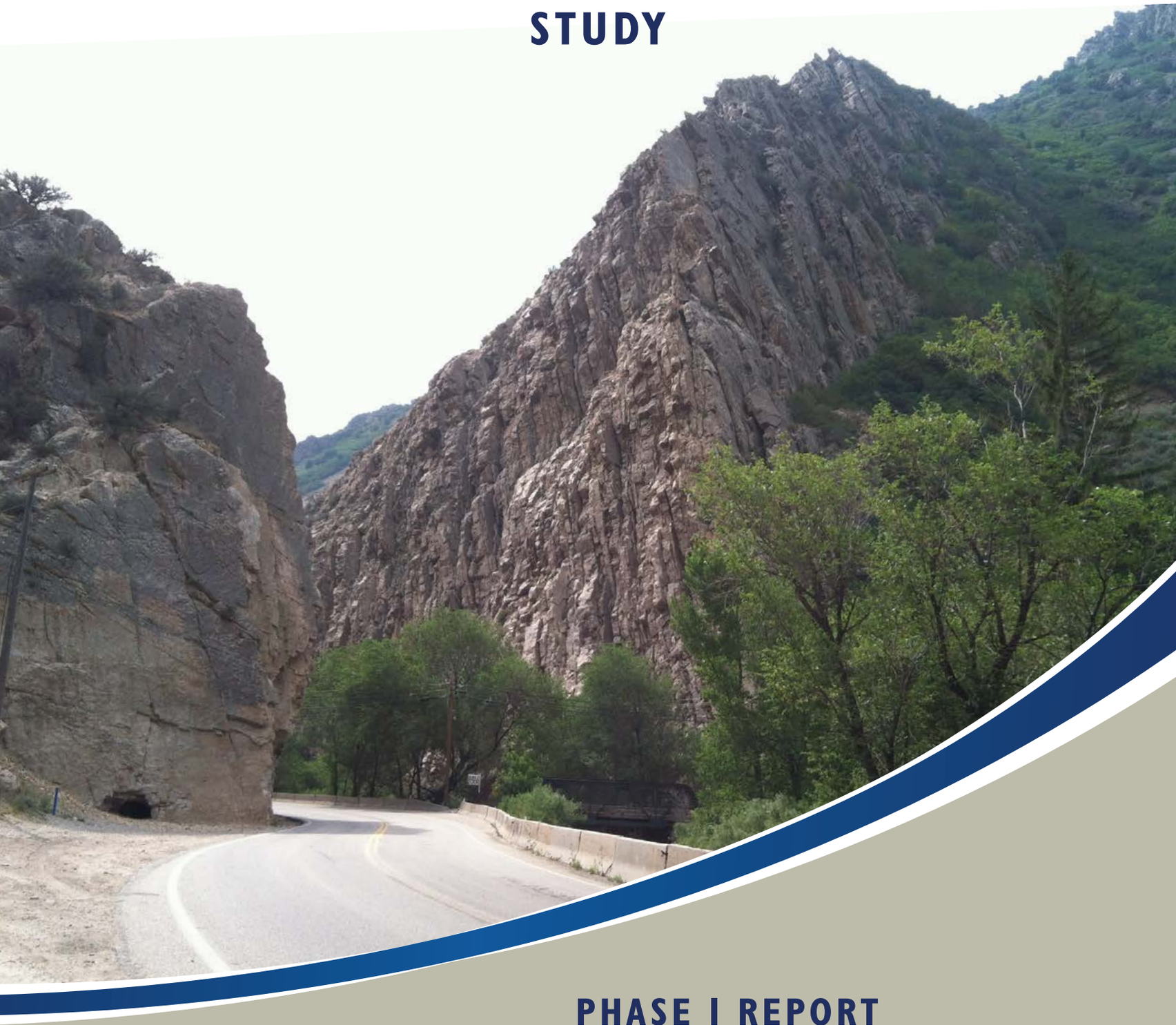
OGDEN CANYON
TRANSPORTATION USE STUDY

SR-39; OGDEN CANYON TRANSPORTATION USE STUDY



PHASE I REPORT

May 21, 2015

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1.0 EXECUTIVE SUMMARY

1.1 Purpose of the Study

The Utah Department of Transportation (UDOT) has completed Phase I of a Transportation Study in Ogden Canyon. The Transportation Commission asked UDOT to conduct the study and look at all modes of transportation in the canyon. The purpose of the study is to gather and share information in an interactive and transparent process and develop an understanding of the safety and mobility needs in the canyon.

The study collected and analyzed existing and future safety concerns, traffic volumes, resident needs, economic needs, multi-modal uses (biking, truck traffic, pedestrian, transit, etc.), recreational uses, environmental concerns, and geotechnical/geologic concerns.

The purpose of Phase I was to gather physical information and opinions concerning transportation through Ogden Canyon so a plan can be formed for future canyon uses and needs. This report documents the information that has been gathered and recommends next actions.

1.2 Description of Ogden Canyon

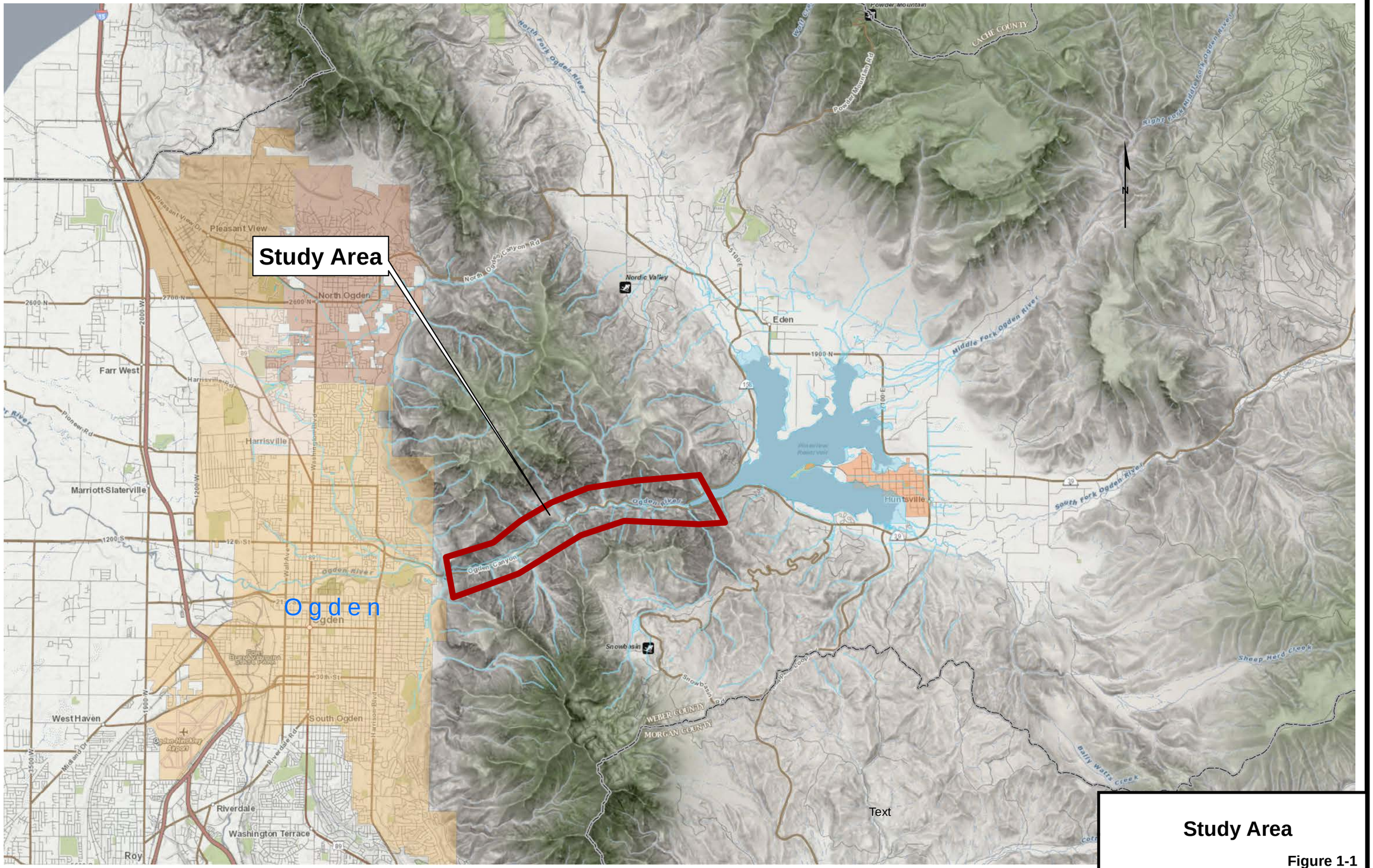
As seen in Figure 1-1, Ogden Canyon is a narrow gorge connecting the city of Ogden to the Ogden Valley, which is 10 miles northeast of downtown Ogden City. At the west end of the Ogden Valley and the top of the canyon is an earthen dam originally built in 1936, behind which are held the waters of Pineview Reservoir. The Ogden River flows into the reservoir from the east and exits at the dam site, with the river flowing through the canyon and on through Ogden City, eventually flowing into the Great Salt Lake. The canyon itself is five miles long with steep canyon walls. The average width of the canyon floor is 200 feet with the widest point 500 feet and at its most narrow point, just 90 feet wide. The elevation of the canyon climbs 450 feet from the mouth of the canyon to the top near Pineview Reservoir. There is thick native vegetation including trees and shrubs in much of the canyon. Many recreational homes have been constructed along the river, with several constructed higher on the mountain away from the river (from Selective Reconnaissance Level Survey, Ogden Canyon Waterline Project, October 2011).

1.3 Public Outreach

An extensive public involvement effort was undertaken, which included a project website, an online public survey, several press releases, meetings with agencies and residents, and a mailer to 1,100 property owners in the canyon and surrounding area. These efforts resulted in over 1400 comments. More extensive information is included in Section 2.0 Public Outreach Program.

1.4 Operational Safety Report

An Operational Safety Report (OSR) was prepared for SR-39 from MP 7.7 to MP 16.6 and SR-158 from MP 0.0 to MP 1.6. There are some extreme horizontal curves on both routes that have posted advisory speed plaques as low as 15 MPH on SR-158 and as low as 25 MPH on SR-39. There are center and shoulder rumble strips on SR-39 from MP 13.3 to MP 16.6.



Text

Study Area

Figure 1-1

There were six severe crashes and 45 total crashes from MP 8.5 to MP 11.5 where a vehicle ran off the road or crossed the center median. During the site visit multiple vehicles were observed crossing the center median while traveling around curves.

Based on the crash analysis data and the results of the site evaluation, the following countermeasures are recommended:

1. Shoulder and Centerline rumble strip installation for SR-39 from MP 8.9 to MP 13.3.
2. Improve advisory speed and curve warning signing and roadway delineation.

A more thorough discussion can be found in Section 3.0 Operational Safety Report.

1.5 Roadway Geometry

The existing roadway was studied for operational safety and deficiencies. Evaluations were completed for horizontal curves, stopping sight distance, vertical curves, and accident history. Comments from the public and agencies were placed on maps to assist in identifying areas where safety and functionality could be improved. Using Microstation, SR-39 was realigned in places that had been flagged as the worst curves within Ogden Canyon so that impacts to the river and other resources could be evaluated.

Trail alignments were also developed based on input from residents, coordination with agencies, and study of environmental and engineering constraints. A number of trail possibilities are shown in this document. These alternatives should be refined through further study and other possible alternatives should be developed.

An extensive review of the roadway study, including figures, is found in Section 4.0 Roadway Geometry Analysis.

1.6 Environmental Concerns

An initial screening of environmental resources was done using previously completed studies and public records such as the Ogden Canyon Waterline Environmental Assessment (October 2011), site visits, meetings with agencies, and coordination with the public. Areas of special concern include potential impacts to the Ogden River floodplain, State Sensitive Species such as the lyrate mountainsnail and the Bonneville cutthroat trout, impacts to water quality, impacts to visual resources such as the dramatic cliffs and rock formations, and impacts to archaeological and historic sites. These and other environmental considerations are detailed in Section 5.0 Environmental.

1.7 Geologic Hazards

Golder Associates conducted a preliminary “desktop” study and brief field reconnaissance to identify geological and geotechnical constraints and issues related to future transportation improvements within Ogden Canyon. Golder reviewed previous studies, existing information, and made limited field observations.

Very steep, rocky slopes are prevalent features in all sections west of the Pineview Reservoir dam. These slopes produce occasional high-energy rockfall events from various areas over most of the alignment within the canyon. Rock debris from these high-energy rockfall events currently creates a hazard at the

bottom of the canyon nearly everywhere below the Pineview Reservoir dam, except where the canyon widens. In general, the north side of the canyon shows more distinct, rocky outcrops, talus, and less vegetation. The more shaded southern side is vegetated with conifers with intermittent rocky slopes and thicker soil cover over the bedrock.

Recent and historic landslides have been mapped on both the north and south sides of the canyon throughout the entire study area. Below the Pineview Reservoir dam, mapped landslides are more frequent along the south side of the canyon.

Debris and mudflow events are possible from most of the drainages, but additional vegetation on the south side may increase the amount of available source material that may be scoured during intense precipitation events. Removal of the existing vegetation by wildfire would increase the probability of debris and mudflows. The very steep slopes on the north side, which consist mostly of rocky outcrops and talus, will also produce debris events during intense precipitation events because rocky material is available to be scoured, infiltration will be low, and flow velocity will be high.

In general, ditch widths along the uphill side of the road are not wide enough or of the appropriate shape to provide retention of rockfall, debris, or avalanche events. A preliminary check of typical ditch width and shape below rock cuts shows that existing ditches are insufficient to provide retention of rock debris based on FHWA guidelines. We are not aware of any existing rockfall mitigation structures except occasional portable concrete barriers on the uphill side of the road.

Natural and man-triggered avalanches have been reported on the slopes of the canyon. However, the records found were brief and without accurate information pertaining to location and other specifics. UDOT maintenance personnel reported frequent, springtime wet snow slides in many of the drainages, particularly along the south side of the canyon below the Pineview Reservoir dam.

Geotechnical issues common to all segments include scour of retaining walls near the river, rockfall from existing rock cuts, and soil slopes where large cobble and boulders erode and descend to the road. Stability of future rock and soil cuts for widening or improved sight distance will be an issue due to the potential cut heights and rock quality. Design and constructability in talus deposits and on steep slopes with severe traffic and space constraints will affect planning of future uses.

Seismicity and liquefaction potential, if present, will affect the design of structures. Previous published reports indicate that the liquefaction potential within the canyon is very low but some potential exists to the east of the Pineview Reservoir dam and near the mouth of the canyon. Soft Bonneville sediments exist east and possibly west of the dam in limited areas, which may affect design of foundations.

More detailed information can be found in Section 6.0 Geotechnical.

1.8 Traffic

Traffic counts were collected at three locations in Ogden Canyon and correlated with historical information collected by the automatic traffic recorder in Ogden Canyon. Traffic volumes are the highest on weekends and the summer months due to the recreational opportunities in the surrounding areas. Truck traffic volumes were also collected. Future traffic volumes for the canyon were predicted and it was found that the existing two lane road has sufficient capacity to handle the volumes predicted for 2040. A full report is found in Section 7.0 Traffic.

1.9 Short-term Recommendations

- Install additional VMS signs to warn Ogden Canyon users of closures before they get to the turn-offs for other routes. Possible locations: for westbound traffic in Huntsville on SR-39 before the turn-off for southbound Trappers Loop; on northbound I-15 before the US-89 split (so drivers can get off and take I-84 to Trappers Loop); on northbound I-15 before the I-84 split; in Eden on SR-158.
- Add signs that say "Hidden Driveway" near residences that have direct access to SR-39.
- Install shoulder and centerline rumble strip for SR-39 from MP 8.9 to MP 13.3.
- Improve advisory speed and curve warning signing and roadway delineation (as detailed in Figure 3-2a and 3-2b)

1.10 Long-term Recommendations

Summary of Next Public Outreach Actions

- Continue to build consensus and good will through conducting an open and transparent process.
- Present survey and data findings from Phase I to the public.
- Form focus groups to discuss transportation concepts and develop criteria for evaluating all concepts.
- Form a steering committee with a select member from each of the focus groups to evaluate transportation concepts.
- Present transportation concepts to the public through an open house, website, and media.

Summary of Next Roadway and Trail Analysis Actions

- Continue to refine options for improving safety on SR-39 by coordinating with the public and analyzing environmental impacts of actions.
- Continue to refine trail options by coordinating with the public and analyzing environmental impacts of trail types and locations.
- Develop design criteria for a trail in the canyon in order to evaluate feasibility of alternatives.

Summary of Next Environmental Actions

- A detailed hydraulic analysis will need to be completed in Phase 2 to determine if any proposed improvements in the canyon would alter the floodplain.
- Air quality should be evaluated in conjunction with regulatory agencies to determine if a detailed study is warranted.
- Measures to reduce traffic noise in the canyon should be evaluated.
- Any proposed improvements need to be evaluated for their potential impacts to water quality.
- A new paleontological file search will need to be conducted for the project area defined by any proposed improvements.
- A wetland delineation will need to be completed.
- Obtain letter from UDOT Wildlife Biologist on Threatened and Endangered Species and perform search of UNHP database.
- Complete Reconnaissance Level Survey for historic properties.
- Perform Class 3 pedestrian survey for cultural resources.
- Contact Native American tribes for cultural and historic resources.

- Coordinate with Utah Office of Tourism on Scenic Byway designation and possible incorporation of Corridor Management Plan goals.
- Review hazardous materials database to determine risk of contaminated soils.
- If improvements are to be made with federal money, a NEPA document will need to be prepared.
- If improvements are to be made with state money, a State Environmental Study will need to be prepared.

Summary of Next Geotechnical Actions

- Inventory man-made rock and soil slopes likely to produce rockfall. Collect data on stability, height, slope, ditch width, rock structure, and potential to produce rockfall.
- Evaluate naturally-occurring rockfall sources to estimate size, historic frequency, and trajectory.
- Debris, mudflow, and flood study on larger watersheds in canyon.
- Additional avalanche mapping and dendritic studies (dating trees to estimate frequency).
- Further study on faults.
- Selective, infrequent borings to determine foundation types and soil deposits.
- Investigate groundwater conditions.

2.0 PUBLIC OUTREACH PROGRAM

2.1 Summary

Over 1000 direct mailers were sent to property owners in early November 2014. These mailers advertised the project website and invited citizens to leave comments and obtain more information about the study.

Three press releases were prepared, resulting in six newspaper articles. Additionally, the project team met with 16 agencies and conducted 13 meetings with Ogden Canyon residents.

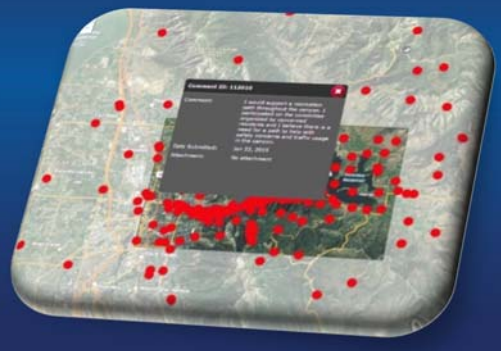
Direct mailers sent to property owners

2.2 Project Website

A website was established at http://www.udot.utah.gov/ogdencanyonstudy. The website went live on October 31, 2014 and received 408 comments during the 3 ½ month comment period. The website had a geographic information system (GIS) database embedded so that users could log the exact location their comment referred to or their residence if they had a general comment about the project. Users could also click on the interactive map to see comments that others had left, making the public comment process transparent and accountable.

Comments from the website were categorized into the following topics:

- Safety/Roadway
- Safety/Recreation
- Pedestrian/Bicycle Path
- Truck Traffic/Speed Limit
- Aesthetics/Environmental
- Canyon Private Property
- Public Transit
- Business Concerns
- Communication



Interactive map used to track and display public comments

Safety/Roadway

Many commenters included their concerns regarding the narrowness of the canyon road. While many would like to widen the roadway, there still existed concerns such as private property easements or purchases, protection of the river/wildlife and other long-term effects of widening. Further ideas such as "A pull out area to allow slow traffic to pass (with signs)" were included in the comments.

Safety/Recreational Access

Safety concerns within the canyon ranged from cyclists on the road to rock fall areas. Some voiced that they would like to have all bicycles removed from the canyon while others would like to see a bike lane and a wider road for safe travel.

"Please keep the bike riders out of Ogden Canyon, it's too narrow."

Recreational users share the need for additional parking throughout the canyon to be able to access rock climbing, fishing, backcountry skiing, biking and hiking. While some expressed that the canyon is too narrow for additional recreational access, others expressed that there are currently too few access points – especially trail access for bikers, hikers and fishermen (from the road to the river).

Pedestrian/Bicycle Path

Collected comments expressed both concerns and excitement about a trail through the canyon. 91% of commenters were in favor of a trail being built in the canyon whether it was alongside the roadway or separate. The majority shared a vision of a paved trail for biking/hiking/commuting which connects the upper and lower valleys.

"I would like to see access for hikers, bikers and other recreationists to be able to travel through the canyon. I think that this is an opportunity for Ogden to connect with the Ogden valley and would become the crown jewel of Ogden's trail system."

Out of the remaining 9%, 3% were completely against a trail running the length of the canyon due to concerns with the following: narrow canyon, protection of private property, nature conservation, increased crime and high expenses. 6% of commenters said they would be in support of a trail as long as it didn't interfere with private property rights in the canyon.

"We have the Ogden River Parkway and Weber River Parkway to enjoy. We just don't see it being imperative to have Ogden Canyon available for bicyclists, hikers, and recreational uses. The expense and effects on the canyon would outweigh the benefits."

