



Mill Creek Canyon Transportation Feasibility Study

August 2012

Prepared for:

Uinta-Wasatch-Cache National Forest &
Salt Lake County Public Works



Submitted by:

FEHR & PEERS

EXECUTIVE SUMMARY

Mill Creek Canyon, a local favorite along the Wasatch Front, offers a place for people to hike, bike, picnic, cross country ski, snowshoe, or simply experience nature. Mill Creek Canyon is located within the Central Wasatch Management Area of the Wasatch-Cache National Forest, and is immediately adjacent to the Salt Lake County urban area. The United States Forest Service is the majority land owner in Mill Creek Canyon, managing 81% of the land. In recent years, Salt Lake County and Forest Service representatives have noticed some often-recurring problems in Mill Creek Canyon:

- Overcrowding of key parking areas in both summer and winter peak seasons;
- Conflicts between vehicles, cyclists, and pedestrians on the roadway; and
- Environmental impacts associated with informal overflow parking initiated by visitors, including watershed degradation, loss of vegetation, and erosion.

In 2008 Salt Lake County and the Uinta-Wasatch-Cache National Forest applied for a Paul Sarbanes Transit in Parks and Public Lands grant from the Federal Transit Administration to analyze these issues and identify potential transportation alternatives to address the problems. Salt Lake County and the Forest Service were awarded the grant and the Mill Creek Canyon Transportation Feasibility Study began analysis in 2011.

Visitor activity was monitored over several days in summer 2011 and winter 2012. Automobile traffic, parked vehicles, and walking and cycling activity were highest on Saturdays, Sundays, and holidays. Traffic volumes and general visitor activity were lower on weekdays. Visitor activity is significantly higher in the summer; on average, traffic observed passing the fee booth in summer was at least three times higher than in winter. People enjoy bringing their dogs to the canyon, particularly on odd-numbered days when dogs are allowed off-leash: roughly 15% of visitors on odd-numbered days had dogs accompany them. Cycling and walking on the road are also popular activities. During the summer observation period, an average of 18 cyclists per hour and six pedestrians per hour traveled uphill past the Fee Booth. Many of these road users are not going to a specific activity center in the canyon – cycling and walking is the activity and the canyon is the destination.

Public parking is available at trailheads, picnic areas, and areas with wide road shoulder or pullouts. There is private parking areas associated with Mill Creek Inn, Log Haven, Camp Tracy, and the cabin areas at Porter Fork and The Firs. Some of the developed sites have paved

parking areas with delineated spaces, and there are numerous unpaved parking areas. Key parking problems in Mill Creek Canyon include:

- Trailheads that are in high demand quickly reach capacity, while parking supply in other areas is under-utilized;
- Drivers park illegally when they are unable to find a legitimate parking space, leading to congestion on the roadway; and
- Trail users must often park at overflow lots and walk on the roadway to trailheads, sharing the pavement with vehicles traveling in both directions, leading to a diminished canyon experience for these users.

To address these primary issues in the Canyon, the project team explored a variety of concepts, grouped into three categories:

- Parking management concepts
- Transit concepts
- Bicycle and pedestrian concepts

Parking management concepts evaluated for Mill Creek Canyon fall into two categories: systems that provide information about parking to users, and systems that change how parking is priced and managed. Parking management concepts included Dynamic Message Signs (DMS), staff-based systems, web-based systems, toll increases, paid parking, automobile restrictions, or reservation systems.

Transit concepts should address parking congestion at key areas in Mill Creek Canyon, and accommodate a range of users and their gear: dogs, bikes, picnic hampers, skis, snowshoes, and other accessories. The transit concepts are categorized into rubber-tire shuttle buses, and cable-propelled technology. Shuttle bus concepts included a winter shuttle, connecting riders from the 3900 South park-and-ride to the Winter Gate; a summer all-canyon shuttle, connecting riders from the 3900 South park-and-ride to the Big Water trailhead; a summer upper-canyon shuttle, connecting riders from the Terraces Roadside parking lot to the Big Water trailhead; and a cable-propelled transit system, connecting riders from the 3900 South park-and-ride to the Big Water trailhead.

Mill Creek Canyon is a popular destination for cyclists. The length and grade of the corridor offer an obtainable challenge, and traffic volumes are lower than in adjacent canyons. Strategies for improving cycling conditions in Mill Creek Canyon included an uphill bike lane, downhill shared lane markings, and bicycle amenities such as bike racks and bicycle-specific roadside signage.

Pedestrian strategies are focused on improving safety by reducing conflicts with vehicles, either by slowing vehicles or by removing pedestrians from the roadway. Pedestrian concepts included off-street trail improvements at the Winter Gate, Big Water trailhead, and Church Fork trailhead,

as well as traffic calming strategies at major pedestrian activity areas like the Boy Scouts' Camp Tracy property, Mill Creek Inn, and Log Haven.

The Project Team went through a multi-tiered process for screening and selecting concepts. This included multiple rounds of discussion and refinement with the Steering Committee. The Project Team presented these concepts to the stakeholders in a March 2012. This was followed by an April 2012 public open house. Following these rounds of screening, the Project Team further refined the concepts to create groups of recommendations for parking, transit, and bicycle and pedestrian improvements. Table ES-1 below outlines these recommendations and cost estimates.

Table ES.1: Summary of Recommendations

Phase	Project	Conceptual Cost Estimate
Pilot	Summer Upper-Canyon Shuttle	\$149,200/season
Pilot	Portable Real-time Parking Information	\$55,550
Pilot	Staff-based Parking Information	\$1,330
Pilot	Shift Gate Location	\$7,060
Short-Term	Integrated Parking Information	\$166,100
Short-Term	Parking Clarification	Varies
Short-Term	Downhill Shared-Lane Markings	\$6,050
Short-Term	Uphill Bike Lanes	\$678,160
Short-Term	Speed Feedback Signs	\$11,860
Short-Term	Advance Warning Signs	\$4,110
Short-Term	Off-Street Trail Connections (contingent)	NA
Short-Term	Continuous Summer Upper-Canyon Shuttle	\$149,200/season
Long-Term	Web-based Parking Management Systems	NA
Long-Term	Text Message Alerts	NA
Long-Term	Summer All-Canyon Shuttle	NA
Long-Term	Park-and-Ride Enhancements	NA

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1. INTRODUCTION

Mill Creek Canyon is a local favorite among the magnificent canyons of the Wasatch Front. It is tucked behind residential neighborhoods on the east side of the Salt Lake Valley, and offers a place for people to hike, bike, have a picnic, cross country ski, snowshoe, or simply to experience nature. Unlike Big and Little Cottonwood Canyons, Mill Creek Canyon does not have major ski resort destinations. Another important distinguishing feature about Mill Creek Canyon is that it is not a municipal drinking water source, so currently dogs and horses are allowed. Primary recreational activities in Mill Creek Canyon are dispersed active recreation and picnicking. Figure 1 provides an illustration of the study area.

Mill Creek Canyon is located within the Central Wasatch Management Area of the Uinta-Wasatch-Cache National Forest. The Forest Service is the majority land owner in Mill Creek Canyon, managing 81% of the land. Mill Creek Inn and cabins in Porter Fork and The Firs are privately owned structures situated on National Forest System land under special permit authorization. Log Haven and the Boy Scouts of America's Camp Tracy are on private land.

The Canyon is managed in close partnership between the Forest Service, Salt Lake County departments of Public Works, Parks and Recreation, and Sheriff's Office. Salt Lake City and the Salt Lake City-County Health Department also have authority to regulate the types of activities that occur in the watershed. A map showing land jurisdiction is provided in Figure 2.

