating transportation planning in the region. WFRC is responsible for Salt Lake County and prepares the Regional Transportation Plan (RTP) every four years, which is the plan for the development of the future transportation system. The most recent plan is the 2019-2050 RTP, which includes a list of projects that are planned to meet future transportation needs over a 30+ year horizon.

The travel demand model has two primary inputs: land use data and transportation system data. The land use data consists of residential and employment data for the entire region. This data is prepared in geographic blocks called Traffic Analysis Zones (TAZs). The travel model inputs are prepared for a base year, which in this case was 2019, and for a future year, which in this case was 2050. A base year of 2019 was used because both travel model socioeconomic inputs and published traffic volume data are available for that year. In travel modeling, the base year always lags the current year by a few years because of the need to have land use input and calibration data. Details on how the travel model was used for this project can be found in the **Bangerter Highway & 2700 West Existing and 2050 No Build Traffic Analysis** memo.

1.2 Traffic Operations Analysis

The Vissim software was selected for this study because it allows for the evaluation of freeways, closely spaced intersections, and the interaction between the two facilities. Vissim allows for driving behaviors to be modified, can collect travel time data for user-specified segments and can measure queue lengths at study intersections, which collectively are used to calibrate the model to observed conditions.

The intersections within the study area were modeled according to assumed future intersection and roadway geometry based on the RTP and the various build alternatives. The study area was modeled as a network; however, the analysis was completed for each intersection independently.

1.2.1 Traffic Volumes

The future build AM and PM peak hour volumes were developed for year 2050 using principles described in the National Highway Cooperative Research Program (NCHRP) Report 255 document. The forecast peak period intersection volumes were developed from the existing peak hour traffic volumes and data from the WFRC/MAG travel demand model. The travel model was run for the base year (2019) and for the future years. The difference between the base year and future year models was used to estimate the traffic growth for each intersection leg, which was then applied to the existing intersection leg volumes. The future individual movement volumes were then balanced to ensure the correct number of inbound and outbound vehicles on each leg of the intersection. Details on existing and no build conditions volumes can be found in the **Bangerter Highway & 2700 West Existing and 2050 No Build Traffic Analysis** memo.

1.2.2 Measures of Effectiveness

The operational analysis is based upon Vissim output correlated to the *Highway Capacity Manual (HCM) 6th Edition* methodologies, which describes how transportation system performance can be measured and ranked by level of service (LOS). LOS is measured quantitatively and reported on a scale from A to F, with A representing the best performance and F the worst.

The primary measure of effectiveness for this study was intersection performance. For intersections LOS is based on average vehicle delay measured in seconds per vehicle. Delay and LOS are determined for each turning movement, approach, and the overall intersection. **Table 1** provides details regarding LOS criteria thresholds for signalized intersections.

Table 1. Intersection Level of Service Criteria for Signalized Intersections

Level of Service	Traffic Conditions	Average Delay (seconds/vehicle)
A	Free Flow Operations / Insignificant Delay	0 ≤ 10
B	Smooth Operations / Short Delays	> 10 and ≤ 20
C	Stable Operations / Acceptable Delays	> 20 and ≤ 35
D	Approaching Unstable Operations / Tolerable Delays	> 35 and ≤ 55
E	Unstable Operations / Significant Delays Begin	> 55 and ≤ 80
F	Very Poor Operations / Excessive Delays Occur	> 80

Source: Highway Capacity Manual 6th Edition, *TRB National Research Council, Washington D.C*

Another important measure of effectiveness is the 95th percentile queue length for each turning movement. It is the vehicle queue distance that will only be exceeded five percent of the time during the analysis period and helps identify issues such as queuing between intersections and queues that exceed their turning movement storage.

2 INTERCHANGE ALTERNATIVES ANALYSIS

For the purposes of the build alternatives analysis, proposed alternatives for the new interchange at 2700 West were developed using projected 2050 traffic volumes. The four interchange alternatives analyzed were: (1) Tight Diamond Interchange, (2) Single Point Urban Interchange (SPUI), (3) Right-In/Right-Out Interchange with roundabouts on 2700 West to facilitate left turn movements via U-turns, and (4) Overpass Only alternative with no access to or from Bangerter Highway at 2700 West. For the Tight Diamond Interchange and SPUI alternatives analysis, it was assumed that all left and right turn movements at the 2700 West interchange would have one lane and that the off-ramps would have free right turn movements. For the Right-In/Right-Out Interchange it was assumed that the right turn movements at the 2700 West interchange would be free movements with no stops required.

2.1 Tight Diamond Interchange Alternative

This section presents the evaluation of traffic operations and queue lengths for the Tight Diamond Interchange alternative. **Table 2** presents the level of service (LOS) and delay in seconds per vehicle for the AM and PM peak hours of the 2050 No Build and Tight Diamond alternatives. Detailed analysis results from the intersection analysis can be found in **Appendix A: 2050 TDI Alternative Traffic Volumes and Intersection LOS Results**.

Table 2. 2050 Tight Diamond Interchange Delay and Level of Service Comparison

Intersection	2050 AM Peak Hour		2050 PM Peak Hour	
	No Build[1]	Diamond[1]	No Build[1]	Diamond[1]
2700 West & Bangerter Highway	F / 100	D / 36	F / 129	C / 30
13400 South & Bangerter Highway	D / 53	D / 42	D / 49	D / 41
Redwood Rd & Bangerter Highway	F / > 180	F / > 180	F / > 180	F / > 180
1. Average delay reported in seconds/vehicle				

Comparing the delay per vehicle shows significant improvement at the 2700 West when compared to the 2050 No Build alternative. The tight diamond interchange is expected to operate at LOS D or better during the 2050 AM and PM peak hours.

The 95th percentile queue lengths presented in **Table 3** are of each approach at the 2700 West & Bangerter Highway interchange and compare the Tight Diamond Interchange alternative to the No Build alternative for the 2050 AM and PM peak hours. As shown, the queues for all the approaches are expected to decrease. Overall, the largest differences are for the eastbound approach during the AM peak hour and the westbound approach during the PM peak hour.

Table 3. 2050 Tight Diamond Interchange 95th Percentile Queue Lengths Comparison

Approach	2050 AM Peak Hour		2050 PM Peak Hour	
	No Build (ft)	**Diamond** (ft)	**No Build** (ft)	**Diamond** (ft)
Northbound	1,275	325	675	275
Southbound	800	300	1,250	425
Eastbound	5,425	0	2,500	25
Westbound	1,900	1,900	4,650	875

2.2 SPUI Alternative

This section presents the evaluation of traffic operations and queue lengths for the SPUI alternative. **Table 4** presents the level of service (LOS) and delay in seconds per vehicle for the AM and PM peak hours of the 2050 No Build and SPUI alternatives. Detailed analysis results from the intersection analysis can be found in **Appendix B: 2050 SPUI Alternative Traffic Volume and Intersection LOS Results**.

Table 4. 2050 SPUI Delay and Level of Service Comparison

Location	2050 AM Peak Hour		2050 PM Peak Hour	
	No Build[1]	SPUI[1]	No Build[1]	SPUI[1]
2700 West & Bangerter Highway	F / 123	C / 26	F / 113	C / 32
13400 South & Bangerter Highway	D / 54	D / 41	F / 143	D / 40
Redwood Rd & Bangerter Highway	F / > 180	F / > 180	F / > 180	F / > 180
1. Average delay reported in seconds/vehicle				

Overall, delay shows substantial improvement when compared to the 2050 No Build alternative. The 2700 West SPUI interchange shows substantial reduction in delay and the 2700 West interchange operating at LOS C in both the 2050 AM and PM peak hours.

The 95th percentile queue lengths presented in **Table 5** are of each approach at the 2700 West & Bangerter Highway interchange and compare the SPUI alternative to the No Build alternative for the 2050 AM and PM peak hours. The SPUI substantially reduces the 95th percentile queues associated with the No Build. Queue length reductions follow similar trends as the Tight Diamond Interchange alternative with reductions of over 5,000 feet on the northbound and southbound approaches in the AM peak hour as well as reductions of over 2,00 feet and 900 feet in the eastbound and westbound directions.

Table 5. 2050 SPUI 95th Percentile Queue Lengths Comparison

Approach	AM Peak Hour		PM Peak Hour	
	No Build (ft)	**SPUI** (ft)	**No Build** (ft)	**SPUI** (ft)
Northbound	1,075	825	575	250
Southbound	600	525	1,250	700
Eastbound	5,700	50	1,975	50
Westbound	2,050	400	4,475	775

2.3 Right-In/Right-Out Interchange Alternative

This section provides evaluation of traffic operations for the Right-In/Right-Out (RIRO) Interchange alternative. This interchange would have right-in/out access between Bangerter Highway and 2700 West with no left turns allowed at the interchange, instead left turns would be accomplished via U-turns at roundabouts on 2700 West on the north and south sides of the interchange. For this analysis, the north roundabout was assumed at Sanborn Drive approximately 1,400 feet from the interchange and the south roundabout was assumed at 14000 South approximately 1,100 feet from the interchange. The roundabouts were modeled conservatively without side street traffic, meaning that the only traffic using the roundabout would be interchange and 2700 West through traffic. It was assumed that the roundabouts would have one lane. **Table 6** compares the intersection delay and level of service results for the Roundabout Interchange and No Build alternatives. The analysis included the roundabouts as part of the 2700 West interchange.

Table 6. 2050 Right-In/Right-Out Interchange Delay and Level of Service Comparison

Location	2050 AM Peak Hour		2050 PM Peak Hour	
	No Build[1]	**RIRO**[1]	**No Build**[1]	**RIRO**[1]
2700 West & Bangerter Highway	F / 123	D / 44	F / 113	E / 64
13400 South & Bangerter Highway	D / 54	D / 41	F / 143	D / 40
Redwood Rd & Bangerter Highway	F / > 180	F / > 180	F / > 180	F / > 180

1. Average delay reported in seconds/vehicle

The 2700 West interchange delay values presented for the RIRO alternative includes delay at the right-in/right-out intersections, delay within the roundabouts, counts the out of direction travel time as delay. Compared to the 2050 No build alternative, this alternative shows improvement. However, the 2050 PM peak hour is projected to operate at a LOS E. 2700 West interchange delays are substantially higher than those of the previous interchange build alternatives, due to out of direction travel and high circulating volumes in the roundabouts. **Appendix C: 2050 RIRO Alternative Traffic Volume and Intersection LOS Results** contains delay values for the different components of RIRO interchange as well as the combined delay and LOS results.

The 95th percentile queue lengths presented in **Table 7** are of each approach at the 2700 West & Bangerter Highway interchange and compare the Right-In/Right-Out Interchange alternative to the No Build alternative for the 2050 AM and PM peak hours. The RIRO Interchange alternative significantly reduces the queues in the eastbound and westbound directions on Bangerter Highway since those would be uncontrolled movements. The northbound and southbound queue values on Bangerter Highway include queueing from north and south roundabouts.

Table 7. 2050 Roundabout Interchange 95th Percentile Queue Lengths Comparison

Approach	2050 AM Peak Hour		2050 PM Peak Hour	
	No Build (ft)	**RIRO** (ft)	**No Build** (ft)	**RIRO** (ft)
Northbound	1,075	900	575	425
Southbound	600	225	1,250	525
Eastbound	5,700	150	1,975	175
Westbound	2,050	-	4,475	-

2.4 Overpass Only Alternative

This section presents the evaluation of the Overpass Only alternative. The analysis for this alternative was different from those for the other alternatives. This was due to the nature of the alternative, which would remove traffic from 2700 West and reroute it to other interchanges. As such, the analysis for this alternative focused on impacts to the adjacent interchanges. A one-page executive summary of the traffic analysis findings can be found in **Appendix E: 2700 West-Bangerter Executive Summary**.

The 2700 West and Bangerter intersection and the adjacent interchanges were analyzed for 2050 traffic conditions for both interchange and Overpass Only alternatives using the Vissim microsimulation traffic analysis software. The Tight Diamond Alternative was used for the interchange scenario described in the following sections.

As with the other alternatives, 2050 volumes were projected from existing volumes using the WFRC/MAG travel demand model. The 2050 volumes between the interchange and Overpass Only alternatives are summarized in **Table 8** below. Full turning movement volume figures comparing the alternative volumes can be found in **Appendix D: 2050 Overpass Alternative Traffic Volume and Intersection LOS Results**.

Table 8. Overpass Only 2050 Peak Hour Volumes Comparison

Intersection	2050 AM Peak Hour				2050 PM Peak Hour			
	Volumes		Change		Volumes		Change	
	Inter-change	Over-pass	Total	Percent	Inter-change	Over-pass	Total	Percent
2700 West & Bangerter Highway	2,190	940	-1,250	-57%	2,530	1,250	-1,280	-51%
13400 South & Bangerter Highway	7,090	7,320	230	3.2%	7,700	8,020	320	4.2%
Redwood Rd & Bangerter Highway	7,190	7,870	680	9.5%	8,610	9,040	430	5.0%

Overall, volumes decrease on 2700 West without Bangerter Highway access and increase at the adjacent interchanges. In the 2050 AM peak hour, the largest growth occurs at the Redwood Road & Bangerter Highway interchange with an additional 680 vehicles for a 9.5% increase. The 13400 South & Bangerter Highway interchange has an additional 230 vehicles for a 3.2% increase. In the 2050 PM peak hour, the largest

increase is also at Redwood Road with a change of 430 vehicles for a 5% increase, while at 134000 South there would be 320 more vehicles for a 4.2% increase.

A comparison of 2050 interchange performance between the interchange and Overpass Only alternatives show the effect of overpass on the adjacent interchanges of 2700 West and Bangerter Hwy. The worst affect is observed on the Redwood Road interchange which was already experiencing high delay and a LOS F in the interchange scenario. Due to volume increase on Redwood Rd interchange, during AM peak Redwood Rd is expected to experience a delay of more than 7 minutes in the overpass option (68% higher than the interchange option), and more than 4 minutes during the PM peak hour (similar to the interchange option).

Additionally, 13400 South interchange which is LOS D in both interchange and overpass option, in the interchange AM scenario sees delay increases of 10 seconds per vehicle (24% higher than the interchange option). Details of the delay and LOS for each intersection turning movement for the Overpass scenario are summarized in **Appendix D: 2050 Overpass Alternative Traffic Volume and Intersection LOS Results**.

Vehicle delay at Redwood Rd & Bangerter Hwy interchange was measured for 2050 conditions for the Interchange and Overpass Only alternatives. **Table 9** shows the total vehicle delay in hours for the AM and PM peak hours across the study area. Notably, delay increases in the Overpass Only alternative when compared to the interchange. Total delay increases from 643 hours to 946 hours (47%) in the AM and from 652 to 700 hours (7%) in the PM.

Table 9. Redwood Rd Interchange Delay

Redwood Rd Interchange Delay	AM Peak Hour		PM Peak Hour	
	Intchg	Overpass	Intchg	Overpass
Hours	643	946	652	700

Using these delay values and annual traffic volume profile data obtain from the Automated Traffic Signal Performance Measure (ATSPM), annual user costs were estimated based on a vehicle class weighted average value of $18.8 per delay hour. For 2050, this resulted in a user cost increase of $6.6 million for the Overpass Only alternative, while the cumulative user cost value increase from 2025 through 2050 was $100 million.

2.5 Alternative Selection

Multi-disciplinary project meetings were held to evaluate the four alternatives and to select the preferred alternative to move forward. A wide range of issues were considered in making this decision, including traffic operations, design, cost, constructability, impacts to residents and businesses, and other considerations.

A summary of the traffic performance of the three remaining interchange alternatives, Tight Diamond Interchange, SPUI, and Right-In/Right-Out (RIRO) Interchange, is presented below. **Table 10** compares the intersection levels of service and delay for the 2700 West study intersections for the 2050 AM and PM peak hours.

Table 10. 2050 Interchange Alternatives Intersection Performance Comparison

Location	2050 AM Peak Hour[1]				2050 PM Peak Hour[1]			
	Diamond	SPUI	RIRO	Overpass	Diamond	SPUI	RIRO	Overpass
2700 West & Bangerter Highway	D / 36	C / 26	D / 44	-- / --	C / 30	C / 32	E / 64	-- / --
13400 South & Bangerter Highway	D / 42	D / 41	D / 41	D / 52	D / 41	D / 40	D / 40	D / 42
Redwood Rd & Bangerter Highway	F / 141	F / 141	F / > 180	F / > 180	F / > 180	F / > 180	F / > 180	F / > 180

1. Average delay reported in seconds/vehicle

The Overpass Only alternative was eliminated due to traffic impacts to adjacent Redwood Rd interchange where 2050 AM peak hour delays would increase by as much as 68% compared to the interchange alternatives. As shown in the table, the Right-In/Right-Out Interchange is the only interchange alternative that performs at a LOS E. Additionally, there is a general dislike towards the idea due to increased out of direction travel by the motorists. Therefore, the Right-In/Right-Out Interchange alternative was eliminated.

Both the Tight Diamond Interchange and the SPUI perform acceptably. Although the SPUI generally performs slightly better than the Tight Diamond, they are both expected to operate very well with good levels of service. Ultimately, the study team selected the Tight Diamond Interchange as the preferred alternative due to a lower construction cost that would save UDOT several million dollars.

3 ALTERNATIVE REFINEMENT

After the selection of the Tight Diamond as the preferred alternative, the design team began preparing conceptual interchange designs for different options to minimize impacts. This section describes an additional traffic analysis that was performed to evaluate the performance of the conceptual design and presents the recommended turn pocket storage lengths to accommodate the anticipated 2050 demand.

3.1 Traffic Volume Refinement

A second set of 2050 traffic volumes was developed for the alternative refinement process based on the following two incidents:

1. Members of the study team met with Bluffdale City officials and obtained information regarding proposed developments in the southwest quadrant of 2700 West and Bangerter Highway. A review of the WFRC travel model showed that the proposed developments were not included in the land use projections used for the model. A trip generation exercise was performed to estimate the number of additional vehicle trips that would be generated by the proposed developments. These trips were then added to the original volumes, resulting in higher 2700 West interchange volumes.
2. An error in the background roadway assumptions in the travel model was found. The RTP network included a roadway connection on 14400 South between Mountain View Corridor in Herriman and 2700 West in Bluffdale. However, this connection is not actually in the RTP. Removing the connection resulted in lower volumes at the 2700 West interchange and higher volumes at the 13400 South interchange, particularly on the west side of the interchange.

Applying both volume adjustments gave a final 2050 volume set with higher volumes at the 2700 West interchange. **Table 11** compares the estimated 2050 peak hour volumes at 2700 West and Bangerter Highway for the two volume sets.

Table 11. 2050 Peak Hour Volumes Comparison for 2700 West and Bangerter Highway

Scenario	Northbound			Southbound			Eastbound		Westbound		Total
	Left	Thru	Right	Left	Thru	Right	Left	Right	Left	Right	
	2050 AM Peak Hour										
Volume Set 1	200	140	550	290	120	10	20	210	350	300	2,190
Volume Set 2	330	180	410	280	150	20	30	370	300	250	2,320
	2050 PM Peak Hour										
Volume Set 1	190	120	440	340	160	30	20	230	570	430	2,530
Volume Set 2	330	140	410	320	210	40	40	360	500	420	2,770

3.2 Concept Design Traffic Evaluation

With the updated concept design, 2700 West corridor was evaluated for traffic performance including the interchange on Bangerter Highway and the adjacent driveways on 2700 West. The estimated 2050 delay and LOS for the study intersections are shown in **Table 12**. During the 2050 AM peak hour, the interchange of 2700 West & Bangerter Highway is expected to operate at LOS C and at LOS D during PM peak hour. Detailed analysis results from the intersection analysis can be found in **Appendix F: 2050 Final Build Traffic Volume and Intersection LOS Results**.

Table 12. 2050 Build Level of Service and Delay

Intersection	LOS / Delay (sec / veh)[1]	
	AM Peak Hour	PM Peak Hour
13400 South & Bangerter Hwy	D / 44	D / 39
2700 West & Bangerter Hwy	C / 26	D / 30
Redwood Rd & Bangerter Hwy	F / >180	F / >180

1. Average delay reported in seconds/vehicle

3.3 Turning Movement Storage Lengths

After completing the delay analysis, recommended turning movement storage length values were developed for the 2700 West interchange using the final model. The recommended values are shown in **Table 13**. It is important to realize that for tight diamond interchanges, the cross-street storage is outside of the interchange, meaning that the distance inside the interchange between the two ramps should not be included in the storage calculations. With the way signal timing is done for tight diamonds, there should not be any vehicles "stuck" in between the ramps, aside for the occasional straggler.

Table 13. Recommended Storage Lengths

Approach	Movement	Storage (feet)
Northbound	Left	400
	Right	450
Southbound	Left	400
	Right	100
Eastbound	Left	150
	Right	400
Westbound	WB Left	600
	Right	450

4 FREEWAY RAMP ANALYSIS

Separate analyses were performed to determine the appropriate gap acceptance lengths for the freeway on-ramps and the required ramp meter storage to meet 2050 traffic demands.

4.1 On-Ramp Gap Acceptance Length

An analysis was performed for the 2700 West on-ramps to determine what the gap acceptance lengths should be 2050 conditions. Gap acceptance is used in the design of parallel entrance ramps and refers the distance that the on-ramp lane is carried after joining the mainline and before the lane is merged into the mainline via a taper. Essentially, it is the length for a vehicle entering the freeway to complete the merge maneuver with mainline traffic. Guidance for determination of gap acceptance length is provided in the UDOT *Roadway Design Manual* on drawing DM 10.1, Entrance Ramp Geometrics. Note C states that, "for a single lane parallel entrance ramp use a gap acceptance length of 1,200 feet if combined ramp and mainline acceptance lane volume is projected to exceed 2,400 passenger cars per hour during the peak hour. Use a 500-foot length otherwise."

Peak hour volumes for 2050 conditions were developed for the 2700 West on-ramp and the Bangerter Highway mainline just upstream of the on-ramp. It was assumed that there would be an even distribution of traffic among mainline lanes on Bangerter Highway. Thus, the mainline acceptance lane volume was one-third of the mainline volume, since the RTP shows Bangerter Highway as a three-lane freeway. The on-ramp volume and the mainline acceptance lane volume were added together and then converted from vehicles to passenger cars by using principles described in Chapter 12 of the *Highway Capacity Manual, 6th Edition*. The resulting number was compared to the 2,400 passenger cars threshold used to determine whether the acceptance lane length should be 500 or 1,200 feet**. Table 14** shows the resulting combined ramp and mainline acceptance lane volume (in passenger cars) and the gap associated acceptance length for each on-ramp. It shows that 500 feet is required for both the eastbound and westbound on-ramps.

Table 14. 2700 West Gap Acceptance Lengths

Westbound		Eastbound	
Acceptance Lane Volume (pc/hr)	Acceptance Lane Length (feet)	Acceptance Lane Volume (pc/hr)	Acceptance Lane Length (feet)
2,277	500	2,141	500
2,017		2,082	
1,621	500	2,173	500
1,329		2,177	

4.2 Ramp Meter Storage

Ramp meter storage requirements were obtained from information prepared as part of the Managed Motorways Study. Storage requirements are based on peak hour volumes with the larger of the AM and PM peak hours being used. **Table 15** shows the recommended ramp meter storage lengths for the 2700 West on-ramps for a one-lane ramp at the merge.

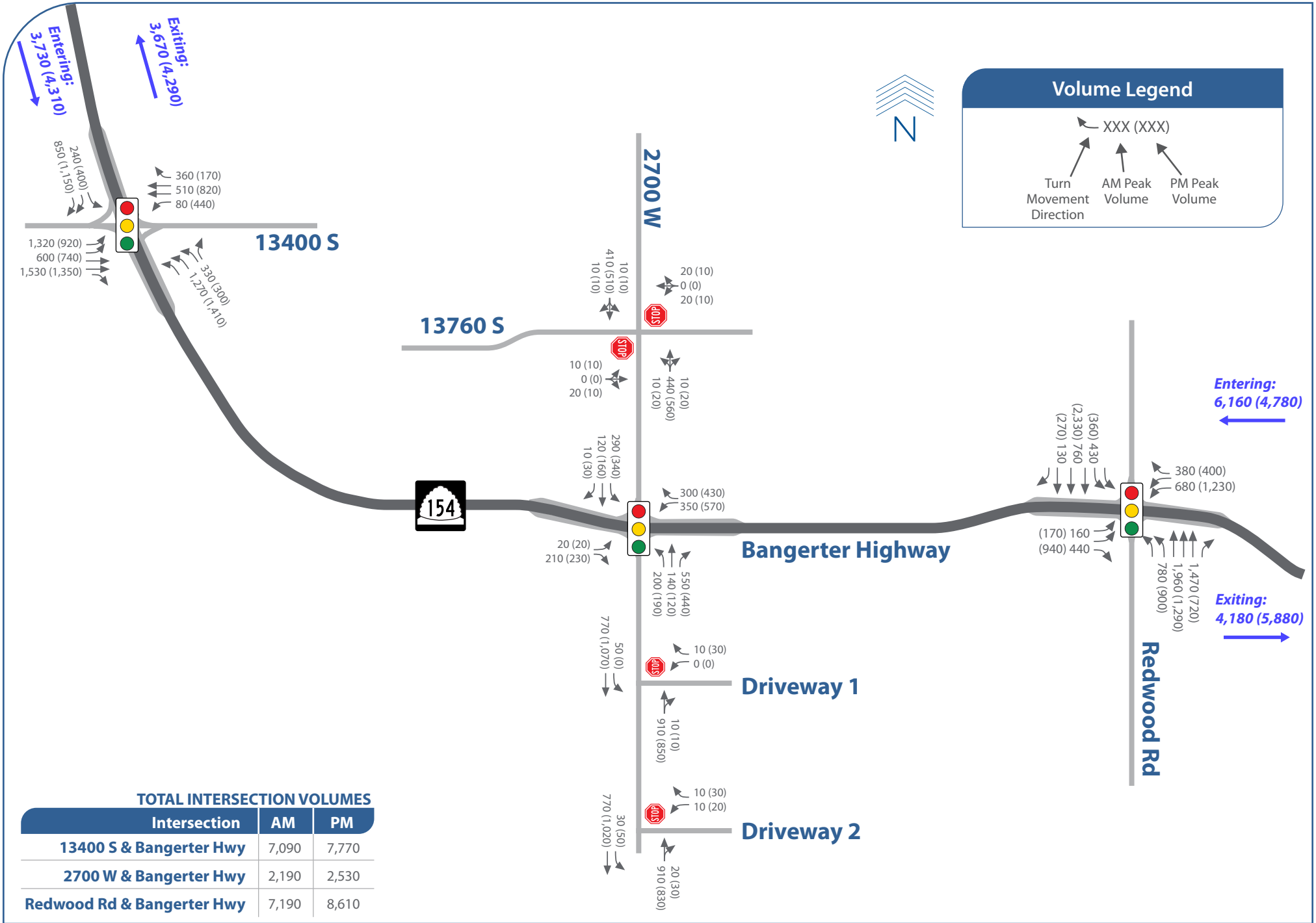
Table 15. 2700 West Ramp Meter Storage Requirements

On-Ramp	2050 Peak Hour Volume (veh /hr)		Total Storage Required (lane-feet)
	AM	PM	
Eastbound	690	**730**	1,490
Westbound	350	**370**	740

5 CONCLUSION

The traffic analysis shows that a grade-separated interchange will be required to meet the 2050 traffic demands at the intersection of Bangerter Highway & 2700 West. Due to traffic impacts on the interchange at Redwood Road & Bangerter Highway, the Overpass Only alternative was eliminated. A tight diamond interchange was selected as the preferred interchange alternative due to acceptable traffic performance and a lower construction cost than a SPUI.

Appendix A. 2050 TDI Alternative Traffic Volume and Intersection LOS Results



TOTAL INTERSECTION VOLUMES

Intersection	AM	PM
13400 S & Bangerter Hwy	7,090	7,770
2700 W & Bangerter Hwy	2,190	2,530
Redwood Rd & Bangerter Hwy	7,190	8,610

2050 Build Tight Diamond / SPUI Peak Hour Traffic Volumes

2700 West & Bangerter Highway Environmental Study

2700 West Bangerter Environmental

VISSIM Volume, Queue, and Delay Results

2050TDIAM

LOS Category: Signalized

1: 2700 W & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	200	195	98%	75	325	48	D
NBT	140	138	99%	50	275	45	D
NBR	550	549	100%	0	0	1	A
NB	**890**	**882**	**99%**			**18**	**B**
SBL	290	286	99%	25	300	21	C
SBT	120	120	100%	0	100	19	B
SBR	10	10	100%	0	0	0	A
SB	**420**	**416**	**99%**			**20**	**B**
EBL	20	20	100%	0	0	69	E
EBR	210	220	105%	0	0	12	B
EB	**230**	**240**	**104%**			**17**	**B**
WBL	350	329	94%	400	1,900	121	F
WBR	300	273	91%	225	1,850	36	D
WB	**650**	**602**	**93%**			**83**	**F**
Total	**2,190**	**2,140**	**98%**			**36**	**D**

Node Letter: U VISSIM ID: 2700

LOS Category: Unsignalized

2: East 13630 S & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	10	10	100%	0	0	6	A
WB	**10**	**10**	**100%**			**6**	**A**
Total	**10**	**10**	**100%**			**6**	**A**

Node Letter: UA VISSIM ID: 3402

LOS Category: Unsignalized

3: West 13630 S & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	10	9	90%	0	75	4	A
NB	**10**	**9**	**90%**			**4**	**A**
EBL	10	9	90%	0	25	8	A
EBR	20	20	100%	0	25	6	A
EB	**30**	**29**	**97%**			**6**	**A**
Total	**40**	**38**	**95%**			**6**	**A**

Node Letter: UA VISSIM ID: 3403

LOS Category: Unsignalized

4: Dr 1 & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	10	3	30%	0	0	8	A
WB	**10**	**3**	**30%**			**8**	**A**
Total	**10**	**3**	**30%**			**8**	**A**

Node Letter: UB VISSIM ID: 3404

2050TDIPM

LOS Category: Signalized

1: 2700 W & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	190	185	97%	50	275	52	D
NBT	120	124	103%	25	200	48	D
NBR	440	441	100%	0	0	0	A
NB	**750**	**750**	**100%**			**21**	**C**
SBL	340	341	100%	75	425	30	C
SBT	160	164	103%	25	150	28	C
SBR	30	30	100%	0	0	0	A
SB	**530**	**535**	**101%**			**28**	**C**
EBL	20	20	100%	0	25	65	E
EBR	230	233	101%	0	0	12	B
EB	**250**	**253**	**101%**			**16**	**B**
WBL	570	542	95%	200	875	57	E
WBR	430	405	94%	25	400	22	C
WB	**1,000**	**947**	**95%**			**42**	**D**
Total	**2,530**	**2,485**	**98%**			**30**	**C**

Node Letter: U VISSIM ID: 2700

LOS Category: Unsignalized

2: East 13630 S & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	10	9	90%	0	0	5	A
WB	**10**	**9**	**90%**			**5**	**A**
Total	**10**	**9**	**90%**			**5**	**A**

Node Letter: UA VISSIM ID: 3402

LOS Category: Unsignalized

3: West 13630 S & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	20	20	100%	0	75	4	A
NB	**20**	**20**	**100%**			**4**	**A**
EBL	10	5	50%	0	25	11	B
EBR	10	12	120%	0	25	5	A
EB	**20**	**17**	**85%**			**7**	**A**
Total	**40**	**37**	**93%**			**6**	**A**

Node Letter: UA VISSIM ID: 3403

LOS Category: Unsignalized

4: Dr 1 & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	30	12	40%	0	0	3	A
WB	**30**	**12**	**40%**			**3**	**A**
Total	**30**	**12**	**40%**			**3**	**A**

Node Letter: UB VISSIM ID: 3404

2050TDIAM

LOS Category: Unsignalized

5: Dr 2 & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBL	10	9	90%	0	25	24	C
WBR	10	9	90%	0	25	11	B
WB	**20**	**18**	**90%**			**17**	**C**
Total	**20**	**18**	**90%**			**17**	**C**

Node Letter: UC VISSIM ID: 3405

LOS Category: Signalized

6: 13400 S & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	1,270	1,202	95%	175	550	63	E
NBR	330	309	94%	0	0	6	A
NB	**1,600**	**1,511**	**94%**			**51**	**D**
SBL	240	238	99%	25	150	50	D
SBR	850	847	100%	25	175	11	B
SB	**1,090**	**1,085**	**100%**			**19**	**B**
EBL	1,320	1,298	98%	500	1,975	73	E
EBT	600	596	99%	125	500	56	E
EBR	1,530	1,529	100%	25	375	17	B
EB	**3,450**	**3,423**	**99%**			**45**	**D**
WBL	80	80	100%	25	75	56	E
WBT	510	502	98%	125	375	74	E
WBR	360	370	103%	0	0	2	A
WB	**950**	**952**	**100%**			**45**	**D**
Total	**7,090**	**6,971**	**98%**			**42**	**D**

Node Letter: T VISSIM ID: 3406

LOS Category: Signalized

7: Redwood Rd & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	780	542	69%	75	325	475	F
NBT	1,960	1,319	67%	100	450	461	F
NBR	1,470	949	65%	6,975	8,700	573	F
NB	**4,210**	**2,810**	**67%**			**501**	**F**
SBL	430	422	98%	300	725	157	F
SBT	760	755	99%	75	250	38	D
SBR	130	130	100%	0	0	2	A
SB	**1,320**	**1,307**	**99%**			**73**	**E**
EBL	160	165	103%	25	125	58	E
EBR	440	443	101%	0	0	6	A
EB	**600**	**608**	**101%**			**20**	**B**
WBL	680	652	96%	1,000	3,550	208	F
WBR	380	368	97%	75	350	87	F
WB	**1,060**	**1,020**	**96%**			**165**	**F**
Total	**7,190**	**5,745**	**80%**			**293**	**F**

Node Letter: V VISSIM ID: 3401

2050TDIPM

LOS Category: Unsignalized

5: Dr 2 & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBL	20	19	95%	0	50	21	C
WBR	30	31	103%	0	50	9	A
WB	**50**	**50**	**100%**			**13**	**B**
Total	**50**	**50**	**100%**			**13**	**B**

Node Letter: UC VISSIM ID: 3405

LOS Category: Signalized

6: 13400 S & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	1,410	1,340	95%	150	425	49	D
NBR	300	278	93%	0	0	5	A
NB	**1,710**	**1,618**	**95%**			**42**	**D**
SBL	400	403	101%	50	200	42	D
SBR	1,150	1,151	100%	50	300	17	B
SB	**1,550**	**1,554**	**100%**			**23**	**C**
EBL	920	906	98%	250	850	75	E
EBT	740	732	99%	100	400	44	D
EBR	1,350	1,357	101%	0	250	7	A
EB	**3,010**	**2,995**	**100%**			**37**	**D**
WBL	170	172	101%	50	125	83	F
WBT	820	798	97%	300	825	96	F
WBR	440	442	100%	0	0	10	A
WB	**1,430**	**1,412**	**99%**			**68**	**E**
Total	**7,700**	**7,579**	**98%**			**41**	**D**

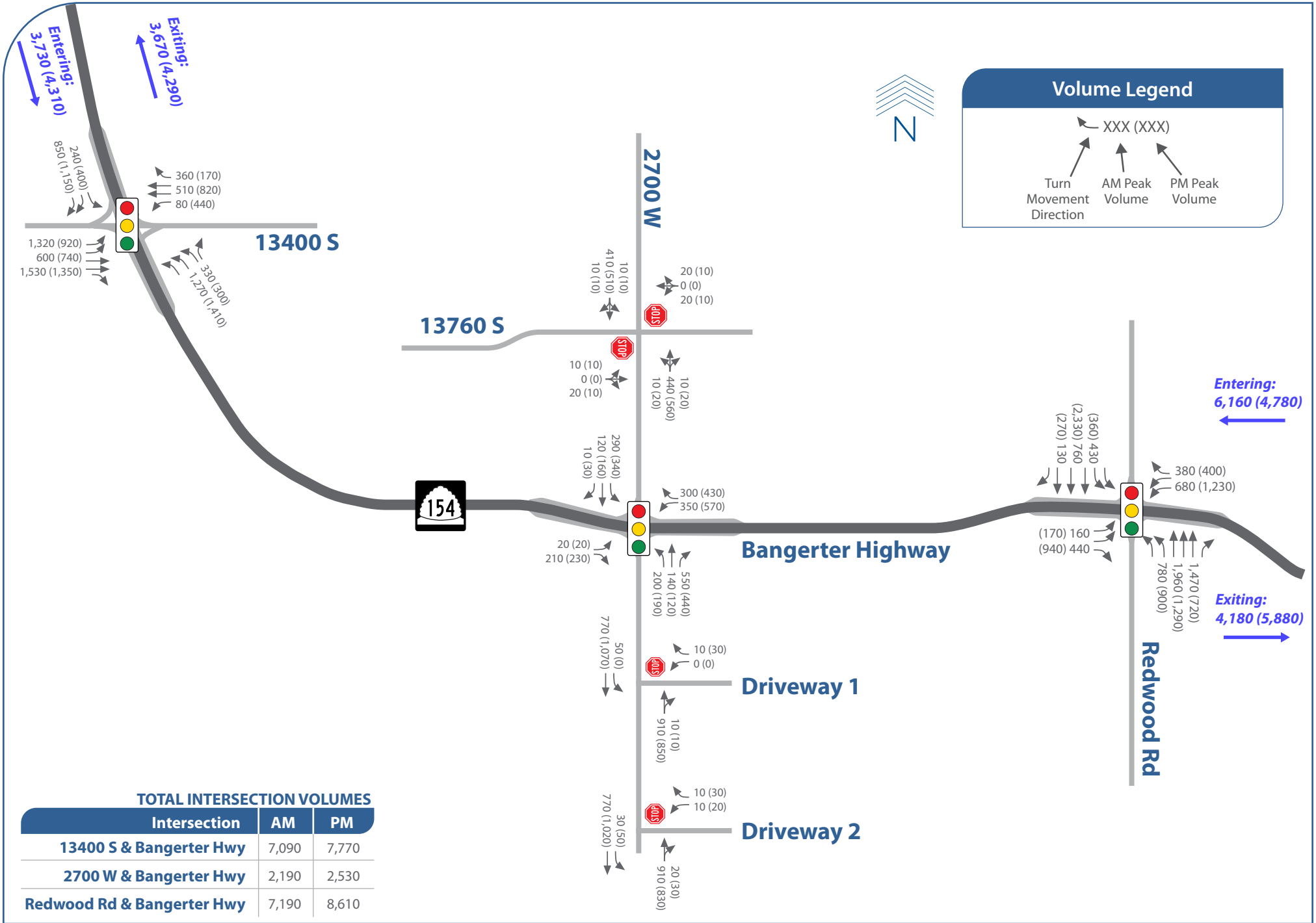
Node Letter: T VISSIM ID: 3406

LOS Category: Signalized

7: Redwood Rd & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	900	766	85%	4,000	8,225	469	F
NBT	1,290	1,077	83%	100	425	318	F
NBR	720	603	84%	0	0	262	F
NB	**2,910**	**2,446**	**84%**			**351**	**F**
SBL	360	258	72%	75	200	367	F
SBT	2,330	1,661	71%	2,275	2,450	337	F
SBR	270	187	69%	0	0	293	F
SB	**2,960**	**2,106**	**71%**			**337**	**F**
EBL	170	179	105%	25	100	47	D
EBR	940	938	100%	0	75	10	A
EB	**1,110**	**1,117**	**101%**			**16**	**B**
WBL	1,230	1,143	93%	3,575	6,075	258	F
WBR	400	368	92%	50	225	207	F
WB	**1,630**	**1,511**	**93%**			**246**	**F**
Total	**8,610**	**7,180**	**83%**			**273**	**F**

Node Letter: V VISSIM ID: 3401

Appendix B. 2050 SPUI Alternative Traffic Volume and Intersection LOS Results



TOTAL INTERSECTION VOLUMES

Intersection	AM	PM
13400 S & Bangerter Hwy	7,090	7,770
2700 W & Bangerter Hwy	2,190	2,530
Redwood Rd & Bangerter Hwy	7,190	8,610

2050 Build Tight Diamond / SPUI Peak Hour Traffic Volumes

2700 West & Bangerter Highway Environmental Study

2700 West Bangerter Environmental

VISSIM Volume, Queue, and Delay Results

2050SPUIAM

LOS Category: Signalized

1: 2700 W & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	200	189	95%	100	825	58	E
NBT	140	136	97%	25	175	35	C
NBR	550	542	99%	0	0	1	A
NB	**890**	**867**	**97%**			**19**	**B**
SBL	290	285	98%	125	525	53	D
SBT	120	119	99%	25	125	29	C
SBR	10	10	100%	0	0	0	A
SB	**420**	**414**	**99%**			**45**	**D**
EBL	20	20	100%	0	50	40	D
EBR	210	220	105%	0	0	11	B
EB	**230**	**240**	**104%**			**13**	**B**
WBL	350	332	95%	100	400	46	D
WBR	300	274	91%	0	125	10	A
WB	**650**	**606**	**93%**			**30**	**C**
Total	**2,190**	**2,127**	**97%**			**26**	**C**

Node Letter: U VISSIM ID: 2700

LOS Category: Unsignalized

2: East 13630 S & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	10	10	100%	0	0	6	A
WB	**10**	**10**	**100%**			**7**	**A**
Total	**10**	**10**	**100%**			**6**	**A**

Node Letter: UA VISSIM ID: 3402

LOS Category: Unsignalized

3: West 13630 S & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	10	9	90%	0	0	4	A
NB	**10**	**9**	**90%**			**5**	**A**
EBL	10	9	90%	0	25	9	A
EBR	20	20	100%	0	0	6	A
EB	**30**	**29**	**97%**			**7**	**A**
Total	**40**	**38**	**95%**			**7**	**A**

Node Letter: UA VISSIM ID: 3403

LOS Category: Unsignalized

4: Dr 1 & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	10	3	30%	0	0	4	A
WB	**10**	**3**	**30%**			**4**	**A**
Total	**10**	**3**	**30%**			**4**	**A**

Node Letter: UB VISSIM ID: 3404

2050SPUIPM

LOS Category: Signalized

1: 2700 W & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	190	185	97%	50	250	52	D
NBT	120	124	103%	25	150	42	D
NBR	440	441	100%	0	0	1	A
NB	**750**	**750**	**100%**			**20**	**B**
SBL	340	341	100%	175	700	53	D
SBT	160	164	103%	25	175	39	D
SBR	30	30	100%	0	0	0	A
SB	**530**	**535**	**101%**			**46**	**D**
EBL	20	20	100%	0	50	38	D
EBR	230	233	101%	0	0	12	B
EB	**250**	**253**	**101%**			**14**	**B**
WBL	570	540	95%	175	775	52	D
WBR	430	406	94%	50	450	17	B
WB	**1,000**	**946**	**95%**			**37**	**D**
Total	**2,530**	**2,484**	**98%**			**32**	**C**

Node Letter: U VISSIM ID: 2700

LOS Category: Unsignalized

2: East 13630 S & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	10	9	90%	0	0	5	A
WB	**10**	**9**	**90%**			**5**	**A**
Total	**10**	**9**	**90%**			**5**	**A**

Node Letter: UA VISSIM ID: 3402

LOS Category: Unsignalized

3: West 13630 S & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	20	20	100%	0	75	7	A
NB	**20**	**20**	**100%**			**7**	**A**
EBL	10	5	50%	0	25	12	B
EBR	10	12	120%	0	0	7	A
EB	**20**	**17**	**85%**			**9**	**A**
Total	**40**	**37**	**93%**			**8**	**A**

Node Letter: UA VISSIM ID: 3403

LOS Category: Unsignalized

4: Dr 1 & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	30	12	40%	0	0	2	A
WB	**30**	**12**	**40%**			**2**	**A**
Total	**30**	**12**	**40%**			**2**	**A**

Node Letter: UB VISSIM ID: 3404

2050SPUIAM

LOS Category: Unsignalized

5: Dr 2 & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBL	10	9	90%	0	25	19	C
WBR	10	9	90%	0	25	11	B
WB	**20**	**18**	**90%**			**14**	**B**
Total	**20**	**18**	**90%**			**14**	**B**

Node Letter: UC VISSIM ID: 3405

LOS Category: Signalized

6: 13400 S & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	1,270	1,200	94%	175	550	64	E
NBR	330	307	93%	0	0	6	A
NB	**1,600**	**1,507**	**94%**			**52**	**D**
SBL	240	238	99%	25	150	50	D
SBR	850	846	100%	25	175	11	B
SB	**1,090**	**1,084**	**99%**			**19**	**B**
EBL	1,320	1,298	98%	450	1,650	72	E
EBT	600	597	100%	100	450	52	D
EBR	1,530	1,528	100%	25	425	14	B
EB	**3,450**	**3,423**	**99%**			**43**	**D**
WBL	80	80	100%	25	75	56	E
WBT	510	502	98%	125	400	74	E
WBR	360	370	103%	0	0	2	A
WB	**950**	**952**	**100%**			**45**	**D**
Total	**7,090**	**6,966**	**98%**			**41**	**D**

Node Letter: T VISSIM ID: 3406

LOS Category: Signalized

7: Redwood Rd & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	780	542	69%	75	325	475	F
NBT	1,960	1,319	67%	100	450	461	F
NBR	1,470	949	65%	6,975	8,700	573	F
NB	**4,210**	**2,810**	**67%**			**501**	**F**
SBL	430	422	98%	300	725	157	F
SBT	760	755	99%	75	250	38	D
SBR	130	130	100%	0	0	2	A
SB	**1,320**	**1,307**	**99%**			**73**	**E**
EBL	160	165	103%	25	125	58	E
EBR	440	443	101%	0	0	6	A
EB	**600**	**608**	**101%**			**20**	**B**
WBL	680	652	96%	1,000	3,550	208	F
WBR	380	368	97%	75	350	87	F
WB	**1,060**	**1,020**	**96%**			**165**	**F**
Total	**7,190**	**5,745**	**80%**			**293**	**F**

Node Letter: V VISSIM ID: 3401

2050SPUIPM

LOS Category: Unsignalized

5: Dr 2 & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBL	20	19	95%	0	50	23	C
WBR	30	31	103%	0	50	10	A
WB	**50**	**50**	**100%**			**15**	**B**
Total	**50**	**50**	**100%**			**15**	**B**

Node Letter: UC VISSIM ID: 3405

LOS Category: Signalized

6: 13400 S & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	1,410	1,342	95%	125	450	48	D
NBR	300	280	93%	0	0	5	A
NB	**1,710**	**1,622**	**95%**			**40**	**D**
SBL	400	402	101%	50	200	41	D
SBR	1,150	1,151	100%	50	275	17	B
SB	**1,550**	**1,553**	**100%**			**23**	**C**
EBL	920	906	98%	250	900	75	E
EBT	740	732	99%	100	375	44	D
EBR	1,350	1,356	100%	0	250	7	A
EB	**3,010**	**2,994**	**99%**			**37**	**D**
WBL	170	173	102%	50	125	82	F
WBT	820	801	98%	300	800	96	F
WBR	440	442	100%	0	0	10	A
WB	**1,430**	**1,416**	**99%**			**67**	**E**
Total	**7,700**	**7,585**	**99%**			**40**	**D**

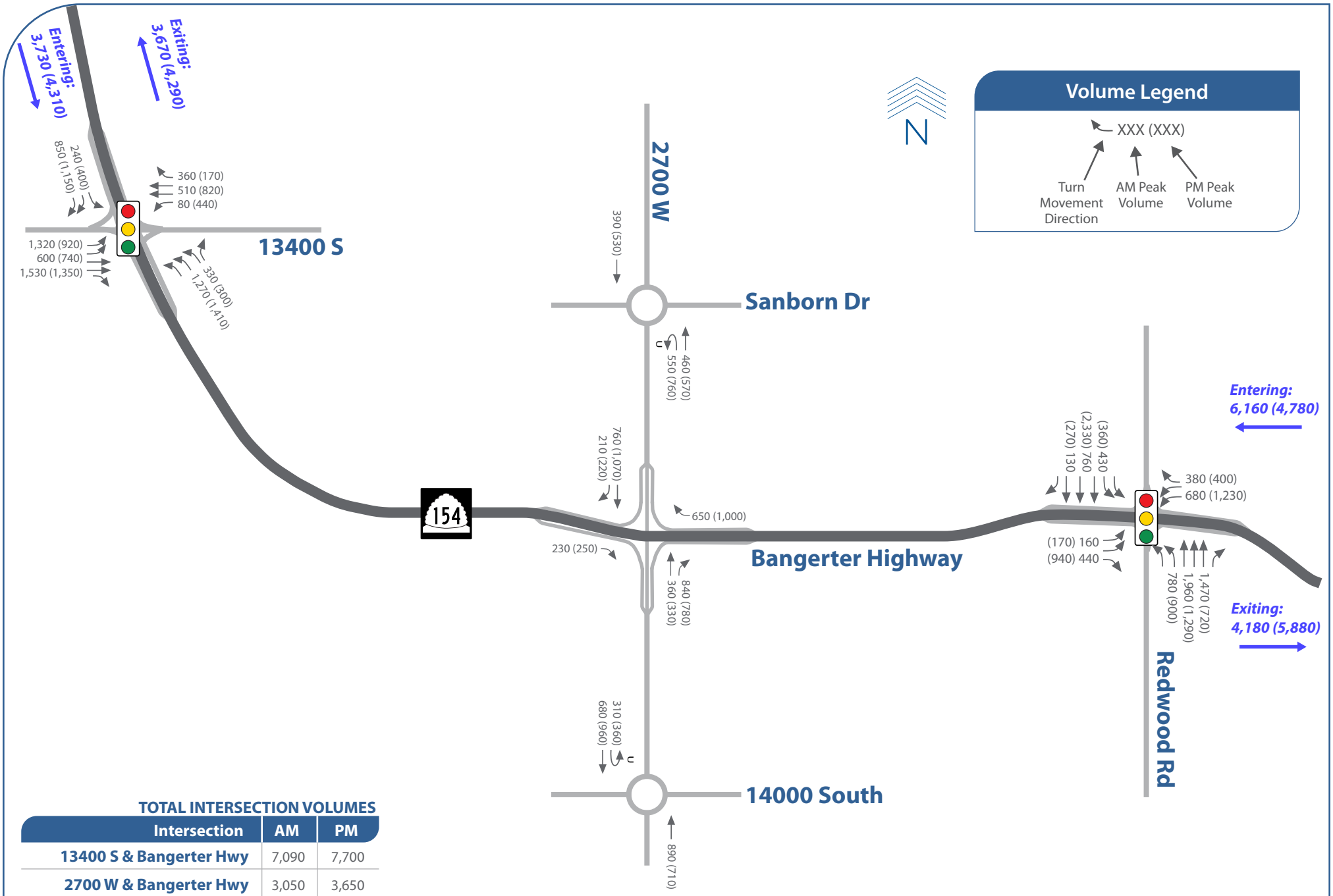
Node Letter: T VISSIM ID: 3406

LOS Category: Signalized

7: Redwood Rd & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	900	766	85%	4,000	8,225	469	F
NBT	1,290	1,077	83%	100	425	318	F
NBR	720	603	84%	0	0	262	F
NB	**2,910**	**2,446**	**84%**			**351**	**F**
SBL	360	258	72%	75	200	367	F
SBT	2,330	1,661	71%	2,275	2,450	337	F
SBR	270	187	69%	0	0	293	F
SB	**2,960**	**2,106**	**71%**			**337**	**F**
EBL	170	179	105%	25	100	47	D
EBR	940	938	100%	0	75	10	A
EB	**1,110**	**1,117**	**101%**			**16**	**B**
WBL	1,230	1,143	93%	3,575	6,075	258	F
WBR	400	368	92%	50	225	207	F
WB	**1,630**	**1,511**	**93%**			**246**	**F**
Total	**8,610**	**7,180**	**83%**			**273**	**F**

Node Letter: V VISSIM ID: 3401

Appendix C. 2050 Roundabout Alternative Traffic Volume and Intersection LOS Results



TOTAL INTERSECTION VOLUMES

Intersection	AM	PM
13400 S & Bangerter Hwy	7,090	7,700
2700 W & Bangerter Hwy	3,050	3,650
Redwood Rd & Bangerter Hwy	7,190	8,610

2050 RIRO Peak Hour Traffic Volumes

2700 West & Bangerter Highway Environmental Study

2050AM_RIRO

LOS Category: Signalized

6: 13400 S & Bangerter

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Delay / LOS Analysis Period 900-4500	
NBL	1,270	1,226	97%	200	575	65	E
NBR	330	309	94%	0	0	6	A
NB	**1,600**	**1,535**	**96%**			**53**	**D**
SBL	240	238	99%	25	150	49	D
SBR	850	848	100%	25	175	11	B
SB	**1,090**	**1,086**	**100%**			**19**	**B**
EBL	1,320	1,300	98%	450	1,625	70	E
EBT	600	598	100%	125	475	53	D
EBR	1,530	1,529	100%	25	450	14	B
EB	**3,450**	**3,427**	**99%**			**42**	**D**
WBL	80	80	100%	25	75	56	E
WBT	510	502	98%	125	375	74	E
WBR	360	370	103%	0	0	2	A
WB	**950**	**952**	**100%**			**45**	**D**
Total	**7,090**	**7,000**	**99%**			**41**	**D**

Node Letter: T VISSIM ID: 3406

LOS Category: Signalized

7: Redwood Rd & Bangerter

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Delay / LOS Analysis Period 900-4500	
NBL	780	542	69%	75	325	475	F
NBT	1,960	1,319	67%	100	450	461	F
NBR	1,470	949	65%	6,975	8,700	573	F
NB	**4,210**	**2,810**	**67%**			**501**	**F**
SBL	430	422	98%	300	725	157	F
SBT	760	755	99%	75	250	38	D
SBR	130	130	100%	0	0	2	A
SB	**1,320**	**1,307**	**99%**			**73**	**E**
EBL	160	165	103%	25	125	58	E
EBR	440	443	101%	0	0	6	A
EB	**600**	**608**	**101%**			**20**	**B**
WBL	680	652	96%	1,000	3,550	208	F
WBR	380	368	97%	75	350	87	F
WB	**1,060**	**1,020**	**96%**			**165**	**F**
Total	**7,190**	**5,745**	**80%**			**293**	**F**

Node Letter: V VISSIM ID: 3401

2050PM_RIRO

LOS Category: Signalized

6: 13400 S & Bangerter

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Delay / LOS Analysis Period 900-4500	
NBL	1,410	1,350	96%	125	450	47	D
NBR	300	279	93%	0	0	5	A
NB	**1,710**	**1,629**	**95%**			**40**	**D**
SBL	400	403	101%	50	200	42	D
SBR	1,150	1,150	100%	50	300	17	B
SB	**1,550**	**1,553**	**100%**			**23**	**C**
EBL	920	906	98%	250	725	72	E
EBT	740	732	99%	100	400	43	D
EBR	1,350	1,356	100%	0	225	6	A
EB	**3,010**	**2,994**	**99%**			**35**	**C**
WBL	170	172	101%	50	125	84	F
WBT	820	798	97%	300	825	98	F
WBR	440	439	100%	0	0	11	B
WB	**1,430**	**1,409**	**99%**			**69**	**E**
Total	**7,700**	**7,585**	**99%**			**40**	**D**

Node Letter: T VISSIM ID: 3406

LOS Category: Signalized

7: Redwood Rd & Bangerter

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Delay / LOS Analysis Period 900-4500	
NBL	900	766	85%	4,000	8,225	469	F
NBT	1,290	1,077	83%	100	425	318	F
NBR	720	603	84%	0	0	262	F
NB	**2,910**	**2,446**	**84%**			**351**	**F**
SBL	360	258	72%	75	200	367	F
SBT	2,330	1,661	71%	2,275	2,450	337	F
SBR	270	187	69%	0	0	293	F
SB	**2,960**	**2,106**	**71%**			**337**	**F**
EBL	170	179	105%	25	100	47	D
EBR	940	938	100%	0	75	10	A
EB	**1,110**	**1,117**	**101%**			**16**	**B**
WBL	1,230	1,143	93%	3,575	6,075	258	F
WBR	400	368	92%	50	225	207	F
WB	**1,630**	**1,511**	**93%**			**246**	**F**
Total	**8,610**	**7,180**	**83%**			**273**	**F**

Node Letter: V VISSIM ID: 3401

2700 West Bangerter Environmental

VISSIM Volume, Queue, and Delay Results

2050AM_PGBM

LOS Category: Unsignalized

1: 2700 West & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	200	180	90%	175	900	31	D
NBT	140	123	88%	175	900	29	D
NBR	550	499	91%	175	900	27	D
NB	**890**	**802**	**90%**			**28**	D
SBL	290	251	87%	25	225	20	C
SBT	120	99	83%	25	225	16	C
SBR	10	9	90%	25	225	12	B
SB	**420**	**359**	**85%**			**19**	**C**
EBL	20	19	95%	0	150	21	C
EBR	210	208	99%	0	150	13	B
EB	**230**	**227**	**99%**			**14**	**B**
WBL	350	314	90%	0	0	18	C
WBR	300	262	87%	0	0	12	B
WB	**650**	**576**	**89%**			**15**	**B**
Total	**2,190**	**1,964**	**90%**			**21**	**C**

Node Letter: U VISSIM ID: 3407

2050PM_PGBM

LOS Category: Unsignalized

1: 2700 West & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	190	168	88%	50	425	21	C
NBT	120	102	85%	50	425	20	C
NBR	440	401	91%	50	425	13	B
NB	**750**	**671**	**89%**			**16**	**C**
SBL	340	312	92%	325	525	91	F
SBT	160	143	89%	325	525	87	F
SBR	30	28	93%	325	525	83	F
SB	**530**	**483**	**91%**			**89**	**F**
EBL	20	18	90%	0	175	25	C
EBR	230	220	96%	0	175	16	C
EB	**250**	**238**	**95%**			**17**	**C**
WBL	570	513	90%	0	0	29	D
WBR	430	365	85%	0	0	21	C
WB	**1,000**	**878**	**88%**			**26**	**D**
Total	**2,530**	**2,270**	**90%**			**35**	**D**

Node Letter: U VISSIM ID: 3407

VISSIM Travel Time Comparison

2700 West & Bangerter

2050AM_Roundabout

2700W EB	Dist (mi)	Base FFS (mph)	# Veh	Travel Time (sec)	Travel Speed (mph)	LOS
EBL_addedTT	0.6	35	20	72	28	A

2700W NB	Dist (mi)	Base FFS (mph)	# Veh	Travel Time (sec)	Travel Speed (mph)	LOS
NBL_addedTT	0.7	35	184	86	28	B
Total	0.7	35	--	86	28	B

2700W SB	Dist (mi)	Base FFS (mph)	# Veh	Travel Time (sec)	Travel Speed (mph)	LOS
SBL_addedTT	0.6	35	278	74	27	B
Total	0.6	35	--	74	27	B

2700W WB	Dist (mi)	Base FFS (mph)	# Veh	Travel Time (sec)	Travel Speed (mph)	LOS
WBL_addedTT	0.7	35	333	89	28	B
Total	0.7	35	--	89	28	B

2050PM_Roundabout

2700W EB	Dist (mi)	Base FFS (mph)	# Veh	Travel Time (sec)	Travel Speed (mph)	LOS
EBL_addedTT	0.6	35	20	72	28	B

2700W NB	Dist (mi)	Base FFS (mph)	# Veh	Travel Time (sec)	Travel Speed (mph)	LOS
NBL_addedTT	0.7	35	181	90	27	B
Total	0.7	35	--	90	27	B

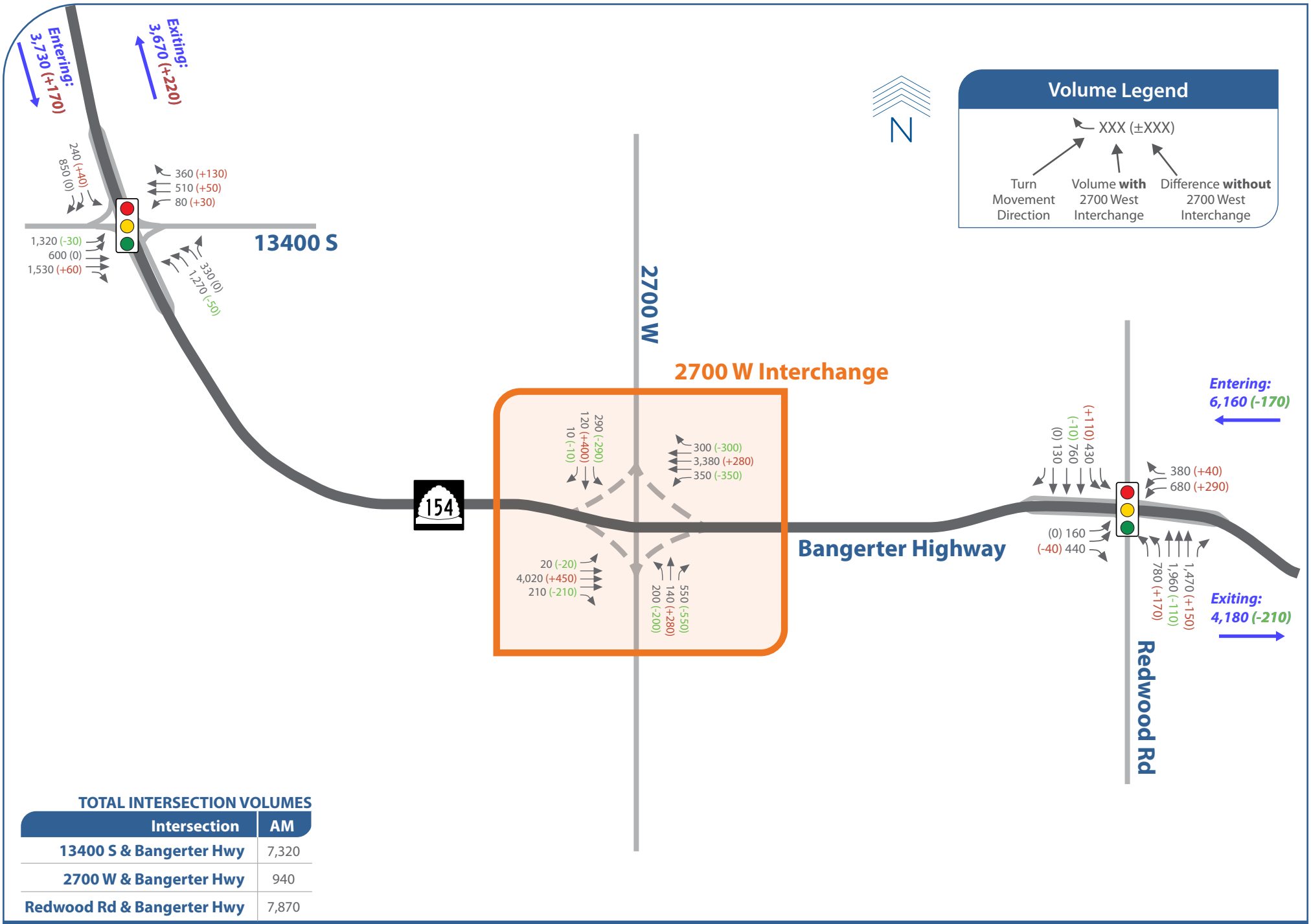
2700W SB	Dist (mi)	Base FFS (mph)	# Veh	Travel Time (sec)	Travel Speed (mph)	LOS
SBL_addedTT	0.6	35	324	76	27	B
Total	0.6	35	--	76	27	B

2700W WB	Dist (mi)	Base FFS (mph)	# Veh	Travel Time (sec)	Travel Speed (mph)	LOS
WBL_addedTT	0.7	35	538	92	27	B
Total	0.7	35	--	92	27	B

Combined LOS/Delay for 2700 W & Bangerter

	AM					PM				
	Demand	Delay from RIRO Node	Delay from out of direction travel	Total Delay	LOS	Demand	Delay from RIRO Node	Delay from out of direction travel	Total Delay	LOS
NBL	200	31	69	100	F	200	21	69	90	F
NBT	140	29	0	29	C	140	20	0	20	B
NBR	550	27	0	27	C	550	13	0	13	B
NB	**890**			**44**	**D**	**890**			**34**	**C**
SBL	340	20	57	77	E	340	91	57	148	F
SBT	160	16	0	16	B	160	87	0	87	F
SBR	10	12	0	12	B	30	83	0	83	F
SB	**510**			**57**	**D**	**530**			**126**	**F**
EBL	20	21	57	78	E	20	25	57	82	F
EBR	210	13	0	13	B	210	16	0	16	B
EB	**230**			**19**	**B**	**230**			**21**	**B**
WBL	350	18	70	88	F	350	29	70	99	F
WBR	300	12	0	12	A	300	21	0	21	B
WB	**650**			**53**	**D**	**650**			**65**	**E**
TOTAL	2,280			**47**	**D**	2,300			**64**	**E**

Appendix D. 2050 Overpass Alternative Traffic Volume and Intersection LOS Results

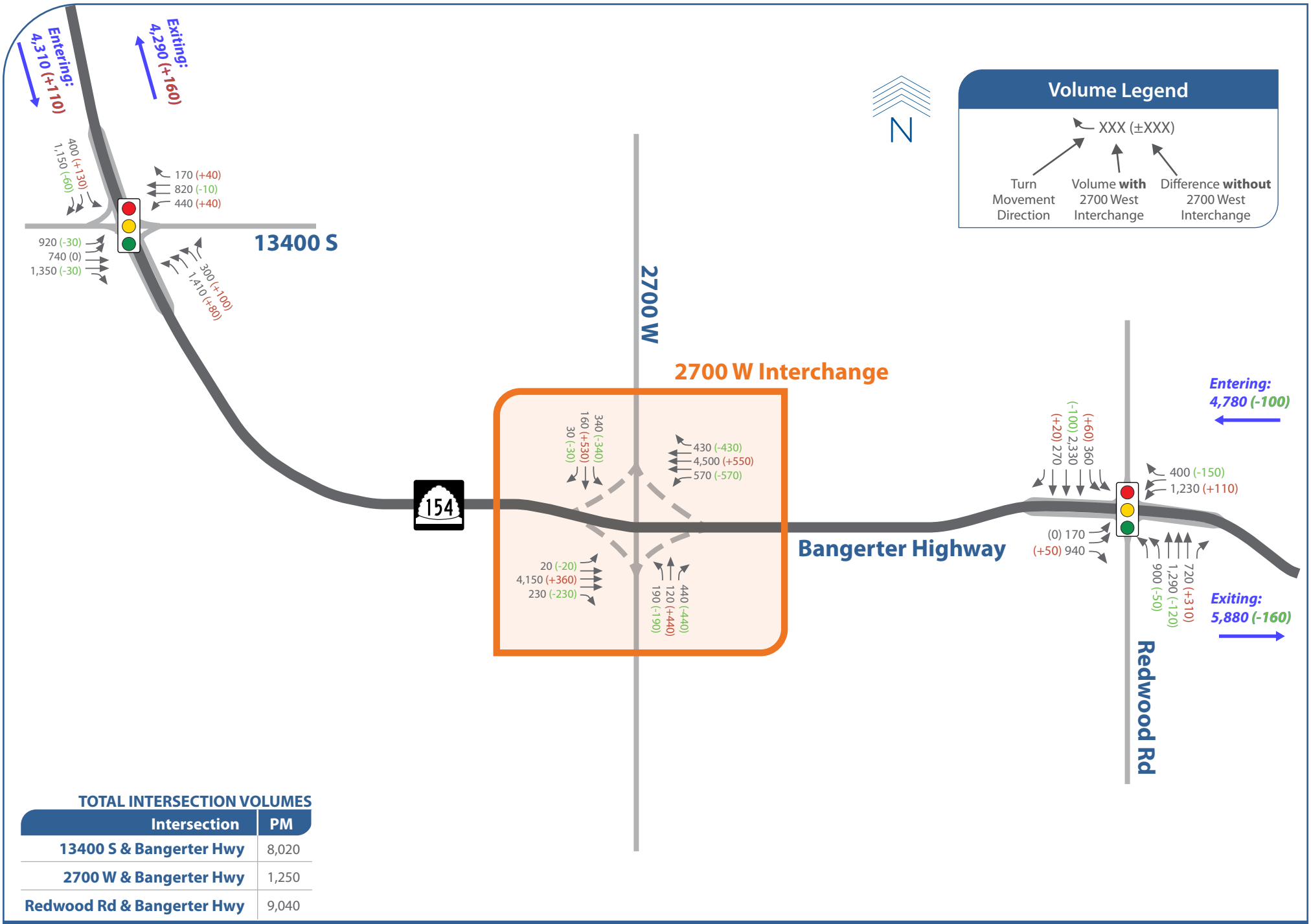


TOTAL INTERSECTION VOLUMES

Intersection	AM
13400 S & Bangerter Hwy	7,320
2700 W & Bangerter Hwy	940
Redwood Rd & Bangerter Hwy	7,870

2050 Build Overpass AM Peak Hour Traffic Volumes

2700 West & Bangerter Highway Environmental Study



TOTAL INTERSECTION VOLUMES

Intersection	PM
13400 S & Bangerter Hwy	8,020
2700 W & Bangerter Hwy	1,250
Redwood Rd & Bangerter Hwy	9,040

2050 Build Overpass PM Peak Hour Traffic Volumes

2700 West & Bangerter Highway Environmental Study

2050 Bld AM_ Overpass

LOS Category: Unsignalized

2: East 13630 S & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	20	10	50%	0	0	6	A
WB	**20**	**10**	**50%**			**5**	**A**
Total	**20**	**10**	**50%**			**5**	**A**

Node Letter: UA VISSIM ID: 3402

LOS Category: Unsignalized

3: West 13630 S & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	10	20	200%	0	75	2	A
NB	**10**	**20**	**200%**			**2**	**A**
EBL	10	8	80%	0	25	11	B
EBR	20	10	50%	0	0	6	A
EB	**30**	**18**	**60%**			**8**	**A**
Total	**40**	**38**	**95%**			**5**	**A**

Node Letter: UA VISSIM ID: 3403

LOS Category: Unsignalized

4: Dr 1 & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	10	27	270%	0	0	1	A
WB	**10**	**27**	**270%**			**1**	**A**
Total	**10**	**27**	**270%**			**1**	**A**

Node Letter: UB VISSIM ID: 3404

LOS Category: Unsignalized

5: Dr 2 & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBL	10	17	170%	0	50	11	B
WBR	10	31	310%	0	50	7	A
WB	**20**	**48**	**240%**			**9**	**A**
Total	**20**	**48**	**240%**			**9**	**A**

Node Letter: UC VISSIM ID: 3405

2050 Bld PM_ Overpass

LOS Category: Unsignalized

2: East 13630 S & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	10	9	90%	0	0	5	A
WB	**10**	**9**	**90%**			**5**	**A**
Total	**10**	**9**	**90%**			**5**	**A**

Node Letter: UA VISSIM ID: 3402

LOS Category: Unsignalized

3: West 13630 S & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	20	19	95%	0	75	3	A
NB	**20**	**19**	**95%**			**3**	**A**
EBL	10	8	80%	0	25	13	B
EBR	10	9	90%	0	0	6	A
EB	**20**	**17**	**85%**			**9**	**A**
Total	**40**	**36**	**90%**			**6**	**A**

Node Letter: UA VISSIM ID: 3403

LOS Category: Unsignalized

4: Dr 1 & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBR	30	28	93%	0	0	1	A
WB	**30**	**28**	**93%**			**1**	**A**
Total	**30**	**28**	**93%**			**1**	**A**

Node Letter: UB VISSIM ID: 3404

LOS Category: Unsignalized

5: Dr 2 & 2700 W						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
WBL	20	18	90%	0	50	14	B
WBR	30	32	107%	0	50	8	A
WB	**50**	**50**	**100%**			**10**	**A**
Total	**50**	**50**	**100%**			**10**	**A**

Node Letter: UC VISSIM ID: 3405

2050 Bld AM_ Overpass

LOS Category: Signalized

6: 13400 S & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	1,220	968	79%	125	450	57	E
NBR	330	260	79%	0	0	4	A
NB	**1,550**	**1,228**	**79%**			**46**	**D**
SBL	280	280	100%	50	175	55	D
SBR	850	850	100%	25	175	9	A
SB	**1,130**	**1,130**	**100%**			**21**	**C**
EBL	1,290	1,231	95%	775	3,450	95	F
EBT	600	583	97%	275	2,175	68	E
EBR	1,590	1,556	98%	25	425	34	C
EB	**3,480**	**3,370**	**97%**			**62**	**E**
WBL	110	112	102%	25	100	60	E
WBT	560	550	98%	200	625	94	F
WBR	490	497	101%	50	550	16	B
WB	**1,160**	**1,159**	**100%**			**57**	**E**
Total	**7,320**	**6,887**	**94%**			**52**	**D**

Node Letter: T VISSIM ID: 3406

LOS Category: Signalized

7: Redwood Rd & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	950	673	71%	2,925	8,700	408	F
NBT	1,850	1,286	70%	75	375	421	F
NBR	1,620	1,079	67%	7,200	8,700	495	F
NB	**4,420**	**3,038**	**69%**			**444**	**F**
SBL	540	453	84%	1,300	2,225	415	F
SBT	750	656	87%	975	2,225	264	F
SBR	130	116	89%	0	0	204	F
SB	**1,420**	**1,225**	**86%**			**314**	**F**
EBL	160	162	101%	25	125	59	E
EBR	480	492	103%	0	0	5	A
EB	**640**	**654**	**102%**			**18**	**B**
WBL	970	659	68%	5,800	7,575	878	F
WBR	420	284	68%	50	300	751	F
WB	**1,390**	**943**	**68%**			**841**	**F**
Total	**7,870**	**5,860**	**74%**			**433**	**F**

Node Letter: V VISSIM ID: 3401

2050 Bld PM_ Overpass

LOS Category: Signalized

6: 13400 S & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	1,490	1,186	80%	125	500	47	D
NBR	400	321	80%	0	0	6	A
NB	**1,890**	**1,507**	**80%**			**38**	**D**
SBL	530	537	101%	75	250	43	D
SBR	1,090	1,090	100%	25	250	15	B
SB	**1,620**	**1,627**	**100%**			**24**	**C**
EBL	890	879	99%	200	625	65	E
EBT	740	735	99%	100	400	43	D
EBR	1,380	1,385	100%	0	275	6	A
EB	**3,010**	**2,999**	**100%**			**32**	**C**
WBL	210	212	101%	75	175	104	F
WBT	810	779	96%	400	925	122	F
WBR	480	480	100%	0	0	22	C
WB	**1,500**	**1,471**	**98%**			**87**	**F**
Total	**8,020**	**7,604**	**95%**			**42**	**D**

Node Letter: T VISSIM ID: 3406

LOS Category: Signalized

7: Redwood Rd & Bangerter						Delay / LOS	
		Volume		Queue (ft) Avg / 95th		Analysis Period	
Mvmt	Demand	Served	% Served	900-4500		900-4500	
NBL	850	759	89%	3,025	7,400	367	F
NBT	1,170	1,051	90%	75	350	208	F
NBR	1,030	930	90%	0	0	146	F
NB	**3,050**	**2,740**	**90%**			**231**	**F**
SBL	420	300	71%	925	2,450	361	F
SBT	2,230	1,610	72%	2,275	2,450	330	F
SBR	290	204	70%	0	0	287	F
SB	**2,940**	**2,114**	**72%**			**331**	**F**
EBL	170	167	98%	25	100	43	D
EBR	990	1,004	101%	0	100	8	A
EB	**1,160**	**1,171**	**101%**			**13**	**B**
WBL	1,340	1,026	77%	6,850	7,575	524	F
WBR	550	418	76%	100	425	482	F
WB	**1,890**	**1,444**	**76%**			**512**	**F**
Total	**9,040**	**7,469**	**83%**			**279**	**F**

Node Letter: V VISSIM ID: 3401

Appendix E. 2700 West-Bangerter Executive Summary

2700 West & Bangerter Highway

INTERCHANGE vs. OVERPASS TRAFFIC ANALYSIS

This is an Executive Summary of the traffic analysis comparison between two access options for 2700 West & Bangerter Highway:

- » ***Interchange*** at 2700 West – providing access to Bangerter Highway
- » ***Overpass*** at 2700 West – not providing access to Bangerter Highway

The ***Study Area*** includes the interchanges along Bangerter Highway from 13400 South to Redwood Road. The following is a summary of the traffic analysis results.