Truck Traffic/Speed Limit

Jersey barrier sliding into the river

The majority of commenters would like to see large truck traffic rerouted out of Ogden Canyon to Trappers Loop. Large trucks are also a problem when they have hit barriers into the river with their trailers, causing the entire canyon to be shut down.

There have been "…many narrow escapes as autos/trucks exceed speed limits and drift over the white lines on many occasions. More so in the first mile of the canyon road on the Ogden side. As many of the trucks are engaged in building out the valley, loads are too heavy to safely negotiate this section."

As mentioned in the previous quote, another large concern is speed limit. Many would like to either see the speed limit reduced, better enforced or reduced for large truck traffic.

Aesthetics/Environmental

Many are concerned about maintaining the aesthetics of the canyon and are frustrated with several visual aspects including the green erosion control blanket on the hillside along with the "ugly cement barriers" which replaced the historic, hand-made rock walls. Users and residents of the canyon have expressed interest in preserving the natural resources and scenic value within the canyon.
The majority of the respondents emphasized a desire to reduce impacts to the river and maintain and even improve the look and feel of the canyon. Both the Division of Wildlife Resources and Bill King (a private property owner) provided specific environmental insights. Please see Section 5.0 Environmental for further information.

Canyon Private Property

Some of the property owners in the canyon feel like their "property rights aren't considered." They've had fishermen in their backyards and residents have had issues with Ogden City during various projects. Canyon property owners would like to be considered throughout the duration of the project.

Public Transit

> *"And please! Some public transport through the canyon for those of us who commute the canyon. Would save some wear and tear on the roads and pollution in the air."*

Commenters mentioned how helpful shuttles throughout the canyon would be since the current canyon conditions are dangerous for bike commuters. "Consider a shuttle between Wheeler Creek TH [trailhead] and Rainbow Gardens for bike commuters. This could be beneficial between say 6 and 9 am and 4-6 pm with pickups every 20 or 30 minutes. This would help bike commuters in both directions."

Business Concerns

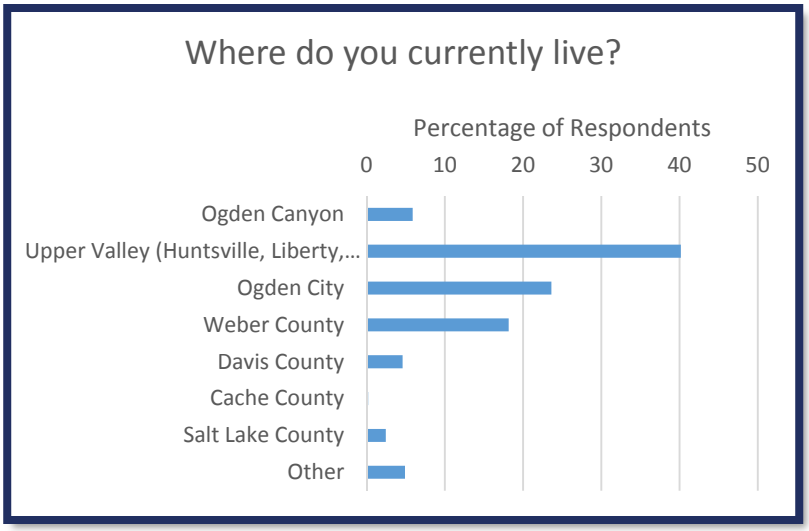
The only comments within this category were from the Gray Cliff Lodge Restaurant within Ogden Canyon. They stated that during the 22 month waterline project, their business was affected by 60% from canyon closures. They believe that more work in the canyon will put them out of business.

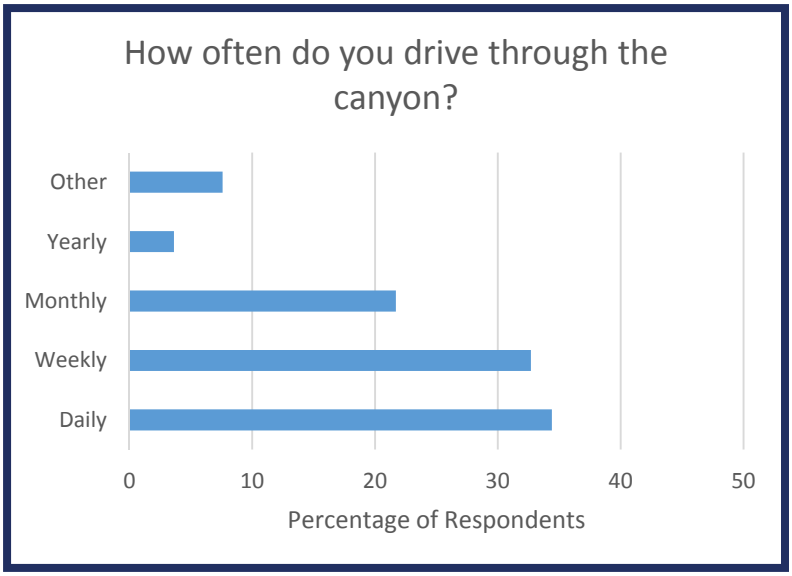
Communication

Commenters would like to see some form of communication to notify when the canyon is closed either via text message or email. Another idea mentioned was installation of large VMS signs at both ends of the canyon. Anything to help spread the word will help commuters, residents and recreationalists to plan ahead and choose alternate routes.

2.3 Survey

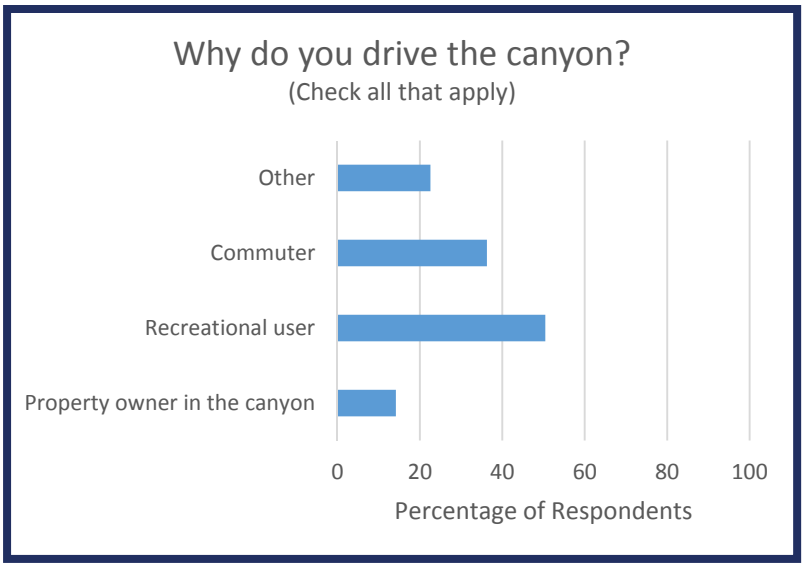
In order to augment the comments from the project website and solicit opinions about specific issues and concerns, a detailed 31-question survey was launched in January 2015. The survey was available for 30 days and 941 responses were received. A break-down of the respondents' place of residence is shown in the bar graph. Of these, 55 respondents said they live in Ogden Canyon.





The majority of survey respondents (40%) were from the Upper Valley, which consists of the cities of Huntsville, Eden, and Liberty. Most residents of the Upper Valley use either Ogden Canyon or Trappers Loop to enter and leave the Upper Valley, so their interest in the canyon is both for commuting purposes as well as recreational. Ogden City residents made up 24% and the rest of Weber County made up 18% of the survey respondents. Residents who actually live in Ogden Canyon made up about 6% of the survey respondents, representing 55 people.

Over 80% of respondents drive through the canyon at least monthly, with more than 30% using the canyon daily and another 30% using the canyon at least weekly. Of the 55 canyon residents, over 80% say they drive in the canyon daily. Some canyon residents own seasonal/vacation homes and do not drive through the canyon on a regular basis.



A brief summary of the survey results follows. A full report of the survey questions and answers is located in the project file.

- 70% of people are most concerned about bicycle and pedestrian safety
- 60% of people are in favor of safety improvements even if they impact private property or aesthetics
- More than 460 people commented on trucking issues
- Nearly 90% are in favor of better messaging signs (VMS)
- 78% of people are in favor of a trail if impacts to residents can be minimized
- 75% of people want a trail that allows bicycles up and down canyon
- 55% of people do not want bicycles on the roadway. 42% would be in favor of cyclists on the roadway if improvements were made.
- 60% of people are in favor of more parking options
- 41 people said they currently use the bus system in the canyon

Canyon Residents

General Comments:

- 55 of the 941 survey respondents said they live in the canyon
- 82% drive the canyon daily
- 74% extremely concerned about heavy truck traffic
- 57% extremely concerned about road cyclists and pedestrians
- 47% in favor of roadway improvements for safety even if private property or canyon aesthetics are affected
- 43 residents made specific comments about limiting heavy truck traffic, noise from trucks, and trucks crossing the center line

Opinions on Trail:

More than 80% of canyon residents said that they were extremely concerned about:

- Privacy for canyon residents
- Trespassing on private property
- Vandalism/crime along the trail
- Arson
- Impacts to property right-of-way
- Environmental and aesthetics protection

- 50% were extremely concerned about maintenance of the trail
- 50% are in support of a trail in the canyon if impacts to canyon residents can be minimized

Opinions on Parking:

- 80% of canyon residents are opposed to additional parking for recreational purposes.
- However, there were about 20 comments about improving the existing parking areas near Wheeler Creek Trailhead, Indian Trailhead, and the canyon businesses.
- Three suggestions for limiting parking to Rainbow Gardens and Pineview Reservoir area.

Opinions on Environmental Issues:

- 46% support additional measures for controlling rock fall onto the roadway
- 75% do not support any changes to the Ogden River
- 83% are concerned about traffic noise

- Specific comments suggested limiting heavy trucks, prohibiting engine brakes, prohibiting motorcycles, lowering and/or enforcing the speed limit
- One person suggested building sound walls

2.4 Meetings with Agencies

Ogden City

Ogden Canyon is a critical corridor for the city. The city's main priority is getting a trail in the canyon. They would prefer a 10-foot wide asphalt or gravel trail that connects the mouth of the canyon to Pineview Reservoir and is located off the SR-39 roadway. Ogden City would also like to add fisherman's access and pocket parks throughout the canyon.

Ogden City has utility infrastructure issues in the canyon (waterline, sewer, etc.). They are concerned with the growing population in Huntsville and Eden and their access to Ogden's business areas. Ogden City also cares about the visual and aesthetic resources of the canyon. They do not want to widen the canyon and ruin the visual qualities of the canyon, but they are also concerned that the vocal minority will override the majority of people who really want a trail.

Weber Pathways

Weber Pathways is a non-profit organization founded in 1995 with the purpose of building a trail in Ogden Canyon. They believe that the 10 miles of paved trails and 69 miles of unpaved trails within and near the study area could be connected with a future trail in Ogden Canyon. Their vision is to have an active transport of pedestrians and cyclists through the canyon.

They would prefer that a trail be constructed on the north side for sunlight. Active transportation on the road is very dangerous with current conditions. A trail would benefit businesses and special events in the canyon and reduce motorized traffic.

Weber County Fire District

The Fire District has six stations; two of them are in the Upper Valley (one in Eden and one in Huntsville). They are worried about access and water supply. The existing bridges in the canyon are inadequate. Trucks have fallen through some of the bridges and they have to be very cautious about going over them. There is also inadequate hydrant pressure. Their trucks have to fill up at the bottom of the canyon for this reason.

There are issues with the steep grades and narrowness of the canyon. It's difficult for their engines to get up the canyon when there is snow and ice on the road. They have a couple of large water tankers that can hold 4,000 gallons and they don't like to take them in the canyon because the roadway is so narrow.

House fire at 680 Canyon Road, January 3, 2015. The canyon was closed while the fire department worked to put out the fire. Photo from www.kutv.com

U.S. Forest Service

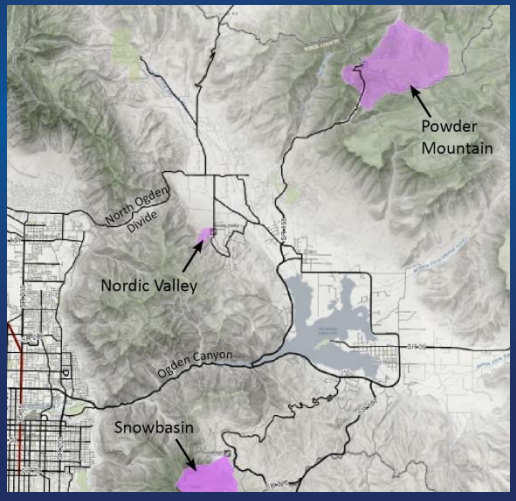
The Forest Service owns lands on both sides of the canyon. The majority of their adjacent lands are on the south side of the highway. The Bureau of Reclamation land is mainly just around the dam. The USFS uses SR-39 in the canyon to access their federal land and to provide fire protection. They have offices in Ogden, Huntsville, and Randolph. No one is permanently stationed in Huntsville, so they drive the corridor daily to get to work.

The USFS works together with Weber County for fire control. If the fire or hazard is on the west end of the canyon, USFS can respond more quickly. The canyon is tight, narrow, and doesn't allow much room for error. USFS employees are constantly pulling trailers have to drive much slower than they should be driving during an emergency. They are in favor of roadway safety improvements to make it faster, safer, and easier for their trucks and trailers to travel through the canyon.

Parking for recreation and bicycles on the road are both safety issues. The USFS maintains the Indian Trailhead and the parking lot there. They also maintain the Wheeler Creek trails and pullouts around the reservoir. They would like an active transportation corridor through the canyon.

Nordic Valley

Nordic Valley (formerly known as Wolf Mountain) is a ski resort in Eden, Utah. They currently have plans for 600 vacation homes at their resort, but eventually they could have as many as 2,200 units for rent. They also noted that their summertime market is growing due to mountain biking.



Ski Resorts in the Ogden Valley

They said the North Ogden Divide is not a viable option for moving a lot of traffic because most people find it uncomfortable to drive. They had several ideas for improving the transportation options from Ogden to their resort.

1. They would like a tunnel from the freeway down in Ogden.
2. They are going to work with the Forest Service on a tram from Ogden to the Upper Valley.
3. They think Ogden Canyon should be widened to accommodate traffic. They suggest having flex lanes in the canyon to accommodate peak travel.

Powder Mountain

Powder Mountain is a resort in East Eden, Utah. A biking and walking trail through Ogden Canyon is important to them. They would like to see a parking area near the Rainbow Gardens area where people could park and then be shuttled to the resort. They already have some transit right now, but it could be improved.

There is currently a traffic bottleneck at Pineview Dam. They think a traffic light would help at this location. They would also like to see a transit connection from the airport, a permanent road condition

(VMS) sign in the canyon, and would like the areas where the barrier gets knocked into the river to be fixed.

Snowbasin

The Snowbasin ski resort is located in the mountains to the south of Ogden Canyon. One of the popular ways to access Snowbasin from Ogden is to drive through Ogden Canyon to Huntsville and then take Trappers Loop (SR-167) to Snowbasin. The Snowbasin representatives said that the Ogden Canyon corridor is vital to their business during winter and summer. Keeping the road open is critical because 35% of their business drives through Ogden Canyon.

They would like to see better parking areas in the canyon or a park and ride lot. They would like to have Little Cottonwood Canyon's bus program mirrored. (Utah Transit Authority partners with Alta, Brighton, Snowbird, and Solitude ski resorts to provide a ski bus for Big and Little Cottonwood Canyons.) They would also like more VMS signs for communication.

Weber County

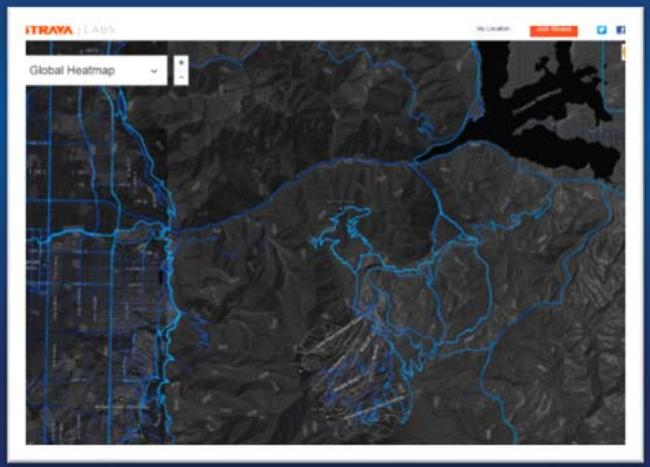
There are water and sewer infrastructure issues in the canyon. There have been septic system problems and the water line they have been using in the canyon for the last three years is not working well. Ogden Canyon road is a long road with 123 residents. This makes it difficult to put in an acceptable system and the county does not want to put in a sewer system.

The County estimates that approximately 70% of the residents live in the canyon year-round. They get maybe two to four new building permit requests per year. There is turn over with older generations that have held onto their lots and new people moving in. To build something new, it's almost impossible unless people are combining lots. Things are a little more flexible now where people can build up, but they can't build out.

Weber County wants better VMS for traffic delays. North Ogden Divide isn't an easy second access and Trappers Loop is a long way away. Residents were notified well during construction of the waterline in the canyon, but other closures have not been messaged as well. They also suggested an IRIS alert system for residents in the canyon if there is a canyon closure.

The Weber County traffic and safety people have been pushing for rumble strips in the canyon, but the County has put that on hold. As far as EMS goes, the Alaskan Inn is the dividing line where Ogden City would respond to fires. Above this line, the Upper Valley fire stations would respond.

The County would like to see a feasible route for a trail that has consent and buy-in from residents. They want shoulders and bike lanes with a multi-use trail on the side. The County did a re-zone with Keith Rounkles at The Oaks a couple years ago and he was going to develop a trailhead there with the



User-mapped runs and bicycle rides from http://labs.strava.com/heatmap

Forest Service.

Wheeler Creek Canyon is a popular destination. Weber County officials said there are a lot of people parking on the other side of the canyon road across from Wheeler Creek. If there were more parking facilities in the canyon there would be higher use. That higher use needs to be balanced. If you look at the Strava Cycle Heat Map, you can see that people do use Ogden Canyon a lot. Wheeler Creek is a big route that people map themselves on. It is the darkest color in the canyon.

The County would like a trail in the canyon, but is not willing to take the lead and move something forward at this point. They are eager to see the results of the Transportation Use Study.

Bureau of Reclamation

The Bureau's mission and first priority is to deliver water. If there is a multi-use possibility, which wouldn't impact water, the Bureau would support that. The Bureau manages the dam, the reservoir and the flume. They also manage the larger water conduit on the hill that goes down the canyon.

Pineview Dam

PacifiCorp owns the power lines in the canyon. The Bureau looked at placing a trail up on the hill, on the right-of-way with PacifiCorp, years ago, but the plan dissipated. The Bureau wants their pipeline protected, in any case. Their first priority is to protect the dam. The dam and area surrounding it is a primary jurisdiction zone and needs to be kept safe from vandalism and acts of terror. This wouldn't limit having a trail continuing past the dam, but additional fencing would be required for that area.

Huntsville – Mayor Truett

Mayor Truett would like Huntsville to have a say in what happens in the Upper Valley and in the canyon. They would like to be able to control the building that is happening. The Mayor would like better notification on events that happen in the Upper Valley. Sometimes events take place and the cities aren't notified beforehand. The Tour of Utah closed Ogden Canyon and the city wasn't told about it. People were upset that it paralyzed the use of the canyon. He said that during the summer months there is an event every weekend in the Upper Valley. The only events that give back to the valley are the Amazing Race and the Ogden Valley Marathon. Huntsville is Ogden's playground but the mayor doesn't feel like the city gets a benefit from this.

Biking in Ogden Canyon is too dangerous and creates a traffic bottleneck. It seems very difficult to expand the canyon road and he doesn't think biking and hiking should be on the roadway. Mayor Truett would also like to see better signage to alert people that the canyon is closed. He thinks that big trucks shouldn't be allowed in the canyon.

Ogden Canyon is the main corridor between Ogden and the Upper Valley. The mayor does not think anyone drives 35 mph, more like 45 mph. From a Huntsville perspective, he does not think anyone would ever drive 25 mph. He doesn't want to share the corridor with bikes because it's too dangerous. North Ogden Divide is dangerous and steep. Trappers Loop is out of the way.

Division of Wildlife Resources

Ogden Canyon is a brown trout area and they need to be protected. There can be almost 6,000 fish per mile of stream. At the mouth of the canyon, there's a snail of concern. The Lyrate mountainsnail is a State Sensitive Species and the DWR regulates them. The DWR doesn't know exactly where the snail habitat is, except that it is near the mouth of the canyon. A survey would need to be completed for the snail.

The DWR owns land in the canyon to the east of the Alaskan Inn and they would like to have public access to the natural resources there. They are respecting private property rights, but they would like to increase access, especially for fishing. Fishermen sometimes encroach on private property to use the river. You can float through these areas, but you can't touch the bottom of the river.

DWR thinks the public would really enjoy having a trail and increased access points along the river. DWR has a fishing access near The Oaks restaurant. It is still on private property, but they have an agreement with the owner to allow access for a certain amount of money per year.

The plants and animals on the riversides rely a lot on the space on the side of the river. When you take that away by widening the road, it affects them a lot. DWR's opinion is that narrowing the river area any further would result in a dangerous situation in high water years. There was a dangerous point a few years back when Pineview Reservoir was only five inches from an uncontrolled spill point.