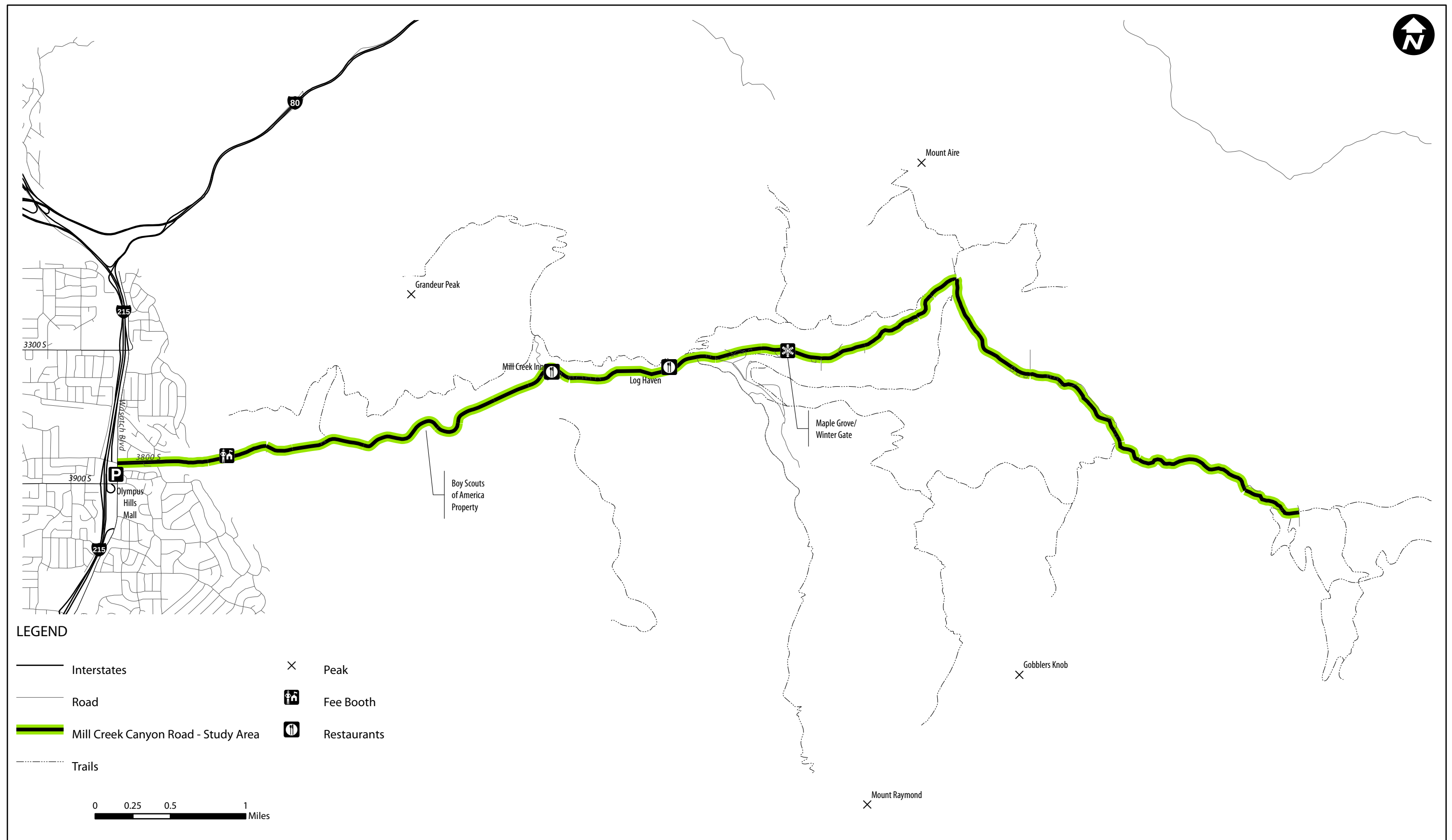
STUDY BACKGROUND AND PURPOSE

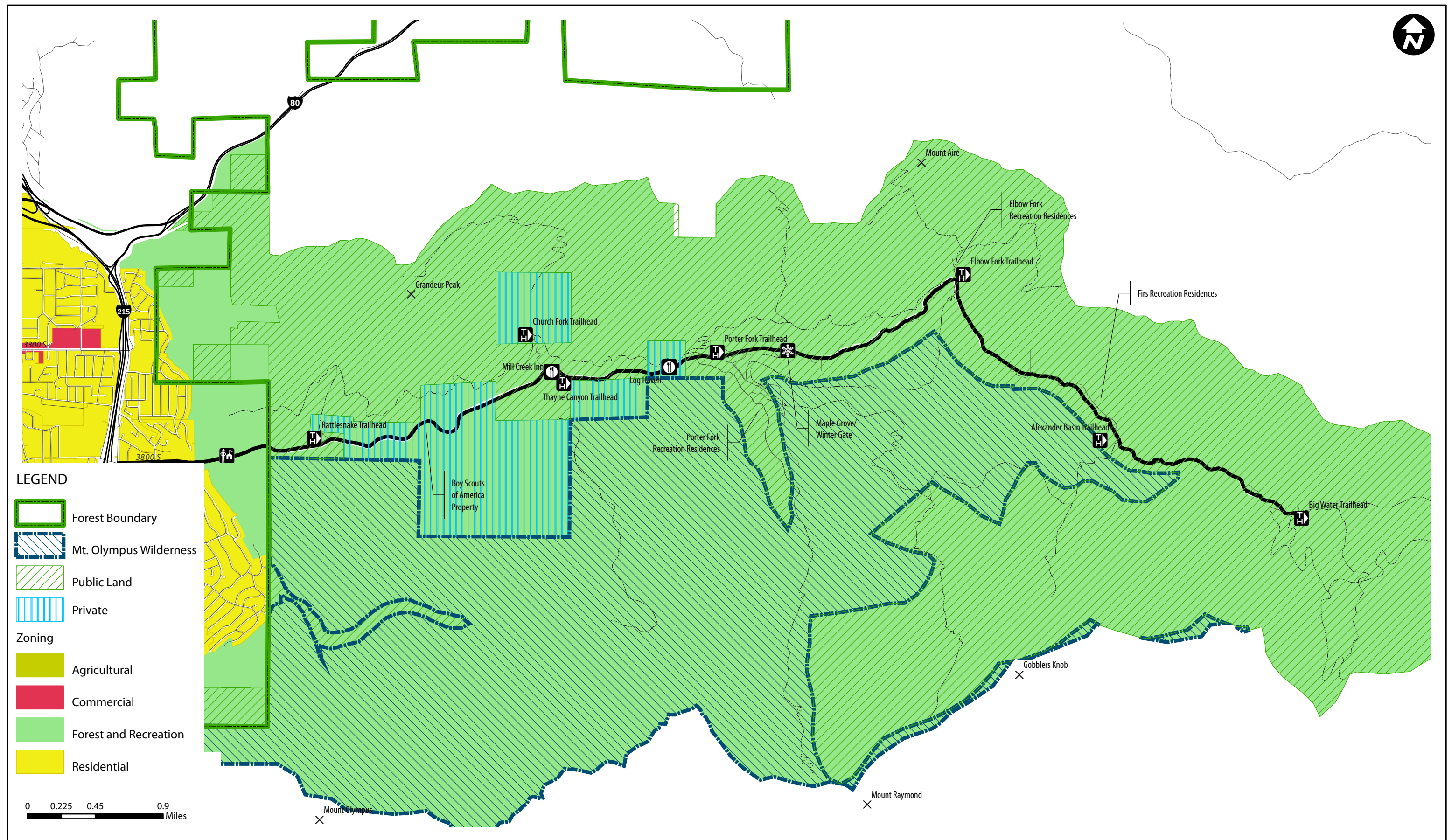
In 2008, Salt Lake County and the Uinta-Wasatch-Cache National Forest applied for a Paul Sarbanes Transit in Parks and Public Lands grant from the Federal Transit Administration. County and Forest Service representatives had noticed some often-recurring problems in Mill Creek Canyon:

- Overcrowding of key parking areas in both summer and winter peak seasons;
- Conflicts between vehicles, cyclists, and pedestrians on the roadway; and
- Environmental impacts associated with informal overflow parking initiated by visitors, including watershed degradation, loss of vegetation, and erosion.

The grant application outlined several goals that the study should achieve, as provided below:

- Reduce traffic congestion and air pollution
- Enhance visitor mobility, experience and safety





- Improve visitor education, recreation, and health benefits
- Protect natural and cultural resources
- Identify alternatives with operational efficiency and financial feasibility

In 2011, this Mill Creek Canyon Transportation Feasibility Study was initiated to address the concerns and goals outlined above.

PROJECT PARTNERS

The Steering Committee for the Mill Creek Transportation Feasibility Study included representatives from multiple agencies:

- Salt Lake County Engineering and Flood Control
- Salt Lake County Parks and Recreation
- Salt Lake County Planning and Development Services
- Salt Lake County Mayor's Office
- Uinta-Wasatch-Cache National Forest
- Wasatch Front Regional Council
- Utah Transit Authority

These representatives worked with the project consultants to guide and direct the study, develop a range of alternatives, educate the public, and screen and prioritize potential recommendations. The Steering Committee also engaged a group of stakeholders representing a range of public and private interests in Mill Creek Canyon. More information about the stakeholders and the public engagement process can be found in Chapter 7.

LAND MANAGEMENT AND PLANNING RESOURCES

Wasatch-Cache National Forest Revised Forest Plan

Management of the Forest is primarily guided by the Wasatch-Cache National Forest Revised Forest Plan, which was last updated in February 2003. The Revised Forest Plan described:

- Desired future conditions
- Management prescriptions



- Standards and guidelines for decisions affecting the forest.

The Forest Plan specifies how construction and reconstruction of roads should occur to minimize impacts to the environment and forest resources. Furthermore, the plan states that preservation of the watershed is a primary factor in managing roads in the Central Wasatch Management Area, that the Forest Service will not permit expansion of parking unless needed to improve mass transit or for watershed protection, and that the Forest Service will work with local parties to explore options for minimizing private vehicular use in the canyon.

The Forest Service uses the Recreational Opportunity Spectrum (ROS) as a tool to define the recreation setting and experience. Mill Creek Canyon road corridor is classified as “Roaded Natural”, because it is a predominantly natural environment but has much evidence of other users and human modification. In a Roaded Natural setting, there is a low probability of experiencing isolation from the sights and sounds of man. However, the natural appearance of the road corridor is important and the Forest Service strives to maintain the natural qualities.

Mount Olympus Wilderness Area

Mount Olympus Wilderness Area is a congressionally designated wilderness, which restricts the activities that can occur within its boundaries. Generally, no motorized vehicles or roads are allowed in wilderness areas. Mount Olympus Wilderness Area captures much of the terrain on the south side of Mill Creek Canyon. This has implications for the development of any permanent structures, trail building, or allowing certain types of activities within the wilderness boundaries.

Watershed Management

Although Mill Creek is not currently a source of culinary water, protecting water quality is a priority for many of the agencies responsible for managing activities in Mill Creek Canyon. The watershed is regulated by numerous agencies including:

- Salt Lake City Department of Public Utilities
- Salt Lake County
- The Salt Lake Valley Health Department
- The U. S. Forest Service
- The Metropolitan Water District of Salt Lake City
- The Town of Alta
- Sandy City
- The Jordan Valley Water Conservancy District

Salt Lake County was designated the area-wide water quality planning authority by the Clean Water Act in 1973. As a result of that act Salt Lake County produces a water quality management plan that is updated every six years. In the 2009 Water Quality Stewardship Plan (adopted as the area-wide management plan by EPA in October 2010) the Salt Lake County Watershed Planning and Restoration program characterized the upper Millcreek Sub-Watershed as Excellent in 24 of the 27 metrics used to characterize that watershed with an overall score of 88/100 for the function of Millcreek Stream through that watershed.

The Salt Lake City Watershed Management Plan (1999) prioritizes water quality first and multiple use of the watershed second. The plan states:

“To the extent that, in the reasonable judgment of the City, a proposed development or activity, either individually or collectively, poses an actual or potential impact to the watershed or water quality Salt Lake City will either oppose, or seek to modify, manage, control, regulate or otherwise influence such proposed development or activity so as to eliminate or mitigate potential impacts” (p.3).

In addition, the Salt Lake Valley Health Department maintains a strict 50-foot building setback from all streams. The health department regulations for watersheds do not specifically regulate transportation facilities. Within the context of these strict watershed controls, any soil disturbing activities would be subject to scrutiny by the agencies with authority over the watershed.

Salt Lake County Zoning Ordinances

The Salt Lake County Zoning Ordinance regulates private land use in Mill Creek Canyon. The primary county plan that addresses transportation in the Canyon is the 1989 Wasatch Canyons Master Plan, which is currently being updated through the Salt Lake County Planning and Development Services Department.