1 TRAFFIC VOLUMES

» An ***Overpass*** at 2700 West would increase 2050 peak hour traffic volumes at the Redwood Road and Bangerter Highway interchange by ***5-10%***

2 VEHICLE DELAY

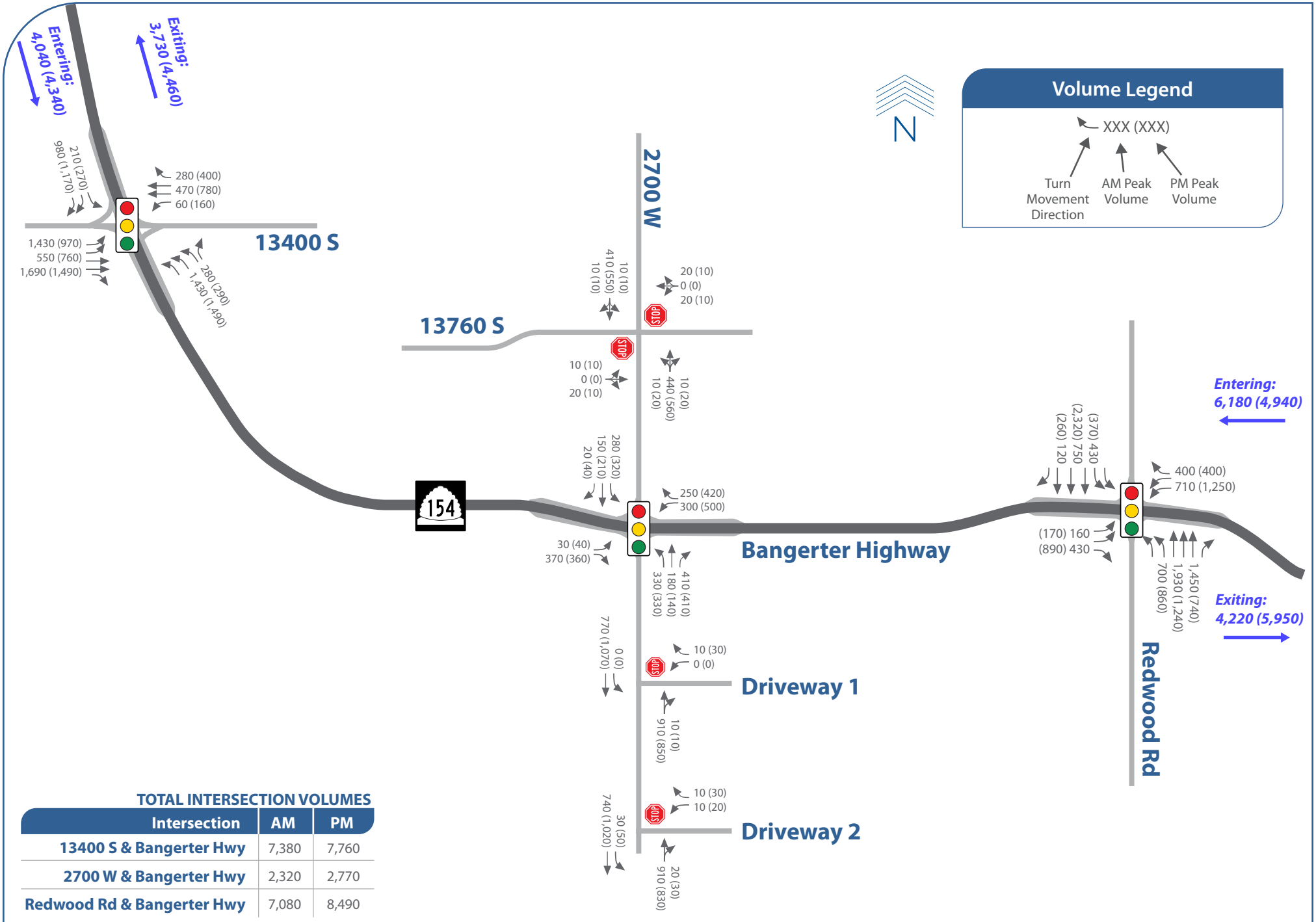
» The Redwood Road interchange will operate at LOS F in the Interchange scenario. The ***Overpass*** would increase delay at the already failing interchange by ***47%*** in the AM peak hour and ***2.2%*** in the PM peak hour.

» User costs (based on ***Redwood Rd interchange*** delay) for the Overpass would be an additional **$6.6 million** in 2050 and **$100 million** total from 2025 to 2050.

» The additional delay with the ***Overpass*** translates directly into an increase in queue lengths along Redwood Road and Bangerter Highway, as shown in the figure.



Appendix F. 2050 Final Build Traffic Volume and Intersection LOS Results



TOTAL INTERSECTION VOLUMES

Intersection	AM	PM
13400 S & Bangerter Hwy	7,380	7,760
2700 W & Bangerter Hwy	2,320	2,770
Redwood Rd & Bangerter Hwy	7,080	8,490

2050 Build Final Peak Hour Traffic Volumes

2700 West & Bangerter Highway Environmental Study

2700 West Bangerter Environmental

VISSIM Volume, Queue, and Delay Results

2050BldAM 13400 SInts

LOS Category: Signalized

1: 13400 South & 4050 West

Delay / LOS

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Analysis Period 900-4500	
NBL	280	232	83%	1,950	2,750	431	F
NBT	40	36	90%	1,775	2,725	372	F
NBR	300	255	85%	1,800	2,750	373	F
NB	**620**	**523**	**84%**			**399**	**F**
SBL	120	117	98%	50	175	67	E
SBT	10	11	110%	0	50	73	E
SBR	20	19	95%	0	25	5	A
SB	**150**	**147**	**98%**			**60**	**E**
EBL	100	92	92%	25	150	218	F
EBT	3,250	2,938	90%	3,350	4,400	205	F
EBR	250	228	91%	0	100	202	F
EB	**3,600**	**3,258**	**91%**			**205**	**F**
WBL	170	160	94%	150	550	142	F
WBT	2,460	2,443	99%	150	900	20	B
WBR	250	247	99%	25	175	21	C
WB	**2,880**	**2,850**	**99%**			**27**	**C**
Total	**7,250**	**6,778**	**93%**			**142**	**F**

Node Letter: A VISSIM ID: 3200

LOS Category: Signalized

2: 13400 South SPUI

Delay / LOS

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Analysis Period 900-4500	
NBL	1,430	1,379	96%	250	675	70	E
NBR	280	270	96%	0	0	13	B
NB	**1,710**	**1,649**	**96%**			**61**	**E**
SBL	210	207	99%	50	250	49	D
SBR	980	996	102%	100	400	29	C
SB	**1,190**	**1,203**	**101%**			**33**	**C**
EBL	1,430	1,323	93%	350	975	67	E
EBT	550	509	93%	125	925	41	D
EBR	1,690	1,532	91%	0	0	11	B
EB	**3,670**	**3,364**	**92%**			**37**	**D**
WBL	60	60	100%	25	125	70	E
WBT	470	461	98%	150	425	88	F
WBR	280	273	98%	0	0	2	A
WB	**810**	**794**	**98%**			**57**	**E**
Total	**7,380**	**7,010**	**95%**			**44**	**D**

Node Letter: B VISSIM ID: 134

2050BldPM 13400 SInts

LOS Category: Signalized

1: 13400 South & 4050 West

Delay / LOS

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Analysis Period 900-4500	
NBL	180	175	97%	125	450	112	F
NBT	40	43	108%	25	200	28	C
NBR	180	182	101%	50	225	45	D
NB	**400**	**400**	**100%**			**72**	**E**
SBL	270	267	99%	225	950	113	F
SBT	90	88	98%	25	125	69	E
SBR	200	200	100%	25	175	31	C
SB	**560**	**555**	**99%**			**76**	**E**
EBL	80	76	95%	25	150	207	F
EBT	2,770	2,578	93%	2,500	4,400	190	F
EBR	290	263	91%	25	150	188	F
EB	**3,140**	**2,917**	**93%**			**190**	**F**
WBL	310	302	97%	175	500	89	F
WBT	2,940	2,903	99%	125	900	16	B
WBR	190	192	101%	0	100	15	B
WB	**3,440**	**3,397**	**99%**			**23**	**C**
Total	**7,540**	**7,269**	**96%**			**97**	**F**

Node Letter: A VISSIM ID: 3200

LOS Category: Signalized

2: 13400 South SPUI

Delay / LOS

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Analysis Period 900-4500	
NBL	1,490	1,446	97%	150	500	48	D
NBR	290	276	95%	0	0	9	A
NB	**1,780**	**1,722**	**97%**			**42**	**D**
SBL	370	371	100%	100	500	46	D
SBR	1,170	1,170	100%	175	575	43	D
SB	**1,540**	**1,541**	**100%**			**44**	**D**
EBL	970	910	94%	175	675	50	D
EBT	760	716	94%	100	850	24	C
EBR	1,490	1,402	94%	0	0	10	A
EB	**3,220**	**3,028**	**94%**			**26**	**C**
WBL	160	157	98%	75	275	78	E
WBT	780	779	100%	250	750	87	F
WBR	400	398	100%	0	0	7	A
WB	**1,340**	**1,334**	**100%**			**62**	**E**
Total	**7,880**	**7,625**	**97%**			**39**	**D**

Node Letter: B VISSIM ID: 134

2050BldAM 13400 SInts

LOS Category: Signalized

3: 13400 South & Market Center Drive — Delay / LOS

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Analysis Period 900-4500	
NBL	60	57	95%	0	75	25	C
NBT	20	20	100%	0	25	23	C
NBR	30	30	100%	0	25	5	A
NB	**110**	**107**	**97%**			**19**	**B**
SBL	40	44	110%	0	50	25	C
SBT	10	9	90%	0	25	23	C
SBR	110	103	94%	0	50	5	A
SB	**160**	**156**	**98%**			**12**	**B**
EBL	280	263	94%	25	125	24	C
EBT	630	603	96%	0	150	6	A
EBR	130	124	95%	0	150	3	A
EB	**1,040**	**990**	**95%**			**10**	**A**
WBL	20	18	90%	0	50	25	C
WBT	640	641	100%	25	150	12	B
WBR	70	69	99%	25	150	9	A
WB	**730**	**728**	**100%**			**12**	**B**
Total	**2,040**	**1,981**	**97%**			**12**	**B**

Node Letter: C VISSIM ID: 3300

LOS Category: Signalized

4: 13400 South & Hamilton View Road — Delay / LOS

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Analysis Period 900-4500	
NBL	190	190	100%	25	100	32	C
NBT	200	199	100%	25	100	28	C
NBR	100	104	104%	0	50	5	A
NB	**490**	**493**	**101%**			**25**	**C**
SBL	100	103	103%	25	75	35	C
SBT	100	96	96%	25	125	30	C
SBR	140	138	99%	25	125	11	B
SB	**340**	**337**	**99%**			**24**	**C**
EBL	120	114	95%	25	75	37	D
EBT	500	482	96%	25	175	17	B
EBR	80	74	93%	0	50	5	A
EB	**700**	**670**	**96%**			**19**	**B**
WBL	80	75	94%	0	75	35	C
WBT	400	400	100%	25	175	19	B
WBR	110	113	103%	25	175	13	B
WB	**590**	**588**	**100%**			**20**	**B**
Total	**2,120**	**2,088**	**98%**			**21**	**C**

Node Letter: D VISSIM ID: 3400

2050BldPM 13400 SInts

LOS Category: Signalized

3: 13400 South & Market Center Drive — Delay / LOS

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Analysis Period 900-4500	
NBL	130	127	98%	50	200	52	D
NBT	40	39	98%	0	75	47	D
NBR	80	81	101%	0	50	5	A
NB	**250**	**247**	**99%**			**36**	**D**
SBL	130	126	97%	50	200	66	E
SBT	30	30	100%	0	75	56	E
SBR	180	180	100%	0	75	6	A
SB	**340**	**336**	**99%**			**33**	**C**
EBL	350	344	98%	75	225	72	E
EBT	820	774	94%	50	300	15	B
EBR	250	247	99%	50	300	6	A
EB	**1,420**	**1,365**	**96%**			**28**	**C**
WBL	20	21	105%	0	75	73	E
WBT	1,030	1,026	100%	50	275	20	B
WBR	60	61	102%	50	275	17	B
WB	**1,110**	**1,108**	**100%**			**21**	**C**
Total	**3,120**	**3,056**	**98%**			**27**	**C**

Node Letter: C VISSIM ID: 3300

LOS Category: Signalized

4: 13400 South & Hamilton View Road — Delay / LOS

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Analysis Period 900-4500	
NBL	270	267	99%	75	175	73	E
NBT	290	285	98%	50	175	47	D
NBR	260	267	103%	0	100	7	A
NB	**820**	**819**	**100%**			**43**	**D**
SBL	180	184	102%	50	150	72	E
SBT	420	423	101%	150	450	60	E
SBR	330	321	97%	150	475	50	D
SB	**930**	**928**	**100%**			**59**	**E**
EBL	160	154	96%	50	125	73	E
EBT	580	560	97%	25	150	17	B
EBR	290	267	92%	0	100	9	A
EB	**1,030**	**981**	**95%**			**24**	**C**
WBL	390	382	98%	75	250	67	E
WBT	510	520	102%	50	275	29	C
WBR	130	128	98%	50	275	23	C
WB	**1,030**	**1,030**	**100%**			**42**	**D**
Total	**3,810**	**3,758**	**99%**			**42**	**D**

Node Letter: D VISSIM ID: 3400

2050BldAM 13400 SInts

LOS Category: Signalized

5: 2700 West TDI

Delay / LOS

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Analysis Period 900-4500	
NBL	280	277	99%	75	350	51	D
NBT	160	120	75%	25	100	23	C
NBR	350	348	99%	25	200	13	B
NB	**790**	**745**	**94%**			**29**	**C**
SBL	280	276	99%	25	225	26	C
SBT	120	157	131%	50	200	45	D
SBR	20	22	110%	0	25	6	A
SB	**420**	**455**	**108%**			**32**	**C**
EBL	30	26	87%	0	75	60	E
EBR	220	203	92%	0	25	5	A
EB	**250**	**229**	**92%**			**12**	**B**
WBL	170	157	92%	50	200	47	D
WBR	250	243	97%	0	125	10	A
WB	**420**	**400**	**95%**			**24**	**C**
Total	**1,880**	**1,829**	**97%**			**26**	**C**

Node Letter: F VISSIM ID: 2700

LOS Category: Signalized

6: Redwood Road SPUI

Delay / LOS

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Analysis Period 900-4500	
NBL	700	506	72%	400	475	403	F
NBT	1,930	1,381	72%	675	8,675	382	F
NBR	1,450	1,007	69%	6,425	8,700	484	F
NB	**4,080**	**2,894**	**71%**			**421**	**F**
SBL	430	414	96%	275	825	143	F
SBT	750	737	98%	100	700	41	D
SBR	120	120	100%	0	0	4	A
SB	**1,300**	**1,271**	**98%**			**71**	**E**
EBL	160	157	98%	25	100	58	E
EBR	430	423	98%	0	0	6	A
EB	**590**	**580**	**98%**			**20**	**B**
WBL	710	655	92%	1,850	3,800	290	F
WBR	400	364	91%	225	1,475	163	F
WB	**1,110**	**1,019**	**92%**			**245**	**F**
Total	**7,080**	**5,764**	**81%**			**272**	**F**

Node Letter: I VISSIM ID: 3401

2050BldPM 13400 SInts

LOS Category: Signalized

5: 2700 West TDI

Delay / LOS

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Analysis Period 900-4500	
NBL	190	191	101%	50	200	53	D
NBT	110	178	162%	25	175	33	C
NBR	250	248	99%	0	100	10	A
NB	**550**	**617**	**112%**			**30**	**C**
SBL	320	314	98%	75	300	35	C
SBT	180	111	62%	25	150	50	D
SBR	40	43	108%	0	25	5	A
SB	**540**	**468**	**87%**			**36**	**D**
EBL	40	41	103%	0	75	60	E
EBR	290	284	98%	0	75	11	B
EB	**330**	**325**	**98%**			**17**	**B**
WBL	410	388	95%	75	375	41	D
WBR	420	402	96%	50	300	22	C
WB	**830**	**790**	**95%**			**31**	**C**
Total	**2,250**	**2,200**	**98%**			**30**	**C**

Node Letter: F VISSIM ID: 2700

LOS Category: Signalized

6: Redwood Road SPUI

Delay / LOS

Mvmt	Demand	Volume Served	% Served	Queue (ft) Avg / 95th 900-4500		Analysis Period 900-4500	
NBL	860	770	90%	2,525	5,700	351	F
NBT	1,240	1,116	90%	175	450	208	F
NBR	740	685	93%	0	0	148	F
NB	**2,840**	**2,571**	**91%**			**235**	**F**
SBL	370	267	72%	75	200	368	F
SBT	2,320	1,647	71%	2,275	2,450	338	F
SBR	260	179	69%	0	0	296	F
SB	**2,950**	**2,093**	**71%**			**339**	**F**
EBL	160	157	98%	25	100	46	D
EBR	890	868	98%	0	0	12	B
EB	**1,050**	**1,025**	**98%**			**18**	**B**
WBL	1,250	1,159	93%	3,900	7,275	275	F
WBR	400	374	94%	50	225	228	F
WB	**1,650**	**1,533**	**93%**			**263**	**F**
Total	**8,490**	**7,222**	**85%**			**240**	**F**

Node Letter: I VISSIM ID: 3401

Appendix B: Traffic and Design

Bangerter Highway at 2700 West
Alternatives Memo

BANGERTER
2700 WEST

ALTERNATIVES MEMO

BANGERTER HIGHWAY AT 2700 WEST

MARCH 25, 2022

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Alternatives

INTRODUCTION

The Utah Department of Transportation (UDOT) is conducting a State Environmental Study (SES) to analyze improvements at the Bangerter Highway (State Route 154) and 2700 West intersection in Riverton and Bluffdale, Utah. The Wasatch Front Regional Council's 2019–2050 *Wasatch Front Regional Transportation Plan* (RTP) includes projects to convert Bangerter Highway into a freeway system by replacing the at-grade intersections with grade-separated interchanges.

During the current (2021) AM and PM peak periods, drivers waiting at this intersection experience an average delay of 74 and 39 seconds, respectively (for this analysis, the AM peak period is from 7:00 to 9:00 AM, and the PM peak period is from 4:00 to 6:00 PM).

Level of service (LOS) is a measure of the operating conditions on a road or at an intersection. Level of service is represented by a letter "grade" ranging from A (free-flowing traffic and little delay) to F (extremely congested, stop-and-go traffic and excessive delay). For roads such as Bangerter Highway, UDOT considers LOS A through D to be acceptable operating conditions and LOS E and F to be unacceptable operating conditions.

Currently, the AM peak-period delay is classified as LOS E and the PM peak-period delay is classified as LOS D at the Bangerter Highway and 2700 West intersection. If no operational improvements are made, traffic modeling indicates that, by 2050, this intersection would operate at LOS F during the AM and PM peak periods, with the AM peak period delay projected to be 123 seconds and the PM peak period delay projected to be 113 seconds.

The needs for the current project (converting the Bangerter Highway and 2700 West intersection to a grade-separated interchange) are:

- Current failing conditions (LOS E) at the Bangerter Highway and 2700 West intersection during the AM peak period
- Future failing conditions (LOS F) at the Bangerter Highway and 2700 West intersection during both the AM and PM peak periods

The purpose of the project is to:

- Reduce current and future delay at the Bangerter Highway and 2700 West intersection (metric: level of service at the intersection)
- Improve traffic operations and mobility on Bangerter Highway at the 2700 West intersection (metric: vehicle queue lengths on mainline Bangerter Highway)

ALTERNATIVES DEVELOPMENT AND SCREENING

As part of this project, UDOT developed and screened a range of alternatives. Two screenings were conducted: a purpose and need screening and a key environmental impacts screening. The purpose of this memo is to describe that process and how UDOT arrived at the alternative selected to be evaluated in the SES.

UDOT developed and evaluated a range of alternatives for the Bangerter Highway and 2700 West intersection. In this location, certain corridor constraints limited what alternatives were feasible.

CORRIDOR CONSTRAINTS

RESIDENTIAL AND COMMERCIAL DEVELOPMENT

Existing and planned commercial development is located south of Bangerter Highway on both the east and west sides of 2700 West. Residential development exists on both sides of Bangerter Highway. Limiting residential and commercial property impacts was a priority for UDOT.

ROCKY MOUNTAIN POWER SUBSTATION

A Rocky Mountain Power substation is located on the northwest corner of the Bangerter Highway and 2700 West intersection. Limiting impacts to this substation was a priority for UDOT.

ROSE CREEK AND THE UTAH & SALT LAKE CANAL

Both Rose Creek and the Utah & Salt Lake Canal cross Bangerter Highway. Limiting impacts to these aquatic features was a priority for UDOT.

INTERCHANGE ALTERNATIVES VERSUS NO BUILD

INTERCHANGE ALTERNATIVES

UDOT developed four interchange alternatives for the interchange at Bangerter Highway and 2700 West: (1) a tight diamond interchange (TDI), (2) a single-point urban interchange (SPUI), (3) a right-in/right-out (RIRO) interchange with roundabouts on 2700 West to facilitate turn movements via U-turns, and (4) an overpass-only alternative with no access to or from Bangerter Highway at 2700 West.

NO BUILD

With the no build alternative, all of the projects proposed in the 2019–2050 RTP would be built except for an interchange at Bangerter Highway and 2700 West. The no build alternative assumes that Bangerter Highway and 2700 West would continue to be an at-grade intersection. The RTP projects included as part of the no build alternative are:

- Mountain View Corridor as a freeway (RTP projects R-S-102 and R-S-103)
- Reversible lanes on 12600 South between Bangerter Highway and Mountain View Corridor (RTP project R-S-68)
- 13400 South as a local expressway between Mountain View Corridor and Bangerter Highway (RTP project R-S-74)
- 13800 South connection between 4170 West and Mountain View Corridor frontage road (RTP Project R-S-75)
- Bangerter Highway as a freeway except at the 2700 West intersection
- Widening Redwood Road to seven lanes from Bangerter Highway to Porter Rockwell Boulevard (RTP project R-S-122)
- 14000 South connection between 3600 West and 2700 West (RTP Project R-S-76)

PURPOSE AND NEED SCREENING

The purpose and need screening evaluated the ability of the interchange and no build alternatives to meet the purpose of and need for the project, as described in the Introduction. The primary measure of effectiveness was intersection performance, where acceptable performance is defined as LOS D or better at the Bangerter Highway and 2700 West intersection. A comparison of level of service between the interchange and no build alternatives is shown in Table 1.

The analysis for the overpass-only alternative was different from those for the other alternatives. This was due to the nature of the alternative, which would remove traffic from 2700 West and reroute it to other interchanges. For this reason, the analysis for this alternative focused on impacts to the adjacent interchanges. The overpass-only alternative was eliminated from further analysis because it would have traffic impacts to the adjacent Redwood Road interchange, where 2050 AM peak-hour delays would increase by as much as 68% compared to the other interchange alternatives.

The RIRO interchange is the only interchange alternative that would perform at a LOS E. Additionally, the concept requires increased out-of-direction travel by motorists. Therefore, the RIRO interchange alternative was also eliminated.

Both the TDI and the SPUI would perform acceptably, at LOS D or better. Although the SPUI would generally perform slightly better than the TDI, they are both expected to operate very well and have acceptable levels of service. Both the TDI and the SPUI were carried forward in the analysis.

Table 1. Purpose and Need Screening: Interchange and No Build Alternatives

Evaluation Criteria	Level of Service during Peak Periods in 2050 (AM/PM)				
	Interchange Alternatives				No Build Alternative
	TDI[a]	SPUI[a]	RIRO[a]	Overpass Only	At-grade Intersection
Provides LOS D or better at the Bangerter Highway and 2700 West intersection	LOS D/ LOS C	LOS C/ LOS C	LOS D/ LOS E	Not applicable[b]	LOS F/ LOS F
Results	**Advanced**	**Advanced**	**Eliminated**	**Eliminated**	**Eliminated**

Sources: *Bangerter Highway and 2700 West Existing and 2050 No Build Traffic Analysis* (Avenue Consultants 2022); *Bangerter Highway and 2700 West Future Build Traffic Analysis* (Avenue Consultants 2022)

[a] For this initial screening analysis, UDOT assumed that that all left- and right-turn movements at the 2700 West interchange would have one lane and that the off-ramps would have free right-turn movements for the TDI and SPUI alternatives. The final TDI proposed in the SES includes single-lane turn movements with stop-controlled right-turn movements.

[b] The analysis for the overpass-only alternative was different from those for the other alternatives. This was due to the nature of the alternative, which would remove traffic from 2700 West and reroute it to other interchanges. For this reason, the analysis for this alternative focused on impacts to the adjacent interchanges. The overpass-only alternative was eliminated from further analysis because it would have traffic impacts to the adjacent Redwood Road interchange, where 2050 AM peak-hour delays would increase by as much as 68% compared to the other interchange alternatives.

TDI AND SPUI INTERCHANGE ALTERNATIVES

UDOT evaluated two alternatives with both the TDI and SPUI:

1. **Bangerter Highway Over:** Bangerter Highway over 2700 West with 2700 West at the existing grade
2. **2700 West Over:** Bangerter Highway at the existing grade with 2700 West over Bangerter Highway

UDOT did not develop or evaluate any alternatives that would have Bangerter Highway below grade (going under 2700 West) because Bluffdale City and Riverton City did not request an evaluation of this type of alternative and because there would likely be substantial increases in costs and impacts to utilities, Rose Creek, and drainage from a below-grade Bangerter Highway alternative in this location.

KEY ENVIRONMENTAL IMPACTS SCREENING

The key environmental impacts screening evaluated the TDI and SPUI alternatives based on overall costs and their expected impacts to certain environmental resources including impacts to residences, businesses, and Rose Creek (Table 2).

Table 2. Key Environmental Impacts Screening: TDI and SPUI Alternatives

Resource	TDI Alternative		SPUI Alternative	
	Bangerter Highway Over Alternative Bangerter Highway over 2700 West (Figure 1)	**2700 West Over Alternative** 2700 West over Bangerter Highway (Figure 2)	**Bangerter Highway Over Alternative** Bangerter Highway over 2700 West (Figure 3)	**2700 West Over Alternative** 2700 West over Bangerter Highway (Figure 4)
Residential relocations	0	2	0	2
Partial residential property acquisitions	17	22	15	18
Potential residential relocations	3	3	3	3
Business relocations	0	0	0	0
Partial commercial property acquisitions	3	3	2	3
Total number of parcels impacted	23	30	20	26
Rose Creek impact (linear feet)	1,051	2,200	1,051	2,200
Maintenance of traffic considerations	Moderate	Moderate	Moderate	Moderate
Estimated cost	$86,900,000	$94,500,000	$93,000,000	$97,000,000
Results	**Advanced**	**Eliminated**	**Eliminated**	**Eliminated**

The SPUI alternatives were eliminated due to overall higher costs. The TDI 2700 West Over Alternative was eliminated due to higher costs as well as greater impacts to Rose Creek compared to the TDI Bangerter Highway Over Alternative.

Figure 1: TDI Bangerter Highway Over Alternative



Figure 2: TDI 2700 West Over Alternative



Figure 3: SPUI Bangerter Highway Over Alternative



Figure 4: SPUI 2700 West Over Alternative



TDI BANGERTER OVER ALTERNATIVE: HORIZONTAL ALIGNMENT ALTERNATIVES

UDOT evaluated three horizontal alignment alternatives with the TDI Bangerter Highway Over Alternative: north shift, south shift, and hybrid shift (split the Bangerter Highway alignment to both the north and south sides).

KEY ENVIRONMENTAL IMPACTS SCREENING

The key environmental impacts screening evaluated the horizontal alignment alternatives based on their expected impacts to certain environmental resources including the number of business and residential relocations and impacts to Rose Creek (Table 3).

Table 3. Key Environmental Impacts Screening: Horizontal Alignment Alternatives

Resource	Horizontal Alignment Alternatives		
	North Shift (Figure 5)	**South Shift** (Figure 6)	**Hybrid Shift** (Figure 7)
Residential relocations	9	1	0
Partial residential property acquisitions	14	14	17
Potential residential relocations	0	0	3
Business relocations	0	2	0
Partial commercial property acquisitions	3	2	3
Total number of parcels impacted	26	19	23
Impact to Rocky Mountain Power substation	Yes	No	No
Results	**Eliminated**	**Eliminated**	**Advanced**

The north and south shift alternatives were both eliminated because they would cause a greater number of residential and business relocation impacts than the hybrid shift alternative. In addition, the north shift alternative would impact the Rocky Mountain Power substation. Ultimately, UDOT decided to evaluate the TDI Bangerter Highway Over Alternative with the hybrid shift in the SES because it would be the most cost-effective in addition to having the least amount of impacts to residential and commercial property, Rose Creek, the Utah & Salt Lake Canal, and existing utilities.

SUMMARY

The alternative selected to advance and be evaluated in the SES is the TDI Bangerter Highway Over 2700 West with Hybrid Shift Alternative.

Figure 5: TDI Bangerter Highway Over 2700 West with North Shift Alternative



Figure 6: TDI Bangerter Highway Over 2700 West with South Shift Alternative

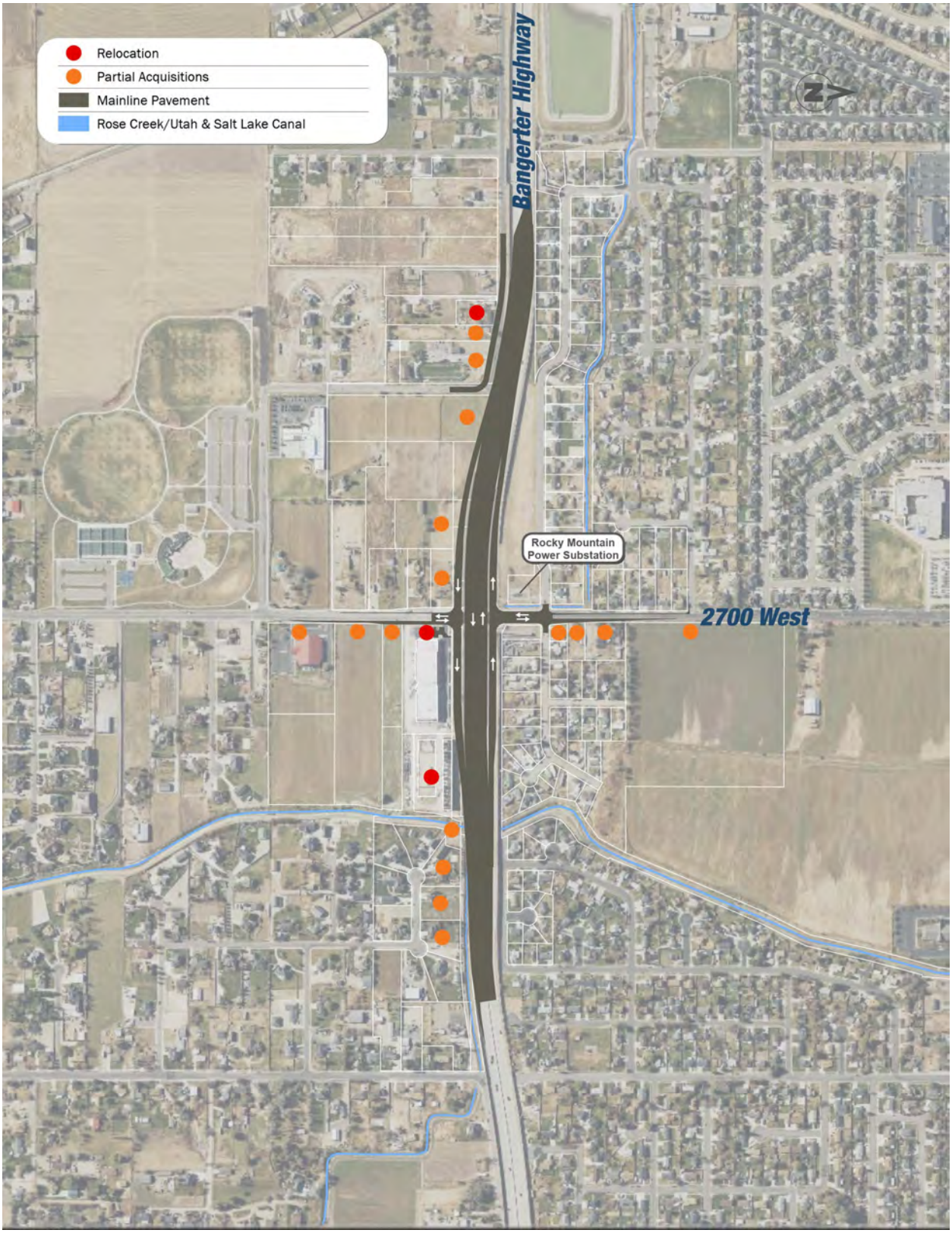


Figure 7: TDI Bangerter Highway Over 2700 West with Hybrid Shift Alternative





Appendix C: Public Involvement

Bangerter Highway at 2700 West
Public Scoping Report

BANGERTER

BANGERTER HIGHWAY AT 2700 WEST

PUBLIC SCOPING REPORT

PIN: 18808

Project Number: S-0154(92)0

Prepared For: Utah Department of Transportation

Prepared By: Horrocks Engineers

Date: February 25, 2021

Table of Contents

Project Overview 1
Public Scoping Meeting 1
Public Comments 3
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Appendix B: Attendance 13
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Appendix D: Public Comments 35

PROJECT OVERVIEW

The Utah Department of Transportation (UDOT) has initiated State Environmental Studies (SESs) for the following intersections along Bangerter Highway:

- 2700 West
- 13400 South
- 9800 South
- 4700 South
- 4100 South
- 3500 South to S.R. 201
- California Avenue

Bangerter Highway is a major north-south corridor in the state of Utah, and with continued growth in the area, the amount of traffic on Bangerter Highway is expected to increase. This projected increase in traffic will also increase delays on Bangerter Highway by up to four times longer than the current conditions. UDOT is proposing to replace at-grade, signalized intersections along the corridor with grade-separated interchanges, which will allow one street to pass over the other. This separation will move Bangerter Highway and cross-street traffic more efficiently and will eliminate points of conflict along this busy highway.

The purpose of this study is to identify the best solution to address the needs along Bangerter Highway, evaluate the impacts of the proposed improvements to the natural and built environments, and provide opportunities for public input.

PUBLIC SCOPING MEETING

Meeting Overview

An online public scoping meeting and an in-person public scoping meeting (open house format) were held to educate and inform the public about the SES process and gather input regarding the study.

WHEN AND WHERE

Online Presentation and Q&A	**When:** Tuesday, August 31, 2021, 6 – 7 p.m. **Where:** Zoom Webinar- A link to join the online meeting was posted on the study website: udot.utah.gov/Bangerter2700West
In-Person Open House	**When:** Wednesday, September 1, 2021, 6 – 7:30 p.m. **Where:** Bluffdale Elementary School 14323 S 2700 W Bluffdale, UT 84065

Advertisements

The project team (consisting of UDOT staff and consultant firms) developed and executed a comprehensive outreach plan to invite adjacent property owners, residents, and the general public to attend the public scoping meeting, including:

- A legal notice published in statewide and local newspapers according to the UDOT's Environmental Manual of Instruction (MOI). The legal notice was published in the print edition of the Deseret News on August 13, 2021 and August 20, 2021 and the digital version on August 17, 2021 and August 24, 2021. The legal notice was also published in the print edition of the Salt Lake Tribune on August 15, 2021 and August 22, 2021 and the digital version on August 17, 2021 and August 24, 2021.
- 1,095 postcards mailed on August 23, 2021, to properties surrounding the study area.
- An advertisement posted on Riverton City's and the City of Bluffdale's social media, website, and newsletter.
- An email update to the environmental stakeholder list (533 subscribers) sent on August 25, 2021 to advertise the public open house.
- A project website that was updated with registration details.

Copies of the meeting advertisements are available in Appendix A

Attendance

25 members of the public attended the online public meeting in addition to members of the project team who facilitated and served as panelists during the Q&A portion. The in-person public meeting had 24 attendees who provided their information on the sign-in sheets at the meeting. *A list of online meeting attendees and scanned copies of the sign-in sheets from the in-person meeting are available in Appendix B.*

Information Presented

ONLINE PRESENTATION AND Q&A

The project team gave a presentation at the start of the online public meeting that included information about the environmental study process, existing and future traffic conditions, the study area, the study schedule, possible interchange design alternatives, and project contact information. After the presentation, attendees had the opportunity to ask questions via the Zoom Question and Answer feature, with project team members providing responses to questions submitted live during the meeting.

IN-PERSON PUBLIC MEETING

The same project information presented during the online public meeting was also available at the public open house via informational display boards, which included information about the environmental study process, existing and future traffic conditions, the study area, the study schedule, possible interchange design alternatives, and project contact information. Scroll plot maps that showed an aerial view of the study area and the existing 2700 West and Bangerter intersection were displayed to facilitate public discussion. Representatives from the project team were available to answer questions

and provide additional information as needed. A comment area and comment forms were provided for attendees to leave written comments to be included as part of the formal comment period.

Materials presented at these meetings are available in Appendix C.

PUBLIC COMMENTS

A formal comment period was held from August 16, 2021, to September 15, 2021. Members of the public were encouraged to leave comments via postal mail and email. A comment form was available at the in-person public meeting and on the project website for the general public's use. A total of 12 comments were received (9 comment forms collected during the in-person public meeting, 2 email comments, and 1 phone comment).

Common themes from the public comments include:

- Design
- Local road access
- Bluffdale-Riverton access
- Pedestrian overpass
- Noise reduction

The verbatim public comments are provided in Appendix E.

Appendix A: Advertisements

Postcard Mailer

BANGERTER
2700 WEST

YOU'RE INVITED! ENVIRONMENTAL STUDY PUBLIC MEETING OPPORTUNITIES

The Utah Department of Transportation (UDOT) has recently started a State Environmental Study (SES) to evaluate a potential freeway-style interchange at Bangerter Highway and 2700 West in order to reduce congestion and improve safety. The study is scheduled for completion in early 2022, with construction slated for 2023*.

The study team is hosting two initial public meetings to gather feedback about overall transportation needs and environmental issues that should be considered during the study. Input received will help the team develop and refine the preferred design concept that will be available for further public comment later in the SES process. **For more information and to stay informed about the study's progress and future public engagement opportunities, visit the study website and sign up for email updates.**

ONLINE PRESENTATION AND Q&A
When: Tuesday, August 31, 2021
6 - 7 p.m.
Where: Zoom Webinar
Visit the study website for information on how to join the online meeting:
udot.utah.gov/bangerter2700west

IN-PERSON OPEN HOUSE
When: Wednesday, September 1, 2021
6 - 7:30 p.m.
Where: Bluffdale Elementary School
14323 S 2700 W
Bluffdale, UT 84065
(See map on reverse side)

The same information and materials will be available at both meetings. If you cannot participate in either opportunity, materials can be viewed on the project website and you can send feedback via email or mail.

**Environmental studies are process-driven, meaning this schedule is approximate and subject to change.*

Hotline: 888-766-ROAD (7623) | **Email:** bangerter@utah.gov | **Website:** udot.utah.gov/bangerter2700west

A UDOT PROJECT

In-person Open House Location

Parking is available at Bluffdale Elementary School.



2162 W. Grove Parkway, Suite 400
Pleasant Grove, UT 84062

Bluffdale Elementary School meets the Americans with Disabilities Act (ADA) accessibility standards. If you need special accommodations during these meetings, please contact the study team in advance.

Contáctenos también si necesita esta información en Español.

Mailer Area


S 1830 W
HOMESTEAD ESTATES
Bling It On Dress Rentals
Jesus Christ of Latter...
2700 W
2700 W
Just 4 Kids Adventures
Hamilton School
Richardson Art and Frame
Rose Creek
Old Farm Park
Bowcutts Flooring America
Midvalley Bible Church
North Star Academy
2950
Wardle Fields Regional Park

Legal Ad

Via Utah Press Association (https://www.utahlegals.com)

VIEW **The Salt Lake Tribune**
Tuesday, August 17, 2021

NOTICE OF PUBLIC MEETING On Proposed Improvements for the Bangerter Highway (S.R. 154) and 2700 West Intersection in Salt Lake County, UT; UDOT Project No. S-0154(92)0 As part of the State Environmental Study, the Utah Department of Transportation (UDOT) advises all interested persons or groups t ... **click 'view' to open the full text.**

VIEW **Deseret News**
Tuesday, August 17, 2021

NOTICE OF PUBLIC MEETING
On Proposed Improvements for the
Bangerter Highway (S.R. 154) and 2700 West Intersection
in Salt Lake County, UT;
UDOT Project No. S-0154(92)0
As part of the State Environmental Study, the Utah Department of Trans-
portation (UDOT) advises all i ... **click 'view' to open the full text.**

VIEW **The Salt Lake Tribune**
Sunday, August 15, 2021

NOTICE OF PUBLIC MEETING On Proposed Improvements for the Bangerter Highway (S.R. 154) and 2700 West Intersection in Salt Lake County, UT; UDOT Project No. S-0154(92)0 As part of the State Environmental Study, the Utah Department of Transportation (UDOT) advises all interested persons or groups t ... **click 'view' to open the full text.**

VIEW **Deseret News**
Friday, August 13, 2021

NOTICE OF PUBLIC MEETING On Proposed Improvements for the Bangerter Highway (S.R. 154) and 2700 West Intersection in Salt Lake County, UT; UDOT Project No. S-0154(92)0 As part of the State Environmental Study, the Utah Department of Transportation (UDOT) advises all interested persons or groups th ... **click 'view' to open the full text.**

VIEW **The Salt Lake Tribune**
Sunday, August 22, 2021

NOTICE OF PUBLIC MEETING On Proposed Improvements for the Bangerter Highway (S.R. 154) and 2700 West Intersection in Salt Lake County, UT; UDOT Project No. S-0154(92)0 As part of the State Environmental Study, the Utah Department of Transportation (UDOT) advises all interested persons or groups t ... **click 'view' to open the full text.**

VIEW **Deseret News**
Friday, August 20, 2021

NOTICE OF PUBLIC MEETING On Proposed Improvements for the Bangerter Highway (S.R. 154) and 2700 West Intersection in Salt Lake County, UT; UDOT Project No. S-0154(92)0 As part of the State Environmental Study, the Utah Department of Transportation (UDOT) advises all interested persons or groups th ... **click 'view' to open the full text.**

VIEW **The Salt Lake Tribune**
Tuesday, August 24, 2021

NOTICE OF PUBLIC MEETING On Proposed Improvements for the Bangerter Highway (S.R. 154) and 2700 West Intersection in Salt Lake County, UT; UDOT Project No. S-0154(92)0 As part of the State Environmental Study, the Utah Department of Transportation (UDOT) advises all interested persons or groups t ... **click 'view' to open the full text.**

VIEW **Deseret News**
Tuesday, August 24, 2021

NOTICE OF PUBLIC MEETING
On Proposed Improvements for the
Bangerter Highway (S.R. 154) and 2700 West Intersection
in Salt Lake County, UT;
UDOT Project No. S-0154(92)0
As part of the State Environmental Study, the Utah Department of Trans-
portation (UDOT) advises all i ... **click 'view' to open the full text.**

Social Media



Bluffdale Facebook Post 9/1/2021



Riverton Facebook Post 9/1/2021

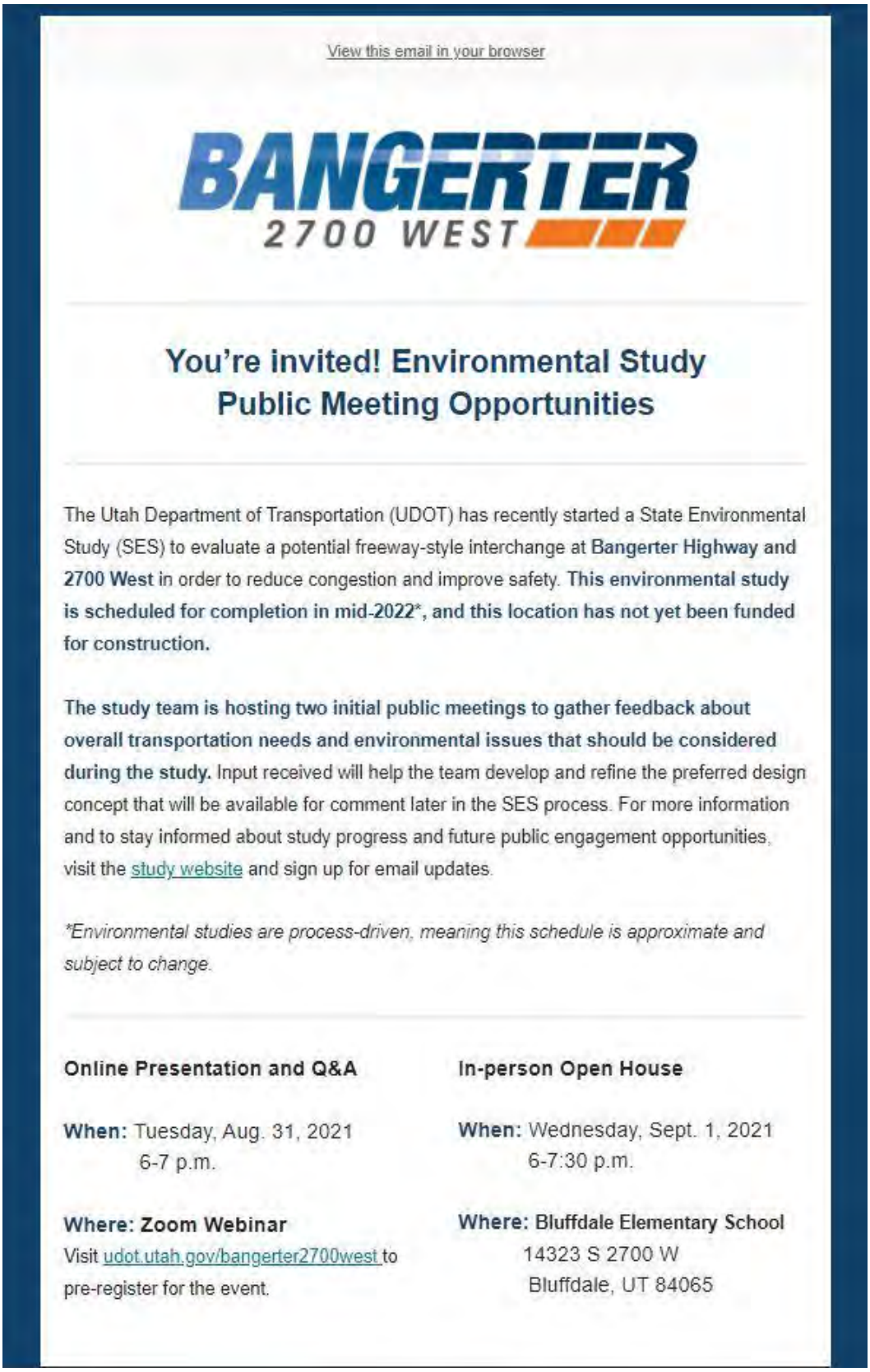


Riverton Twitter Post 9/1/2021



UDOT Region Two Post 9/1/2021

Email Notification



View this email in your browser

BANGERTER
2700 WEST

You're invited! Environmental Study Public Meeting Opportunities

The Utah Department of Transportation (UDOT) has recently started a State Environmental Study (SES) to evaluate a potential freeway-style interchange at **Bangerter Highway** and **2700 West** in order to reduce congestion and improve safety. **This environmental study is scheduled for completion in mid-2022*, and this location has not yet been funded for construction.**

The study team is hosting two initial public meetings to gather feedback about overall transportation needs and environmental issues that should be considered during the study. Input received will help the team develop and refine the preferred design concept that will be available for comment later in the SES process. For more information and to stay informed about study progress and future public engagement opportunities, visit the study website and sign up for email updates.

**Environmental studies are process-driven, meaning this schedule is approximate and subject to change.*

Online Presentation and Q&A

When: Tuesday, Aug. 31, 2021
6-7 p.m.

Where: Zoom Webinar
Visit udot.utah.gov/bangerter2700west to pre-register for the event.

In-person Open House

When: Wednesday, Sept. 1, 2021
6-7:30 p.m.

Where: Bluffdale Elementary School
14323 S 2700 W
Bluffdale, UT 84065



The same information and materials will be available at both meetings. If you cannot participate in either opportunity, materials can be reviewed on the project website and feedback can be sent via email or postage.

Contáctenos si necesita esta información en español.

For further project information:
Hotline: (888) 766-7623
Email: bangerter@utah.gov
Web: udot.utah.gov/bangerter2700west

Know before you go. Check UDOT Traffic before hitting the road.

Know before you go. Check UDOT Traffic before hitting the road.

Business Flyer

BANGERTER 2700 WEST

YOU'RE INVITED! ENVIRONMENTAL STUDY PUBLIC MEETING OPPORTUNITIES

The Utah Department of Transportation (UDOT) has recently started a State Environmental Study (SES) to evaluate a potential freeway-style interchange at Bangerter Highway and 2700 West in order to reduce congestion and improve safety. The study is scheduled for completion in early 2022, with construction slated for 2023*.

The study team is hosting two initial public meetings to gather feedback about overall transportation needs and environmental issues that should be considered during the study. Input received will help the team develop and refine the preferred design concept that will be available for comment later in the SES process. **For more information and to stay informed about study progress and future public engagement opportunities, visit the study website and sign up for email updates.**

ONLINE PRESENTATION AND Q&A

When: Tuesday , August 31, 2021
6 - 7 p.m.

Where: Zoom Webinar
Visit **udot.utah.gov/bangerter2700west** for information on how to join the online meeting

IN-PERSON OPEN HOUSE

When: Wednesday, September 1, 2021
6 - 7:30 p.m.

Where: Bluffdale Elementary School
14323 S 2700 W
Bluffdale, UT 84065
(See map on reverse side)

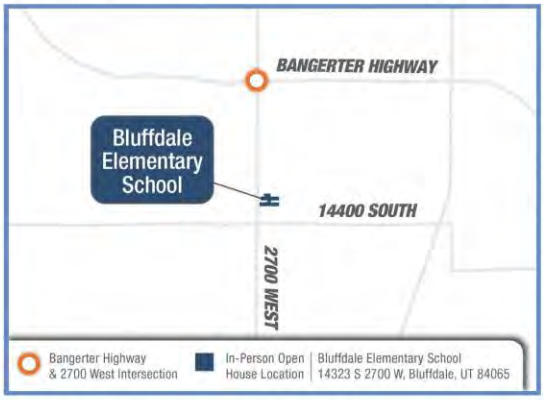
The same information and materials will be available at both meetings. If you cannot participate in either opportunity, materials can be reviewed on the project website and feedback can be sent via email or postage.

*Environmental studies are process-driven, meaning this schedule is approximate and subject to change.

Hotline: 888-766-ROAD (7623) | **Email:** bangerter@utah.gov | **Website:** udot.utah.gov/bangerter2700west A UDOT PROJECT

In-person Open House Location

Parking is available at Bluffdale Elementary School.



Bluffdale Elementary School meets the Americans with Disabilities Act (ADA) accessibility standards. If you need special accommodations during these meetings, please contact the study team in advance.

Contáctenos también si necesita esta información en Español.

Public Comment Options

The Bangerter 2700 West SES Project Team wants to hear from you! The 30-day public comment period for the Bangerter 2700 West SES Project will close September 15, 2021. You many submit a public comment through the following methods:

Hotline: 888-766-ROAD (7623)

Email: bangerter@utah.gov

Website: udot.utah.gov/bangerter2700west

Mail: Bangerter SES ICO HDR
2825 E Cottonwood Pkwy, Ste 200
Cottonwood Heights, UT 84121

Press Release Text

UDOT Begins Final Push to Convert Bangerter Highway into a Freeway

State Legislature allocates more than $600 million to advance the effort

Salt Lake City (July X, 2021) - The Utah Department of Transportation (UDOT) recently initiated seven environmental studies needed to convert Bangerter Highway into a freeway. The studies will be completed over the next two years at the following locations along Bangerter Highway:

1. 13400 South in Riverton
2. 9800 South in South Jordan
3. 4700 South in Taylorsville/West Valley City
4. 4100 South in West Valley City
5. 3500 South to S.R. 201 in West Valley City/Salt Lake City
6. California Avenue in Salt Lake City
7. 2700 West in Bluffdale/Riverton

The studies will evaluate environmental impacts associated with potential improvements like new interchanges or frontage roads and will ultimately identify a preferred design at each location that minimizes impacts while still meeting the mobility needs of Bangerter Highway and the local cross-streets. The public will have several opportunities throughout the course of the studies to engage with the study team and provide feedback on the proposed solutions before final decisions are made and the projects move forward to design and construction.

"UDOT is prioritizing the completion of Bangerter Highway to improve safety and mobility along this critical corridor," according to Brian Allen, UDOT Project Manager. "When the freeway is complete and traffic can flow freely without stop lights, we expect to see a significant reduction in crashes and in time driving both north and south on Bangerter Highway and east and west on cross-streets. In fact, traffic projections show that when all is said and done, the time it takes to drive from I-15 in Draper to the Salt Lake International Airport via Bangerter will be reduced by up to 20 minutes," Allen said.

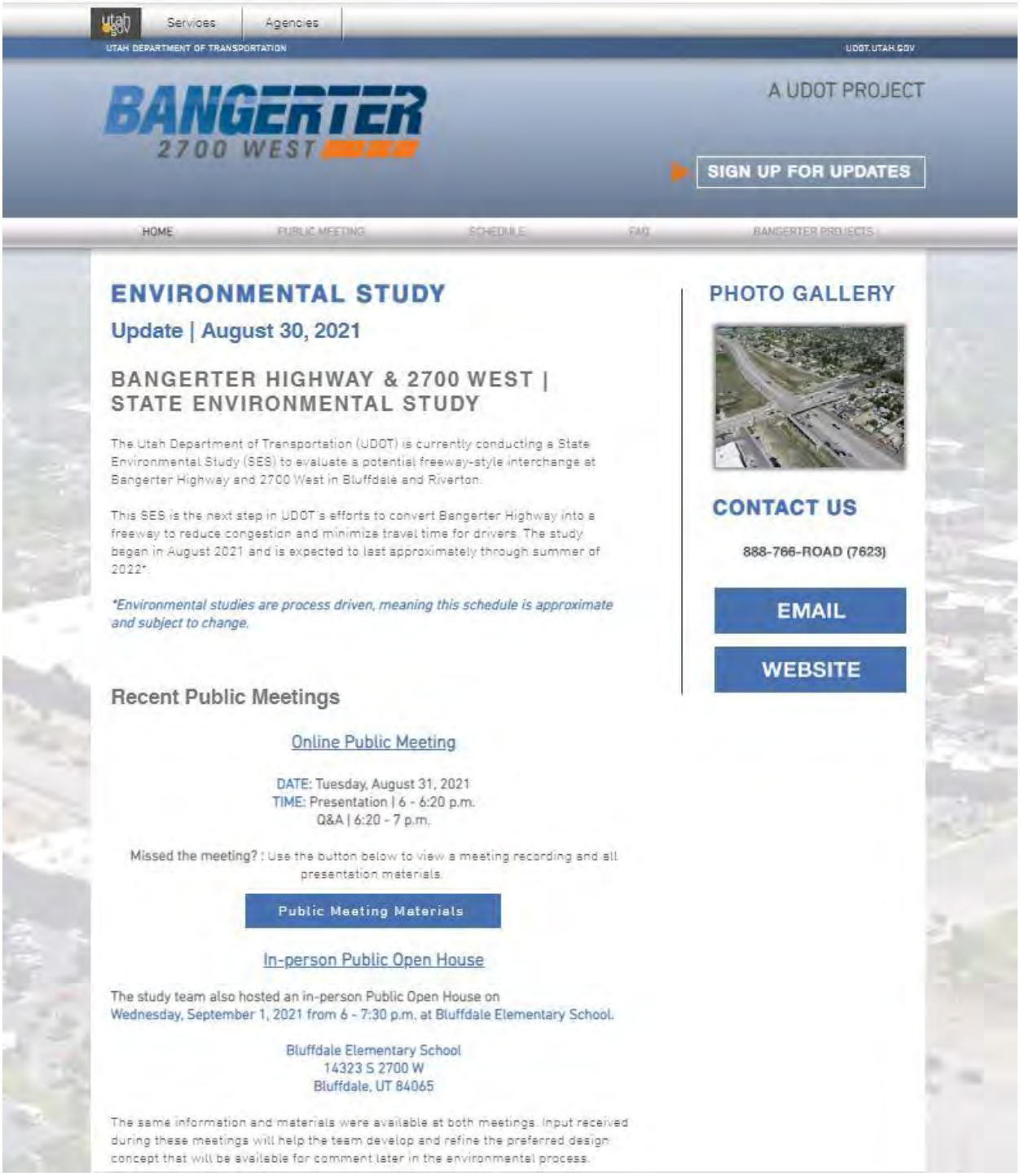
Construction at 13400 South, 4700 South and 9800 South is slated to begin in 2023, and work at 4100 South, California Avenue, and between 3500 South and S.R. 201 is scheduled to start in 2028. Construction funding for 2700 West has not yet been allocated.

The public is invited to participate in the environmental study process through a variety of ways, beginning in July with public open houses for 13400 South, 4700 South and 9800 South. Visit udot.utah.gov/bangerter for more information about these events and to sign up for updates.

-UDOT-

Media Contact:
John Gleason
UDOT Public Information Officer
jgleason@utah.gov
801-560-7740

Website Content

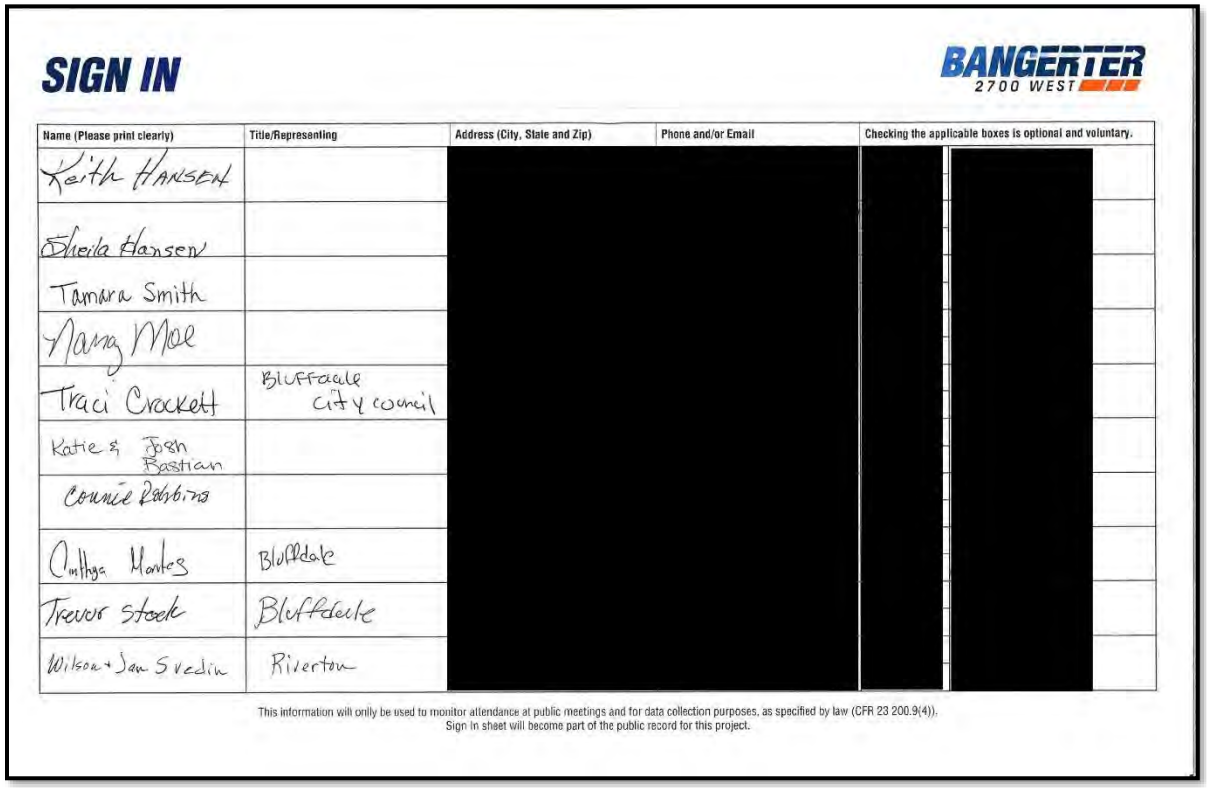


Appendix B: Attendance

Online Public Meeting Attendees

Bangerter 13400 South Public Hearing Online Meeting Attendee Report		
First Name	**Last Name**	**Time in**
GRant	Crowell	63
Kamalanathan	dorairaj	50
Brenda	Lyon	64
Rick	Wardle	64
Nancy	Moe	64
sadie	s	43
John	Browne	64
Norman	Curtis	64
Crystal	Varela	53
Amy	Rose	63
Wendy	Wolf	43
Michele	Fazio	63
Thad	Van Ry	47
Bryan	Coulter	30
Mike	Miller	60
Melanie	Escobar	64
Kathy	Whitenight	51
Grant	Farnsworth	64
Jonathan	Knight	3
Audrey	Rupp	64
Cliff	Frazier	23
Chris	Tasker	57
Shanae	Woolf	65

In-person Meeting Attendees

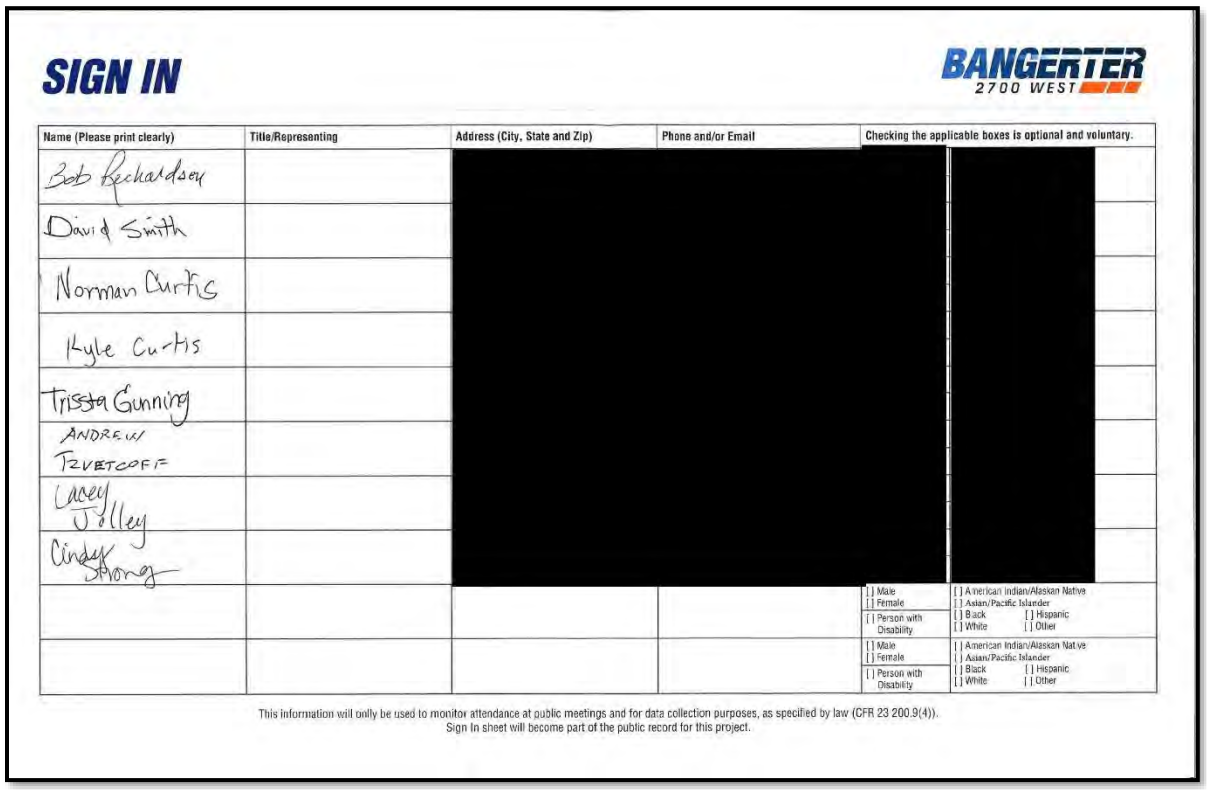


SIGN IN

BANGERTER 2700 WEST

Name (Please print clearly)	Title/Representing	Address (City, State and Zip)	Phone and/or Email	Checking the applicable boxes is optional and voluntary.
Keith Hansen		[redacted]	[redacted]	[redacted]
Sheila Hansen				
Tamara Smith				
Nancy Moe				
Traci Crockett	Bluffdale city council			
Katie & Josh Bastian				
Connie Robbins				
Cynthia Montes	Bluffdale			
Trevor Stock	Bluffdale			
Wilson + Jan Svedin	Riverton			

This information will only be used to monitor attendance at public meetings and for data collection purposes, as specified by law (CFR 23 200.9(4)).
Sign In sheet will become part of the public record for this project.

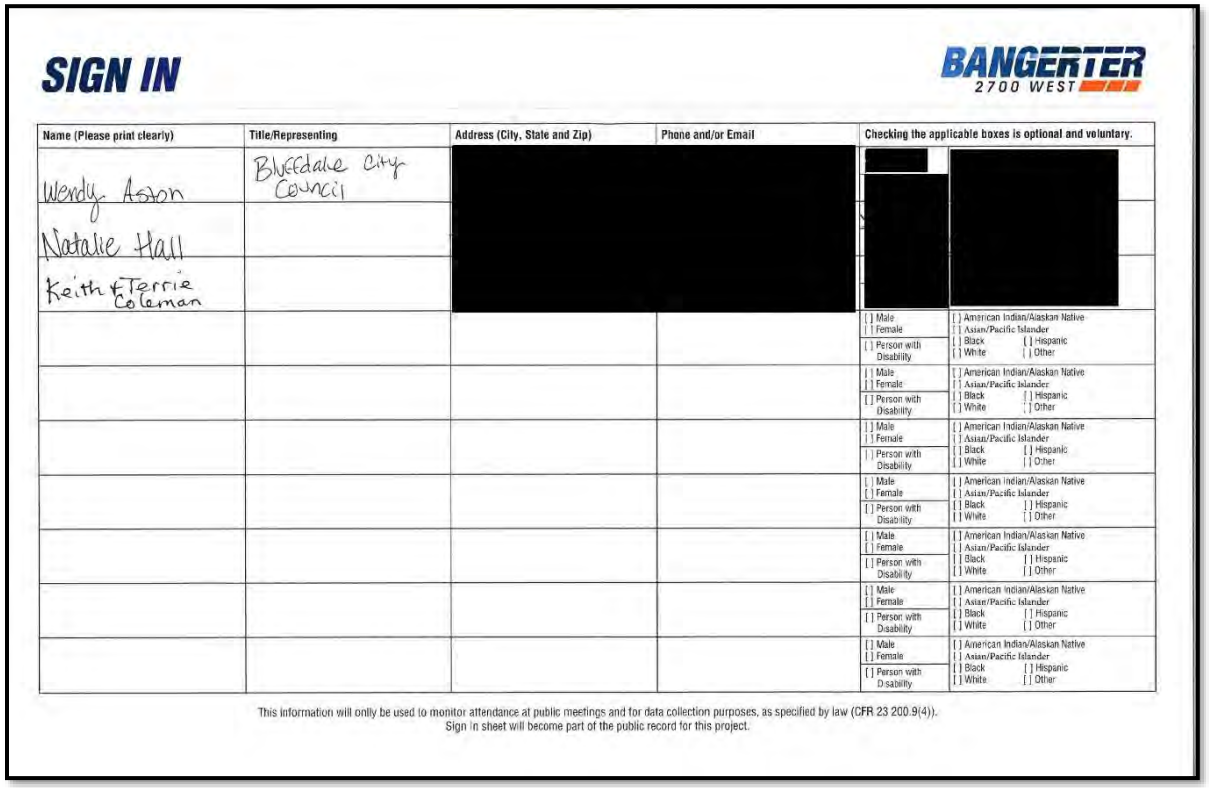


SIGN IN

BANGERTER 2700 WEST

Name (Please print clearly)	Title/Representing	Address (City, State and Zip)	Phone and/or Email	Checking the applicable boxes is optional and voluntary.
Bob Richardson		[redacted]	[redacted]	[redacted]
David Smith				
Norman Curtis				
Kyle Curtis				
Trista Gunning				
ANDREW IZVETCOFF				
Lacey Jolley				
Cindy Strong				
				[ ] Male [ ] Female [ ] Person with Disability — [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability — [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other

This information will only be used to monitor attendance at public meetings and for data collection purposes, as specified by law (CFR 23 200.9(4)).
Sign In sheet will become part of the public record for this project.



SIGN IN

BANGERTER 2700 WEST

Name (Please print clearly)	Title/Representing	Address (City, State and Zip)	Phone and/or Email	Checking the applicable boxes is optional and voluntary.	
Wendy Aston	Bluffdale City Council	[redacted]		[redacted]	[redacted]
Natalie Hall					
Keith & Terrie Coleman					
				[ ] Male [ ] Female [ ] Person with Disability	[ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability	[ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability	[ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability	[ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
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				[ ] Male [ ] Female [ ] Person with Disability	[ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability	[ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other

This information will only be used to monitor attendance at public meetings and for data collection purposes, as specified by law (CFR 23 200.9(4)).
Sign in sheet will become part of the public record for this project.