Weber School District

There needs to be a strict truck speed; to stay in the center of the travel lane you can only go 30 mph. There is no way the tractor trailers can navigate the tight curves without taking both lanes. If the Narrows could be widened a bit, that would help a lot. Passing lanes in areas that are wide enough would also be helpful. Safe pullouts would be good for when buses break down. Sometimes they have to push buses all the way out of the canyon. Also, the overhangs of the rocks in the canyon are very close to the tops of the buses.

There is not enough parking for recreation. People park their cars next to the road and it's dangerous. Construction or crashes in the canyon are very inconvenient. It would be helpful to let people know before they reach the turn-off for Trappers Loop. Once you get to Rainbow Gardens, it's already too late.

Trappers Loop is just too far and costly as a driver. Trappers Loop is too steep for buses. When there is a closure of Ogden Canyon, the school buses have to divert to Weber Canyon. There are school kids that live in the canyon too, so in the case of a closure, there's nowhere to drop them off.

The school district has 14 buses which run to the Upper Valley each day. Buses also have to come down for repairs and field trips. There is a minimum of 28 trips down and up the canyon each day with the district's buses. There are three high school buses down and back up every morning and a couple more in the afternoon. They go to the ski resorts and environmental center in the Upper Valley.

Sierra Club

There is no place to stop in the canyon and enjoy the beauty unless you own a home there. The Sierra Club would like a safe access for fishermen and a 10-ft wide asphalt trail up the canyon. There should

also be lower speed limits in the Narrows and a restriction on large vehicles. They also suggest push button signs to warn vehicles of bicycles on the road.

Utah Trucking Association

The current restriction in the canyon for trucks is 10 feet wide and 77 feet long by state law. The trucks need access to the Upper Valley, but that could be done with smaller vehicle configurations. They are nervous about people wanting to ban "jake" (engine compression) brakes because that is the safest way to get down the canyon. They suggested educating truck drivers in the canyon to only use "jake" brakes in certain areas.

Most good operators will use Trappers Loop over Ogden Canyon, because it's just a few more miles and the canyon is so narrow. As far as banning trucks from the canyon altogether, the Association would appreciate being in a situation where they could decide to keep their larger trucks out voluntarily rather than putting a sign at the canyon entrance not allowing trucks at all. They probably would not support certain day usage restrictions. They don't feel like turnouts would be useful to them to pull over and let drivers pass because they would have problems getting back out into the flow of traffic.

We should talk to the AGC (Associated General Contractors) to discuss truck use for the construction in the Upper Valley. If building increases up there, there will be an increase in construction equipment transported to the Upper Valley, including concrete mixers which are heavy and slow.

PacifiCorp

PacifiCorp needs access points maintained on SR-39. They do not have any interest in a trail, but they would probably allow access through their property. Their power lines go from the hydroelectric plant at the dam and down through the canyon. There is a 12,470-volt overhead power line on the south side of the canyon and another line on the north side. If a trail is built it can't affect the operational viability of PacifiCorp's equipment. They would support a pathway running along their power poles as long as it didn't interfere with functionality.

Their transmission lines provide power to the Ogden Valleys. They will need to rebuild that line as growth occurs, especially in the Upper Valley near the ski resorts. It's on the long-range plan, but might happen sooner based on growth.

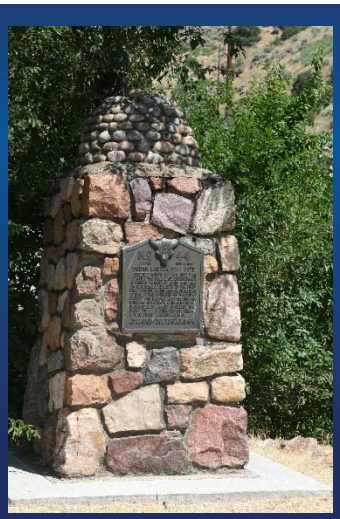
2.5 Meetings with Residents

Thirteen meetings were held with canyon residents. This is a summary of their concerns:

- Upset about old rock walls being replaced with jersey barrier
- Biking is not safe on the existing road
- Concerned about privacy and security if a trail is built
- Concerned about bathroom facilities for trail users
- Concerned about trail maintenance
- Heavy trucks in canyon can't make the turns in their own lane
- Would like limitations on size, length, and weight of vehicles on road
- Want the canyon to remain scenic
- Trail may be OK as long as it is not on or near their property
- Traffic noise is a problem
- Want better notification of canyon closures
- Want a shuttle in the canyon for recreational users

2.6 Map of Unique Canyon Features

Using data gathered from the public outreach, a map was created of unique features in Ogden Canyon. These are historical, environmental, aesthetic, and/or recreational elements that make Ogden Canyon a special place to the people who live, work, and play there. These are features that people would like to see preserved for themselves and future generations. An overview map showing their location in the canyon as well as a description of each feature can be seen below.



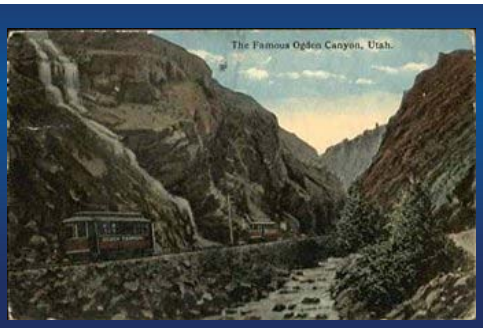
Toll Gate Monument

Toll Gate Monument (MP 8.7)

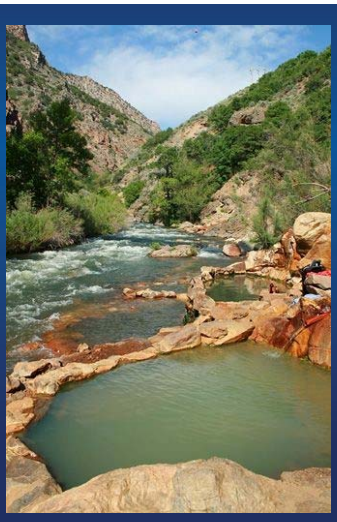
When Ogden Canyon Road was first constructed it was a toll road and a toll gate was located at the mouth of the canyon. The toll gate was in operation from 1865 to 1882, at which point the road became public. A monument at the intersection of Valley Drive and SR-39 (near Rainbow Gardens) built in 1934 commemorates the location. This monument has not been evaluated for the National Register of Historic Places, but it would likely be eligible. (Source: Utah Heritage Foundation and Standard Examiner)

Trolley path

The Ogden Rapid Transit Company, founded by David Eccles, built a streetcar line in Ogden Canyon. The line was completed from the current Rainbow Gardens to the Hermitage in 1909 and from the Hermitage to Huntsville by 1915. Service continued until 1932, when tracks were damaged by floods and the rail company decided to remove its tracks and run buses over the public highway instead. (Source: utahrails.net)



Historic Trolley Path



Thermal Hot Springs

Thermal Hot Springs (MP 8.9)

Native people used these hot springs between 1000 AD and 1850. The existing pools are manmade and are located on private property (Rainbow Gardens) near the mouth of Ogden Canyon. They are on the south side of SR-39 just after the water pipeline that crosses the highway. Several people have died in the hot springs over the years and the area has been fenced off and signed “No Trespassing”.

Ogden River

Many respondents mentioned the beauty of the river and the recreational opportunities it provides. The river is used for fishing and kayaking. Many people mentioned that they wish the hot pots (thermal springs) were still accessible.

Waterfall (MP 9.0)

There is a large waterfall on the north side of SR-39 near MP 9. This waterfall is manmade and is caused by the pipeline placement high on the cliff.

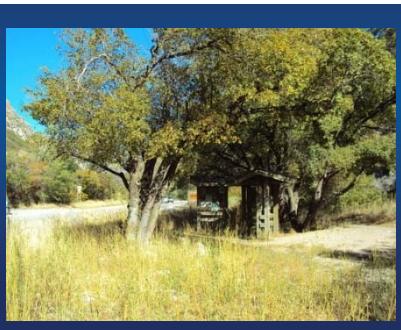
Waterfall

Peery Camp (MP 9.7-9.8)

This area was a retreat for the family of D.H. Peery, one of Ogden's wealthiest businessmen, in the late 1800s/early 1900s. The area first consisted of a cottage and 10 cabins. The Commons area at the camp is recommended eligible for the National Register of Historic Places.

Indian Trailhead (MP 10)

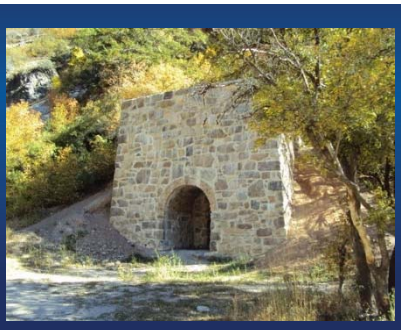
Indian Trail is a 4.2-mile unpaved, heavily forested trail. The trailhead is located near M.P. 10. At the trailhead, on the south side of SR-39, there is a parking lot with space for about 20 cars. Near the trailhead is a restored lime kiln that was used in the 1860s to make lime mortar for building. This is also the trailhead for the Coldwater Canyon and Hidden Valley Trails and the old Civilian Conservation Corps encampment.



Interpretive signs at the Indian Trailhead

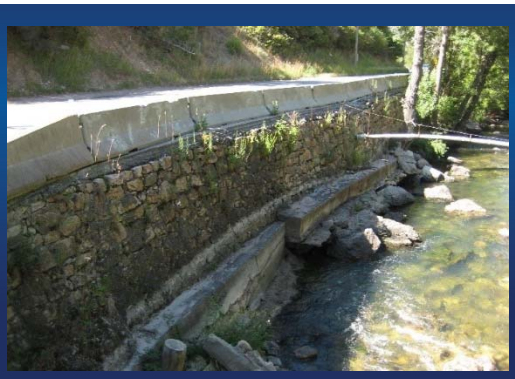
Lime Kiln (MP 10)

In 1865, James Moroni Thomas discovered limestone deposits and opened his first lime kiln near Coldwater Canyon. He sold the first kiln and later built several more. The lime kilns provided lime that was needed in pioneer era construction. The kiln was used to super-heat the limestone that was quarried in the canyon, turning it into a white stone. The white stone was then pulverized and the lime powder was used to make mortar and plaster. This lime kiln was restored by the Utah Heritage Foundation in 2008 and features a plaque with educational information on the kiln and its role in Ogden's history. The kiln is located at the Indian Trailhead.
(Source: Utah Heritage Foundation)



Restored Lime Kiln

Stone walls



Stone walls near river.

There are seven retaining wall segments associated with SR-39 in Ogden Canyon. The segments begin near the mouth of Ogden Canyon and extend intermittently for around five miles to a point near Pineview Reservoir. The walls were constructed in 1921 as part of an improvement project along Ogden Canyon Road/SR-39. Most of the segments were constructed of locally-available rough-cut rock held together with a thin layer of sandy mortar. Two segments consist of dry-stacked rock. These walls are recommended not eligible for the National Register of Historic Places because the integrity of the walls is poor. Additionally, the methods used to construct the walls were common for the period and do not embody any distinctive traits of retaining wall construction. Many people have commented that they would like the remaining stone walls to be preserved.

Ogden Canyon Narrows (MP 9.0-11.0)

Rock cliffs that originally made the Upper Ogden Valley inaccessible.

Narrows

Notable rock formations (Source: Ogden Valley Business Association map):

- Sleeping Beauty – north side of Ogden Canyon just west of The Cobbles at Lewis Grove (MP 10.6)
- Nelly's Nipple – south side of Ogden Canyon just east of Peery Camp (MP 9.9)
- Indian Head Penny Profile – north side of Ogden Canyon just west of Peery Camp (MP 9.7)

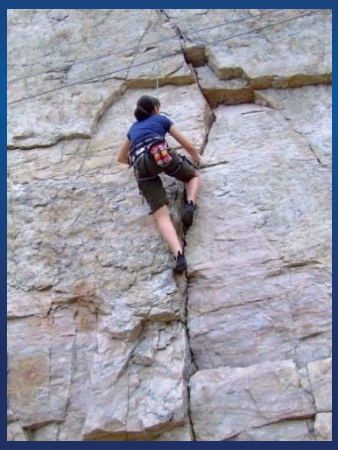
Rock Climbing Routes (Source: http://www.whattodoinogdenvalley.com/climbing.html):

- 5.8 Wall
- Utah Wall
- Roadside Attraction
- Chouinard's Gully
- Moonlight Overhang
- Hole in the Rock

5.8 climbing wall (MP 9.55)

This climbing area is located about half mile east of the waterfall, on the south side of SR-39, right next to the road. The number 5.8 designates the level of difficulty of the climb. This is one of many climbing walls in Ogden Canyon, but climbers say it is one of the few in the canyon for beginners to learn on and it is also one of the few routes that is not located on private property.

Marked climbing routes on the 5.8 climbing wall



Hole in the Rock climbing wall

Hole in the Rock (MP 9.7)

This climbing wall is located about one mile east of the waterfall. This is an extremely popular climbing area and also located near the central parking place for several of the Ogden Canyon climbing areas.

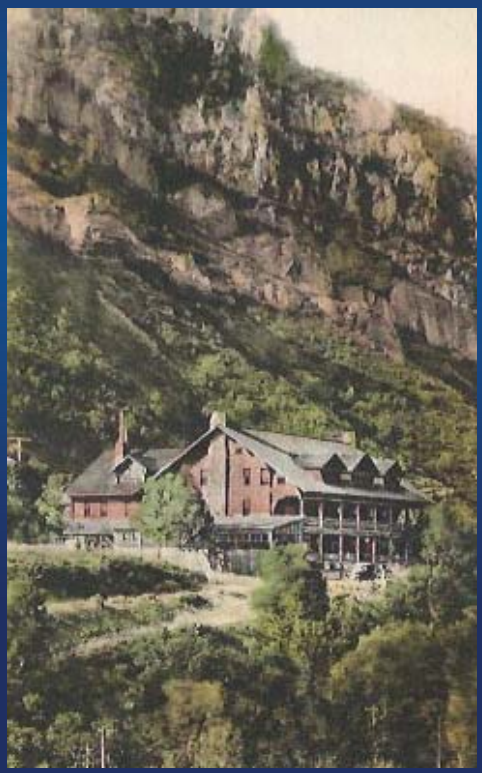
Climbing rock face by Peery Camp bridge

There are a number of climbing rock faces in this location. This description probably refers to the Hole in the Rock climbing face.

Hermitage Hotel (MP 11.4)

The Hermitage Hotel opened in 1905 and burned down in 1939. The ruins are all that is left. This site was evaluated for the National Register of Historic Places and recommended ineligible because of a near complete loss of integrity. The site consists of several bulldozed piles of the original foundation debris, several exposed sections of foundation, a stone retaining wall measuring approximately 15 feet high, and a stone-lined staircase and entryway.

Hermitage Hotel ruins – retaining wall, facing north



The Hermitage Hotel as seen on a postcard of the time period.

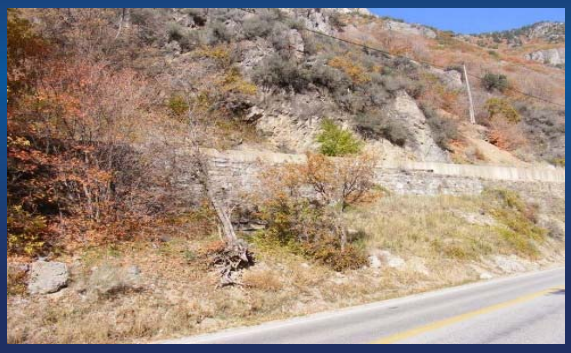
Grey Cliff Lodge

Grey Cliff Lodge (MP 11.6), 508 Ogden Canyon Road
Grey Cliff Lodge and Restaurant is located below the Grey Cliffs at 508 Ogden Canyon Road. It is recommended eligible for the National Register of Historic Places.

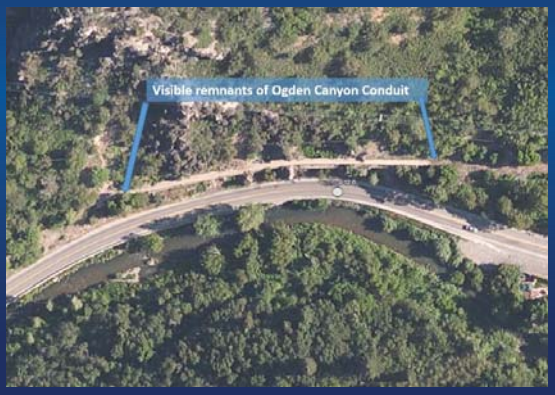
Family home of Browning Arms (MP 11.9), 559 Ogden Canyon Road
John Browning, the founder of Browning Arms, owned a number of homes in Ogden. One of his homes is located at 559 Ogden Canyon Road. This property has not been evaluated for eligibility to the National Register of Historic Places. However, based on preliminary review, it is likely eligible under Criterion B.

Historic Browning Home (zillow.com)

Ogden Canyon Conduit (MP 12.6)
This water conduit was constructed in 1935 by the Barnard-Curtiss Company with assistance from the Civil Conservation Corps. The segment studied as part of the Ogden Canyon Waterline EA is located north of the Ogden River and measures approximately 490 feet long, 8 feet tall, and 2 feet wide. The wood pipeline is set on top of a rock and mortar wall built into the north slope of the canyon wall. The wood pipe has been encased in concrete, though segments of wood are still visible in several places.



Visible remains of Ogden Canyon Conduit



Location of Ogden Canyon Conduit as seen from the air.

The Oaks (MP 12.7), 750 Ogden Canyon Road
Built in 1907. Former summer resort, now a year-round restaurant. This building has not yet been reviewed for eligibility to the National Register of Historic Places, but it is likely eligible.

The Oaks Restaurant

ATK Conference Center

ATK Conference Center (MP 13.2), 890 Ogden Canyon Road
This building is recommended eligible for the National Register of Historic Places.

From the ATK Conference Center website:

In 1904, the Bamberger Electric Railroad Company, a small Utah railroad that hoped to furnish franchise rail service through Ogden Canyon to the Huntsville valley, built the present ACC lodge as the first phase of a major resort hotel.

Because builders of the time built by rule of thumb, no formal architectural plans of the lodge were ever made. The native lumber was cut from the mountains in the Monte Cristo area 20 miles east of the ACC. When Bamberger lost its bid for franchise, it continued to operate the lodge as a restaurant for about two years.

In 1918, J.H. DeVine, attorney for the Bamberger Company, and his good friend Jack Browning, bought the property to use as a summer home for both families. DeVine bought out the Brownings in 1922.

Because of wartime restrictions, lack of help, etc., the DeVines sold the property in 1943. The new owners remodeled the building and operated it unsuccessfully as a restaurant, beer tavern, and venue for "questionable" forms of entertainment under names like "Canyon Club" and "Tyrolean House." The operation was opened and closed several times over the next 15 years.

In 1959, the Ogden Chamber of Commerce showed Thiokol the property, and the company bought it in July 1960. Following remodeling, the conference center began operation on October 1, 1960.

The ACC is now used for technical meetings, personnel training, luncheons, award ceremonies and receptions.

Geologic Fold (MP 13.4)
This is probably the Z Plate Formation, on the north side of Ogden Canyon, near the south end of Pineview Reservoir. Only two are visible in the entire world. (Source: http://www.watchingforrocks.com/2014/05/the-z-fold-of-ogden-canyon.html)

Z Plate Geologic Formation

Wheeler Creek Trail System (MP 13.7)
Wheeler Canyon and its associated trail system is located just west of the junction of SR-39 and SR-158, at the south end of Pineview Reservoir. Wheeler Creek trail is a 1.8-mile trail that travels southeast to the Art Nord Trailhead and connects with the Maples Trail, East Fork Wheeler Creek Trail, and Ice Box Canyon Trail. Hikers can also access Snow Basin Road (SR-226) through this trail system.

Wheeler Creek Trailhead

2.7 Public Outreach Timeline

Media and Press Releases
10/14/14 – Salt Lake Tribune article "Study starts on improving high-use 'really narrow' Utah canyon"
10/14/14 – Standard Examiner article "State launching study to look at the future of Ogden Canyon road"
10/31/14 – Project website live
11/4/14 – Mailed postcards to 1087 property owners
11/5/14 – Press release "Transportation Use Study Beginning in Ogden Canyon"
11/10/14 – Deseret News article "Ogden Canyon transportation use study underway"

11/11/14 – Standard Examiner article "Transportation study could change future of Ogden Canyon"
12/9/14 – Standard Examiner article "Tough choices ahead for UDOT with Ogden Canyon"
12/10/14 – Standard Examiner article "Motorists vs. Cyclists?"
1/15/15 – Press release "Public Invited to Participate in Ogden Canyon Transportation Survey"
1/20/15 – Standard Examiner article "UDOT posts online survey on SR 39"
2/9/15 – Press release "Time Running Out to Take Ogden Canyon Transportation Survey"

16 Agency Meetings:
11/7/14 – Ogden City
11/11/14 – Weber Pathways
11/13/14 – Snowbasin
11/14/14 – U.S. Forest Service
11/20/14 – Weber County Planning
11/21/14 - Weber County Sheriff
11/24/14 – Weber Fire District
11/24/14 – Nordic Valley
11/24/14 – Powder Mountain
12/3/14 – Bureau of Reclamation
12/15/14 –Division of Wildlife Resources
12/15/14 – Weber School District
12/15/14 – Huntsville (Mayor Truett)
12/15/14 – Sierra Club
12/23/14 – Utah Trucking Association
12/30/14 - Pacificorp

13 Meetings with Residents:
11/13/14 – Rick Kearl
11/24/14 – Keith Rounkles
11/24/14 – Scott Mendoza
12/4/14 – Bob Doman
12/4/14 – Jody Sniggs
12/4/14 – Robyn Jones
12/4/14 – Tom Pappas
12/9/14 – Mike and Debbie Bachman
12/15/14 – Bart and Dawnett McKell
12/15/14 – Cathy Harline
12/15/14 – Diane Taylor and Mike Bachman
12/15/14 – Nick & Gale Breeze
12/17/14 – Bill King

3.0 OPERATIONAL SAFETY REPORT

An Operational Safety Report (OSR) was prepared for a section of Ogden Canyon on SR-39 from MP 7.7 to MP 16.6 and SR-158 from MP 0.0 to MP 1.6. This section discusses the results of the historical crash data as it pertains to the proposed project.