Mill Creek Canyon is also included in the Foothills and Canyons Overlay Zone (FCOZ), and is subject to the Natural Hazard Areas regulations. FCOZ establishes standards for development in the foothills and canyons, in order to preserve their natural character. FCOZ lists the following items among its goals:

- Preserve the aesthetic qualities of the foothills and canyons, including ridgelines
- Encourage design that will reduce the risk of natural hazards and maximize residents' safety
- Provide adequate vehicle and pedestrian circulation
- Minimize construction impacts on sensitive lands
- Prohibit activities that would degrade fragile soils, steep slopes, and water quality
- Preserve environmentally sensitive areas through clustering

- Protect streams, drainage channels, absorption areas, and floodplains

FCOZ applies to all private County lands in Mill Creek Canyon, and is generally more restrictive than the underlying base zones (FR, FM). Regulations regarding Natural Hazard Areas attempt to minimize hazards to public health, safety and welfare. This ordinance requires completion of debris flow, landslide, and avalanche hazard reports for applicable areas in the County.



Wasatch Canyons Tomorrow

Wasatch Canyons Tomorrow (2010) was a public process to identify concerns and issues surrounding the canyons across the Wasatch Front. As a community visioning effort, Wasatch Canyons Tomorrow established a public vision and guiding principles for the future of the canyons, addressing growth and the need for watershed protection among other issues. Primary goals identified through the study include:

- Protect high-priority lands while respecting private property rights;
- Offer high-quality recreation while protecting natural resources; and
- Use transportation to reduce congestion, improve air quality, and facilitate access.

Recommendations and strategies from Wasatch Canyons Tomorrow involving Mill Creek Canyon, specifically or generally, include:

- Acquire strategic pieces of land or easements for trail access
- Study trail capacity in the Wasatch Canyons
- Develop a regional Master Trails Plan
- Maintain and enhance winter avalanche safety
- Improve road cycling safety, including an increase in vehicle speeding fines in Mill Creek Canyon
- Study a transit hub near the mouth of Big or Little Cottonwood Canyon, with shuttles or buses to Mill Creek Canyon
- Study alternative transportation in Mill Creek Canyon, including a transit option that allows dog use

2. EXISTING CONDITIONS

This chapter discusses the existing conditions of Mill Creek Canyon in terms of roadway character, rules and programs, visitor use patterns, parking availability, collision patterns, and land management context.

ROADWAY CHARACTER

For most visitors, Mill Creek Canyon begins at Wasatch Boulevard. The initial half-mile of road (signed as 3800 South) is fronted by residential properties. After entering the confines of the canyon slopes, the character of the road signals to visitors that they have left the city behind. The paved two-lane highway is constantly constrained by Mill Creek, rocky outcrops, and dense vegetation. Throughout most of the canyon there are limited locations with sufficient shoulder width for vehicles to pull off the roadway.



The canyon road has a posted speed limit of 30 miles per hour and gains roughly 2,600 feet in elevation from the canyon entrance to the terminus approximately 8.5 miles up-canyon. The cross-section of the road in the lower canyon is generally 11 to 12-foot vehicle travel lanes, two-foot paved road shoulders, and graded gravel road shoulders of irregular widths. There are no bike lanes. Travel lanes are delineated by a double yellow centerline stripe and shoulder stripe pavement markings.



Four miles up-canyon from the fee collection booth, at the mid-canyon gate near Maple Grove Picnic Area, the roadway narrows to 24 feet. In this section there are no shoulder stripes and the roadway centerline is marked by a single stripe. In the upper reaches of the canyon near Big Water, the road is only 16 feet wide, barely enough for two vehicles to pass.



PROGRAMS AND RULES

Generally visitors use Mill Creek Canyon for day use only. There are no developed camping areas; backcountry camping is allowed, but must be at least one-half mile from any roadway.

There is currently a day use fee of \$3.00 per vehicle. Fees are collected as visitors leave the canyon – payment is cash-only. Annual visitor passes are available for \$40; the pass is a plastic hang-tag that indicates the expiration date. Cyclists and pedestrians are not required to pay the fee.

There are ten developed picnic areas through the canyon. Most sites are available on a first-come-first served basis; the larger group sites can be reserved in advance through the Salt Lake County Parks Operations Office. Individual picnic sites have fire rings, picnic tables, grill stands, and most picnic areas have vault toilets. Picnic areas are open from 8 a.m. to 10 p.m., and closed during the winter season.

Drinking water and electricity is generally not available at Forest Service recreation sites in the canyon. There are no garbage collection facilities; visitors are expected to pack out their trash.

From November to July the upper portion of the road is closed at Maple Grove Picnic Area (“Winter Gate”) and vehicle access is restricted to private property owners and management staff. Snow removal is done regularly on the road and parking areas below the Winter Gate. When there is sufficient snowpack on the road above the Winter Gate, the Forest Service routinely grooms a cross country ski track. The road above the Winter Gate is also popular as a



walking path when the snow has melted.

One winter yurt is available for overnight stay at Big Water trailhead. The yurt is accessible by ski or snowshoe only. Reservations are administered through Salt Lake County Parks and Recreation; the yurt is very popular and is consistently booked seven days per week.

To mitigate high use, bicycles are restricted from using trails in the upper canyon on odd numbered days (Big Water, Little Water, and Great Western trails). The Pipeline Trail is open to bikes on all days.

Dogs are required to be leashed at all times at developed sites, parking areas, and roads. On even-numbered calendar days, dogs are required to be leashed on all hiking trails. On odd-numbered days, dogs are permitted to be off-leash on hiking trails. Dogs and horses are not allowed into the adjacent drainage basins that are designated as culinary watersheds.



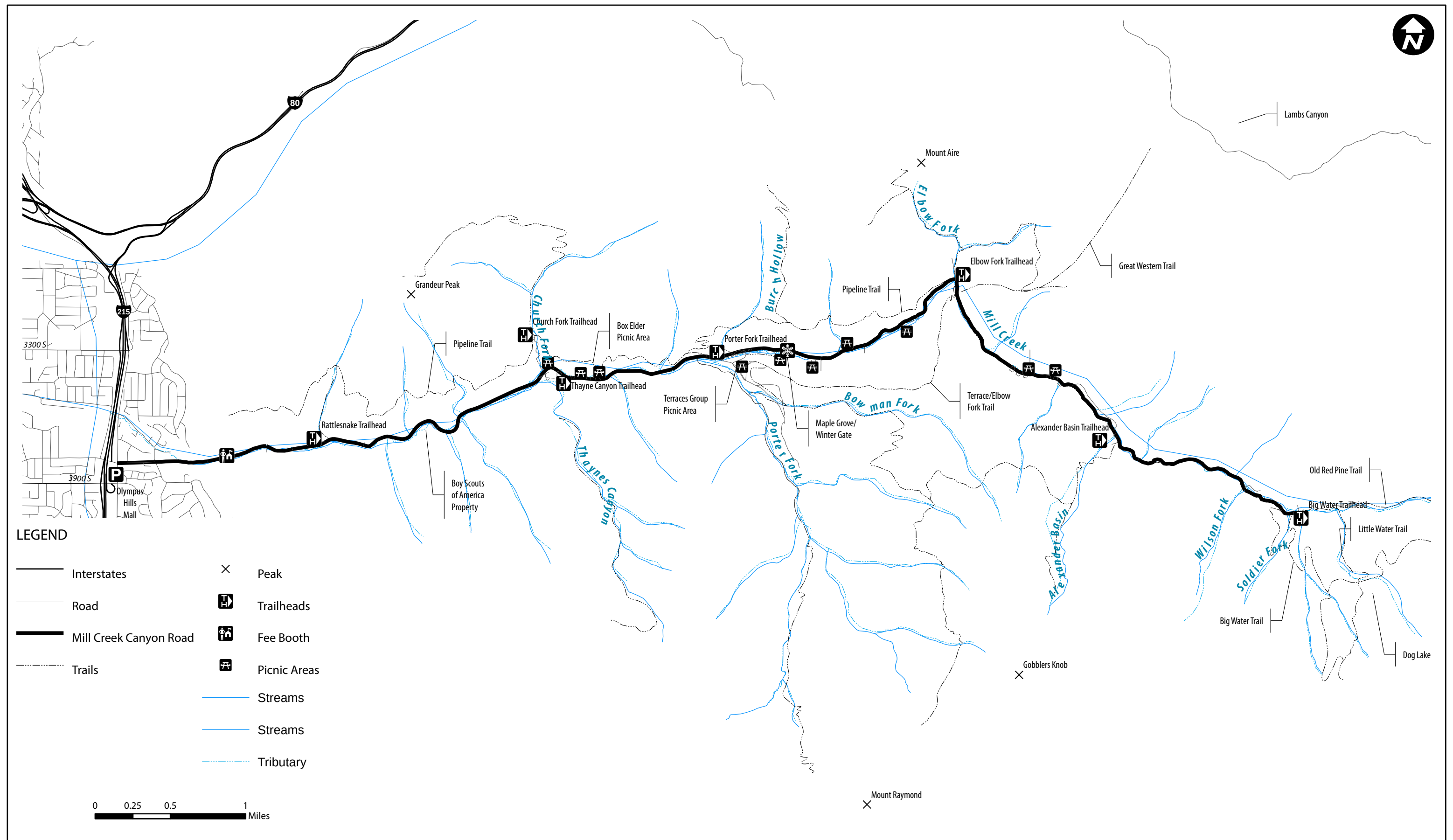
TRAILS AND RECREATION

Mill Creek Canyon has numerous exceptional soft trails, accessed from signed trailheads throughout the Canyon. Notable trailheads in Mill Creek Canyon include (shown in Figure 3):

- **Rattlesnake Gulch** – access to the Pipeline Trail
- **Church Fork** – access to Grandeur Peak
- **Thayne Canyon** – access to Desolation and Thayne Canyon trails
- **Porter Fork** – access to Porter Fork Trail, Mount Raymond, Terraces, and Bowman Fork
- **Burch Hollow** – access to the Pipeline Trail
- **Elbow Fork** – access to Mount Aire, Lamb's Canyon, Terraces, and the Pipeline Trail
- **Alexander Basin** – access to Alexander Basin and Bowman Fork Trails
- **Big Water** – access to Little Water, Big Water, and Old Red Pine Trails



The Great Western Trail (GWT) is a continuous trail spanning five states (Utah, Arizona, Idaho, Wyoming, and Montana). The GWT is routed through Mill Creek Canyon, and utilizes portions of the trails listed above. Between Big Water and Elbow Fork trailheads, the GWT is routed on the main road.