Appendix C: Meeting Materials

Online Presentation Slides



Q&A

BANGERTER

1. TO SUBMIT A QUESTION

Click on the Q&A button at the bottom of the screen

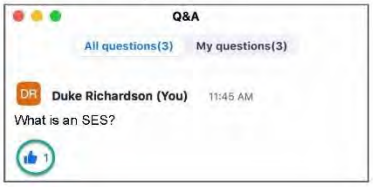


Type question in the Q&A Window



2. TO LIKE OR UPVOTE A QUESTION

Click on the "thumbs-up" button underneath questions



This helps us to know how many people have the same question



A UDOT PROJECT

PRESENTERS

BANGERTER



Brian Allen, P.E.
UDOT Project Manager



Tyler Allen
UDOT Environmental Manager

A UDOT PROJECT

MEETING PURPOSE

BANGERTER

The study team is hosting two initial public meetings to gather feedback about overall transportation needs and environmental issues that should be considered during the study.

Input received during these meetings will help the team develop and refine the preferred design concept that will be available for comment later in the SES process.



A UDOT PROJECT

STATE ENVIRONMENTAL STUDY (SES)

BANGERTER



A UDOT PROJECT

STUDY GOALS

BANGERTER



Convert all remaining at-grade intersections on Bangerter Highway to grade-separated interchanges, or other freeway-like solutions.



Enhance safety.



Improve travel times and increase mobility.

A UDOT PROJECT

TRAFFIC

BANGERTER

This corridor moves **60,000** cars per day

= 1,000 vehicles



2021 2050

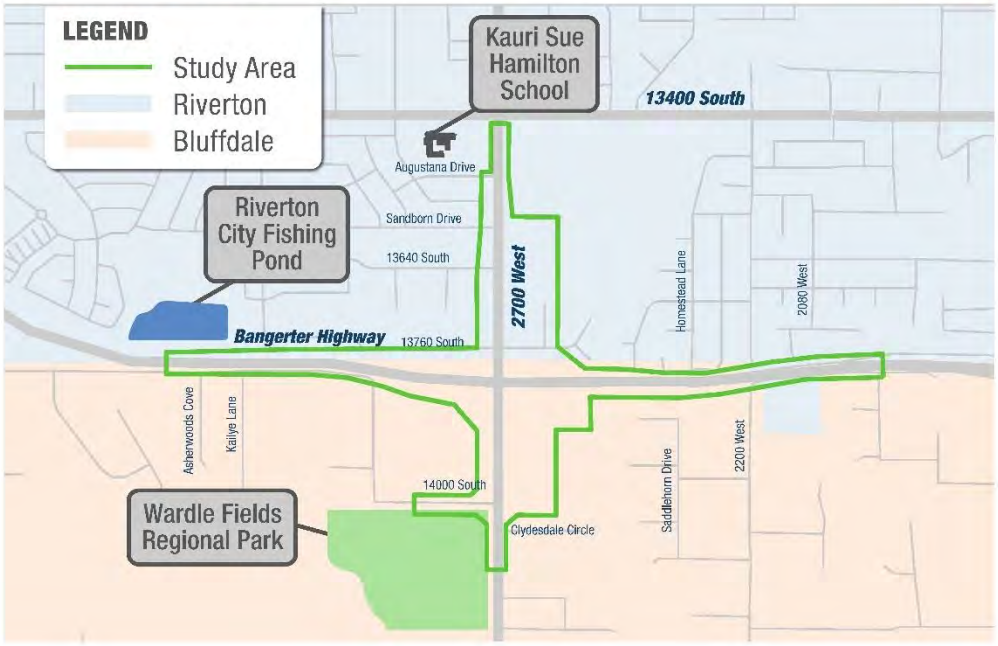
Without major improvements, projections show that delays could increase by nearly **four times** the current condition



A UDOT PROJECT

STUDY AREA

BANGERTER



A UDOT PROJECT

SCHEDULE

BANGERTER

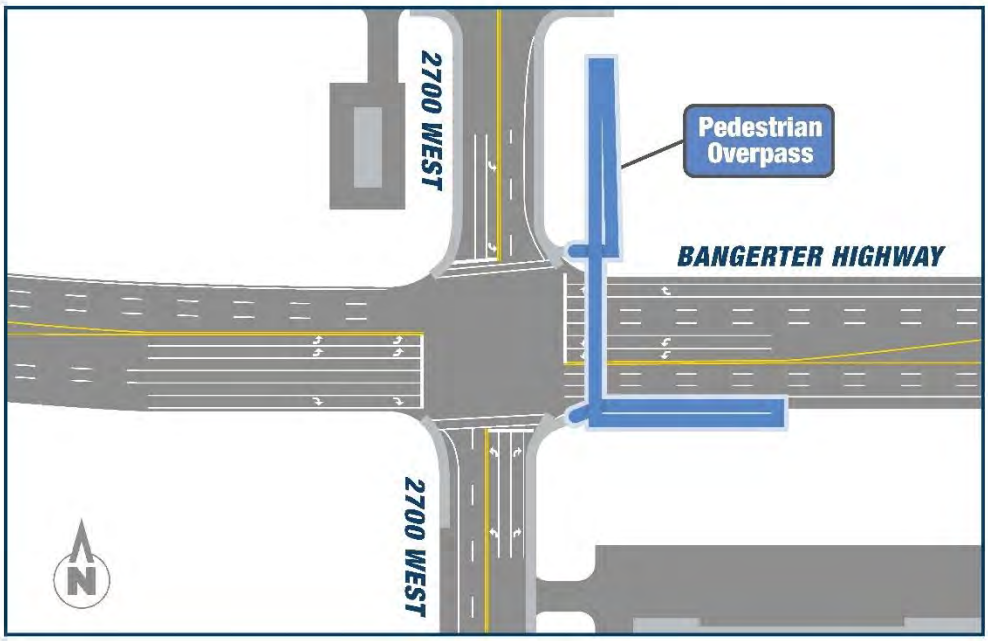


Schedule is process-driven and subject to change.

A UDOT PROJECT

PEDESTRIAN OVERPASS

BANGERTER



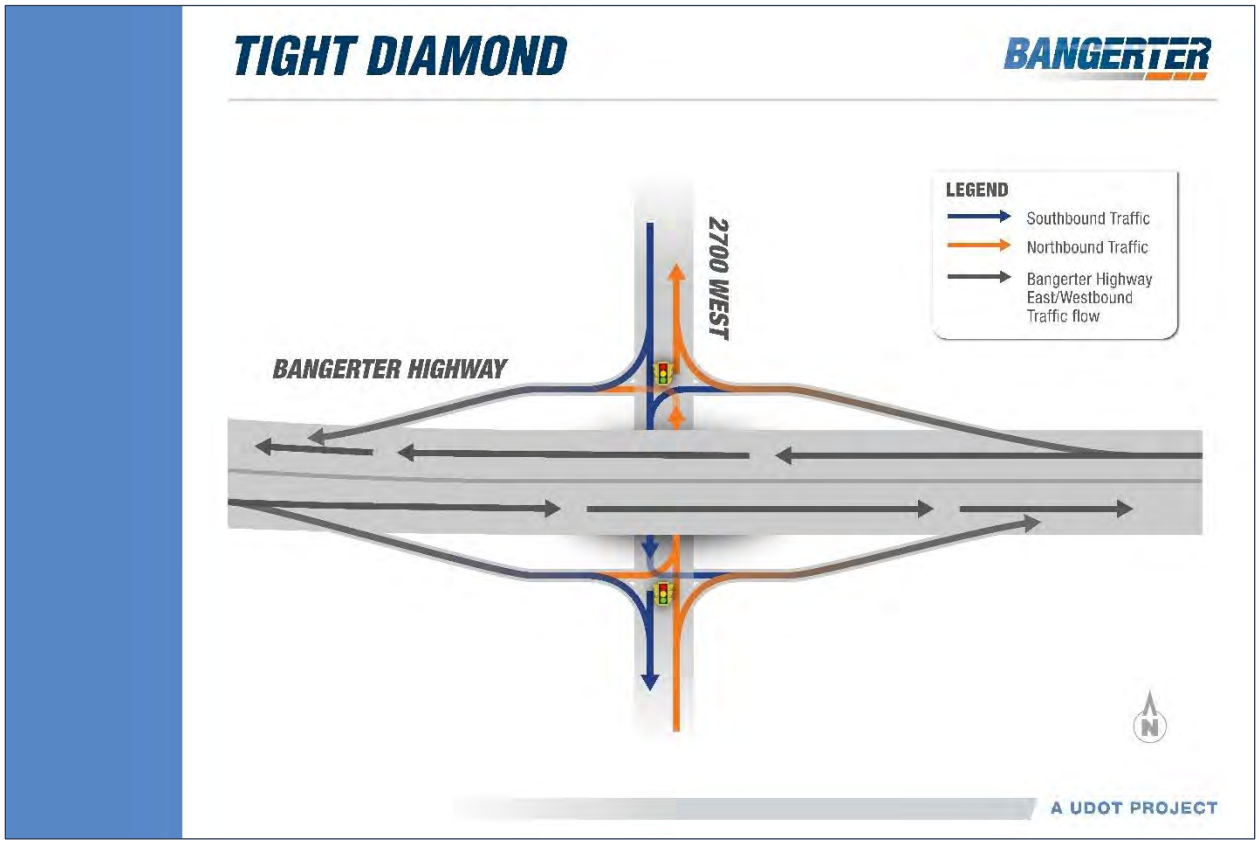
A UDOT PROJECT

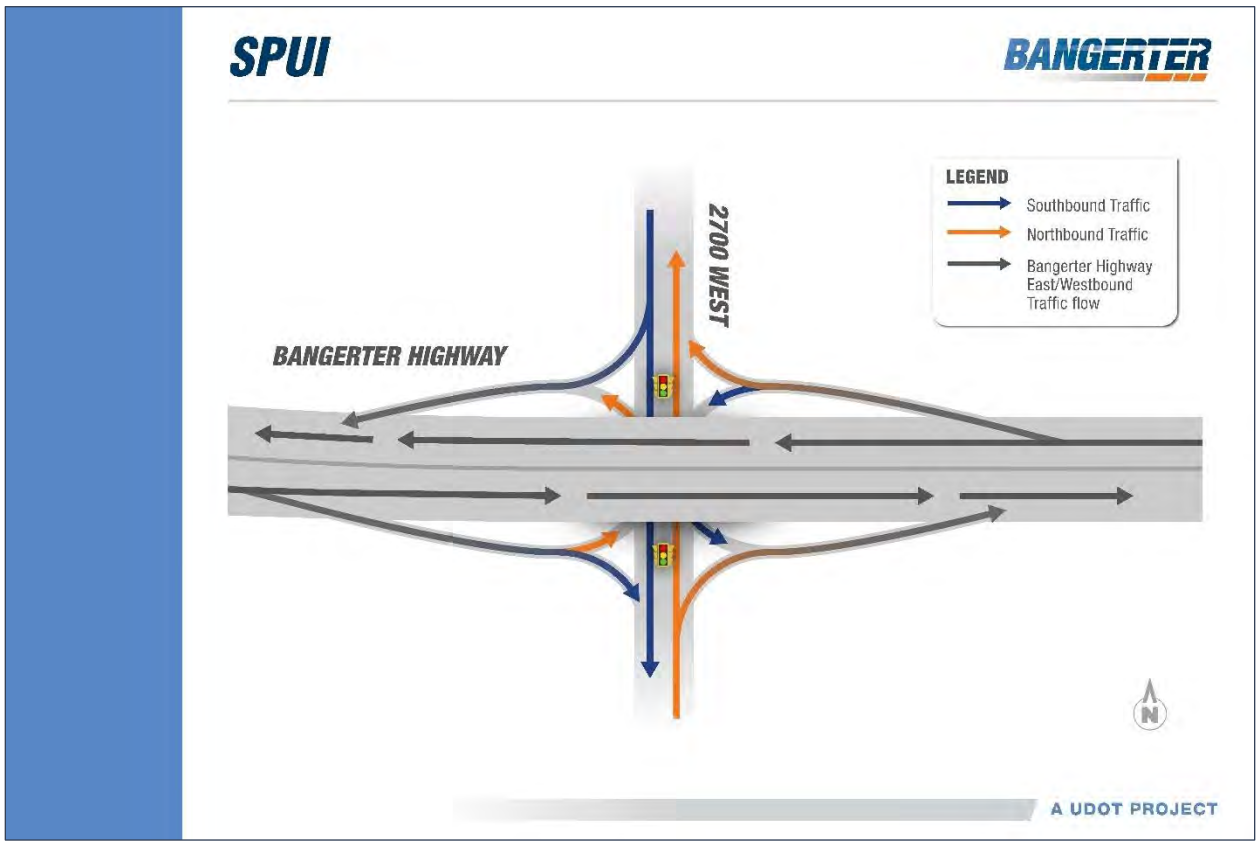
POSSIBLE SOLUTIONS

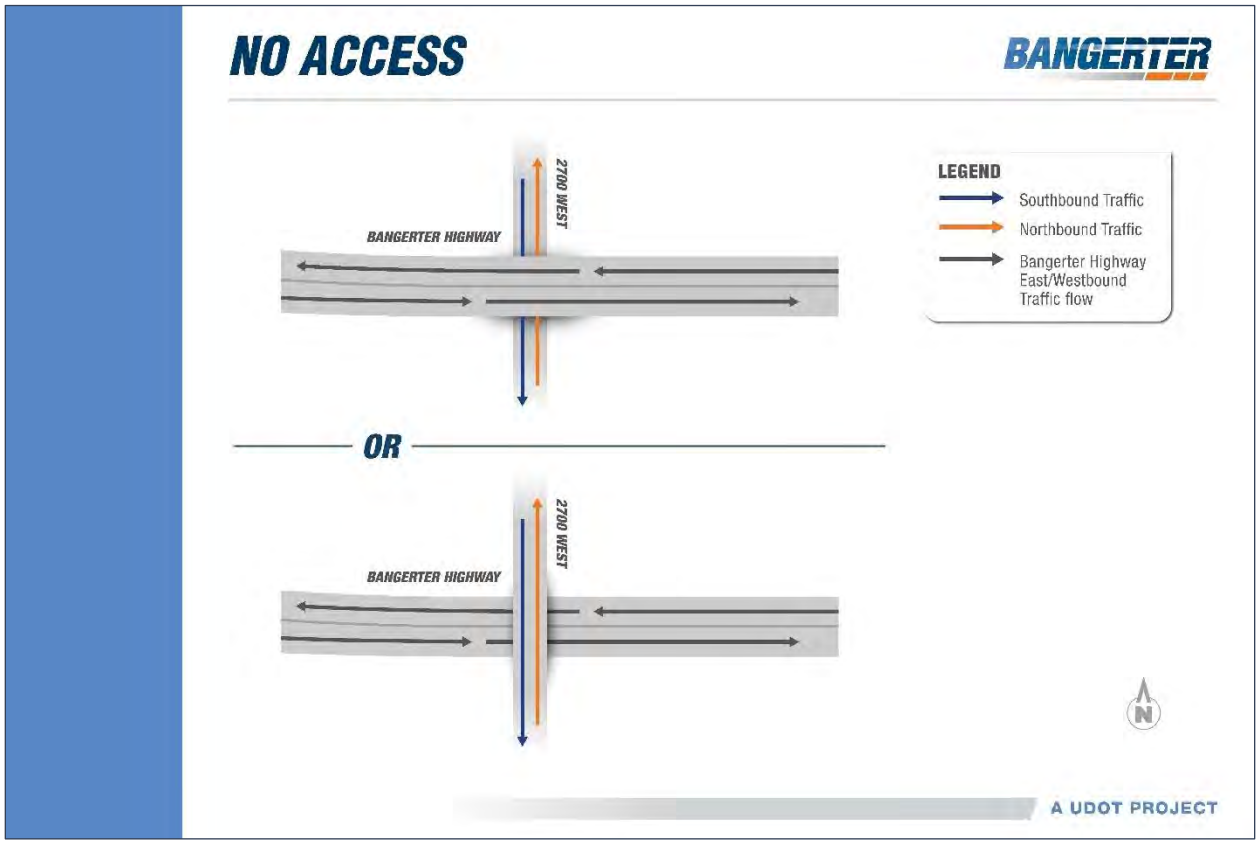
BANGERTER

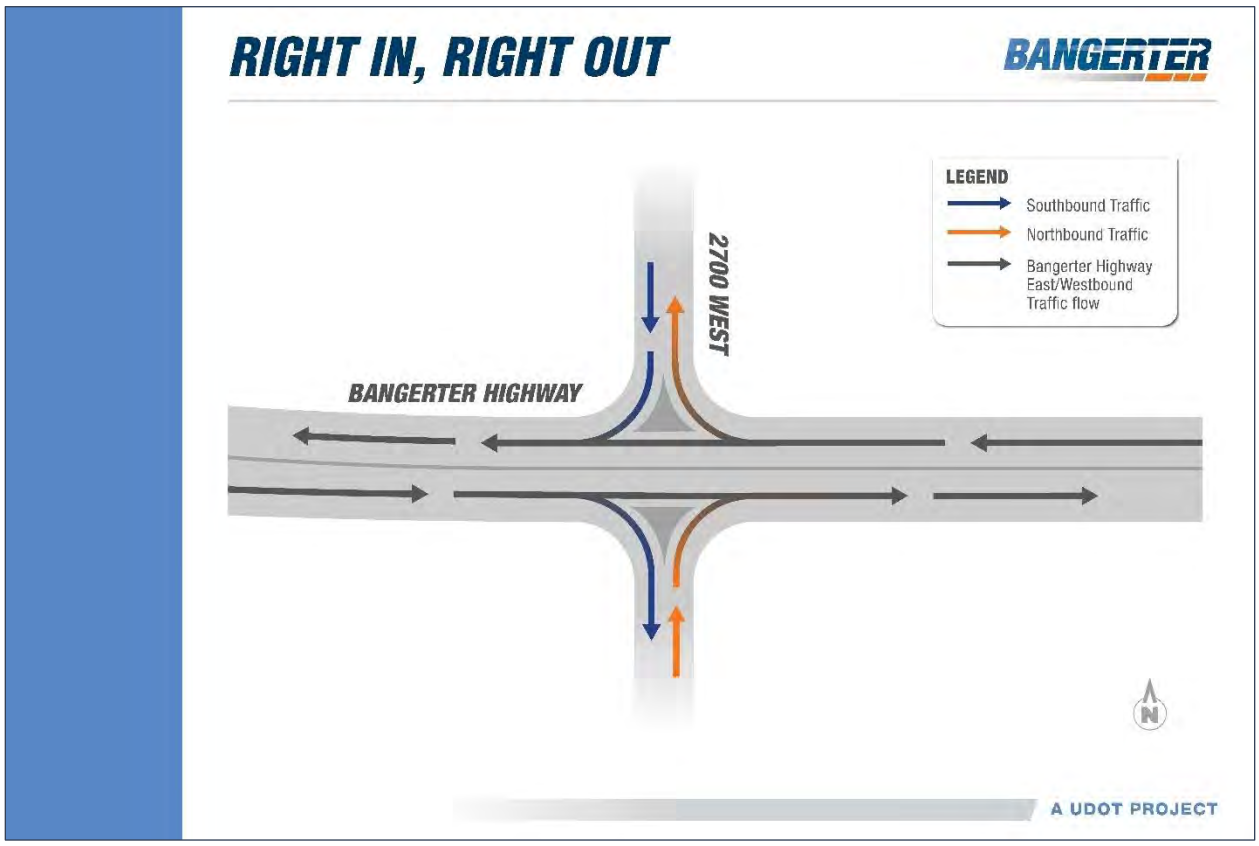
- Tight Diamond Interchange
- Single-Point Urban Interchange (SPUI)
- No Access
- Right In, Right Out
- Over/Under
- No Action

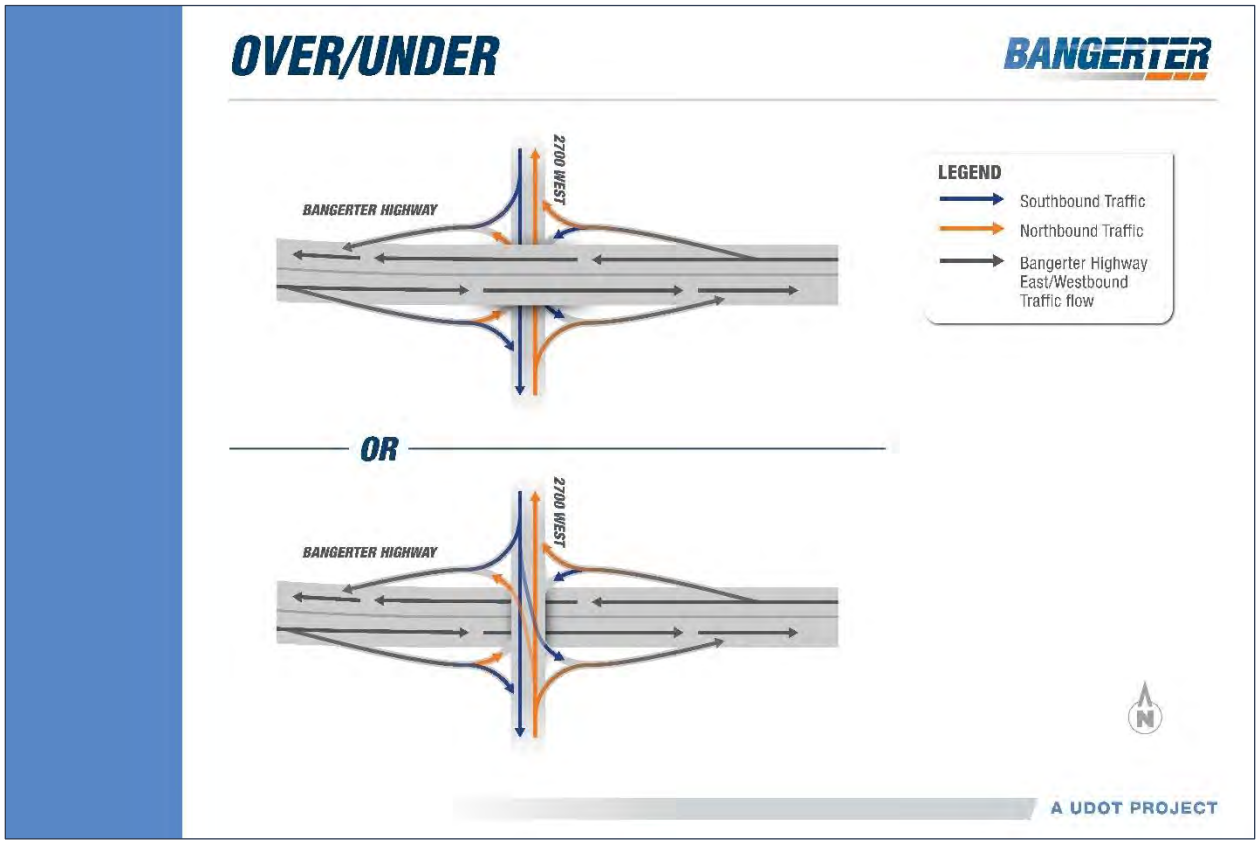
A UDOT PROJECT


TIGHT DIAMOND
BANGERTER
LEGEND
Southbound Traffic
Northbound Traffic
Bangerter Highway East/Westbound Traffic flow
2700 WEST
BANGERTER HIGHWAY
N
A UDOT PROJECT


SPUI
BANGERTER
LEGEND
Southbound Traffic
Northbound Traffic
Bangerter Highway East/Westbound Traffic flow
2700 WEST
BANGERTER HIGHWAY
N
A UDOT PROJECT


NO ACCESS
BANGERTER
2700 WEST
BANGERTER HIGHWAY
LEGEND
Southbound Traffic
Northbound Traffic
Bangerter Highway East/Westbound Traffic flow
OR
2700 WEST
BANGERTER HIGHWAY
N
A UDOT PROJECT


RIGHT IN, RIGHT OUT
BANGERTER
LEGEND
Southbound Traffic
Northbound Traffic
Bangerter Highway East/Westbound Traffic flow
2700 WEST
BANGERTER HIGHWAY
N
A UDOT PROJECT


OVER/UNDER
BANGERTER
2700 WEST
BANGERTER HIGHWAY
LEGEND
Southbound Traffic
Northbound Traffic
Bangerter Highway East/Westbound Traffic flow
OR
2700 WEST
BANGERTER HIGHWAY
N
A UDOT PROJECT


NO ACTION
BANGERTER
LEGEND
Southbound Traffic
Northbound Traffic
Bangerter Highway East/Westbound Traffic flow
2700 WEST
BANGERTER HIGHWAY
N
A UDOT PROJECT

PUBLIC COMMUNICATION AND COMMENT CHANNELS

BANGERTER

30-day Comment Period ends Sept. 15, 2021

Hotline: 888-766-ROAD (7623)

Email: bangerter@utah.gov

Website: udot.utah.gov/bangerter2700west

Mail: Bangerter Environmental c/o HDR
2825 East Cottonwood Pkwy., Suite 200
Salt Lake City, UT 84121

A UDOT PROJECT

Q&A

BANGERTER

Panelists


Brian Allen, P.E. | UDOT Project Manager (PM)


Tyler Allen | UDOT Environmental Manager


Marwan Farah, P.E. | UDOT Bangerter Program Project Manager


Amy Croft, Ph.D. | 2700 W Environmental Lead


John Blumenkamp P.E. | 2700 W Design Lead

Moderators


Melissa Phillips | 2700 W Public Involvement


Brian Gray | 2700 W Public Involvement

A UDOT PROJECT

PUBLIC COMMUNICATION AND COMMENT CHANNELS

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Website: udot.utah.gov/bangerter2700west

Mail: Bangerter Environmental c/o HDR
2825 East Cottonwood Pkwy., Suite 200
Salt Lake City, UT 84121

A UDOT PROJECT

IN-PERSON PUBLIC OPEN HOUSE

BANGERTER

The study team will also be hosting an in-person Public Open House.

When: Wednesday, September 1, 2021
6 - 7:30 p.m.

Where: Bluffdale Elementary
14323 S 2700 W
Bluffdale, UT 84065



The same information and materials will be available at both meetings. Input received during these meetings will help the team develop and refine the preferred design concept that will be available for comment later in the environmental process.

A UDOT PROJECT

In-person Open House Boards

MEETING PURPOSE

BANGERTER

The study team is hosting two initial public meetings to gather feedback about overall transportation needs and environmental issues that should be considered during the study.

Input received during these meetings will help the team develop and refine the preferred design concept that will be available for comment later in the SES process.



A UDOT PROJECT

BANGERTER

WELCOME

Bangerter Environmental Open House

A UDOT PROJECT

SCHEDULE

BANGERTER

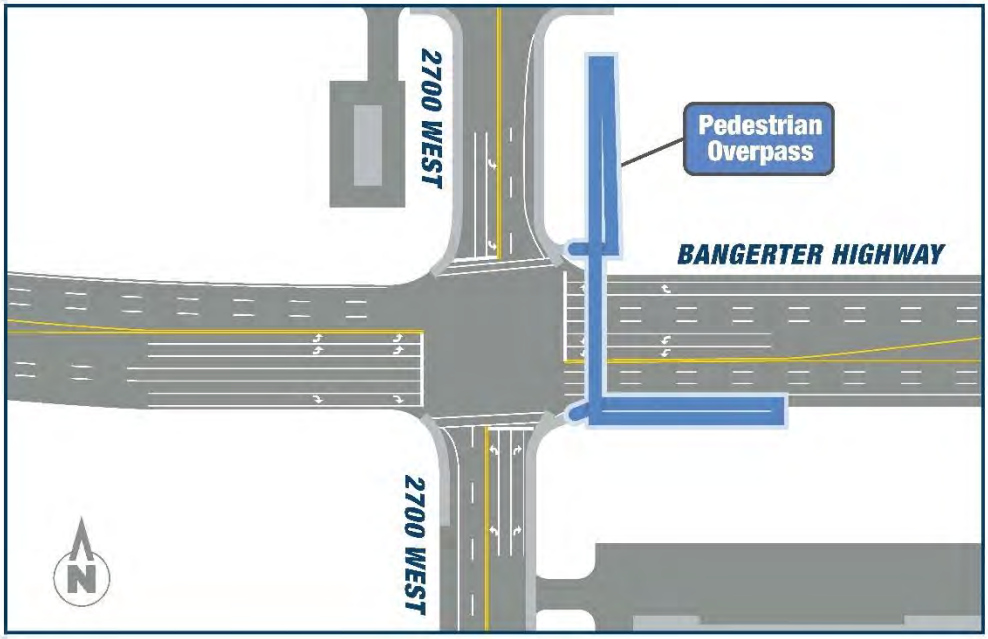


Schedule is process-driven and subject to change.

A UDOT PROJECT

PEDESTRIAN OVERPASS

BANGERTER



A UDOT PROJECT

POSSIBLE SOLUTIONS

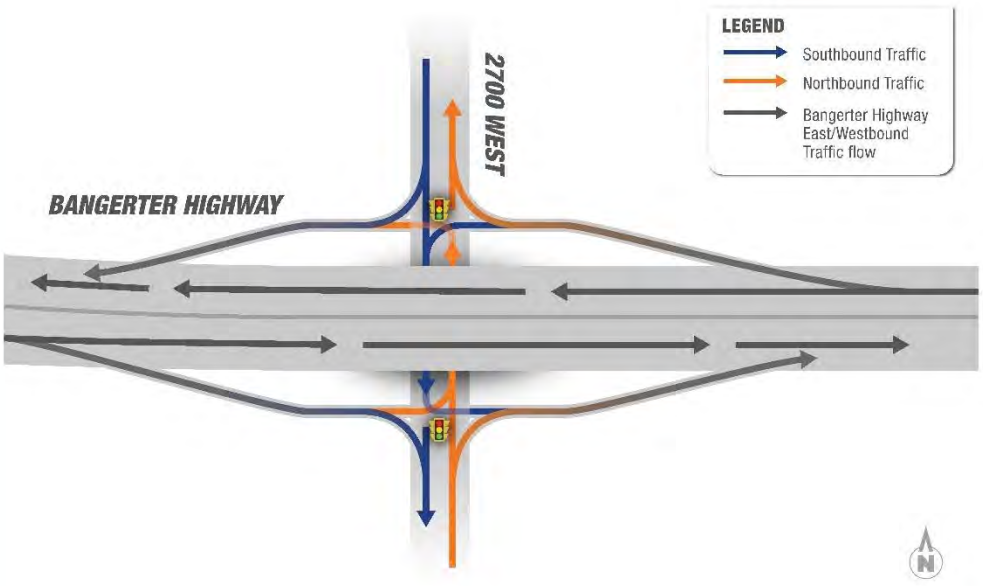
BANGERTER

- Tight Diamond Interchange
- Single-Point Urban Interchange (SPUI)
- No Access
- Right In, Right Out
- Over/Under
- No Action

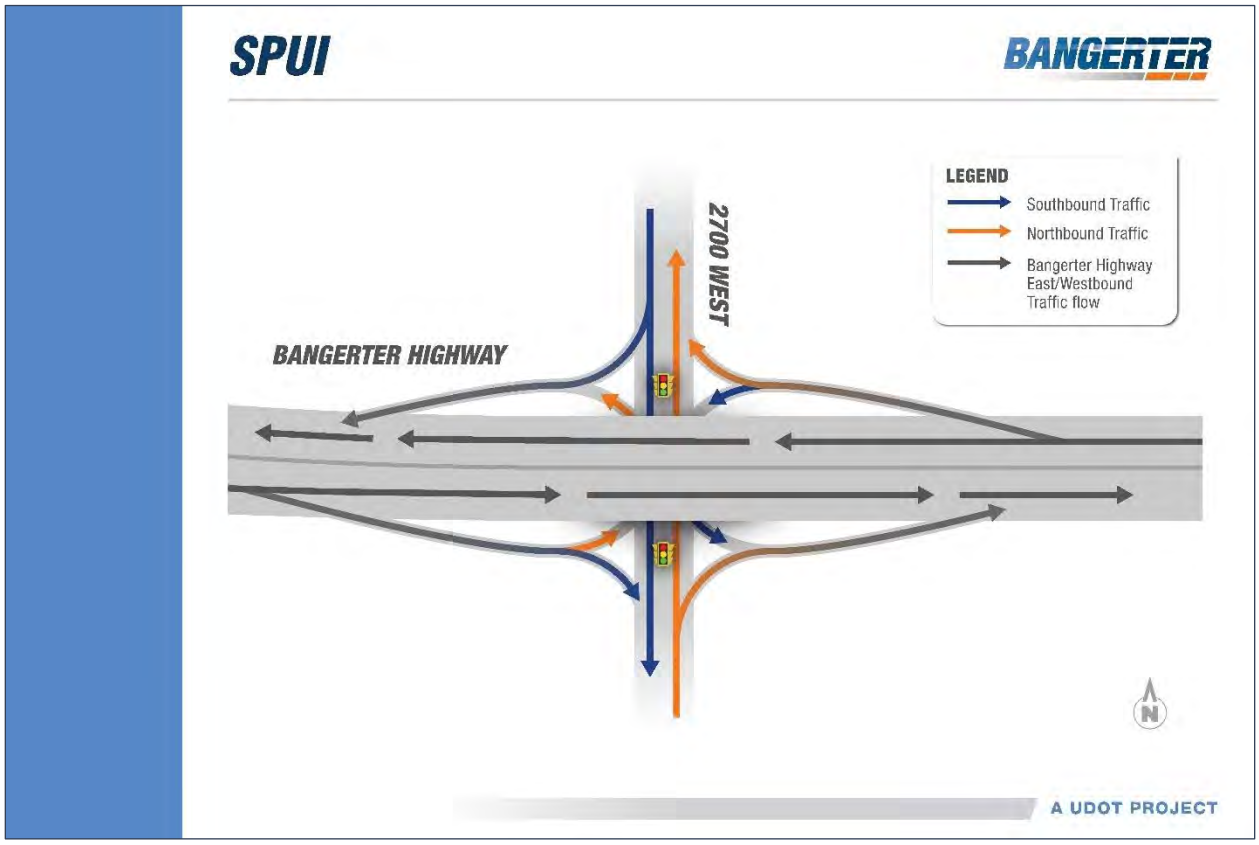
A UDOT PROJECT

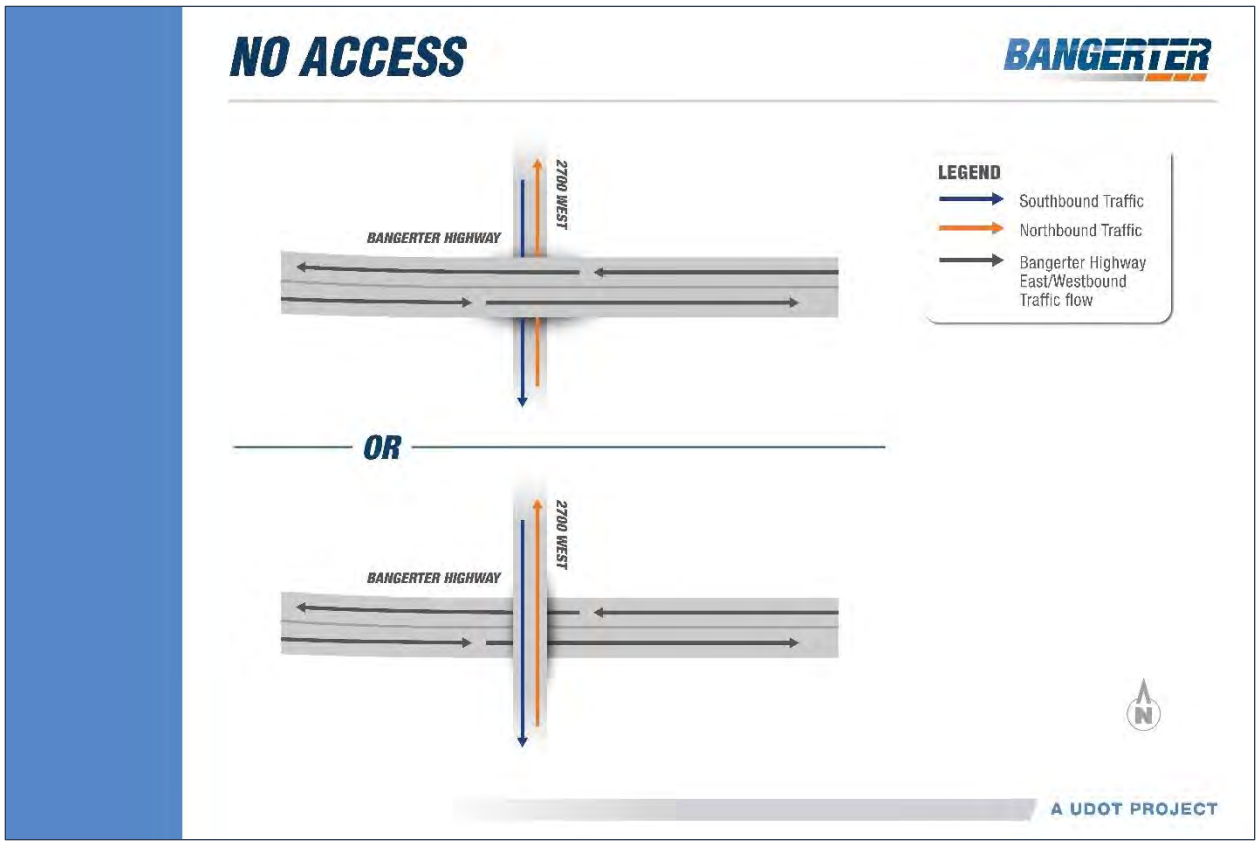
TIGHT DIAMOND

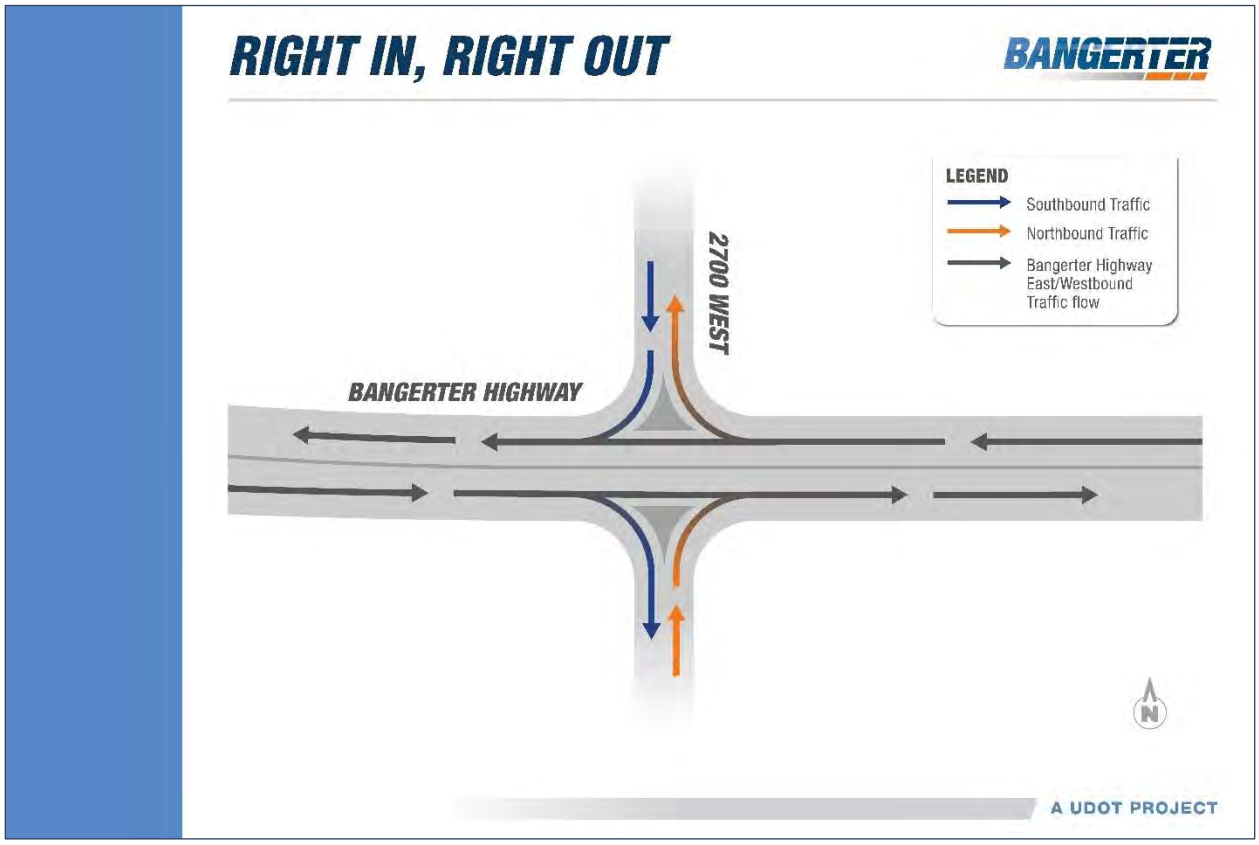
BANGERTER

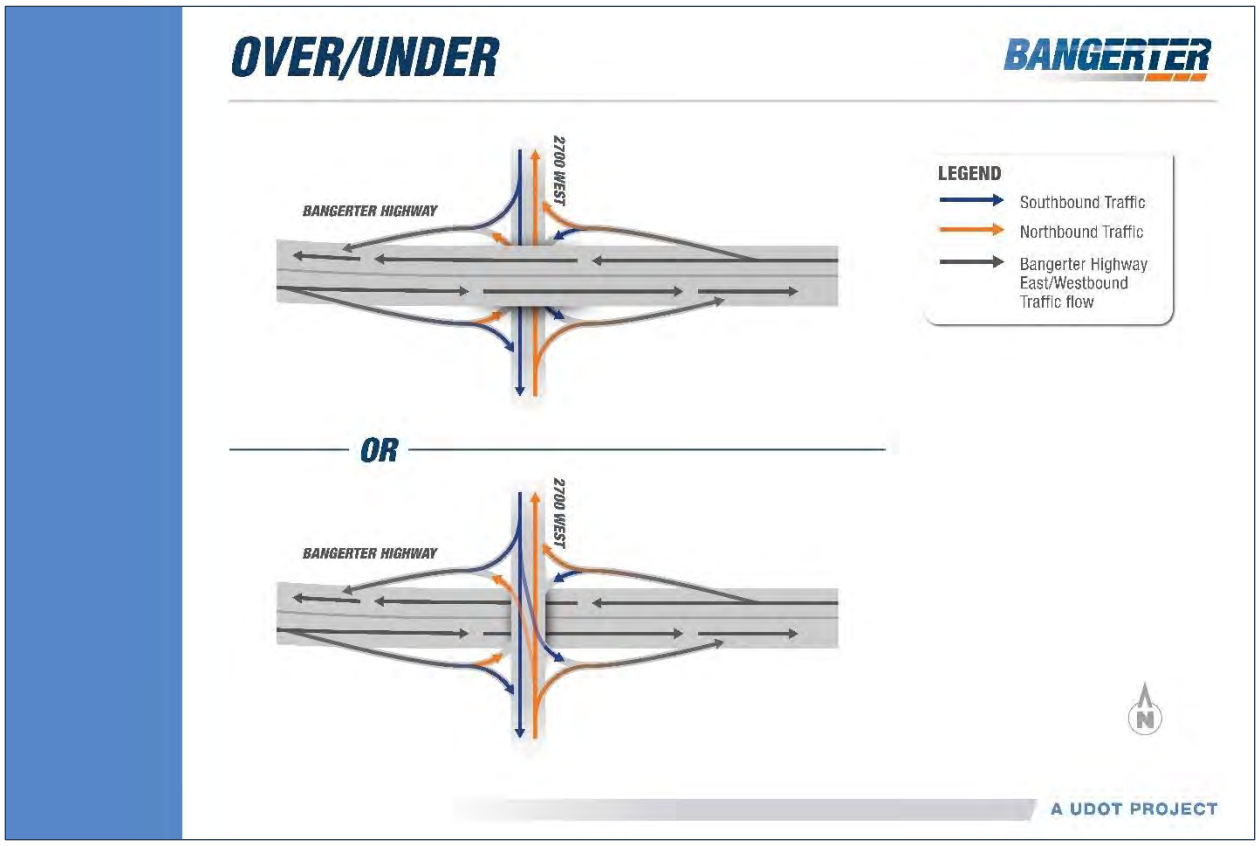


A UDOT PROJECT


SPUI
BANGERTER
LEGEND
Southbound Traffic
Northbound Traffic
Bangerter Highway East/Westbound Traffic flow
2700 WEST
BANGERTER HIGHWAY
N
A UDOT PROJECT


NO ACCESS
BANGERTER
LEGEND
Southbound Traffic
Northbound Traffic
Bangerter Highway East/Westbound Traffic flow
2700 WEST
BANGERTER HIGHWAY
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RIGHT IN, RIGHT OUT
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OVER/UNDER
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Southbound Traffic
Northbound Traffic
Bangerter Highway East/Westbound Traffic flow
2700 WEST
BANGERTER HIGHWAY
OR
2700 WEST
BANGERTER HIGHWAY
N
A UDOT PROJECT

NO ACTION

BANGERTER



A UDOT PROJECT

PUBLIC COMMUNICATION AND COMMENT CHANNELS

BANGERTER

30-day Comment Period ends Sept. 15, 2021

Hotline: 888-766-ROAD (7623)

Email: bangerter@utah.gov

Website: udot.utah.gov/bangerter2700west

Mail: Bangerter Environmental c/o HDR
2825 East Cottonwood Pkwy., Suite 200
Salt Lake City, UT 84121

A UDOT PROJECT

STATE ENVIRONMENTAL STUDY (SES)

BANGERTER



A UDOT PROJECT

STUDY GOALS

BANGERTER



Convert all remaining at-grade intersections on Bangerter Highway to grade-separated interchanges, or other freeway-like solutions.

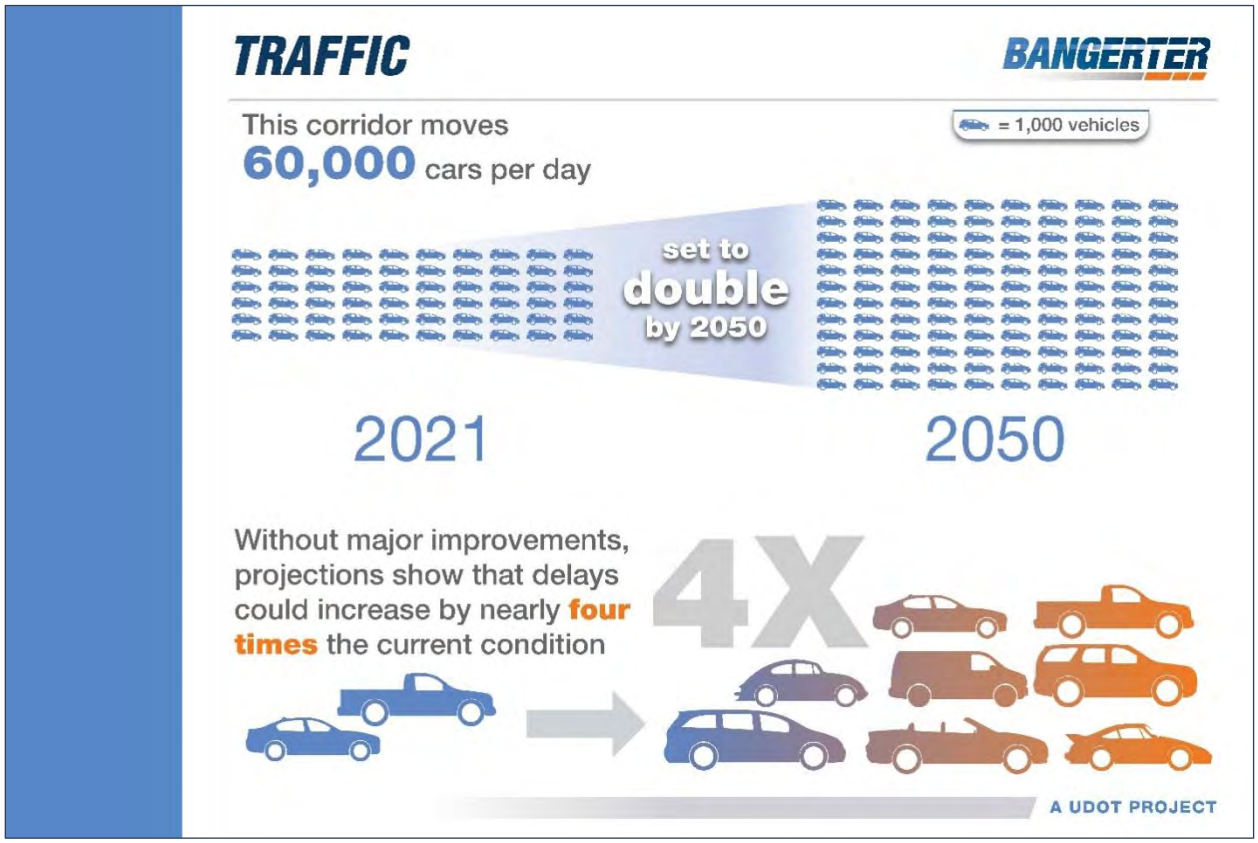


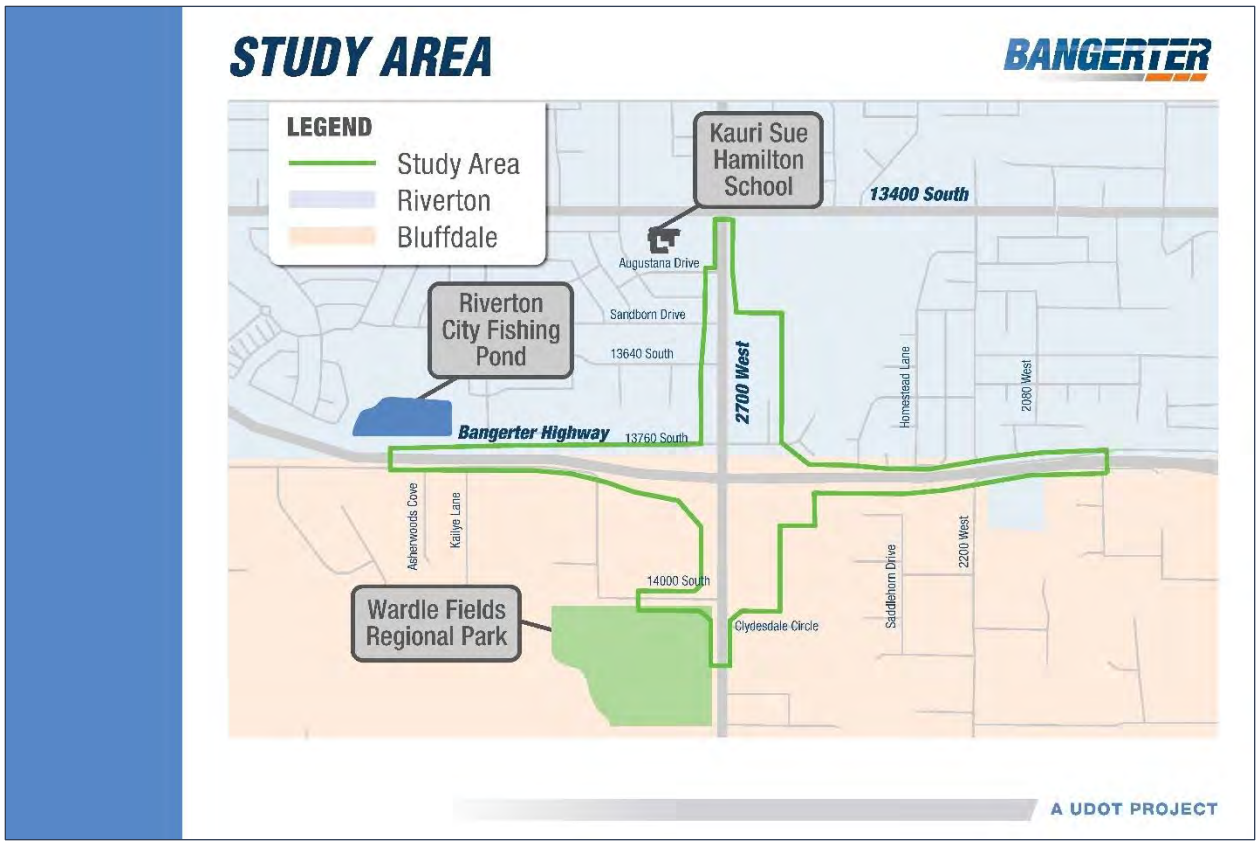
Enhance safety.



Improve travel times and increase mobility.

A UDOT PROJECT


TRAFFIC
BANGERTER
This corridor moves
60,000 cars per day
= 1,000 vehicles
set to
double
by 2050
2021
2050
Without major improvements, projections show that delays could increase by nearly four times the current condition
4X
A UDOT PROJECT


STUDY AREA
BANGERTER
LEGEND
Study Area
Riverton
Bluffdale
Kauri Sue Hamilton School
13400 South
Augustana Drive
Riverton City Fishing Pond
Sandborn Drive
13640 South
2700 West
Homestead Lane
2080 West
Bangerter Highway
13760 South
Asherwoods Cove
Kaliye Lane
14000 South
Wardle Fields Regional Park
Clydesdale Circle
Saddlehorn Drive
2200 West
A UDOT PROJECT

Appendix D: Public Comments

Name	Comment
Andrew Tzvetcoff	9/1/2021 | Comment Form I am all for constructing a tight diamond or SPUI interchange. I drive Bangerter daily and I see the benefits of the previous Bangerter interchange work.
Bob Richardson	9/1/2021 | Comment Form I am concerned about exiting from 16470 So on to 2700 West. I like the tight diamond outlay We have deer in our backyard on Rose Creek.
Natalie Hall	9/1/2021 | Comment Form Tight Diamond makes the most sense – traffic can get to and from Bluffdale + Riverton. Over vs. under for cost purposes means funding is (could) be more available. DO NOT CUT OFF any access to + from Bluffdale. Must provide access. *Riverton High is our district school. 2700 W is only access to our school. *Please provide any other information or comments you feel would be helpful to the study team.* Riverton library, senior center Riverton is Bluffdale's senior center.
Cindy Strong	9/1/2021 | Comment Form I would prefer the tight diamond.
Kyle Curtis	9/1/2021 | Comment Form - Direct access for pedestrians from Bluffdale – Riverton - Existing problems expected to worsen involving the neighborhood roads to the north within 300' of Bangerter - Overlays of suggested plans showing impact of current resident properties - Possible closure of neighborhood roads with re-located access
Wendy Aston	9/1/2021 | Comment Form

Name	Comment
	It is imperative for our city to have access to Bangerter at 2700 W. Also equally important would be a pedestrian crossing. For citizens to access the soon to be retail area on 2700 W.
Trevor Stock	9/1/2021 | Comment Form About the pedestrian over pass. I think there need to be a way for pedestrians to cross still with what ever plan is used. I see people use it every day. I also think side walks should be put on both sides of the road. Runners and kids use them every day.
Joshua Bastian	9/1/2021 | Comment Form Sound reduction please! Sound walls and designs that reduce sound please!
Traci Crockett	9/1/2021 | Comment Form Thank you for all your work. Bluffdale is excited to have an exit here to support our commercial business! Let’s get this funded!
Thad Van Ry	8/31/2021 | Email I attended the 2700 West Environmental Study Online Public Meeting. I live near 2700 West on 12875 South. I have concerns about the right on, right off option and the no access options. Regarding the right-on, right-off option, there is a regional park just south of the intersection that Salt Lake County spent a considerable amount of money to develop. This park gets a large amount of usage from residents in my area who would be cut off from easy access to that park. I'm not in favor of that. Regarding the no access option, I'm opposed to this as it would make it more difficult for us when we need to access I-15. This would put more traffic from my area on to 13400 South to access I-15. Thanks for your consideration.
Scott Norby	8/31/2021 | Email I appreciate the slides; it gave me a quick executive summary. I thought they were well done. A few questions/comments. What happens to access to 13760 South onto 2700 west? Will noise be

Name	Comment
	reduced? Will the sound barrier wall become taller? I like the SPUI design. It is obvious that traffic will continue to increase; it is great to know that people are planning ahead. Finally, when is the expected completion date? I know that depends on the EIS but at least an approximate date would be helpful. Are there future plans to expand the freeway and would that impact my back lot?
Chase Dansie	9/3/2021 | Phone Chase called the hotline and spoke with Tiffany. Chase wanted to know if any decisions had been made on the final design of 9800 South. Tiffany explained the environmental process and offered to add Chase to the email list. chasedansie@gmail.com was added to the 9800 South MailChimp list.

BANGERTER 2700 WEST

Appendix C: Public Involvement

Correspondence and Communication

THE CITY OF BLUFFDALE
2222 W 14400 South • Bluffdale, Utah 84065 • (801) 254-2200 • Fax (801) 253-3270

March 1, 2022

Brian Allen, P.E., Project Manager
Utah Department of Transportation – Region 2
2010 S 2760 W,
Salt Lake City, UT 84104

RE: Bangerter Highway and 2700 West Interchange

Dear Brian,

Thank you for the opportunity to direct the type of interchange the City would like to have at Bangerter Highway and 2700 West.

The City of Bluffdale is in support of having the diamond interchange design where Bangerter Highway crosses over 2700 West. We believe this type of interchange will adequately serve the traffic and safety needs of the City along with the ability to have our trail system connect.

Regards,

Natalie Hall, Mayor



Appendix C: Public Involvement

Bangerter Highway at 2700 West
Public Meeting Report

Bangerter Highway At 2700 West

PUBLIC MEETING REPORT

Project Number:	**S-0154(92)0**
PIN:	**18808**
Prepared For:	**Utah Department of Transportation**
Prepared By:	**Horrocks Engineers & HDR**
Date:	**May 16, 2022**

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Business and Neighborhood Meeting 2

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Advertisements 2
Attendance 2
Information Presented 2

Public Hearing 3

Meeting Overview 3
Advertisements 3
Attendance 4
Information Presented 4
Information Available on the Study Website 4
Public Comments 5

List of Appendices

Appendix A Advertisements A-1

Appendix B Attendance B-1

Appendix C Meeting Materials C-1

Appendix D Public Comments D-1

Study Overview

The Utah Department of Transportation (UDOT) has initiated State Environmental Studies (SESs) for the following intersections along Bangerter Highway:

- 2700 West
- 13400 South
- 9800 South
- 4700 South
- 4100 South
- 3500 South to S.R. 201
- California Avenue

Bangerter Highway is a major north-south corridor in the state of Utah, and with continued growth in the area, the amount of traffic on Bangerter Highway is expected to increase. This projected increase in traffic will also increase delays on Bangerter Highway by up to four times longer than the current conditions. UDOT is proposing to replace at-grade, signalized intersections along the corridor with grade-separated interchanges, which will allow one street to pass over the other. This separation will move Bangerter Highway and cross-street traffic more efficiently and will eliminate points of conflict along this busy highway.

The purpose of this study is to identify the best solution to address the needs along Bangerter Highway, evaluate the impacts of the proposed improvements to the natural and built environments, and provide opportunities for public input.

The following report is a summary of the preparation and execution of the Business and Neighborhood Meeting (in-person only) and the Public Hearing (both in-person and online options) regarding the Bangerter Highway and 2700 West intersection.

Meeting Summaries

BUSINESS AND NEIGHBORHOOD MEETING

MEETING OVERVIEW

An in-person Business and Neighborhood Meeting was held to review the proposed improvements, communicate potential property impacts with property owners and businesses, and provide property owners and businesses with information related to the right-of-way process and anticipated project schedule.

Date/Location

Date
Tuesday, Apr. 12, 2022
6 to 7:30 p.m.

Location:
Oquirrh Hills Middle School
12949 South 2700 West
Riverton, UT 84065

ADVERTISEMENTS

The invitations for the Business and Neighborhood Meeting were limited to those property owners with direct impacts once future construction is complete. Outreach efforts to these properties included:

- **March 15 – April 11, 2022** – Door hangers were distributed to commercial and residential properties identified as potentially impacted by the project. Concentrated canvassing efforts were executed with a focus on direct contact with property owners to gather contact information.
- **April 6** – Targeted email for nearby business and potentially impacted residential stakeholders.

*Copies of the Business and Neighborhood Meeting outreach advertisements are available in **Appendix A**.*

ATTENDANCE

- 24 stakeholders signed in for and attended the Business and Neighborhood Meeting held on Tuesday, April 12.

*A list of Neighborhood Meeting attendees is available in **Appendix B**.*

INFORMATION PRESENTED

The study team began the Business and Neighborhood Meeting with a presentation by Alex Fisher-Willis, the UDOT Project Manager. This presentation highlighted information including the study goals,

alternative selection process, and more. The presentation slides were also printed onto boards, which were positioned around the room for accessibility.

Additionally, scroll plot maps were provided for viewing at the meeting. Three scroll plots that included preliminary design and potential impact information were displayed showing the grade-separated tight diamond interchange at Bangerter Highway and 2700 West with Bangerter Highway going over 2700 West and a hybrid shift horizonal alignment.

A copy of the information presented at the Business and Neighborhood Meeting is available in ***Appendix C***.

PUBLIC HEARING

MEETING OVERVIEW

A Public Hearing was held, with both an in-person and online engagement opportunity, to review the proposed improvements and gather feedback.

Date/Location

In-Person Open House

Date
Tuesday, April 26, 2022
6 to 7:30 p.m.

Location
Oquirrh Hills Middle School
12949 South 2700 West
Riverton, UT 84065

Online Presentation and Q&A

Date
Wednesday, April 27, 2022
6 to 7 p.m.

Location
Zoom webinar – A link to join the online meeting and registration instructions were available on the study website: udot.utah.gov/bangerter2700west

ADVERTISEMENTS

The study team (consisting of UDOT staff and consultant firms) developed and executed a comprehensive outreach plan to invite adjacent property owners, residents, and the general public to attend one of the Public Hearing opportunities. The plan included:

- **March 16, 2022** – Public Hearing information was added to the project website
- **April 14, 2022** – 1,095 postcards were sent to addresses near the study area

- **April 19, 2022, 10:00 a.m.** –An email notification was sent to the Bangerter Highway at 2700 West stakeholder list
- **April 19 – 25, 2022** – Social media notifications advertising the Public Hearing were posted on UDOT's and Riverton City's social media channels.
- **Jan. 18, 2022** – A media notice with details about the Public Hearings for all Bangerter Highway intersections undergoing SESs were sent to major media outlets.
- **April 13 & 20, 2022 –** A legal notice was published in the major newspaper publications as required by the UDOT Environmental Manual of Instruction and Utah Administrative Code R930-2. The legal notice was published in the print and digital versions of the Salt Lake Tribune and Deseret News.

*Copies of the Public Hearing advertisements are available in **Appendix A**.*

ATTENDANCE

- 38 stakeholders signed in for the in-person Public Hearing on Tuesday, April 26, 2022
- 7 stakeholders logged in for the online Public Hearing on Wednesday, April 27, 2022

*A list of attendees for the online meeting and scanned copies of the sign-in sheets from the in-person meeting are available in **Appendix B**.*

INFORMATION PRESENTED

The in-person meeting for the Public Hearing was an open house format without a presentation. Attendees were invited to review scroll plot maps, information boards and Draft SES; ask project team members questions; and leave public comments.

The online meeting for the Public Hearing featured a presentation by Alex Fisher-Willis, the UDOT Project Manager, accompanied by informational slides. The presentation highlighted information including the study goals, alternative selection process, and more. Online attendees had the opportunity to participate in a live Q&A session with members of the project team and UDOT's Right of Way team.

The same information was presented at both Public Hearing opportunities.

*Materials presented at these meetings are available in **Appendix C**.*

INFORMATION AVAILABLE ON THE STUDY WEBSITE

The study team utilized a project website throughout the environmental process to provide a centralized place for the public to access study information. In preparation for the Public Hearing, the website was updated with meeting details and registration links for the online option.

Additionally, a copy of the Draft SES was published on the website at the start of the formal comment period (the formal comment period was held from April 11, 2022, through May 11, 2022). Copies of the scroll plot maps for the preferred alternative were featured as well along with copies of the Public Hearing presentation slides. After the online Public Hearing, a recording of the meeting was posted to allow anyone who could not attend the opportunity to hear and watch the information presented.

PUBLIC COMMENTS

A 30-day formal comment period was held from April 11, 2022, through May 11, 2022. A comment form was available at the in-person Public Hearing and on the study website for the general public's use. A court reporter was available at the in-person Public Hearing to record verbal comments.

A total of 16 comments were received (1 email comment, 6 website comments, 3 verbal comments at the in-person Public Hearing, and 6 written comments from the in-person Public Hearing).

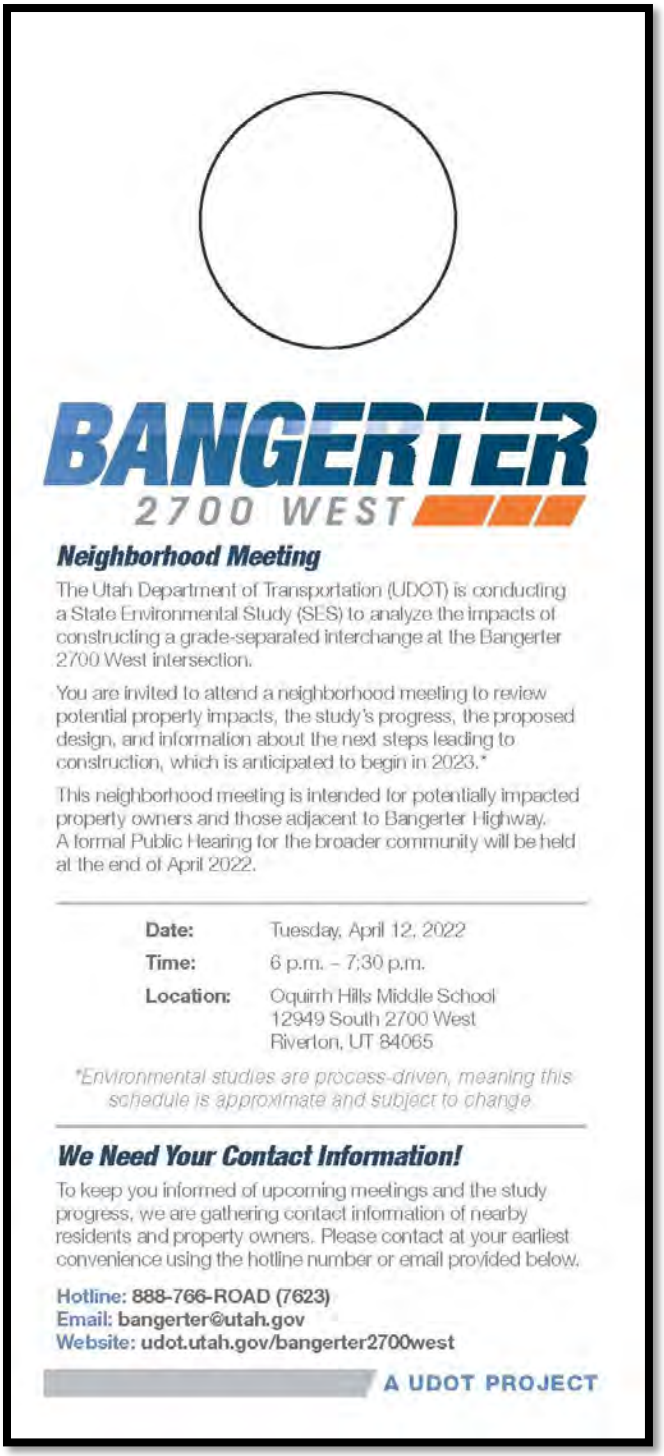
Common themes from the public comments included:

- 13760 South 2700 West intersection safety concerns (7)
- General project support (4)
- Rose Creek Trail (2)
- Road shoulder safety along 2700 West north of Bangerter
- Neighborhood outlet
- Lighting plan
- Design input
- Noise wall

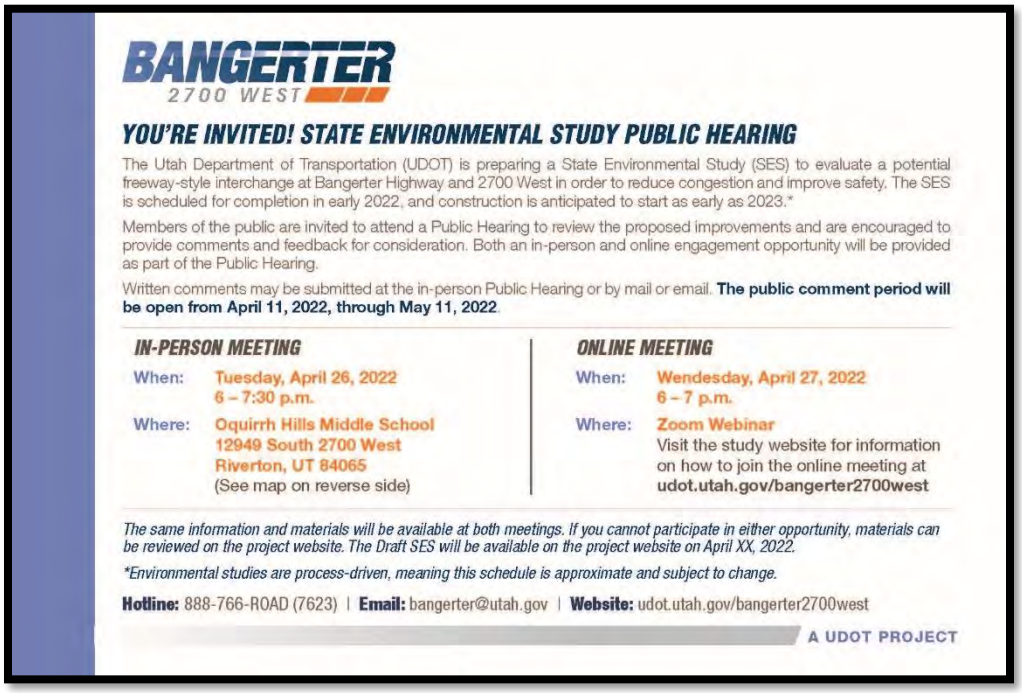
*The verbatim public comments and associated responses are provided in **Appendix D**.*

Appendix A Advertisements

Neighborhood Meeting Door Hanger



Public Hearing Postcard Invitation



BANGERTER
2700 WEST

YOU'RE INVITED! STATE ENVIRONMENTAL STUDY PUBLIC HEARING

The Utah Department of Transportation (UDOT) is preparing a State Environmental Study (SES) to evaluate a potential freeway-style interchange at Bangerter Highway and 2700 West in order to reduce congestion and improve safety. The SES is scheduled for completion in early 2022, and construction is anticipated to start as early as 2023.*

Members of the public are invited to attend a Public Hearing to review the proposed improvements and are encouraged to provide comments and feedback for consideration. Both an in-person and online engagement opportunity will be provided as part of the Public Hearing.

Written comments may be submitted at the in-person Public Hearing or by mail or email. **The public comment period will be open from April 11, 2022, through May 11, 2022.**

IN-PERSON MEETING

When: Tuesday, April 26, 2022
6 – 7:30 p.m.

Where: Oquirrh Hills Middle School
12949 South 2700 West
Riverton, UT 84065
(See map on reverse side)

ONLINE MEETING

When: Wendesday, April 27, 2022
6 – 7 p.m.

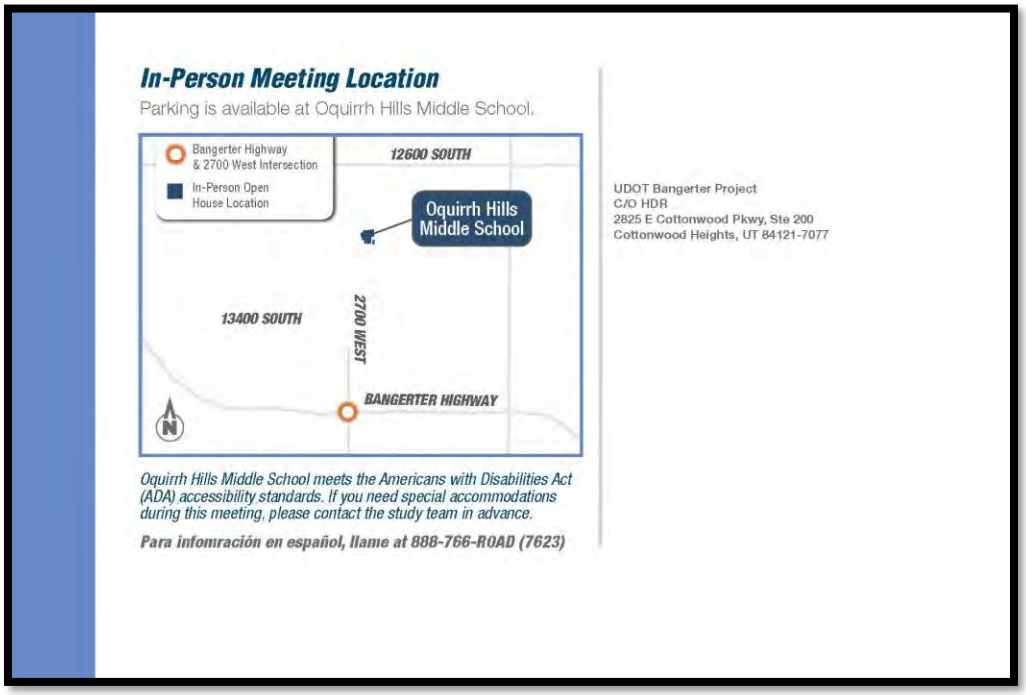
Where: Zoom Webinar
Visit the study website for information on how to join the online meeting at
udot.utah.gov/bangerter2700west

The same information and materials will be available at both meetings. If you cannot participate in either opportunity, materials can be reviewed on the project website. The Draft SES will be available on the project website on April XX, 2022.