On November 18, 2014, Horrocks Engineers investigated the project site and conducted its investigation in accordance with the *Operational Safety Report Manual* (UDOT, Version 1.2, June 20, 2014).

3.1 Roadway Physical Conditions

Preliminary investigations indicate there may be an issue with run-off-the-road (ROR) crashes. There are no other pavement, roadway, or lighting conditions that appear to be contributing to overall crash frequency. This segment is a two-lane highway constructed with lane widths of approximately 11 feet without shoulders and with pull-outs placed along the route. SR-39 has a posted speed limit of 50 MPH from MP 7.7 to MP 8.9, 40 MPH from MP 8.9 to MP 13.3, 45 MPH from MP 13.3 to 13.8 and 55 MPH from MP 13.8 to MP 16.6. SR-158 has a posted speed limit of 40 MPH from MP 0.0 to MP 0.7 and 50 MPH from MP 0.7 to MP 1.6. The roadway does not appear to have any extreme vertical curves, but there are some extreme horizontal curves on both routes that have posted advisory speed plaques as low as 15 MPH on SR-158 and as low as 25 MPH on SR-39. There are center and shoulder rumble strips on SR-39 from MP 13.3 to MP 16.6.

3.2 Principal Manners of Collision

Based on analysis of the historical crash data from January 1, 2011 through December 31, 2013 there were 17 severe crashes that occurred within this segment of SR-39 and 0 severe crashes on SR-158 in the past three years. There were five severe crashes at the intersection of SR-39 & Harrison Blvd at the beginning of the study area. Four of the five crashes were angle crashes. Since the scope for this project does not include upgrading the traffic signal, these crashes were not further investigated.

There was one severe single vehicle crash at MP 14.5 that was the only crash in the area in the last three years. This crash was an attempted suicide and does not indicate a crash trend.

The 11 remaining severe crashes occurred between MP 8.5 and MP 11.5. The principal manners of collision for MP 8.5 to MP 11.5 are shown in Table 3-1.

Table 3-1. Principal Manners of Collision

Crash Severity	Run-off-road right	Run-off-road left	Cross Median
Fatal	2	0	0
Incapacitating Injury	1	2	1
Non-Incapacitating Injury	3	2	1
Possible Injury	1	5	2
Property Damage Only	12	4	9
Total	**19**	**13**	**13**

The following is a brief description of severe crashes that were not further investigated because there were no significant trends associated with the severe crash.

1. There was a parked vehicle crash at MP 9.0 where a westbound vehicle making a U-turn hit an eastbound vehicle and a parked vehicle.
2. There were two motorcycle crashes that did not appear to indicate trends. The first (MP 8.97) occurred when an eastbound motorcycle had a mechanical failure crashed into the concrete barrier. The second (MP 10.997) occurred when a motorcycle rolled while making a right-turn at a high rate of speed.

There were six severe crashes and 45 total crashes from MP 8.5 to MP 11.5 where a vehicle ran off the road or crossed the center median. During the site visit multiple vehicles were observed crossing the center median while traveling around curves. Crash locations are shown in Figure 3-1 and are color coded by severity.

Each crash record for the fatal and incapacitating injury crashes was reviewed to determine whether the crash could have been mitigated with countermeasures. Crashes that could not be mitigated were not included in the analysis. A map showing severity of crashes and manner of collision is provided in Section 4.0 Roadway Geometry Analysis.

3.3 Recommended Countermeasures

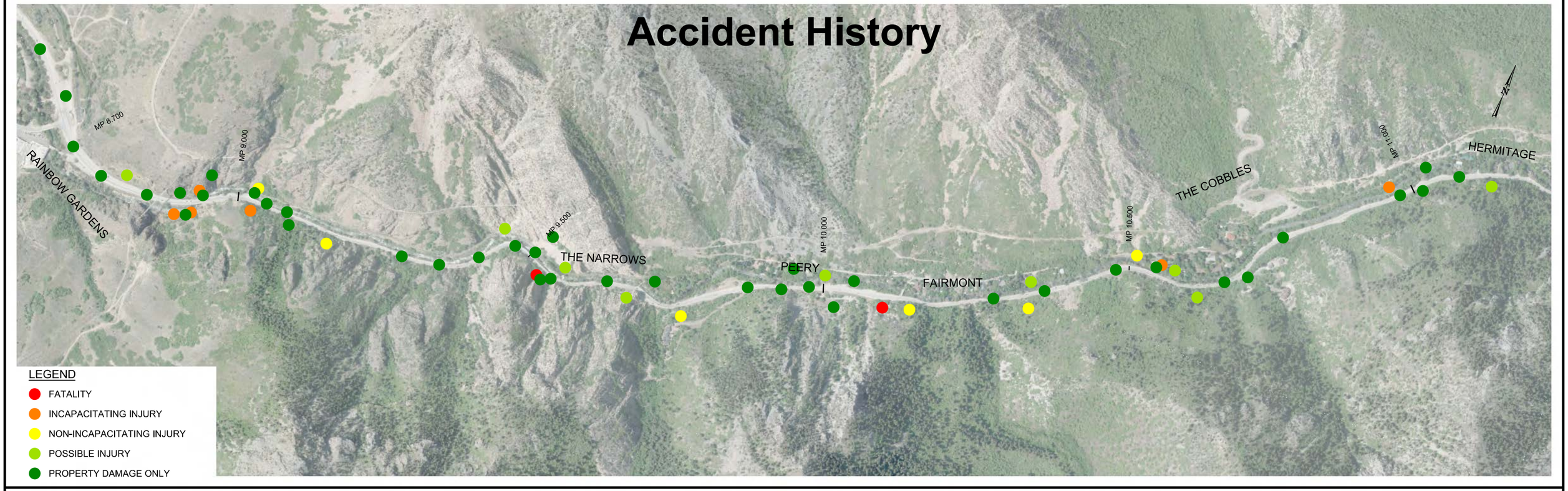
Table 2 identifies the benefit savings of implementing the specific countermeasure for the manners of collision investigated. Based on the crash analysis data and the results of the site evaluation, the following countermeasures are recommended:

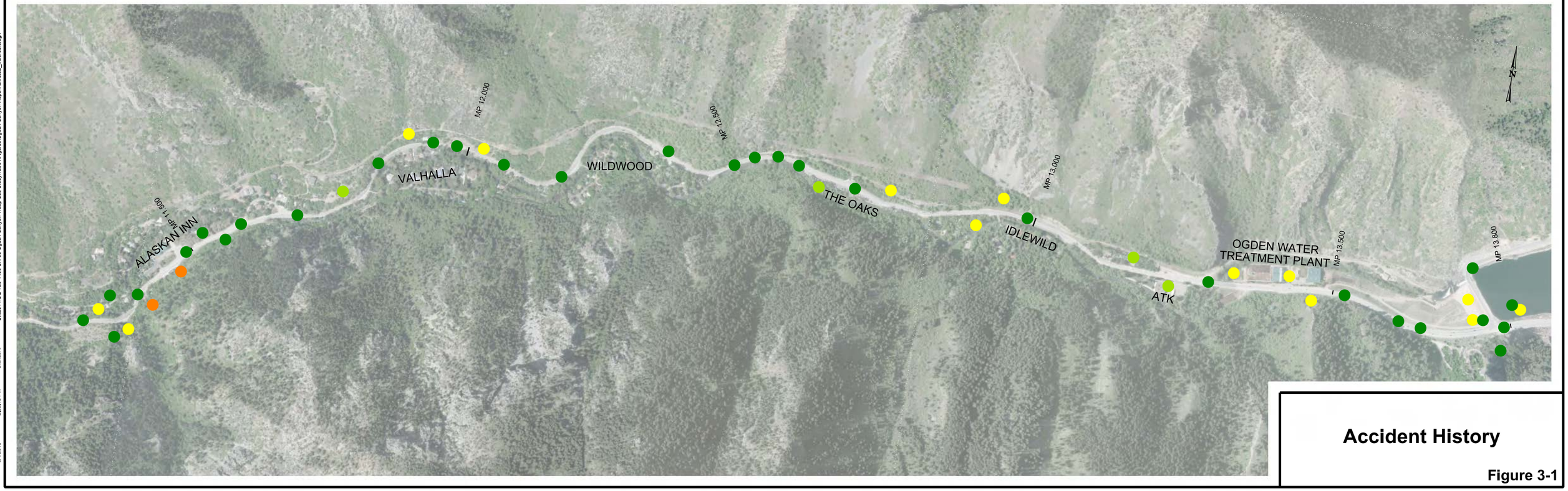
1. Shoulder and Centerline rumble strip installation for SR-39 from MP 8.9 to MP 13.3.

2. Improve advisory speed and curve warning signing and roadway delineation. Refer to Figures 3-2a and 3-2b for exact recommendations.

Benefits listed below are amortized over the service life of the proposed countermeasure. Cost comparisons by the design team should take into account the maintenance of the countermeasure over the service life.

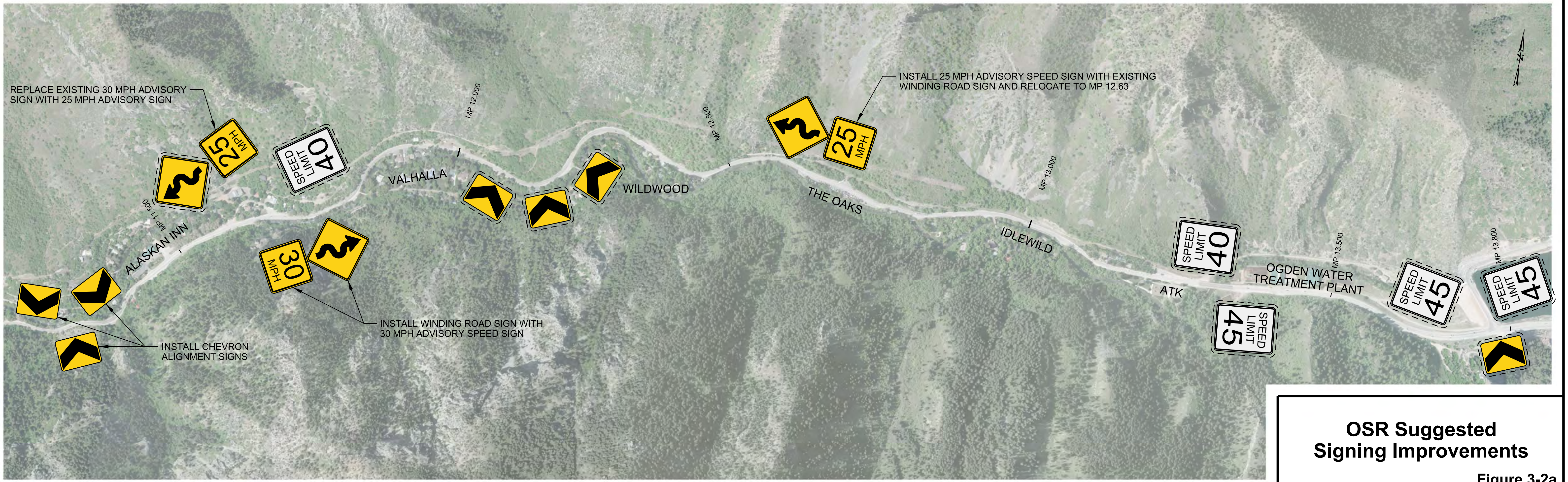
Accident History





Accident History

Figure 3-1



OSR Suggested Signing Improvements

Figure 3-2a

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OSR Suggested Signing Improvements

OSR Suggested Signing Improvements

Figure 3-2b

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Table 3-2. Recommended Countermeasures

Countermeasure	Estimated Cost Savings (Benefit)	Project Service Life (years)	Benefit per Year	Length (feet)	Benefit per foot	Estimated Annual Reduction of Crashes
Shoulder and Centerline Rumble Strips	$5,508,538	10	$645,769	15840	$348	2.23
Upgrade Signing and curve delineation	$6,623,003	10	$776,418	NA	NA	2.70

*Benefits are not additive

The recommendations in Table 3-2 may only be feasible if the costs of the improvements are less than the benefit. Implementation of rumble strips will result in a reduction of 0.30 severe crashes per year. Improved signing and curve delineation will result in a reduction of 0.36 severe crashes per year.

Sensitive Critical Design Elements

It is recommended that any design elements within the project meet or exceed the design standards set by UDOT. Because of the severity of crashes associated with the manners of collision, Table 3-3 identifies the critical design elements that might aggravate the current crash frequencies. The design team should avoid negatively impacting these elements.

Table 3-3. Critical Design Elements Sensitive to Observed Crash Patterns

SR-39
Design Speed
Lane Width
Shoulder Width
Sight Distance
Superelevation

4.0 ROADWAY GEOMETRY ANALYSIS

4.1 Alignment

Before a geometric roadway analysis could be done on Ogden Canyon, an alignment of the corridor needed to be generated. Documents from previous projects within the canyon indicated that a plan set from 1920 most closely resembled the current alignment of the canyon. The bearings and curve radii data were input into Bentley Microstation and then rotated to best fit the geographically reprojected aerial view of Ogden Canyon.

4.2 Horizontal Curve Analysis

A ball bank study was performed to show areas of the canyon that fail when traveling at certain speeds. The ball bank analysis was performed for each curve at various speeds including the posted speed limit and posted advisory curve warning speeds.

The ball bank study data showed areas of the canyon that fail when traveling at certain speeds. Curves that require a vehicle to travel at 25 mph or less were colored red while each other speed was marked a different color. These curves are shown in Figure 4-1.

4.3 Stopping Sight Distance

Ogden Canyon's alignment was also evaluated for Stopping Sight Distance (SSD). SSD is the line-of-sight distance it takes for a vehicle's driver to see something on the road and be able to come to a complete stop. The SSD value changes depending on how fast a vehicle is traveling. A design speed of 40 mph was chosen for evaluation since it is the posted speed limit for Ogden Canyon. At 40 mph the SSD Design value is 305 feet. A line spanning 305 feet was drawn in the alignment file and placed in different locations throughout each curve to determine its maximum SSD. The curves that had a SSD less than 305 feet were categorized by degrees of failure and matched to the previous analysis to show another reason why certain curves were failing the current AASHTO standards. These curves are shown in Figure 4-2.

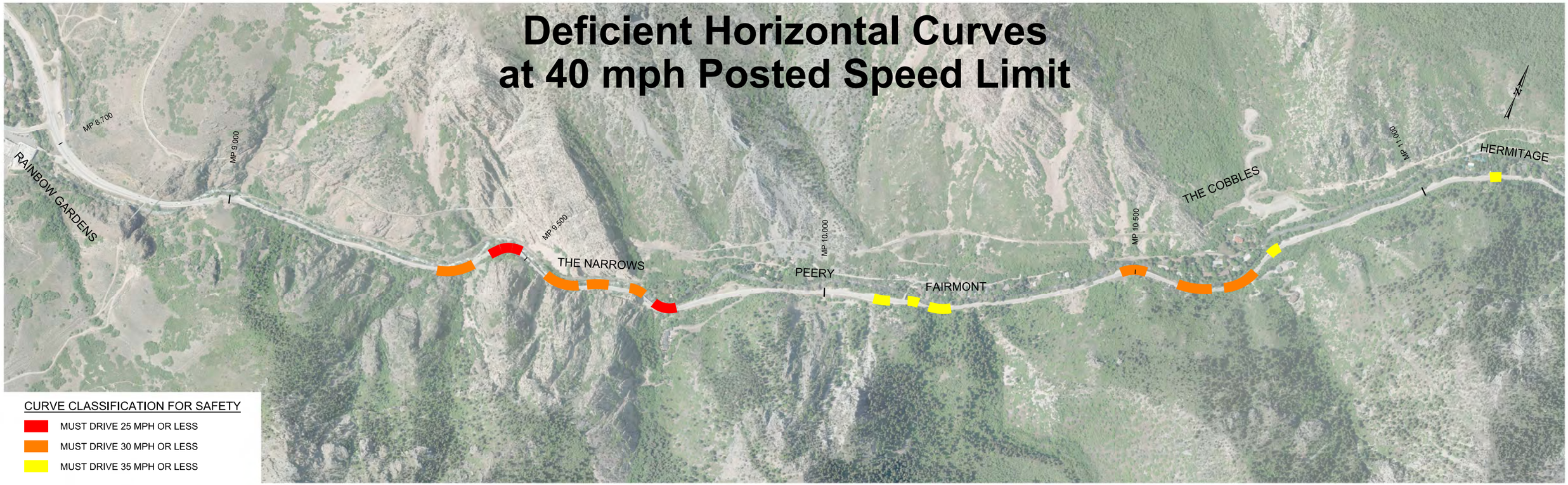
4.4 Vertical Curve Analysis

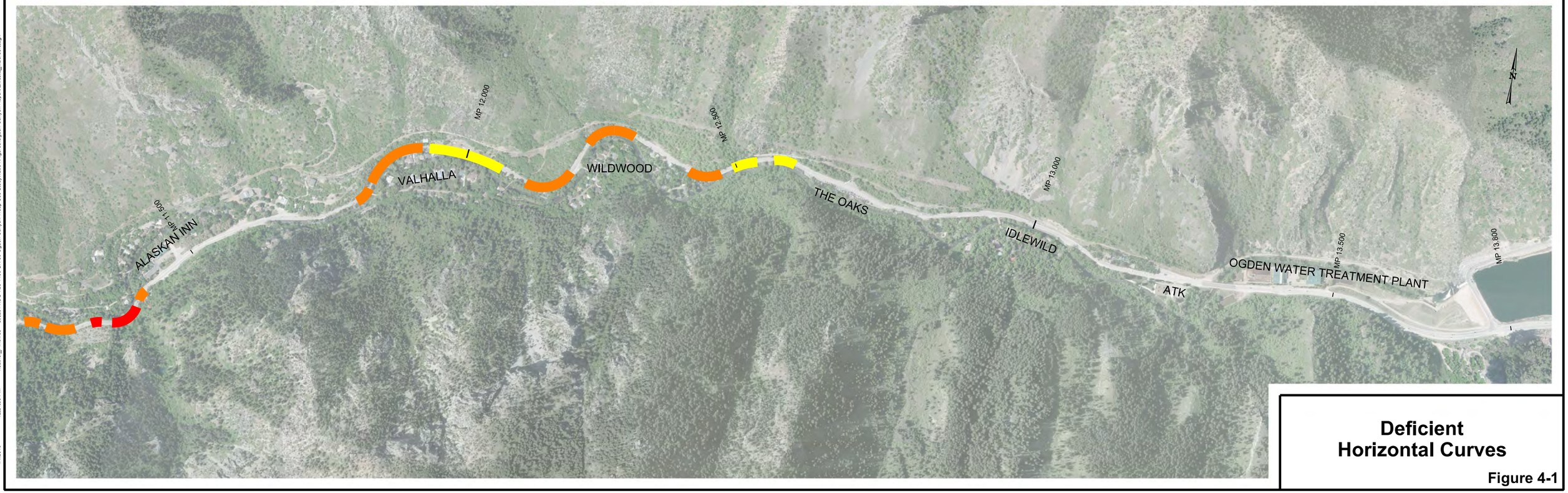
Using elevation data obtained from the Utah Automated Geographic Reference Center (AGRC), a profile of the existing highway centerline was created and analyzed against AASHTO design criteria for vertical curves. When crest vertical curves fail, it means that the stopping sight distance will not meet minimum standards for the design speed. A driver cannot see an obstruction on the other side of the hill in time to stop. When a sag curve fails, it means the curve will cause water to pond on the roadway in this section. Two crest curves in Ogden Canyon fail while eight sag curves do not meet standard. These curves are shown in Figure 4-3.