VISITOR ACTIVITY

Visitor activity in Mill Creek Canyon was measured over several days in both the summer and winter seasons. The data collection dates reflected seasonal variations in visitor activity. Automobile traffic, parking, walking and cycling activity were monitored; the data collection techniques and summaries are presented in the following section.

Traffic Data

Continuous two-way vehicle counts were collected for the summer season over a 10-day period from July 22 to July 31, 2011; this period includes a Utah state holiday weekend (Pioneer Day observed on Monday, July 25), a typical summer weekend, and mid-week days. The weather during the observation period was generally dry and sunny, with daily temperature highs of 80-85 Fahrenheit in the lower elevation portion of the canyon, suggesting that activity in the canyon was not suppressed by poor weather conditions. Automated vehicle counters were placed near the fee booth and the mid-canyon gate near Maple Grove.

Continuous two-way vehicle counts were also collected for the winter season over six consecutive days from February 17 to February 22, 2012. This period includes a federal holiday (President's Day observed Monday, February 20). The weather during this observation period was representative of typical wintertime conditions, including a significant snowfall event Sunday and Monday. As during the summer data collection session, an automated vehicle counter was placed near the fee booth. The upper canyon road was closed to vehicle traffic for the winter season at Maple Grove.

Figure 4 summarizes the daily traffic observed during the summer passing both the fee booth and Maple Grove. The Maple Grove traffic volumes represent vehicles traveling up-canyon from Maple Grove. The difference between these measured volumes represents the amount of traffic with destinations between the fee booth and Maple Grove. Figure 5 summarizes the daily traffic passing the fee booth, and compares summer and winter traffic volumes according to day-of-week.

During the observation period the days of highest traffic occur on Saturdays, Sundays, and holidays. Traffic volumes are lower on weekday. Other observations worth noting:

- Traffic is significantly higher in the summer. On average, traffic observed passing the fee booth in summer was at least three times higher than in winter.
- The maximum observed daily traffic occurred on Saturday, July 23, during which 4,600 vehicles passed the Fee Booth and 1,700 vehicles passed Maple Grove. Vehicle traffic peaked in the winter on Saturday, February 18, during which 1,300 vehicles passed the fee booth.

- During the summer, the volume of traffic observed passing the Maple Grove is about 30-40% of traffic entering the canyon, suggesting that 60-70% of vehicle destinations are down-canyon of Maple Grove.

Figure 4: Summer Daily Traffic Volumes

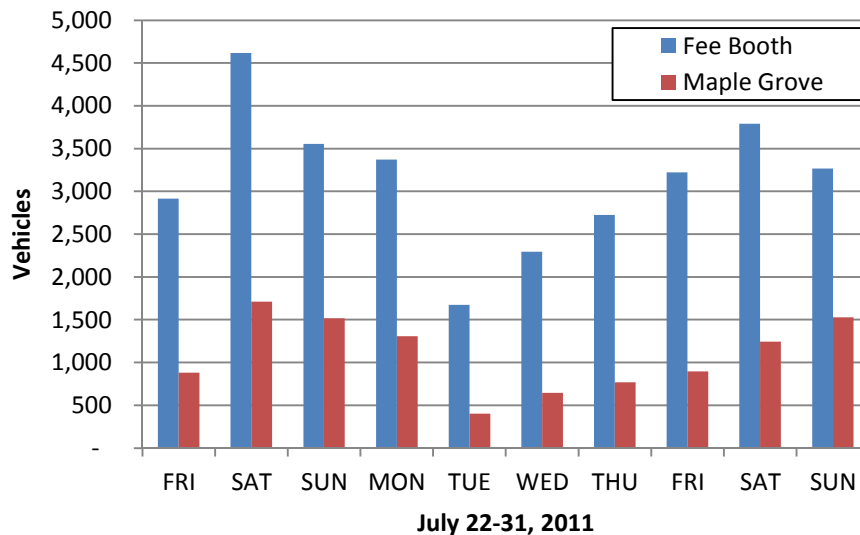
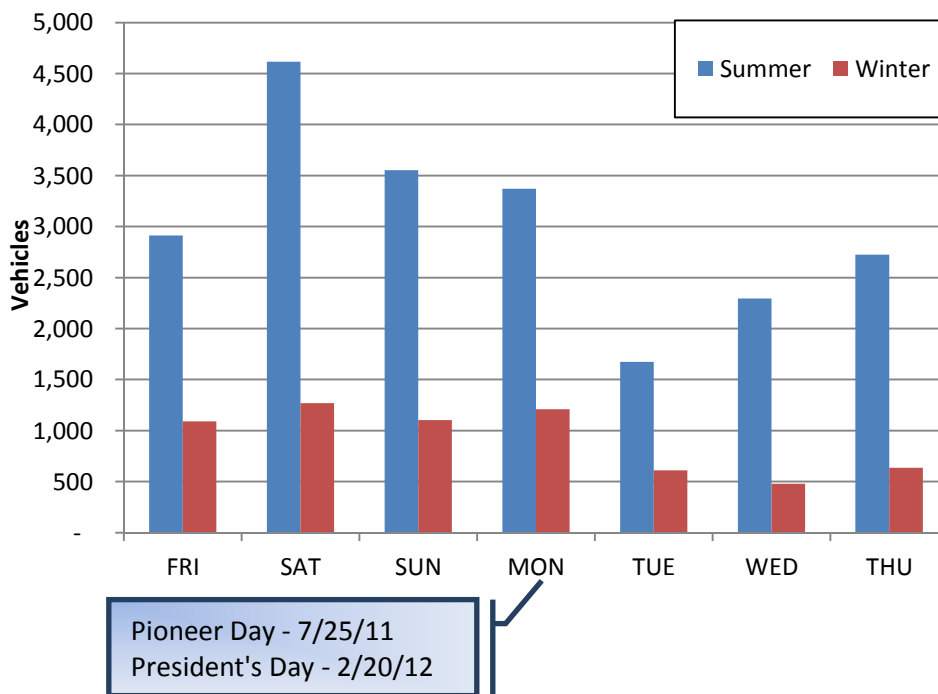


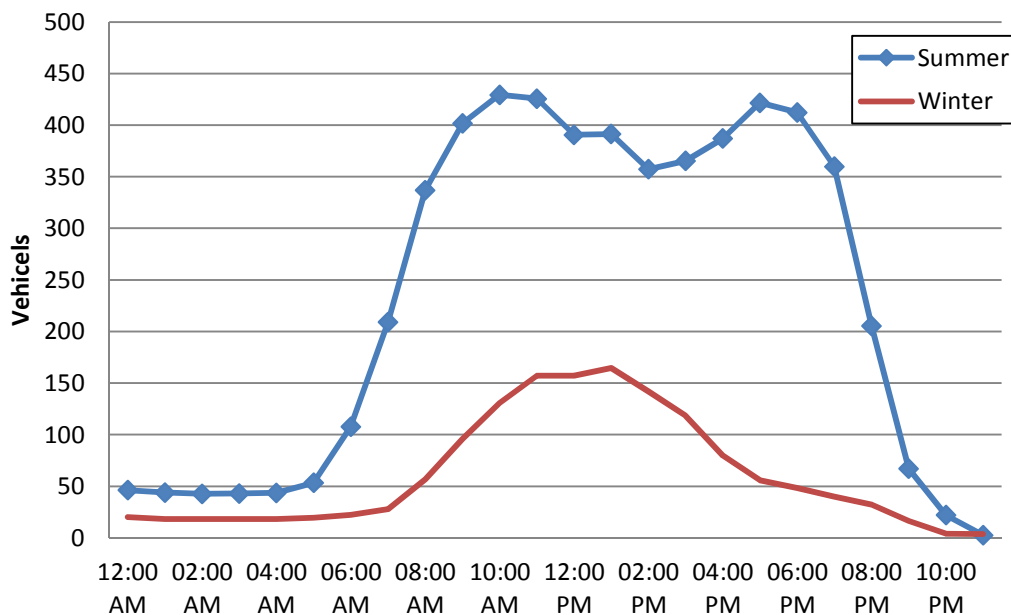
Figure 5: Summer/Winter Daily Traffic Volumes Passing Fee Booth



- Daily traffic varies dramatically from day to day, and is sensitive to weather, off-leash regulations, organized activities such as BSA Camp Tracy activities, weddings, special events, and private cabin use.

Since the automated traffic counters are sensitive to the direction of vehicle travel, the accumulation of vehicles throughout the day can be determined. Figure 6 summarizes the average daily vehicle accumulation for summer and winter weekend conditions, which indicates the number of vehicles present in the canyon at a given time. Traffic data was averaged over Saturday, Sunday, and Monday (holiday).

Figure 6: Weekend Vehicle Accumulation

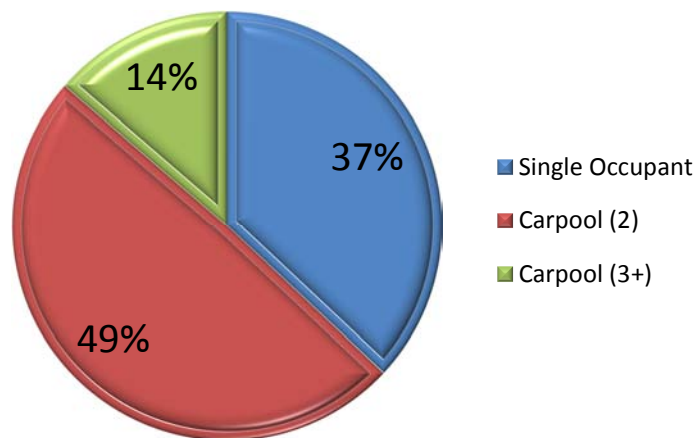


As shown in Figure 6, peak vehicle accumulation is dramatically higher in the summer compared to winter conditions. On average, vehicle accumulation peaks at 430 vehicles in the summer and 160 vehicles in the winter. Compared to the winter, summer traffic enters the canyon earlier and accumulated vehicles do not decline until late in the day. This is intuitive since the period of daylight is longer in the summer, and summertime activities commonly occur during evening periods. Winter vehicle accumulation is highest between roughly 9:00 AM to 4:00 PM.