*Environmental studies are process-driven, meaning this schedule is approximate and subject to change.

Hotline: 888-766-ROAD (7623) | **Email:** bangerter@utah.gov | **Website:** udot.utah.gov/bangerter2700west

A UDOT PROJECT



In-Person Meeting Location

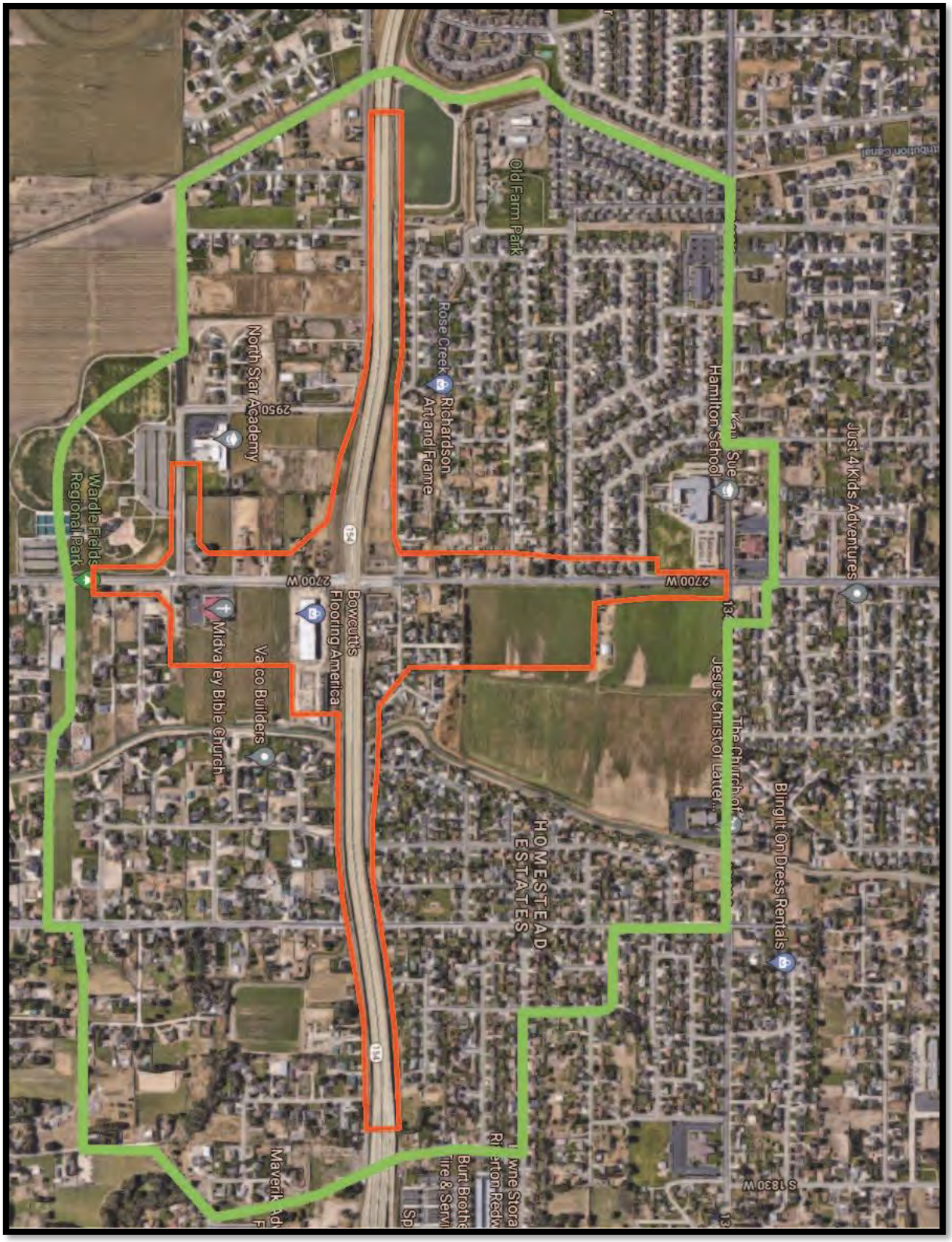
Parking is available at Oquirrh Hills Middle School.

UDOT Bangerter Project
C/O HDR
2825 E Cottonwood Pkwy, Ste 200
Cottonwood Heights, UT 84121-7077

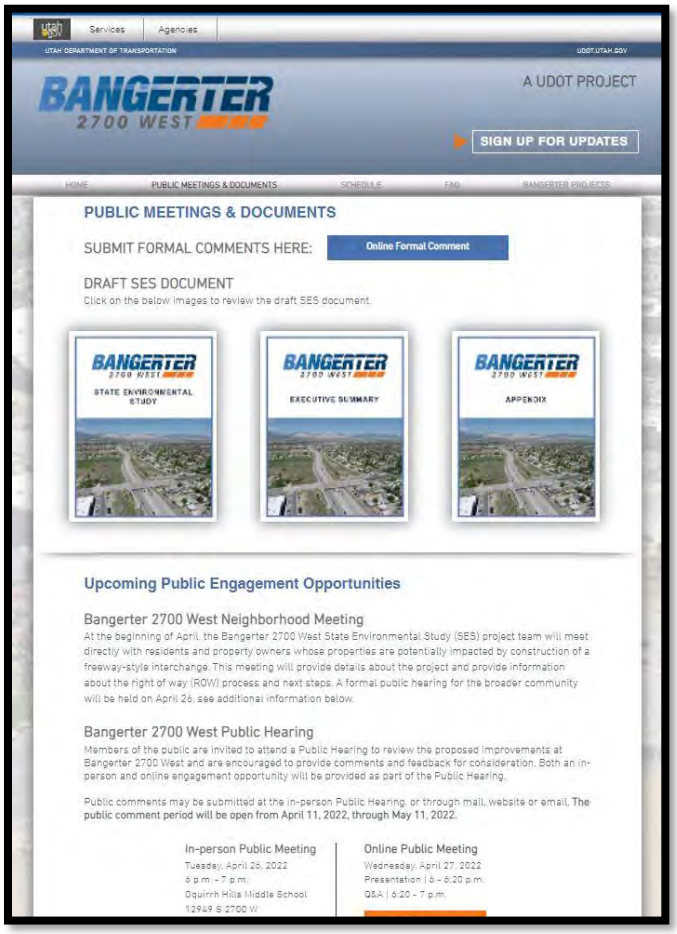
Oquirrh Hills Middle School meets the Americans with Disabilities Act (ADA) accessibility standards. If you need special accommodations during this meeting, please contact the study team in advance.

Para infomración en español, llame at 888-766-ROAD (7623)

Public Hearing Mailer Area



Public Hearing Project Website Post





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SALT LAKE CITY UTAH 84127
FED. TAX I.D.# 87-0128317
801-204-6910

DeseretNews

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HDR Inc
2825 E Cottonwood Parkway, Suite 200
Cottonwood Heights, UT 84121

ACCOUNT NUMBER
54813

ACCOUNT NAME
HDR Inc

TELEPHONE
801-743-7820

ORDER #
DN0016011

CUSTOMER REFERENCE NUMBER
Bangerter 2700 West SES Public Hearing

CAPTION
NOTICE OF PUBLIC HEARING On Proposed Improvements for the Bangerter Highway (S.R. 154) and 2700 West Intersection in Salt Lake County, UT; UDOT Project No.

TOTAL COST
$325.04

NOTICE OF PUBLIC HEARING

On Proposed Improvements for the
Bangerter Highway (S.R. 154) and 2700 West Intersection
in Salt Lake County, UT;
UDOT Project No. S-0154(92)0

As part of the State Environmental Study process, the Utah Department of Transportation (UDOT) advises all interested persons or groups that a Public Hearing will be held to present the proposed improvements at the Bangerter Highway and 2700 West intersection in Salt Lake County, UT. The proposed project includes constructing a grade-separated Tight Diamond Interchange at the intersection of Bangerter Highway and 2700 West. Both an in-person and online engagement opportunity will be provided as part of the Public Hearing.

In-person
When: Tuesday, Apr. 26, 2022, from 6 – 7:30 p.m.
Where: Oquirrh Hills Middle School, 12949 South 2700 West, Riverton, UT 84065

Online
When: Wednesday, Apr. 27, 2022, from 6 – 7 p.m.
Where: Visit udot.utah.gov/bangerter2700west for instructions on how to join the online meeting.

Members of the public are invited to attend the Public Hearing and are encouraged to provide comments and feedback for consideration. Information to be presented at the meetings will include the Draft State Environmental Study which identifies a Proposed Action, the process used to identify the Proposed Action, environmental resources considered and appropriate mitigation. The team will also present the project schedule and will be available to answer questions.

The Draft State Environmental Study will be available at udot.utah.gov/bangerter2700west beginning Apr. 11, 2022. Other meeting materials will be available on the study website starting on Apr. 28, 2022, at udot.utah.gov/bangerter2700west. Written comments should be sent to:

Bangerter Environmental c/o HDR
2825 East Cottonwood Parkway Suite 200
Cottonwood Heights, UT 84121

Comments may also be submitted at the in-person public meeting, via email at bangerter@utah.gov, or by calling the project hotline at 888-766-7623. Comments need to be submitted by May 11, 2022, to be included in the official transcripts of the Public Hearing. Comments provided to the study team will be reviewed and considered by UDOT. All comments received will be documented in the project record. The study team will contact you if they need additional information or clarification.

If you have questions about the Public Hearings, please contact a study representative at 888-766-ROAD (7623) or bangerter@utah.gov, or visit udot.utah.gov/bangerter2700west.

In compliance with the Americans with Disabilities Act, individuals needing special accommodations (including auxiliary communicative aids and services) or language translation services during this meeting should notify the study team five days in advance at 888-766-ROAD (7623) or bangerter@utah.gov.

Para información en español, llame al 888-766-ROAD (7623).
DN0016011

AFFIDAVIT OF PUBLICATION

AS THE DESERET NEWS, INC. LEGAL BOOKER, I CERTIFY THAT THE ATTACHED ADVERTISEMENT OF **LEGAL NOTICE FOR HDR INC** WAS PUBLISHED BY DESERET NEWS, INC., WEEKLY NEWSPAPER PRINTED IN THE ENGLISH LANGUAGE WITH GENERAL CIRCULATION IN UTAH, AND PUBLISHED IN SALT LAKE CITY, SALT LAKE COUNTY IN THE STATE OF UTAH. NOTICE IS ALSO POSTED ON UTAHLEGALS.COM ON THE SAME DAY AS THE FIRST NEWSPAPER PUBLICATION DATE AND REMAINS ON UTAHLEGALS.COM INDEFINITELY. COMPLIES WITH UTAH DIGITAL SIGNATURE ACT UTAH CODE 46-2-101; 46-3-104.

PUBLISHED ON 04/13/2022, 04/20/2022

DATE 04/20/2022

SIGNATURE

STATE OF UTAH
COUNTY OF Salt Lake

SUBSCRIBED AND SWORN TO BEFORE ME ON THIS 20th DAY OF APRIL IN THE YEAR 2022

BY KARYN VIGIL

LENEA TAPUSOA
NOTARY PUBLIC-STATE OF UTAH
COMMISSION# 712892
COMM. EXP. 07-06-2024

NOTARY PUBLIC SIGNATURE

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HDR ENGINEERING, INC.
SHAUNA HILL
2825 E COTTONWOOD PKWY STE 200
COTTONWOOD HEIGHTS, UT 84121
Shauna.Hill@hdrinc.com

ACCOUNT NUMBER
6082

ACCOUNT NAME
HDR ENGINEERING, INC.

TELEPHONE
801-743-7820

ORDER #
SLT0016608

CUSTOMER REFERENCE NUMBER

CAPTION
NOTICE OF PUBLIC HEARING On Proposed Improvements for the Bangerter Highway (S.R. 154) and 2700 West Intersection in Salt Lake County, UT; UDOT Project No.

TOTAL COST
$470.80

NOTICE OF PUBLIC HEARING

On Proposed Improvements for the
Bangerter Highway (S.R. 154) and 2700 West Intersection
in Salt Lake County, UT
UDOT Project No. S-0154(92)0

As part of the State Environmental Study process, the Utah Department of Transportation (UDOT) advises all interested persons or groups that a Public Hearing will be held to present the proposed improvements at the Bangerter Highway and 2700 West intersection in Salt Lake County, UT. The proposed project includes constructing a grade-separated Tight Diamond Interchange at the intersection of Bangerter Highway and 2700 West. Both an in-person and online engagement opportunity will be provided as part of the Public Hearing.

In-person
When: Tuesday, Apr. 26, 2022, from 6 – 7:30 p.m.
Where: Oquirrh Hills Middle School, 12949 South 2700 West, Riverton, UT 84065

Online
When: Wednesday, Apr. 27, 2022, from 6 – 7 p.m.
Where: Visit udot.utah.gov/bangerter2700west for instructions on how to join the online meeting.

Members of the public are invited to attend the Public Hearing and are encouraged to provide comments and feedback for consideration. Information to be presented at the meetings will include the Draft State Environmental Study which identifies a Proposed Action, the process used to identify the Proposed Action, environmental resources considered and appropriate mitigation. The team will also present the project schedule and will be available to answer questions.

The Draft State Environmental Study will be available at udot.utah.gov/bangerter2700west beginning Apr. 11, 2022. Other meeting materials will be available on the study website starting on Apr. 26, 2022, at udot.utah.gov/bangerter2700west. Written comments should be sent to:

Bangerter Environmental c/o HDR
2825 East Cottonwood Parkway Suite 200
Cottonwood Heights, UT 84121

Comments may also be submitted at the in-person public meeting, via email at bangerter@utah.gov, or by calling the project hotline at 888-766-7623. Comments need to be submitted by May 11, 2022, to be included in the official transcripts of the Public Hearing. Comments provided to the study team will be reviewed and considered by UDOT. All comments received will be documented in the project record. The study team will contact you if they need additional information or clarification.

If you have questions about the Public Hearings, please contact a study representative at 888-766-ROAD (7623) or bangerter@utah.gov, or visit udot.utah.gov/bangerter2700west.

In compliance with the Americans with Disabilities Act, individuals needing special accommodations (including auxiliary communicative aids and services) or language translation services during this meeting should notify the study team five days in advance at 888-766-ROAD (7623) or bangerter@utah.gov.

Para información en español, llame al 888-766-ROAD (7623).
SLT0016608

AFFIDAVIT OF PUBLICATION

AS THE SALT LAKE TRIBUNE, INC. LEGAL BOOKER, I CERTIFY THAT THE ATTACHED ADVERTISEMENT OF NOTICE OF PUBLIC HEARING On Proposed Improvements for the Bangerter Highway (S.R. 154) and 2700 West Intersection in Salt Lake County, UT; UDOT Project No. FOR HDR ENGINEERING, INC. WAS PUBLISHED BY THE SALT LAKE TRIBUNE, INC., WEEKLY NEWSPAPER PRINTED IN THE ENGLISH LANGUAGE WITH GENERAL CIRCULATION IN UTAH, AND PUBLISHED IN SALT LAKE CITY, SALT LAKE COUNTY IN THE STATE OF UTAH. NOTICE IS ALSO POSTED ON UTAHLEGALS.COM ON THE SAME DAY AS THE FIRST NEWSPAPER PUBLICATION DATE AND REMAINS ON UTAHLEGALS.COM INDEFINITELY. COMPLIES WITH UTAH DIGITAL SIGNATURE ACT UTAH CODE 46-2-101; 46-3-104.

PUBLISHED ON 04/13/2022, 04/20/2022

DATE 05/12/2022 SIGNATURE Jordyn gallegos

STATE OF UTAH
COUNTY OF SALT LAKE

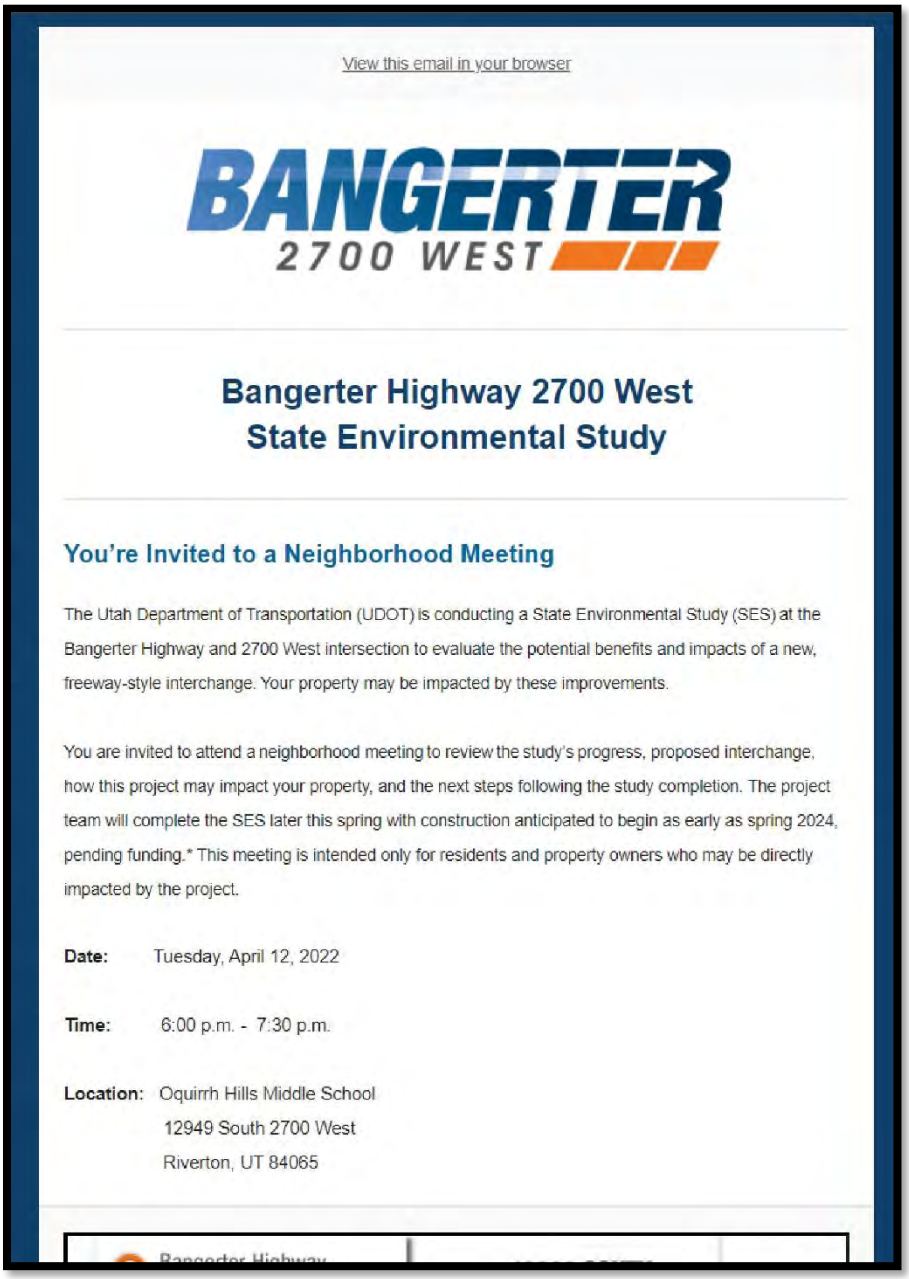
SUBSCRIBED AND SWORN TO BEFORE ME ON THIS 12th DAY OF MAY IN THE YEAR 2022

BY Jordyn Gallegos

LAREE WHITMER
NOTARY PUBLIC-STATE OF UTAH
COMMISSION# 715683
COMM. EXP. 12-09-2024

LaRee Whitmer
NOTARY PUBLIC SIGNATURE

Stakeholder Email Update Neighborhood Meeting



View this email in your browser

BANGERTER 2700 WEST

Bangerter Highway 2700 West
State Environmental Study

You're Invited to a Neighborhood Meeting

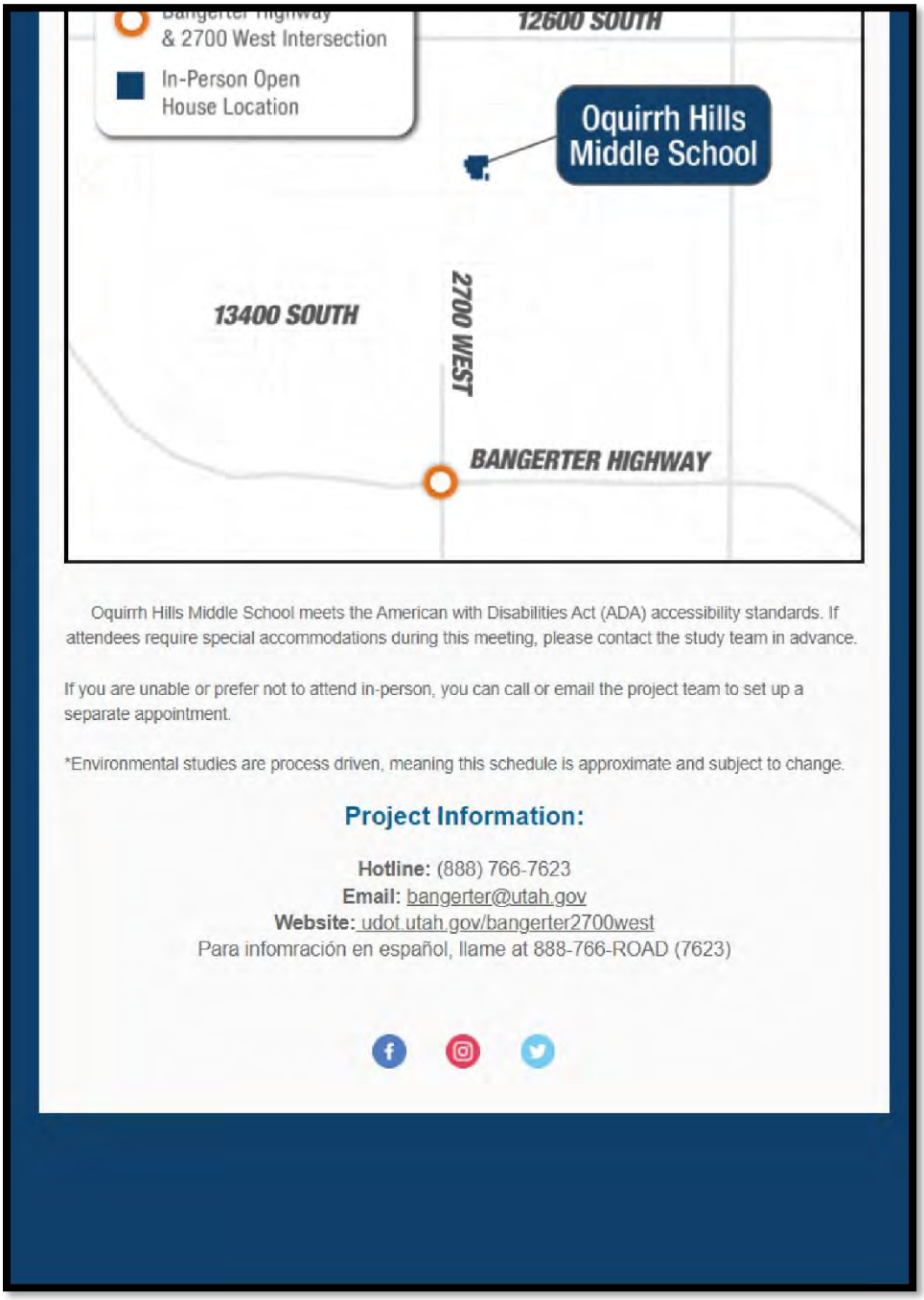
The Utah Department of Transportation (UDOT) is conducting a State Environmental Study (SES) at the Bangerter Highway and 2700 West intersection to evaluate the potential benefits and impacts of a new, freeway-style interchange. Your property may be impacted by these improvements.

You are invited to attend a neighborhood meeting to review the study's progress, proposed interchange, how this project may impact your property, and the next steps following the study completion. The project team will complete the SES later this spring with construction anticipated to begin as early as spring 2024, pending funding.* This meeting is intended only for residents and property owners who may be directly impacted by the project.

Date: Tuesday, April 12, 2022

Time: 6:00 p.m. - 7:30 p.m.

Location: Oquirrh Hills Middle School
12949 South 2700 West
Riverton, UT 84065



Oquirrh Hills Middle School meets the American with Disabilities Act (ADA) accessibility standards. If attendees require special accommodations during this meeting, please contact the study team in advance.

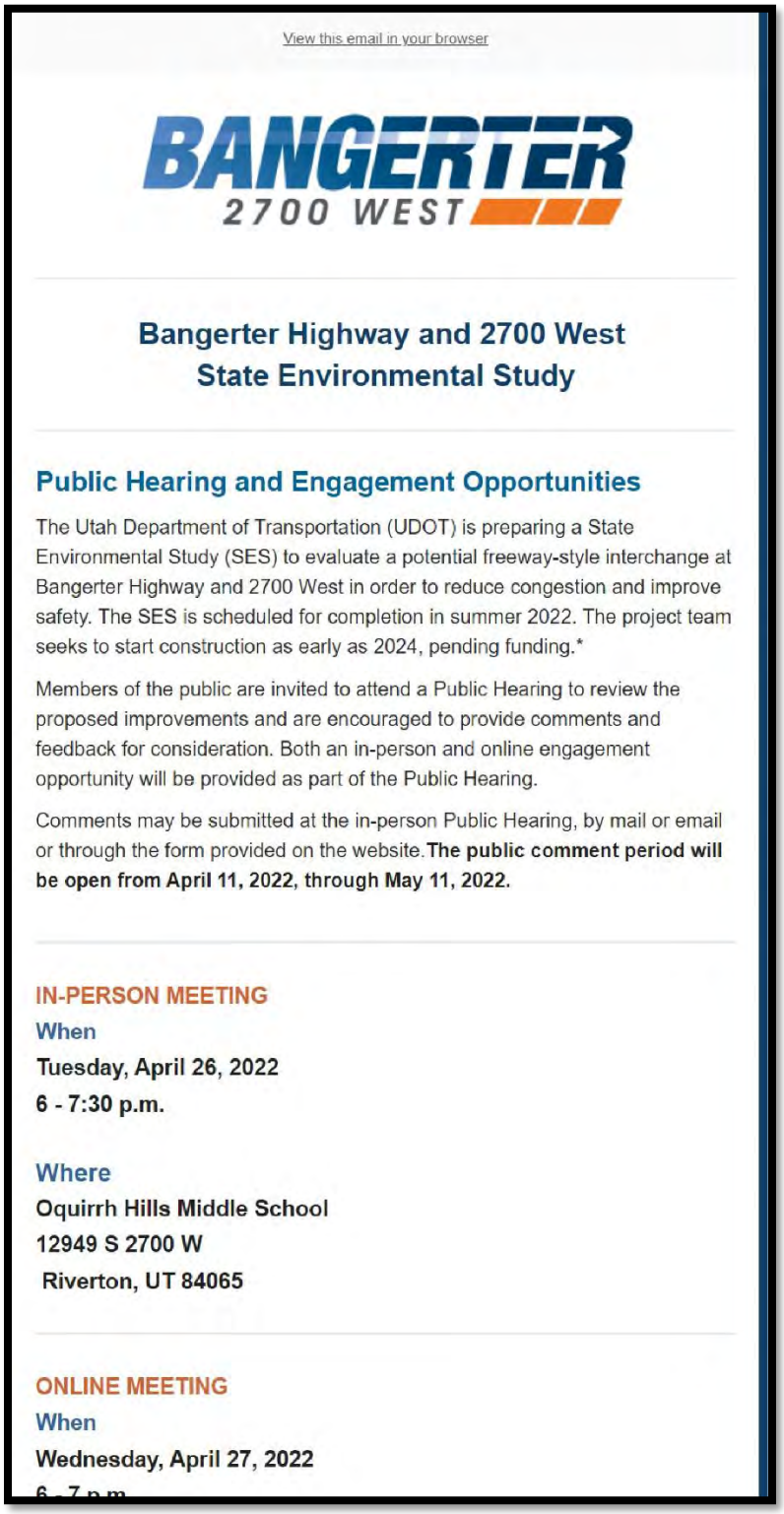
If you are unable or prefer not to attend in-person, you can call or email the project team to set up a separate appointment.

*Environmental studies are process driven, meaning this schedule is approximate and subject to change.

Project Information:

Hotline: (888) 766-7623
Email: bangerter@utah.gov
Website: udot.utah.gov/bangerter2700west
Para infomración en español, llame at 888-766-ROAD (7623)

Stakeholder Email Update Neighborhood Meeting



View this email in your browser

BANGERTER 2700 WEST

Bangerter Highway and 2700 West State Environmental Study

Public Hearing and Engagement Opportunities

The Utah Department of Transportation (UDOT) is preparing a State Environmental Study (SES) to evaluate a potential freeway-style interchange at Bangerter Highway and 2700 West in order to reduce congestion and improve safety. The SES is scheduled for completion in summer 2022. The project team seeks to start construction as early as 2024, pending funding.*

Members of the public are invited to attend a Public Hearing to review the proposed improvements and are encouraged to provide comments and feedback for consideration. Both an in-person and online engagement opportunity will be provided as part of the Public Hearing.

Comments may be submitted at the in-person Public Hearing, by mail or email or through the form provided on the website. **The public comment period will be open from April 11, 2022, through May 11, 2022.**

IN-PERSON MEETING

When

Tuesday, April 26, 2022
6 - 7:30 p.m.

Where

Oquirrh Hills Middle School
12949 S 2700 W
Riverton, UT 84065

ONLINE MEETING

When

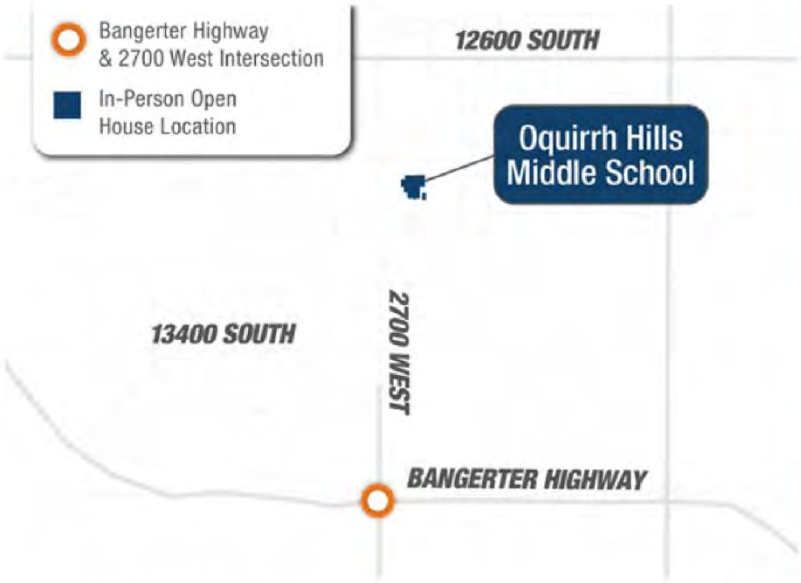
Wednesday, April 27, 2022
6 - 7 p.m.

Where

Zoom Webinar

Click here for online meeting registration

Please note: the information and materials at both meetings will be identical. If you cannot participate in either opportunity, meeting materials can be reviewed on the project website. The Draft SES will be available on the project website.



Oquirrh Hills Middle School meets the American with Disabilities Act (ADA) accessibility standards. If attendees require special accommodations during this meeting, please contact the study team in advance.

For project information
***Para información en español*:**
Hotline (*Número de teléfono*): (888) 766-7628
Email (*Correo electrónico*): bangerter@utah.gov
Web (*Sitio web*): udot.utah.gov/bangerter2700west

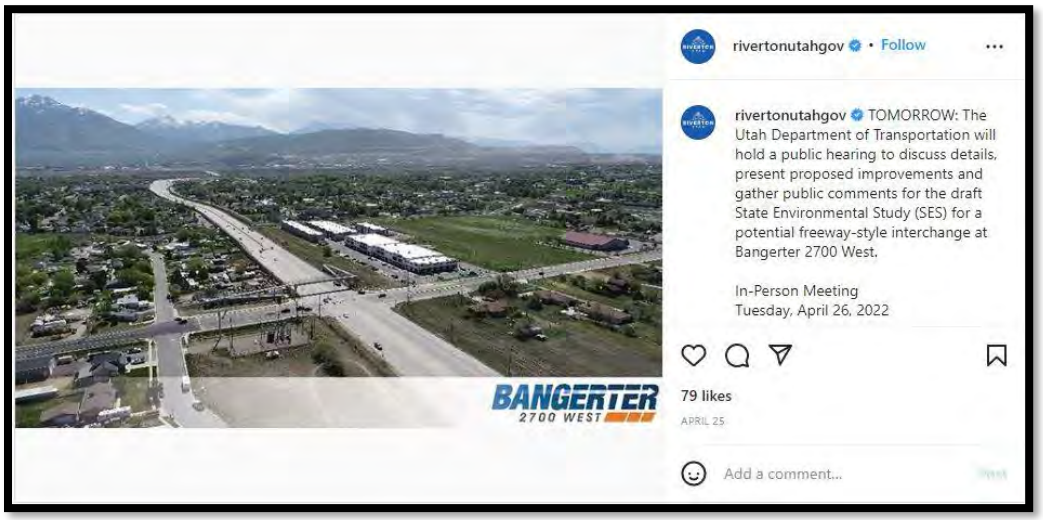
Know before you go. Check UDOT Traffic before hitting the road.

Public Hearing Social Media Notification

Riverton Facebook



Riverton Instagram



Riverton Twitter



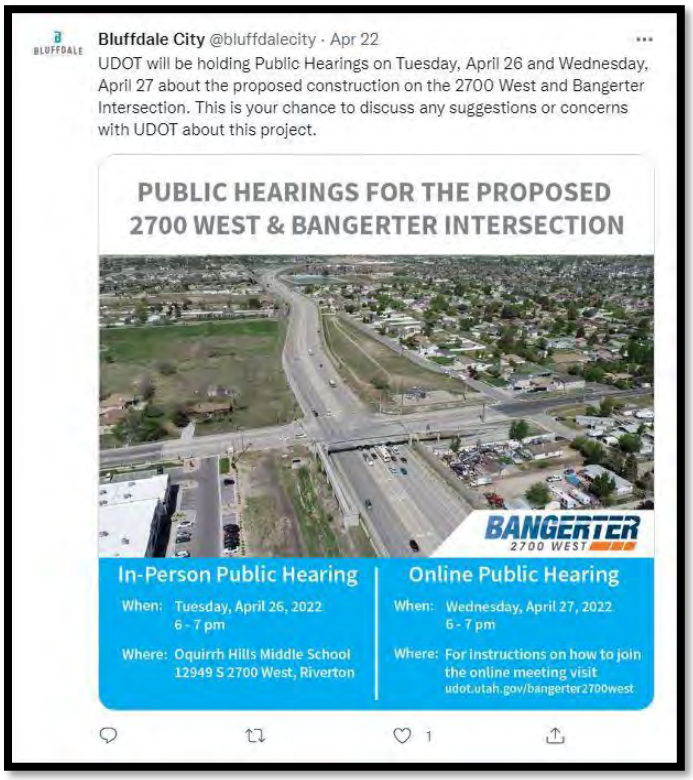
Bluffdale Facebook



Bluffdale Instagram



Bluffdale Twitter

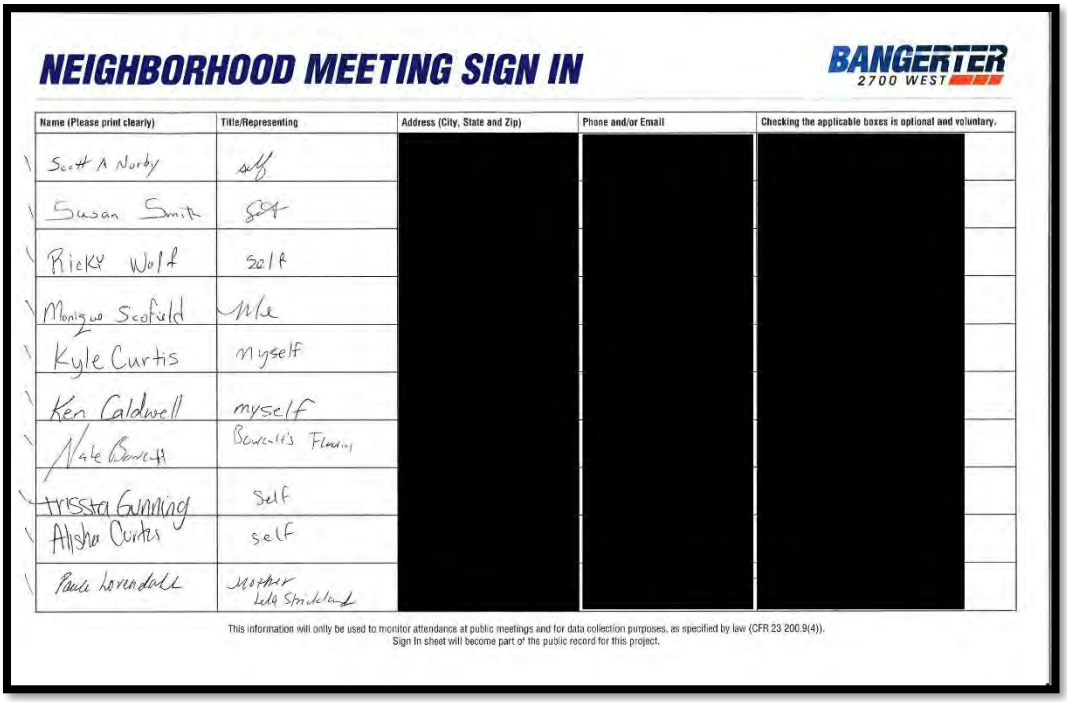


UDOT Region Two Twitter



Appendix B Attendance

Neighborhood Meeting Sign-In Sheets

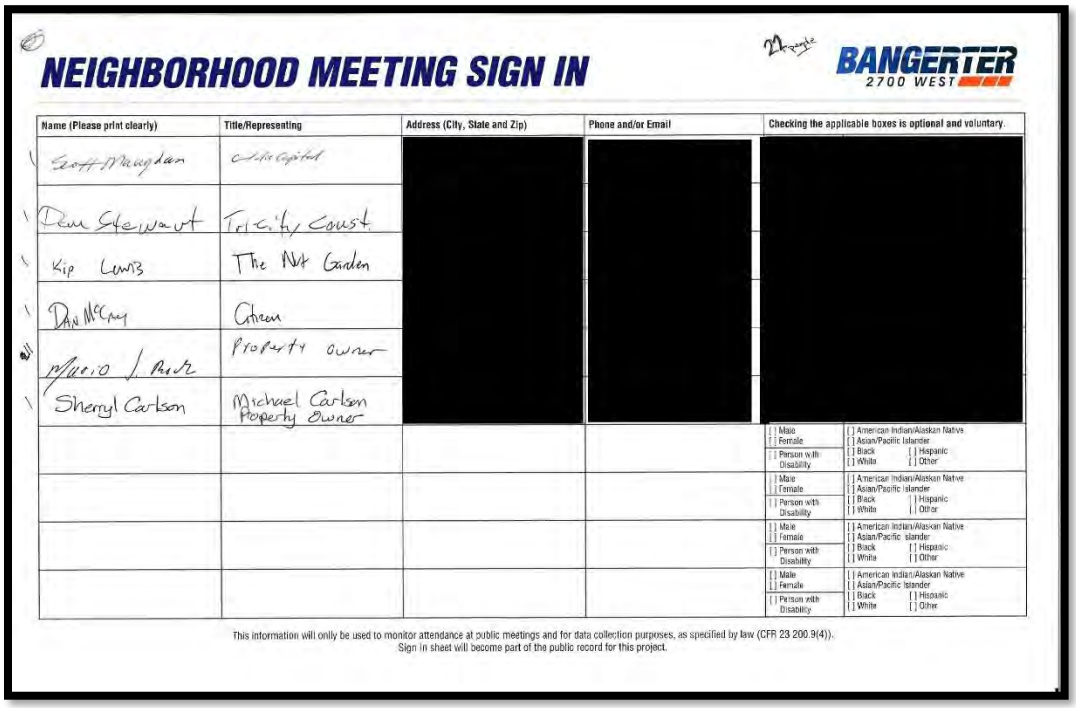


NEIGHBORHOOD MEETING SIGN IN

BANGERTER 2700 WEST

Name (Please print clearly)	Title/Representing	Address (City, State and Zip)	Phone and/or Email	Checking the applicable boxes is optional and voluntary.
Scott A Norby	self	[redacted]	[redacted]	[redacted]
Susan Smith	SA			
Ricky Wolf	Self			
Monique Scofield	Me			
Kyle Curtis	myself			
Ken Caldwell	myself			
Nate Bowen	Bowen's Fleming			
Trissta Gunning	Self			
Alisha Curtis	self			
Paula Lorendale	Mother Lola Strickland			

This information will only be used to monitor attendance at public meetings and for data collection purposes, as specified by law (CFR 23 200.9(4)).
Sign In sheet will become part of the public record for this project.

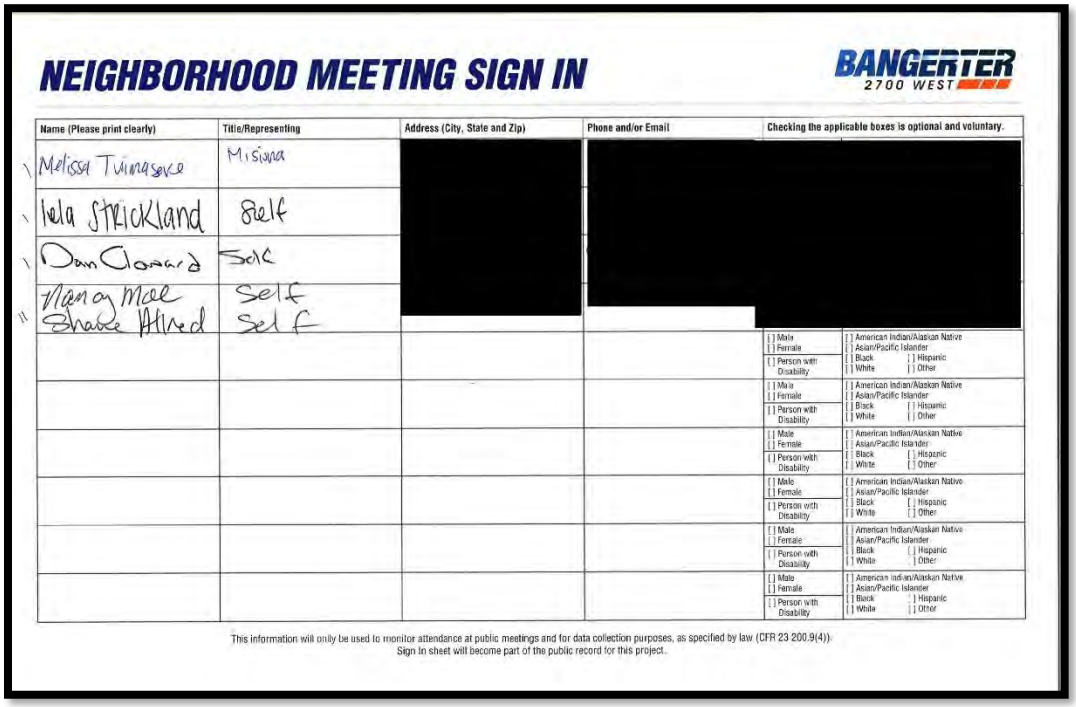


NEIGHBORHOOD MEETING SIGN IN

BANGERTER 2700 WEST

Name (Please print clearly)	Title/Representing	Address (City, State and Zip)	Phone and/or Email	Checking the applicable boxes is optional and voluntary.
Scott Maughan	Wasatch Capital	[redacted]	[redacted]	[redacted]
Dan Stewart	Trinity Coast			
Kip Lewis	The Nut Garden			
Dan McCoy	Green			
Mario J. Ruiz	Property Owner			
Sheryl Carlson	Michael Carlson Property Owner			
				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other

This information will only be used to monitor attendance at public meetings and for data collection purposes, as specified by law (CFR 23 200.9(4)).
Sign In sheet will become part of the public record for this project.

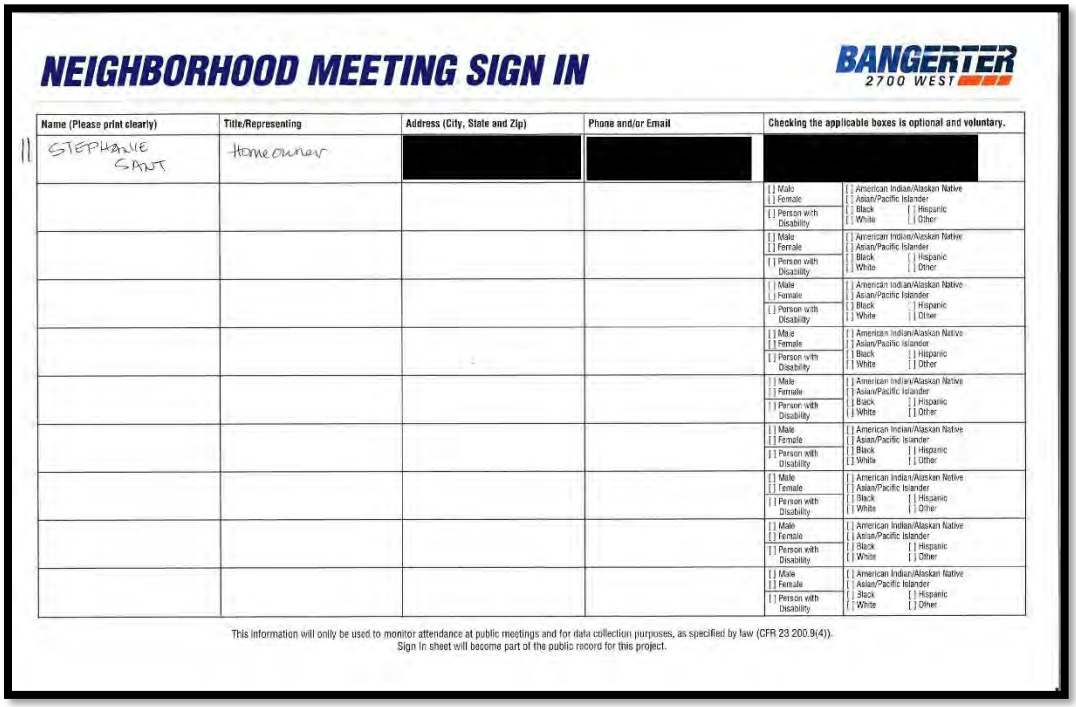


NEIGHBORHOOD MEETING SIGN IN

BANGERTER 2700 WEST

Name (Please print clearly)	Title/Representing	Address (City, State and Zip)	Phone and/or Email	Checking the applicable boxes is optional and voluntary.
Melissa Twingsevo	Missing	[redacted]	[redacted]	
Iela Strickland	Self			
Dan Clonard	Self			
Nancy Moe	Self			
Shake Allred	Self			
				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other

This information will only be used to monitor attendance at public meetings and for data collection purposes, as specified by law (CFR 23 200.9(4)).
Sign In sheet will become part of the public record for this project.



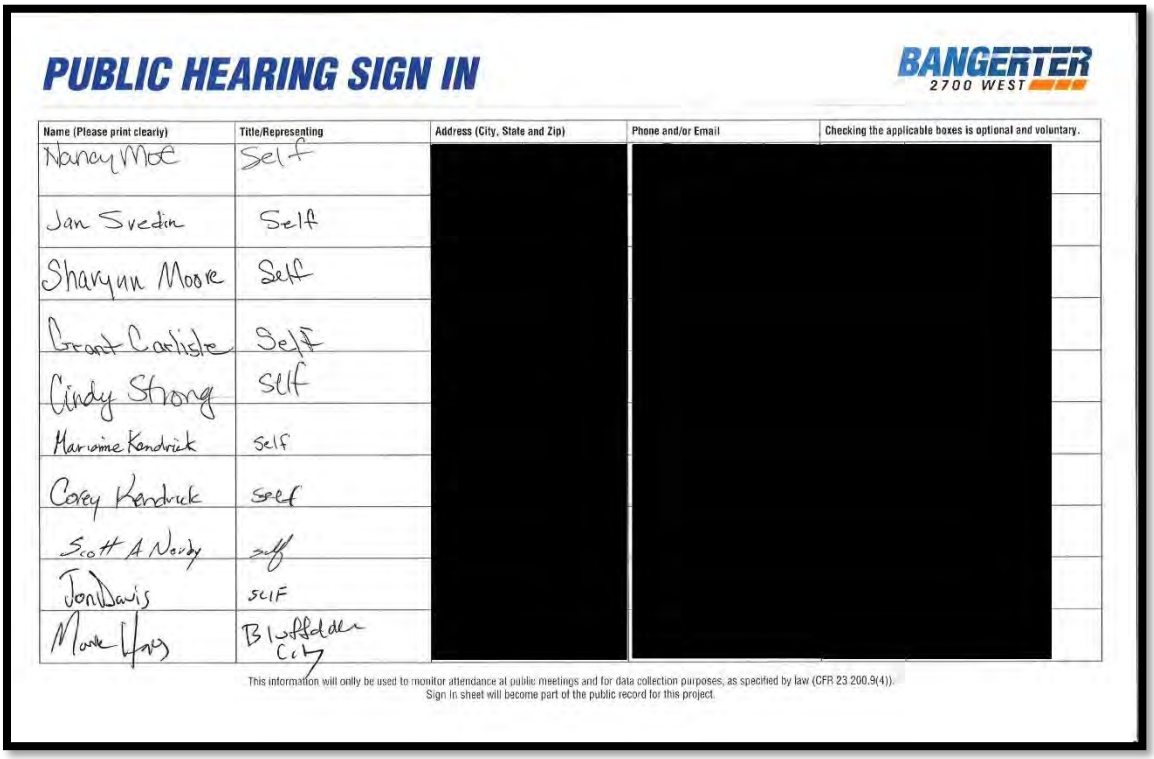
NEIGHBORHOOD MEETING SIGN IN

BANGERTER 2700 WEST

Name (Please print clearly)	Title/Representing	Address (City, State and Zip)	Phone and/or Email	Checking the applicable boxes is optional and voluntary.
STEPHANIE SANT	Homeowner	[redacted]	[redacted]	
				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
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				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other

This information will only be used to monitor attendance at public meetings and for data collection purposes, as specified by law (CFR 23 200.9(4)).
Sign In sheet will become part of the public record for this project.

Public Hearing In-person Sign-in Sheets

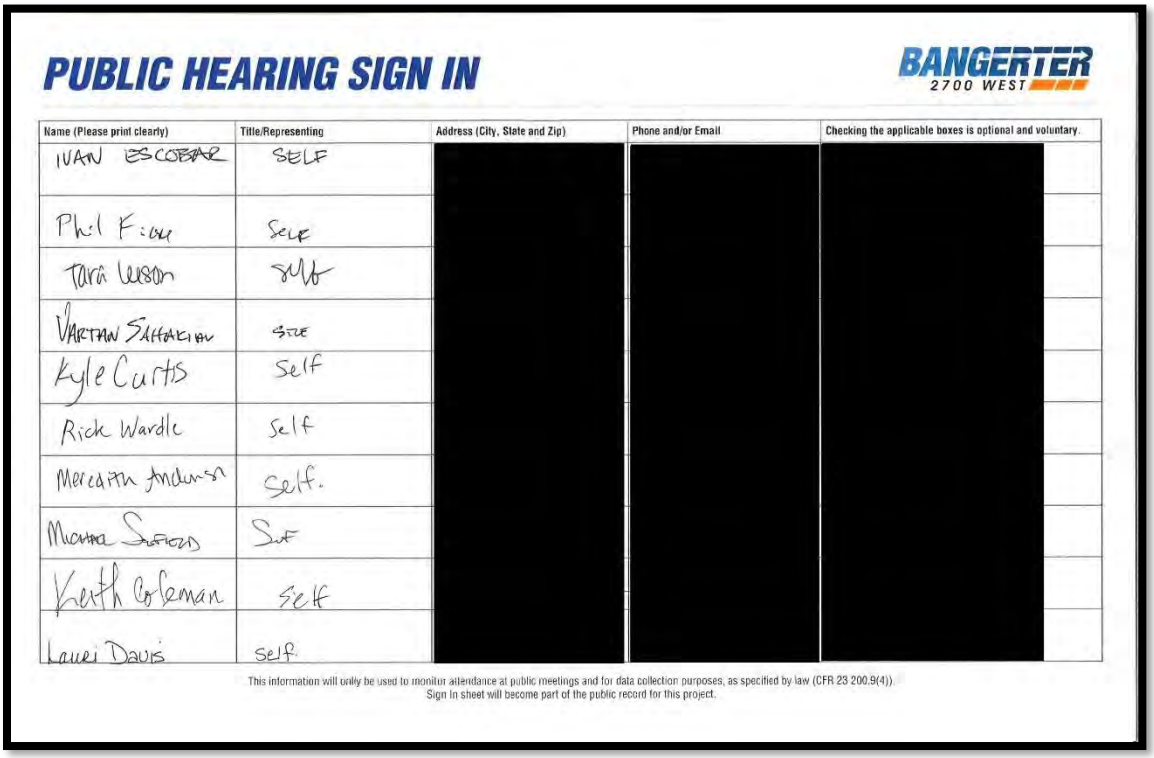


PUBLIC HEARING SIGN IN

BANGERTER 2700 WEST

Name (Please print clearly)	Title/Representing	Address (City, State and Zip)	Phone and/or Email	Checking the applicable boxes is optional and voluntary.
Nancy Mot	Self	[redacted]	[redacted]	
Jan Svedin	Self			
Sharyn Moore	Self			
Grant Carlisle	Self			
Cindy Strong	Self			
Marianne Kendrick	Self			
Corey Kendrick	Self			
Scott A Neidy	Self			
Jon Davis	SELF			
Mark Hay	Bluffdale City			

This information will only be used to monitor attendance at public meetings and for data collection purposes, as specified by law (CFR 23 200.9(4)).
Sign in sheet will become part of the public record for this project.

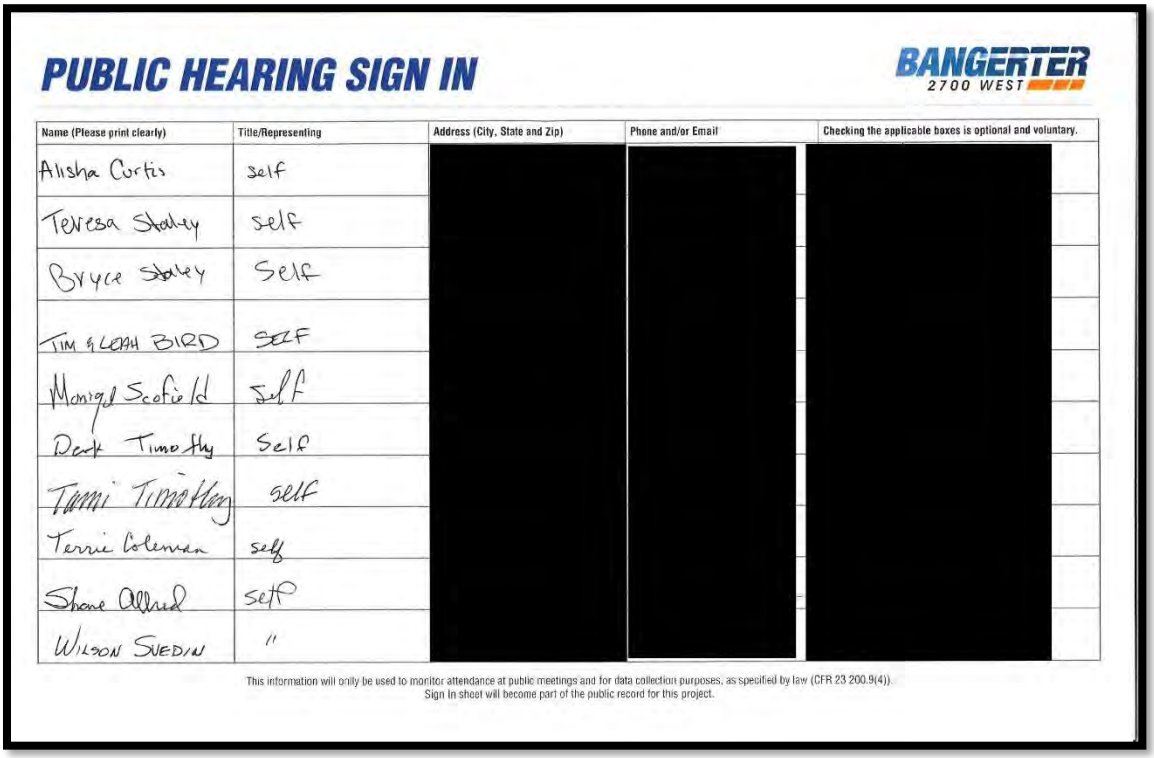


PUBLIC HEARING SIGN IN

BANGERTER 2700 WEST

Name (Please print clearly)	Title/Representing	Address (City, State and Zip)	Phone and/or Email	Checking the applicable boxes is optional and voluntary.
IVAN ESCOBAR	SELF	[redacted]	[redacted]	[redacted]
Phil Fisher	Self			
Tara Leeson	Self			
VARTHAN SARKARIAN	SELF			
Kyle Curtis	Self			
Rick Wardle	Self			
Meredith Anderson	Self.			
Monica Sutton	Self			
Keith Coleman	Self			
Lauri Davis	self			

This information will only be used to monitor attendance at public meetings and for data collection purposes, as specified by law (CFR 23 200.9(4)).
Sign in sheet will become part of the public record for this project.

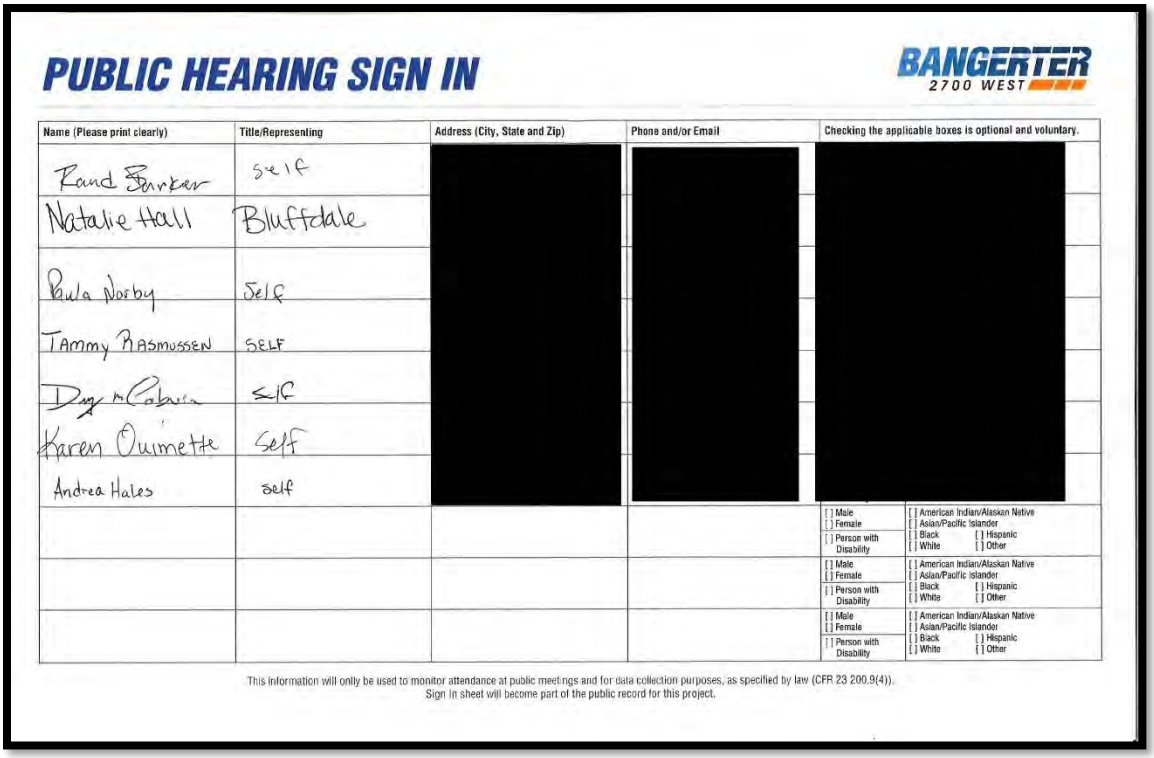


PUBLIC HEARING SIGN IN

BANGERTER 2700 WEST

Name (Please print clearly)	Title/Representing	Address (City, State and Zip)	Phone and/or Email	Checking the applicable boxes is optional and voluntary.
Alisha Curtis	self	[redacted]	[redacted]	[redacted]
Teresa Staley	self			
Bryce Staley	Self			
TIM & LEAH BIRD	SELF			
Monigal Scofield	Self			
Dark Timothy	Self			
Tami Timothy	self			
Terrie Coleman	self			
Shane Allred	self			
Wilson Sueoin	"			

This information will only be used to monitor attendance at public meetings and for data collection purposes, as specified by law (CFR 23 200.9(4)).
Sign In sheet will become part of the public record for this project.



PUBLIC HEARING SIGN IN

BANGERTER 2700 WEST

Name (Please print clearly)	Title/Representing	Address (City, State and Zip)	Phone and/or Email	Checking the applicable boxes is optional and voluntary.
Rand Barker	self	[redacted]	[redacted]	[redacted]
Natalie Hall	Bluffdale			
Paula Norby	Self			
Tammy Rasmussen	SELF			
Dug McCabe	self			
Karen Ouimette	Self			
Andrea Hales	self			
				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other
				[ ] Male [ ] Female [ ] Person with Disability; [ ] American Indian/Alaskan Native [ ] Asian/Pacific Islander [ ] Black [ ] Hispanic [ ] White [ ] Other

This information will only be used to monitor attendance at public meetings and for data collection purposes, as specified by law (CFR 23 200.9(4)).
Sign In sheet will become part of the public record for this project.

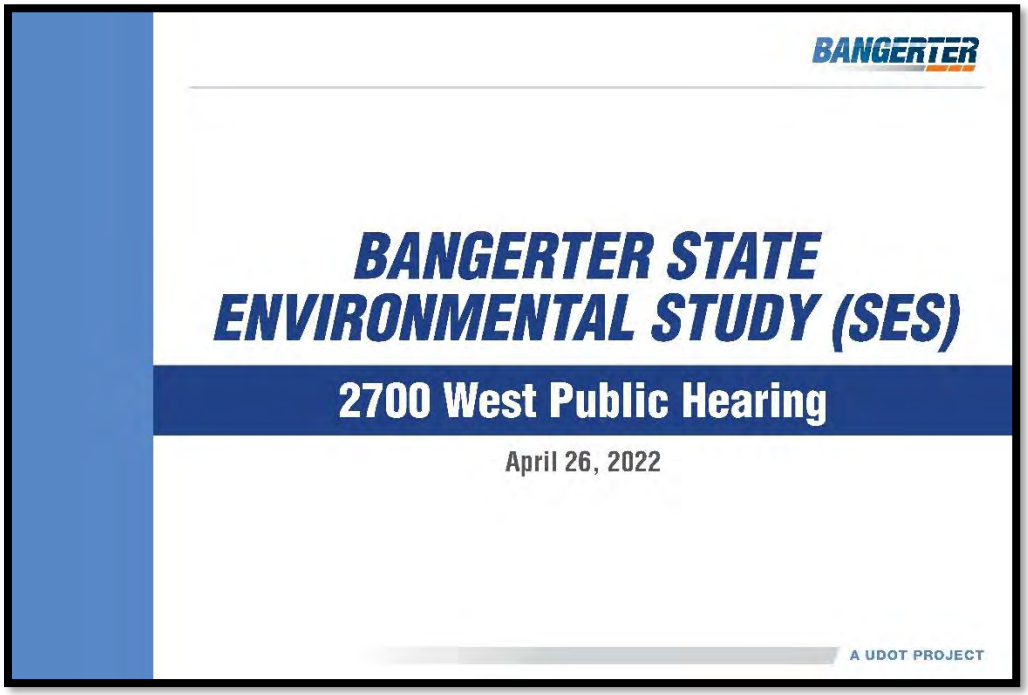
Online Public Meeting Sign-In Information

Bangerter 13400 South Public Hearing Online Meeting Attendee Report			
First Name	**Last Name**	**Time in**	**Zip**
Melissa	Tuimaseve	3	84065
Josh	Speulda	52	84088
Becky	Condie	52	84065
Erwin	Lozano	23	84065
Daniel	Chadwell	52	84065
DaNae	Middleton	42	84065
Caroline	E	25	84065

Appendix C Meeting Materials

The same presentation and information boards were used for the Neighborhood Meeting, In-person Public Hearing, and the Online Public Hearing.





BANGERTER

WELCOME

ONLINE PUBLIC MEETING

Bangerter | 2700 West State Environmental Study (SES)

The meeting will begin shortly after 6 p.m. to allow participants time to join the Zoom webinar. Please visit the study website at **udot.utah.gov/bangerter2700west** to access supporting materials for today's presentation.

To submit questions, click the Q&A button on your screen. Our study team will be monitoring the questions and will answer as many as possible following the presentation.

Please note, this event is being recorded and will be available for viewing at **udot.utah.gov/bangerter2700west**.

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Q&A

BANGERTER

1. TO SUBMIT A QUESTION

Click on the Q&A button at the bottom of the screen

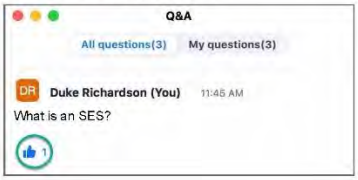


Type question in the Q&A Window



2. TO LIKE OR UPVOTE A QUESTION

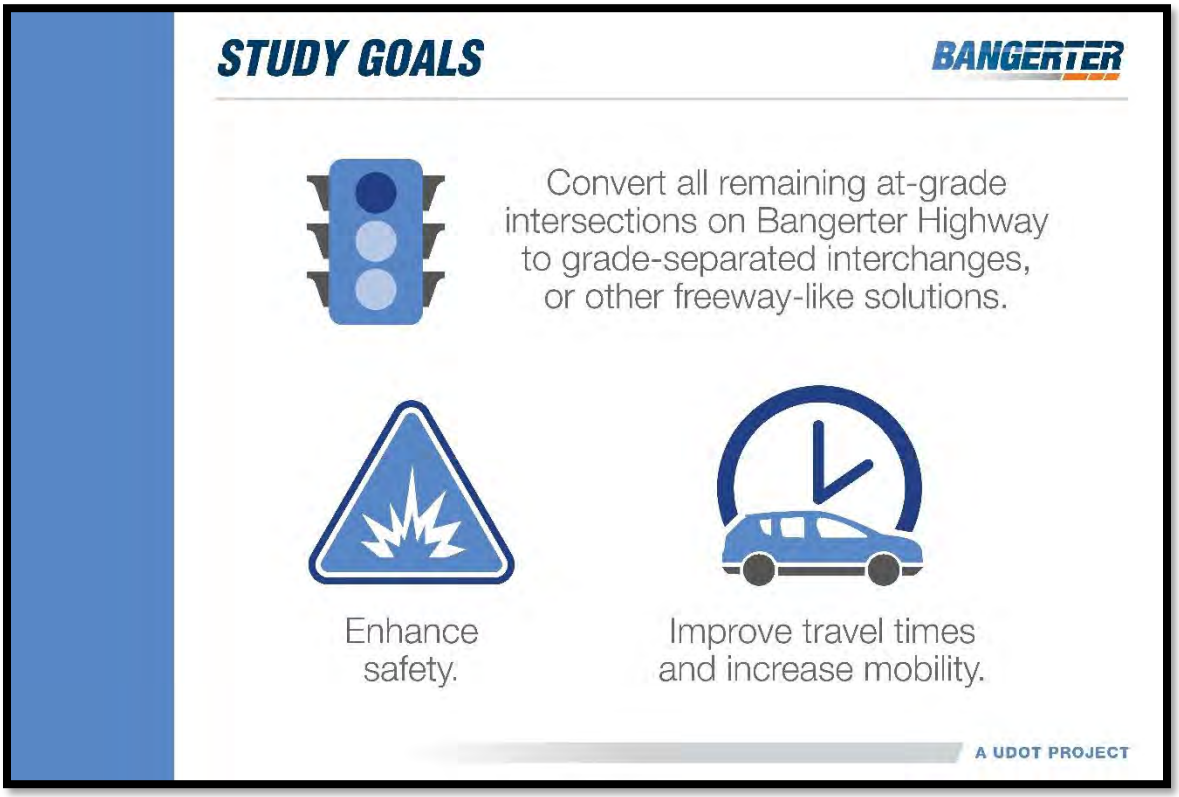
Click on the "thumbs-up- botton underneath questions

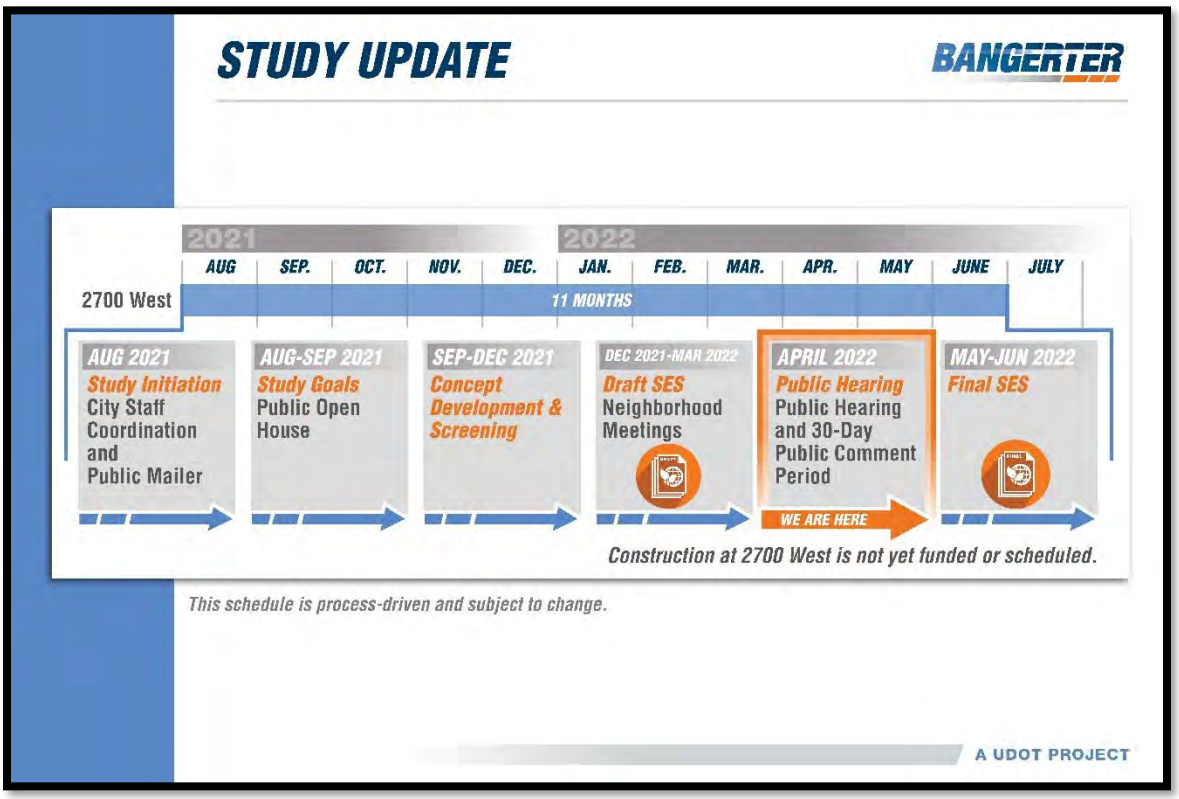


This helps us to know how many people have the same question



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STUDY GOALS
BANGERTER
Convert all remaining at-grade intersections on Bangerter Highway to grade-separated interchanges, or other freeway-like solutions.
Enhance safety.
Improve travel times and increase mobility.
A UDOT PROJECT

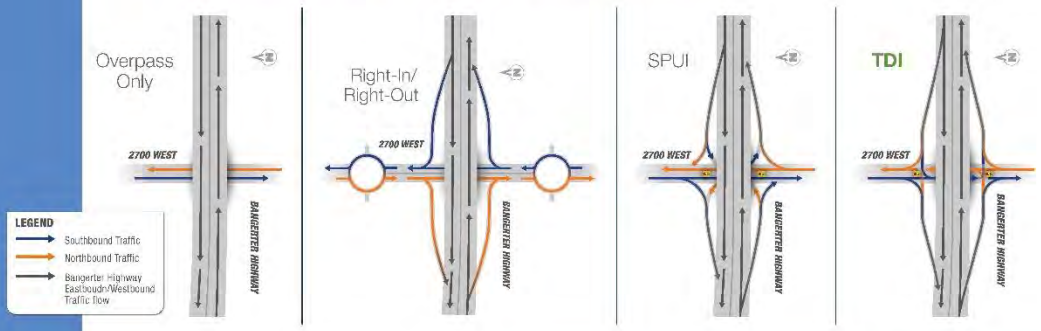

STUDY UPDATE
BANGERTER
2021
2022
AUG
SEP.
OCT.
NOV.
DEC.
JAN.
FEB.
MAR.
APR.
MAY
JUNE
JULY
2700 West
11 MONTHS
AUG 2021
Study Initiation
City Staff Coordination and Public Mailer
AUG-SEP 2021
Study Goals
Public Open House
SEP-DEC 2021
Concept Development & Screening
DEC 2021-MAR 2022
Draft SES
Neighborhood Meetings
APRIL 2022
Public Hearing
Public Hearing and 30-Day Public Comment Period
WE ARE HERE
MAY-JUN 2022
Final SES
Construction at 2700 West is not yet funded or scheduled.
This schedule is process-driven and subject to change.
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ALTERNATIVE SELECTION

BANGERTER

INTERCHANGE TYPES

- Overpass Only
- Right-In/Right-Out
- Single Point Urban Interchange (SPUI)
- **Tight Diamond Interchange (TDI)**



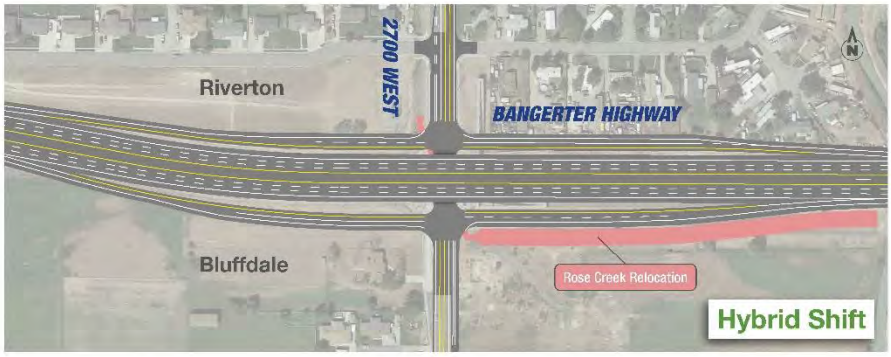
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ALTERNATIVE SELECTION

BANGERTER

HORIZONTAL ALIGNMENTS

- North Shift
- **Hybrid Shift**
- South Shift

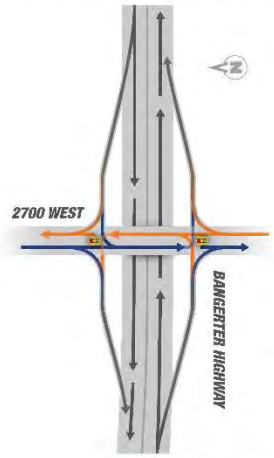


A UDOT PROJECT

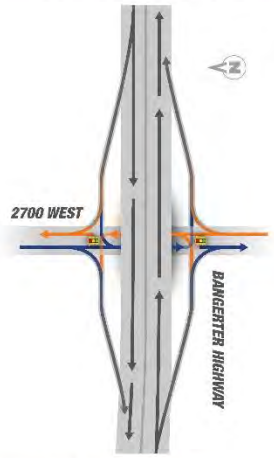
VERTICAL ALIGNMENTS

BANGERTER

TDI: 2700 West Over
$94.5 Million



TDI: Bangerter Over
$86.9 Million



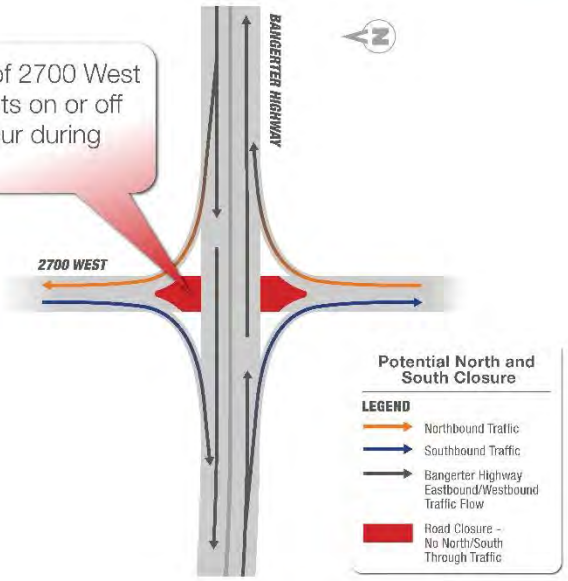
Both options will require the removal of the current pedestrian crossing over Bangerter Highway.