4.5 Current Centerline Crossovers

To further evaluate curve geometry of Ogden Canyon, AutoTURN was used to analyze where semi-trucks are currently crossing over the centerline. The canyon is prohibited to certain sizes of semis already, so the largest allowable semi (WB-50) was used for analysis. AutoTURN's WB-50 semi animation was run and locations where semis must cross the centerline to avoid driving off the road with the back

Deficient Horizontal Curves at 40 mph Posted Speed Limit

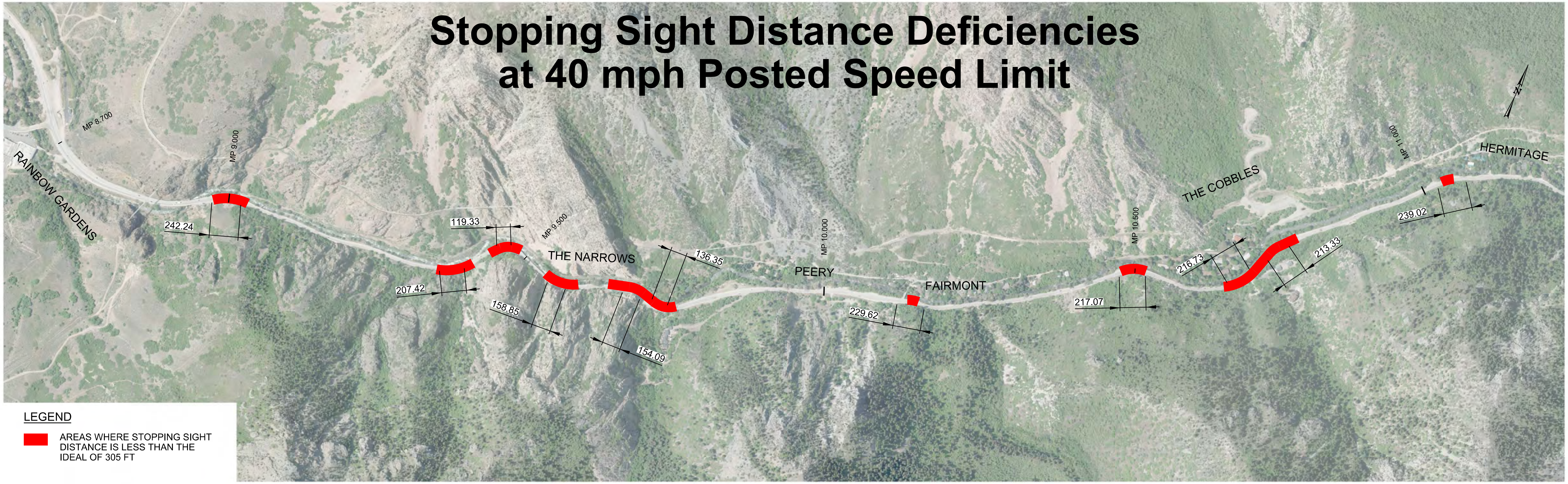


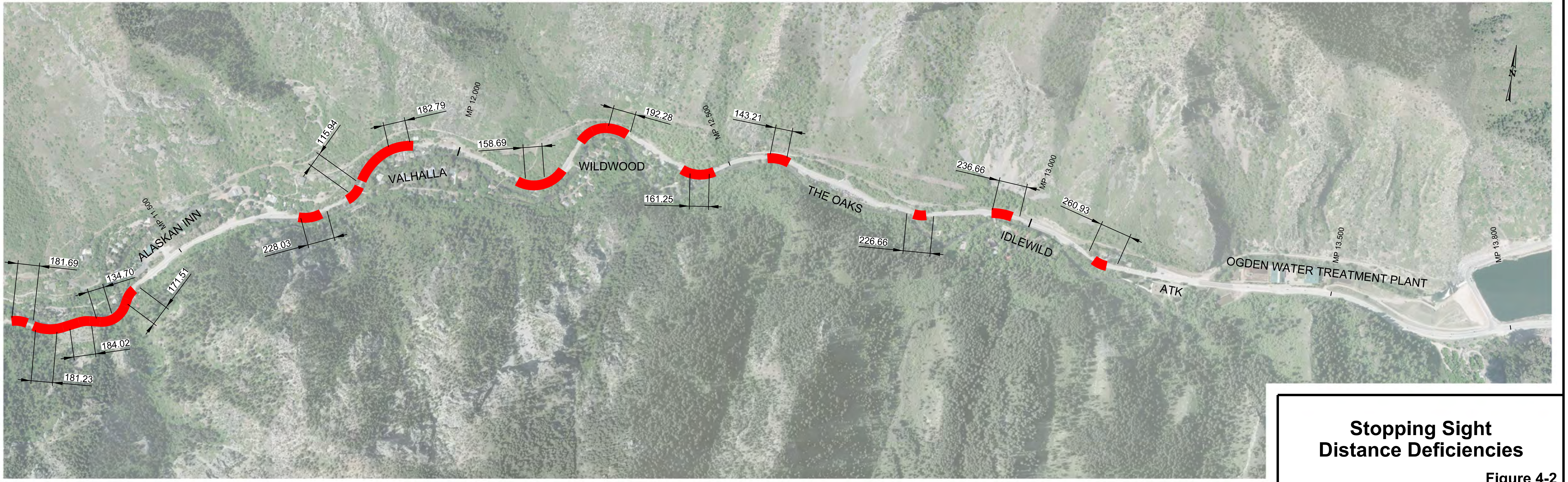


Deficient Horizontal Curves

Figure 4-1

Stopping Sight Distance Deficiencies at 40 mph Posted Speed Limit





Stopping Sight Distance Deficiencies

Figure 4-2

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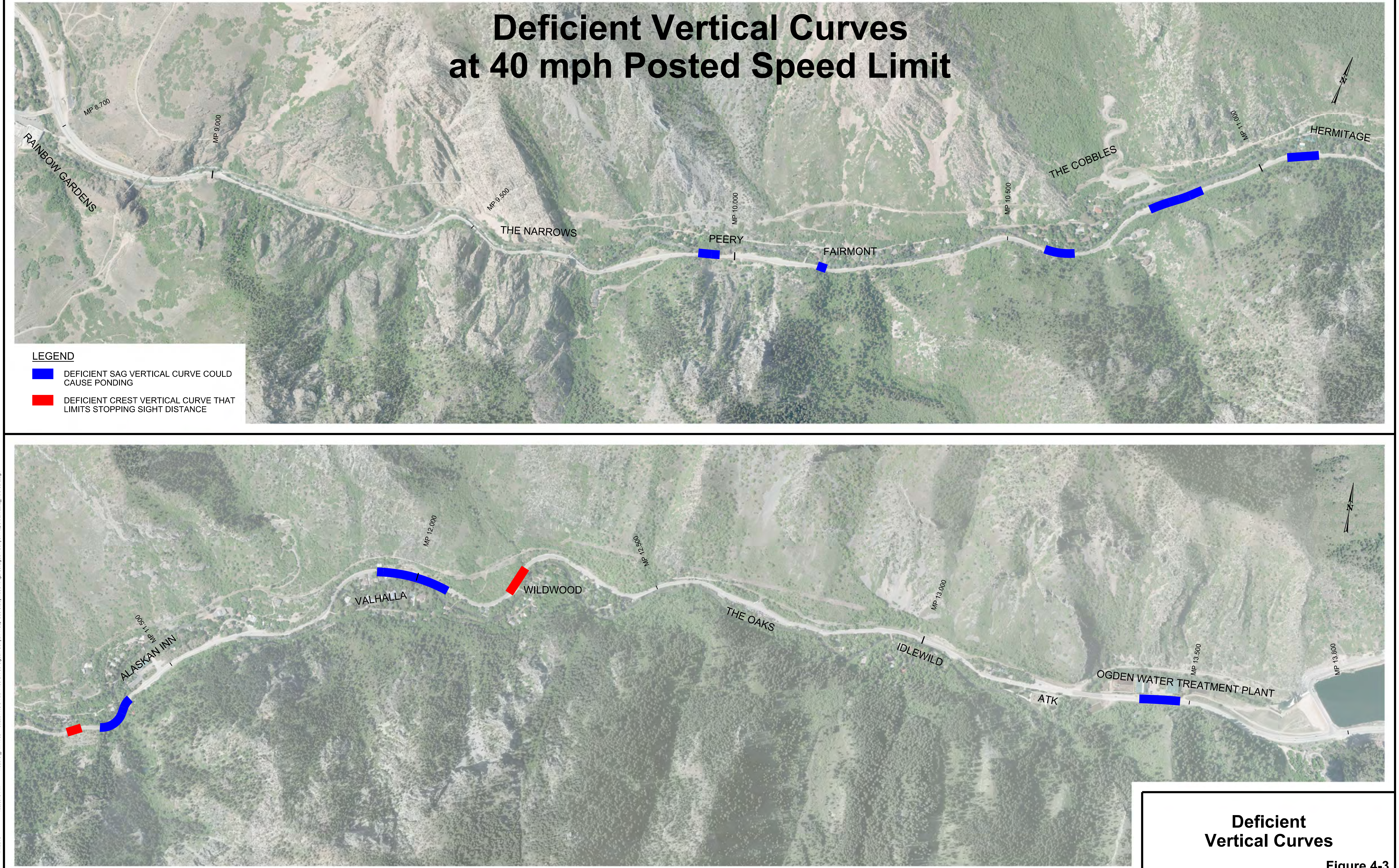

Deficient Vertical Curves

Figure 4-3

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end of their vehicle were plotted. These locations directly correlated with the data found in the previous curve analysis and are shown in Figure 4-4.

4.6 Accident History

Accident history documents were translated into Microstation. Each crash was color coded by accident type and placed on an aerial view of the canyon to show areas where curve geometry may be a concern. There were 41 total accidents that occurred in the canyon ranging in intensity from "fatal" to "possible injury." These crashes were then sorted to show whether the accident was caused by an east-bound or west-bound vehicle. More information on accident history is located in Section 3.0 Operational Safety Report.

4.7 Operational Safety Report

An Operational Safety Report (OSR) was developed where the data was then translated into Microstation. The report recommends adding/moving signs within the canyon to improve safety and installing shoulder and centerline rumble strips from MP 8.9 to MP 13.3. More information on this study can be found in the previous section of the document.

4.8 Spot Improvement

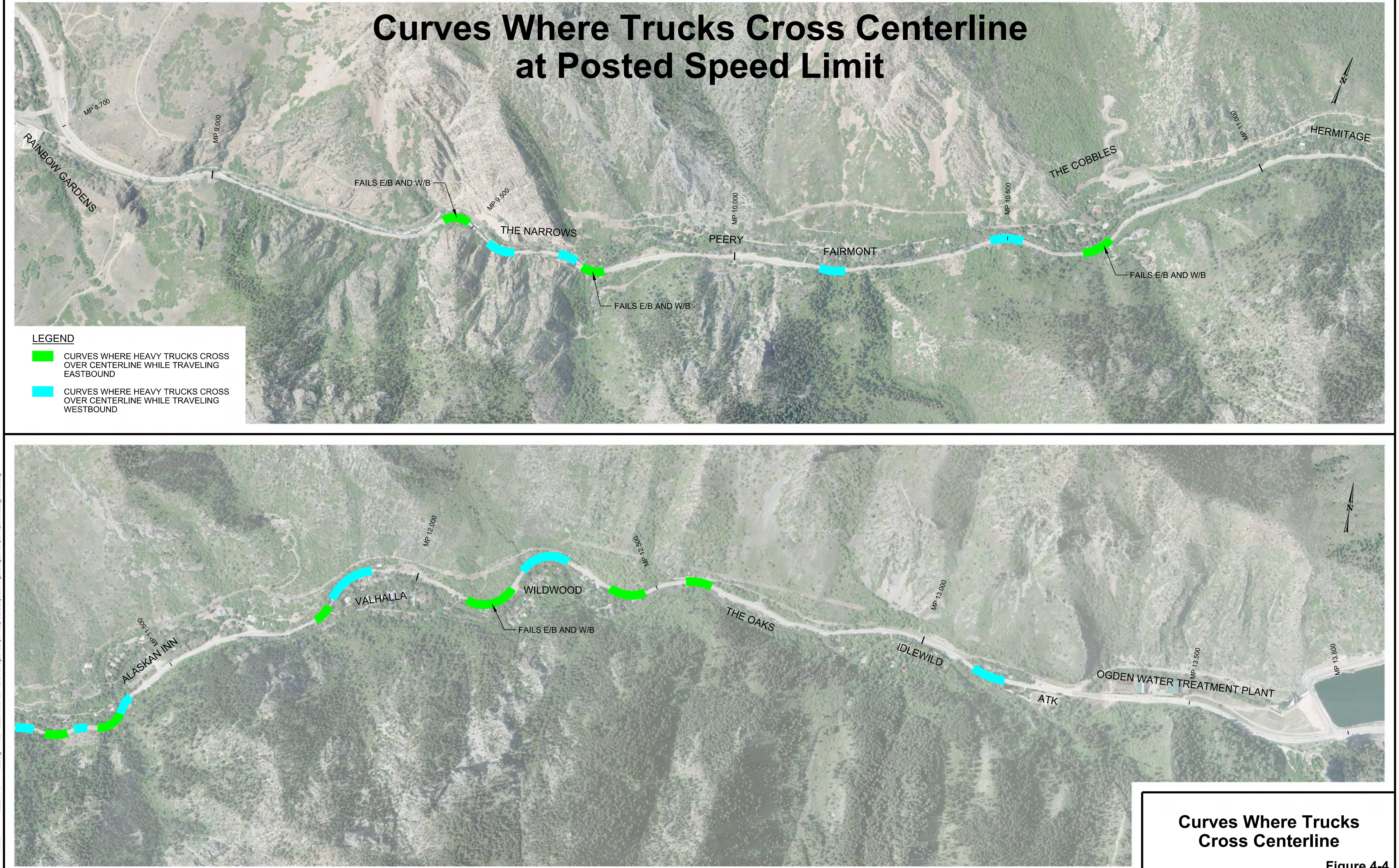
Curves requiring vehicles to travel at 25 mph or slower due to issues with sight distance, superelevation, and/or geometry were pinpointed using Microstation. Ultimately, three locations were flagged for redesign; two curves in the Narrows and one area just west of the Alaskan Inn (refer to Figures 4-5a-c). By using the superelevation table within AASHTO's *Guidelines for Geometric Designs of Highways and Streets*, the minimum arc radius with a maximum superelevation of 6% was determined. Ogden Canyon's most substandard curves (the curves in red on Figure 4-1) were redesigned using the minimum allowable radii at speeds of 30, 35, and 40 mph. Each curve was designed with absolute minimal impact to the river and the canyon wall. In locations where either the river or the rock wall must be impacted, consideration was given to minimizing environmental impacts. These spot improvements are shown in Figure 4-5a through Figure 4-5c.

4.9 Realignment

After doing a spot improvement of all the areas of Ogden Canyon that required vehicles to travel at 25 mph or less, a total realignment of the canyon was done. This realignment involved upgrading the entire corridor to a uniform speed of either 35 or 40 mph. The realignment resulted in flattening a number of curves and would result in additional environmental impacts that should be evaluated as part of Phase II. These realignments are show in Figures 4-6 and 4-7.

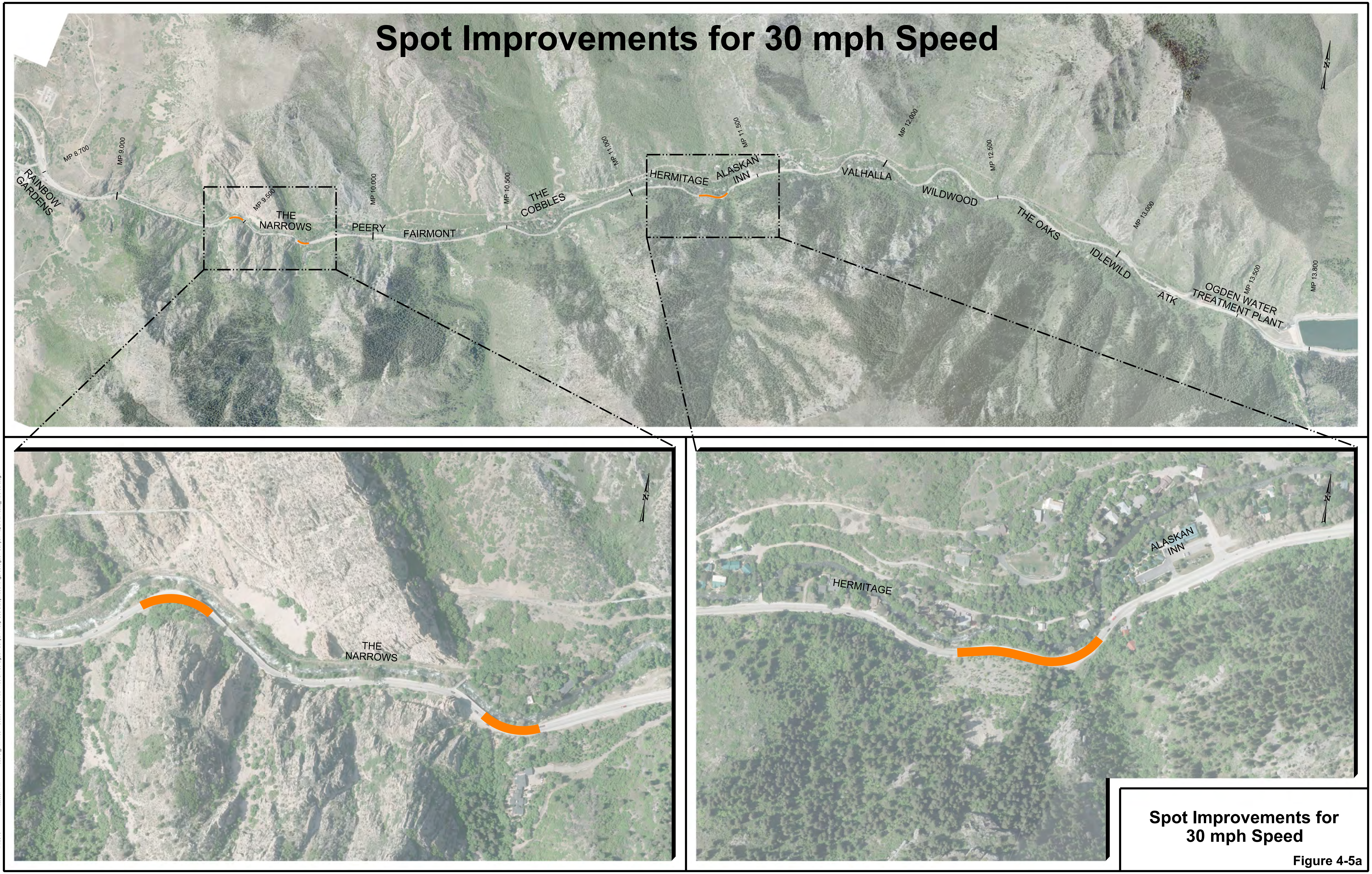
4.10 Trails

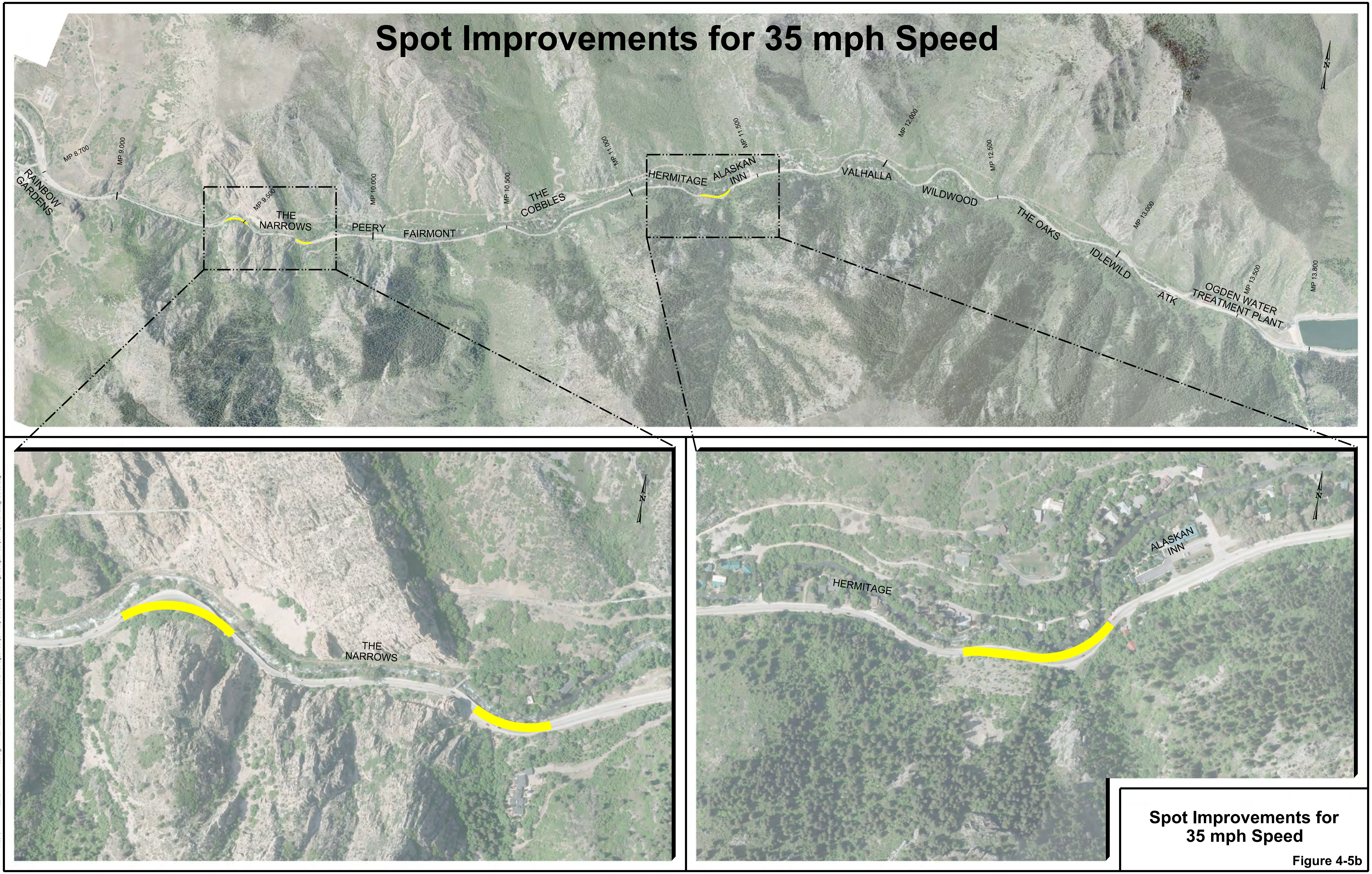
Ogden Canyon Residents submitted comments on their preferred trail alignments. Using the right-of-way file in Microstation, other potential trails were drawn up as alternatives to the "residents' trail alignments." To ensure that the alignments were feasible, the terrain was reviewed in the field. It was found that some of the alignments will require further analysis due to rock faces or steep slopes at certain locations. Figure 4-8 shows some of the possible alignments for a trail in Ogden Canyon and they are further described below. This figure is not intended to represent every possible alignment, but it does present an array of options that should be considered further.