Vehicle Loads

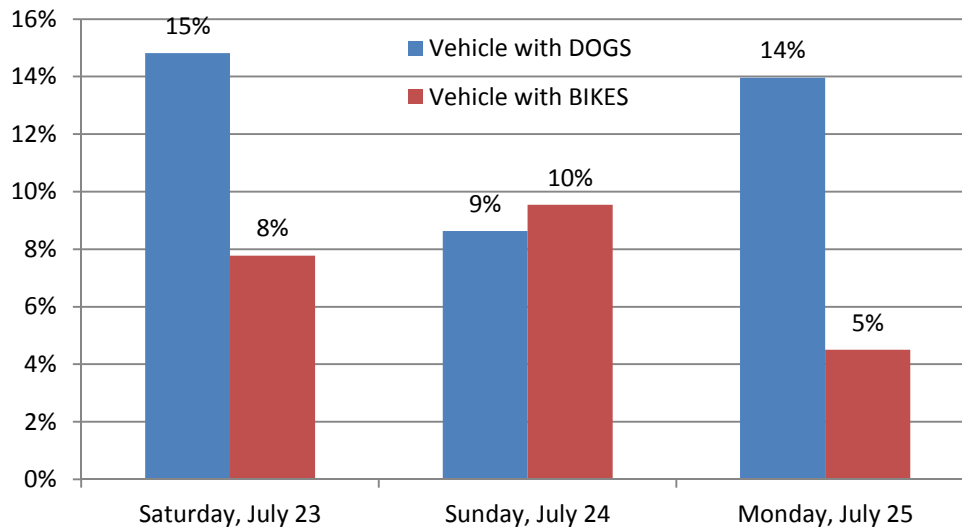
“Vehicle load” refers to the number of human passengers, and the presence of dogs or bikes in an individual vehicle. Observation of uphill traffic near the Fee Booth occurred from 9:00-11:00 AM for three consecutive days on Pioneer Weekend (July 23-25th). Data collectors recorded the number of vehicles with a single occupant, two occupants, and three-or-more occupants. Averaged over the observation periods, vehicle occupancy was 1.8 passengers per vehicle – as shown in Figure 7, most vehicles contained two or more people. Vehicle occupancy was consistent during the winter (1.7) and was similar to that observed in Little Cottonwood Canyon (1.7) and Big Cottonwood Canyon (2.0).

Figure 7: Average Vehicle Occupancy



On average, dogs were observed in 12% of vehicles, and bikes were observed in 7% of vehicles, as shown in Figure 8. It is notable that the vehicle loads appear to vary if the calendar day is even or odd. Proportionally more dogs were observed on odd days, during which dogs are allowed off-leash on hiking trails.

Figure 8: Vehicle Loads



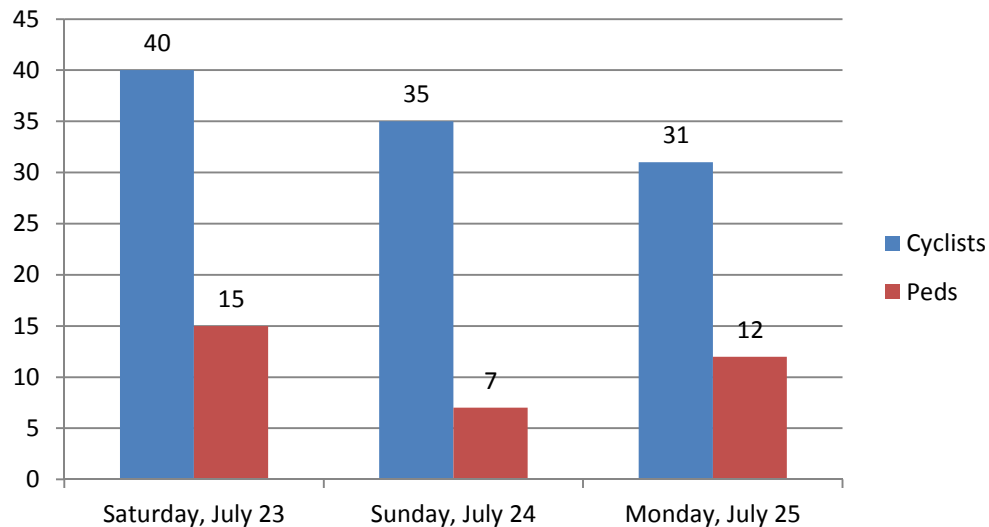
Bicycle and Pedestrians

Observation of uphill cyclists and pedestrians on the road near the Fee Booth occurred from 9:00-11:00 AM for three consecutive days on Pioneer Weekend (July 23-25th), as shown in Figure 9. On average, 18 cyclists per hour and 6 pedestrians per hour were observed traveling uphill near the Fee Booth. Cyclists and pedestrians were most active on Saturday. It is apparent that many of these road users are not going to a specific activity center in the canyon – cycling and walking is the activity and the canyon is the destination. Road cyclists commonly travel to the Big Water trailhead and then return down-canyon.

The number of downhill cyclists can exceed the number of uphill cyclists on even calendar days due to the popular Wasatch Crest Trail. Mountain bikers complete a loop from the upper Big Cottonwood Canyon to the base of Mill Creek Canyon utilizing a private van shuttle. Wasatch Crest Shuttles provides regular (weekday and weekend) one-way transportation service to the trailhead start for a \$12 fare. Wasatch Crest Shuttles picks up at the UTA Park and Ride lot on 3900 South/ Wasatch Blvd.



Figure 9: Uphill Bicyclists and Pedestrians (9-11AM)



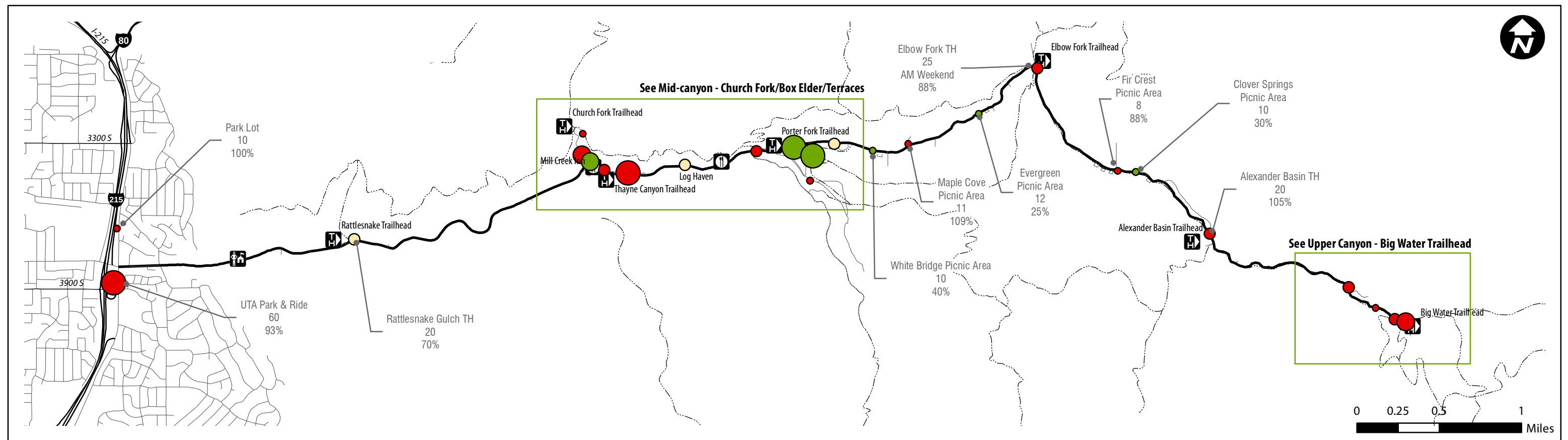
Parking Capacity and Utilization

Public parking is available at trailheads, picnic areas, and areas with wide road shoulder or pullouts. There are private parking areas associated with Mill Creek Inn, Log Haven, Camp Tracy, and the cabin areas at Porter Fork and The Firs. Some of the developed sites have paved parking areas with delineated spaces, and there are numerous unpaved parking areas.

Parking lot capacity was measured or estimated for most of the parking areas in the canyon; minor pullouts and private parking areas at Mill Creek Inn, Log Haven, and Camp Tracy were not included. The capacities of unpaved parking areas were estimated based on area and observed parking patterns. "Parking utilization" refers to the amount of parking supply that is occupied by stationary vehicles at a moment in time. A parking utilization of 100% means all parking spaces are occupied, although parking lots are generally considered to be "full" when utilization approaches about 85% and there are few available spaces. Parking utilization data was collected during morning (9-11 AM) and afternoon periods (2-4 PM) on:

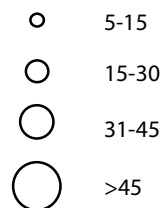
- July 22-24, 2011 (Pioneer Day weekend)
- July 27, 2011 (typical weekday)
- February 17-19, 2012 (Presidents Day weekend)
- February 22, 2012 (typical weekday)

Parking utilization patterns for the summer and winter seasons are summarized in Figures 10 and 11, which illustrate the highest parking demand observed. Parking lot capacity is indicated by the size of the symbol, and maximum parking demand is indicated by the shade of the symbol.