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POTENTIAL CROSS-STREET CLOSURE

BANGERTER

A potential closure of 2700 West or turning movements on or off 2700 West may occur during construction.



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AFFECTED ENVIRONMENT AND MITIGATION COMMITMENTS

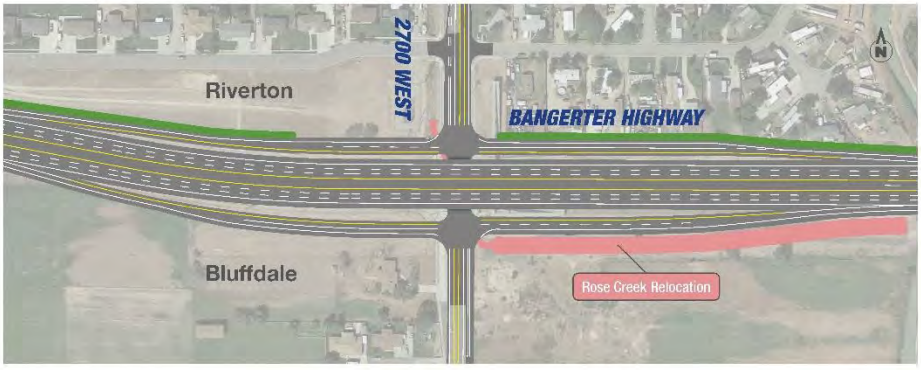
BANGERTER

Proposed Action Impacts	Mitigation
Right of Way	
• Partial ROW acquisition: **20 parcels** • Total area acquisition: **2.43 acres** • Temporary construction easements and perpetual easements required	Property owners will be compensated according to the requirements of the Utah Relocation Assistance Act.
Relocation	
• **3 potential** residential relocations • **20 parcels** require partial acquisition	Property owners will be compensated according to the requirements of the Utah Relocation Assistance Act.
Noise	
• Noise level increase from 32 - 66 dBA to **38 - 69 dBA** • **12 receptors** impacted by the project noise levels • **2 receptors** exhibit noise levels greater than 10 dBA existing noise level	Three noise walls are recommended to be replaced "in-kind". • **Wall 1:** 15 feet tall located on the north side of Bangerter Highway east of 2700 West to tie into the existing 15-foot noise wall • **Wall 2:** 15 feet tall located on the north side of Bangerter Highway west of 2700 West to tie into the existing 15-foot noise wall • **Wall 3:** 16 feet tall located on the south side of Bangerter Highway east of 2700 West to tie into the existing 16-foot noise wall
Water Resources	
• **1,051 linear feet** of impact to Rose Creek • Rose Creek will be relocated	The relocation will comply with all conditions and findings in the U.S. Army Corps of Engineers Nationwide Permit 14 and the Stream Alteration Permit from the Utah Division of Water Rights.

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AFFECTED ENVIRONMENT AND MITIGATION COMMITMENTS

BANGERTER



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RIGHT-OF-WAY ACQUISITION PROCESS

BANGERTER

1. **Identification** — The study team identifies what properties will be needed to construct the selected alternative.
2. **Contact** — Property owners will be contacted directly if their property is identified as a full or partial acquisition.
3. **Valuation** — Right-of-way (ROW) professionals will estimate the value of property.
4. **Acquisition** — ROW professionals will work closely with the property owner to acquire needed property at fair market value.

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IMPACTED PROPERTY MAPS

BANGERTER



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HOW TO COMMENT

BANGERTER

1. Visit the website: **udot.utah.gov/bangerter2700west**
2. Email study team at **bangerter@utah.gov**
3. **Mail a comment to:** Bangerter Environmental c/o HDR
   2825 East Cottonwood Parkway,
   Suite 200
   Cottonwood Heights, UT 84121

The formal comment period will be open between April 11, 2022 and May 11, 2022.

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NEXT STEPS

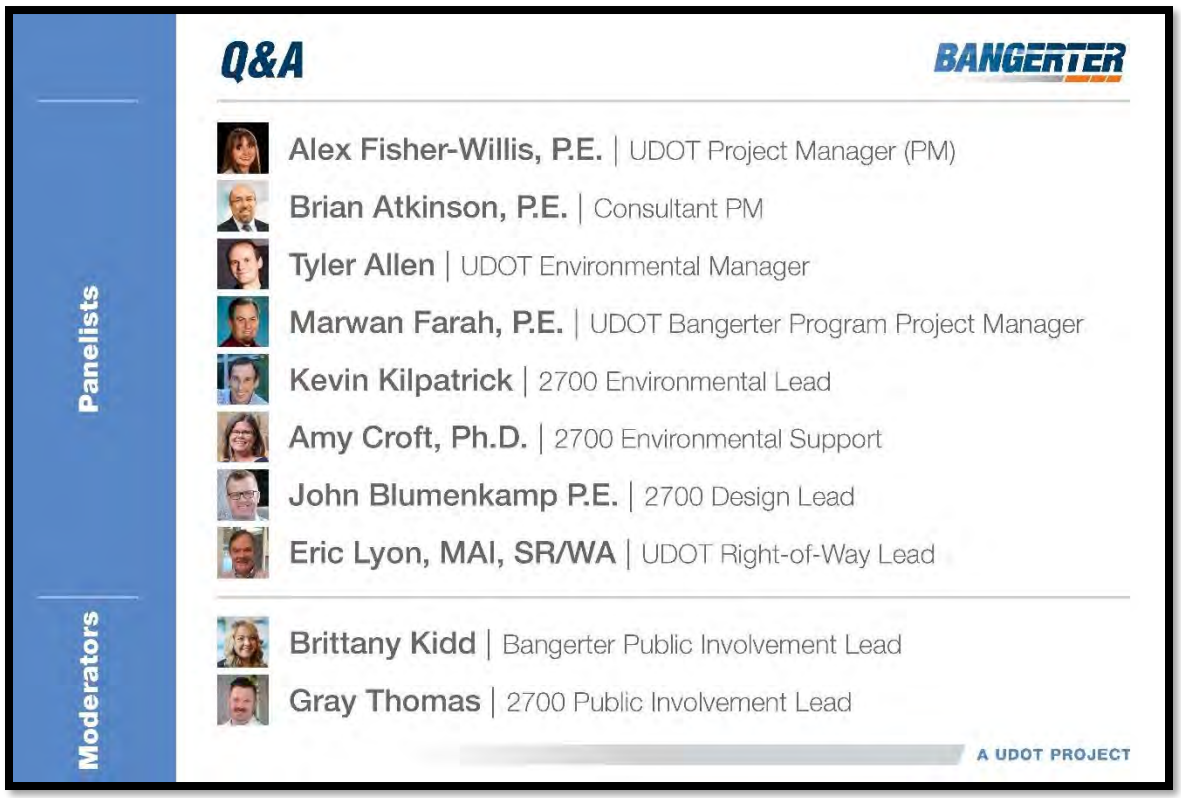
BANGERTER



This schedule is process-driven and subject to change.

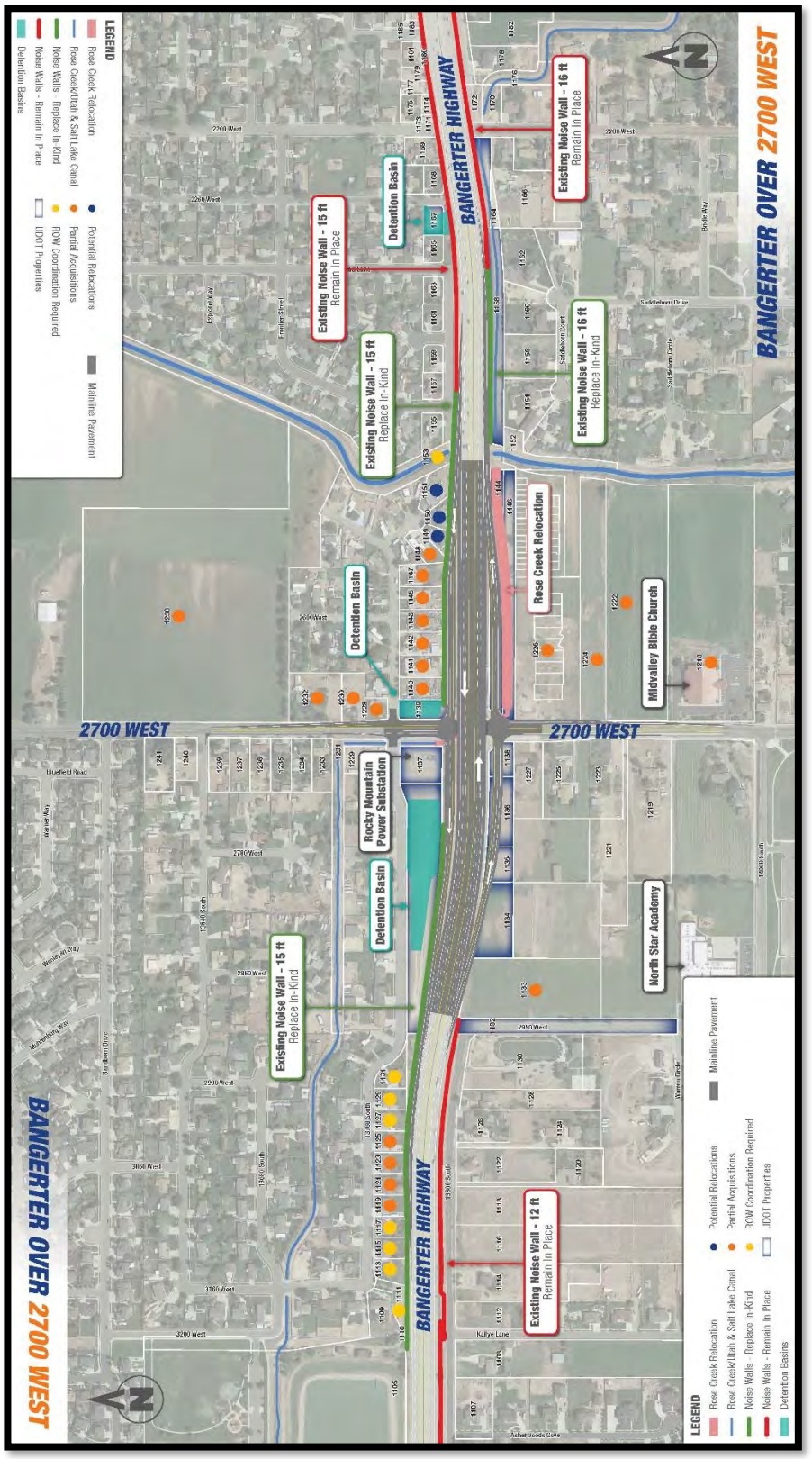
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CONTACT US
BANGERTER
Hotline: 888-766-ROAD (7623)
Email: bangerter@utah.gov
Website: udot.utah.gov/bangerter2700west
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Q&A
BANGERTER
Panelists
Alex Fisher-Willis, P.E. | UDOT Project Manager (PM)
Brian Atkinson, P.E. | Consultant PM
Tyler Allen | UDOT Environmental Manager
Marwan Farah, P.E. | UDOT Bangerter Program Project Manager
Kevin Kilpatrick | 2700 Environmental Lead
Amy Croft, Ph.D. | 2700 Environmental Support
John Blumenkamp P.E. | 2700 Design Lead
Eric Lyon, MAI, SR/WA | UDOT Right-of-Way Lead
Moderators
Brittany Kidd | Bangerter Public Involvement Lead
Gray Thomas | 2700 Public Involvement Lead
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BANGERTER
THE LIVE ONLINE PRESENTATION HAS CONCLUDED
A recording of the presentation and Q&A will be available on the project website tomorrow.
Website: udot.utah.gov/bangerter2700west
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Public Hearing Scroll Plot



Appendix D Public Comments

See next page

RESPONSES TO PUBLIC COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD (4/11/2022 – 5/11/2022)
Project Name: Bangerter Highway at 2700 West Interchange Improvements
UDOT PIN: 18808; UDOT Project Number: S-0154(92)0

No.	Name (Comment Method)	Comment	Response
1.	Trissta Gunning (Email)	Hello, I am writing because I am concerned about the turn to my house. This turn is 300 feet away from bangerter as it is. It is already a dangerous place for vehicles to stop and go. My kids can not walk to school because there is no sidewalk. They have to walk up the side of the road on the east side because it has the biggest gap for pedestrian to walk on. Then they have to J walk across 2700 west to the houses on the west side where the side walks starts. We had another accident in front of my drive way about a month ago. It's not the first time and it won't be the last. The other issues is that if any of us trys to leave in the morning or in the afternoons we have to wait for a while before we can get out. There is not anything that tells people not to block that section but people do. Which means I could be waiting upwards of 5-10 minutes just to pull out unless I make a right turn and flip around somewhere up the road just to get onto bangerter. Making a left turn is ridiculous and dangerous. I know my self and a few other neighbors wouldn't mind if there was a walk put up and a new entrance made. A new entrance can be made of the famer guy down the road would sell enough to make a road it could connect into the road in the circle in the court. Not to mention that the bus driver would have a safer place to drop kids off. Right now he lays on his horn EVERYDAY because people pass h even with his stop sign up and light flashing. If he could turn in and make a loop I know those kids would be safer too. It way too dangerous right now. I have added in pictures from multiple wrecks. 2 of which were just in the last month.	UDOT anticipates that, under future conditions with the new Bangerter Highway interchange, traffic operations would improve at the intersection of 13760 South and 2700 West. Because Bangerter Highway traffic would be moving over 2700 West, the Proposed Action would remove the Bangerter Highway through traffic from the traffic signal, creating additional time and space for all other traffic movements. The traffic analysis shows that, because fewer vehicles would use the traffic signal at Bangerter Highway and 2700 West, vehicle queue lengths would decrease with the Proposed Action, making it easier for vehicles to turn left from 13760 South. The intersection might still be blocked at times, but it should occur less frequently with the Proposed Action. In addition, UDOT will look at ways to refine the ramp configuration during final design to encourage vehicles to make slower turns when exiting Bangerter Highway. 2700 West is a city road and not a UDOT facility, and any improvements beyond the interchange are the responsibility of Riverton City. Riverton City would also be responsible for any changes to access to residential areas on the east side of 2700 West. The Proposed Action would provide sidewalks on both the east and west sides of 2700 West between 13640 South and 14000 South and 5-foot-wide bicycle lanes on both the east and west sides of 2700 West between 13760 South and 14000 South. A 6-foot-wide shoulder would be provided on both the east and west sides of 2700 West between 13760 South and 13640 South. UDOT will work with Riverton and

No.	Name (Comment Method)	Comment	Response
			Bluffdale Cities to tie the new sidewalks into existing and future planned sidewalks.
2.	Kyle Curtis (Website)	The street east of 2700w and just north of bangerter highway "13760s" is a major concern being it is less that 300' from bangerter currently.it is a very dangerous intersection as is already for drivers, service carriers and pedestrians. During construction and even after completion, we are going to be even worse off. This is a dead end street, we need a solution to move entry to our neighborhood further away from bangerter highway. With the potential removal of the sky bridge, we will be exposed to direct intersection noise. Continuing the sound barrier down 2700w would be optimal to obtain a little peace again.	UDOT anticipates that, under future conditions with the new Bangerter Highway interchange, traffic operations would improve at the intersection of 13760 South and 2700 West. Because Bangerter Highway traffic would be moving over 2700 West, the Proposed Action would remove the Bangerter Highway through traffic from the traffic signal, creating additional time and space for all other traffic movements. The traffic analysis shows that, because fewer vehicles would use the traffic signal at Bangerter Highway and 2700 West, vehicle queue lengths would decrease with the Proposed Action, making it easier for vehicles to turn left from 13760 South. The intersection might still be blocked at times, but it should occur less frequently with the Proposed Action. In addition, UDOT will look at ways to refine the ramp configuration during final design to encourage vehicles to make slower turns when exiting Bangerter Highway. 2700 West is a city road and not a UDOT facility, and any improvements beyond the interchange are the responsibility of Riverton City. Riverton City would also be responsible for any changes to access to residential areas on the east side of 2700 West. UDOT does not expect noise levels near the pedestrian bridge on the corner of 13760 South and 2700 West to increase with the Proposed Action. The current noise wall extends to the location of the pedestrian bridge and was included in the noise analysis. The existing noise walls in the

No.	Name (Comment Method)	Comment	Response
			area would remain in place or would be replaced in kind where they would be disturbed by the Proposed Action.
3.	Rick Wardle (Public Hearing, Verbal Comment)	I'm in favor of the current design as it's planned.	Your comment has been recognized.
4.	Nancy Moe (Public Hearing, Verbal Comment)	So I'm concerned because if they take my property, the back of it – I don't know how much they're planning on taking. I have horse property - a lot of us on that side do - and if they take it, that's going to totally change the way I've been living the last umpteen many years. So I'm concerned about that. I'm concerned of, you know, "Oh, sure, you'll get grandfathered in," but when I go to sell it, will I lose the value of my home that I have now versus then, if that happens? And then I'm concern about 13760, the road that turns into our neighborhood. That road is extremely dangerous. People are getting T-boned and flipping literally right there in our entryway. The power pole to the south of our address or that road, that's the bus stop and people are flying off Bangerter right there. So it's really dangerous there. And when they're dropping the kids off, they're dropping them off just north. There's no sidewalk, there's no lead way. I don't know what you want to call it. Running along side of the road, it's just dirt. It's our road and then just dirt. There's no space there. And kids are getting dropped off there and people are flying passed the bus, which makes it really dangerous because	The amount of property that would need to be acquired from each impacted property would be determined during the final design for the Proposed Action. UDOT will compensate property owners according to the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act and the Utah Relocation Assistance Act. The intent of these laws is to provide fair and equitable compensation to people or businesses whose property is impacted by a government project. After final design is completed, UDOT right-of-way representatives will work with impacted property owners to determine the value of the impacted property and evaluate whether there is enough remaining land for the property to still be economically viable for the property owner. UDOT anticipates that, under future conditions with the new Bangerter Highway interchange, traffic operations would improve at the intersection of 13760 South and 2700 West. Because Bangerter Highway traffic would be moving over 2700 West, the Proposed Action would remove the Bangerter Highway through traffic from the traffic signal, creating additional time and space for all other traffic movements. The traffic analysis shows that, because fewer vehicles would use the traffic signal at Bangerter Highway and 2700 West, vehicle queue lengths would decrease with

No.	Name (Comment Method)	Comment	Response
		they're flying off the freeway. So there's a lot of concerns about that. I was hoping that they would make it a dead end and have it come out more to the north, because there's a huge field right there and you could go right against our property and buy a street from him and make that a way to get out. I think that would be a lot safer.	the Proposed Action, making it easier for vehicles to turn left from 13760 South. The intersection might still be blocked at times, but it should occur less frequently with the Proposed Action. In addition, UDOT will look at ways to refine the ramp configuration during final design to encourage vehicles to make slower turns when exiting Bangerter Highway. 2700 West is a city road and not a UDOT facility, and any improvements beyond the interchange are the responsibility of Riverton City. Riverton City would also be responsible for any changes to access to residential areas on the east side of 2700 West. The Proposed Action would provide sidewalks on both the east and west sides of 2700 West between 13640 South and 14000 South and 5-foot-wide bicycle lanes on both the east and west sides of 2700 West between 13760 South and 14000 South. A 6-foot-wide shoulder would be provided on both the east and west sides of 2700 West between 13760 South and 13640 South. UDOT will work with Riverton and Bluffdale Cities to tie the new sidewalks into existing and future planned sidewalks. UDOT does not plan or develop school commute routes or bus stop plans.
5.	Alisha Curtis (Public Hearing, Verbal Comment)	The blue-dot properties that they have talked about potentially buying out, if they would be able to actually make an access road to go over the canal to this neighborhood. That way it gives an opportunity for more outlets to this	UDOT anticipates that, under future conditions with the new Bangerter Highway interchange, traffic operations would improve at the intersection of 13760 South and 2700 West. Because Bangerter Highway traffic would be moving over 2700 West, the Proposed Action would remove the Bangerter Highway through traffic from the traffic signal,

No.	Name (Comment Method)	Comment	Response
		neighborhood instead of being a dead end. That's the only outlet. Right now, we're a dead end and I have already put the comment out there eliminating the entrance of our street and adding an entrance into the neighborhood further down. This particular one down into the other neighborhood, that is the first I've mentioned this. We haven't added this into anything that we've submitted before. It was just another thought. So potential properties being bought out at the bottom of the street turned whatever, turned into a road into the other neighborhood, over the canal, the neighborhood east of 2700 west. Our neighborhood, which is 13760 South, and they are tentatively thinking about taking these properties, after they've done that and what's left, would they be able to extend a road over the canal and connect to 13800 South? That way it gives an additional outlet for our neighborhood that is currently a dead end. We've got a major problem with our intersection now. It's less than 300 feet as it is and it's going to be even closer to Bangerter once they widen it. It's just scary. We have accidents, we have pedestrians about getting hit daily. So we want to eliminate our intersection altogether and adding to the field next to it.	creating additional time and space for all other traffic movements. The traffic analysis shows that, because fewer vehicles would use the traffic signal at Bangerter Highway and 2700 West, vehicle queue lengths would decrease with the Proposed Action, making it easier for vehicles to turn left from 13760 South. The intersection might still be blocked at times, but it should occur less frequently with the Proposed Action. In addition, UDOT will look at ways to refine the ramp configuration during final design to encourage vehicles to make slower turns when exiting Bangerter Highway. 2700 West is a city road and not a UDOT facility, and any improvements beyond the interchange are the responsibility of Riverton City. Riverton City would also be responsible for any changes to access to residential areas on the east side of 2700 West.
6.	Natalie Hall (Public Hearing, Written Comment)	Support the TDI. Want to make sure the Rose Creek Trail is created/preserved on the Bluffdale side. Happy for the project	Your comment has been recognized. UDOT is working with Bluffdale City to ensure that there is room for a trail adjacent to the relocated Rose Creek.

No.	Name (Comment Method)	Comment	Response
7.	Cindy Strong (Public Hearing, Written Comment)	Looking forward to the Rose Creek Trail. It will be a tough couple years not being able to get to Riverton under Bangerter but we are grateful the interchange will be put in.	Your comment has been recognized. UDOT is working with Bluffdale City to ensure that there is room for a trail adjacent to the relocated Rose Creek.
8.	Monique Scofield (Public Hearing, Written Comment)	1. Lighting plan - interested in lighting plan approaching & at overpass. Discussed with staff re: A) Lighting concerns as ingress/egress ramps light up residential backyards. 2. Interested to have results of traffic study and safty plan for 2700/13760 corner. Would prefer to leave open to access from 13760 to 2700 W. But would like to be ensured that safety for left turn and ped crossing. Good presentation & communication. Thank you.	Lights would be placed on top of the signal poles at the intersection and underneath the bridge. In addition, several lights would be placed where off-ramps begin to diverge from the mainline. Lights would not be placed on the on-ramps. Lights would be designed so as not to create light pollution for neighboring communities. UDOT anticipates that, under future conditions with the new Bangerter Highway interchange, traffic operations would improve at the intersection of 13760 South and 2700 West. Because Bangerter Highway traffic would be moving over 2700 West, the Proposed Action would remove the Bangerter Highway through traffic from the traffic signal, creating additional time and space for all other traffic movements. The traffic analysis shows that, because fewer vehicles would use the traffic signal at Bangerter Highway and 2700 West, vehicle queue lengths would decrease with the Proposed Action, making it easier for vehicles to turn left from 13760 South. The intersection might still be blocked at times, but it should occur less frequently with the Proposed Action. In addition, UDOT will look at ways to refine the ramp configuration during final design to encourage vehicles to make slower turns when exiting Bangerter Highway.

No.	Name (Comment Method)	Comment	Response
9.	Tara Leeson (Public Hearing, Written Comment)	13760 to 2700 W is a traffic problem. It will become a hazard with it being a freeway on-ramp.	UDOT anticipates that, under future conditions with the new Bangerter Highway interchange, traffic operations would improve at the intersection of 13760 South and 2700 West. Because Bangerter Highway traffic would be moving over 2700 West, the Proposed Action would remove the Bangerter Highway through traffic from the traffic signal, creating additional time and space for all other traffic movements. The traffic analysis shows that, because fewer vehicles would use the traffic signal at Bangerter Highway and 2700 West, vehicle queue lengths would decrease with the Proposed Action, making it easier for vehicles to turn left from 13760 South. The intersection might still be blocked at times, but it should occur less frequently with the Proposed Action. In addition, UDOT will look at ways to refine the ramp configuration during final design to encourage vehicles to make slower turns when exiting Bangerter Highway.
10.	Karen Ouimette (Public Hearing, Written Comment)	Hoping for a trail (walking) along Rose Creek. Excited to have this project done. Too many accidents going on. The new interchange will be very welcome! Not looking forward to construction but final project will be AWESOME!	Your comment has been recognized. UDOT is working with Bluffdale City to ensure that there is room for a trail adjacent to the relocated Rose Creek.
11.	Teresa Staley (Public Hearing, Written Comment)	Very concerned about the impact leaving 13760 South turning left or right out of our street is already getting difficult especially turning left going north a lot of time you cannot see oncoming traffic turning right going north off Bangerter. I do not want round abouts at all it will cause even more back then there is now cars going south would not allow	UDOT anticipates that, under future conditions with the new Bangerter Highway interchange, traffic operations would improve at the intersection of 13760 South and 2700 West. Because Bangerter Highway traffic would be moving over 2700 West, the Proposed Action would remove the Bangerter Highway through traffic from the traffic signal, creating additional time and space for all other traffic movements. The traffic analysis shows that, because fewer

No.	Name (Comment Method)	Comment	Response
		people going north in. Please DO NOT allow a round about to this 13760 issue.	vehicles would use the traffic signal at Bangerter Highway and 2700 West, vehicle queue lengths would decrease with the Proposed Action, making it easier for vehicles to turn left from 13760 South. The intersection might still be blocked at times, but it should occur less frequently with the Proposed Action. In addition, UDOT will look at ways to refine the ramp configuration during final design to encourage vehicles to make slower turns when exiting Bangerter Highway. A roundabout is not currently planned for the intersection of 13760 South and 2700 West. Because 2700 West is a city road and not a UDOT facility, improvements beyond the interchange are the responsibility of Riverton City.
12.	Honi Thompson (Website)	Hello! We own 2 properties in the trailer park and its already extremely hard and dangerous at times to get in and out of the neighborhood! I'm asking to look into options of creating a new access point to the neighborhood further north. As it is, our only way in and out is less than 300' away from bangerter... We have had many close calls with our kids getting off the school bus and even adult pedestrians almost getting hit. We have had several roll overs and crashes. It's nearly impossible to make lefts during peak hours. Bangerter traffic blocks our intersection as well. We need a safer access point through the field to one of our current dead ends. I apologize I am unable to come to the meeting	UDOT anticipates that, under future conditions with the new Bangerter Highway interchange, traffic operations would improve at the intersection of 13760 South and 2700 West. Because Bangerter Highway traffic would be moving over 2700 West, the Proposed Action would remove the Bangerter Highway through traffic from the traffic signal, creating additional time and space for all other traffic movements. The traffic analysis shows that, because fewer vehicles would use the traffic signal at Bangerter Highway and 2700 West, vehicle queue lengths would decrease with the Proposed Action, making it easier for vehicles to turn left from 13760 South. The intersection might still be blocked at times, but it should occur less frequently with the Proposed Action.

No.	Name (Comment Method)	Comment	Response
			In addition, UDOT will look at ways to refine the ramp configuration during final design to encourage vehicles to make slower turns when exiting Bangerter Highway. 2700 West is a city road and not a UDOT facility, and any improvements beyond the interchange are the responsibility of Riverton City. Riverton City would also be responsible for any changes to access to residential areas on the east side of 2700 West. The Proposed Action would provide sidewalks on both the east and west sides of 2700 West between 13640 South and 14000 South and 5-foot-wide bicycle lanes on both the east and west sides of 2700 West between 13760 South and 14000 South. A 6-foot-wide shoulder would be provided on both the east and west sides of 2700 West between 13760 South and 13640 South. UDOT will work with Riverton and Bluffdale Cities to tie the new sidewalks into existing and future planned sidewalks. UDOT does not plan or develop school commute routes or bus stop plans.
13.	Christopher Coleman (Website)	If 13400 S. and 2700 W. both undergo major construction during the same time frame how are people expected to transit from East Riverton to Bluffdale and/or Herriman? Traffic around 13400 S worsened dramatically during 12600 S. construction. 12600 S. is still not completed nearly 2 years after construction began. Are residents of Riverton truly expected to have very limited and extremely congested access to Bangerter for two more years?	UDOT and its selected contractor will need to maintain traffic to all areas during the construction phase of both 13400 South and 2700 West. Although access to all areas will be maintained, UDOT anticipates that there could be temporary delays and/or detours during construction. The construction traffic plans will be carefully planned and executed by UDOT's chosen contractor to minimize travel delay as much as possible.

No.	Name (Comment Method)	Comment	Response
14.	LeAnn Morris (Website)	I think it is very appropriate to upgrade the interchange to a freeway style at Bangerter and 2700 West. Traffic flow will be much better. Wise to make the change now before more buildings arrive and space is more accessible.	Your comment has been recognized.
15.	Daniel Velarde (Website)	Bangerter Under 2700 W would be the best option due to noise in the residential area.	Your comment has been recognized. As stated in the *Bangerter Highway at 2700 West Alternatives Memo* in Appendix B of the *Bangerter Highway at 2700 West Interchange Improvements State Environmental Study*, the TDI (Tight Diamond Interchange) 2700 West Over Alternative was eliminated because it would have higher costs and greater impacts to Rose Creek than the TDI Bangerter Highway Over Alternative.
16.	Meredith Anderson (Website)	The left turn lane onto Easton d Bangerter is often backed up and blocks our access in and out of our street. 13760 south. Even if the traffic clears out faster with the new intersection, it will still be dangerous turning left onto 2700 west with the traffic exiting Bangerter. Is it possible to make the end of our road a right turn in and out. The sound wall. Can it be extended closer to 2700 W. If it's an on ramp, I would Imagine the noise will increase.	UDOT anticipates that, under future conditions with the new Bangerter Highway interchange, traffic operations would improve at the intersection of 13760 South and 2700 West. Because Bangerter Highway traffic would be moving over 2700 West, the Proposed Action would remove the Bangerter Highway through traffic from the traffic signal, creating additional time and space for all other traffic movements. The traffic analysis shows that, because fewer vehicles would use the traffic signal at Bangerter Highway and 2700 West, vehicle queue lengths would decrease with the Proposed Action, making it easier for vehicles to turn left from 13760 South. The intersection might still be blocked at times, but it should occur less frequently with the Proposed Action.

No.	Name (Comment Method)	Comment	Response
			In addition, UDOT will look at ways to refine the ramp configuration during final design to encourage vehicles to make slower turns when exiting Bangerter Highway. 2700 West is a city road and not a UDOT facility, and any improvements beyond the interchange are the responsibility of Riverton City. Riverton City would also be responsible for any changes to access to residential areas on the east side of 2700 West. UDOT does not expect noise levels at receptors nearest 2700 West to have traffic noise impacts; that is, they would not exceed the Federal Highway Administration's established noise-abatement criteria and therefore do not meet the requirements to implement additional noise-abatement measures. The existing noise walls in the area would remain in place or would be replaced in kind where they would be disturbed by the Proposed Action.



Appendix D: Environmental Resources

Right-of-Way Property Impacts

BANGERTER 2700 WEST

Bangerter Highway at 2700 West Property Impacts

Parcel Number	Acquisition Type	Parcel Number	Acquisition Type
1101	Not Applicable	1138	Not Applicable
1102	Not Applicable	1139	Not Applicable
1103	Not Applicable	1140	Partial Acquisition
1104	Not Applicable	1141	Partial Acquisition
1105	Not Applicable	1142	Partial Acquisition
1106	Not Applicable	1143	Partial Acquisition
1107	Not Applicable	1144	Not Applicable
1108	Not Applicable	1145	Partial Acquisition
1109	Not Applicable	1146	Not Applicable
1110	Not Applicable	1147	Partial Acquisition
1111	ROW Coordination Required	1148	Partial Acquisition
1112	Not Applicable	1149	Potential Full Acquisition
1113	ROW Coordination Required	1150	Potential Full Acquisition
1114	Not Applicable	1151	Potential Full Acquisition
1115	ROW Coordination Required	1152	Not Applicable
1116	Not Applicable	1153	ROW Coordination Required
1117	ROW Coordination Required	1154	Not Applicable
1118	Not Applicable	1155	Not Applicable
1119	Partial Acquisition	1156	Not Applicable
1120	Not Applicable	1157	Not Applicable
1121	Partial Acquisition	1158	Not Applicable
1122	Not Applicable	1159	Not Applicable
1123	Partial Acquisition	1160	Not Applicable
1124	Not Applicable	1161	Not Applicable
1125	Partial Acquisition	1162	Not Applicable
1126	Not Applicable	1163	Not Applicable
1127	ROW Coordination Required	1164	Not Applicable
1128	Not Applicable	1165	Not Applicable
1129	ROW Coordination Required	1166	Not Applicable
1130	Not Applicable	1167	Not Applicable
1131	ROW Coordination Required	1168	Not Applicable
1132	Not Applicable	1169	Not Applicable
1133	Partial Acquisition	1170	Not Applicable
1134	Not Applicable	1171	Not Applicable
1135	Not Applicable	1172	Not Applicable
1136	Not Applicable	1173	Not Applicable
1137	Not Applicable	1174	Not Applicable

(*continued on next page*)

Parcel Number	Acquisition Type	Parcel Number	Acquisition Type
1175	Not Applicable	1206	Not Applicable
1176	Not Applicable	1207	Not Applicable
1177	Not Applicable	1208	Not Applicable
1178	Not Applicable	1209	Not Applicable
1179	Not Applicable	1215	Not Applicable
1180	Not Applicable	1216	Not Applicable
1181	Not Applicable	1217	Not Applicable
1182	Not Applicable	1218	Partial Acquisition
1183	Not Applicable	1219	Not Applicable
1184	Not Applicable	1220	Not Applicable
1185	Not Applicable	1221	Not Applicable
1186	Not Applicable	1222	Partial Acquisition
1187	Not Applicable	1223	Not Applicable
1188	Not Applicable	1224	Partial Acquisition
1189	Not Applicable	1225	Not Applicable
1190	Not Applicable	1226	Partial Acquisition
1191	Not Applicable	1227	Not Applicable
1192	Not Applicable	1228	Partial Acquisition
1193	Not Applicable	1229	Not Applicable
1194	Not Applicable	1230	Partial Acquisition
1195	Not Applicable	1231	Not Applicable
1196	Not Applicable	1232	Partial Acquisition
1197	Not Applicable	1233	Not Applicable
1198	Not Applicable	1234	Not Applicable
1199	Not Applicable	1235	Not Applicable
1200	Not Applicable	1236	Not Applicable
1201	Not Applicable	1237	Not Applicable
1202	Not Applicable	1238	Partial Acquisition
1203	Not Applicable	1239	Not Applicable
1204	Not Applicable	1240	Not Applicable
1205	Not Applicable	1241	Not Applicable



Appendix D: Environmental Resources

Determination of Eligibility and Finding of Adverse Effect Letter and SHPO Concurrence Letter

State of Utah

SPENCER J. COX
Governor

DEIDRE M. HENDERSON
Lieutenant Governor

DEPARTMENT OF TRANSPORTATION

CARLOS M. BRACERAS, P.E.
Executive Director

TERIANNE S. NEWELL, P.E.
Deputy Director of Planning and Investment

LISA J. WILSON, P.E.
Deputy Director of Engineering and Operations

March 3, 2022

Mr. Chris Hansen
Senior Historic Preservation Specialist
Utah Division of State History
3760 Highland Dr.
Millcreek, UT 84106

RE: UDOT Project No. S-0154(92)0; Bangerter Highway Environmental Document: 2700 West, Salt Lake County, PIN 18808
Determination of Eligibility and Finding of Adverse Effect.

Dear Mr. Hansen:

The Utah Department of Transportation (UDOT) is preparing to undertake the subject state-aid project. In accordance with the *Programmatic Agreement between the UDOT and the Utah State Historic Preservation Officer Regarding Implementation of U.C.A. 9-8-404 for State Funded Transportation Projects in Utah* (renewed January 22, 2018), the UDOT has taken into account the effects of this undertaking on historic properties and is affording the Utah State Historic Preservation Officer (SHPO) an opportunity to comment on the undertaking.

PROJECT DESCRIPTION

UDOT is proposing to construct a grade-separated, tight diamond interchange at the existing intersection of Bangerter Highway and 2700 West. The new interchange would allow unimpeded traffic flow on Bangerter Highway and is projected to operate at LOS D in 2050. The project study area is along Bangerter Highway from milepost 3.8 to 4.9 and along 2700 West between 13640 South and 14000 South (see the Bangerter at 2700 West Study Area Map in the Appendix).

Project work for the Proposed Action includes constructing a grade-separated tight diamond interchange at Bangerter Highway and 2700 West (Bangerter Highway over 2700 West) as well as the associated on- and off-ramps. Project work would also include minor widening and restriping on 2700 West to accommodate the turn lanes for the new grade-separated interchange; modifying utilities and storm drainage; and installing new pavement, traffic signals, advanced traffic management systems (ATMS) equipment, and roadway signs. These improvements would improve traffic flow and safety on Bangerter Highway and 2700 West. If funding is available, project work might also include repaving the Bangerter Highway travel lanes and shoulders to the eastern limits of the Bangerter 13400 South new pavement areas (around 3600 West) and to the western limits of the Bangerter Redwood Road new pavement (around 1950 West).

The area of potential effects (APE) has been defined as SR-154 from milepost 3.8 to 4.9, and along 2700 West between 13640 South and 14000 South in Salt Lake County. The APE has been surveyed for archaeology by Horrocks Engineering, under State Antiquities Project Number U21HX0599, and the results are reported in *A Cultural Resource Inventory of Bangerter Highway at 2700 West, January 2022* (see enclosed report). An intensive level pedestrian survey was conducted using 15 meter transects to identify archaeological resources. A selective-reconnaissance level survey was conducted to record architectural properties, and the results are reported in

Selective Reconnaissance Level Survey, Bangerter Highway Selective Reconnaissance Level Survey; Bangerter Highway @ 2700 West, Riverton and Bluffdale, Salt Lake County, Utah PIN 18808; Project Number S-0154(84), August 2021 (see enclosed report).

The survey has resulted in the identification of 1 archaeological site and 35 architectural properties. Of these, 1 archaeological site and 15 architectural properties are eligible to the National Register of Historic Places (NRHP). No known traditional cultural properties are located in the APE. The Determinations of Eligibility and Findings of Effects are provided in Table 1 for archaeological resources and in Table 2 for architectural properties.

ARCHAEOLOGICAL RESOURCES

Table 1. Determinations of Eligibility and Findings of Effect for Archaeological Resources

Site	Name or Description	NRHP Eligibility	Finding of Effect
42SL295	Utah and Salt Lake Canal	Eligible (Criterion A)	No Adverse Effect

Description of Effect to Site 42SL998: To facilitate construction associated with the Bangerter and 2700 West interchange the project would cut and remove the box culvert's southern end section (e.g., headwall, wingwalls, bottom apron, etc.), extend the barrel, and install a new box culvert end section (e.g., headwall, wingwalls, bottom apron, etc). The existing turnouts and lateral weir structure will be protected in place. A total of 146 square feet of the site will be impacted. All work associated with the canal would be completed outside the irrigation season and coordinated with the managing canal company. No part of the culvert is determined to be historic (constructed in the late 1990s) and all construction will be limited to the previously disturbed section of the site and will not impact the historic channel.

ARCHITECTURAL PROPERTIES

Table 2. Determinations of Eligibility and Findings of Effect for Architectural Properties

Address	Date	Style	NRHP Eligibility/ SHPO Rating	Finding of Effect
3301 West 13800 South	1964	Ranch	Eligible/EC	No Historic Properties Affected
14005 South 2700 West	1970	Ranch	Eligible/EC	No Historic Properties Affected
14063 South 2700 West	1971	Ranch	Eligible/EC	No Historic Properties Affected
14095 South 2700 West	1972	Ranch	Eligible/EC	No Historic Properties Affected
13836 South 2200 West	1943	Minimal Traditional/Cottage	Not Eligible/NC	No Historic Properties Affected
13845 South 2200 West	1966	Split Entry (Gen.)	Eligible/EC	No Historic Properties Affected
2115 West 13800 South	1959	Basement	Eligible/EC	No Historic Properties Affected
2067 West 13800 South	1972	Ranch	Not Eligible/NC	No Historic Properties Affected
2047 West 13800 South	1898	Victorian Eclectic	Not Eligible/NC	No Historic Properties Affected

2037 West 13800 South	1973	Ranch	Eligible/EC	No Historic Properties Affected
2001 West 13800 South	1942	Minimal Traditional	Eligible/EC	No Historic Properties Affected
1981 West 13800 South	1966	Ranch	Not Eligible/NC	No Historic Properties Affected
1965 West 13800 South	1966	Ranch	Not Eligible/NC	No Historic Properties Affected
1929 West 13800 South	1960	Ranch	Not Eligible/NC	No Historic Properties Affected
2533 West 13760 South	1973	Manufactured	Eligible/EC	Adverse Effect
2537 West 13760 South	1970	Manufactured	Not Eligible/NC	No Historic Properties Affected
2609 West 13760 South	1973	Manufactured	Not Eligible/NC	No Historic Properties Affected
2629 West 13760 South	1966	Manufactured	Not Eligible/NC	No Historic Properties Affected
2653 West 13760 South	1973	Manufactured	Not Eligible/NC	No Historic Properties Affected
2670 West 13760 South	1972	Manufactured	Eligible/EC	No Historic Properties Affected
2658 West 13760 South	1973	Manufactured	Eligible/EC	No Historic Properties Affected
13748 South 2600 West	1973	Manufactured	Not Eligible/NC	No Historic Properties Affected
13720 South 2600 West	1975	Manufactured	Not Eligible/NC	No Historic Properties Affected
13698 South 2600 West	1973	Manufactured	Not Eligible/NC	No Historic Properties Affected
13749 South 2600 West	1973	Manufactured	Not Eligible/NC	No Historic Properties Affected
13733 South 2700 West	1970	Manufactured	Not Eligible/NC	No Historic Properties Affected
13719 South 2700 West	1971	Manufactured	Eligible/EC	No Adverse Effect
13597 South 2700 West	1975	Ranch	Eligible/EC	No Historic Properties Affected

13718 South 2700 West	1974	Ranch	Not Eligible/NC	No Historic Properties Affected
13704 South 2700 West	1973	Ranch	Eligible/EC	No Historic Properties Affected
13692 South 2700 West	1973	Ranch	Not Eligible/NC	No Historic Properties Affected
13678 South 2700 West	1973	Ranch	Not Eligible/NC	No Historic Properties Affected
13646 South 2700 West	1973	Ranch	Eligible/EC	No Historic Properties Affected
13624 South 2700 West	1971	Ranch	Not Eligible/NC	No Historic Properties Affected
13610 South 2700 West	1923	Bungalow	Eligible/EC	No Historic Properties Affected

Description of Effects: This proposed project requires right of way acquisitions of approximately 14,022 square feet in area from 2 properties eligible to the NRHP including 1 full parcel acquisition at 2533 West 13760 South. The building will be removed as a result of construction. For the other property, 13719 South 2700 West, the acquisition and associated construction affect a relatively small portion of the property and will not substantially impact or alter any contributing elements of the property or any of the character-defining features for which it was determined eligible for the NRHP. Thus, the proposed project will result in a finding of Adverse Effect.

CONSULTATION EFFORTS

Native American consultation was initiated through letters sent to the Eastern Shoshone Tribe of the Wind River Reservation, Shoshone-Bannock Tribes, Northwestern Band of Shoshone Nation, Uintah and Ouray Ute Tribes, and the Skull Valley Band of Goshute Indians (sent December 10, 2022). In addition, notification was also sent to those tribes with whom UDOT has Section 106 Programmatic Agreements: Cedar Band of Paiutes, Shivwits Band of Paiute Indian Tribe, and the Confederated Tribes of the Goshute Reservation (sent December 10, 2022). To date, none of the tribes have responded to these notifications.

SUMMARY

To summarize, the project will result in a finding of **Adverse Effect** for 1 architectural property, **No Adverse Effect** for 1 archaeological site and 1 architectural property and a finding of **No Historic Properties Affected** for all remaining architectural properties and archaeological sites. Therefore, the Finding of Effect for the proposed UDOT Project No. S-0154(92)0; Bangerter Highway Environmental Document: 2700 West, Salt Lake County, Utah, is A**dverse Effect**.

Please review this document and, providing you agree with the findings contained herein, provide written concurrence. Should you have any questions or need additional information, please feel free to contact Liz Robinson at 801-910-2035 or lizrobinson@utah.gov; or Elizabeth Giraud at 801-633-8484 or egiraud@utah.gov.

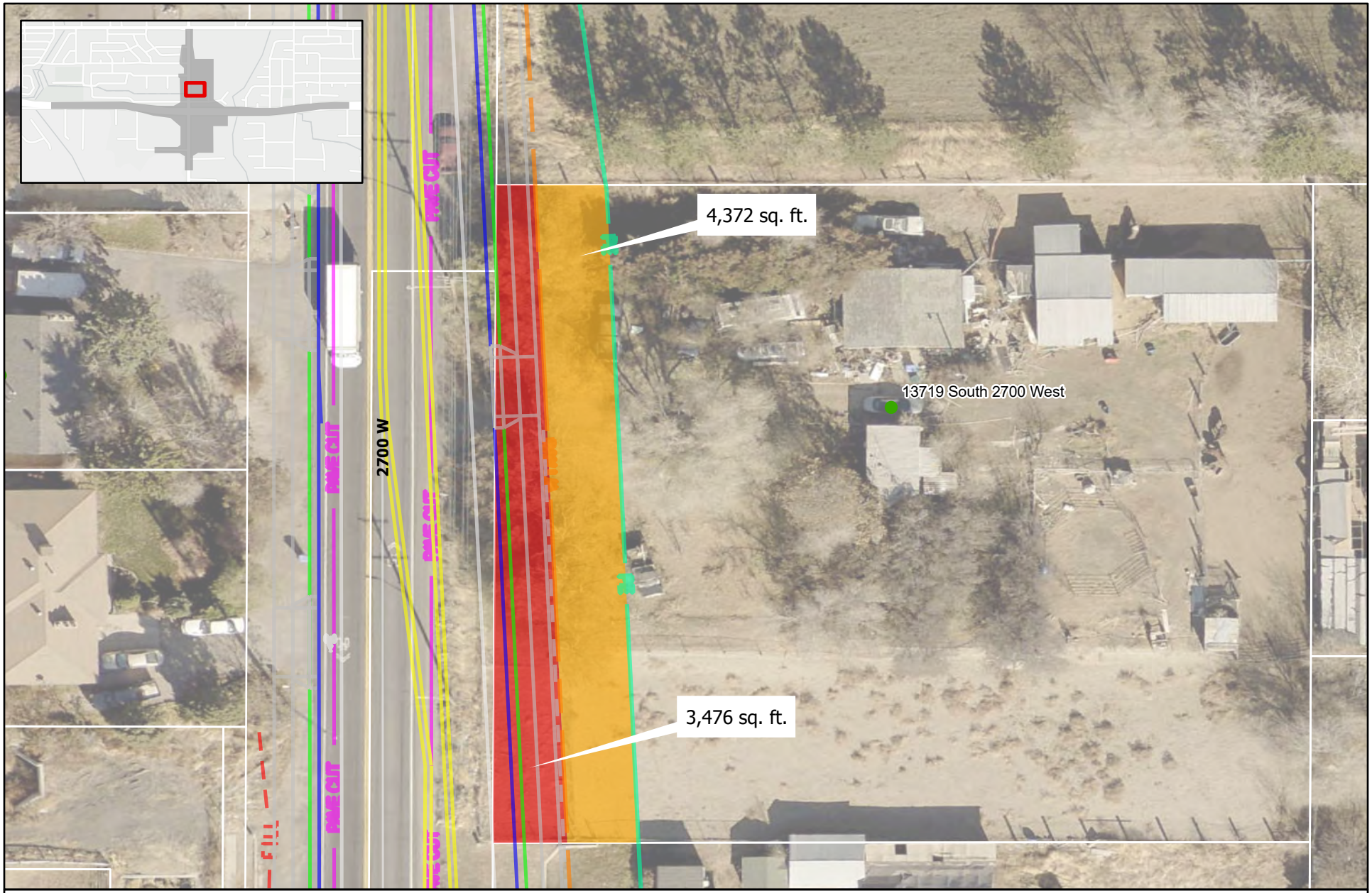
Sincerely,

Liz Robinson, M.A., RPA
Cultural Resources Program Manager
UDOT Environmental Services

Elizabeth Giraud, AICP
Architectural Historian
UDOT Environmental Services

Enclosures

cc: Brian Allen, Project Manager
Tyler Allen, Environmental Manager



N

0 30 60

Feet

Eligible/Contributing Historic Property

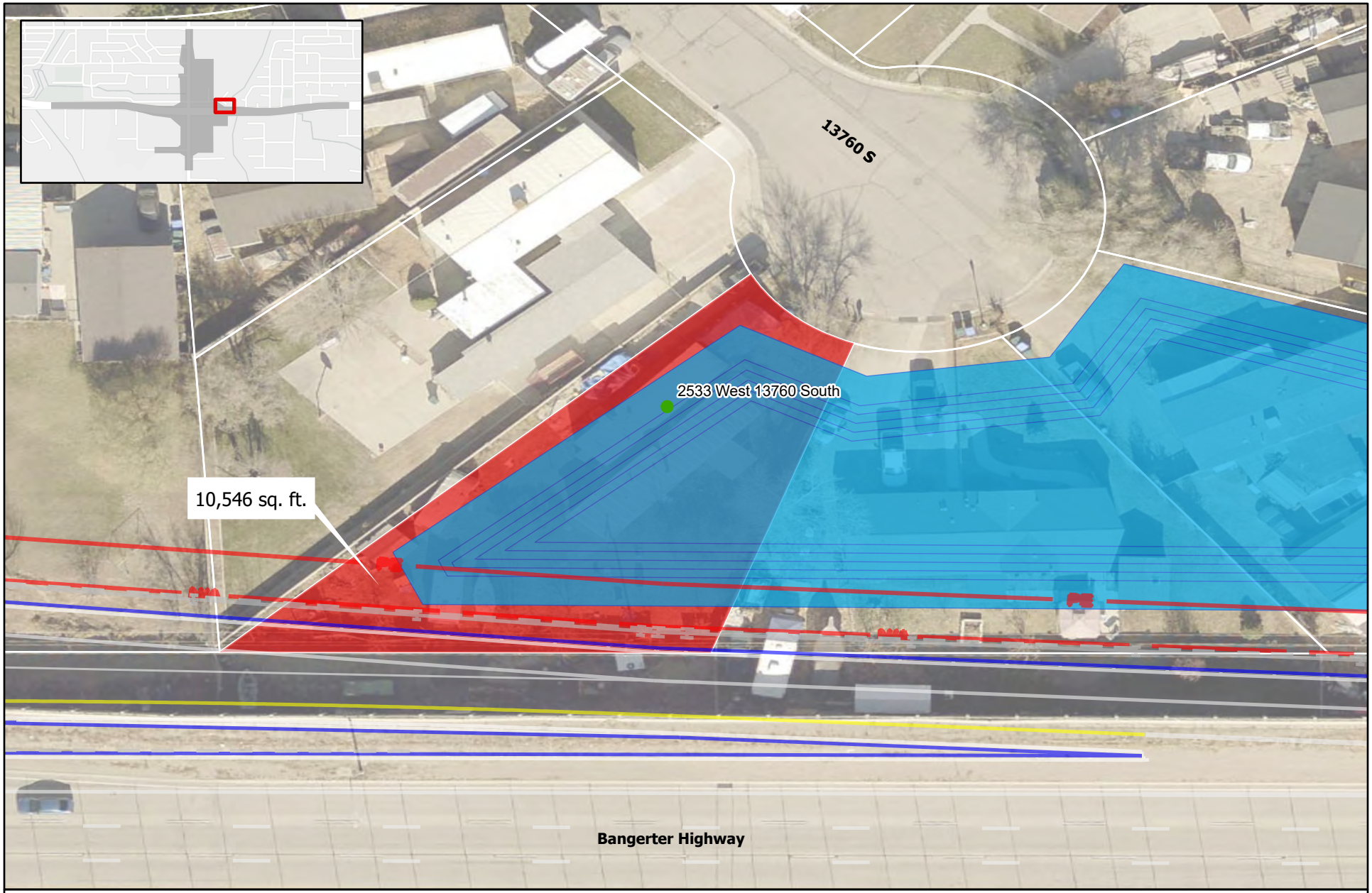
ROW Permanent Impacts

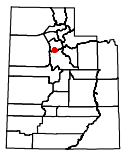
ROW Temporary Construction Impacts

18808: Bangerter Environmental - 2700 West

Eligible Properties - ROW Impacts

Map 1 of 2





N

0 30 60

Feet

- Eligible/Contributing Historic Property
- ROW Permanent Impacts
- ROW Temporary Construction Impacts

18808: Bangerter Environmental - 2700 West

Eligible Properties - ROW Impacts

Map 2 of 2

Spencer J. Cox
Governor

Deidre M. Henderson
Lieutenant Governor

Jill Remington Love
Executive Director
Utah Department of Cultural and Community Engagement

Utah Division of State History

Jennifer Ortiz
Director

Christopher Merritt
State Historic Preservation Officer

March 8, 2022

Liz Robinson
Cultural Resources Program Manager
Utah Dept of Transportation (UDOT)
4501 Constitution Blvd
Salt Lake City, UT 84119

RE: PIN 18808_Bangerter Highway Environmental Document: 2700 West

For future correspondence, please reference Case No. 22-0373

Dear Ms. Robinson,

The Utah State Historic Preservation Office received your submission and request for our comment on the above-referenced undertaking on March 3, 2022. Based on the information provided to our office, we concur with your determinations of eligibility and with a finding of adverse effect for the proposed undertaking. We look forward to further consulting with you to address mitigation for the adverse effect.

This information is provided to assist with state law responsibilities as per UCA 9-8-404. If you have questions, please contact me at (801) 245-7239 or by email at clhansen@utah.gov.

Sincerely,

Christopher Hansen
Preservation Planner/Utah SHPO



Appendix D: Environmental Resources

Memorandum of Agreement

MEMORANDUM OF AGREEMENT
BETWEEN
THE UTAH DEPARTMENT OF TRANSPORTATION
AND THE UTAH STATE HISTORIC PRESERVATION OFFICER

REGARDING

PROJECT #S-0154(92)0; Bangerter Highway Environmental Document: 2700 West
Salt Lake County, Utah

WHEREAS, the Utah Department of Transportation (UDOT) proposes to use state funds to undertake **PROJECT #S-0154(92)0; Bangerter Highway Environmental Document: 2700 West, Salt Lake County, Utah** which proposes to construct a grade-separated tight diamond interchange at the existing intersection of Bangerter Highway (SR-154) and 2700 West ; and

WHEREAS, in accordance with the *Programmatic Agreement between the UDOT and the Utah State Historic Preservation Officer Regarding Implementation of U.C.A. 9-8-404 for State Funded Transportation Projects in Utah* (renewed January 22, 2018), the UDOT is taking into account the effects of **PROJECT #S-0154(92)0; Bangerter Highway Environmental Document: 2700 West, Salt Lake County, Utah,** on historic properties and has determined that this undertaking will have an adverse effect on 1 historic residential property eligible for inclusion in the National Register of Historic Places, UDOT has consulted with the Utah State Historic Preservation Officer (SHPO) pursuant to U.C.A. 9-8-404 to resolve the adverse effects; and

WHEREAS, the UDOT has consulted with the Eastern Shoshone Tribe of the Wind River Reservation, Shoshone-Bannock Tribes, Northwestern Band of Shoshone Nation, Uintah and Ouray Ute Tribes, Skull Valley Band of Goshute Indians, Cedar Band of Paiutes, Shivwits Band of Paiute Indian Tribe, and the Confederated Tribes of the Goshute Reservation and the Tribes have been afforded an opportunity to review the project and have not responded with objections; and

NOW, THEREFORE, the UDOT and the Utah SHPO agree that upon UDOT's decision to proceed with the undertaking, UDOT shall ensure that the following stipulations are implemented in order to take into account the effects of the undertaking on historic properties, and the stipulations shall govern the undertaking and all of its parts until this MOA expires or is terminated.

STIPULATIONS

The UDOT shall ensure that the following measures are carried out:

I. MITIGATION OF HISTORIC BUILDINGS

UDOT shall be responsible for the documentation of 2 structures on the following property located within Salt Lake County, Utah:

2533 West 13760 South, Riverton

The structures will be documented according to the Utah State Intensive Level Survey Standards (ILS) as required by SHPO. Documentation will include a completed ILS Historic Site Form, which will be based partly on title searches and obituary research, photographs of the exterior of the buildings, a sketch map of the property layout, aerial photograph maps indicating the location of the buildings, and a U.S. Geological Survey map (scale 1:24,000) indicating the location of the buildings.

II. REPORTING: The UDOT shall ensure that any/all reports on activities carried out pursuant to this agreement are provided to the SHPO, the signatories to this MOA, and upon request, to any other interested parties.

III. PERSONNEL QUALIFICATIONS: The UDOT shall ensure that all historic work carried out pursuant to this agreement is completed by or under the direct supervision of a person or persons meeting or exceeding the Secretary of the Interior's Historic Preservation Professional Qualification Standards for History (36 CFR 61 Appendix A).

IV. DURATION: This agreement will be null and void if its terms are not carried out within five (5) years from the date of its execution. Prior to such time, the UDOT may consult with the other signatories to reconsider the terms of the agreement and amend it in accordance with Stipulation VII below.

V. DISCOVERY: The following measures regarding inadvertent discoveries of historic properties, archaeological sites, and paleontological resources will be implemented:

A. UDOT Standard Specifications Section 01355, Part 3.8, Discovery of Historical, Archaeological or Paleontological Objects, Features, Sites, or Human Remains, will be enforced during this project. This specification stipulates procedures to be followed should any archaeological, historic, or paleontological resources be discovered during construction of the project. These procedures are as follows:
   1) Immediately suspend construction operations in the vicinity of the discovery if a suspected historic, archeological or paleontological item, feature, or site is encountered or if suspected human remains are encountered.
   2) Verbally notify the engineer of the nature and exact location of the findings.
   3) The Engineer contacts the UDOT region staff archaeologist, who will assess the nature of the discovery and determine the necessary course of action.
   4) Protect the discovered objects or features and provide written confirmation of the discovery to the Engineer within two calendar days.
   5) The Engineer keeps the Contractor informed concerning the status of the restriction: 1) the time necessary for the Department to handle the discovered item, feature, or site is variable, dependent on the nature and condition of the discovered item; and 2) the Engineer will provide written confirmation when work may resume in the area.
B. Should a discovery occur, the UDOT will consult with the SHPO toward developing and implementing an appropriate treatment plan prior to resuming construction.

VI. DISPUTE RESOLUTION: Should any party to this agreement object at any time to any actions proposed or the manner in which the terms of this MOA are implemented, the UDOT shall consult with the objecting parties to resolve the objection. If the UDOT determines, within 30 days, that the objection(s) cannot be resolved, the UDOT will:

A. The UDOT may render a decision regarding the dispute. In reaching its decision, the UDOT will take into account all comments regarding the dispute from the parties to the MOA and prepare a written response to the signatories.
B. The UDOT's responsibilities to carry out all other actions subject to the terms of this MOA that are not the subject of the dispute remain unchanged. The UDOT will notify all parties of its decision in writing before implementing that portion of the undertaking subject to dispute under this stipulation. The UDOT's decision will be final.
C. Further, at any time during implementation of the measures stipulated in this agreement should an objection to any such measure be raised by a member of the public, the UDOT shall take the objections into account and consult as needed with the objecting party or the SHPO to resolve the objection.

VII. AMENDMENTS AND NONCOMPLIANCE: If any signatory to this MOA, including any invited signatory, determines that its terms will not or cannot be carried out or that an amendment to its terms must be made, that party shall immediately consult with the other parties to develop an amendment to this MOA. The amendment will be effective on the date a copy signed by all of the original signatories is filed with the SHPO. If the signatories cannot agree to appropriate terms to amend the MOA, any signatory may terminate the agreement in accordance with Stipulation VIII, below.

VIII. TERMINATION: If an MOA is not amended following the consultation set out in Stipulation VI and Stipulation VII, it may be terminated by any signatory or invited signatory. Within 30 days following termination, the UDOT shall notify the signatories if it will initiate consultation to execute an MOA with the signatories and proceed accordingly.

IX. EXECUTION: Execution of this Memorandum of Agreement by the UDOT and the Utah SHPO and the submission of documentation and filing of this Memorandum of Agreement with the Utah SHPO in accordance with U.C.A. 9-8-404 prior to UDOT's approval of this undertaking, and implementation of its terms, evidence that the UDOT has taken into account the effects of this undertaking on historic properties, and has afforded the State Historic Preservation Office an opportunity to comment on **PROJECT #S-0154(92)0; Bangerter Highway Environmental Document: 2700 West, Salt Lake County, Utah.**

SIGNATORIES:

UTAH DEPARTMENT OF TRANSPORTATION



04/04/2022

Robert Stewart, UDOT Region Director — Date

UTAH STATE HISTORIC PRESERVATION OFFICE



04/04/2022

Christopher Hansen, Utah Deputy SHPO — Date

Appendix D: Environmental Resources

Tribal Notification Form

State of Utah

SPENCER J. COX
Governor

DEIDRE M. HENDERSON
Lieutenant Governor

DEPARTMENT OF TRANSPORTATION

CARLOS M. BRACERAS, P.E.
Executive Director

TERIANNE S. NEWELL, P.E.
Deputy Director of Planning and Investment

LISA J. WILSON, P.E.
Deputy Director of Engineering and Operations

Tribal Notification Form, Section 106 Consultation

Federally funded projects classified as delegated categorical exclusions are processed in accordance with Stipulation II, Part A and Appendix B of the *Memorandum of Understanding, State Assumption of Responsibility for Categorical Exclusions (23 USC §326)*, by which the UDOT assumes responsibility, assigned by the FHWA, for ensuring compliance with Section 106 of the NHPA and with Section 4(f). This form is submitted on behalf of the FHWA. Direct government-to-government consultation can be conducted upon request.

This project is being conducted pursuant to the *Second Amended Programmatic Agreement among the FHWA, the Utah SHPO, the ACHP, the USACE Sacramento District, and the UDOT Regarding Section 106 Implementation for Federal-Aid Transportation Projects in the State of Utah*, and the *Programmatic Agreement between the UDOT and the Utah SHPO Regarding Implementation of U.C.A. 9-8-404 for State Funded Transportation Projects in Utah.*

UDOT Project: 18808; S-0154(92)0; Bangerter Highway Environmental Document: 2700 West, Salt Lake County.
Contact Name: Jonathan Dugmore — Date: December 10, 2021
Address: 2010 South 2760 West, Salt Lake City, Utah 84104
Telephone: 385-414-2066 — Email: jdugmore@utah.gov

Project Description: UDOT is proposing to construct a grade-separated, tight diamond interchange at the existing intersection of Bangerter Highway and 2700 West. The new interchange would allow unimpeded traffic flow on Bangerter Highway and is projected to operate at LOS D in 2050. The project study area is along Bangerter Highway from milepost 3.8 to 4.9 and along 2700 West between 13640 South and 14000 South (see the Bangerter at 2700 West Study Area Map in the Appendix).

Project work for the Proposed Action includes constructing a grade-separated tight diamond interchange at Bangerter Highway and 2700 West (Bangerter Highway over 2700 West) as well as the associated on- and off-ramps. Project work would also include minor widening and restriping on 2700 West to accommodate the turn lanes for the new grade-separated interchange; modifying utilities and storm drainage; and installing new pavement, traffic signals, advanced traffic management systems (ATMS) equipment, and roadway signs. These improvements would improve traffic flow and safety on Bangerter Highway and 2700 West.

If funding is available, project work might also include repaving the Bangerter Highway travel lanes and shoulders to the eastern limits of the Bangerter 13400 South new pavement areas (around 3600 West) and to the western limits of the Bangerter Redwood Road new pavement (around 1950 West).

Archaeological Potential (Prehistoric or Historic Sites):

- ☐ Known prehistoric sites in the project area
- ☒ Known historic sites in the project area
- ☐ Likely to find prehistoric sites in the project area
- ☐ Likely to find historic sites in the project area
- ☒ Unlikely to find prehistoric sites in the project area
- ☐ Unlikely to find historic sites in the project area
- ☐ No expected ground disturbance
- ☐ Other:

Additional Information/Comments: A pedestrian survey of the project area was conducted by archaeologists for Horrocks Engineers. One historic NRHP-eligible site was identified within the project area: 42SL295, the Utah and Salt Lake Canal.