Curves Where Trucks Cross Centerline at Posted Speed Limit
RAINBOW GARDENS
MP 8.700
MP 9.000
FAILS E/B AND W/B
MP 9.500
THE NARROWS
FAILS E/B AND W/B
MP 10.000
PEERY
FAIRMONT
MP 10.500
THE COBBLES
FAILS E/B AND W/B
MP 11.000
HERMITAGE
LEGEND
CURVES WHERE HEAVY TRUCKS CROSS OVER CENTERLINE WHILE TRAVELING EASTBOUND
CURVES WHERE HEAVY TRUCKS CROSS OVER CENTERLINE WHILE TRAVELING WESTBOUND
ALASKAN INN
MP 11.500
VALHALLA
MP 12.000
WILDWOOD
FAILS E/B AND W/B
MP 12.500
THE OAKS
MP 13.000
IDLEWILD
ATK
MP 13.500
OGDEN WATER TREATMENT PLANT
MP 13.800
N

Curves Where Trucks Cross Centerline

Figure 4-4


Spot Improvements for 30 mph Speed
RAINBOW GARDENS
MP 8.700
MP 9.000
MP 9.500
THE NARROWS
MP 10.000
PEERY
FAIRMONT
MP 10.500
THE COBBLES
MP 11.000
HERMITAGE
MP 11.500
ALASKAN INN
MP 12.000
VALHALLA
WILDWOOD
MP 12.500
THE OAKS
MP 13.000
IDLEWILD
ATK
MP 13.500
OGDEN WATER TREATMENT PLANT
MP 13.800
THE NARROWS
HERMITAGE
ALASKAN INN
Spot Improvements for 30 mph Speed
Figure 4-5a



Spot Improvements for 35 mph Speed

Figure 4-5b

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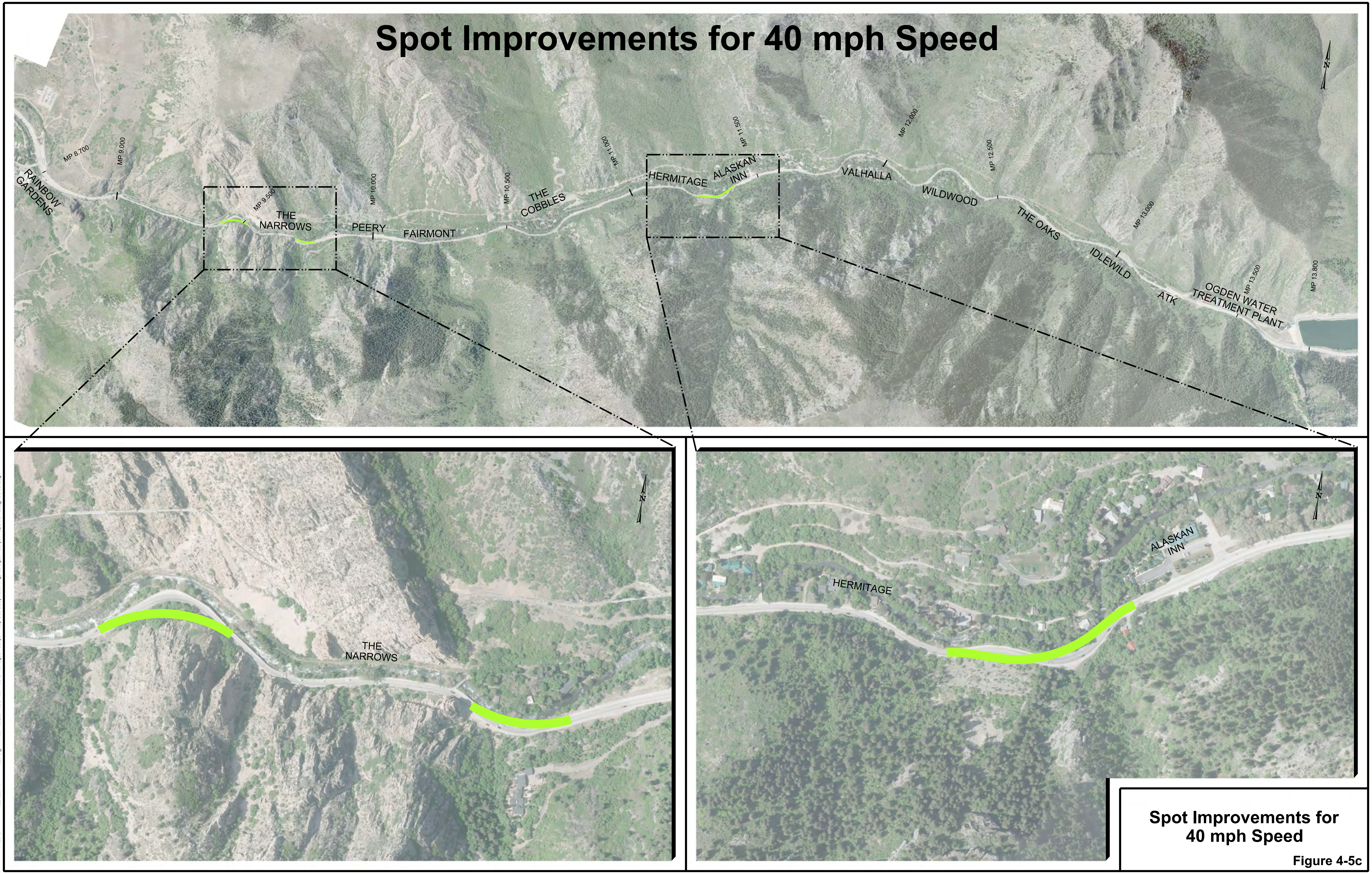


Spot Improvements for 40 mph Speed

Figure 4-5c

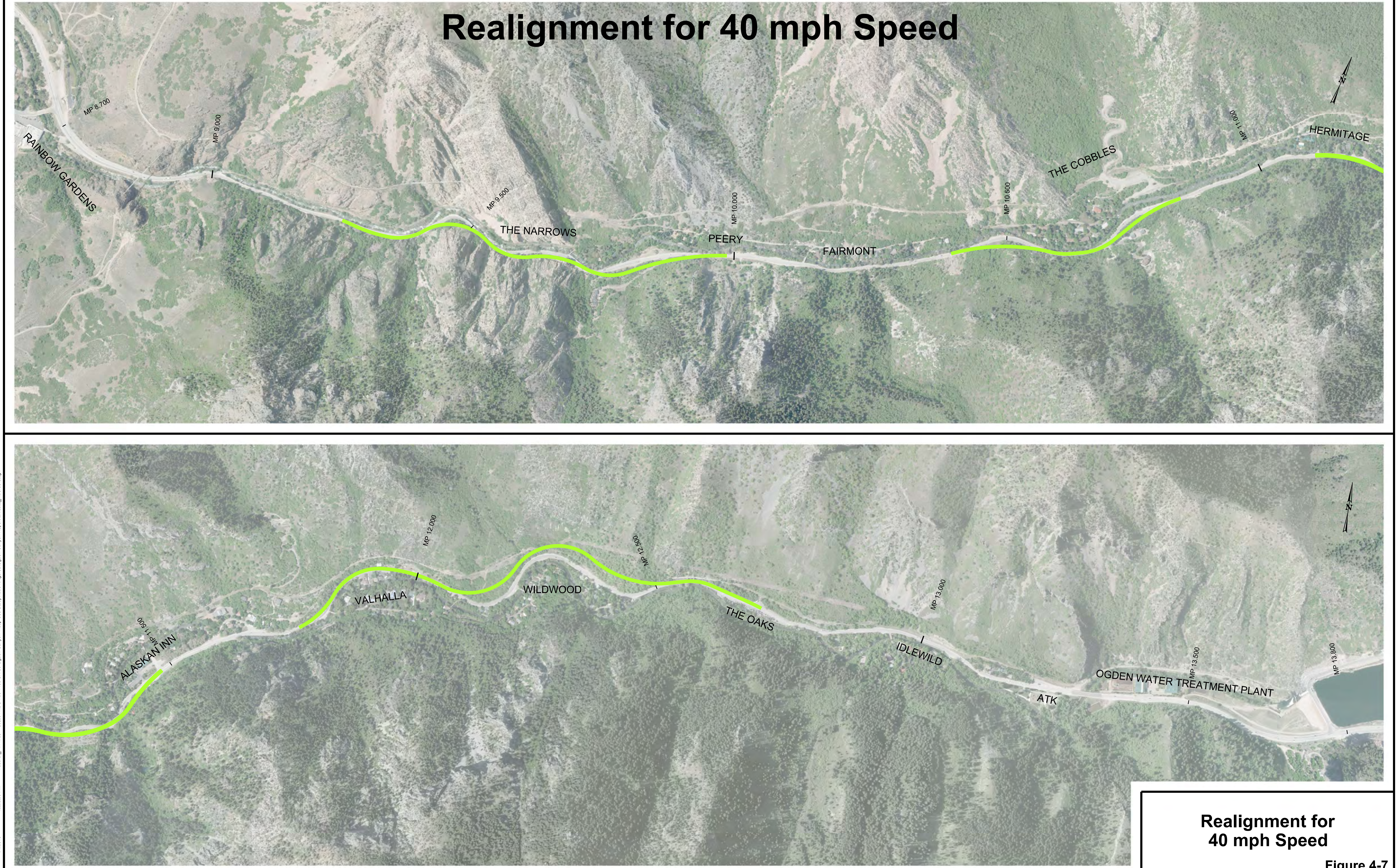
Realignment for 35 mph Speed

RAINBOW GARDENS
MP 8,700
MP 9,000
MP 9,500
THE NARROWS
MP 10,000
PEERY
FAIRMONT
MP 10,500
THE COBBLES
MP 11,000
HERMITAGE

ALASKAN INN
MP 11,500
VALHALLA
MP 12,000
WILDWOOD
MP 12,500
THE OAKS
MP 13,000
IDLEWILD
ATK
MP 13,500
OGDEN WATER TREATMENT PLANT
MP 13,800

Realignment for 35 mph Speed

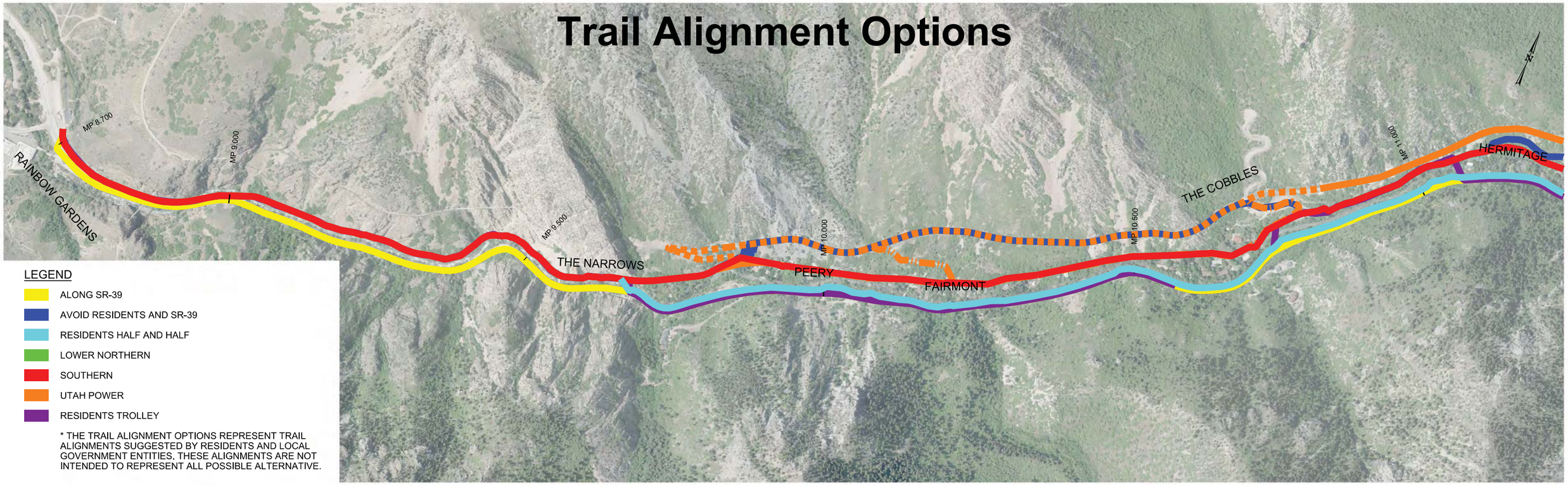
Figure 4-6



Realignment for 40 mph Speed

Figure 4-7

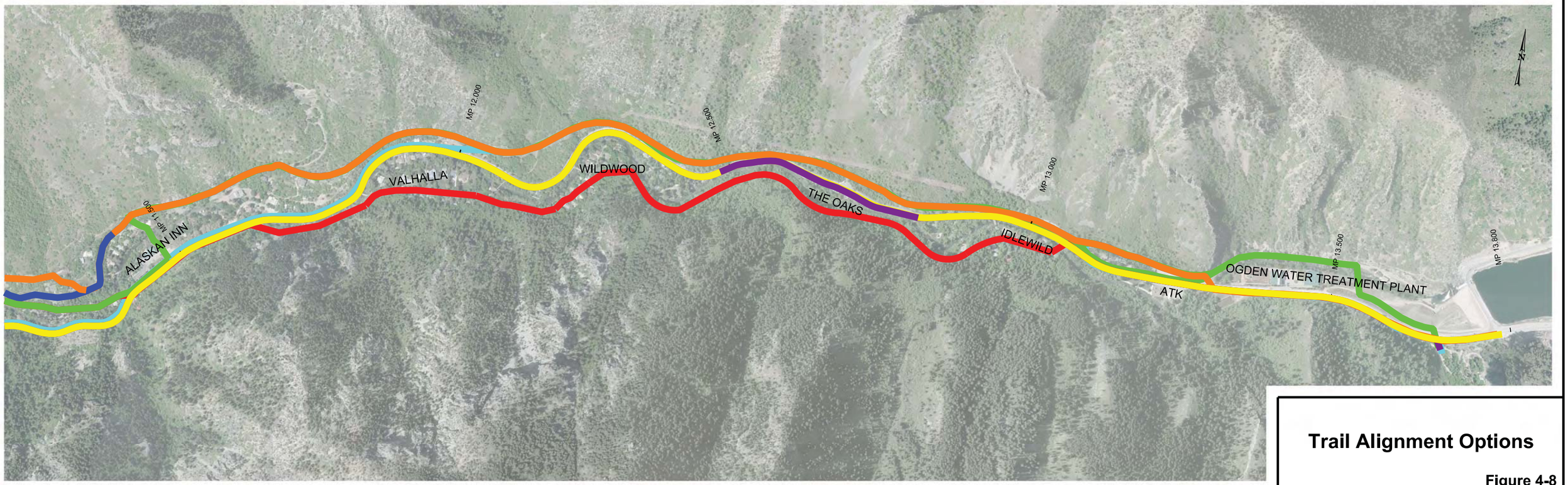
Trail Alignment Options



LEGEND

- ALONG SR-39
- AVOID RESIDENTS AND SR-39
- RESIDENTS HALF AND HALF
- LOWER NORTHERN
- SOUTHERN
- UTAH POWER
- RESIDENTS TROLLEY

* THE TRAIL ALIGNMENT OPTIONS REPRESENT TRAIL ALIGNMENTS SUGGESTED BY RESIDENTS AND LOCAL GOVERNMENT ENTITIES. THESE ALIGNMENTS ARE NOT INTENDED TO REPRESENT ALL POSSIBLE ALTERNATIVE.



Trail Alignment Options

Figure 4-8

Along SR-39 (yellow line on Figure 4-8)

This alignment would place a trail along the shoulder of SR-39 for the entire length of the canyon. Benefits of this alignment would include a smooth ride on the trail and continuous access. One of the biggest challenges would be that the already narrow SR-39 would need to be widened to accommodate a trail. There would also be safety risks for pedestrians and bicyclists due to the proximity of vehicles on SR-39. Additionally, there would be conflicts for pedestrians and bicyclists as they cross driveways and access roads.

Avoid Residents and SR-39 (dark blue line on Figure 4-8)

The goals of this trail alignment were to keep the trail away from the highway to increase pedestrian safety, avoid private residences as much as possible, and provide a facility that cyclists could use comfortably. Challenges with this option are possible undesirable switchbacks that may be necessary to mitigate for steep grades and more difficult emergency access. Although an effort was made to reduce impacts to private property, there would still be some effects.

Utah Power (orange line on Figure 4-8)

To remedy the property impacts in the previous trail alignment, an option that utilizes the existing PacifiCorp utility corridor was developed. The utility corridor is located higher up the mountain on the north side of the canyon. Advantages of this alignment include avoidance of private property and scenic views of the canyon from the trail. The switchbacks associated with the *Avoid Residents and SR-39* alignment were made more extreme and emergency access is even more limited.

Southern (red line on Figure 4-8)

This trail alignment was developed in order to reduce the amount of private property impacts. The alignment follows the right-of-way for the 36-inch waterline owned by Ogden City from the mouth of the canyon to just west of the Alaskan Inn. The trail crosses SR-39 and follows an old railbed that once existed on the south side of the river. Where it passes through the Valhalla, Wildwood, and Idlewild subdivisions, the trail uses the existing streets. Just after passing through the Idlewild neighborhood, the trail connects to SR-39 and remains adjacent to the highway until reaching the Wheeler Creek Trailhead.

This alignment would cause the trail to pass through most of the residential areas of the canyon and may be of concern to residents because of privacy issues. Where it passes through the subdivisions, there would also be conflicts with driveways. Advantages are that the trail would be separated from SR-39 for most of its length and slopes would be less steep.

Residents Half and Half (light blue line on Figure 4-8)

This trail alignment was developed by residents of Ogden Canyon. It is adjacent to the north side of SR-39 from the mouth of the canyon to the first bridge that crosses the Ogden River. The trail crosses the bridge and follows the 36-inch waterline easement on the north bank of the Ogden River through the Narrows section of the canyon, crossing the river again at approximately MP 9.7. The trail is then adjacent to the north side of SR-39 until MP 12.0 (just east of the Valhalla neighborhood), where it leaves SR-39 and follows the water pipeline easement to MP 13.1. There it leaves the pipeline easement and crosses to the south side of SR-39 in order to connect to the Wheeler Creek trailhead at MP 13.1 . Advantages of this alignment are that it minimizes impacts to private residences. There would need to be several crossings of the Ogden River and one crossing of SR-39 itself. Whether the trail is on the

shoulder of SR-39 or somewhere adjacent to it, the right-of-way for SR-39 would need to be widened to accommodate the trail in some places, causing environmental impacts.

Lower Northern (green line on Figure 4-8)

This alignment is adjacent to the north side of SR-39 from the mouth of the canyon until the first existing bridge. The trail crosses the bridge and follows the existing access road for the 36-inch water pipeline on the north side of the river. At the Alaskan Inn, the trail leaves the 36-inch waterline right-of-way and travels north across the river to the 72-inch waterline right-of-way (owned by the Bureau of Reclamation) located higher up on the mountainside. The trail then follows the 72-inch pipeline right-of-way through the rest of the canyon and passes north of the Ogden Water Treatment Plant. From there, the trail heads south and crosses SR-39 to connect with the Wheeler Creek Trailhead at MP 13.1.

Residents Trolley (purple line on Figure 4-8)

This alignment was developed by Ogden Canyon residents for a trolley route to carry recreationalists through the canyon. This option requires users to ride a bus, constructed to remind one of the old electric trolley that traversed the canyon in the early 20th century. It would be capable of regular vehicle speeds and would use the existing highway when it is not on its specially constructed pathway. No foot or bicycle traffic would be allowed, but bike racks would be provided on the trolley so users could continue their bike ride from either end of the canyon. It would stop at several public access points along the way.

Streetcar that traveled Ogden Canyon from 1909 to 1932 (Photo from Standard Examiner)

Trolley-style bus currently used in Ogden City's downtown trolley route. (Photo from Utah Alliance for Economic Development)

The proposed route for the trolley is to travel on SR-39 from the mouth of the canyon to the first existing bridge. The trolley route crosses the bridge and follows the access road for the 36-inch water pipeline on the north bank of the Ogden River through the Narrows. The trolley then crosses the river just west of Peery Camp and uses the existing SR-39 to approximately MP 10.75. The trolley crosses the river again (on a new bridge) and travels on the north side of the river to approximately MP 11.1 where it again crosses the river (on a new bridge) and travels on SR-39. The trolleys travels on SR-39 to the Wheeler Creek Trailhead at MP 13.1. This route would necessitate at least two new crossings of the Ogden River. If pedestrians and bicyclists wanted to enjoy the canyon, they would need to get off the trolley at one of the stops and use another facility such as Indian Trail. There would not be a continuous walking or biking route through the canyon.

4.11 Utilities

The utilities within Ogden Canyon include Comcast, CenturyLink, Pineview Water Systems, Syringa Networks, Weber Canyon, and Rocky Mountain Power as determined from information on the Blue Stakes of Utah website. Comcast, CenturyLink, and Rocky Mountain Power responded with data on Ogden Canyon's utilities. Comcast does not currently have any cables in Ogden Canyon.

5.0 ENVIRONMENTAL

5.1 Land Use

The current land use and zoning of Ogden Canyon is forest residential land. There are six small residential communities and scattered commercial use. Weber County has no general plan for Ogden Canyon because the canyon is fully developed and there are no plans to alter the existing land use or zoning of the canyon.