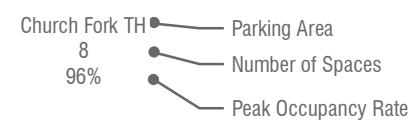
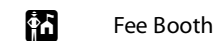
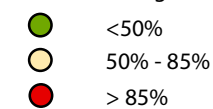


LEGEND

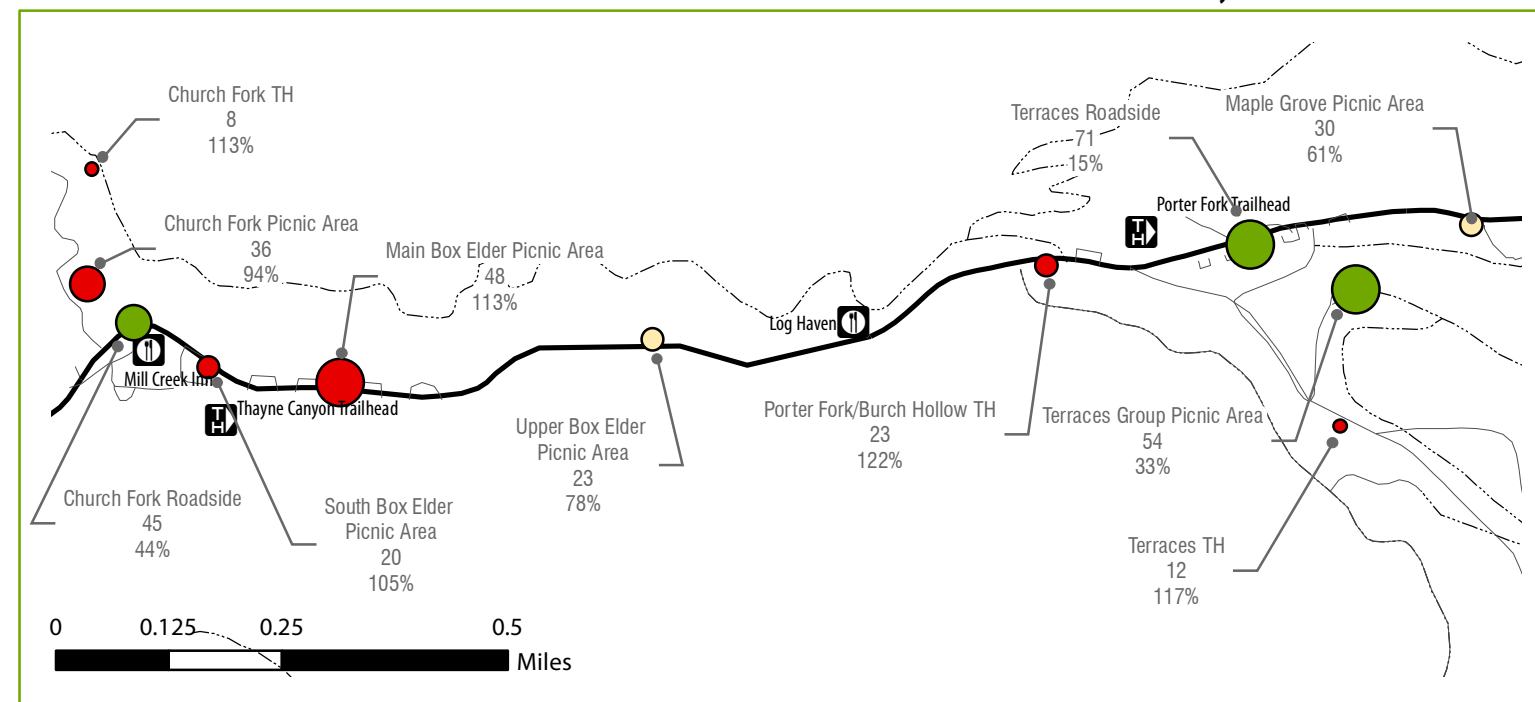
Parking Area Capacity



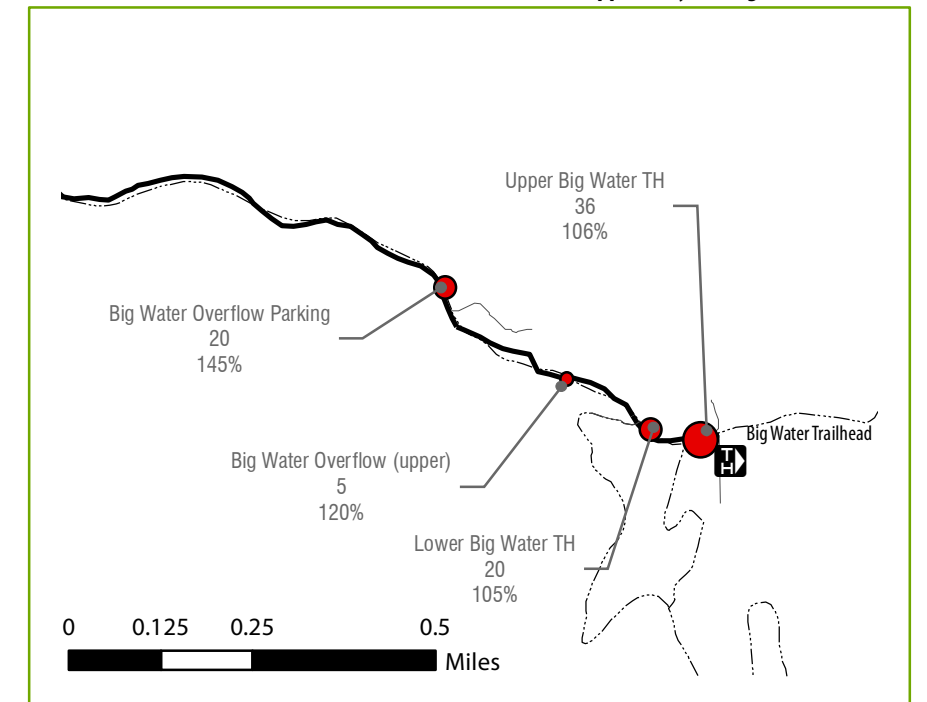
Maximum Parking Utilization

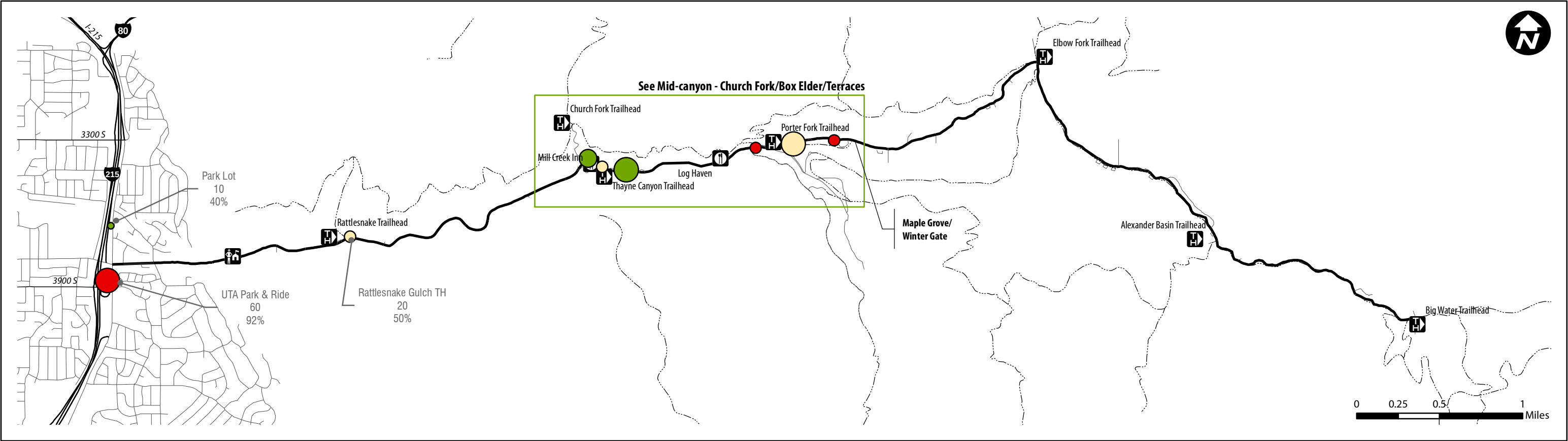


Mid-canyon - Church Fork/Box Elder/Terraces



Upper Canyon - Big Water Trailhead





LEGEND

Parking Area Capacity

- 5-15
- 16-30
- 31-45
- >45

Maximum Parking Utilization

- <50%
- 50% - 85%
- > 85%

- Fee Booth
- Trailheads

- Church Fork TH
- 8
- 96%
- Parking Area
- Number of Spaces
- Peak Occupancy Rate

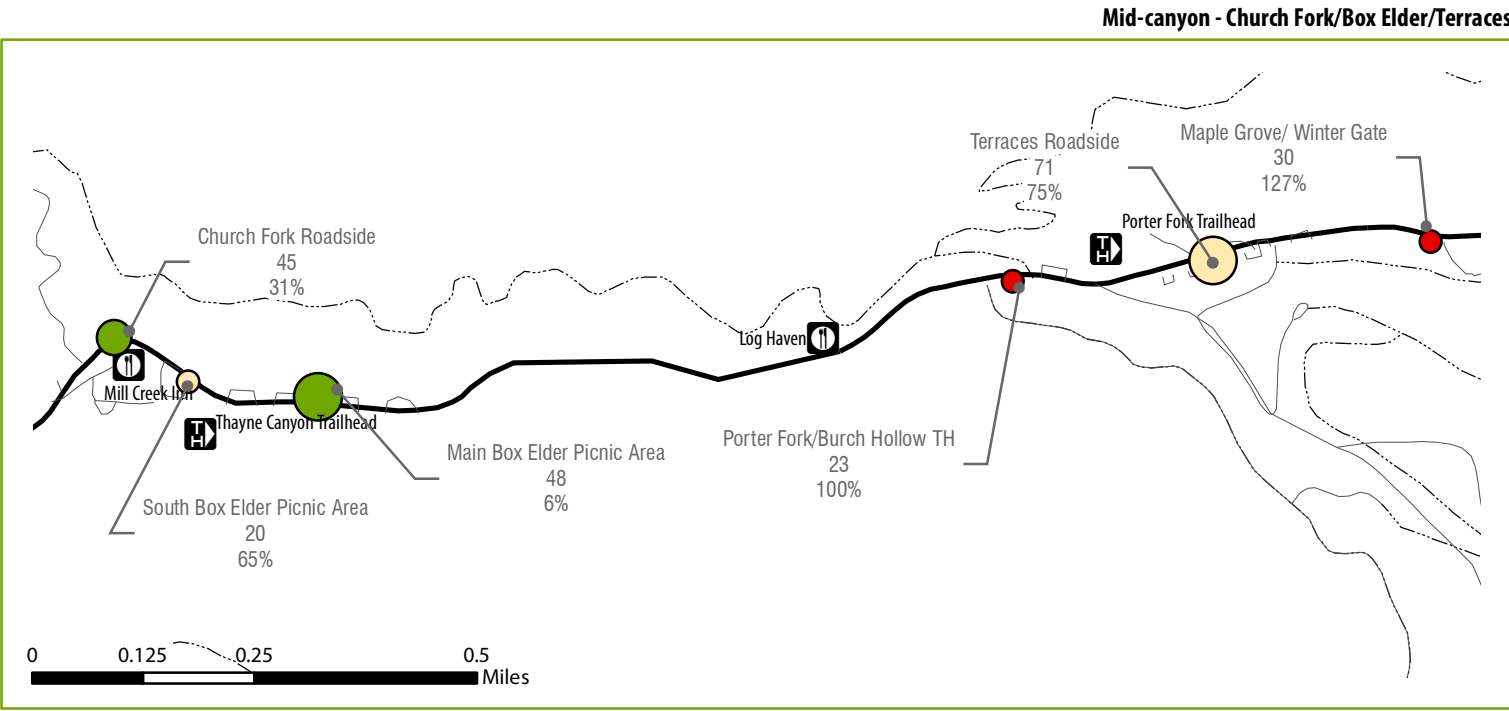


Figure 11 WINTER PARKING UTILIZATION



As shown in Figures 10 and 11, several parking areas exceeded capacity – generally these areas were unpaved, and visitors were more inclined to crowd onto road shoulders or vegetated areas. In many instances vehicles were observed parking partially within the roadway and hindering traffic. During the winter season vehicles parallel-park on the north side of the road at the Maple Grove/Winter Gate parking area, effectively increasing the total parking capacity but also inhibiting vehicle circulation.