Tribal Information
«AddressBlock»

Copies to: «cc_1»
«cc_2»
«cc_3»
«cc_4»

Comments:

1. Do you wish to be a Section 106 consulting party on this project?	☐Yes	☐No	☐Not Sure
2. If you do not wish to be a Section 106 consulting party, do you wish to continue to be involved in the development of this project?	☐Yes	☐No	☐Not Sure
Note: If your answer is "Not Sure," UDOT will continue to provide information.			
3. Are you aware of any traditional religious or culturally important places in or near the project area?	☐Yes	☐No	☐Not Sure
4. If yes, can you share details about the place (e.g., location and other characteristics) and any concerns you may have?	☐Yes	☐No	
5. Is this information sensitive?	☐Yes	☐No	

Additional Comments:

Name of person completing this form, if different from above:
Signature: Date:

Identical copies of the Project Notification Form sent to the following recipients:

Original to:	CC to:	Email to:
Mr. John St. Clair, Chairman Eastern Shoshone Tribe of the Wind River Reservation P.O. Box 538/15 North Fork Rd Fort Washakie, WY 82514	Ms. Glenda Trosper, Director, Cultural Center Eastern Shoshone Tribe of the Wind River Reservation P.O. Box 538/15 North Fork Rd Fort Washakie, WY 82514 Mr. Joshua Mann, THPO Eastern Shoshone Tribe of the Wind River Reservation P.O. Box 538/15 North Fork Rd Fort Washakie, WY 82514	vhill@easternshoshone.org glendatrosper@washakie.net wferris@easternshoshone.org
Mr. Devon Boyer, Chairman Shoshone-Bannock Tribes of Fort Hall P.O. Box 306 Pima Drive Fort Hall, ID 83203	Ms. Carolyn Smith, Cultural Resource Director Shoshone-Bannock Tribes of Fort Hall P.O. Box 306 Pima Drive Fort Hall, ID 83203	csmith@shoshonebannocktribes.com
Mr. Dennis Alex, Chairman Northwestern Band of Shoshone Nation 2575 Commerce Way Ogden, UT 84401	Ms. Patty Timbimboo-Madsen, Cultural Specialist Northwestern Band of Shoshone Nation 2575 Commerce Way Ogden, UT 84401	banner02@gmail.com ptimbimboo@nwbshoshone.com
Mr. Luke Dunkin, Chairperson Ute Indian Tribe of the Uintah and Ouray Ute Indian Reservation P.O. Box 190 Fort Duchesne, UT 84026	Ms. Betsy Chapoose, Director, Cultural Rights and Protection Ute Indian Tribe of the Uintah and Ouray Ute Indian Reservation P.O. Box 190 Fort Duchesne, UT 84026	luked@utetribe.com betsyc@utetribe.com
Ms. Candace Bear, Chairwoman Skull Valley Band of Goshute Indians 407 Skull Valley Rd Skull Valley, UT 84029	None	candaceb@svgoshutes.com
Mr. Tom Delice, Band Chairman Cedar Band of Paiutes 600 North 100 East P.O. Box 235 Cedar City, UT 84721	Mr. Robert Pete, Cultural Resources Representative Cedar Band of Paiutes 601 North 100 East P.O. Box 235 Cedar City, UT 84721	robertpete58@yahoo.com
Ms. Hope Silvas, Band Chairwoman Shivwits Band of Paiute Indian Tribe of Utah 6060 West 3650 North Ivins, UT 84738	Ms. Carmen Clark, Cultural Resources Director Shivwits Band of Paiute Indian Tribe of Utah 6060 West 3650 North Ivins, UT 84738	carmenclark435@gmail.com
Mr. Rupert Steele, Chairman Confederated Tribes of the Goshute Reservation P.O. BOX 6104 195 Tribal Center Rd. Ibapah, UT 84034	Ms. Mary Pete-Freeman, Cultural Resources Coordinator Confederated Tribes of the Goshute Reservation P.O. BOX 6104 195 Tribal Center Rd. Ibapah, UT 84034	rupertsteele@yahoo.com mary.freeman@ctgr.us

Appendix D: Environmental Resources

Utah Geological Survey Letter

State of Utah

SPENCER J. COX
Governor

DEIDRE M. HENDERSON
Lieutenant Governor

Department of Natural Resources

BRIAN C. STEED
Executive Director

Utah Geological Survey
R. WILLIAM KEACH, II
State Geologist/Division Director

February 22, 2022

Haylie Ferguson
Horrocks Engineers
2162 West Grove Parkway, Suite 400
Pleasant Grove UT 84062

RE: Paleontological file search and recommendations for the UDOT Bangerter Highway at 2700 West Interchange Project, Salt Lake 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 Hailie:

I have conducted a paleontological file search for the Bangerter Highway at 2700 West Interchange Project in response to your email of February 22, 2022. 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 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



Appendix D: Environmental Resources

UDOT Threatened and Endangered Species and Wildlife Concurrence Memo
and
Biological Resources Evaluation Memo

Memorandum

Environmental Services

DATE: February 1, 2022

TO: Amy Croft, Environmental Scientist, HDR

FROM: Matt Howard, Natural Resources Manager

SUBJECT: S-0154(92)0; Bangerter Highway at 2700 W Interchange PIN 18808

Amy,

I have reviewed the wildlife reevaluation memo for the Bangerter Highway at 2700 W interchange project concerning potential impacts to threatened and endangered species and concur with its findings. The proposed improvements would not negatively impact federally listed species. The project would not result in direct or incidental take under the BGEPA and MBTA. I have evaluated the project for impacts to greater sage-grouse. The project does not take place within a SGMA, nor does it take place within mapped habitat for sage-grouse and would therefore have no impact on sage-grouse or its habitat.

Sincerely,

Matt Howard
Natural Resource Manager

Memo

Date:	Wednesday, October 06, 2021
Project:	PIN: 18808; Project Number: S-0154(92)0; Bangerter Highway at 2700 West Interchange Improvements
To:	Matt Howard, Naomi Kisen, and Tyler Allen, UDOT
From:	HDR
Subject:	Biological Resources Evaluation for Bangerter Highway at 2700 West Interchange

Introduction

The Utah Department of Transportation (UDOT) is preparing a State Environmental Study (SES) to evaluate improvements to Bangerter Highway (State Route 154) at 2700 West in Riverton, Utah (the project). These improvements would improve traffic flow and safety on Bangerter Highway and 2700 West. The project includes a grade-separated interchange at 2700 West; utility and storm drainage modifications; and installing new pavement, traffic signals, advanced traffic management systems (ATMS) equipment, and roadway signage. This project might also include relocating and constructing a pedestrian structure over Bangerter Highway. This memorandum summarizes the existing biological resources that could be affected by the proposed improvements.

Regulatory Setting

Threatened and Endangered Species

The Endangered Species Act (16 United States Code [USC] Sections 1531–1544) provides for the conservation of threatened and endangered species and the ecosystems on which they depend. Section 3 of the Endangered Species Act prohibits the “taking” of any endangered species, and defines “taking” broadly to include actions that are not necessarily intended to cause harm to the species (an “incidental taking”).

Section 7 of the Endangered Species Act requires federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) before taking any action that could affect a federally listed threatened or endangered species or designated critical habitat for an endangered species. In addition, federal agencies must ensure that their actions are not likely to jeopardize the continued existence of any listed species or to destroy or adversely modify any designated critical habitat.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (16 USC Sections 703–712) makes it unlawful to take, import, export, possess, sell, purchase, or barter any migratory bird, with the exception of the taking of game birds during established hunting seasons. The law also applies to feathers, eggs, nests, and products made from migratory birds. Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds* (January 10, 2001), directs federal agencies taking actions likely to affect migratory birds to support the implementation of the Migratory Bird Treaty Act by requiring agencies to analyze impacts to migratory birds and species of concern in accordance with the National Environmental Policy Act as appropriate.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 USC Sections 668–668d) makes it unlawful to take, import, export, sell, purchase, transport, or barter any bald or golden eagle or their parts, products, nests, or eggs. “Take” includes pursuing, shooting, poisoning, wounding, killing, capturing, trapping, collecting, molesting, or disturbing eagles.

Other Special-status Species

Resource and land management agencies, including the Utah Division of Wildlife Resources (UDWR), the U.S. Department of Agriculture Forest Service (USFS), the National Park Service (NPS), and the Bureau of Land Management (BLM) designate sensitive species, identify wildlife habitat areas (such as those for big-game species), and establish conservation agreements. These agencies and the U.S. Fish and Wildlife Service (USFWS) also manage designated lands as wildlife refuges or lands otherwise protected for wildlife. Sensitive species and conservation agreement species typically include species listed under the Endangered Species Act and additional species identified as those that warrant management considerations and actions in order to avoid becoming threatened or endangered.

Candidate Conservation Agreements encourage conservation actions for species that are candidates for listing as threatened or endangered, or that are likely to become candidates. Conservation agreements are designed to remove enough threats to the target species to eliminate the need for protection under the Endangered Species Act.

Methodology

Study Area

The project study area is located on both sides of Bangerter Highway between about 1950 West to 3300 West and on both sides of 2700 West between about 13400 South and 14100 South. Figure 1 shows the general vicinity of the study area.

The study area, which ranges in elevation from about 4,460 to 4,560 feet, is part of the Central Basin and Range Ecoregion and includes the Moist Wasatch Front Footslopes subregion (Woods and others 2001). The study area is part of the Jordan hydrologic region in the Jordan River watershed (hydrologic unit code 16020204), and the waters in the area eventually drain to the Great Salt Lake. In general, the study area consists primarily of residential and commercial development with some open fields and agricultural areas.

Analyses

HDR used several methods to collect data regarding the biological resources in the study area. These methods included conducting literature reviews, interpreting aerial photographs, and conducting a reconnaissance-level field survey for biological resources on August 20, 2021.

HDR obtained a species list from the USFWS Information, Planning, and Conservation System (IPaC) website for federally threatened, endangered, or candidate species that might occur in the study area and/or might be affected by the project. HDR also consulted the USFWS Environmental Conservation Online System (ECOS) for a list of species under conservation agreement that are known to occur in Salt Lake County. Additionally, HDR obtained a species list from the Utah Natural Heritage Program online data request website to determine whether there are records of occurrence for state-listed Species of Greatest Conservation Need (as designated by the Utah Wildlife Action Plan) in the vicinity of the study area. Reports from IPaC and the Utah Natural Heritage Program are provided in Appendix A, *Pertinent Correspondence*. The Utah Species Field Guide (UDWR, no date), NatureServe (www.natureserve.org),

Figure 1. 2700 West Study Area



Audubon (Audubon, no date), and Cornell Lab's All About Birds website (Cornell Lab of Ornithology, no date) were referenced for species habitat descriptions.

Results

Special-status Species

SPECIAL-STATUS PLANT SPECIES

No special-status plant species of concern were identified in the IPaC report or listed under conservation agreement and known to occur in Salt Lake County.

SPECIAL-STATUS WILDLIFE SPECIES

Threatened, Endangered, and Candidate Species. The IPaC report identified one federally listed fish species, June sucker (*Chasmistes liorus*), and one bird species, yellow-billed cuckoo (*Coccyzus americanus*), that could occur or are known to occur in or near the study area. The study area does not include designated or proposed critical habitat for these species. Table 1 describes the preferred habitat for each species. Potentially suitable habitat does not exist in the study area for either species.

Table 1. Federally Listed Wildlife Species Known to Occur in or near the Study Area

Common Name[a]	Scientific Name	Federal Status	Preferred Habitat[b]	Potentially Suitable Habitat Present?[b]
June sucker	*Chasmistes liorus*	Threatened	June suckers are endemic to Utah Lake and its tributaries (the Provo and Spanish Fork Rivers).	There is no potentially suitable habitat in the study area. Additionally, there is no downstream habitat or water withdrawals that would impact downstream habitat.
Yellow-billed cuckoo	*Coccyzus americanus*	Threatened	Yellow-billed cuckoos prefer to nest in tall cottonwood and willow riparian woodland with dense understory foliage. They prefer patches of at least 25 acres of dense riparian forest with a canopy cover of at least 50% in both the understory and overstory. USFWS's suitable habitat guidelines for this species for Utah require patches of multilayered vegetation that are at least 12 acres in extent and at least 100 meters (328 feet) wide by 100 meters long.	There is no potentially suitable habitat in the study area.

[a] Source: USFWS 2021

[b] Sources: NatureServe, no date; UDWR, no date

Species Listed under Conservation Agreements. HDR consulted the USFWS ECOS for a list of species listed under conservation agreements that are known to occur or could occur in Salt Lake County. One amphibian species, one bird species, and two fish species were identified. Table 2 describes the preferred habitat for each species. There is no suitable habitat in the study area for any of the species.

Table 2. Species under Conservation Agreements That Are Known to Occur in Salt Lake County

Common Name	Scientific Name	Preferred Habitat[a]	Potentially Suitable Habitat Present?[a]
Amphibians			
Columbia spotted frog	*Rana luteiventris*	Columbia spotted frogs are highly aquatic and are rarely found far from permanent quiet water. They usually live at the grassy/sedgy margins of streams, lakes, ponds, springs, and marshes and use stream-side small mammal burrows as shelter. Breeding typically occurs in small pools or ponds with little or no current surrounded by dense aquatic vegetation.	There is no suitable breeding habitat in the study area. There are records of individuals within a 2-mile radius of the study area (UDWR 2021).
Birds			
Greater sage-grouse	*Centrocercus urophasianus*	Greater sage-grouse are found throughout Utah and require sagebrush habitat.	There is no suitable habitat in the study area.
Fish			
Bonneville cutthroat trout	*Oncorhynchus clarkii utah*	Habitat for Bonneville cutthroat trout ranges from high-elevation streams with coniferous and deciduous riparian trees, to low-elevation streams in sage-steppe grasslands containing herbaceous riparian zones, to lakes.	There is no suitable habitat in the study area. Additionally, there is no downstream habitat or water withdrawals that would impact downstream habitat.
Least chub	*Iotichthys phlegethontis*	Least chubs are endemic to the Bonneville Basin of Utah. There are only five wild populations, three in the Snake Valley in Utah's West Desert and two in the Sevier River drainage. Least chubs inhabits spring-fed marshes and wetlands.	There is no suitable habitat in the study area. Additionally, there is no downstream habitat or water withdrawals that would impact downstream habitat.

[a] Sources: Audubon, no date; Cornell Lab of Ornithology, no date; NatureServe, no date; UDWR, no date

Migratory Birds. Table 3 lists the migratory bird species included in the IPaC report that could occur in or near the study area. There is no suitable habitat in the study area for any of the species.

Table 3. Migratory Birds Known to Occur in or near the Study Area

Common Name[a]	Scientific Name	Preferred Habitat[b]	Potentially Suitable Habitat Present?[b]
Bald eagle	*Haliaeetus leucocephalus*	Breeding habitat for bald eagles most commonly includes areas close to coastal areas, bays, rivers, lakes, reservoirs, or other bodies of water that reflect the general availability of primary food sources including fish, waterfowl, or seabirds. Nests usually are in tall trees or on pinnacles or cliffs near water. Winter habitat is commonly associated with open water, though some bald eagles use montane areas if upland food resources such as rabbit or deer carrion are readily available.	There is no suitable breeding or nesting habitat in the study area.
Black rosy-finch	*Leucosticte atrata*	Black rosy-finches breed above the timberline in alpine tundra using barren, rocky, or grassy areas and cliffs among glaciers or at the bases of snow fields. Nests are located in a well-protected site in a crevice or hole in a cliff. Winter habitat includes lower elevations in open country of mountains and nearby valleys.	There is no suitable breeding or nesting habitat in the study area.
Brewer's sparrow	*Spizella breweri*	Brewer's sparrows breed primarily in shrub-steppe habitats in Utah and are considered to be shrub-steppe obligates. They also breed in large sagebrush openings in pinyon-juniper habitat or coniferous forests. Breeding habitats are usually dominated by big sagebrush. Nest sites are almost always well-concealed in a low shrub.	There is no suitable breeding or nesting habitat in the study area.
Clark's grebe	*Aechmophorus clarkii*	Clarke's grebes prefer to nest on large freshwater lakes and marshes among tall, emergent vegetation on the water's edge. Winter habitat includes saltwater habitats including shores, bays, and rivers.	There is no suitable breeding or nesting habitat in the study area.
Golden eagle	*Aquila chrysaetos*	Golden eagles generally inhabit open and semi-open country such as prairies, sagebrush, arctic and alpine tundra, savannah or sparse woodland, and barren areas, especially in hilly or mountainous regions, in areas with sufficient mammalian prey base and near suitable nesting sites. Nests are most often on rock ledges of cliffs.	There is no suitable breeding or nesting habitat in the study area.
Green-tailed towhee	*Pipilo chlorurus*	Green-tailed towhees breed in dense, shrubby habitat with scattered conifers. Nest sites are concealed at about knee height in very dense vegetation, in the low branches of shrubs or small trees.	There is no suitable breeding or nesting habitat in the study area.
Long-billed curlew	*Numenius americanus*	Long-billed curlews breed in prairies and grassy meadows and sometimes in agricultural fields. Nests are located on the ground on a flat, dry area with short grass.	There is no suitable breeding or nesting habitat in the study area. Although there are agricultural fields in the study area, they are highly disturbed with dense vegetation and do not provide suitable breeding or nesting habitat.

(*continued on next page*)

Table 3. Migratory Birds Known to Occur in or near the Study Area

Common Name[a]	Scientific Name	Preferred Habitat[b]	Potentially Suitable Habitat Present?[b]
Marbled godwit	*Limosa fedoa*	Marbled godwits breed in meadows, short-grass prairies, pastures, and marshes. Nest are placed on the ground, usually in a dry spot in short grass fairly close to water. Winter habitat includes coastal mudflats, estuaries, and beaches. They are common migrants in northern Utah, especially in areas around the Great Salt Lake and Utah Lake.	There is no suitable breeding or nesting habitat in the study area.
Olive-sided flycatcher	*Contopus cooperi*	Olive-sided flycatchers breed in various forest and woodland habitats—taiga, subalpine coniferous forest, mixed coniferous-deciduous forest, burned-over forest, spruce or tamarack bogs, and other forested wetlands—and along the forested edges of lakes, ponds, and streams. Nests are placed most often in conifers. Olive-sided flycatchers migrate to South America, Central America, and southern Mexico for the winter.	There is no suitable breeding or nesting habitat in the study area.
Pinyon jay	*Gymnorhinus cyanocephalus*	Pinyon-juniper forests are the preferred habitat for pinyon jays. Their diet consists primarily of pinyon and other pine seeds, and the timing and location of breeding is tied to pine seed availability. Nests are located in trees, usually conifers, 5 to 30 feet off the ground.	There is no suitable breeding or nesting habitat in the study area.
Sage thrasher	*Oreoscoptes montanus*	Sagebrush communities are the preferred breeding habitat for sage thrashers. They require relatively dense ground cover for concealment, but also some bare ground for foraging since they spend a majority of their time on the ground. Nest sites are located in sagebrush or other low shrubs. Sage thrashers use arid or semi-arid open country with scattered bushes, grasslands, and open pinyon-juniper woodlands during migration and wintering.	There is no suitable breeding or nesting habitat in the study area.
Virginia's warbler	*Leiothlypis virginiae*	The preferred breeding habitat for Virginia's warblers is in low, brushy areas on dry mountainsides where an herbaceous or woody understory is well-developed. Lower mountain habitats with dense stands of Gambel oak and a relatively high slope are preferred for breeding, although mountain mahogany woodlands, riparian areas, Ponderosa pine forests, and pinyon-juniper woodlands, all with shrubby understories, are also used for breeding. Breeding occasionally occurs in Douglas-fir and aspen habitats with the required shrubby understory. Nests are often placed under grass tufts on ground covered by dense brush.	There is no suitable breeding or nesting habitat in the study area.

(*continued on next page*)

Table 3. Migratory Birds Known to Occur in or near the Study Area

Common Name[a]	Scientific Name	Preferred Habitat[b]	Potentially Suitable Habitat Present?[b]
Willet	*Tringa semipalmata*	Willets prefer marshes, wet meadows, mudflats, and beach habitats. Birds nest in salt marshes in eastern North America and along marshy lake margins in western North America. Large expanses grasslands are required for nesting and foraging. Nest sites are located on the ground in marshy areas or grasslands near water.	There is no suitable breeding or nesting habitat in the study area.
Willow flycatcher	*Empidonax traillii*	Willow flycatchers are associated with dense riparian deciduous shrub cover separated by open areas. The presence of water (running water, pools, or saturated soils) and willow, alder, or other deciduous riparian shrubs are essential habitat elements. Nests are primarily near slow streams, standing water or seeps, or swampy thickets (especially of willow and buttonbush, but also dogwood, elderberry, hawthorn, rose, tamarisk, and others).	There is no suitable breeding or nesting habitat in the study area.

[a] Source: USFWS 2021

[b] Sources: Audubon, no date; Cornell Lab of Ornithology, no date; NatureServe, no date; UDWR, no date; UDWR 2021

Summary

HDR identified 2 federally listed wildlife species, 4 species listed under conservation agreements, and 14 migratory bird species that could occur or are known to occur in the study area. There is no suitable habitat in the study area for any of the species.

References

Audubon

No date Guide to North American Birds. https://www.audubon.org/bird-guide. Accessed September 14, 2021.

Cornell Lab of Ornithology

No date All About Birds. https://www.allaboutbirds.org/news/. Accessed September 14, 2021.

NatureServe

No date NatureServe Explorer. http://explorer.natureserve.org. Accessed September 14, 2021.

[UDWR] Utah Division of Wildlife Resources

No date Utah Species Field Guide. https://fieldguide.wildlife.utah.gov/. Accessed September 14, 2021.

2021 Utah Natural Heritage Program Online Species Search Report. Report Number 12406. June 24.

[USFWS] United States Fish and Wildlife Service

2021 List of threatened and endangered species for the Bangerter Highway and 2700 West SES. Species list provided by the Utah Ecological Services Field Office. June.

Woods, A.J., D.A. Lammers, S.A. Bryce, J.M. Omernik, R.L. Denton, M. Domeier, and J.A. Comstock

2001 Ecoregions of Utah (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,175,000). https://gaftp.epa.gov/EPADataCommons/ORD/Ecoregions/ut/ut_front.pdf.

Appendix A

Pertinent Correspondence

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Utah Ecological Services Field Office
2369 West Orton Circle, Suite 50
West Valley City, UT 84119-7603
Phone: (801) 975-3330 Fax: (801) 975-3331
http://www.fws.gov
http://www.fws.gov/utahfieldoffice/

In Reply Refer To: June 24, 2021
Consultation Code: 06E23000-2021-SLI-0574
Event Code: 06E23000-2021-E-01210
Project Name: Bangerter Highway and 2700 West SES

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Utah Ecological Services Field Office
2369 West Orton Circle, Suite 50
West Valley City, UT 84119-7603
(801) 975-3330

Project Summary

Consultation Code: 06E23000-2021-SLI-0574
Event Code: 06E23000-2021-E-01210
Project Name: Bangerter Highway and 2700 West SES
Project Type: TRANSPORTATION
Project Description: Bangerter Highway and 2700 West SES
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@40.501296350000004,-111.95698897188157,14z



Counties: Salt Lake County, Utah

Endangered Species Act Species

There is a total of 2 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Birds

NAME	STATUS
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS
June Sucker *Chasmistes liorus* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/4133	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Black Rosy-finch *Leucosticte atrata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9460	Breeds Jun 15 to Aug 31

NAME	BREEDING SEASON
Brewer's Sparrow *Spizella breweri* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9291	Breeds May 15 to Aug 10
Clark's Grebe *Aechmophorus clarkii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jan 1 to Dec 31
Golden Eagle *Aquila chrysaetos* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/1680	Breeds Dec 1 to Aug 31
Green-tailed Towhee *Pipilo chlorurus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9444	Breeds May 1 to Aug 10
Long-billed Curlew *Numenius americanus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5511	Breeds Apr 1 to Jul 31
Marbled Godwit *Limosa fedoa* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds elsewhere
Olive-sided Flycatcher *Contopus cooperi* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31
Pinyon Jay *Gymnorhinus cyanocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9420	Breeds Feb 15 to Jul 15
Sage Thrasher *Oreoscoptes montanus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9433	Breeds Apr 15 to Aug 10
Virginia's Warbler *Vermivora virginiae* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9441	Breeds May 1 to Jul 31

NAME	BREEDING SEASON
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5
Willow Flycatcher *Empidonax traillii* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/3482	Breeds May 20 to Aug 31

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

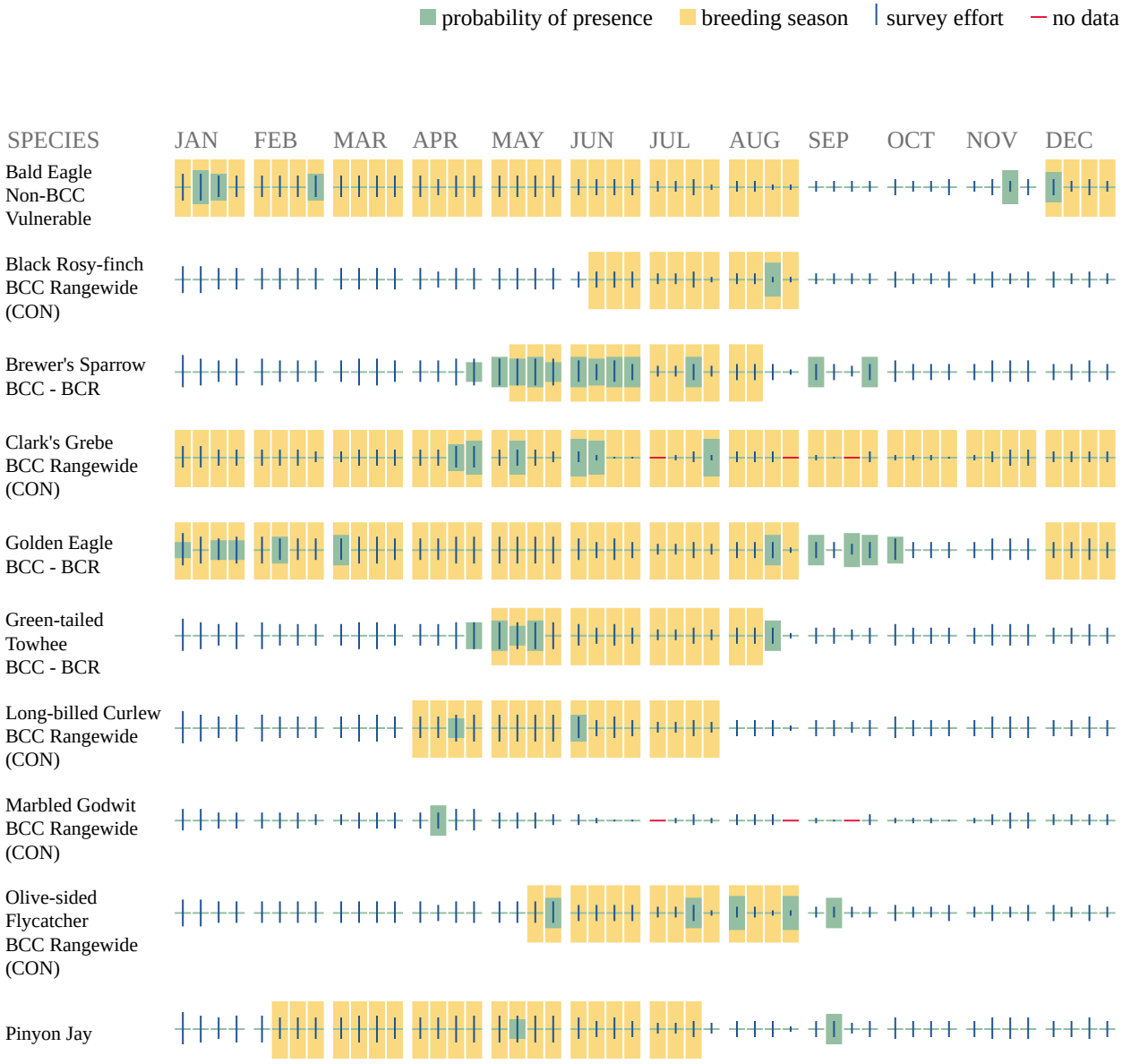
Breeding Season (■)

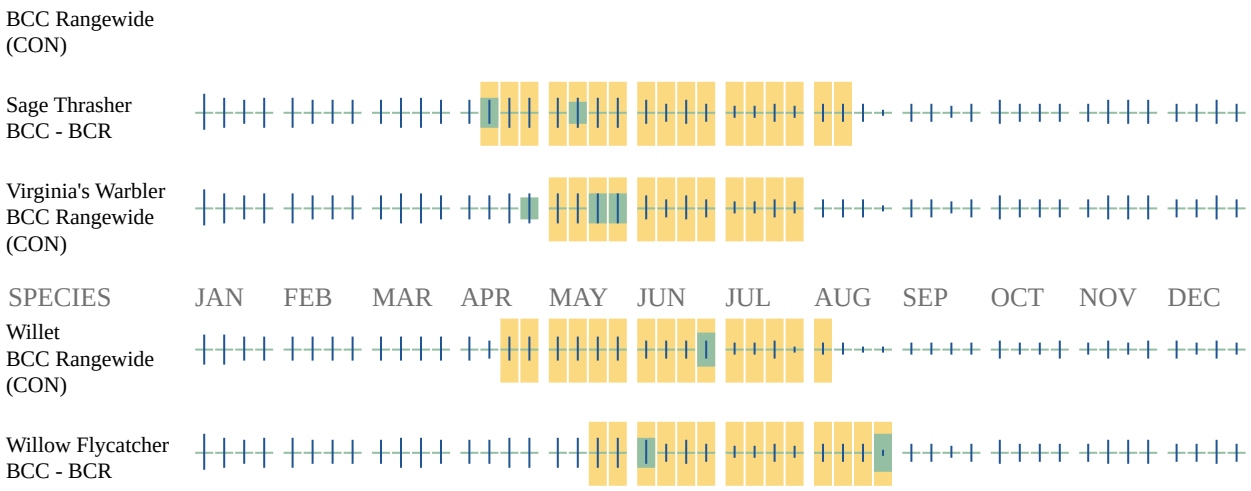
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.





Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as

warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Utah Division of Wildlife Resources
Utah Natural Heritage Program
1594 W. North Temple
PO Box 146301
Salt Lake City, UT 84116

Report Number: 12406
June 24, 2021

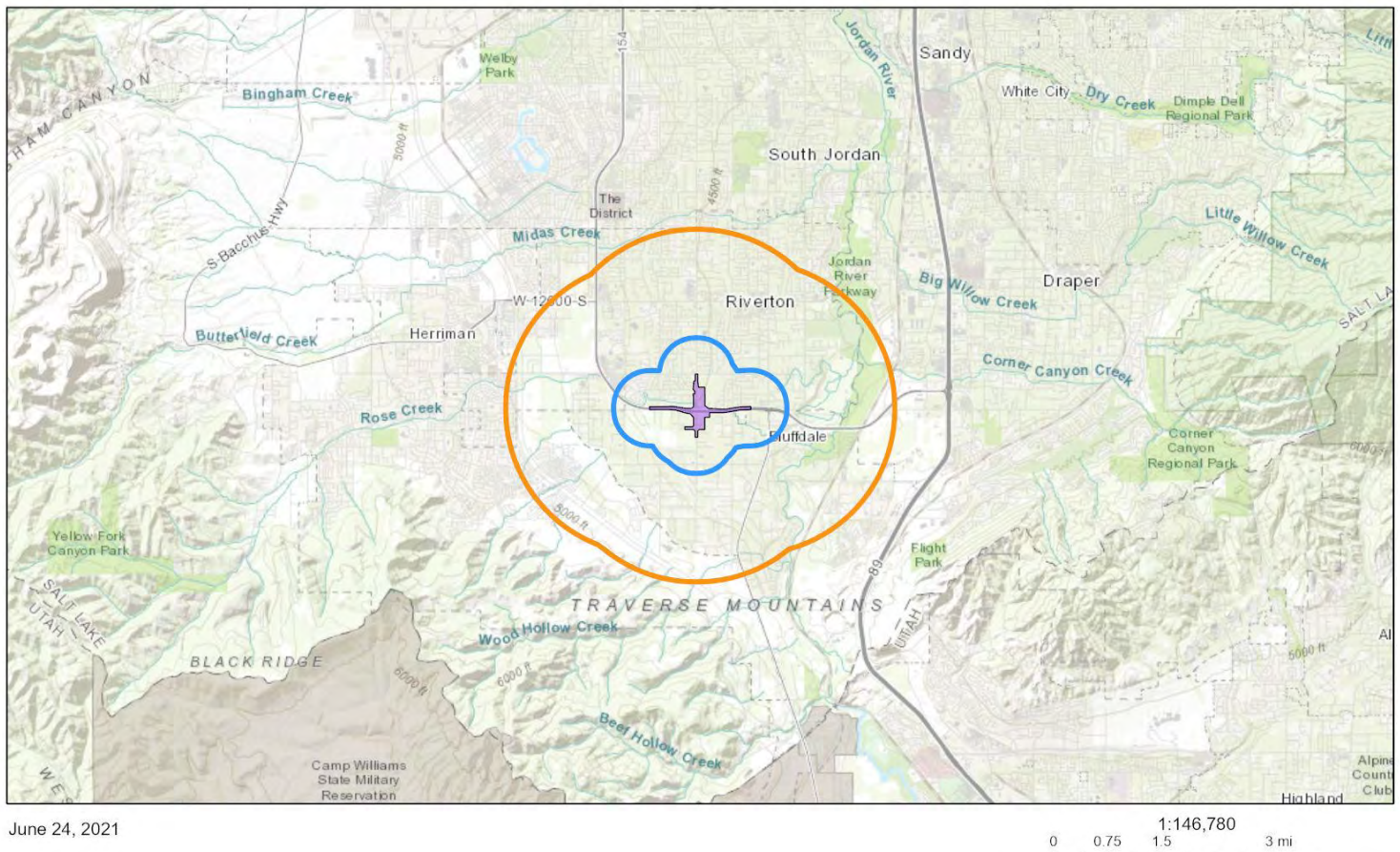
Utah Natural Heritage Program Online Species Search Report

Project Information

Project Name
Bangerter Highway and 2700 West SES

Project Description
Bangerter Highway and 2700 West SES

Location Description
Bangerter Highway and 2700 West SES



June 24, 2021

1:146,780
0 0.75 1.5 3 mi
0 1.5 3 6 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Animals within a ½ mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
No Species Found				

Plants within a ½ mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
No Species Found				

Animals within a 2 mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
Green River Pebblesnail	Fluminicola coloradoensis	SGCN		1993
Northern Leopard Frog	Lithobates pipiens	SGCN		1979
Columbia Spotted Frog	Rana luteiventris	SGCN		1968

Plants within a 2 mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
No Species Found				

Definitions

State Status

SGCN	Species of greatest conservation need listed in the Utah Wildlife Action Plan

U.S. Endangered Species Act

LE	A taxon that is listed by the U.S. Fish and Wildlife Service as "endangered" with the probability of worldwide extinction
LT	A taxon that is listed by the U.S. Fish and Wildlife Service as "threatened" with becoming endangered
LE;XN	An "endangered" taxon that is considered by the U.S. Fish and Wildlife Service to be "experimental and nonessential" in its designated use areas in Utah
C	A taxon for which the U.S. Fish and Wildlife Service has on file sufficient information on biological vulnerability and threats to justify it being a "candidate" for listing as endangered or threatened
PT/PE	A taxon "proposed" to be listed as "endangered" or "threatened" by the U.S. Fish and Wildlife Service

Disclaimer

The information provided in this report is based on data existing in the Utah Division of Wildlife Resources' central database at the time of the request. It should not be regarded as a final statement on the occurrence of any species on or near the designated site, nor should it be considered a substitute for on-the-ground biological surveys. Moreover, because the Utah Division of Wildlife Resources' central database is continually updated, any given response is only appropriate for its respective request.

The UDWR provides no warranty, nor accepts any liability, occurring from any incorrect, incomplete, or misleading data, or from any incorrect, incomplete, or misleading use of these data.

The results are a query of species tracked by the Utah Natural Heritage Program, which includes all species listed under the U.S. Endangered Species Act and species on the Utah Wildlife Action Plan. Other significant wildlife values might also be present on the designated site. Please contact UDWR's regional habitat manager if you have any questions.

Contact the U.S. Fish and Wildlife Service at (801) 975-3330 for the purpose of consultation under the Endangered Species Act.

Please contact our office at (801) 538-4759 or habitat@utah.gov if you require further assistance.

Your project is located in the following UDWR region(s): Central region

Report generated for:
Amy Croft
HDR
2825 East Cottonwood Parkway Suite 200
Cottonwood Heights, UT 84121
(801) 743-7832
amy.croft@hdrinc.com



Appendix D: Environmental Resources

UDOT Environmental Review for Water Resources and Wetlands, Noxious Weeds, and Visual Aesthetics
and
Aquatic Resources Delineation Report

MEMORANDUM

Date: Wednesday, February 2, 2022

To: Amy Croft
HDR

From: Dan Bolin
UDOT Landscape Architect

RE: **ENVIRONMENTAL REVIEW FOR WATER RESOURCES AND WETLANDS, NOXIOUS WEED, AND VISUAL AESTHETICS**

PROJECT DESCRIPTION AND SCOPE OF WORK

The Utah Department of Transportation (UDOT) is proposing to construct a grade-separated, tight diamond interchange at the existing intersection of Bangerter Highway and 2700 West. The new interchange would allow unimpeded traffic flow on Bangerter Highway and is projected to operate at LOS D in 2050. The project study area is along Bangerter Highway from milepost 3.8 to 4.9 and along 2700 West between 13640 South and 14000 South (see the Bangerter at 2700 West Study Area Map in the Appendix).

Project work for the Proposed Action includes constructing a grade-separated tight diamond interchange at Bangerter Highway and 2700 West (Bangerter Highway over 2700 West) as well as the associated on- and off-ramps. Project work would also include minor widening and restriping on 2700 West to accommodate the turn lanes for the new grade-separated interchange; modifying utilities and storm drainage; and installing new pavement, traffic signals, advanced traffic management systems (ATMS) equipment, and roadway signs. This project would also require right-of-way acquisition. These improvements would improve traffic flow and safety on Bangerter Highway and 2700 West.

Water Resources and Wetlands:

HDR evaluated the project for waters of the U.S. (WOTUS), including wetlands and streams regulated by US Army Corps of Engineers (USACE) and other waters under the jurisdiction of the State of Utah. To determine whether WOTUS are situated within or adjacent to the project limits, HDR conducted a desktop analysis using aerial imagery, U.S. Fish and Wildlife Service NWI data, the U.S. Geological Survey National Hydrography Dataset, and the FEMA Flood Map Service Center. HDR also conducted an aquatic resources delineation on August 20, 2021.

The project will require a re-alignment of Rose Creek, a jurisdictional resource, as well as impacts to the Utah & Salt Lake Canal and ditch D-2, both of which are likely jurisdictional resources. It is anticipated that the project will have 1,051 linear feet (0.25 acres) of impact to Rose Creek, 6LF (0.002 acres) of the Utah and Salt Lake Canal (C-1), and 8 LF (0.0004) acres of ditch D-2 (see attached aquatic resources delineation and impact table in HDR environmental review). Impacts to Rose Creek, the Utah & Salt Lake Canal, and ditch D-2 will require a USACE Nationwide 14 permit and impacts to Rose Creek will additionally require a Utah Stream Alteration Permit. No wetlands were identified within the project area.

Mitigation Commitments:

1. **Obtain a Utah Stream Alteration Permit from the Utah Division of Water Rights prior to construction. (UDOT Responsible)**
2. **Obtain a Nationwide Permit 14 from the U.S. Army Corps of Engineers prior to construction. (UDOT Responsible)**

3. **Comply with all conditions of both the Utah Stream Alteration Permit and USACE Nationwide 14 Permit. (Awarded Contractor Responsible)**

Utah Pollutant Discharge Elimination System (UPDES):

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

Mitigation Commitments:

1. **Comply with UCGP, by preparing a SWPPP during design and advertisement; provide SWPPP to the project awarded contractor prior to Notice to Proceed. (UDOT Responsible)**

2. **Comply with UCGP, by finalizing the SWPPP prior to beginning earth disturbing activities; implementing and maintaining the project SWPPP throughout project construction. (Awarded Contractor Responsible)**

Federal Emergency Management Agency (FEMA) Floodplains:

This project occurs partially within a FEMA Special Flood Hazard Area. A floodplain development permit must be obtained from Utah Division of Emergency Management or local floodplain administrator prior to construction. A pre-project Letter of Map Revision (LOMR) and post-project Conditional Letter of Map Revision (CLOMR) are anticipated.

Mitigation Commitments:

1. **Obtain a Floodplain Development permit from the Utah Division of Emergency Management or local floodplain administrator prior to construction. (UDOT Responsible)**
2. **Obtain a pre-project Letter of Map Revision (LOMR) and post-project Conditional Letter of Map Revision (CLOMR) if determined necessary by the Federal Emergency Management Agency (FEMA). (UDOT Responsible)**

Noxious Weeds:

Noxious weed species, as defined by the Utah Noxious Weed Act (Utah Administrative Code, Rule R68-9), have been identified growing within the project limits. Additionally, the project includes earthwork which has the potential to introduce noxious weeds. To reduce the introduction and spread of noxious weeds, the project is required to properly clean earthmoving construction equipment before mobilizing onto the project and treat any noxious weeds within the project limits prior to earth disturbance and as they appear during construction.

Mitigation Commitments:

1. **Include UDOT Special Provision Section 02924S NOXIOUS WEED CONTROL in the contract documents to require that earthmoving construction equipment is to be properly cleaned before mobilizing onto the project site and to treat any noxious weeds within the project limits before construction and throughout the duration of the project. (UDOT Responsible)**

2. **Comply with UDOT Special Provision Section 02924S NOXIOUS WEED CONTROL requirements by properly cleaning all earthmoving construction equipment before mobilizing onto the project site, avoiding unnecessary earth disturbances and treating any noxious weeds prior to earth disturbance and throughout the duration of the project. (Awarded Contractor Responsible)**

Visual Aesthetics:

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

Mitigation Commitments:

1. **Visual: Reclaim all disturbed areas per UDOT standard specifications. (Awarded Contractor Responsible)**

Memo

Date:	Friday, January 28, 2022
Project:	PIN: 18808; Project Number: S-0154(92)0; Bangerter at 2700 W Interchange Improvements
To:	Dan Bolin, UDOT
From:	Amy Croft, HDR
Subject:	Environmental review for water resources and wetlands, noxious weeds, and visual aesthetics

Project Description and Scope of Work

UDOT is proposing to construct a grade-separated, tight diamond interchange at the existing intersection of Bangerter Highway and 2700 West. The new interchange would allow unimpeded traffic flow on Bangerter Highway and is projected to operate at LOS D in 2050. The project study area is along Bangerter Highway from milepost 3.8 to 4.9 and along 2700 West between 13640 South and 14000 South (see the Bangerter at 2700 West Study Area Map in the Appendix).

Project work for the Proposed Action includes constructing a grade-separated tight diamond interchange at Bangerter Highway and 2700 West (Bangerter Highway over 2700 West) as well as the associated on- and off-ramps. Project work would also include minor widening and restriping on 2700 West to accommodate the turn lanes for the new grade-separated interchange; modifying utilities and storm drainage; and installing new pavement, traffic signals, advanced traffic management systems (ATMS) equipment, and roadway signs. This project would also require right-of-way acquisition. These improvements would improve traffic flow and safety on Bangerter Highway and 2700 West.

Water Resources and Wetlands

HDR evaluated the project for waters of the U.S. (WOTUS), including wetlands and streams regulated by US Army Corps of Engineers (USACE) and other waters under the jurisdiction of the State of Utah. To determine whether WOTUS are situated within or adjacent to the project limits, HDR conducted a desktop analysis using aerial imagery, U.S. Fish and Wildlife Service NWI data, the U.S. Geological Survey National Hydrography Dataset, and the FEMA Flood Map Service Center. HDR also conducted an aquatic resources delineation on August 20, 2021.

The entire delineation survey area is about 116 acres and contains a total of 0.54 acre of aquatic resources. The aquatic resources that were delineated in the survey area consist of 0.45 acre (2,902 linear feet) of perennial stream (Rose Creek), 0.05 acre (117 linear feet) of canal (Utah & Salt Lake Canal), and 0.04 acre (609 linear feet) of ditches (D-1 and D-2). No wetlands were identified in the survey area.

The project will impact Rose Creek, a jurisdictional resource, as well as the Utah & Salt Lake Canal and ditch D-2, both of which are likely jurisdictional resources. The table below provides a summary of the linear feet and acres of anticipated impacts.

Aquatic Feature	Linear feet that will be impacted		Linear feet that will be replaced	
	Existing Channel	Existing Culvert	New Channel Segment	New Culvert
Rose Creek	1,051 LF (0.250 acres)	288 LF	1,047 LF	373 LF
Utah & Salt Lake Canal (C-1)	6 LF (0.002 acres)	0 LF	0 LF	6 LF
D-2	8 LF (0.0004 acres)	0 LF	0 LF	8 LF

Utah Pollutant Discharge Elimination System (UPDES)

This project will disturb more than one (1) acre of earth.

Federal Emergency Management Agency (FEMA) Floodplains

This project does occur partially within a FEMA Special Flood Hazard Area.

Noxious Weeds

Noxious weeds including scotch thistle, salt cedar, and common reed were identified growing within the project limits.

Visual Aesthetics

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



Aquatic Resources Delineation Report

Bangerter Highway at 2700 West Interchange Improvements

UDOT PIN 18808

Riverton, Utah

February 21, 2022

Executive Summary

On behalf of the Utah Department of Transportation (UDOT), HDR, Inc. (HDR), has prepared this aquatic resources delineation report in support of the proposed interchange improvements at the intersection of State Route 154 (Bangerter Highway) at 2700 West in Riverton, Utah. HDR conducted fieldwork for the delineation on August 20, 2021.

The delineation was conducted in accordance with the following delineation manuals and delineation reference guides:

- *Corps of Engineers Wetlands Delineation Manual* (USACE 1987)
- *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008)
- *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States: A Delineation Manual* (Lichvar and McColley 2008)
- *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Curtis and Lichvar 2010)
- U.S. Army Corps of Engineers regulatory guidance letters and joint agency regulations, policies, references, and guidance

The entire delineation survey area is about 116 acres and contains a total of 0.54 acre of aquatic resources. The aquatic resources that were delineated in the survey area consist of 0.45 acre (2,902 linear feet) of perennial stream, 0.05 acre (117 linear feet) of canals, and 0.04 acre (609 linear feet) of ditches.

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1 Introduction

On behalf of the Utah Department of Transportation (UDOT), HDR, Inc. (HDR), has prepared this aquatic resources delineation report in support of the Bangerter Highway at 2700 West Interchange Improvements project (Proposed Project) in Riverton, Utah.

The purpose of this report is to identify and describe aquatic resources in the delineation survey area (survey area) for the Proposed Project (see Appendix A, Project Location Overview Map). The results of the delineation are summarized in Table 3, Aquatic Resources Summary, on page 8. The jurisdictional status of the delineated aquatic resources is subject to determination by the U.S. Army Corps of Engineers (USACE).

1.1 Aquatic Resources Delineation Survey Area

The survey area is located on both sides of Bangerter Highway between about 1950 West and 3300 West and on both sides of 2700 West between about 13400 South and 14100 South in Riverton, Utah. It covers about 116 acres and includes property owned by UDOT and property that is privately owned.

The survey area can be accessed from Bangerter Highway from the east and the west. It can also be accessed from the north and the south along 2700 West. As defined by the Public Land Survey System, the survey area is located in Township 4 South, Range 1 West, and Sections 4 and 5. The elevation in the survey area ranges from about 4,460 to 4,560 feet above mean sea level.

1.2 Contact Information

1.2.1 Project Applicant and Owner

Utah Department of Transportation, Region Two
Attention: Brian Allen
(385) 414-1092
brianja@utah.gov

1.2.2 Land Ownership

Land in the survey area includes property owned by UDOT as well as property that is privately owned. Contact and access information for landowners can be coordinated as necessary.

1.2.3 Contact Information for the Delineation Consultant

HDR, Inc.
2825 E. Cottonwood Parkway, Suite 200
Salt Lake City, Utah 84121

Field biologists:

Amy Croft, PhD
(801) 743-7832
amy.croft@hdrinc.com

Joshua McMillin
(801) 743-7860
joshua.mcmillin@hdrinc.com

2 Delineation Methodology

2.1 Preliminary Data Gathering

Before conducting delineation fieldwork, HDR reviewed information from several sources, including the following:

- Aerial images of the Proposed Project area
- Topography and surface water maps from the U.S. Geological Survey
- National Hydric Soils List for Utah (USDA NRCS 2021a)
- U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps in geographic information systems (GIS) format
- U.S. Department of Agriculture, Natural Resources Conservation Service's (USDA NRCS) Web Soil Survey (USDA NRCS 2021b)
- USACE delineation manuals and delineation reference guides (described in Section 2.3, Delineation Procedures)

2.2 Delineation Survey Area Boundaries

All areas within the approximately 116-acre survey area were included in the delineation.

2.3 Delineation Procedures

HDR surveyed for wetlands and other waters of the United States on August 20, 2021. The delineation was conducted in accordance with the following delineation manuals and delineation reference guides:

- *Corps of Engineers Wetlands Delineation Manual* (USACE 1987)
- *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (*Arid West Regional Supplement*; USACE 2008)
- *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States: A Delineation Manual* (Lichvar and McColley 2008)
- *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Curtis and Lichvar 2010)
- USACE regulatory guidance letters and joint agency (USACE and EPA) regulations, policies, references, and guidance

HDR assessed the entire survey area to determine the presence or absence of aquatic features. The routine method was applied by selecting sampling point locations in the field. These sampling points were placed at locations where landform, vegetative, or hydrologic characteristics indicated the potential for wetlands. A minimum of one set of paired data points (one within a wetland and one just outside wetland boundaries) was established to help delineate each wetland or wetland complex. Additional data points were located as needed to help determine wetland boundaries.

HDR recorded detailed information about vegetation, soils, and hydrologic characteristics for each data point and used this information to determine whether an area qualifies as a wetland and to help identify the wetland boundaries. Photographs of aquatic resources in the survey area and sample locations identified by HDR are included as Appendix B, On-site Representative Photographs.

Based on information gathered from sample points and observable changes in elevation and plant communities, HDR mapped aquatic resource boundaries in the survey area through a combination of global positioning system (GPS)-based field mapping (using ArcGIS Collector and an iPad) and desktop digitization using Google Images files dated 2018. To produce aquatic resources delineation maps for the survey area, data were exported into GIS software (ArcGIS Pro 10.8.1). Appendix C, Aquatic Resources Delineation Map Series, provides the aquatic resources delineation maps. These data were also used to calculate the area of aquatic features in the survey area.

2.3.1 Wetlands

A determination of the occurrence of wetlands is based on the presence or absence of hydrophytic (wetland) vegetation, hydric (wetland) soils, and wetland hydrology. The presence of all three of the criteria is necessary for an area to be designated as a wetland unless problematic conditions or significant disturbance is identified and evaluated in accordance with delineation procedures. Wetland boundaries are considered to be a line across which the vegetation, soils, and hydrologic characteristics begin or cease to meet wetland criteria.

Vegetation

Hydrophytic vegetation includes plants that are adapted to grow in water, or in a substrate that is at least periodically deficient in oxygen as a result of excessive water contact. Hydrophytic vegetation indicators include a prevalence of hydrophytic vegetation (that is, a majority of dominant plant species that are facultative or obligate wetland plants as listed in the National Wetland Plant List [NWPL; Lichvar et al. 2016]) and morphological or physiological adaptations to saturated soil conditions. Table 1 lists the most recent NWPL indicator statuses assigned to plant species for the purpose of delineating wetlands (Lichvar et al. 2012).

Table 1. Wetland Indicator Status System

Indicator Status	Indicator Symbol	Definition
Obligate wetland	OBL	Plants that almost always occur in wetlands.
Facultative wetland	FACW	Plants that usually occur in wetlands but could occur in non-wetlands.
Facultative	FAC	Plants that occur in wetlands and non-wetlands.
Facultative upland	FACU	Plants that usually occur in non-wetlands but could occur in wetlands.
Upland plants	UPL	Plants that almost never occur in wetlands.
Not listed	NL	Plants that are not listed on the NWPL and therefore are assumed to be upland.

Source: Lichvar et al. 2012

HDR documented vegetation within a sample plot surrounding each sampling point location. Each polygon area was visually inspected, and plant species were identified. Vegetation was considered hydrophytic when over 50% of the dominant species had an indicator status of facultative (FAC), facultative wetland (FACW), or obligate (OBL) or when the prevalence index was less than 3.0 in cases where the dominance was less than or equal to 50%. To identify the appropriate indicator status of each plant species recorded, HDR referenced the version of the Arid West Regional Wetland Plant List (a subset of the NWPL) that was available for delineation fieldwork and analysis (Lichvar et al. 2016).

Soils

Hydric soils are soils that are saturated, flooded, or ponded for long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile. Anaerobic conditions favor the growth and regeneration of hydrophytic vegetation. Hydric soil indicators can include organic soils (histosols), mineral soils saturated and rich in organics (histic epipedons), sulfidic odor, low dissolved oxygen concentration (aquic moisture regime) and reducing conditions, gleyed and/or low chroma soils, soils listed on national, state, or local hydric soils lists, and iron and manganese concentrations close to the soil surface. HDR used a standard Munsell soil color chart to determine the soil matrix and mottle colors (Munsell Color 2009). In accordance with USACE methodology, soil profiles were investigated at sampling points in the survey area and were examined for indicators of hydric conditions.

Hydrology

The term *wetland hydrology* encompasses all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season. Areas with evident characteristics of wetland hydrology are those where the presence of water has an overriding influence on the characteristics of vegetation and soils due to anaerobic and reducing conditions, respectively. Wetland hydrology indicators include obvious characteristics such as surface water, soil saturation, and water table depth. Other indicators include soil cracking, a salt crust, drainage patterns, water-stained leaves, and the presence of oxidized rhizospheres. HDR evaluated hydrology at each sampling point in the survey area.

2.3.2 Other (Non-wetland) Aquatic Resources

This delineation also evaluated the presence of aquatic resources other than wetlands potentially subject to USACE's jurisdiction. In non-tidal areas, USACE maintains jurisdiction over areas below the OHWM in water features such as navigable streams, rivers, and lakes; interstate waters; and tributaries to navigable waters.

HDR delineated non-wetland aquatic features based on the presence of a bed and bank and an OHWM (Lichvar and McColley 2008; USACE 2005). Potentially jurisdictional non-wetland features were delineated along the OHWM. If a feature did not exhibit a bed and bank and an OHWM, and did not show distinct vegetation changes, it was not further evaluated as a potential aquatic resource or considered to be a potentially jurisdictional water.

3 Environmental Setting

The survey area is located on both sides of Bangerter Highway between about 1950 West and 3300 West and on both sides of 2700 West between about 13400 South and 14100 South in Riverton, Utah. The survey area consists primarily of residential and commercial development, disturbed upland plant communities, and agricultural land. Rose Creek flows throughout the extent of the survey area.

The survey area is part of the Central Basin and Range ecoregion in the Moist Wasatch Front Footslopes subregion (Woods et al. 2001). The average annual precipitation in the survey area is 18.57 inches, and the average annual snowfall is 47 inches (U.S. Climate Data 2021).

3.1 National Wetlands Inventory Wetland Mapping

NWI maps provide data regarding wetlands and deepwater habitats, such as lakes and streams, categorized by the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin Classification System; Cowardin et al. 1979). NWI data are based primarily on the interpretation of high-altitude images and do not represent regulatory boundaries.

Appendix D, National Wetlands Inventory Map Series, provides a map series that shows NWI data across the survey area. These maps identify multiple potential riverine and open-water features in the survey area.

3.2 Existing Field Conditions

The delineation field reconnaissance was conducted on August 20, 2021.

Weather data for the survey area were obtained from historical records collected in Salt Lake City, Utah (National Weather Service 2021). During the field survey, temperatures ranged from 54 to 76 degrees Fahrenheit, with no measurable precipitation and mostly sunny to partly cloudy skies. However, the area had above-average precipitation on August 18 and 19, the two days prior to the field survey. Salt Lake City typically receives an average of 0.58 inch of precipitation in August, but a total of 2.29 inches fell in August 2021, including 0.81 inch on August 18 and 0.34 inch on August 19. Therefore, the photographs taken during the field survey, especially of Rose Creek, show evidence of these high-precipitation events.

The survey area is located in the Jordan River watershed in the Great Basin Region Watershed, hydrologic unit code 16020204 (USGS 2021). Rose Creek is located in the survey area and is a tributary to the Jordan River. The Jordan River flows from Utah Lake north through the Salt Lake Valley where it drains to the Great Salt Lake. The Great Salt Lake is considered a traditional navigable water under 33 Code of Federal Regulations Section 328.3(a)(1) (UtahCleanWater.org, no date).

3.2.1 General Soil Conditions

The survey area has a variety of soil types, none of which are listed as hydric in the *Soil Survey of Utah* (USDA NRCS 2021a). Table 2 lists the four soil types that were identified in the survey area. Soil map unit boundaries for the survey area are provided in Appendix E, USDA NRCS Soil Map Series (USDA NRCS 2021b).

Table 2. Soil Types Identified in the Survey Area

Soil Name	Map Unit Symbol	Acreage
Bluffdale silty clay loam, 1 to 3 percent slopes	BnB	49.1
Kearns silt loam, 1 to 3 percent slopes	KaB	30.8
Lakewin sandy loam, 0 to 1 percent slopes	LaA	1.0
Taylorsville silty clay loam, 1 to 3 percent slopes	TaB	35.0
Total		**115.9**

3.2.2 General Plant Community Types

In general, the survey area consists primarily of residential and commercial development, disturbed uplands roadsides, and agricultural land. Rose Creek flows throughout the extent of the survey area.

Upland and agricultural areas consist primarily of a mix of native and introduced grasses and forbs. Cheatgrass (*Bromus tectorum*) and burning bush (*Bassia scoparia*) are present throughout the survey area.

Common plant species that are present along Rose Creek include barnyardgrass (*Echinochloa crus-galli*), curly dock (*Rumex crispus*), and two-scale saltbush (*Atriplex micrantha*). Broadleaf cattail (*Typha latifolia*), common reed (*Phragmites australis*), and saltcedar (*Tamarix ramosissima*) grow on the banks of the Utah & Salt Lake Canal. All hydrophytic vegetation was growing below the OHWM or sporadically as narrow fringes of vegetation along the banks of Rose Creek and the Utah & Salt Lake Canal.

4 Results

Section 4 describes the results of the aquatic resources delineation. The maps in Appendix C, Aquatic Resources Delineation Map Series, show the aquatic resource areas in the survey area and the locations of wetland delineation sampling points. On-site photographs are provided in Appendix B, On-site Representative Photographs.

The entire delineation survey area is about 116 acres and contains a total of 0.54 acre of aquatic resources. These resources consist of 0.45 acre (2,902 linear feet) of perennial stream, 0.05 acre (117 linear feet) of canals, and 0.04 acre (609 linear feet) of ditches. Table 3, Aquatic Resources Summary, on page 8 summarizes all of the aquatic resource features that were delineated by HDR. The following subsections describe the delineated features by each aquatic resource type.

4.1 Wetlands

No wetlands were delineated in the survey area.

4.2 Other (Non-wetland) Aquatic Resources

One perennial stream, one canal, and two ditch features were identified in the survey area.

4.2.1 Perennial Streams

Perennial Stream Segments P-1a, P-1b, P-1c, P-1d, and P-1e (Rose Creek). Perennial stream P-1, also known as Rose Creek, runs through the extent of the survey area and is represented by five segments (P-1a, P-1b, P-1c, P-1d, and P-1e) totaling 0.45 acre (2,902 linear feet). The channel width to the OHWM at representative transects averaged 8 feet. The lateral extent of the OHWM was indicated by physical characteristics including breaks in bank slopes, changes in vegetation cover and species, changes in sediment texture, and flow observations. Rose Creek (stream P-1) is a tributary to the Jordan River. The Jordan River is a tributary to the Great Salt Lake, a traditional navigable water (TNW); therefore, this stream would be considered jurisdictional.

4.2.2 Canals

Canal Segments C-1a and C-1b (Utah & Salt Lake Canal). Canal C-1, also known as the Utah & Salt Lake Canal, is represented by two segments in the survey area (C-1a and C-1b) totaling 0.05 acre (117 linear feet). The channel width to the OHWM at representative transects averaged 15 feet. The lateral extent of the OHWM was indicated by physical characteristics including breaks in bank slopes, changes in vegetation cover and species, and flow observations. The Utah & Salt Lake Canal (canal C-1) is a diversion of the Jordan River in Bluffdale, Utah, and travels through the Salt Lake Valley where it connects with the C-7 Ditch near Magna, Utah. The C-7 Ditch continues north and drains into the Great Salt Lake, a TNW. Since canal C-1 carries water from a tributary to a TNW and reconnects with a tributary to a TNW, this canal would be considered jurisdictional.

4.2.3 Ditches

Ditch D-1. Ditch D-1 totals <0.01 acre (59 linear feet), and the channel width averaged 1 foot. The lateral extent of the OHWM was indicated by physical characteristics including breaks in bank slopes and changes in vegetation cover and species. Ditch D-1 is located in an agricultural field and is controlled by a headgate, so it is likely an irrigation ditch. Because it does not appear to have a relatively permanent flow or a connection to a TNW or a tributary of a TNW, this ditch would not be considered jurisdictional.

Ditch D-2. Ditch D-2 totals 0.03 acre (550 linear feet). The channel width to the OHWM averaged 3 feet. The lateral extent of the OHWM was indicated by physical characteristics including breaks in bank slopes, changes in vegetation species, and flow observations. Ditch D-2, which carries a relatively permanent flow, begins from a culvert running underneath 2700 West and about 13900 South and continues east beyond the survey area where it drains into the Utah & Salt Lake Canal. The Utah & Salt Lake Canal is a tributary to the Great Salt Lake, a TNW. Given that ditch D-2 carries relatively permanent flow and is connected to a tributary of a TNW, this ditch would be considered jurisdictional.

Table 3. Aquatic Resources Summary

Aquatic Resource Feature Name	Cowardin Classification[a]	Size (acres)	Length (feet)	Latitude[b]	Longitude[b]	Map Sheet Number(s)[c]
Perennial Streams						
P-1a	R	0.02	133	40.501859 40.501864	–111.958510 –111.958041	4
P-1b	R	0.02	175	40.501771 40.501294	–111.957909 –111.957911	4
P-1c	R	0.02	201	40.501101 40.500562	–111.957923 –111.957919	4
P-1d	R	0.24	1,065	40.499968 40.499981	–111.957411 –111.953613	4,5
P-1e	R	0.15	1,328	40.499963 40.500189	–111.953119 –111.948406	5
Canals						
C-1a	R	0.03	66	40.500685 40.500524	–111.953414 –111.953339	5
C-1b	R	0.02	51	40.500014 40.499881	–111.953355 –111.953376	5
Ditches						
D-1	R	<0.01	59	40.497073 40.496915	–111.960090 –111.960079	7
D-2	R	0.03	550	40.498660 40.498660	–111.957539 –111.955549	7,8

[a] Codes from *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979): R (Riverine).

[b] Two sets of coordinates are included for long, linear features. The top row provides the uppermost (upstream) location of the feature in the survey area, and the bottom row provides the lowest downstream location of the feature in the survey area.

[c] See Appendix C, Aquatic Resources Delineation Map Series.

5 Delineation Summary

All areas in the delineation survey area were assessed to determine the presence or absence of aquatic resources, including wetlands and other waters, in accordance with the procedures and guidelines established by USACE. There is a total of 0.77 acre of aquatic resources in the survey area. These resources consist of 0.45 acre (2,902 linear feet) of perennial stream, 0.05 acre (117 linear feet) of canals, and 0.04 acre (609 linear feet) of ditches. All features recorded and mapped are included in Appendix C, Aquatic Resources Delineation Map Series.

Table 3 above summarizes all delineated aquatic resource features in the survey area. Features are ordered by resource type and then by their locations on the map sheets in Appendix C. Table 4 summarizes the criteria and rationale for the jurisdictional determination for each feature, subject to USACE's review and concurrence.

Table 4. Criteria and Rationale for Jurisdictional Determination for Each Aquatic Resource Feature in the Survey Area[a]

Aquatic Resource Feature Name	Size (acres)	Length (feet)	Map Sheet Number(s)[b]	Criteria and Rationale for Jurisdictional Determination
Perennial Streams				
P-1a, P-1b, P-1c, P-1d, P-1e (Rose Creek)	0.45	2,902	4,5	Rose Creek (stream P-1) is a tributary to the Jordan River. The Jordan River is a tributary to the Great Salt Lake, a TNW; therefore, this stream would be considered jurisdictional.
Canals				
C-1a, C-1b (Utah & Salt Lake Canal)	0.05	117	5	The Utah & Salt Lake Canal (canal C-1) is a diversion of the Jordan River in Bluffdale, Utah, and travels through the Salt Lake Valley where it connects with the C-7 Ditch near Magna, Utah. The C-7 Ditch continues north and drains into the Great Salt Lake, a TNW. Since canal C-1 carries water from a TNW and reconnects to a tributary to a TNW, this canal would be considered jurisdictional.
Ditches				
D-1	<0.01	59	7	Ditch D-1 is located in an agricultural field and is controlled by a headgate, so it is likely an irrigation ditch. Because it does not appear to have a relatively permanent flow or a connection to a TNW or a tributary of a TNW, this ditch would not be considered jurisdictional.
D-2	0.03	550	7,8	Ditch D-2, which carries a relatively permanent flow, begins from a culvert running underneath 2700 West and 13900 South and continues east beyond the survey area where it drains into the Utah & Salt Lake Canal. The Utah & Salt Lake Canal is a tributary to the Great Salt Lake, a TNW. Given that ditch D-2 carries relatively permanent flow and is connected to a tributary of a TNW, this ditch would be considered jurisdictional.

[a] The criteria and rationale presented in this table are subject to USACE's review and concurrence.
[b] See Appendix C, Aquatic Resources Delineation Map Series.

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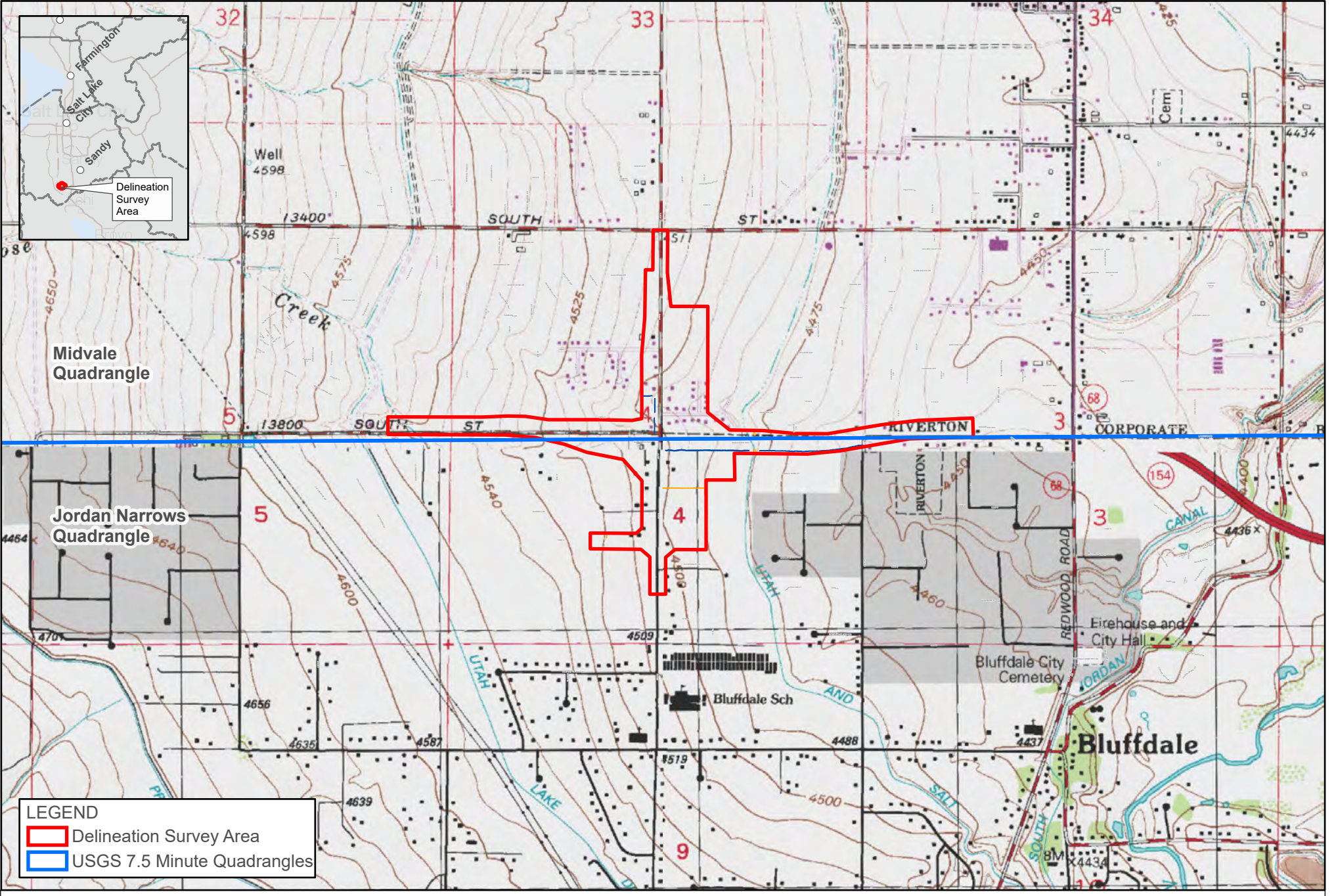
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APPENDIX A

Project Location Overview Map



DATA SOURCES:
Imagery: State of Utah Topo Basemap
PLSS: State of Utah

PROJECTION:
Utah Stateplane Central

CARTOGRAPHERS: HDR

0 0.25 0.5 Miles

18808: Bangerter Environmental - 2700 West

Project Location Overview Map

APPENDIX B

On-site Representative Photographs

P-1a (Rose Creek)



P-1b (Rose Creek)



P-1c (Rose Creek)



P-1d (Rose Creek)



P-1e (Rose Creek)



Canal C-1a
(Utah & Salt Lake Canal)

No photos available.

Canal C-1b
(Utah & Salt Lake Canal)



Ditch D-1

No photos available.