5.2 Social

Ogden Canyon is rugged and narrow throughout much of its length. In a number of spots, the canyon widens out and residential areas have been developed. Many residential homes have been constructed along the river, with several constructed higher on the mountain away from the river. These residential areas began as summer residences and over the years some have been upgraded and made into year-round residences. Some of these areas were centered around resorts and lodges, such as the Hermitage and the Idlewild.

There are currently seven distinct neighborhoods in Ogden Canyon: Peery Camp, Fairmont Subdivision, The Cobbles (historically known as Lewis Grove), The Hermitage, Valhalla, Wildwood, and Idlewild. These neighborhoods each have bridges across the Ogden River to access the small communities. Some of the residents have held the land in their family for over 100 years and live there year-round, while others are vacation homes owned by people who live most of the year outside the Canyon.

Map of Ogden Canyon Neighborhoods

Meetings have been held with individual residents who live in these neighborhoods and are detailed in the Public Outreach section. Their primary concerns are traffic noise from SR-39, canyon closures, access to their property, privacy and security from non-residents, heavy truck traffic, construction and maintenance of a trail in the canyon, and property rights. They are also upset about the historic stone walls that have been replaced with jersey barriers.

5.3 Floodplains

Digital Flood Insurance Rate Maps were obtained in a GIS-compatible format from AGRC and added to the GIS database. Most of SR-39 is adjacent to the Ogden River and SR-39 crosses the river in three places. The existing road is within or adjacent to the 500-year floodplain for most of its length and near the 100-year floodplain in two places.

A detailed hydraulic analysis will need to be completed in Phase 2 to determine if any proposed improvements in the canyon would alter the floodplain.

5.4 Pedestrians and Bicyclists

Ogden Canyon is a popular destination for hikers and bicyclists. The canyon is used for a number of special events each year, including the Ogden Marathon and the Tour of Utah cycling race. There are no dedicated bike lanes, sidewalks, or walking trails along SR-39. Pedestrians and bicyclists must use the shoulder of the road or share the travel lanes with vehicles.

Ogden Marathon

Mountain biking is popular on the established canyon trails such as Indian Trail, Wheeler Creek Trail, and Coldwater Canyon Trail. These trails are accessed primarily by driving to the trailheads in a motor vehicle and offloading mountain bikes. The Indian Creek Trail can also be accessed where it crosses the Bonneville Shoreline Trail near Ogden's 22nd Street Trailhead. Existing trails are shown in Figure 5-1.

Tour of Utah bicycle race

In a survey conducted during January 2015, 70% of respondents listed road cyclists and pedestrians as their number one safety concern in the canyon. Additionally, 78% of respondents support a trail in the canyon if impacts to canyon residents can be minimized, especially if it can accommodate bicyclists traveling both up and down the canyon. Of over 450 responses of those who use the canyon for recreation, over 80% use it for hiking, more than any other recreational use. In addition, comments from the survey and website show that there are a large number of people who would like to commute through the canyon by bike, but don't feel safe doing so.

Ogden Canyon Destinations and Existing Infrastructure

0 0.25 0.5 1 Miles

N

Destination Type
- Recreation
- Other

Trails
- Natural Surface
- Paved
- Bike Route

- Highways
- Major Local Roads
- Minor Local Roads

- Cultural Resources
- Pineview Reservoir
- Streams

North Ogden

Ogden

Huntsville

North Arm Trailhead

Eden Park

Valley Elementary School

Pineview North

Pineview West Trailhead

Port Ramp Marina

Middle Inlet Day Use Area

Pineview Loop Trailhead

Wind Surfer Beach Trailhead

Cemetery Point Recreation Site

Huntsville Square

Anderson Cove Campground

Jefferson Hunt Campground

ATK Conference Center

The Oaks

Gray Cliff Lodge

Alaskan Inn

Fishing Access Site

Wheeler Creek Trailhead

Historic Lime Kiln

Coldwater Trailhead

Bonneville Shoreline Trailhead

Rainbow Gardens Trailhead

Lewis Peak

Southern Skyline

Dry Canyon Overlook

City View

Sardine Peak

Maples

Hidden Valley

Taylor Canyon

Indian

Wheeler Creek

Icebox

Maples

Race Loop

Snowbasin

Middle Fork

East Fork

Old Snowbasin

Trappers Loop

Old Trappers Loop

Basinview

Chaparral

Innsbruck

Quail

Stoker

Radford

Highway 158

Highway 39

Ogden Canyon

Nordic Valley

Viking

Shady

Big Sky

Sierra

Pineview North

Lorl Canyon

Park

Songbird

Valley

Green Line

Polk

Douglas

Fowler

Mountain

Dillon

Quincy

Monroe

Jackson

Van Buren

Harrison

Taylor

Fillmore

Pierce

Buchanan

Lake

Maule

Doxey

Eccles

Tyler

Capitol

Collins

Vitt

Sheridan

Hudson

Peach

Simoron

Hislop

Oak

Bst (n. Ogden)

Bst (ogden)

WCSB10

WC082

Existing Trails

Figure 5-1

Alta Bicycle and Pedestrian Study

Alta Planning and Design conducted a study as part of this project on bicycling and walking facilities in Ogden Canyon and made trip generation projections based on comparisons with other canyons in Utah. Along the Wasatch Front, Emigration Canyon in Salt Lake City, and Provo Canyon in the Provo/Orem area, have similar characteristics, destinations, and trip purposes as Ogden Canyon. Utilizing existing bicycle and pedestrian counts from within these canyons (or very near the canyons), Alta estimated possible bicycle and pedestrian usage for a potential future bike lane or shared use path in Ogden Canyon. This analysis resulted in an approximate projection of 56,000 trips per year if bicycle-only bike lanes were built in Ogden Canyon. If a shared-use path was constructed there would be an estimated 220,000 trips per year, about four times more than the projected figures for an on-road, bicycle-only bike lane. The Alta study also noted that bike lanes in Ogden Canyon may have an even higher ridership than the projected figures because Ogden Canyon's profile is about half as steep as Emigration Canyon.

Indian Trailhead with interpretive signing and trail maps

Wheeler Creek Trail is a popular destination for mountain bikers

Hiking/Mountain Biking Trails

There are a number of trails in the canyon that allow hikers and mountain bikers to explore the mountainsides, but there are no trails that connect the mouth of the canyon to Pineview Reservoir. The Bonneville Shoreline Trail (a natural surface trail used primarily by mountain bikes) and the Ogden River Parkway intersect at the bottom of Ogden Canyon and both facilities would connect to future facilities in the Canyon.

Indian Trail

Indian Trail is a 4.2-mile unpaved, heavily forested trail. The trailhead is located near M.P. 10. At the trailhead, on the south side of SR-39, there is a parking lot with space for about 20 cars. This trail also connects to the Coldwater Canyon Trail and the Hidden Valley Trail.

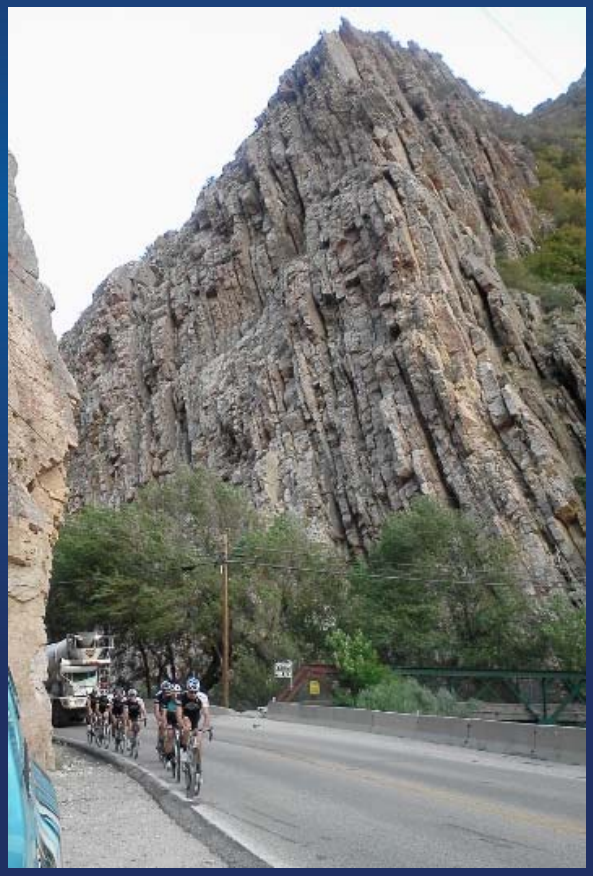
Wheeler Creek Trail

Wheeler Canyon and its associated trail system is located just west of the junction of SR-39 and SR-158, at the south end of Pineview Reservoir. Wheeler Creek trail is a 1.8-mile trail that travels southeast to the Art Nord Trailhead and connects with the Maples Trail, East Fork Wheeler Creek Trail, and Ice Box Canyon Trail.

Existing conditions make it difficult for bikers and pedestrians to use SR-39 safely.

Biking Trails

There are no existing bike lanes in the canyon and very limited shoulders. The Wasatch Front Regional Council (WFRC) Regional Transportation Plan (RTP) 2015-2040 designates SR-39 in Ogden Canyon as a proposed shared use bicycle path (Class 1). WFRC does not phase bicycle routes as part of the RTP, so the proposed Bicycle path in Ogden Canyon does not have an associated phase. Class 1 bicycle paths utilize a completely separated right of way for the exclusive use of bicycles and pedestrians.



Bikers and truck sharing the road in the Ogden Canyon Narrows

The Ogden Valley General Plan (Weber County, 2005) lists a dedicated bike path through Ogden Canyon on the existing rail bed as one of its eight highest priorities. Additionally, the Weber County Cooperative Pathways Master Plan (Weber County and Weber Pathways, 2010) lists a trail in Ogden Canyon as a high priority.

Parking

Existing parking is limited to the existing commercial businesses in the canyon (such as the Oaks Restaurant, Greycliff Lodge, and the Alaskan Inn), informal pullouts, and the small parking areas at the Wheeler Creek and Indian trailheads. In the January 2015 survey, 60% of respondents said they are in favor of more parking options in the canyon.

WFRC has a park and ride lot planned near Pineview Dam. This lot is planned for Phase 2 of the long range plan, which would be between 2025 and 2034.

"There are a couple rock climbing areas where there are only three spaces for parking and it's dangerous for bicycles in the canyon."

Rock Climbing

Ogden Canyon is attractive to rock climbers because of its dramatic rock formations, especially in the section known as the Narrows. According to the Ogden Valley General Plan Recreation Element, some of these climbs were originally established in the 1960s by Jeff and Greg Lowe when they began their climbing careers. The Lowe brothers grew up in Ogden and went on to become internationally recognized climbers. There are between 30 and 40 different climbs ranging in difficulty from 5.6 to 5.13+. In addition to rock climbing, there are eight ice climbs inside of Ogden Canyon, located on the north canyon wall at the man-made waterfall created by the Ogden Canyon Waterline. These climbs range from W12-3, I to W15, I.

Rock Climbing in Ogden Canyon (photo from Standard Examiner)

5.5 Air Quality

Ogden City is a maintenance area for carbon monoxide (CO) and a nonattainment area for particulate matter smaller than 2.5 micrometers (PM 2.5). This project is located just outside Ogden City, in Weber County. Air quality should be evaluated in conjunction with regulatory agencies to determine if a detailed study is warranted.

5.6 Noise

Residents in Ogden Canyon are concerned about traffic noise, particularly that of heavy trucks. Measures to reduce traffic noise in the canyon should be evaluated as part of any further study.

5.7 Water Quality

The Ogden River watershed is a very important water supply. Pineview Reservoir supplies the city of Ogden with water through a pipeline that extends from the reservoir to a water treatment plant at the mouth of the canyon. The Ogden River is home to many species of fish and is enjoyed by many for fishing and kayaking. The Ogden River extends through the city of Ogden and eventually connects to the Great Salt Lake. Any proposed improvements need to be evaluated for their potential impacts to water quality in Phase 2.

5.8 Geology and Soils

A preliminary geotechnical study was performed by Golder Associates for Phase 1. Detailed information on the study and recommendations is available in the Geotechnical section of this report. Golder recommends that additional studies be completed to provide more specific information about hazards as potential transportation improvements are identified. Rockfall, landslides, debris flows, and avalanches are the most prominent hazards which affect safety and maintenance of the existing roadway and these studies should be prioritized. Additionally, 70% of respondents to the January 2015 survey are in favor of doing more to prevent rock falls onto the roadway.

5.9 Paleontology

A file search conducted by the Utah Geological Survey on October 20, 2011 for the Ogden Canyon Waterline Environmental Assessment (July 2012) revealed that there are no recorded paleontological localities for the project area defined for the waterline. A new file search will need to be conducted for the project area defined by any proposed transportation improvements.

5.10 Wetlands

A search of the National Wetlands Inventory database revealed no documented wetlands in Ogden Canyon. The Ogden Canyon Waterline EA also did not identify any wetlands in the study area. However, due to the presence of the Ogden River and associated tributaries, a wetland delineation should be completed for the study area to verify this information.

5.11 Biological Resources

Threatened and Endangered Species

No suitable habitat for Threatened or Endangered Species exists in the study area, and according to Utah Natural Heritage Program data, no Endangered Species Act species are known to occur in the study area. A letter from the UDOT Wildlife Biologist will be required as part of a future NEPA process.

State-Sensitive Wildlife Species

As identified in the Ogden Canyon Waterline Environmental Assessment (July 2012), the following State-Sensitive Species could occur in the project area because their habitat exists in Ogden Canyon.

Birds
Short-eared owl
Burrowing owl
Ferruginous hawk
Grasshopper sparrow
Sharp-tailed grouse

Amphibians
Columbia spotted frog

Mollusks
Deseret mountainsnail
Lyrate mountainsnail

Mammals
Kit fox

Fish
Bluehead sucker
Bonneville cutthroat trout

While any of these species could possibly be found in the canyon, two species, the Lyrate mountainsnail and the Bonneville cutthroat trout, are known to occur in the project area, based on a search of the UNHP database. This search was done as part of the Ogden Canyon Pipeline EA, and an updated search will need to be conducted if an environmental document is initiated.

State-Sensitive Species are species for which there is evidence that the population is threatened and for which conservation measures are needed to preclude them from being listed under the Federal Endangered Species Act. Utah Administrative Code R-657 gives the Utah Division of Wildlife Resources

(UDWR) authority to make designations of State-Sensitive Species and develop management recommendations.

Preliminary coordination with UDWR occurred in Phase 1. UDWR is specifically concerned about impacts to brown trout in the Ogden River and the Lyrate mountainsnail at the mouth of the canyon. Additional coordination with UDWR is necessary to determine the locations of the State Sensitive Species and minimize impacts.

UDWR has an agreement with the owner of The Oaks restaurant to allow fishing access on the Ogden River through his property. This area is signed and has some limited parking that is shared with the restaurant.

UDWR fishing access point near The Oaks restaurant.

Migratory Birds

The project area contains habitat that could potentially be used by species protected under the Migratory Bird Treaty Act. The site contains breeding, nesting, and foraging habitat for a variety of migratory songbirds, raptors, and gamebirds. No migratory bird species, or evidence of such, were observed in or adjacent to the project area during site visits conducted as part of the Ogden River Pipeline EA; however, it is anticipated that migratory bird species use portions of the project area as stopping sites during migration in order to forage and rest. Additionally, interviews with canyon residents give anecdotal evidence of the presence of migratory birds such as pelicans in the canyon. Additional site visits should be conducted as part of any future improvements.

5.12 Historic and Archeological Preservation

Historic

There are 164 historic structures located in Ogden Canyon. As part of the Ogden Canyon Waterline EA, a selective reconnaissance level survey was completed for only those historic properties (constructed prior to 1966) in Ogden Canyon with contributing historic landscape elements that would be affected by replacement of the Ogden Canyon Waterline. A total of 28 properties (including five bridges) were surveyed, 23 of which are eligible for inclusion on the National Register of Historic Places (NRHP).

There are other known historic sites that were not considered as part of the Ogden Canyon Waterline EA because they were outside the study area of that project. One example is the lime kiln located at approximately M.P. 10. There are 132 structures potentially eligible for the NRHP based on age and will need to be further evaluated for integrity and significance. A Reconnaissance Level Survey will need to be completed for the study area, using information gathered in the Selective Reconnaissance Level Survey for Ogden Canyon (October 2011).

Archeological

The Ogden Canyon Waterline EA identified several known archeological sites in Ogden Canyon. Only one was recommended eligible for the National Register of Historic Places. Site 42WB300, a 1935 stone structure that supports the Ogden Canyon Conduit, was recommended eligible for inclusion on the (NRHP). A more extensive Class 3 pedestrian survey will need to be conducted to identify any cultural resources that were outside of the study area for the waterline project.

As part of the Ogden Canyon Waterline EA, letters were written to 10 Native American tribes that may have cultural and historical interest within the project area. Only the Paiute Indian Tribe of Utah responded. This tribe did not have any objections to that project. Letters will need to be resent to these tribes, because the study area is larger and could potentially involve more ground disturbance.

5.13 Visual Quality

The project area is located within Ogden Canyon, which is known for its natural scenic beauty and historical structures. SR-39 is designated as a Utah Scenic Byway from I-15 to the Monte Cristo mountain range under Utah Administrative Rule R926-7.

A Corridor Management Plan (CMP) for this scenic byway was completed in 2001. The main purposes of the CMP are to conserve and enhance the byways' qualities and to promote tourism and economic development. The CMP identified three key physical resources for protection or restoration: the historic lime kiln at Coldwater Trailhead (restored by the Utah Heritage Foundation in 2008), The historic bridges to the residential neighborhoods (Peery Camp, Lewis Grove, Idlewild, etc.), and the remains of the stone walls along the river and road.

The CMP listed the following action items that specifically pertain to the section of SR-39 in Ogden Canyon:

- Create a visitor's information kiosk and trailhead at mouth of canyon.
- Encourage development of a trail running from the canyon mouth at least partially into the canyon.
- Replace existing jersey barriers with stone-faced barriers.
- Create a pullout and visitor kiosk near Alaskan Inn and Greycliff lodge.
- Develop a pullout, parking area, trail and restrooms area near the Oaks.
- Encourage bridge upgrades to consider character and historic design.
- Post advanced warning signs along roadway in both directions at pull-out and trailhead locations.
- Place reduced speed and advanced warning signs along roadway in both direction near Alaskan Inn.

Additional coordination with the Utah Office of Tourism, residents, and other government agencies will be necessary to preserve the goals of the CMP and the scenic beauty of Ogden Canyon.

5.14 Hazardous Waste Sites

A review of the hazardous materials database should be completed to determine the risk of contaminated soils.

5.15 Summary of Next Environmental Actions

- A detailed hydraulic analysis will need to be completed in Phase 2 to determine if any proposed improvements in the canyon would alter the floodplain.
- Air quality should be evaluated in conjunction with regulatory agencies to determine if a detailed study is warranted.
- Measures to reduce traffic noise in the canyon should be evaluated.
- Any proposed improvements need to be evaluated for their potential impacts to water quality.

- A new paleontological file search will need to be conducted for the project area defined by any proposed improvements.
- A wetland delineation will need to be completed.
- Obtain letter from UDOT Wildlife Biologist on Threatened and Endangered Species and perform search of UNHP database.
- Complete Reconnaissance Level Survey for historic properties.
- Perform Class 3 pedestrian survey for cultural resources.
- Contact Native American tribes for cultural and historic resources.
- Coordinate with Utah Office of Tourism on Scenic Byway designation and possible incorporation of Corridor Management Plan goals.
- Review hazardous materials database to determine risk of contaminated soils.
- If improvements are to be made with federal money, a National Environmental Policy Act (NEPA) document will need to be prepared.
- If improvements are to be made with state money a State Environmental study document will need to be prepared.

6.0 GEOTECHNICAL

6.1 Geological Investigation

Golder Associates conducted a preliminary "desktop" study and brief field reconnaissance to identify geological and geotechnical constraints and issues related to future transportation improvements within Ogden Canyon. Golder reviewed previous studies, existing information, and made limited field observations. Golder also prepared preliminary geologic conditions mapping in GIS format.

Golder conducted a short site visit to Ogden Canyon on September 23, 2014 to preliminarily verify data obtained during the initial desktop study. They conducted a second site visit on October 28, 2014 to drive the canyon with UDOT Engineering and Maintenance personnel to gather information on historically problematic areas. Observations were limited to road level along the right-of-way for the Phase 1 work due to safety issues with stopping along the roadside.

For the purpose of Golder's report, the study corridor was divided into five segments, chosen to group areas with similar geology and hazards, location of the road and river, and places where the canyon widens at the bottom.

A motorist trying to remove one of the rocks that fell onto SR-39 near The Oaks restaurant, March 7, 2015 (Standard Examiner)

SR-39: MP 8.62 to MP 11.1

Precambrian granite, gneiss, schist, and colluvial soils form the slopes at road level along the western end of the alignment between MP 8.75, where it crosses the Wasatch Fault, and MP 9.4. The south side of the canyon between MP 8.62 and 8.9 is mapped as a landslide and reports indicate movement has occurred in the recent past. Rock slopes separate the mapped landslide from the road but rock slopes present a potential rockfall hazard. The Maxfield and Ophir Formations are exposed higher on the hill and also present a potential rockfall hazard.