Tables 1 and 2 provide a detailed summary of the parking data. Table cells shaded in tan reflect parking areas that achieved 50-85% of capacity, and cells shaded in red were above 85% capacity.

The most popular parking areas in the summer are at picnic areas and trailheads. Big Water trailhead is extremely popular; the main paved lots often reach capacity early in the morning. Elbow Fork and Alexander Basin trails are also very popular. The Church Fork/Box Elder picnic area is an important activity center – there are large number of high-quality picnic sites and access to several hiking trails. However, even during peak demand periods the parking supply was not fully utilized at all parking areas. For instance, in the summer, the Big Water trailhead parking lot and all overflow areas are at or near capacity (85% - 100% utilized). Meanwhile, other areas such as the Terraces roadside or picnic areas have 50 – 70 total spaces each, all less than 20% utilized.

Table 1: Summer Parking Utilization (July 2011)

PARKING AREA NAME	APPROX. VEH. CAPACITY	AVG. A.M. WEEKEND PARKING ^{1,2}	AVG. P.M. WEEKEND PARKING ^{1,2}	A.M. WEEKDAY PARKING ^{1,3}	P.M. WEEKDAY PARKING ^{1,3}
UTA Park & Ride (3900 S/ Wasatch Blvd)	60	37/ 0.62	30/ 0.50	55/ 0.92	50/ 0.83
Park Lot (3700 S/ Wasatch Blvd)	10	7/ 0.70	6/ 0.60	4/ 0.40	4/ 0.40
Rattlesnake TH	20	9/ 0.45	5/ 0.25	4/ 0.20	2/ 0.10
Church Fork TH	8	8/ 1.0	6/ 0.75	7/ 0.88	7/ 0.88
Church Fork Picnic Area	36	9/ 0.25	25/ 0.69	0/ 0	0/ 0
Church Fork (roadside)	45	12/ 0.27	8/ 0.18	0/ 0	0/ 0
South Box Elder	20	19/ 0.95	14/ 0.7	4/ 0.20	3/ 0.15
Main Box Elder	48	27/ 0.56	31/ 0.65	3/ 0.06	14/ 0.29
Upper Box Elder	23	2/ 0.09	12/ 0.52	0/ 0	0/ 0
Porter Fork/ Burch Hollow TH	23	20/ 0.87	11/ 0.48	4/ 0.17	6/ 0.26
Terraces Roadside	71	8/ 0.11	8/ 0.11	0/ 0	6/ 0.08
Terraces TH	12	10/ 0.83	11/ 0.92	9/ 0.75	10/ 0.83
Terraces Group Picnic Area	54	8/ 0.15	16/ 0.30	3/ 0.06	3/ 0.06
Maple Grove	23	6/ 0.26	8/ 0.35	1/ 0.04	2/ 0.09
White Bridge	10	0/ 0	3/ 0.3	0/ 0	0/ 0
Maple Cove	11	5/ 0.45	4/ 0.36	0/ 0	1/ 0.09
Evergreen	12	0/ 0	2/ 0.17	0/ 0	1/ 0.08
Elbow Fork TH	25	17/ 0.68	7/ 0.28	2/ 0.08	6/ 0.24
Fir Crest	8	3/ 0.38	2/ 0.25	0/ 0	1/ 0.13
Clover Springs	10	1/ 0.10	3/ 0.30	0/ 0	1/ 0.10
Alexander Basin TH	20	12/ 0.60	7/ 0.35	3/ 0.15	1/ 0.05
Big Water Overflow Parking (lower)	20	13/ 0.65	17/ 0.85	0/ 0	2/ 0.10
Big Water Overflow Parking (upper)	5	5/ 1.0	5/ 1.0	0/ 0	0/ 0
Lower Big Water TH	20	20/ 1.0	18/ 0.90	3/ 0.15	15/ 0.75
Upper Big Water TH	36	36/ 1.0	31/ 0.86	23/ 0.64	16/ 0.44

1. Indicates number of parked vehicles and utilization ratio.
2. Average of observations during morning (9-11 AM) and evening periods (2-4 PM) on July 23-25, 2011.
3. Single observation during morning (9-11 AM) and evening period (2-4 PM) on July 27, 2011.

	parking areas that were full 50-85% of capacity
	parking areas that were full more than 85% of capacity

Table 2: Winter Parking Utilization (February 2012)

PARKING AREA NAME	APPROX. VEH. CAPACITY ¹	AVG. A.M. WEEKEND PARKING ^{2,3}	AVG. P.M. WEEKEND PARKING ^{2,3}	A.M. WEEKDAY PARKING ^{2,4}	P.M. WEEKDAY PARKING ^{2,4}
UTA Park & Ride (3900 S/ Wasatch Blvd)	60	33/ 0.55	31/ 0.52	52/ 0.87	55/ 0.92
Park Lot (3700 S/ Wasatch Blvd)	10	4/ 0.40	3/ 0.30	2/ 0.20	3/ 0.30
Rattlesnake TH	20	5/ 0.25	8/ 0.40	2/ 0.10	2/ 0.10
Church Fork TH	CLOSED	0/ 0	0/ 0	0/ 0	0/ 0
Church Fork Picnic Area	CLOSED	0/ 0	0/ 0	0/ 0	0/ 0
Church Fork (roadside)	45	5/ 0.11	9/ 0.20	0/ 0	4/ 0.09
South Box Elder	20	6/ 0.30	10/ 0.50	13/ 0.65	1/ 0.05
Main Box Elder	48	1/ 0.02	0/ 0	0/ 0	1/ 0.02
Upper Box Elder	23	0/ 0	1/ 0.04	0/ 0	0/ 0
Porter Fork/ Burch Hollow TH	23	15/ 0.65	22/ 0.96	1/ 0.04	9/ 0.39
Terraces Roadside	71	15/ 0.21	36/ 0.51	1/ 0.01	1/ 0.01
Terraces TH	CLOSED	0/ 0	0/ 0	0/ 0	0/ 0
Terraces Group Picnic Area	CLOSED	0/ 0	0/ 0	0/ 0	0/ 0
Maple Grove	30	22/ 0.73	33/ 1.10	4/ 0.13	25/ 0.83
Upper Canyon	CLOSED	-	-	-	-

1. Vehicle capacity is influenced by snow removal during the winter season.
2. Indicates number of parked vehicles and utilization ratio.
3. Average of observations during morning (9-11 AM) and evening periods (2-4 PM) on February 18-20, 2012.
4. Single observation during morning (9-11 AM) and evening period (2-4 PM) on February 22, 2012.

	parking areas that were full 50-85% of capacity
	parking areas that were full more than 85% of capacity

Winter parking demand is generally at trailheads that access the Pipeline trail and the Winter Gate at Maple Grove. The road above the Winter Gate, Bowman Fork via Terraces Road, and Porter Fork are popular destinations for winter activities. As noted from the traffic counts, traffic volumes are much lower in the winter compared to the summer; however, parking congestion still occurs because most canyon users are generally going to the same areas. Also, snow accumulation can reduce parking availability - consistent snow removal is necessary to maintain optimum parking. At the Maple Grove/Winter Gate area drivers often park illegally, leading to congestion on the roadway and conflicts between vehicles on the roadway and pedestrians walking to or from trailheads.

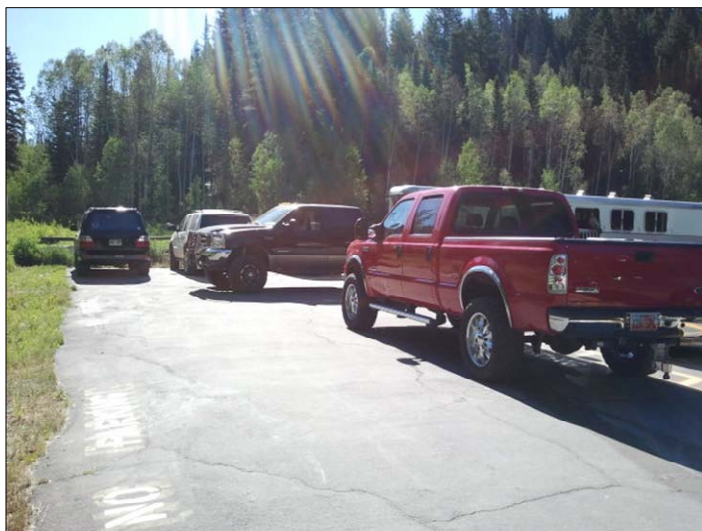
It was noted that equestrians are allowed to use the trails in the canyon and it was observed that Big Water trailhead is a common destination for horseback riding. In the upper canyon there are several issues associated with oversized trailers used for horses. First, the road is too narrow to allow standard passenger vehicles to pass in many places. Trucks with horse trailers are simply larger and less maneuverable than passenger vehicles, which creates circulation



issues on busy days with higher traffic volumes and pedestrians and cyclists on the road. But more importantly, there are no parking stalls designated for vehicles with trailers.