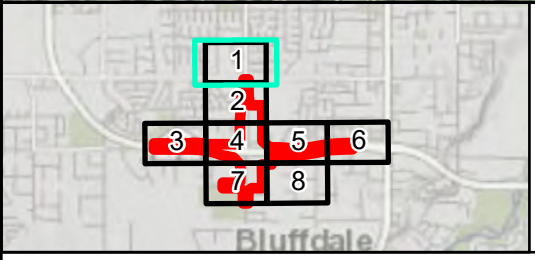
Ditch D-2



APPENDIX C

Aquatic Resources Delineation Map Series





LEGEND

Delineation Survey Area

DATA SOURCES:
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Google Imagery (2018)

PROJECTION:
Utah Stateplane Central

CARTOGRAPHERS: HDR

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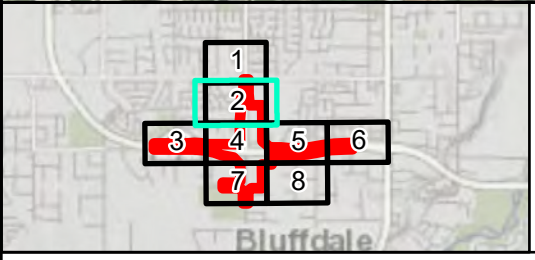
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18808: Bangerter Environmental - 2700 West

Aquatic Resources Delineation Map Series

Figure 1 of 8





LEGEND

Delineation Survey Area

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Aerial Imagery: State of Utah
Google Imagery (2018)

PROJECTION:
Utah Stateplane Central

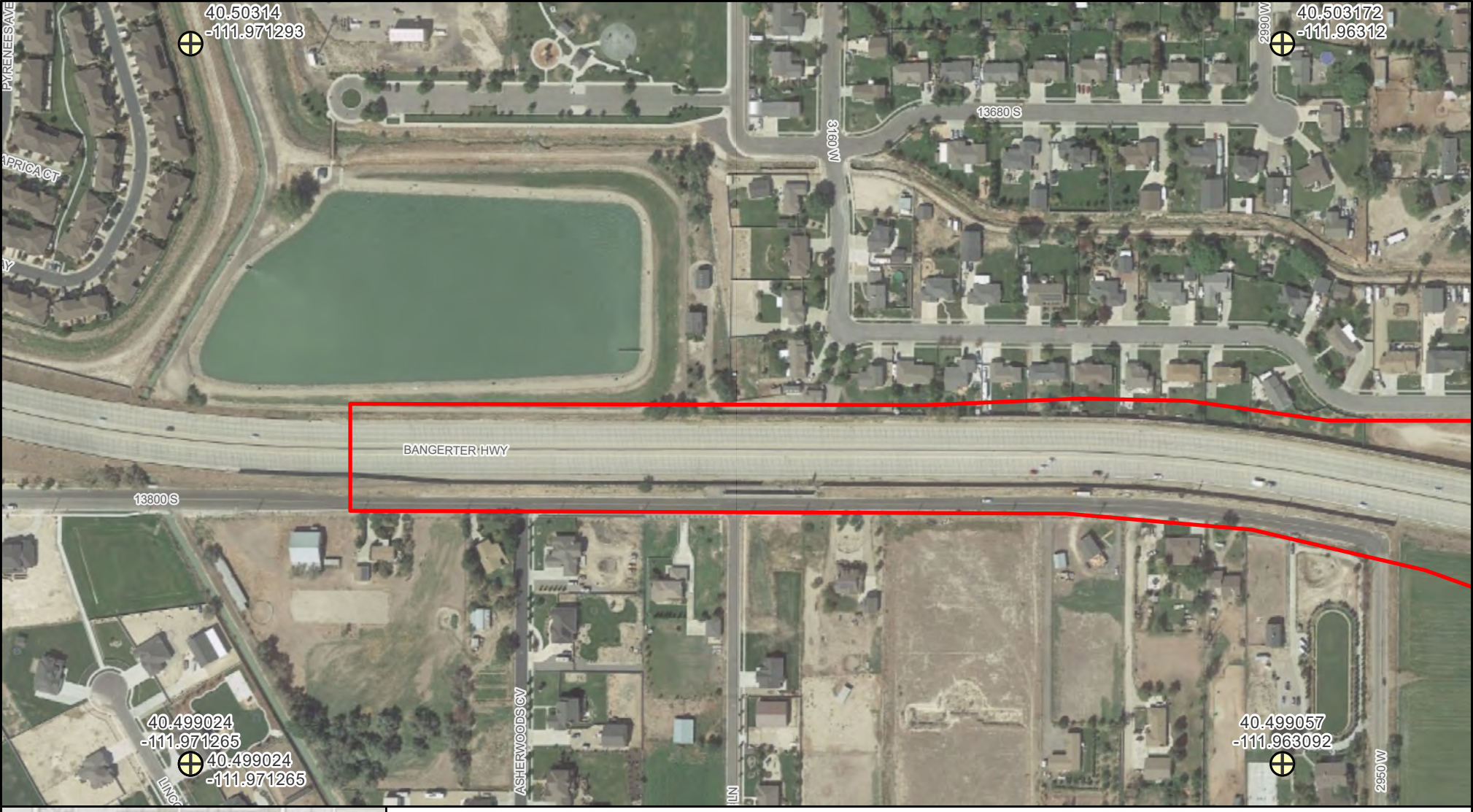
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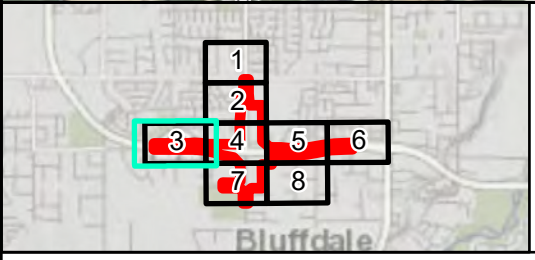
0 Feet 250

1 inch equals 250 feet

18808: Bangerter Environmental - 2700 West

Aquatic Resources Delineation Map Series





LEGEND

Delineation Survey Area

DATA SOURCES:
Aerial Imagery: State of Utah
Google Imagery (2018)

PROJECTION:
Utah Stateplane Central

CARTOGRAPHERS: HDR

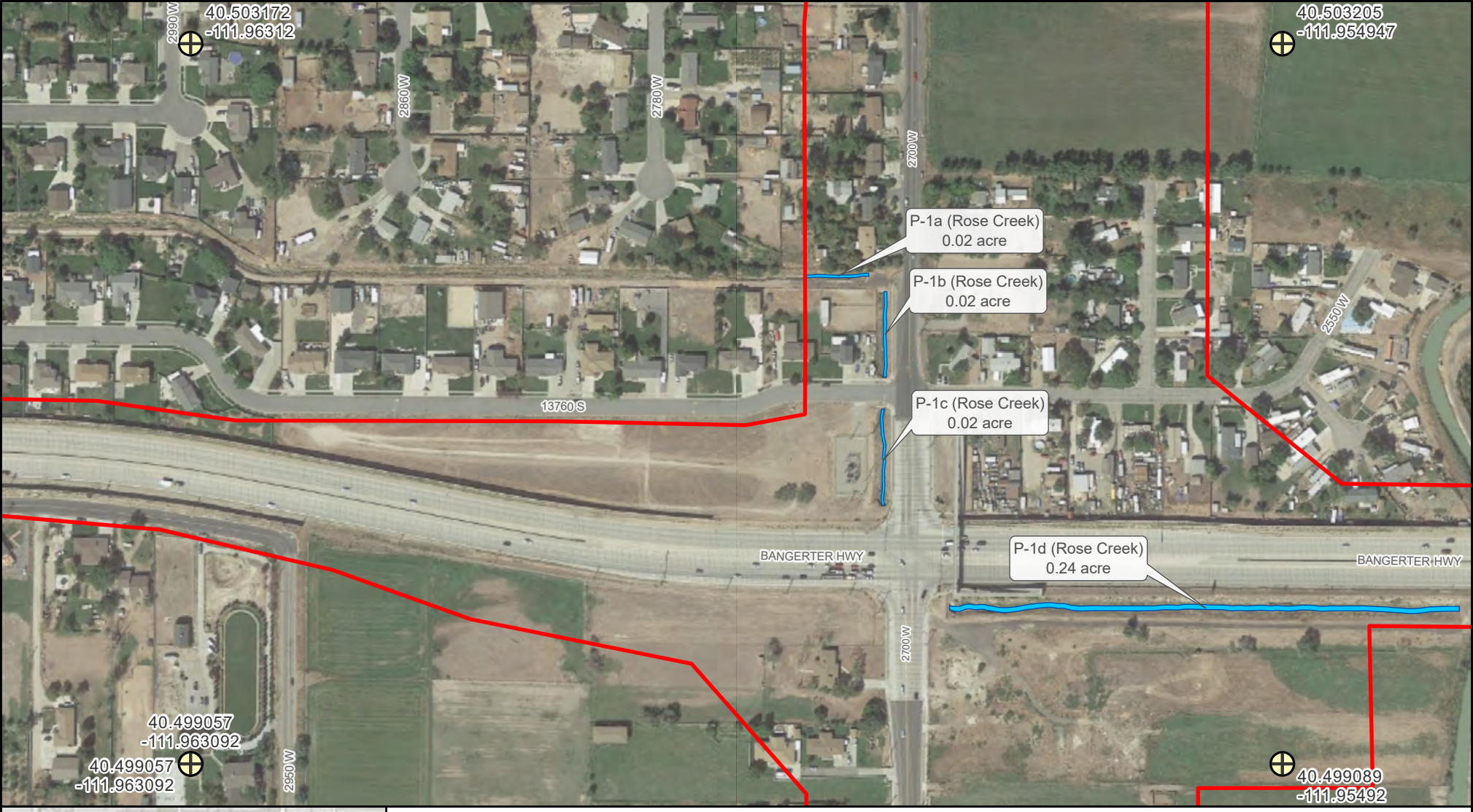
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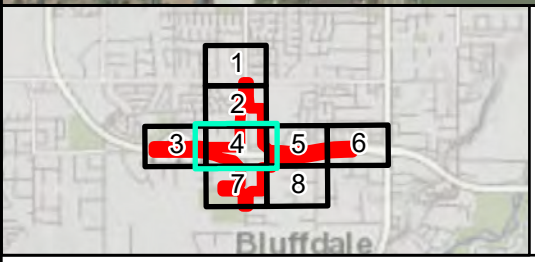
1 inch equals 250 feet

18808: Bangerter Environmental - 2700 West

Aquatic Resources Delineation Map Series

Figure 3 of 8





LEGEND

Delineation Survey Area

DATA SOURCES:
Aerial Imagery: State of Utah
Google Imagery (2018)

PROJECTION:
Utah Stateplane Central

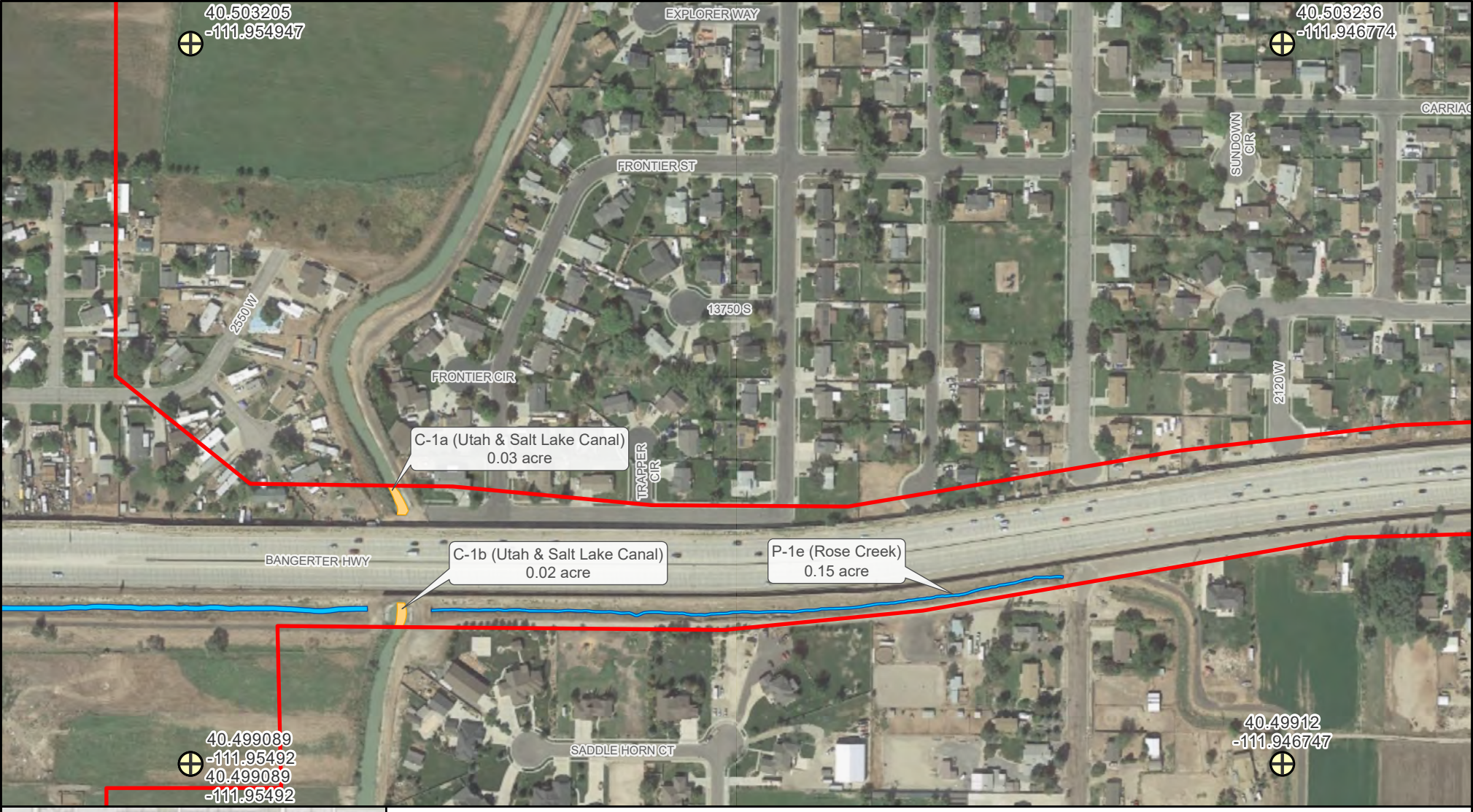
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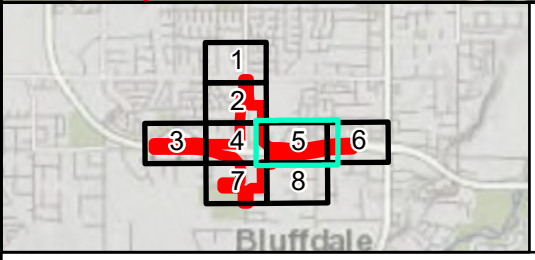
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1 inch equals 250 feet

18808: Bangerter Environmental - 2700 West

Aquatic Resources Delineation Map Series





LEGEND

Delineation Survey Area

DATA SOURCES:
Aerial Imagery: State of Utah
Google Imagery (2018)

PROJECTION:
Utah Stateplane Central

CARTOGRAPHERS: HDR

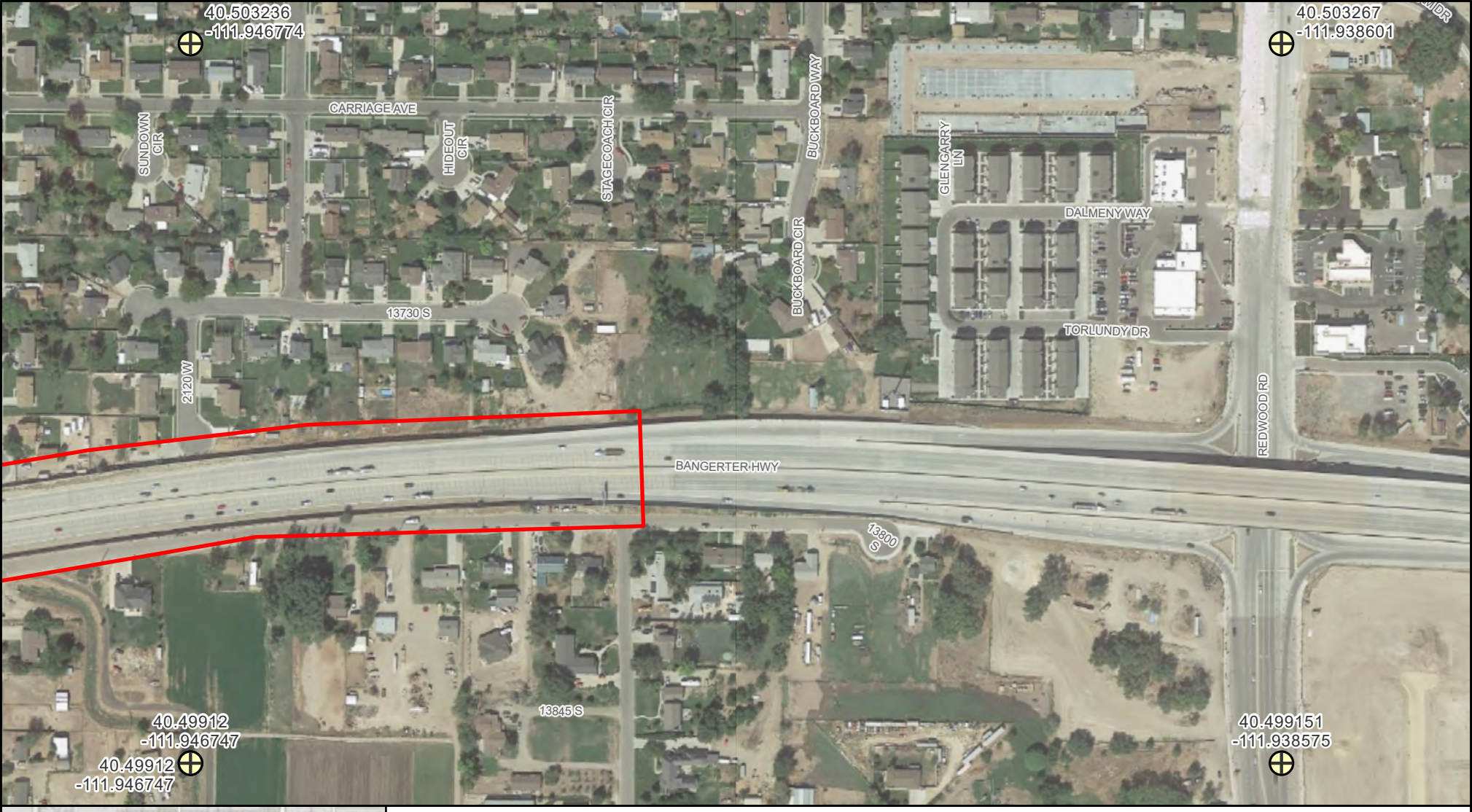
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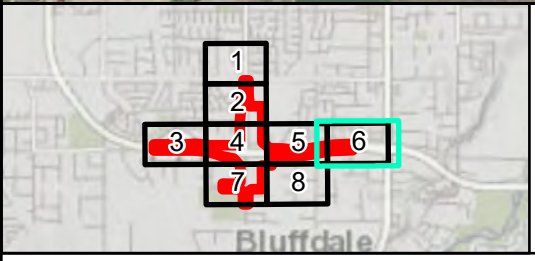
1 inch equals 250 feet

18808: Bangerter Environmental - 2700 West

Aquatic Resources Delineation Map Series

Figure 5 of 8





LEGEND

Delineation Survey Area

DATA SOURCES:
Aerial Imagery: State of Utah
Google Imagery (2018)

PROJECTION:
Utah Stateplane Central

CARTOGRAPHERS: HDR

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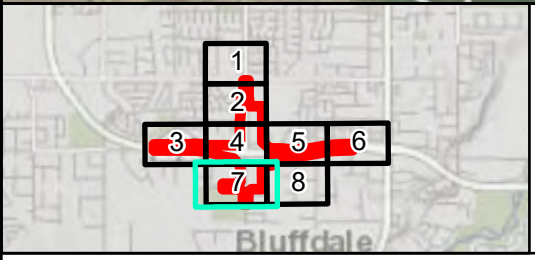
1 inch equals 250 feet

18808: Bangerter Environmental - 2700 West

Aquatic Resources Delineation Map Series

Figure 6 of 8





LEGEND

Delineation Survey Area

DATA SOURCES:
Aerial Imagery: State of Utah
Google Imagery (2018)

PROJECTION:
Utah Stateplane Central

CARTOGRAPHERS: HDR

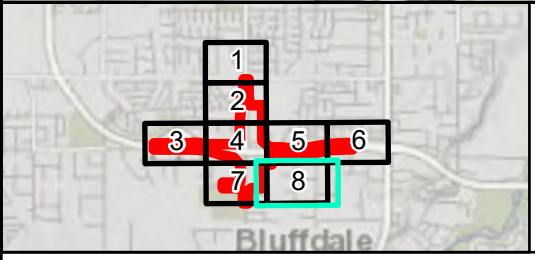
0 Feet 250

1 inch equals 250 feet

18808: Bangerter Environmental - 2700 West

Aquatic Resources Delineation Map Series





LEGEND

Delineation Survey Area

DATA SOURCES:
Aerial Imagery: State of Utah
Google Imagery (2018)

PROJECTION:
Utah Stateplane Central

CARTOGRAPHERS: HDR

0 Feet 250

1 inch equals 250 feet

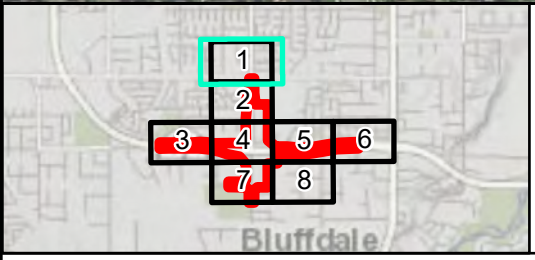
18808: Bangerter Environmental - 2700 West

Aquatic Resources Delineation Map Series

APPENDIX D

National Wetlands Inventory Map Series





LEGEND

Delineation Survey Area

DATA SOURCES:
NWI: U.S. Fish & Wildlife Service
Aerial Imagery: State of Utah
Google Imagery (2018)

PROJECTION:
Utah Stateplane Central

CARTOGRAPHERS: HDR

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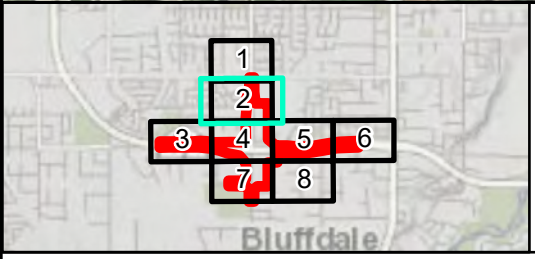
1 inch equals 250 feet

18808: Bangerter Environmental - 2700 West

National Wetlands Inventory Map Series

Figure 1 of 8





LEGEND

Delineation Survey Area

DATA SOURCES:
NWI: U.S. Fish & Wildlife Service
Aerial Imagery: State of Utah
Google Imagery (2018)

PROJECTION:
Utah Stateplane Central

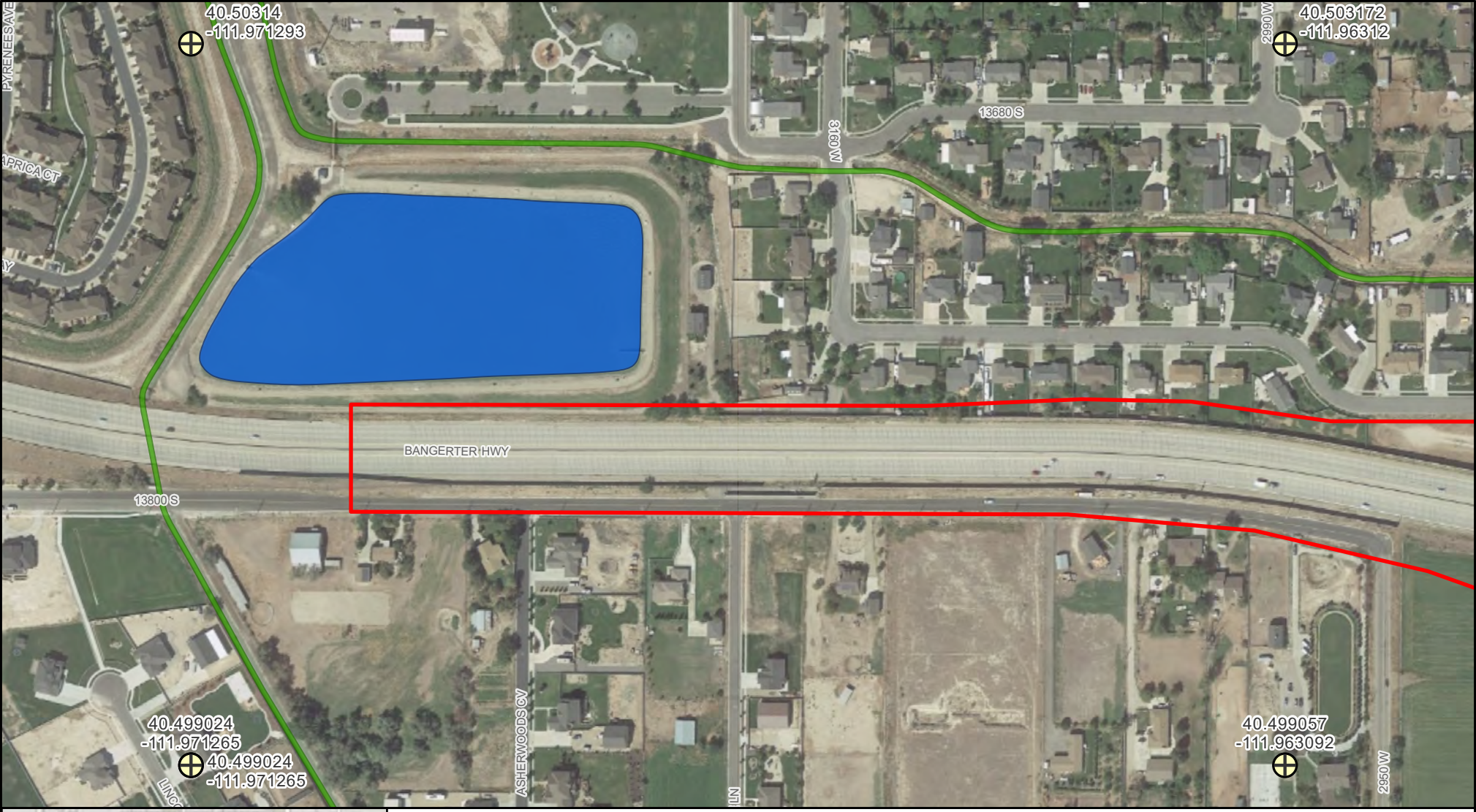
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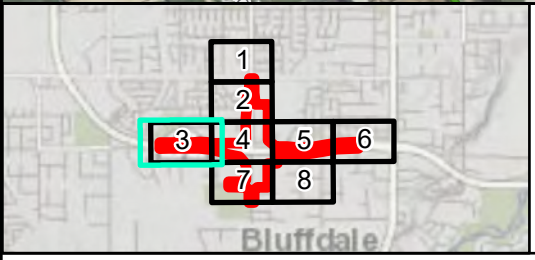
0 Feet 250

1 inch equals 250 feet

18808: Bangerter Environmental - 2700 West

National Wetlands Inventory Map Series





LEGEND

- Delineation Survey Area
- Intermittent riverine
- Palustrine

DATA SOURCES:
NWI: U.S. Fish & Wildlife Service
Aerial Imagery: State of Utah
Google Imagery (2018)

PROJECTION:
Utah Stateplane Central

CARTOGRAPHERS: HDR

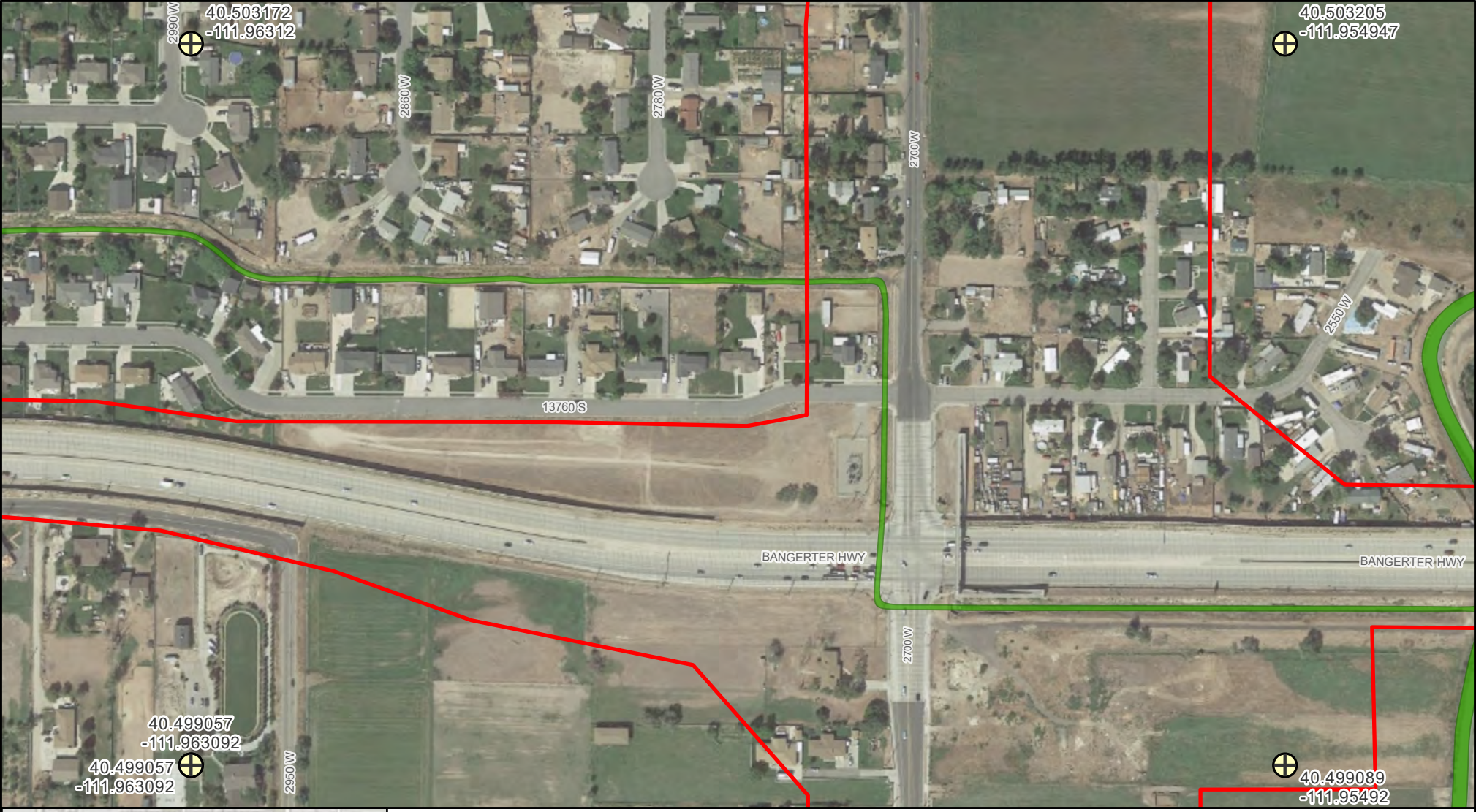
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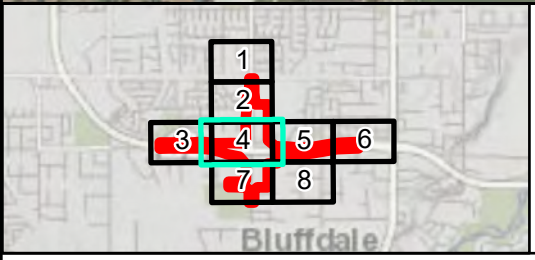
1 inch equals 250 feet

18808: Bangerter Environmental - 2700 West

National Wetlands Inventory Map Series

Figure 3 of 8





LEGEND

Delineation Survey Area

Intermittent riverine

DATA SOURCES:
NWI: U.S. Fish & Wildlife Service
Aerial Imagery: State of Utah
Google Imagery (2018)

PROJECTION:
Utah Stateplane Central

CARTOGRAPHERS: HDR

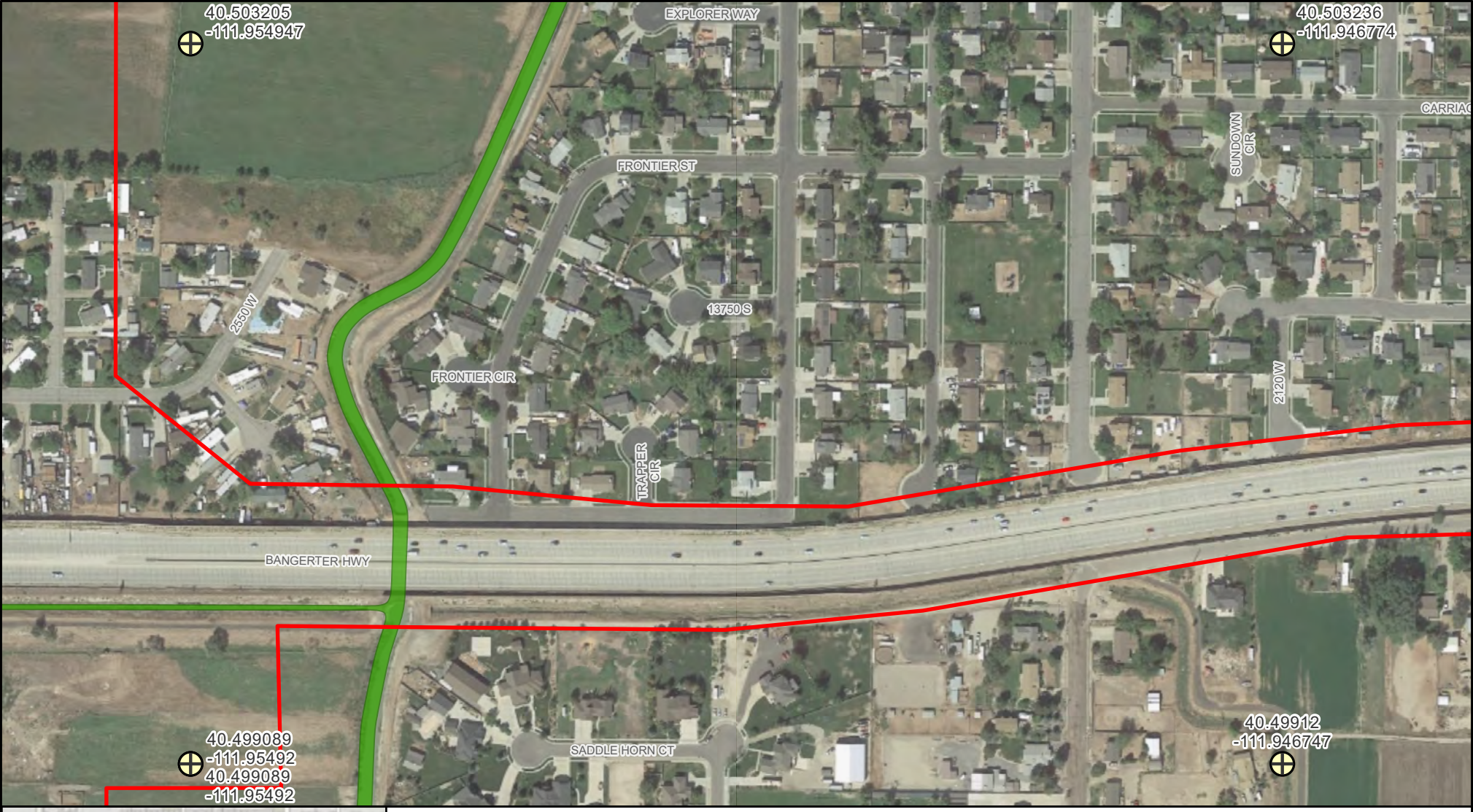
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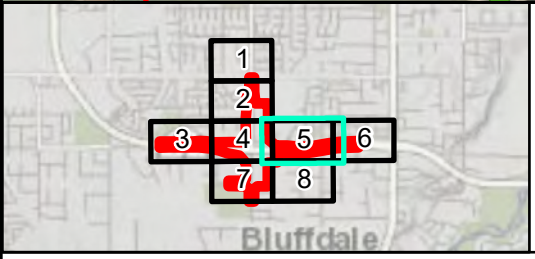
1 inch equals 250 feet

18808: Bangerter Environmental - 2700 West

National Wetlands Inventory Map Series

Figure 4 of 8





LEGEND

Delineation Survey Area

Intermittent riverine

DATA SOURCES:
NWI: U.S. Fish & Wildlife Service
Aerial Imagery: State of Utah
Google Imagery (2018)

PROJECTION:
Utah Stateplane Central

CARTOGRAPHERS: HDR

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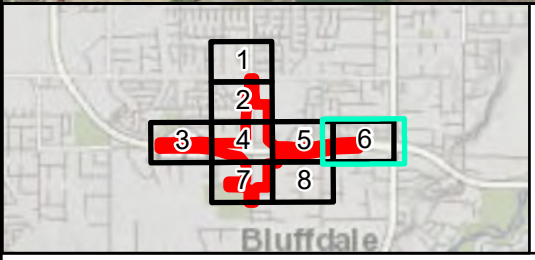
1 inch equals 250 feet

18808: Bangerter Environmental - 2700 West

National Wetlands Inventory Map Series

Figure 5 of 8





LEGEND

Delineation Survey Area

DATA SOURCES:
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Aerial Imagery: State of Utah
Google Imagery (2018)

PROJECTION:
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CARTOGRAPHERS: HDR

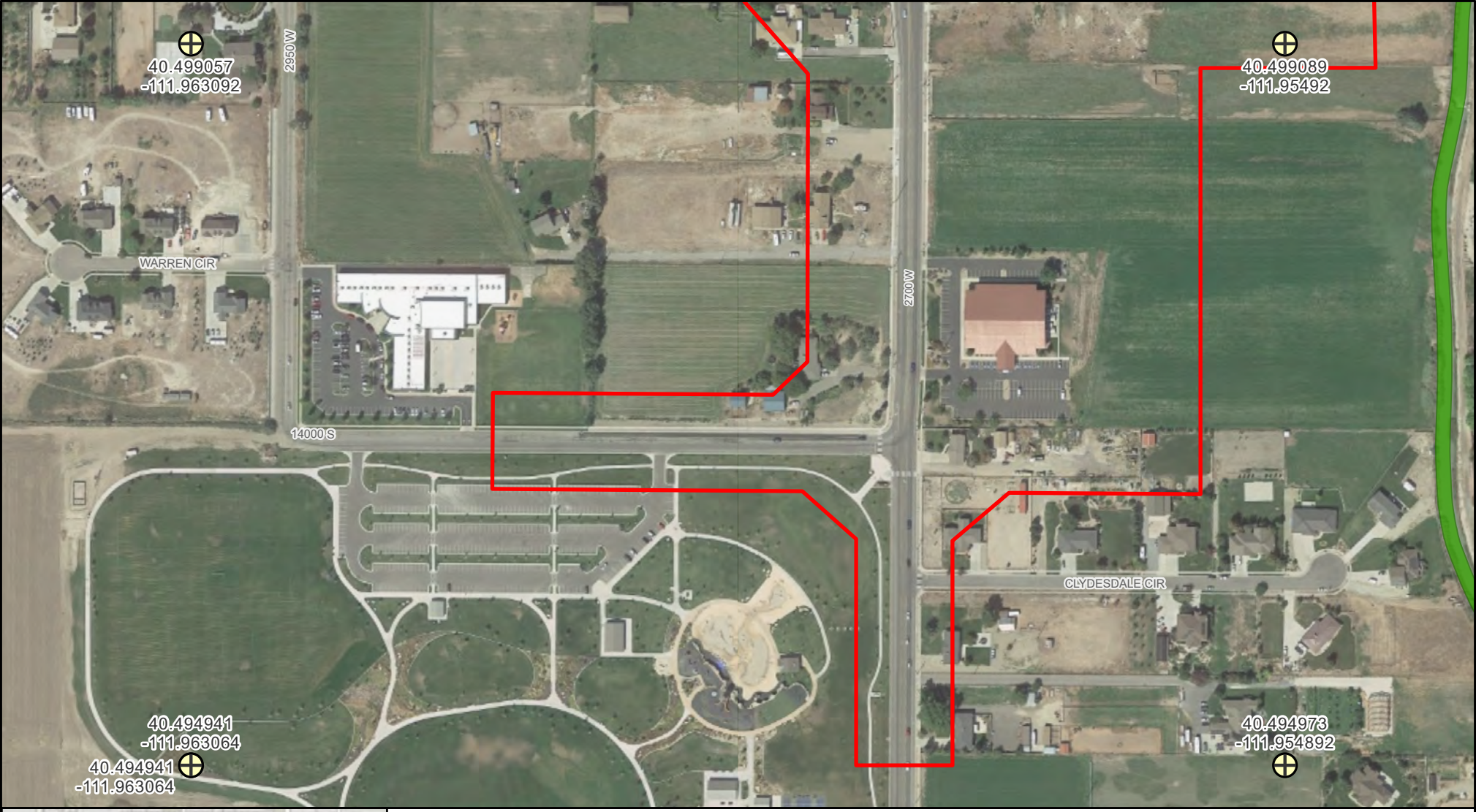
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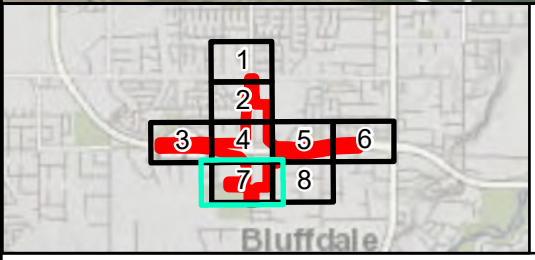
1 inch equals 250 feet

18808: Bangerter Environmental - 2700 West

National Wetlands Inventory Map Series

Figure 6 of 8





LEGEND

Delineation Survey Area

Intermittent riverine

DATA SOURCES:
NWI: U.S. Fish & Wildlife Service
Aerial Imagery: State of Utah
Google Imagery (2018)

PROJECTION:
Utah Stateplane Central

CARTOGRAPHERS: HDR

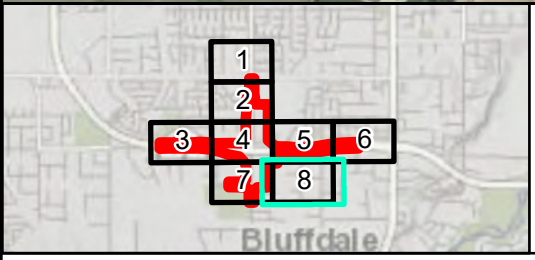
0 Feet 250

1 inch equals 250 feet

18808: Bangerter Environmental - 2700 West

National Wetlands Inventory Map Series





LEGEND

- Delineation Survey Area
- Intermittent riverine

DATA SOURCES:
NWI: U.S. Fish & Wildlife Service
Aerial Imagery: State of Utah
Google Imagery (2018)

PROJECTION:
Utah Stateplane Central

CARTOGRAPHERS: HDR

0 Feet 250

1 inch equals 250 feet

18808: Bangerter Environmental - 2700 West

National Wetlands Inventory Map Series

Figure 8 of 8

APPENDIX E

USDA NRCS Soil Map Series

United States Department of Agriculture

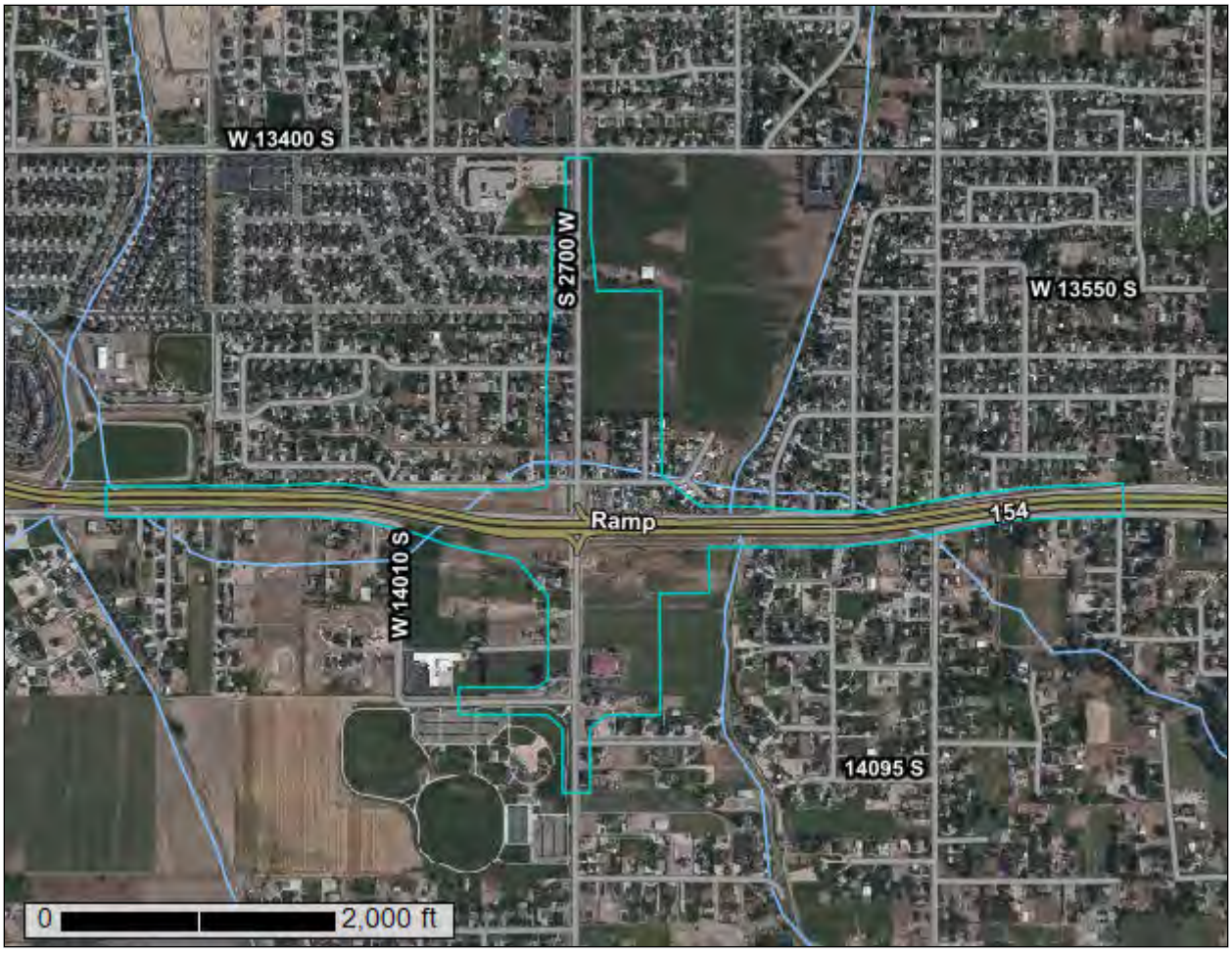
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Salt Lake Area, Utah

Bangerter 2700 W Interchange



September 17, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Soil Map.....9
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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

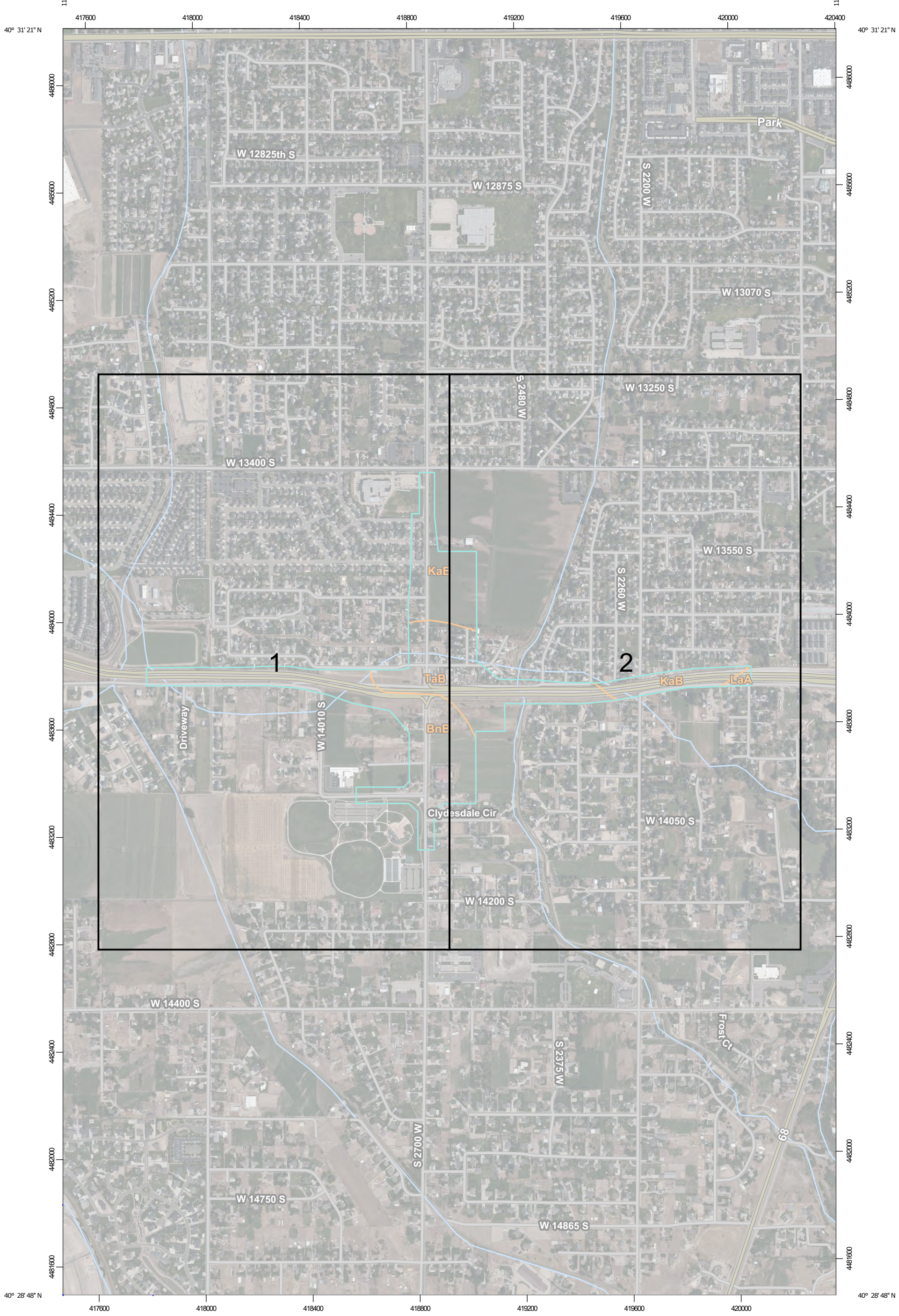
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map
Index Sheet



Map Scale: 1:13,200 if printed on B portrait (11" x 17") sheet.

N

Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84


111° 58' 19" W
111° 57' 24" W
40° 30' 39" N
40° 29' 29" N
417700
417900
418100
418300
418500
418700
418900
4484800
4484600
4484400
4484200
4484000
4483800
4483600
4483400
4483200
4483000
4482800
S 3300 W
W 13400 S
Forest Meadow Dr
S 2900 W
KaB
W 13640 S
S 3200 W
W 13680 S
S 2700 W
TaB
W 13760 S
154
W 13800 S
Ramp
BnB
W 14010 S
W 13940 S
Country Classic Dr
Joins sheet 2
Soil Map may not be valid at this scale.
Map Scale: 1:6,000 if printed on B portrait (11" x 17") sheet.
Meters
0 50 100 200 300
Feet
0 250 500 1000 1500
N
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84
1
Map Sheet Location

Custom Soil Resource Report
Soil Map
Map sheet 2 of 2

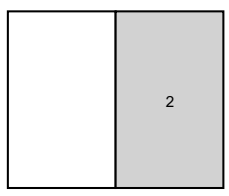


Map Scale: 1:6,000 if printed on B portrait (11" x 17") sheet.

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84



Map Sheet Location

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Salt Lake Area, Utah
Survey Area Data: Version 13, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 5, 2018—Sep 14, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BnB	Bluffdale silty clay loam, 1 to 3 percent slopes	49.1	42.3%
KaB	Kearns silt loam, 1 to 3 percent slopes	30.8	26.6%
LaA	Lakewin sandy loam, 0 to 1 percent slopes	1.0	0.9%
TaB	Taylorsville silty clay loam, 1 to 3 percent slopes	35.0	30.2%
Totals for Area of Interest		**115.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Salt Lake Area, Utah

BnB—Bluffdale silty clay loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: j6gs
Elevation: 4,400 to 4,700 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 49 to 51 degrees F
Frost-free period: 130 to 150 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Bluffdale and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluffdale

Setting

Landform: Lake terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Lacustrine deposits

Typical profile

Ap - 0 to 9 inches: silty clay loam
B1t - 9 to 16 inches: silty clay loam
B21t - 16 to 22 inches: silty clay
B22tca - 22 to 31 inches: silty clay
C1ca - 31 to 40 inches: silty clay
C2&C3 - 40 to 62 inches: silty clay loam

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: R028AY310UT - Upland Loam (Bonneville Big Sagebrush) North
Other vegetative classification: Upland Loam (Mountain Big Sagebrush) (028AY310UT)

Hydric soil rating: No

Minor Components

Bramwell
Percent of map unit: 3 percent

Kearns
Percent of map unit: 3 percent

Hillville
Percent of map unit: 3 percent

Harrisville
Percent of map unit: 3 percent

Taylorsville
Percent of map unit: 3 percent

KaB—Kearns silt loam, 1 to 3 percent slopes

Map Unit Setting
National map unit symbol: j6jd
Elevation: 4,400 to 4,700 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 155 to 180 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition
Kearns and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kearns

Setting
Landform: Alluvial fans
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium

Typical profile
Ap - 0 to 12 inches: silt loam
A1 - 12 to 17 inches: silt loam
B21 - 17 to 24 inches: silt loam
B22 - 24 to 30 inches: silty clay loam
C1ca - 30 to 42 inches: silty clay loam
IIC2&C3 - 42 to 60 inches: gravelly sandy loam

Properties and qualities
Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups
Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: C
Ecological site: R028AY310UT - Upland Loam (Bonneville Big Sagebrush) North
Other vegetative classification: Upland Loam (Mountain Big Sagebrush) (028AY310UT)
Hydric soil rating: No

Minor Components

Parleys
Percent of map unit: 4 percent

Bingham
Percent of map unit: 4 percent

Redrock
Percent of map unit: 4 percent

Lakewin
Percent of map unit: 3 percent

LaA—Lakewin sandy loam, 0 to 1 percent slopes

Map Unit Setting
National map unit symbol: j6jt
Elevation: 4,400 to 4,500 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 150 to 160 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Lakewin and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lakewin

Setting
Landform: Lake terraces

Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Lacustrine deposits

Typical profile

Ap - 0 to 10 inches: sandy loam
A1 - 10 to 18 inches: gravelly sandy loam
B2 - 18 to 25 inches: very gravelly sandy loam
IIC1ca - 25 to 44 inches: very gravelly loamy coarse sand
IIC2ca - 44 to 64 inches: very gravelly coarse sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Ecological site: R028AY306UT - Upland Gravelly Loam (Bonneville Big Sagebrush)
Hydric soil rating: No

Minor Components

Kearns

Percent of map unit: 5 percent

Kidman

Percent of map unit: 5 percent

Deckerman

Percent of map unit: 5 percent

TaB—Taylorsville silty clay loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: j6kx
Elevation: 4,300 to 4,500 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F

Frost-free period: 160 to 180 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Taylorsville and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Taylorsville

Setting

Landform: Lake terraces, lake plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Lacustrine deposits

Typical profile

Ap - 0 to 7 inches: silty clay loam
Ac - 7 to 17 inches: silty clay loam
C1ca - 17 to 27 inches: silty clay loam
C2ca - 27 to 37 inches: silty clay loam
C3 - 37 to 59 inches: silty clay loam

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: High (about 10.0 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R028AY310UT - Upland Loam (Bonneville Big Sagebrush) North
Other vegetative classification: Upland Loam (Mountain Big Sagebrush) (028AY310UT)
Hydric soil rating: No

Minor Components

Taylorsville

Percent of map unit: 4 percent

Kidman

Percent of map unit: 4 percent

Harrisville

Percent of map unit: 4 percent

Pharo

Percent of map unit: 3 percent

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Appendix D: Environmental Resources

Noise Study

BANGERTER HIGHWAY AT 2700 WEST INTERSECTION IMPROVEMENTS NOISE STUDY

PIN: 18808
PROJECT NUMBER: S-0154(92)0

PREPARED FOR:
Utah Department of Transportation

PREPARED BY:
HDR, Inc.

March 2022

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ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
dBA	A-weighted decibels
deg. F	degrees Fahrenheit
EB	eastbound
FHWA	Federal Highway Administration
GPS	global positioning system
L_{eq}	equivalent noise level
LOS	level of service
min.	minutes
ML	monitoring location
mph	miles per hour
N/A	not applicable
NAC	noise-abatement criteria
NB	northbound
SB	southbound
TNM	Traffic Noise Model
UDOT	Utah Department of Transportation
WB	westbound

NOISE STUDY

1.0 INTRODUCTION

This Noise Analysis was prepared in accordance with the Utah Department of Transportation's (UDOT) Noise Abatement Policy (UDOT 2020) and is consistent with 23 Code of Federal Regulations (CFR) Part 772 and Utah Administrative Code Rule R930-3.

2.0 DESCRIPTION OF PROJECT

UDOT is proposing to construct a grade-separated tight diamond interchange at the existing intersection of Bangerter Highway and 2700 West. The new interchange would allow unimpeded traffic flow on Bangerter Highway and is projected to operate at level of service (LOS) D in 2050. The study area is along Bangerter Highway from milepost 3.8 to 4.9 and along 2700 West between 13640 South and 14000 South (Figure 3-1).

Project work for the Proposed Action includes constructing a grade-separated tight diamond interchange at Bangerter Highway and 2700 West (Bangerter Highway over 2700 West) as well as the associated on- and off-ramps. Project work would also include minor widening and restriping on 2700 West to accommodate the turn lanes for the new grade-separated interchange; modifying utilities and storm drainage; and installing new pavement, traffic signals, advanced traffic management systems (ATMS) equipment, and roadway signs. This project would also require right-of-way acquisition. These improvements would improve traffic flow and safety on Bangerter Highway and 2700 West.

The noise study area is the land adjacent to Bangerter Highway and 2700 West that could be affected by an increase in noise levels to a distance of approximately 500 feet.

2.1 Applicability

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

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 (Table 3-1). Since traffic noise varies over time, the sound levels for this noise analysis are expressed as "equivalent levels" or L_{eq}, representing the average sound level over a 1-hour period. 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 (NAC) for several categories of land use activities (Table 3-2). FHWA's NAC are based on sound levels that are considered to be an impact to nearby noise-sensitive areas, also known as receptors. According to FHWA guidance (FHWA 2011), UDOT must give primary consideration for noise abatement to exterior areas that are frequently used by people.

UDOT has developed a noise-abatement policy for transportation projects, which conforms to FHWA's noise-abatement requirements in 23 CFR Part 772.

For each land use category, UDOT's noise-abatement criterion is the noise decibel (dBA) value reflecting the approach criterion of 1 dBA below the noise-abatement criterion value listed in 23 CFR Part 772 for that land use category (Table 3-2).

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 criterion for a specified land use category 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 (Table 3-2) only when development exists or has been permitted (formal building permit issued prior to the date when the final environmental decision document is approved). Activity categories F and G include lands that are not sensitive to traffic noise. There are no impact criteria for these land use types, and an analysis of noise impacts is not required.

For this noise analysis, aerial photographs and on-site visits were used to identify existing land uses and structure locations.

Table 3-1: Weighted Noise Levels and Human Response

Sound Source	dBA[a]	Response Descriptor
Carrier deck jet operation	140	Limit of amplified speech
	130	Painfully loud
Jet takeoff (200 feet) Auto horn (3 feet)	120	Threshold of feeling and pain
Riveting machine Jet takeoff (2,000 feet)	110	
Shout (0.5 foot) New York subway station	100	Very annoying
Heavy truck (50 feet) Pneumatic drill (50 feet)	90	Hearing damage (8-hour exposure)
Passenger train (100 feet) Helicopter (in-flight, 500 feet) Freight train (50 feet)	80	Annoying
Freeway traffic (50 feet)	70	Intrusive
Air conditioning unit (20 feet) Light auto traffic (50 feet)	60	
Normal speech (15 feet)	50	Quiet
Living room, bedroom, library	40	
Soft whisper (15 feet)	30	Very quiet
Broadcasting studio	20	
	10	Just audible
	0	Threshold of hearing

Source: CEQ 1970

[a] Typical A-weighted noise levels taken with a sound-level meter and expressed as decibels on the "A" scale. The "A" scale approximates the frequency response of the human ear.

Table 3-2: UDOT's Noise-abatement Criteria

Activity Category	FHWA Criterion L_{eq} (dBA)	L_{eq} Noise Level (dBA)	Evaluation Location	Description of Activity Category
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 room, 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 categories 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 2020

3.2 Noise-sensitive Land Uses

Table 3-3 and Figure 3-1 show noise-sensitive land uses within each of the activity categories in the noise study area.

Table 3-3: Noise-sensitive Land Uses

Activity Category	Description of Land Uses within Study Area
A	• None
B	• Residential locations within the noise study area
C	• Mid Valley Bible Church • Riverton City Fishing Pond • Wardle Fields Regional Park
D	• None
E	• None
F	• Warehouses and storage units in southeast quadrant of the 2700 West intersection
G	• Undeveloped lands within the noise study area

UDOT's Noise Abatement Policy states that a noise impact analysis is not 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. For more information, see Section 6.0, *Information for Local Officials*, of this noise study.

3.3 Existing Noise

The primary source of noise in the noise study area is automobile and truck traffic from Bangerter Highway, 2700 West, and other roads in the area.

Existing noise levels were established via noise modeling for receptors located adjacent to, and approximately 500 feet from, Bangerter Highway and 2700 West. Existing traffic sound levels for receptors in this area were calculated with the FHWA Traffic Noise Model (TNM) 2.5 software using existing conditions (travel lane configurations and the posted speed limit).

On-site measurements were taken on July 29 and July 30, 2021, with a Larson Davis model 824 sound-level meter for a duration of 20 minutes at the locations listed in Table 3-4 (see Appendix A, *Noise Monitoring Data Sheets and Existing Noise Receptor Maps,* for data sheets and noise measurement locations). Recorded measurements for locations M1–M6 were used to validate the noise model and to ensure it represents existing conditions. To be considered valid, the field noise measurements must be within 3 dBA of the model's predicted noise. The model validation results range between 0 and 3 dBA, so the noise model is considered valid (Table 3-4).

Table 3-4: Model Validation

Monitoring Location	Address	Measured Noise Level (dBA)	Modeled Noise Level (dBA)	Difference (dBA)
ML-1	Southeast corner of Old Farm Park, Riverton	77.0	78.0	1.0
ML-2	3215 West 13800 South, Bluffdale	64.7	62.3	–2.4
ML-3	13660 South 2700 West, Riverton	67.0	65.8	–1.2
ML-4	13930 South 2700 West, Bluffdale	59.0	58.6	–0.4
ML-5	13795 S. Homestead Lane, Riverton	61.0	60.7	–0.3
ML-6	2001 West 13800 South, Bluffdale	64.0	—[a]	—[a]

[a] ML-6 is outside the noise study area and was not used to validate the noise model.

Of the 202 receptors in the noise study area, 2 currently experience a noise level above the NAC threshold (see Table 3-5 and Existing Noise Levels maps in Appendix A). All existing noise walls north and south of Bangerter Highway were included in the noise modeling for the existing conditions (see Appendix A). The existing noise walls are 15 feet tall in the northeast and northwest quadrants, 16 feet tall in the southeast quadrant, and 12 feet tall in the southwest quadrant.

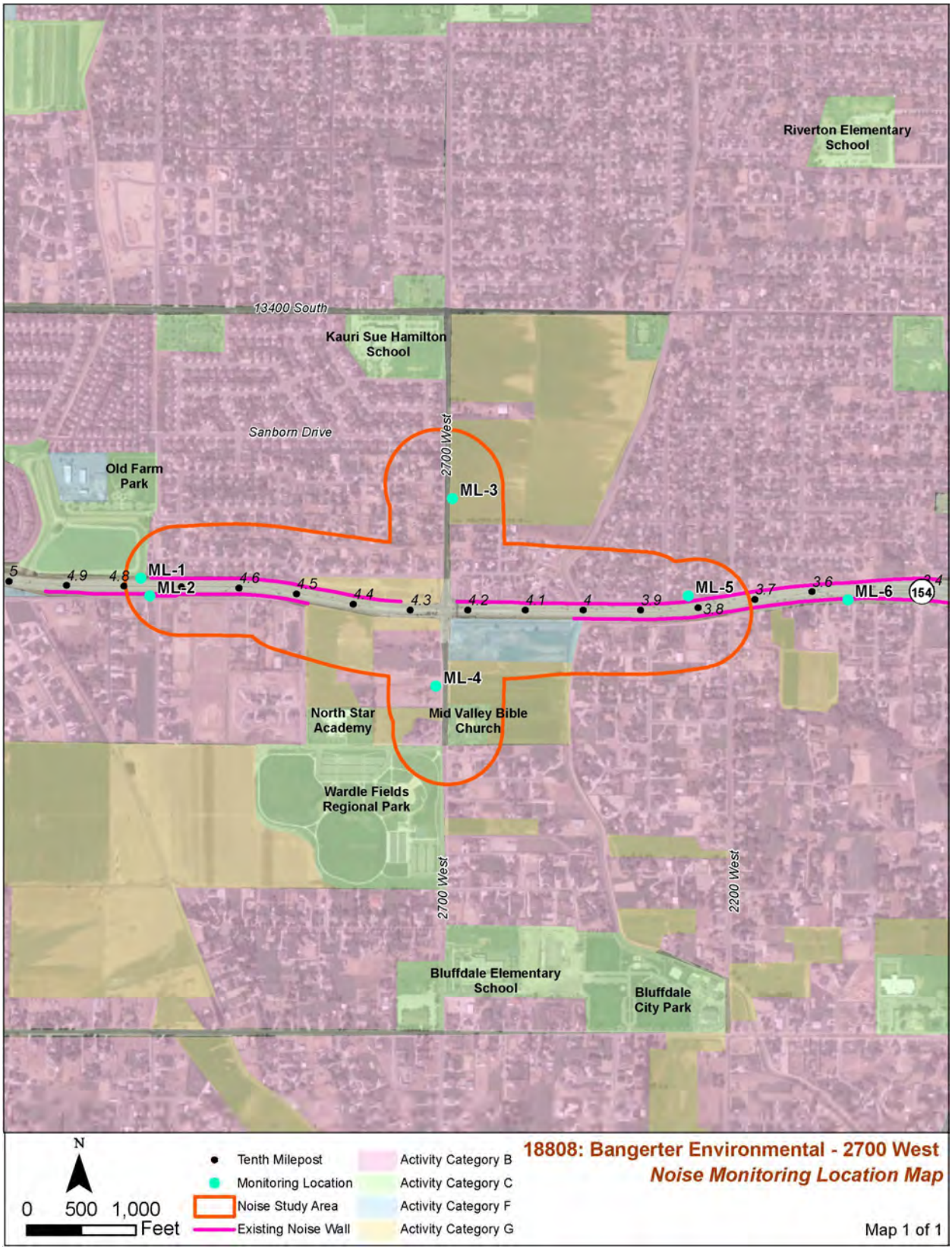


Figure 3-1: Noise-monitoring Locations and Activity Categories

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). With the Proposed Action, Bangerter Highway will be elevated to cross over 2700 West, and 2700 West will remain at-grade. To be consistent with UDOT's Noise Abatement Policy, LOS C traffic volumes were used to determine the greatest hourly traffic noise conditions that are likely to occur regularly. The segments of the four existing noise walls that will remain in place with the Proposed Action were included in the noise modeling (see Appendix B, *Build Noise Receptor Maps*). The existing noise walls that will remain in place are 15 feet tall in the northeast and northwest quadrants, 16 feet tall in the southeast quadrant, and 12 feet tall in the southwest quadrant.

Overall, noise levels with the Proposed Action would range from 38 to 69 dBA compared to the existing conditions of 32 to 66 dBA.

With the Proposed Action, 12 of the 202 receptors (12 activity category B) would have traffic noise impacts; that is, they would exceed the NAC as defined in Section 3.1, *Noise Abatement Criteria*. Two of the impacted receptors would have future worst-case noise levels greater than or equal to an increase of 10 dBA over the existing noise level. The locations of those receptors exceeding the NAC are shown in Appendix B, *Build Noise Receptor Maps*.

3.5 Existing and Proposed Action Summary

Table 3-5 summarizes the existing and build noise levels for the Proposed Action. Refer to the maps in Appendix A and Appendix B for receptor locations.

Table 3-5: Summary of Existing and Build Noise Levels for the Proposed Action

Receptor	NAC	UDOT NAC $L_{eq}(h)$	Existing		With Proposed Action			
			Existing Noise Levels (dBA)	Existing Over NAC	Noise Levels (dBA)	≥ 10 dBA Increase over Existing Noise Level?	≥ UDOT NAC?	Difference
B-001	B	66	59	No	61	No	No	2
B-002	B	66	59	No	62	No	No	3
B-003	B	66	59	No	62	No	No	3
B-004	B	66	58	No	61	No	No	3
B-005	B	66	54	No	57	No	No	3
B-006	B	66	58	No	61	No	No	3
B-007	B	66	54	No	57	No	No	3
B-008	B	66	53	No	55	No	No	2
B-009	B	66	59	No	63	No	No	4
B-010	B	66	61	No	65	No	No	4
B-011	B	66	60	No	62	No	No	2
B-012	C	66	59	No	61	No	No	2
B-013	B	66	61	No	64	No	No	3

Table 3-5: Summary of Existing and Build Noise Levels for the Proposed Action

Receptor	NAC	UDOT NAC $L_{eq}(h)$	Existing		With Proposed Action			
			Existing Noise Levels (dBA)	Existing Over NAC	Noise Levels (dBA)	≥ 10 dBA Increase over Existing Noise Level?	≥ UDOT NAC?	Difference
B-014	B	66	57	No	61	No	No	4
B-015	B	66	54	No	58	No	No	4
B-016	B	66	50	No	54	No	No	4
B-017	B	66	59	No	62	No	No	3
B-018	B	66	59	No	62	No	No	3
B-019	B	66	59	No	63	No	No	4
B-020	B	66	59	No	65	No	No	6
B-021	B	66	59	No	67	No	Yes	8
B-022	B	66	60	No	69	No	Yes	9
B-023	B	66	60	No	69	No	Yes	9
B-024	B	66	59	No	67	No	Yes	8
B-025	B	66	59	No	67	No	Yes	8
B-026	B	66	58	No	66	No	Yes	8
B-027	B	66	55	No	59	No	No	4
B-028	B	66	50	No	54	No	No	4
B-029	B	66	54	No	58	No	No	4
B-030	B	66	54	No	58	No	No	4
B-031	B	66	54	No	59	No	No	5
B-032	B	66	54	No	59	No	No	5
B-033	B	66	53	No	60	No	No	7
B-034	B	66	54	No	61	No	No	7
B-035	B	66	49	No	53	No	No	4
B-036	B	66	48	No	52	No	No	4
B-037	B	66	49	No	54	No	No	5
B-038	B	66	48	No	53	No	No	5
B-039	B	66	48	No	52	No	No	4
B-040	B	66	48	No	55	No	No	7
B-041	B	66	54	No	62	No	No	8
B-042	B	66	57	No	66	No	Yes	9
B-043	B	66	57	No	67	Yes	Yes	10
B-044	B	66	58	No	67	No	Yes	9
B-045	B	66	58	No	65	No	No	7
B-046	B	66	58	No	65	No	No	7
B-047	B	66	58	No	65	No	No	7
B-048	B	66	59	No	65	No	No	6
B-049	B	66	60	No	65	No	No	5
B-050	B	66	61	No	64	No	No	3
B-051	B	66	62	No	64	No	No	2
B-052	B	66	63	No	63	No	No	0

Table 3-5: Summary of Existing and Build Noise Levels for the Proposed Action

Receptor	NAC	UDOT NAC $L_{eq}(h)$	Existing		With Proposed Action			
			Existing Noise Levels (dBA)	Existing Over NAC	Noise Levels (dBA)	≥ 10 dBA Increase over Existing Noise Level?	≥ UDOT NAC?	Difference
B-053	B	66	63	No	63	No	No	0
B-054	B	66	64	No	65	No	No	1
B-055	B	66	52	No	60	No	No	8
B-056	B	66	51	No	59	No	No	8
B-057	B	66	50	No	57	No	No	7
B-058	B	66	49	No	58	No	No	9
B-059	B	66	62	No	65	No	No	3
B-060	B	66	61	No	65	No	No	4
B-061	B	66	60	No	65	No	No	5
B-062	B	66	60	No	64	No	No	4
B-063	B	66	60	No	64	No	No	4
B-064	B	66	59	No	64	No	No	5
B-065	B	66	60	No	65	No	No	5
B-066	B	66	59	No	63	No	No	4
B-067	B	66	56	No	62	No	No	6
B-068	B	66	53	No	60	No	No	7
B-069	B	66	52	No	59	No	No	7
B-070	B	66	50	No	57	No	No	7
B-071	B	66	50	No	57	No	No	7
B-072	B	66	51	No	57	No	No	6
B-073	B	66	50	No	56	No	No	6
B-074	B	66	50	No	55	No	No	5
B-075	B	66	47	No	52	No	No	5
B-076	B	66	54	No	61	No	No	7
B-077	B	66	60	No	65	No	No	5
B-078	B	66	52	No	57	No	No	5
B-079	B	66	49	No	55	No	No	6
B-080	B	66	48	No	54	No	No	6
B-081	B	66	60	No	64	No	No	4
B-082	B	66	54	No	60	No	No	6
B-083	B	66	57	No	61	No	No	4
B-084	B	66	58	No	63	No	No	5
B-085	B	66	60	No	62	No	No	2
B-086	B	66	63	No	64	No	No	1
B-087	B	66	66	Yes	62	No	No	-4
B-088	D	51	32	No	38	No	No	6
B-089	B	66	49	No	54	No	No	5
B-090	B	66	58	No	65	No	No	7
B-091	B	66	57	No	65	No	No	8

Table 3-5: Summary of Existing and Build Noise Levels for the Proposed Action

Receptor	NAC	UDOT NAC $L_{eq}(h)$	Existing		With Proposed Action			
			Existing Noise Levels (dBA)	Existing Over NAC	Noise Levels (dBA)	≥ 10 dBA Increase over Existing Noise Level?	≥ UDOT NAC?	Difference
B-092	C	66	56	No	63	No	No	7
B-093	B	66	66	Yes	65	No	No	-1
B-094	B	66	62	No	63	No	No	1
B-095	B	66	57	No	62	No	No	5
B-096	B	66	56	No	63	No	No	7
B-097	B	66	58	No	64	No	No	6
B-098	B	66	57	No	64	No	No	7
B-099	B	66	59	No	62	No	No	3
B-100	B	66	63	No	64	No	No	1
B-101	B	66	62	No	63	No	No	1
B-102	B	66	58	No	62	No	No	4
B-103	B	66	56	No	62	No	No	6
B-104	B	66	52	No	60	No	No	8
B-105	B	66	51	No	57	No	No	6
B-106	B	66	55	No	62	No	No	7
B-107	B	66	51	No	57	No	No	6
B-108	B	66	52	No	59	No	No	7
B-109	B	66	49	No	58	No	No	9
B-110	B	66	51	No	59	No	No	8
B-111	B	66	52	No	59	No	No	7
B-112	B	66	54	No	60	No	No	6
B-113	B	66	54	No	62	No	No	8
B-114	B	66	54	No	61	No	No	7
B-115	B	66	53	No	61	No	No	8
B-116	B	66	52	No	59	No	No	7
B-117	B	66	51	No	59	No	No	8
B-118	B	66	56	No	63	No	No	7
B-119	B	66	57	No	64	No	No	7
B-120	B	66	59	No	63	No	No	4
B-121	B	66	60	No	65	No	No	5
B-122	B	66	51	No	58	No	No	7
B-123	B	66	52	No	58	No	No	6
B-124	B	66	51	No	59	No	No	8
B-125	B	66	55	No	62	No	No	7
B-126	B	66	55	No	62	No	No	7
B-127	B	66	56	No	64	No	No	8
B-128	B	66	59	No	68	No	Yes	9
B-129	B	66	50	No	57	No	No	7
B-130	B	66	53	No	59	No	No	6

Table 3-5: Summary of Existing and Build Noise Levels for the Proposed Action

Receptor	NAC	UDOT NAC $L_{eq}(h)$	Existing		With Proposed Action			
			Existing Noise Levels (dBA)	Existing Over NAC	Noise Levels (dBA)	≥ 10 dBA Increase over Existing Noise Level?	≥ UDOT NAC?	Difference
B-131	B	66	51	No	58	No	No	7
B-132	B	66	53	No	60	No	No	7
B-133	B	66	56	No	64	No	No	8
B-134	B	66	59	No	69	Yes	Yes	10
B-135	B	66	50	No	55	No	No	5
B-136	B	66	51	No	55	No	No	4
B-137	B	66	52	No	57	No	No	5
B-138	B	66	52	No	58	No	No	6
B-139	B	66	56	No	60	No	No	4
B-140	B	66	59	No	65	No	No	6
B-141	B	66	59	No	64	No	No	5
B-142	B	66	54	No	58	No	No	4
B-143	B	66	54	No	58	No	No	4
B-144	B	66	55	No	58	No	No	3
B-145	B	66	55	No	58	No	No	3
B-146	B	66	59	No	63	No	No	4
B-147	B	66	59	No	63	No	No	4
B-148	B	66	57	No	59	No	No	2
B-149	B	66	52	No	56	No	No	4
B-150	B	66	52	No	56	No	No	4
B-151	B	66	52	No	56	No	No	4
B-152	B	66	51	No	55	No	No	4
B-153	B	66	51	No	56	No	No	5
B-154	B	66	50	No	54	No	No	4
B-155	B	66	51	No	55	No	No	4
B-156	B	66	54	No	57	No	No	3
B-157	B	66	56	No	59	No	No	3
B-158	B	66	60	No	63	No	No	3
B-159	B	66	50	No	53	No	No	3
B-160	B	66	50	No	54	No	No	4
B-161	B	66	51	No	55	No	No	4
B-162	B	66	53	No	56	No	No	3
B-163	B	66	57	No	60	No	No	3
B-164	B	66	54	No	56	No	No	2
B-165	B	66	54	No	57	No	No	3
B-166	B	66	57	No	60	No	No	3
B-167	B	66	60	No	63	No	No	3
B-168	B	66	52	No	55	No	No	3
B-169	B	66	55	No	58	No	No	3

Table 3-5: Summary of Existing and Build Noise Levels for the Proposed Action

Receptor	NAC	UDOT NAC $L_{eq}(h)$	Existing		With Proposed Action			
			Existing Noise Levels (dBA)	Existing Over NAC	Noise Levels (dBA)	≥ 10 dBA Increase over Existing Noise Level?	≥ UDOT NAC?	Difference
B-170	B	66	58	No	61	No	No	3
B-171	B	66	50	No	53	No	No	3
B-172	B	66	52	No	55	No	No	3
B-173	B	66	54	No	57	No	No	3
B-174	B	66	56	No	60	No	No	4
B-175	B	66	58	No	62	No	No	4
B-176	B	66	59	No	61	No	No	2
B-177	B	66	56	No	59	No	No	3
B-178	B	66	54	No	57	No	No	3
B-179	B	66	52	No	55	No	No	3
B-180	B	66	51	No	54	No	No	3
B-181	B	66	51	No	54	No	No	3
B-182	B	66	55	No	58	No	No	3
B-183	B	66	58	No	61	No	No	3
B-184	C	66	49	No	52	No	No	3
B-185	B	66	57	No	66	No	Yes	9
B-186	B	66	55	No	64	No	No	9
B-187	B	66	56	No	65	No	No	9
B-188	B	66	56	No	64	No	No	8
B-189	B	66	53	No	58	No	No	5
B-190	B	66	51	No	56	No	No	5
B-191	B	66	50	No	57	No	No	7
B-192	B	66	50	No	57	No	No	7
B-193	B	66	52	No	58	No	No	6
B-194	B	66	56	No	59	No	No	3
B-195	B	66	53	No	57	No	No	4
B-196	B	66	50	No	54	No	No	4
B-197	B	66	55	No	59	No	No	4
B-198	B	66	51	No	55	No	No	4
B-199	B	66	50	No	54	No	No	4
B-200	B	66	58	No	60	No	No	2
B-201	B	66	58	No	63	No	No	5
B-202	B	66	51	No	54	No	No	3

4.0 NOISE ABATEMENT

According to UDOT's Noise Abatement Policy, specific conditions must be met before traffic noise abatement is implemented. Noise abatement must be considered both feasible and reasonable.