Motorists removing rocks that fell onto SR-39 near The Oaks restaurant, March 7, 2015 (Standard Examiner)

A narrow ditch and steep rock and soil slopes along the north side of the road present a rockfall hazard from the west end of the canyon to MP 8.95, where the road crosses to the south side of the river. The road remains on the south side of the river through the rest of this section to MP 11.1. The existing road is protected by the river between MP 8.95 and MP 11.1 from rockfall, debris flow, and avalanche hazard originating on the north slope of the canyon. The Tintic Quartzite, Ophir Shale and Maxfield Limestone formations likely produce frequent rockfall and debris flow events from the north slope of the canyon, which may impact future improvements along the north side of the river.

Shallow landslides or debris flows are mapped along the south side of the canyon between MP 8.9 and MP 10.1, typically in the drainages. UDOT maintenance personnel confirmed that debris flow events in this section occur frequently. Deeper (>10 feet) slides are mapped at MP 9.1 and MP 9.3. A large basin has been mapped as shallow landslide with a deeper, associated slide terminating south of the road at MP 10.2. Several other small slides have been mapped south of the road between MP 10.4 and MP 10.6. Natural and man-made soil and rock slopes along this section are likely to produce rockfall events. Tall, steep rock outcrops on the south side between MP 8.95 and MP 9.75 define numerous steep drainages that report to the road along this section. The drainages are likely to deposit mud, rocks, and avalanche debris on the road periodically. The existing ditch is very narrow and provides little protection or snow storage in most places.

SR-39: MP 11.1 to MP 11.6

This half-mile long segment has significant drainages to the south and to the north of the canyon and a widened area of the canyon bottom. The existing road alignment is against the hillside on the south side of the widened area and not exposed to potential hazards from the north slopes. Residential development has occurred in the relatively level canyon bottom in this area. Several landslides or debris flows are mapped within the drainage on the north side. Landslides are also mapped between MP 11.3 and MP 11.5 on the south side, immediately uphill and on both sides of the existing alignment. At approximately MP 11.2, two landslides were reported by UDOT maintenance personnel to have occurred in the 1970s, and the grade of the road was raised to help stabilize them.

SR-39: MP 11.6 to MP 13.8

The current alignment crosses the river on a bridge at MP 11.65 and runs on the north side of the river to MP 13.3, which is approximately one-half mile below the Pineview Reservoir dam. Between MP 11.6 and MP 13.1 the canyon traverses through east-dipping beds of Cambrian, Ordovician and Devonian age limestone, shale, and dolomite, which are likely to produce high-energy, naturally-occurring rockfall events. Debris and avalanche events should also be expected from the steep drainages along this segment.

Normal faulting has been mapped near MP 12.5. At MP 13.1 the slopes on both sides of the canyon are formed in Mississippian age limestone which is more resistant to erosion than the younger age beds farther down valley. The more resistant rock types result in steeper slopes and drainages, which are likely to produce high-energy rockfall events that can reach the canyon bottom. The south side of the canyon is steep but well vegetated. The north side of the canyon has relatively little vegetation and much of the slope consists of rocky outcrops and talus fields.

There are two large landslides mapped along the south side of the canyon in this segment which cover nearly the entire alignment between MP 11.6 and the Pineview Reservoir dam. The road meanders back and forth across the valley bottom and the proximity to the north and south side slopes is variable, along with the relative hazard. UDOT maintenance personnel report that a slide on the north side of the canyon near MP 12.9 has experienced several episodes of movement over the past 30 years, requiring occasional maintenance.

Reports indicate that the design of Pineview Reservoir dam may have considered potentially liquefiable foundation soils. Soft, liquefiable soils associated with Bonneville sediments in the basin now occupied by Pineview Reservoir may have been deposited downstream at some time in the past. The likelihood of soft soil deposits decreases farther downstream from the Pineview Reservoir dam, but occurrence in limited areas is possible.

SR-39: MP 13.8 to MP 15.8

The town of Huntsville and Pineview Reservoir are located within a structural graben bounded on the western edge by the Willard Thrust Fault which crosses the alignment at MP 14.2. Deep deposits of Tertiary-age volcanic tuff form the gentle hills to the south and west of the reservoir. The graben was a bay of Lake Bonneville some 25,000 years ago, and lacustrine sediments are likely to be present above the Pineview Reservoir dam and, to a lesser extent, below the dam. Silty, clayey, low-strength Bonneville sediments are commonly associated with slope failures where they occur along the Wasatch front.

UDOT maintenance personnel indicated that several high, excavated soil slopes require regular maintenance along this section. Large boulders within the eroding soils matrix result in frequent rockfall that is not retained by the ditch. Portable concrete barriers have been installed in some locations to enhance rock retention. Geologic mapping indicates that these slopes consist of colluvial deposits overlying the Mississippian limestone or weathered volcanic tuff. Natural rockfall is possible but less likely than in areas below the Pineview Reservoir dam.

The section between MP 14.8 to the eastern end of the study area is mapped as a Quaternary landslide. Seasonal variations in the water elevation of the Pineview Reservoir may affect stability of these slopes.

Weber County Road 158: MP 0.0 to 3.3

The alignment of CR 158 crosses the Pineview Reservoir dam then traverses the hillside along the north side of the reservoir. This segment of CR 158 is similar to the eastern segment of SR-39 above the Pineview Reservoir dam, both geologically and topographically. Several man-made cuts with a narrow ditch create a rockfall hazard in some areas. Significant natural rockfall is possible but unlikely. The area between MP 1.2 and MP 3.0 is mapped as a Quaternary landslide deposit and may be affected by variations in water level in the reservoir.

6.2 Recommendations

Golder recommends that additional studies be completed to provide more specific information about hazards as potential transportation improvements are identified. Rockfall, landslides, debris flows, and avalanches are the most prominent hazards which affect safety and maintenance of the existing roadway and these studies should be prioritized.

Additional rockfall studies will likely be required for most future improvements. Rockfall in Ogden Canyon originates either from existing man-made rock and soil cuts on the uphill side of SR-39, or from unstable, natural rock outcroppings on the north and south slopes. Future studies should include review of vehicle crash data as well as additional input from UDOT maintenance personnel to determine problem areas affecting the existing road alignment. Man-made rock and soil slopes which are likely to produce rockfall should be inventoried, and data should be collected for each site and analyzed to determine overall stability, height, slope angle, ditch width, rock structure, and the potential to produce rockfall events. Additional investigation of naturally-occurring rockfall should include evaluation of source areas to estimate size, historic frequency, and trajectory of rockfall events. The naturally occurring rockfall will, in general, involve larger rocks with higher velocities, and will be more challenging to mitigate than rockfall originating from man-made slopes just above the road. However, both types have potential to result in injury and property damage.

A debris, mudflow, and flood study, including basin evaluation and hydrology, should be conducted on larger watersheds with the potential to erode and produce debris-laden waters during intense

precipitation events. Although the Ogden River is controlled by flow release from the Pineview Reservoir dam in the canyon, side drainages may cause localized flooding.

Additional mapping and dendritic studies should be conducted to determine historic avalanche paths which may affect future transportation improvements. Dendritic studies include dating of trees to estimate the frequency of avalanche events at a specific location. The study should include additional input from UDOT maintenance staff and should address the type and frequency of events and potential impacts to health, safety, and maintenance/operation of future uses.

Approximately 30 landslide and debris flow areas have been mapped within the study area. Active and inactive landslides are not well differentiated from talus and debris flows in the literature and additional studies are needed to determine whether these mapped features will affect future uses. Additional studies should include verification of the location and extent of the mapped features, visual assessment to evaluate potential future movements, and to determine which features may have sufficient impact on future uses to warrant specific investigation and evaluation.

Additional desk and field studies should be conducted to determine if all relevant faulting is shown on the current mapping and to evaluate the current status of faults regarding the probability for activation.

Preliminary geotechnical issues and constraints for proposed corridor improvements should be identified by additional geological mapping, geophysical studies, and selective, infrequent borings. Early efforts should focus on general foundation types, identification of areas where exposed bedrock or shallow rock exists, versus thicker soil deposits. Localized deposits of soft, problematic soils, such as transported Bonneville sediments, may occur above and below the dam. The occurrence of perennial streams from the small side basins and unstable slopes throughout the alignment indicate the possibility of near-surface groundwater and springs. Preliminary investigation of groundwater conditions along the alignment should also be included for the slopes and canyon bottom.

6.3 Summary of Next Geotechnical Actions

- Inventory man-made rock and soil slopes likely to produce rockfall. Collect data on stability, height, slope, ditch width, rock structure, and potential to produce rockfall.
- Evaluate naturally-occurring rockfall source to estimate size, historic frequency, and trajectory.
- Debris, mudflow, and flood study on larger watersheds in canyon.
- Additional avalanche mapping and dendritic studies (dating trees to estimate frequency).
- Further study on faults.
- Selective, infrequent borings to determine foundation types and soil deposits.
- Investigate groundwater conditions.

7.0 TRAFFIC

7.1 Historical/Current Traffic

UDOT has an automatic traffic recorder (ATR) located on SR-39 in Ogden Canyon approximately one half mile west of Pineview Dam. Traffic data is collected hourly every day of the year. The average weekday traffic volumes have remained stable from 2004 to 2012, with a dip in 2013 before rebounding in 2014, as shown in Figure 7-1.

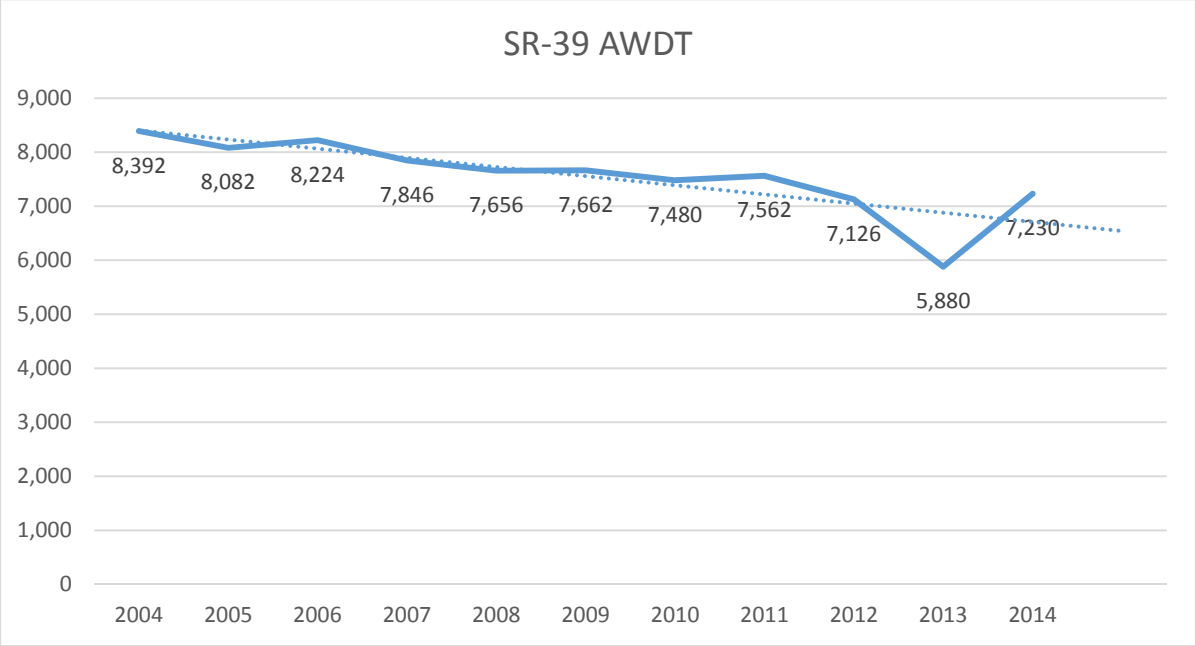


Figure 7-1: Average Weekday Traffic Volumes

Weekend and Seasonal Traffic Variations

Traffic volumes are the highest on weekends and the summer months. This is due to the recreational opportunities in the surrounding areas. The average daily weekend volume has averaged approximately 13% higher than weekday traffic volumes for the past four years. The months of June, July, August and September record volumes that are between 15-30% more than the average month. July has consistently had the highest monthly volumes for the past decade. The three highest hourly volumes (1037 to 1094 vehicles/hour) recorded by the ATR in 2013 occurred on Memorial Day, July 4th, and Labor Day weekends.

Truck Traffic

Each vehicle counted is classified by the standard FHWA Classification. The vehicle classifications are shown in Figure 7-2. All vehicles Class 4 and greater are considered in the truck percentages. Truck volumes are approximately 10% of the overall traffic in Ogden Canyon. Of this ten percent, 6% is Classes 4 through 7, which are essentially buses, recreational vehicles, and smaller delivery trucks. The remaining 4% are semi tractors pulling a single trailer. There are no multi-unit semis in the canyon.

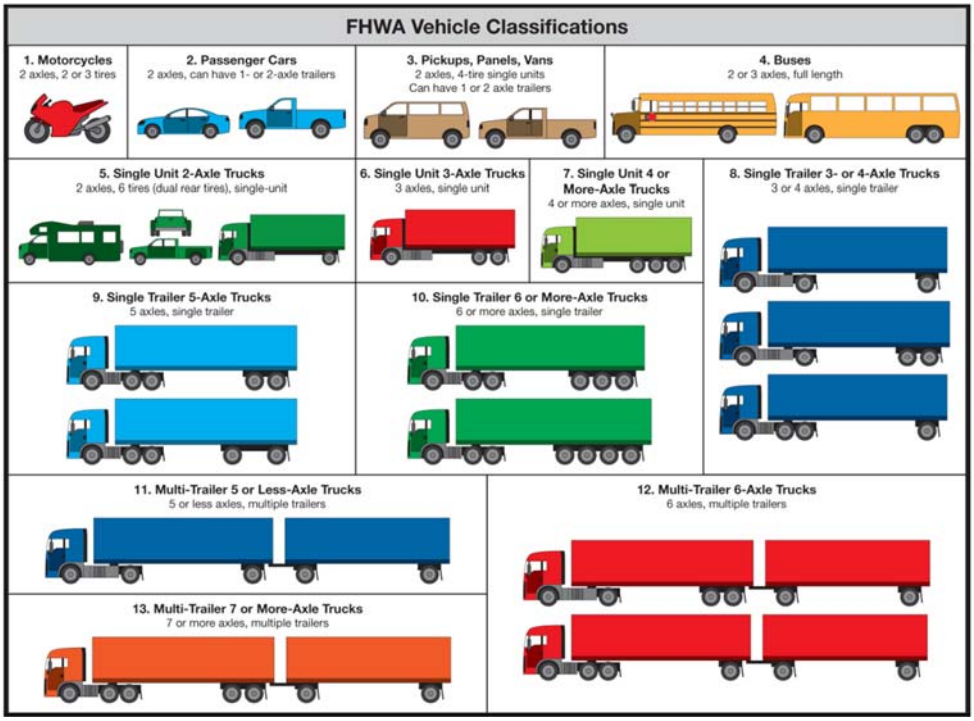


Figure 7-2: FHWA Classification

Traffic Counts

To supplement the ATR information, traffic data was collected along SR-39 & SR-158 in Ogden Canyon. Data were collected using pneumatic tubes at the 3 locations shown in Figure 7-3 below. The existing speed data, daily traffic volumes, peak hour traffic volumes and daily vehicle classification at the three locations are summarized below.

Figure 7-3: Count Locations

Data Collection

Traffic counts were conducted for 24 hours at all three study locations. Counts were performed on October 21, 2014.

Tables 7-1, 7-2, & 7-3 summarize the resulting Average Daily Volume (ADT), 85th percentile speed, and peak hour traffic volumes at locations 1, 2, & 3, respectively.

Table 7-1: Traffic Conditions at Count Location 1 (Lower Canyon)

Day **Tuesday**	ADT	85th Percentile Speed	Posted Speed Limit	AM Peak Hour	AM Peak Count	PM Peak Hour	PM Peak Count
Eastbound	3,689	47.0 MPH	40	11:30 AM	199	5:00 PM	423
Westbound	3,714	47.4 MPH	40	7:00 AM	369	3:45 PM	272
Total	7,403			7:00 AM	530	5:00 PM	661

Table 7-2: Traffic Conditions at Count Location 2 (SR-158)

Day **Tuesday**	ADT	85th Percentile Speed	Posted Speed Limit	AM Peak Hour	AM Peak Count	PM Peak Hour	PM Peak Count
Eastbound	2,136	42.3 MPH	40	8:00 AM	115	4:45 PM	251
Westbound	2,170	48.3 MPH	40	8:15 AM	245	4:00 PM	153
Total	4,306			7:30 AM	341	4:45 PM	401

Table 7-3: Traffic Conditions at Count Location 3 (SR-158)

Day **Tuesday**	ADT	85th Percentile Speed	Posted Speed Limit	AM Peak Hour	AM Peak Count	PM Peak Hour	PM Peak Count
Eastbound	1,557	58.8 MPH	55	11:30 AM	84	4:45 PM	163
Westbound	1,539	59.3 MPH	55	7:00 AM	118	1:30 PM	118
Total	3,096			11:15 AM	199	4:45 PM	269

Tables 7-4, 7-5, & 7-6 summarize the resulting vehicle classifications at locations 1, 2, & 3, respectively. Throughout the duration of the data collection there were no vehicle classes above class 10 observed.

Table 7-4: Traffic Class Count Location 1 (Lower Canyon)

Day **Tuesday**	ADT	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10
Eastbound	3,689	9	2,527	832	21	215	18	9	50	3	5
Westbound	3,714	7	2,397	902	26	273	13	2	78	6	10
Total	7,403	16	4,924	1734	47	488	31	11	128	9	15
Percentage		.22%	66.51%	23.42%	.63%	6.59%	.42%	.15%	1.73%	.12%	.20%

Table 7-5: Traffic Class Count Location 2 (SR-158)

Day **Tuesday**	ADT	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10
Eastbound	2,136	4	1,476	466	12	130	9	8	24	2	5
Westbound	2,170	1	1,414	530	23	159	9	0	29	1	4
Total	4,306	5	2,890	996	35	289	18	8	53	3	9
Percentage		.12%	67.12%	23.13%	.81%	6.71%	.42%	.19%	1.23%	.07%	.21%

Table 7-6: Traffic Class Count Location 3 (SR-158)

Day **Tuesday**	ADT	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10
Eastbound	1,557	2	1,040	367	7	93	9	4	23	2	3
Westbound	1,539	8	977	367	8	130	8	1	31	0	9
Total	3,096	10	2,017	734	15	223	17	5	54	2	12
Percentage		.32%	65.15%	23.71%	.48%	7.20%	.55%	.16%	1.74%	.06%	.39%

These collected traffic volumes closely correlate with the average weekday in October 2013. The ADT is nearly identical and the percent of trucks is 9.8% (although semi-trailers were only 2% of the overall total). The 85th percentile speeds range from 2 to 8 miles per hour over the posted speed limit at the three locations. An unexpected outcome was the timing of the AM peak hour on the two SR-39 locations in the eastbound direction. The peak hour occurred at 11:30 am, instead of the traditional 7 to 9 am time frame. The PM peak hours for the westbound direction at these two sites are 1:30 and 3:45 pm – which are sooner than the typical 4 to 6 pm.

7.2 Future Traffic

The WFRC Regional model predicts modest growth of approximately 2.5% per year until the year 2040 as shown in Figure 7-4. The existing two lane road has sufficient capacity to handle the volumes predicted for 2040 with the projected growth in the upper valleys. The number of trucks will increase proportionately as the population grows in the east. There will be occasional spikes in truck traffic related to construction of homes and other projects.

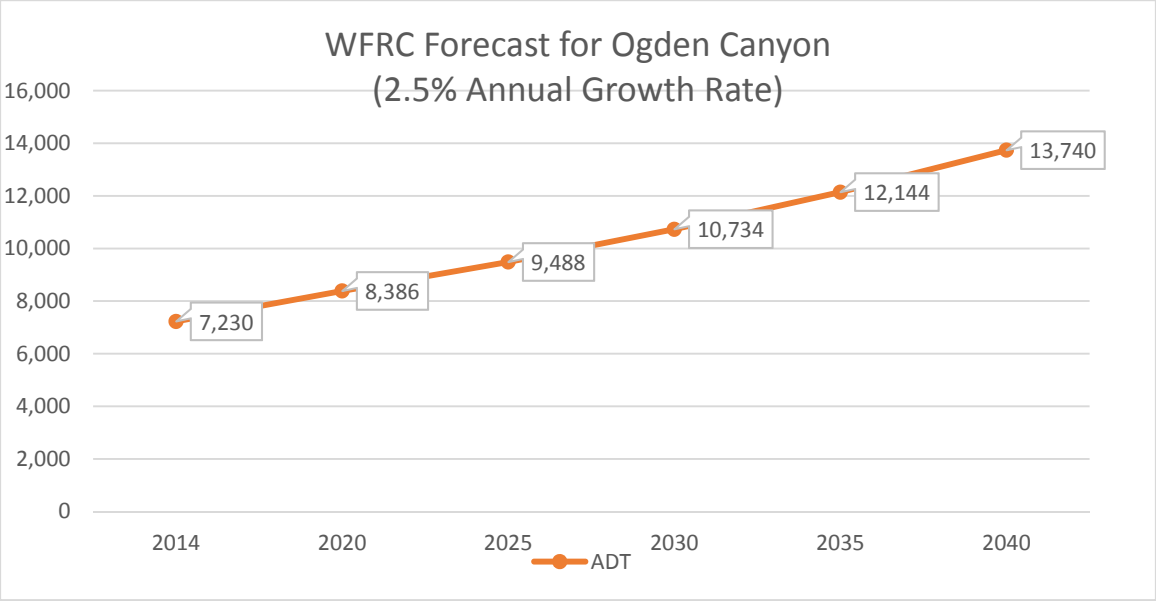


Figure 7-4: Future Traffic Projections

8.0 DOCUMENTS COLLECTED/REFERENCED