The factors considered when determining whether abatement is feasible are:

- **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 Roads:** To avoid a damaged barrier from becoming a safety hazard, in the event of a failure, barrier height shall be no greater than the distance from the back-of-curb to the face of the proposed barrier. Because the distance from the back-of-curb to the face of a proposed barrier varies, barrier heights that meet this safety requirement might 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 whether abatement is reasonable are:

- **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 a noise-abatement measure must be deemed reasonable in order for it to be included in a 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 5 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 for activity category B and $360 per linear 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.

- **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 in UDOT's Noise Abatement Policy.

4.1 Noise Barriers

For a noise barrier to be effective, it must be high enough and long enough to block the view of the noise source from the receptor's perspective. FHWA's *Highway Traffic Noise: Analysis and Abatement Guidance* (FHWA 2011) states that a good rule of thumb is that the noise barrier should extend 4 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 barriers for driveway and cross street access greatly reduce the effectiveness of noise barriers. Therefore, impacted receptors with direct access onto local streets do not qualify for noise barriers.

The anticipated cost of each wall was calculated by multiplying the wall area and the wall cost per square foot ($20). The allowable cost was calculated by multiplying the allowable cost per benefited receptor ($30,000) by the number of receptors benefited by the wall because all areas adjacent to the noise walls were activity category B (see Appendix D, *Noise Wall Analysis*, for detailed wall analyses).

In an effort to provide an objective analysis of traffic noise reduction at impacted receptors, a variety of noise wall heights were considered. If multiple wall heights would meet noise-abatement requirements, the shortest wall height found to be both feasible and reasonable would be recommended for balloting. A total of three noise walls were considered for the Proposed Action. See the noise wall maps in Appendix C, *Build Scenario Noise Walls*.

4.2 Barrier Analysis for Proposed Action

Barrier 1

Barrier 1 would be located on the north side of Bangerter Highway east of 2700 West. Barrier 1 would extend 1,376 feet east of 2700 West, where it would tie in to the existing 15-foot-tall noise wall that would remain in place. Barrier 1 was evaluated to replace the portion of the existing noise wall that would be removed as part of the Proposed Action. The wall was evaluated where noise impacts are expected to a total of 2 residential receptors (B-128 and B-134) from the Proposed

Action on the north side of Bangerter Highway. There are 11 front-row residential receptors in this area. This analysis assumes that the segment of the existing 15-foot-tall wall to the east would remain in place. Barrier 1 would be located near the clear zone for the westbound off-ramp and would be about 1,376 feet long (see Appendix C, *Build Scenario Noise Walls*).

As summarized in Table 4-1, UDOT evaluated Barrier 1 at a height of 17 feet and a length of 1,376 feet (for detailed information, see Appendix D, *Noise Wall Analysis*). Because the existing noise wall is 15 feet tall and Barrier 1 was not acoustically feasible at the maximum height of 17 feet, shorter height walls were not evaluated.

Table 4-1: Noise-abatement Analysis for Barrier 1 for the Proposed Action

Barrier Height (feet)	Feasible		Reasonable					Is Barrier Feasible and Reasonable?
	% Front-row with 5-dBA Reduction	Acoustically Feasible?[a]	% Front-row with 7-dBA Reduction	Noise Abatement Design Goal?[b]	Anticipated Cost	Allowable Cost	Cost-effective?[c]	
17	36%	No	N/A	N/A	N/A	N/A	N/A	No

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

A 17-foot-tall wall is not acoustically feasible. Although the 17-foot-tall wall is not acoustically feasible, a 15-foot-tall and 1,376-foot-long wall is recommended to be replaced “in kind” consistent with UDOT’s Noise Abatement Policy.

Barrier 2

Barrier 2 would be located on the north side of Bangerter Highway west of 2700 West. Barrier 2 would extend 1,931 feet west of 2700 West, where it would tie in to the existing 15-foot-tall noise wall that would remain in place. Barrier 2 was evaluated to replace a portion of the existing noise wall that would be removed as part of the Proposed Action. The evaluated Barrier 2 of 1,931 feet is longer than the existing Barrier 2 of 1,612 feet to provide a conservative analysis with a longer noise wall. The wall was evaluated where noise impacts are expected to a total of 9 residential receptors (B-021 to B-026 and B-042 to B-044) from the Proposed Action on the north side of Bangerter Highway. There are 19 front-row residential receptors in this area. This analysis assumes that the segment of the existing 15-foot-tall wall to the west would remain in place. Barrier 2 would be located near the clear zone for the westbound on-ramp and would be about 1,931 feet long (see Figure C-1, *Noise Wall Analysis*).

As summarized in Table 4-2, UDOT evaluated Barrier 2 at heights of 16 and 17 feet and a length of 1,931 feet (for detailed information, see Appendix D, *Noise Wall Analysis*). Because the existing noise wall is 15 feet tall and Barrier 2 did not meet the noise-abatement goal at 16 feet, shorter height walls were not evaluated.

Table 4-2: Noise-abatement Analysis for Barrier 2 for the Proposed Action

Barrier Height (feet)	Feasible		Reasonable					Is Barrier Feasible and Reasonable?
	% Front-row with 5-dBA Reduction	Acoustically Feasible?[a]	% Front-row with 7-dBA Reduction	Noise Abatement Design Goal?[b]	Anticipated Cost	Allowable Cost	Cost-effective?[c]	
16	63%	Yes	32%	No	N/A	N/A	N/A	No
17	63%	Yes	37%	Yes	$656,540	$390,000	No	No

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

A 16-foot-tall wall is acoustically feasible; however, it does not meet the noise-abatement design goal. A wall 17-foot-tall wall is acoustically feasible and meets the noise-abatement design goal; however, it does not meet the reasonable cost-effectiveness criterion. Although walls ranging from 16 to 17 feet tall are not feasible and reasonable, a 15-foot-tall wall that is 1,612 feet long (the length of the existing wall) is recommended to be replaced “in kind” consistent with UDOT’s Noise Abatement Policy.

If funding is available, the western piece of the existing 15-foot-tall noise wall that was assumed in this analysis to remain in place may be replaced with a new 15-foot-tall noise wall to be consistent with the section of Barrier 2 that will be replaced “in kind.”

Barrier 3

Barrier 3 would be located on the south side of Bangerter Highway east of 2700 West. Barrier 3 would extend 1,000 feet east of the Utah and Salt Lake Canal, where it would tie in to the existing 16-foot-tall noise wall that would remain in place. Barrier 3 was evaluated to replace a portion of the existing noise wall that would be removed as part of the Proposed Action. The evaluated Barrier 3 of 1,000 feet is slightly longer than the existing Barrier 3 of about 973 feet to provide a conservative analysis with a longer noise wall. The wall was evaluated where noise impacts are expected to a total of 1 residential receptor (B-185) from the Proposed Action on the south side of Bangerter Highway. There are 4 front-row residential receptors in this area. This analysis assumes that the segment of the existing 16-foot-tall wall to the east would remain in place. Barrier 3 would be located near the clear zone for the eastbound on-ramp and would be about 1,000 feet long (see Figure C-1, *Noise Wall Analysis*).

As summarized in Table 4-3, UDOT evaluated Barrier 3 at a height of 17 feet and length of 1,000 feet (for detailed information, see Appendix D, *Noise Wall Analysis*). Because the existing noise wall is 16 feet tall and Barrier 3 did not meet the noise-abatement design goal at the maximum height of 17 feet, shorter height walls were not evaluated.

Table 4-3: Noise-abatement Analysis for Barrier 3 for the Proposed Action

Barrier Height (feet)	Feasible		Reasonable					Is Barrier Feasible and Reasonable?
	% Front-row with 5-dBA Reduction	Acoustically Feasible?[a]	% Front-row with 7-dBA Reduction	Noise Abatement Design Goal?[b]	Anticipated Cost	Allowable Cost	Cost-effective?[c]	
17	100%	Yes	0%	No	N/A	N/A	N/A	No

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

A 17-foot-tall wall is acoustically feasible but does not meet the noise-abatement design goal. Although the 17-foot-tall wall is not reasonable, a 16-foot-tall and 973-foot-long wall (the length of the existing wall) is recommended to be replaced “in kind” consistent with UDOT’s Noise Abatement Policy.

5.0 CONSTRUCTION IMPACTS

Construction noise impacts are considered temporary and will be minimized by following UDOT Special Provision 01355M, *Environmental Compliance*, and Special Provision 00555, *Prosecution and Progress*. UDOT does not expect that normal activities would be disrupted for an extended time, since no receptors are expected to be exposed to construction noise for a long time.

6.0 INFORMATION FOR LOCAL OFFICIALS

According to UDOT's Noise Abatement Policy, UDOT must provide to local governments an estimated distance from the edge of pavement to where the worst-hour $L_{eq}(h)$ levels of 66 dBA and 71 dBA would occur for land uses with activity category G. The 66-dBA contour line represents the areas that would have residential noise impacts under UDOT's Noise Abatement Policy. The 71-dBA contour line represents the areas that would have noise impacts at hotels, motels, offices, restaurants and bars, and other undeveloped lands, properties, or activities not included in activity categories A–D or F under UDOT's Noise Abatement Policy.

There are undeveloped areas located in the southwest quadrant of the Bangerter Highway and 2700 West intersection. The contour analysis for the southwest quadrant found that the worst-hour $L_{eq}(h)$ levels of 66 dBA and 71 dBA would occur in the UDOT right of way and would not extend to adjacent, undeveloped private properties.

7.0 CONCLUSIONS

Overall, noise levels with the Proposed Action would range from 38 to 69 dBA compared to the existing conditions of 32 to 66 dBA.

All existing noise walls that would be impacted by the Proposed Action will be replaced "in kind" per UDOT's Noise Abatement Policy and are discussed below. No balloting is required for noise walls that will remain in place or are replaced "in kind."

7.1 Summary of Evaluated Barriers for Proposed Action

Table 7-1 summarizes the evaluated barriers for the Proposed Action.

Table 7-1: Proposed Action Evaluated Walls

Barrier	Evaluated Length (feet)	Minimum Height (feet)	Determination
1	1,376	15	Replace "in kind."
2	1,931[a]	15	Replace "in kind" with 1,612-foot-long wall.
3	1,000[a]	16	Replace "in kind" with 973-foot-long wall.

[a] The evaluated length for Barriers 2 and 3 is longer than the existing length.

8.0 REFERENCES

[CEQ] Council on Environmental Quality

1970 Environmental Quality: The First Annual Report of the Council on Environmental Quality. U.S. Government Printing Office, Washington, DC.

[FHWA] Federal Highway Administration

2011 Highway Traffic Noise: Analysis and Abatement Guidance. FHWA-HEP-10-025. https://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/analysis_and_abatement_guidance/revguidance.pdf. December.

[UDOT] Utah Department of Transportation

2020 Noise Abatement. UDOT 08A2-1. Effective November 6, 1987. Revised May 28, 2020. https://www.udot.utah.gov/main_old/uconowner.gf?n=10496602977480171.

Appendix A: Noise Monitoring Data Sheets and Existing Noise Receptor Maps

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET Reading: ML-1

Project Description: Bangerter 12 Environmental – 2700 West

Noise Source: Bangerter Highway Date: 7/29/2021 Personnel: KK & JM

Equipment	Type	Serial #
Sound Level Meter	Larson Davis 824	A2635
Microphone/Preamp	Larson Davis 2541	7490
Calibrator	Larson Davis CAL200	3669

SLM SETTINGS (circle one) FAST SLOW

WEIGHTING (circle one) A Lin.

Location Description: Southeast corner of Old Farm Park on north side of Bangerter Highway by the trail. Recreational property.

SITE SKETCH: Including noise source, receptors, reference distances, North arrow, wind direction arrow, terrain and shielding, roadway profile, and direct lines of sight:

N

GPS 40 30'03" N 111 58'04" W
See attached photos of location.

Data File #7.
Leq 77.0 dBA, Max 96.5 dBA, Min 45.4 dBA

3 lanes EB and 3 lanes WB during monitoring with free-flow speeds (65 mph).

Start Time:	Stop Time:	Duration:
2:48 PM	3:08 PM	20 min.

Wind Speed/Direction: 4-8 MPH from NE Percentiles: Sunny

Temperature: 88 deg. F Humidity: 42%

Calibration results before: 114.3 dBA and after 114.3 dBA

Traffic Count Roadway: Bangerter Highway

Direction	Auto	Med. Truck	Heavy Truck	Bus	Motorcycles
EB	553	8	21	0	0
WB	605	10	19	0	2

*Note roadway direction in table



ML-1 S



ML-1 SE

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET Reading: ML-2

Project Description: Bangerter 12 Environmental – 2700 West

Noise Source: Bangerter Highway Date: 7/29/2021 Personnel: KK & JM

Equipment	Type	Serial #
Sound Level Meter	Larson Davis 824	A2635
Microphone/Preamp	Larson Davis 2541	7490
Calibrator	Larson Davis CAL200	3669

SLM SETTINGS (circle one) FAST SLOW

WEIGHTING (circle one) A Lin.

Location Description: South side of Bangerter Highway on south side of frontage road. Residential properties on south side of frontage road. Existing noise wall between Bangerter Highway and the frontage road is 12-feet tall. Address is 3215 W. 13800 S., Bluffdale, UT

SITE SKETCH: Including noise source, receptors, reference distances, North arrow, wind direction arrow, terrain and shielding, roadway profile, and direct lines of sight:

N

GPS 40 30'02" N 111 58'03" W
Monitoring site was on north side of frontage road facing north towards Bangerter Highway.

Data File #8.
Leq 64.7 dBA, Max 82.4 dBA, Min 50.8 dBA

3 lanes EB and 3 lanes WB during monitoring with free-flow speeds (65 mph).

Start Time:	Stop Time:	Duration:
3:33 PM	3:53 PM	20 min.

Wind Speed/Direction: 4-8 MPH from NE Percentiles: Sunny

Temperature: 88 deg. F Humidity: 41%

Calibration results before: 114.3 dBA and after 114.3 dBA

Traffic Count Roadway: Bangerter Highway

Direction	Auto	Med. Truck	Heavy Truck	Bus	Motorcycles
EB	548	2	23	0	0
WB	730	11	20	0	2

*Note roadway direction in table

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET Reading: ML-3

Project Description: Bangerter 12 Environmental – 2700 West

Noise Source: 2700 West Date: 7/30/2021 Personnel: JM

Equipment	Type	Serial #
Sound Level Meter	Larson Davis 824	A2635
Microphone/Preamp	Larson Davis 2541	7490
Calibrator	Larson Davis CAL200	3669

SLM SETTINGS (circle one) FAST SLOW

WEIGHTING (circle one) A Lin.

Location Description: East side of 2700 West next to agricultural field. Across 2700 W from residential properties on west side of 2700 West. Address is 13660 S. 2700 W., Riverton, UT.

SITE SKETCH: Including noise source, receptors, reference distances, North arrow, wind direction arrow, terrain and shielding, roadway profile, and direct lines of sight:

N

GPS 40 30'11" N 111 57'27" W
See attached photos of location.

Data File #12.
Leq 67.0 dBA, Max 81.2 dBA, Min 48.5 dBA

1 lane SB and 1 lane NB during monitoring with free-flow speeds (45 mph).

Start Time:	Stop Time:	Duration:
10:06 AM	10:26 AM	20 min.

Wind Speed/Direction: 3-5 MPH from SE Percentiles: Cloudy

Temperature: 72 deg. F Humidity: 80%

Calibration results before: 114.1 dBA and after 114.1 dBA

Traffic Count Roadway: 2700 West

Direction	Auto	Med. Truck	Heavy Truck	Bus	Motorcycles
NB	45	1	0	0	0
SB	61	1	0	0	0

*Note roadway direction in table



ML-3 NW



ML-3 W

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET Reading: ML-4

Project Description: Bangerter 12 Environmental – 2700 West

Noise Source: 2700 West Date: 7/30/2021 Personnel: JM

Equipment	Type	Serial #
Sound Level Meter	Larson Davis 824	A2635
Microphone/Preamp	Larson Davis 2541	7490
Calibrator	Larson Davis CAL200	3669

SLM SETTINGS (circle one) FAST SLOW

WEIGHTING (circle one) A Lin.

Location Description: West side of 2700 West in vacant lot. Adjacent to residential properties on west side of 2700 W. Address is 13930 S. 2700 W., Bluffdale, UT.

SITE SKETCH: Including noise source, receptors, reference distances, North arrow, wind direction arrow, terrain and shielding, roadway profile, and direct lines of sight:

N

GPS 40 29'54" N 111 57'29" W
See attached photos of location.

Data File #11.
Leq 59.0 dBA, Max 74.0 dBA, Min 43.8 dBA

1 lane SB and 1 lane NB during monitoring with free-flow speeds (45 mph).

Start Time:	Stop Time:	Duration:
9:30 AM	9:50 AM	20 min.

Wind Speed/Direction: 2-4 MPH from SE Percentiles: Cloudy

Temperature: 70 deg. F Humidity: 89%

Calibration results before: 114.1 dBA and after 114.1 dBA

Traffic Count Roadway: 2700 West

Direction	Auto	Med. Truck	Heavy Truck	Bus	Motorcycles
NB	53	2	0	0	0
SB	48	3	0	0	0

*Note roadway direction in table



ML-4 E

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET Reading: ML-5

Project Description: Bangerter 12 Environmental – 2700 West

Noise Source: Bangerter Highway Date: 7/29/2021 Personnel: KK & JM

Equipment	Type	Serial #
Sound Level Meter	Larson Davis 824	A2635
Microphone/Preamp	Larson Davis 2541	7490
Calibrator	Larson Davis CAL200	3669

SLM SETTINGS (circle one) FAST SLOW

WEIGHTING (circle one) A Lin.

Location Description: Vacant lot on north side of Bangerter Highway behind existing 15-feet tall noise wall. Noise wall is located on north side of Bangerter Highway. Near residential properties. Address is 13795 S. Homestead Lane, Riverton, UT.

SITE SKETCH: Including noise source, receptors, reference distances, North arrow, wind direction arrow, terrain and shielding, roadway profile, and direct lines of sight:

N

GPS 40 30'02" N 111 57'01" W
See attached photos of location.

Data File #10.
Leq 61.0 dBA, Max 70.3 dBA, Min 50.2 dBA

3 lanes EB and 3 lanes WB during monitoring with free-flow speeds (65 mph). Some slowing speed on WB traffic due to 2700 W. signal during monitoring period.

Start Time:	Stop Time:	Duration:
4:49 PM	5:09 PM	20 min.

Wind Speed/Direction: 4-8 MPH from NE Percentiles: Sunny

Temperature: 90 deg. F Humidity: 42%

Calibration results before: 114.3 dBA and after 114.3 dBA

Traffic Count Roadway: Bangerter Highway

Direction	Auto	Med. Truck	Heavy Truck	Bus	Motorcycles
EB	731	13	12	1	5
WB	940	6	8	0	4

*Note roadway direction in table



ML-5 SW

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET Reading: ML-6

Project Description: Bangerter 12 Environmental – 2700 West

Noise Source: Bangerter Highway Date: 7/29/2021 Personnel: KK & JM

Equipment	Type	Serial #
Sound Level Meter	Larson Davis 824	A2635
Microphone/Preamp	Larson Davis 2541	7490
Calibrator	Larson Davis CAL200	3669

SLM SETTINGS (circle one) FAST SLOW

WEIGHTING (circle one) A Lin.

Location Description: North side of frontage road on south side of Bangerter Highway behind existing 16-foot tall noise wall. Noise wall is located on south side of Bangerter Highway. Near residential properties on south side of frontage road. Address is 2001 W. 13800 S., Bluffdale, UT.

SITE SKETCH: Including noise source, receptors, reference distances, North arrow, wind direction arrow, terrain and shielding, roadway profile, and direct lines of sight:

N

GPS 40 30'02" N 111 56'40" W
See attached photos of location.

Data File #9.
Leq 64.0 dBA, Max 81.5 dBA, Min 52.6 dBA

3 lanes EB and 3 lanes WB during monitoring with free-flow speeds (65 mph).

Start Time:	Stop Time:	Duration:
4:13 PM	4:33 PM	20 min.

Wind Speed/Direction: 4-8 MPH from NE Percentiles: Sunny

Temperature: 90 deg. F Humidity: 41%

Calibration results before: 114.3 dBA and after 114.3 dBA

Traffic Count Roadway: Bangerter Highway

Direction	Auto	Med. Truck	Heavy Truck	Bus	Motorcycles
EB	659	5	14	0	1
WB	974	13	12	0	4

*Note roadway direction in table



ML-6 NW



ML-6 W

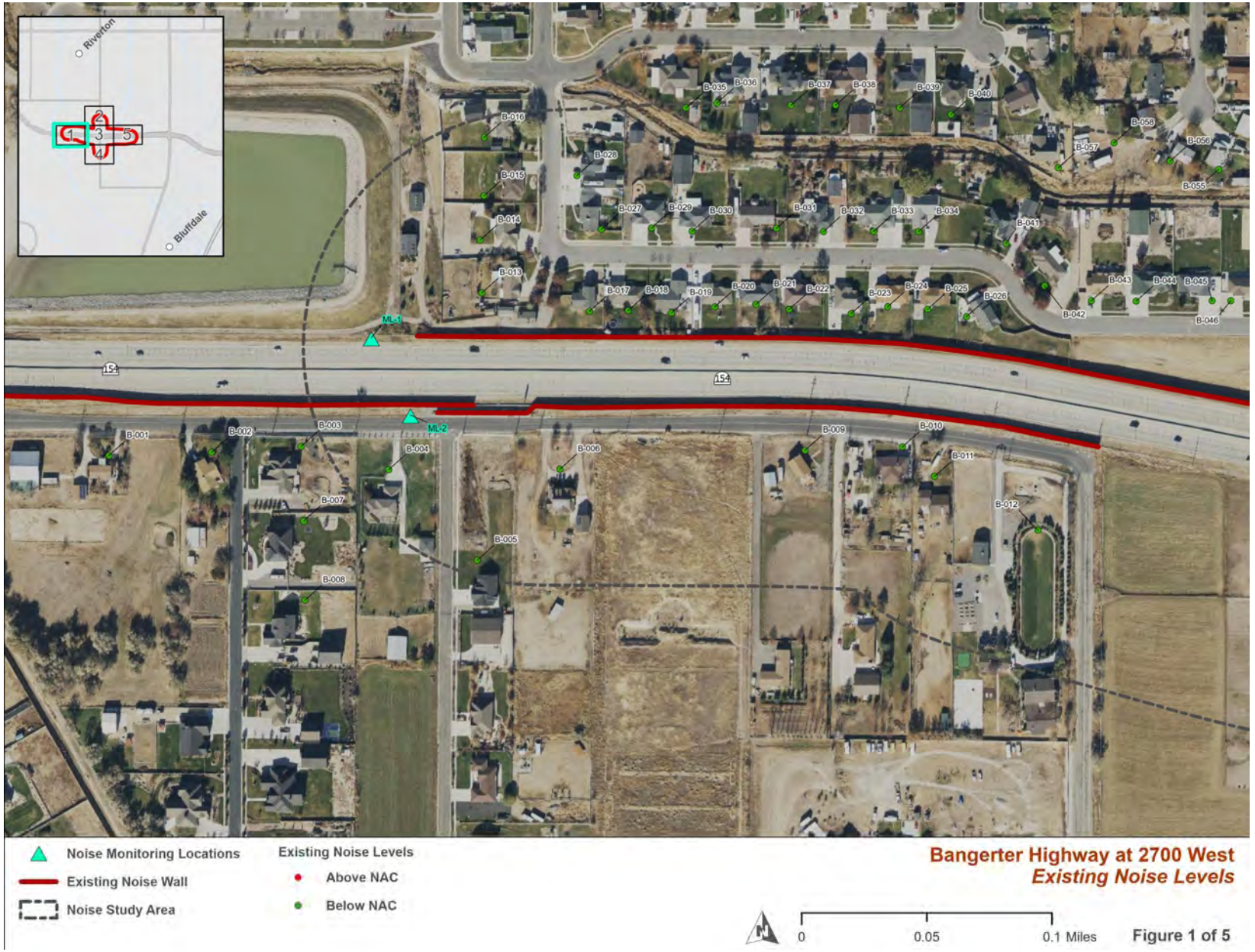


Figure A-1: Existing Noise Levels (1 of 5)



Figure A-2: Existing Noise Levels (2 of 5)



Figure A-3: Existing Noise Levels (3 of 5)



Figure A-4: Existing Noise Levels (4 of 5)

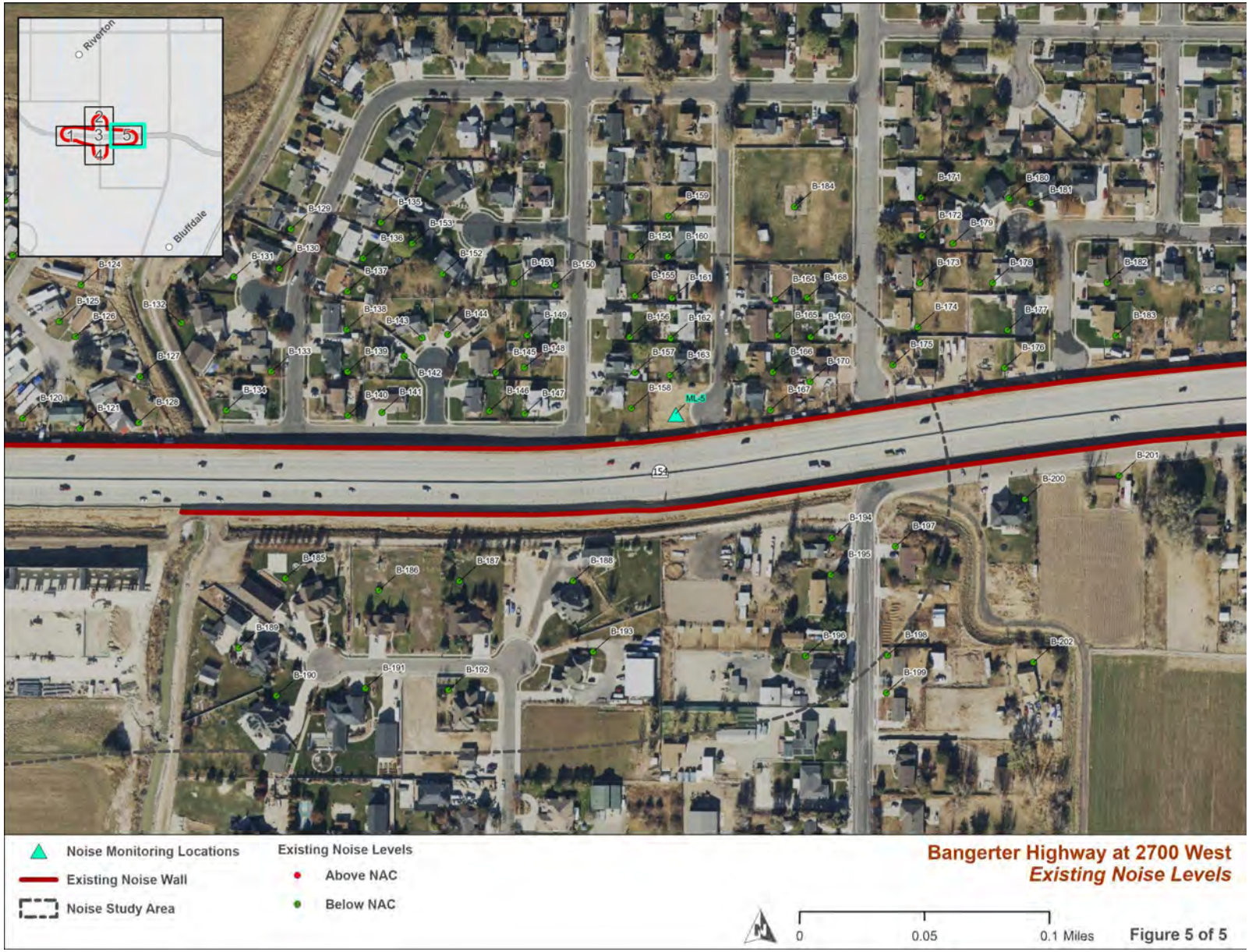


Figure A-5: Existing Noise Levels (5 of 5)

Appendix B: Build Noise Receptor Maps

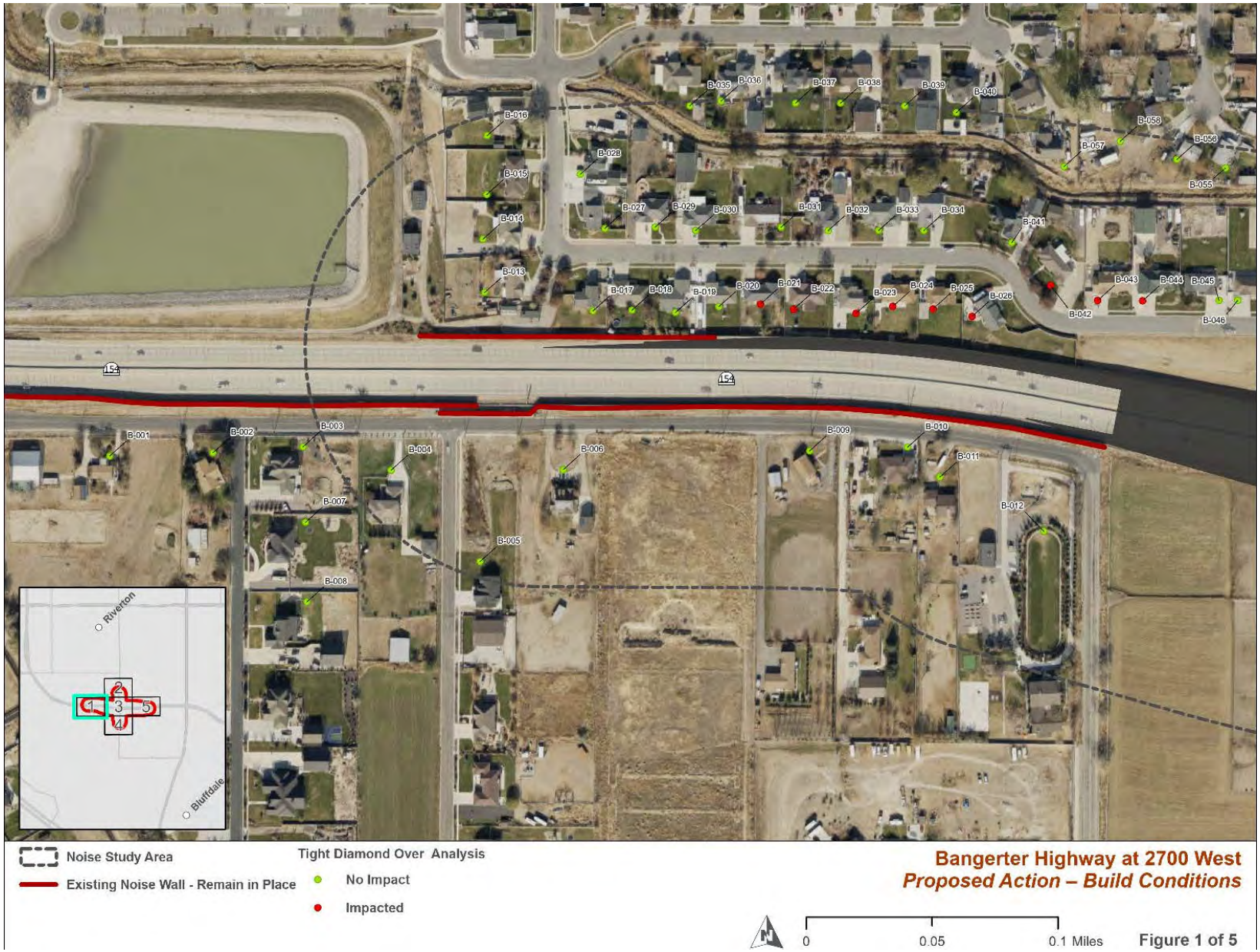


Figure B-1: Proposed Action Build Scenario Noise Levels (1 of 5)



Figure B-2: Proposed Action Build Scenario Noise Levels (2 of 5)



Figure B-3: Proposed Action Build Scenario Noise Levels (3 of 5)



Figure B-4: Proposed Action Build Scenario Noise Levels (4 of 5)

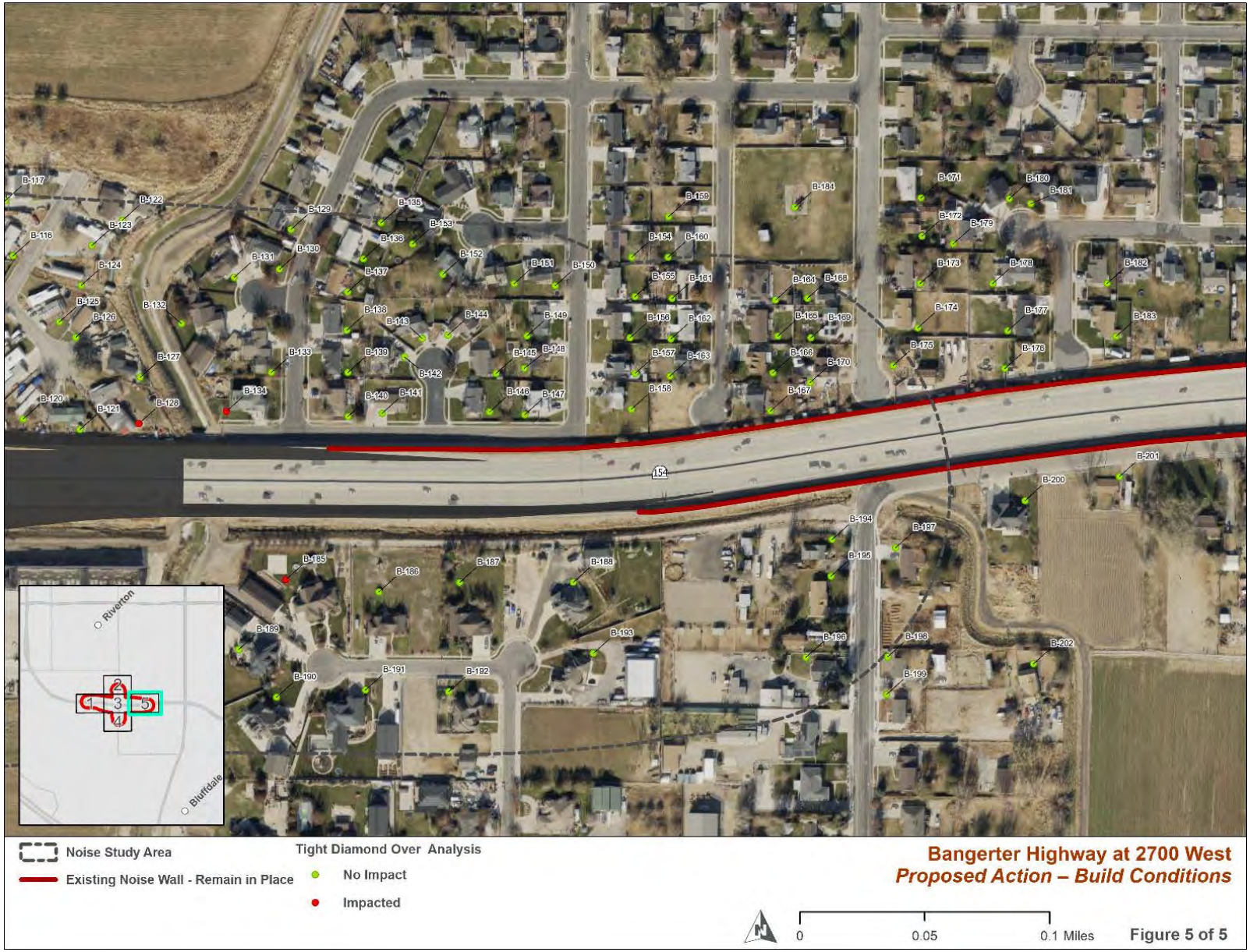


Figure B-5: Proposed Action Build Scenario Noise Levels (5 of 5)

Appendix C: Build Scenario Noise Walls

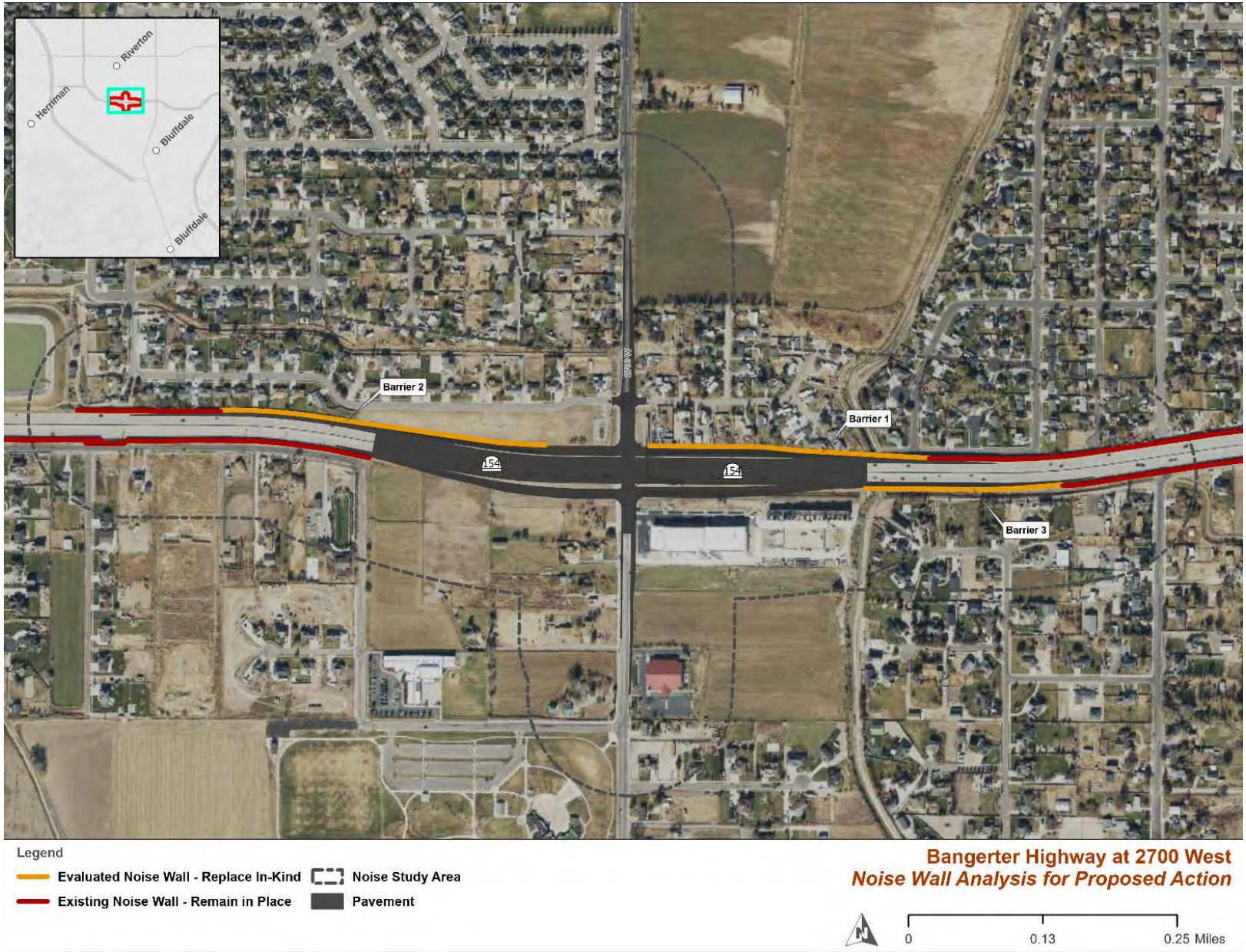


Figure C-1: Noise Wall Analysis

Appendix D: Noise Wall Analysis

BARRIER 1 PROPOSED ACTION
NOISE WALL ANALYSIS

Table 8-1: Barrier 1 at 17 feet tall and 1,376 feet long

Receptor	Number of dwelling units	NAC	1st row receptor	Baseline noise level	17-ft noise level	17-ft noise reduction	Benefited	Design Goal	1st row >= 5 dBA reduction	1st row design goal
B-093	1	B	Yes	65	65	0	No	No	No	No
B-094	1	B	Yes	63	62	1	No	No	No	No
B-095	1	B	Yes	62	62	0	No	No	No	No
B-096	1	B	Yes	63	60	3	No	No	No	No
B-097	1	B	Yes	64	59	5	Yes	No	Yes	No
B-098	1	B	Yes	64	60	4	No	No	No	No
B-099	1	B		62	62	0	No	No	No	No
B-100	1	B		64	64	0	No	No	No	No
B-101	1	B		63	63	0	No	No	No	No
B-102	1	B		62	62	0	No	No	No	No
B-103	1	B		62	62	0	No	No	No	No
B-104	1	B		60	60	0	No	No	No	No
B-105	1	B		57	57	0	No	No	No	No
B-106	1	B		62	61	1	No	No	No	No
B-107	1	B		57	57	0	No	No	No	No
B-108	1	B		59	59	0	No	No	No	No
B-109	1	B		58	58	0	No	No	No	No
B-110	1	B		59	59	0	No	No	No	No
B-111	1	B		59	59	0	No	No	No	No
B-112	1	B		60	60	0	No	No	No	No
B-113	1	B		62	61	1	No	No	No	No
B-114	1	B		61	61	0	No	No	No	No
B-115	1	B		61	60	1	No	No	No	No
B-116	1	B		59	58	1	No	No	No	No
B-117	1	B		59	58	1	No	No	No	No
B-118	1	B		63	60	3	No	No	No	No
B-119	1	B	Yes	64	60	4	No	No	No	No
B-120	1	B	Yes	63	59	4	No	No	No	No
B-121	1	B	Yes	65	58	7	Yes	Yes	Yes	Yes
B-122	1	B		58	56	2	No	No	No	No
B-123	1	B		58	56	2	No	No	No	No
B-124	1	B		59	56	3	No	No	No	No
B-125	1	B		62	60	2	No	No	No	No
B-126	1	B		62	59	3	No	No	No	No
B-127	1	B		64	59	5	Yes	No	No	No
B-128	1	B	Yes	68	61	7	Yes	Yes	Yes	Yes
B-129	1	B		57	54	3	No	No	No	No
B-130	1	B		59	56	3	No	No	No	No
B-131	1	B		58	56	2	No	No	No	No
B-132	1	B		60	57	3	No	No	No	No

Receptor	Number of dwelling units	NAC	1st row receptor	Baseline noise level	17-ft noise level	17-ft noise reduction	Benefited	Design Goal	1st row >= 5 dBA reduction	1st row design goal
B-133	1	B		64	59	5	Yes	No	No	No
B-134	1	B	Yes	69	61	8	Yes	Yes	Yes	Yes

Table 8-2: Barrier 1 at 17 feet tall and 1,376 feet long summary

Receiver Summary:	
Total receiver count	42
First row receiver count	11
Feasibility Factors:	
Number of first row receivers achieve >=5 dBA reduction	4
Percent of first row receivers achieve >=5 dBA reduction	36%
Acoustic feasibility (>=5 dBA reduction for >=50% of front-row)	No
Reasonableness Factors:	
Number of first row receivers achieve design goal >=7 dBA reduction	3
Percent of first row receivers achieve design goal >=7 dBA reduction	27%
Noise abatement design goal (>=7dBA reduction for >=35% of front-row)	No
Number of receivers benefited	6
Cost of noise wall (length x height x $20 per sq ft)	$467,840
Cost of any other items critical to safety	0
Anticipated cost of noise abatement	$467,840
Allowable cost ($30,000 per benefited receptor)	$180,000
Cost effective (anticipated cost < allowable cost)	No
Feasible and Reasonable:	No

BARRIER 2 PROPOSED ACTION
NOISE WALL ANALYSIS

Table 8-3: Barrier 2 at 16 feet tall and 1,931 feet long

Receptor	Number of dwelling units	NAC	1st row receptor	Baseline noise level	16-ft noise level	16-ft noise reduction	Benefited	Design Goal	1st row >= 5 dBA reduction	1st row design goal
B-021	1	B	Yes	67	61	6	Yes	No	Yes	No
B-022	1	B	Yes	69	61	8	Yes	Yes	Yes	Yes
B-023	1	B	Yes	69	61	8	Yes	Yes	Yes	Yes
B-024	1	B	Yes	67	61	6	Yes	No	Yes	No
B-025	1	B	Yes	67	60	7	Yes	Yes	Yes	Yes
B-026	1	B	Yes	66	60	6	Yes	No	Yes	No
B-031	1	B		59	58	1	No	No	No	No
B-032	1	B		59	57	2	No	No	No	No
B-033	1	B		60	57	3	No	No	No	No
B-034	1	B		61	57	4	No	No	No	No
B-037	1	B		54	53	1	No	No	No	No
B-038	1	B		53	51	2	No	No	No	No
B-039	1	B		52	51	1	No	No	No	No
B-040	1	B		55	53	2	No	No	No	No
B-041	1	B		62	56	6	Yes	No	No	No
B-042	1	B	Yes	66	59	7	Yes	Yes	Yes	Yes
B-043	1	B	Yes	67	59	8	Yes	Yes	Yes	Yes
B-044	1	B	Yes	67	59	8	Yes	Yes	Yes	Yes
B-045	1	B	Yes	65	60	5	Yes	No	Yes	No
B-046	1	B	Yes	65	60	5	Yes	No	Yes	No
B-047	1	B	Yes	65	60	5	Yes	No	Yes	No
B-048	1	B	Yes	65	61	4	No	No	No	No
B-049	1	B	Yes	65	62	3	No	No	No	No
B-050	1	B	Yes	64	62	2	No	No	No	No
B-051	1	B	Yes	64	63	1	No	No	No	No
B-052	1	B	Yes	63	63	0	No	No	No	No
B-053	1	B	Yes	63	63	0	No	No	No	No
B-054	1	B	Yes	65	65	0	No	No	No	No
B-055	1	B		60	58	2	No	No	No	No
B-056	1	B		59	57	2	No	No	No	No
B-057	1	B		57	56	1	No	No	No	No
B-058	1	B		58	56	2	No	No	No	No
B-059	1	B		65	65	0	No	No	No	No
B-060	1	B		65	65	0	No	No	No	No
B-061	1	B		65	64	1	No	No	No	No
B-062	1	B		64	64	0	No	No	No	No
B-063	1	B		64	64	0	No	No	No	No
B-064	1	B		64	64	0	No	No	No	No
B-067	1	B		62	61	1	No	No	No	No
B-068	1	B		60	60	0	No	No	No	No

Receptor	Number of dwelling units	NAC	1st row receptor	Baseline noise level	16-ft noise level	16-ft noise reduction	Benefited	Design Goal	1st row >= 5 dBA reduction	1st row design goal
B-069	1	B		59	59	0	No	No	No	No
B-070	1	B		57	56	1	No	No	No	No
B-071	1	B		57	57	0	No	No	No	No
B-072	1	B		57	57	0	No	No	No	No
B-076	1	B	Yes	61	60	1	No	No	No	No

Table 8-4: Barrier 2 at 16 feet tall and 1,931 feet long summary

Receiver Summary:	
Total receiver count	45
First row receiver count	19
Feasibility Factors:	
Number of first row receivers achieve >=5 dBA reduction	12
Percent of first row receivers achieve >=5 dBA reduction	63%
Acoustic feasibility (>=5 dBA reduction for >=50% of front-row)	Yes
Reasonableness Factors:	
Number of first row receivers achieve design goal >=7 dBA reduction	6
Percent of first row receivers achieve design goal >=7 dBA reduction	32%
Noise abatement design goal (>=7dBA reduction for >=35% of front-row)	No
Number of receivers benefited	13
Cost of noise wall (length x height x $20 per sq ft)	$617,920
Cost of any other items critical to safety	0
Anticipated cost of noise abatement	$617,920
Allowable cost ($30,000 per benefited receptor)	$390,000
Cost effective (anticipated cost < allowable cost)	No
Feasible and Reasonable:	No

Table 8-5: Barrier 2 at 17 feet tall and 1,931 feet long

Receptor	Number of dwelling units	NAC	1st row receptor	Baseline noise level	17-ft noise level	17-ft noise reduction	Benefited	Design Goal	1st row >= 5 dBA reduction	1st row design goal
B-021	1	B	Yes	67	61	6	Yes	No	Yes	No
B-022	1	B	Yes	69	61	8	Yes	Yes	Yes	Yes
B-023	1	B	Yes	69	61	8	Yes	Yes	Yes	Yes
B-024	1	B	Yes	67	60	7	Yes	Yes	Yes	Yes
B-025	1	B	Yes	67	60	7	Yes	Yes	Yes	Yes
B-026	1	B	Yes	66	60	6	Yes	No	Yes	No
B-031	1	B		59	58	1	No	No	No	No
B-032	1	B		59	57	2	No	No	No	No
B-033	1	B		60	57	3	No	No	No	No
B-034	1	B		61	57	4	No	No	No	No
B-037	1	B		54	53	1	No	No	No	No
B-038	1	B		53	51	2	No	No	No	No
B-039	1	B		52	51	1	No	No	No	No
B-040	1	B		55	53	2	No	No	No	No
B-041	1	B		62	56	6	Yes	No	No	No
B-042	1	B	Yes	66	59	7	Yes	Yes	Yes	Yes
B-043	1	B	Yes	67	59	8	Yes	Yes	Yes	Yes
B-044	1	B	Yes	67	59	8	Yes	Yes	Yes	Yes
B-045	1	B	Yes	65	59	6	Yes	No	Yes	No
B-046	1	B	Yes	65	59	6	Yes	No	Yes	No
B-047	1	B	Yes	65	60	5	Yes	No	Yes	No
B-048	1	B	Yes	65	61	4	No	No	No	No
B-049	1	B	Yes	65	62	3	No	No	No	No
B-050	1	B	Yes	64	62	2	No	No	No	No
B-051	1	B	Yes	64	62	2	No	No	No	No
B-052	1	B	Yes	63	63	0	No	No	No	No
B-053	1	B	Yes	63	63	0	No	No	No	No
B-054	1	B	Yes	65	65	0	No	No	No	No
B-055	1	B		60	58	2	No	No	No	No
B-056	1	B		59	57	2	No	No	No	No
B-057	1	B		57	56	1	No	No	No	No
B-058	1	B		58	56	2	No	No	No	No
B-059	1	B		65	65	0	No	No	No	No
B-060	1	B		65	65	0	No	No	No	No
B-061	1	B		65	64	1	No	No	No	No
B-062	1	B		64	64	0	No	No	No	No
B-063	1	B		64	64	0	No	No	No	No
B-064	1	B		64	64	0	No	No	No	No
B-067	1	B		62	61	1	No	No	No	No
B-068	1	B		60	59	1	No	No	No	No
B-069	1	B		59	58	1	No	No	No	No
B-070	1	B		57	56	1	No	No	No	No
B-071	1	B		57	57	0	No	No	No	No

Receptor	Number of dwelling units	NAC	1st row receptor	Baseline noise level	17-ft noise level	17-ft noise reduction	Benefited	Design Goal	1st row >= 5 dBA reduction	1st row design goal
B-072	1	B		57	57	0	No	No	No	No
B-076	1	B	Yes	61	60	1	No	No	No	No

Table 8-6: Barrier 2 at 17 feet tall and 1,931 feet long summary

Receiver Summary:	
Total receiver count	45
First row receiver count	19
Feasibility Factors:	
Number of first row receivers achieve >=5 dBA reduction	12
Percent of first row receivers achieve >=5 dBA reduction	63%
Acoustic feasibility (>=5 dBA reduction for >=50% of front-row)	Yes
Reasonableness Factors:	
Number of first row receivers achieve design goal >=7 dBA reduction	7
Percent of first row receivers achieve design goal >=7 dBA reduction	37%
Noise abatement design goal (>=7dBA reduction for >=35% of front-row)	Yes
Number of receivers benefited	13
Cost of noise wall (length x height x $20 per sq ft)	$656,540
Cost of any other items critical to safety	0
Anticipated cost of noise abatement	$656,540
Allowable cost ($30,000 per benefited receptor)	$390,000
Cost effective (anticipated cost < allowable cost)	No
Feasible and Reasonable:	No

BARRIER 3 PROPOSED ACTION NOISE WALL ANALYSIS

Table 8-7: Barrier 3 at 17 feet tall and 1,000 feet long

Receptor	Number of dwelling units	NAC	1st row receptor	Baseline noise level	17-ft noise level	17-ft noise reduction	Benefited	Design Goal	1st row >= 5 dBA reduction	1st row design goal
B-185	1		Yes	B-185	60	6	Yes	No	Yes	No
B-186	1		Yes	B-186	58	6	Yes	No	Yes	No
B-187	1		Yes	B-187	59	6	Yes	No	Yes	No
B-188	1		Yes	B-188	59	5	Yes	No	Yes	No
B-189	1			B-189	56	2	No	No	No	No
B-190	1			B-190	54	2	No	No	No	No
B-191	1			B-191	53	4	No	No	No	No
B-192	1			B-192	53	4	No	No	No	No
B-193	1			B-193	54	4	No	No	No	No

Table 8-8: Barrier 3 at 17 feet tall and 1,000 feet long summary

Receiver Summary:	
Total receiver count	9
First row receiver count	4
Feasibility Factors:	
Number of first row receivers achieve >=5 dBA reduction	4
Percent of first row receivers achieve >=5 dBA reduction	100%
Acoustic feasibility (>=5 dBA reduction for >=50% of front-row)	Yes
Reasonableness Factors:	
Number of first row receivers achieve design goal >=7 dBA reduction	0
Percent of first row receivers achieve design goal >=7 dBA reduction	0%
Noise abatement design goal (>=7dBA reduction for >=35% of front-row)	No
Number of receivers benefited	4
Cost of noise wall (length x height x $20 per sq ft)	$340,000
Cost of any other items critical to safety	0
Anticipated cost of noise abatement	$340,000
Allowable cost ($30,000 per benefited receptor)	$120,000
Cost effective (anticipated cost < allowable cost)	No
Feasible and Reasonable:	No



Appendix D: Environmental Resources

Hazardous Materials Memo

MEMORANDUM

Date:	Tuesday, February 22, 2022
Project:	PIN: 18808; Project Number: S-0154(92)0; Bangerter Highway at 2700 West Interchange Improvements
To:	Project File
From:	HDR
Subject:	Evaluation of Hazardous Materials Sites

INTRODUCTION

HDR, Inc., has prepared this evaluation in support of the Utah Department of Transportation's (UDOT) proposal to construct a grade-separated interchange at the intersection of Bangerter Highway and 2700 West in Riverton and Bluffdale, Utah (the Proposed Action).

HAZARDOUS MATERIALS

Hazardous materials include any solid, liquid, or gaseous materials that, if improperly managed or disposed of, could pose substantial hazards to human health and the environment. A material is considered hazardous if it exhibits one or more of the following characteristics: ignitability, corrosivity, reactivity, and toxicity.

The Resource Conservation and Recovery Act (RCRA) was enacted in 1976 to regulate the safe management of hazardous and nonhazardous solid waste (that is, garbage) and underground storage tanks (USTs) that hold petroleum products or certain chemicals, including leaking underground storage tanks (LUSTs). Under RCRA, hazardous wastes are tracked from the time they are generated until the time they are ultimately disposed of or recycled.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) was enacted in 1980. CERCLA provides for the cleanup and remediation of closed and abandoned hazardous waste sites where hazardous waste has been abandoned, accidentally spilled, or illegally dumped and also created a "Superfund" to help pay for cleanup costs.

AFFECTED ENVIRONMENT

Hazardous materials and waste sites were evaluated by reviewing records from the Utah Department of Environmental Quality (UDEQ). These sites included Brownfields; Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) sites; Environmental Incidents; Enforceable Written Assurances (EWAs); Formerly Used Defense (FUD) Sites; Leaking Underground Storage Tanks (LUSTs); National Priorities list (NPL) sites; Solid Waste Sites; Tier II sites; Toxic Release Inventory (TRI); Used Oil Facilities; and Underground Storage Tanks (USTs). Sites were reviewed for the potential to be affected by the Proposed Action based on standard radius distances as shown in Table 1.

Table 1: Description of hazardous materials sites and search radius

Site Type	Search Radius beyond Study Area	Description
Brownfield	0.5 mile	Brownfields are former industrial areas.
CERCLIS	0.5 mile	CERCLIS sites contain listed chemicals under CERCLA but have not been categorized as NPL sites.
Environmental Incident	Study area or adjacent property	Environmental incidents are locations where a spill or other incident regarding hazardous materials has been reported.
EWA	0.5 mile	EWA sites are properties where the owner has come to an agreement with UDEQ regarding obligations associated with hazardous materials or waste on the site.
Formerly Used Defense Site	0.5 mile	Formerly used defense sites were once under the jurisdiction of the U.S. Department of Defense and could contain hazardous, toxic, or radioactive wastes in the soil, water, or containers on site.
LUST	0.5 mile	LUSTs are UST sites where a leak has been detected.
NPL	1 mile	NPL sites are those containing listed chemicals under CERCLA and that have been identified as priorities for cleanup.
Solid Waste Sites	0.5 mile	Solid waste sites include landfills and transfer stations.
Tier II	0.5 mile	Tier II are sites with documented hazardous chemicals stored on site.
TRI	0.5 mile	TRI sites are sites such as manufacturing or mining facilities that manufacture or process listed chemicals.
Used Oil Facility	Study area or adjacent property	Used oil facilities are sites that store, transport, or recycle used oil.
UST	Study area or adjacent property	USTs are sites where underground storage tanks are currently being used or have been used to store petroleum products such as gasoline or diesel fuel.

Brownfield Sites

No brownfield sites are located within 0.5 mile of the study area.

CERCLIS Sites

No CERCLIS sites are located within 0.5 mile of the study area.

Environmental Incidents

No Environmental Incidents have occurred within the study area or an adjacent property.

Enforceable Written Assurances (EWA) Sites

No EWA sites are located within 0.5 mile of the study area.

Formerly Used Defense (FUD) Sites

No FUD sites are located within 0.5 mile of the study area.

National Priorities List (NPL) Sites

No NPL sites are located within 1 mile of the study area.

Solid Waste Sites

No soild waste sites are located within 0.5 mile of the study area.

Tier II Sites

No Tier II sites are located within 0.5 mile of the study area.

Toxic Release Inventory (TRI) Sites

No TRI sites are located within 0.5 mile of the study area.

Used Oil Facility Sites

No used oil facility sites are located within the study area or an adjacent property.

Underground Storage Tanks (UST) and Leaking Underground Storage Tanks (LUST) Sites

No UST or LUST sites are located within the study area or an adjacent property.

ENVIRONMENTAL CONSEQUENCES

No hazardous materials sites have been identified with or adjacent to the Bangerter Highway at 2700 West Interchange Improvements Project study area; therefore, the Proposed Action would not have direct or indirect impacts on hazardous materials sites.

Figure 1: Study Area Overview



Appendix D: Environmental Resources

Air Quality Summary

Air Quality Summary

Bangerter Highway at 2700 West Intersection Improvements

Project Number: S-0154(92)0; PIN: 18808

Lead Agency: Utah Department of Transportation

February 2022

BANGERTER 2700 WEST

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Abbreviations and Acronyms

CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
EPA	United States Environmental Protection Agency
GHG	greenhouse gas
ID	identifier
LOS	level of service
MSATs	mobile-source air toxics
NAAQS	National Ambient Air Quality Standards
NO_2	nitrogen dioxide
O_3	ozone
PM	particulate matter
SIP	state implementation plan
TIP	transportation improvement program
U.S.	United States
UDOT	Utah Department of Transportation
USC	United States Code
VMT	vehicle-miles traveled
WFRC	Wasatch Front Regional Council

1.0 Introduction

The Utah Department of Transportation (UDOT) is conducting a State Environmental Study to evaluate a potential freeway-style interchange at Bangerter Highway and 2700 West in Riverton, Utah, in order to reduce congestion and improve safety.

1.1 Project Study Area

The proposed interchange would be constructed in Riverton and Bluffdale, Utah. The study area is located on both sides of Bangerter Highway from milepost 3.8 to 4.9 and along 2700 West between 13640 South and 14000 South.

1.2 Proposed Action

Project work for the Proposed Action includes constructing a grade-separated tight diamond interchange at Bangerter Highway and 2700 West as well as the associated on- and off-ramps. Project work would also include minor widening and restriping on 2700 West to accommodate the turn lanes for the new grade-separated interchange; modifying utilities and storm drainage; and installing new pavement, traffic signals, advanced traffic management systems (ATMS) equipment, and roadway signs. This project would also require right-of-way acquisition. These improvements would improve traffic flow and safety on Bangerter Highway and 2700 West.

2.0 Purpose and Need

The primary purpose of this project is to alleviate congestion and improve traffic operations and mobility at the Bangerter Highway and 2700 West intersection.

During the current (2021) AM and PM peak periods, drivers waiting at this intersection experience an average delay of 74 and 39 seconds, respectively. The AM peak-period delay is classified as level of service (LOS) E, and the PM peak-period delay is classified as LOS D. Traffic modeling indicates that, if no operational improvements are made at the Bangerter Highway and 2700 West intersection by 2050 (No-Action Alternative), this intersection would operate at LOS F during the AM and PM peak periods. The AM peak-period delay is projected to be 123 seconds, and the PM peak-period delay is projected to be 113 seconds.

3.0 Attainment Status for the Project Study Area

3.1 Background on National Ambient Air Quality Standards

The U.S. Environmental Protection Agency (EPA), under the authority of the Clean Air Act (42 United States Code [USC] Section 7401 and subsequent sections), established National Ambient Air Quality Standards (NAAQS) for ubiquitous pollutants considered harmful to public health and the environment (40 Code of Federal Regulations [CFR] Part 50). The current NAAQS for criteria pollutants are shown in Table 1. According to EPA, transportation sources currently contribute to four of the six criteria pollutants: carbon monoxide (CO), particulate matter (PM_{10} and $PM_{2.5}$), ozone (O_3), and nitrogen dioxide (NO_2).

If an area meets the NAAQS for a given air pollutant, the area is called an *attainment area* for that pollutant (because the NAAQS have been attained). If an area does not meet the NAAQS for a given air pollutant, the area is called a *nonattainment area*. A *maintenance area* is an area previously designated as a nonattainment area that has been redesignated as an attainment area and is required by Section 175A of the Clean Air Act, as amended, to have a maintenance plan for the 20 years following its redesignation to attainment or maintenance status. The Clean Air Act also requires each State to prepare and submit a state implementation plan (SIP) to attain, maintain, and enforce the NAAQS.

Section 176(c) of the Clean Air Act, and its related amendments, require that transportation plans, programs, and projects that are developed, funded, or approved by the Federal Highway Administration and/or Federal Transit Administration, and metropolitan planning organizations, must demonstrate that such activities conform to the SIP. An individual project is said to conform to the SIP if, both by itself and in combination with the other planned transportation projects, it would not result in any of the following conditions [42 USC Section 7506(c)]:

- Cause or contribute to new air quality violations of the NAAQS,
- Worsen existing violations of the NAAQS, or
- Delay timely attainment of the NAAQS or required interim milestones.

Table 1. National and Utah Ambient Air Quality Standards for Criteria Pollutants and Attainment Status for Salt Lake County

Pollutant	Primary/Secondary Standard	Averaging Time	Level	Form	Attainment Status for Salt Lake County
Carbon monoxide (CO)	Primary	8 hours	9 ppm	Not be exceeded more than once per year	Partial attainment area[a]
		1 hour	35 ppm	Not be exceeded more than once per year	
Ozone (O_3)	Primary and secondary	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years	Marginal nonattainment area
Particulate matter ($PM_{2.5}$)	Primary	1 year	12.0 µg/m^3	Annual mean, averaged over 3 years	Serious nonattainment area
	Secondary	1 year	15.0 µg/m^3	Annual mean, averaged over 3 years	
	Primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years	
Particulate matter (PM_{10})	Primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years	Maintenance area
Nitrogen dioxide (NO_2)	Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years	Attainment area
	Primary and secondary	1 year	53 ppb	Annual mean	Attainment area
Sulfur dioxide (SO_2)[b]	Primary	1 hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years	Attainment area
	Secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year	Attainment area
Lead (Pb)	Primary and secondary	Rolling 3-month average	0.15 µg/m^3	Not to be exceeded	Attainment area

Sources: 49 CFR Part 50 (NAAQS) and EPA Greenbook (https://www.epa.gov/green-book)

µg/m^3 = micrograms per cubic meter; ppm = parts per million; ppb = parts per billion; $PM_{2.5}$ = particulate matter 2.5 microns in diameter or less; PM_{10} = particulate matter 10 microns in diameter or less

[a] A section of Salt Lake County is a CO maintenance area, but the rest is an attainment area. The project study area is located in the attainment area.

[b] The SO_2 standards shown in this table are the current standards, which were established in 2010. Salt Lake County has been designated as an attainment area based on these standards. However, Salt Lake County is an SO_2 nonattainment area based on previous standards set in 1971 and has yet to be designated as an attainment area based on the 1971 standards.

3.2 Attainment Status of the Study Area

The project study area is located in Salt Lake County, which is a nonattainment area for $PM_{2.5}$, O_3, and SO_2. Salt Lake County is a maintenance area for PM_{10}, having transitioned from a nonattainment area effective March 27, 2020. Table 1 above shows Salt Lake County's attainment status for each criteria pollutant. Sulfur dioxide (SO_2) and lead (Pb) are not considered transportation-related criteria pollutants and are not discussed further.

The Proposed Action is identified as a Phase 1 project (Project ID: R-S-198) in the Wasatch Front Regional Council's (WFRC) 2019–2050 *Wasatch Front Regional Transportation Plan*[1] and is also identified in WFRC's conforming 2021–2026 transportation improvement program (TIP).

What are attainment, nonattainment, and maintenance areas?

An attainment area is an area that meets (or "attains") the NAAQS for a given air pollutant.

A nonattainment area is an area that does not meet the NAAQS for a given air pollutant.

A maintenance area is an area previously designated as a nonattainment area that has been redesignated to attainment status and is required to have a maintenance plan.

During the current (2021) AM and PM peak periods, drivers at the Bangerter Highway and 2700 South intersection experience an average delay of 74 and 39 seconds, respectively. The AM peak period delay is classified as level of service (LOS) E and the PM peak period delay is classified as LOS D. If no operational improvements are made at this intersection (No-Action Alternative), traffic modeling indicates that, by 2050, this intersection would operate at LOS F during the AM peak and PM peak periods, with the AM peak period delay projected to be 123 seconds and the PM peak period delay projected to be 113 seconds.

The new grade-separated interchange would improve traffic flow on Bangerter Highway. Vehicle emissions would be lower with the Proposed Action because there would be less traffic congestion and decreased travel times compared to the existing conditions and the No-Action Alternative.

4.0 Hazardous Air Pollutants

In addition to the criteria air pollutants for which there are NAAQS, EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., locomotives, construction equipment, and airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries). Mobile-source air toxics (MSATs) are a subset of the 188 air toxics defined by the Clean Air Act. MSATs are compounds emitted from highway vehicles and non-road equipment.[2] Based on the Federal Highway Administration's analysis using MOVES2014a, diesel particulate matter (diesel PM) remains the dominant MSAT of concern for highway projects.

The amount of MSATs emitted for the No-Action and Proposed Action alternatives would be proportional to the vehicle-miles traveled (VMT), assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for each alternative should be equal given that the Proposed Action is not adding capacity. There would be an overall increase in VMT for both the No-

[1] https://wfrc.org/VisionPlans/RegionalTransportationPlan/Adopted2019_2050Plan/RTP_2019_2050_ADOPTED.pdf

[2] https://www.fhwa.dot.gov/Environment/air_quality/air_toxics/policy_and_guidance/msat

Action and Proposed Action alternatives due to additional households and employment in the study area. Although this increase in VMT would lead to higher MSAT emissions, the increase for the Proposed Action would be offset somewhat by lower MSAT emission rates as a result of decreased travel times and increased speeds. According to EPA's MOVES2014 model, emissions of all of the priority MSATs decrease as speed increases.

Regardless of the alternative chosen, emissions in the design year (2050) will likely be lower than current levels as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by over 90% between 2010 and 2050.[2] Local conditions might differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the air quality impact analysis area are likely to be lower in the future in nearly all cases.

5.0 Greenhouse Gas Emissions

Greenhouse gases (GHG) trap heat and make the planet warmer. Human activities are responsible for almost all the increase in greenhouse gases in the atmosphere over the last 150 years.

The largest source of GHG emissions from human activities in the United States is burning fossil fuels for electricity, heat, and transportation. Carbon dioxide (CO_2) released through the consumption of gasoline and diesel fuel is the main GHG produced by vehicles.

CO_2 emissions are expected to increase by 2050 whether the Proposed Action is implemented or not. This increase is a direct factor of increased VMT in the project study area. The carbon content in fuel is constant, and the amount of CO_2 produced is directly related to the amount of fuel consumed. Increased VMT equates to more fuel burned and more CO_2 released into the atmosphere. Although fuel economy is expected to increase in the future, it would not be enough to offset the increase in VMT.

6.0 Conclusions

The Proposed Action is identified as a Phase 1 project in WFRC's 2019–2050 RTP and is also identified in WFRC's conforming 2021–2026 TIP and therefore conforms to the SIP. For this reason, UDOT does not expect the Proposed Action to adversely affect local compliance with the NAAQS. Atmospheric CO_2 emissions are projected to increase in 2050 due to the greater number of vehicles and increased VMT in 2050. This increase would occur with or without the Proposed Action. The amounts of all other pollutants are projected to decrease in future years due to improved fuel and emissions standards.