The results of a truck and trailer observed trying to access Big Water trailhead on a typical busy weekend:

- Drivers coming down-canyon could not pass the truck. Down-canyon drivers had to reverse to a parking area to get passing room. Pedestrians were weaving through the gridlock the entire time.



- Once the truck and trailer got to the upper Big Water parking area, there was no parking available. The circulation of the parking area was reduced by illegal parking, and the truck was literally stuck. While the truck/trailer driver was trying to decide what to do, vehicles were still crowding into the lot looking for a parking space.

During the summer and winter seasons, the 60-stall park and ride lot at 3900 South/ Wasatch Blvd is heavily utilized. The parking lot was recently improved and has lighting, bus shelters, and attractive landscaping. Commuters seem to use the parking area on weekdays, either accessing transit or carpooling. On weekends, the lot fills up with recreationalists who are carpooling or are using the Wasatch Crest Shuttle.



The other existing parking area at the base of the canyon is a small 10-stall parking area near 3700 South/ Wasatch Blvd. This lot accesses a small park and currently has a glass recycling container.



There are several opportunities to increase parking near the base of the canyon, which could improve carpooling or facilitate a shuttle operation. There are undeveloped parcels on Wasatch Blvd; one across from the Olympus Hills shopping center, and one at 3800 South. Both parcels are owned by the Utah Department of Transportation. The parcel at 3800 South is leased to Salt Lake County for road maintenance operations.



Virginia Way is immediately west of Interstate-215, and is an expansive two-lane road with very large shoulders that could accommodate carpool or shuttle parking. Opportunities exist for shared parking as well – Skyline High School has a large parking lot and a driving practice area that is not heavily used during the summer.

Connections to Parking Areas

Generally, access between recreation areas and overflow parking is limited to walking or biking on the roadway. In the summer, the Big Water primary parking area typically fills early in the morning. Hikers or bikers wishing to access Big Water trailheads will park at overflow lots down-canyon and walk on the roadway, sharing the narrow pavement space with vehicles traveling in

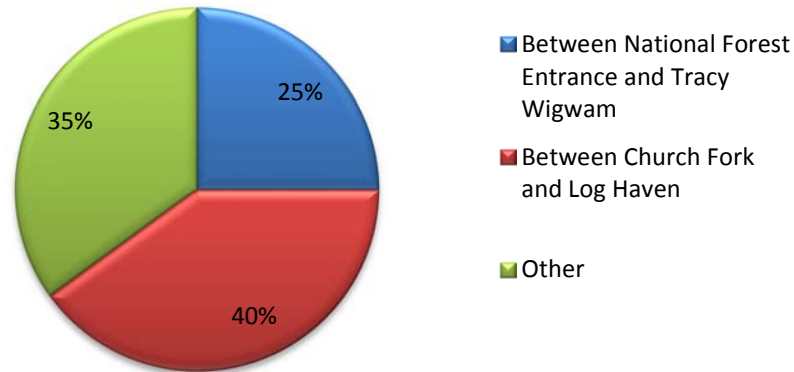
both directions. The roadway is the only connection between the overflow lots and the main trailhead. While no collisions were reported in the data years sampled between vehicles and cyclists or pedestrians in this section of the roadway, it is not an enjoyable experience for users who must negotiate with vehicles to reach the trailhead. There are similar, although less problematic parking-to-trailhead connection issues at Elbow Fork trailhead. At Church Fork, hikers often park on the roadside because the trailhead parking is very small (eight vehicles) and the access road through the picnic area is very steep, narrow, and has steep drop-offs.

Another key example of parking-to-trailhead connection issues is the Maple Grove/Winter Gate area. The roadway beyond the closed gate is a popular destination for hikers, snowshoers, and cross-country skiers in winter. Parking is generally full to capacity by mid-morning, so latecomers must park further down-canyon and walk up the road. Pedestrians on the road are often laden with gear such as skis or snowshoes, and are frequently accompanied by dogs or children; this makes the walk on the roadway between overflow parking at Terraces (roadside) and the gate cumbersome, uncomfortable, and potentially unsafe. Furthermore, drivers frequently circulate between the gate and down-canyon areas, dropping off passengers and gear and searching for parking. This mixed on-road vehicle traffic with pedestrians on the roadway contributes to the general congestion in the area. A trail currently exists near the Terraces roadside lot connecting to the Winter Gate on the south side of Mill Creek; however, it sees relatively little use due to minimal user awareness of this facility, and limited pathway width to accommodate ski sleds/trailers, strollers, and other types of bulky gear.

COLLISION AND CRIME ANALYSIS

Collision data is reported to the Utah Department of Transportation and Salt Lake County. Other traffic-related incidents are reported to Salt Lake County. Collision data was gathered from the County and UDOT for the period between January 1, 2005 and January 1, 2010. According to the data available for this time period, thirty-nine collisions occurred east of the fee gate on Mill Creek Canyon Road. The figure below indicates the general locations where collisions occurred.

Where Collisions Occur



The majority of accidents were single vehicle with “no injury” or “possible injury.” Driving too fast for the conditions or at speeds exceeding the posted speed limit contributed to approximately 60% of the collisions. Roughly 50% of the 17 collisions between Church Fork and Log Haven Restaurant resulted in a possible or non-incapacitating injury; and nearly 50% of the 17 collisions in this section of roadway (not necessarily the same collisions that resulted in possible injury) occurred with ice on the road. Better signage in winter or better maintenance may help reduce accidents caused by ice. A map of collisions by type and location is shown in Figure 12.

Data provided by the County included both collisions and other traffic-related offenses. Between January 1, 2006 and July 7, 2011, there were 257 traffic-related offenses in Mill Creek Canyon. The most frequent offenses were related to theft from a vehicle.

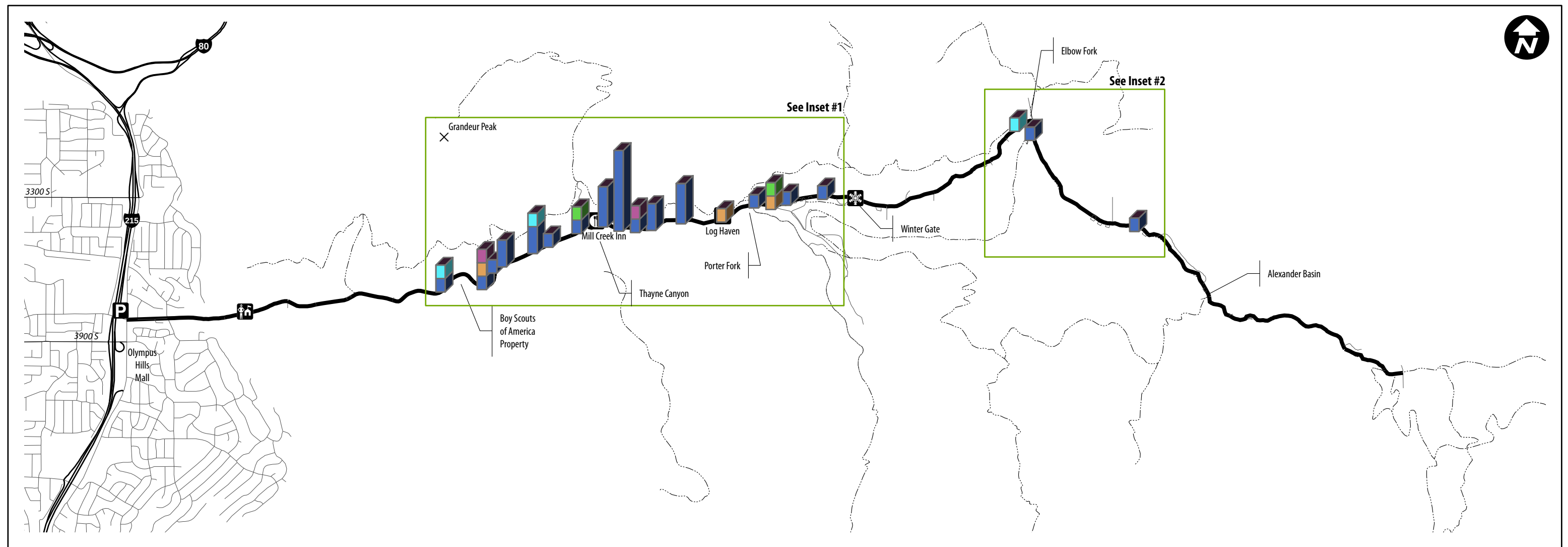


Figure 12 COLLISION LOCATION AND TYPE (2006-2010)

3. CONCEPT DEVELOPMENT AND REFINEMENT

As discussed in Chapter 1, the purpose of this study is to explore a variety of concepts to address parking congestion, impacts of overflow parking, and road user conflicts in Mill Creek Canyon. Multiple concepts can address each of these problems. For the purpose of this study, transportation concepts were grouped into three categories:

- Parking management concepts
- Transit concepts
- Bicycle and pedestrian concepts

This Chapter addresses each of the three main categories individually, and the process used to develop, refine, and recommend concepts. Many concepts are interrelated to other concepts addressing separate issues. For instance, cyclist safety and comfort is related to the speed and volume of vehicle traffic. Concepts that reduce traffic volume or speed indirectly improve the experience of non-motorized road users.

All the concepts introduced acknowledge that expansion of parking capacity is not a long-term solution to the transportation issues in Mill Creek Canyon. Given the ever-growing appetite for outdoor recreation along the Wasatch Front and increase in population, it is reasonable to expect that expanded parking areas will inevitably become congested as they were before. The Wasatch-Cache Revised Forest Plan (2003) recognizes this idea, and has essentially restricted new parking unless it serves or supports mass transit, reduces highway congestion, or is needed for watershed protection. In this context, modifications to parking areas such as surface hardening and painted delineation are intended to minimize informal expansion and erosion rather than relieve parking congestion issues.

While some sections of Mill Creek Canyon Road are below standard widths (particularly in the upper canyon), widening the roadway was not evaluated as part of this study. Concepts that reduce traffic in the upper canyon, such as off street trails and transit shuttles, are more appropriate based on the objectives of this feasibility study. However, some road widening of the upper canyon road between Big Water Trailhead and the overflow lots may be necessary to meet design standards.

PARKING MANAGEMENT CONCEPTS

Parking management alternatives evaluated for Mill Creek Canyon fall into two categories: systems that provide information about parking to users, and systems that change how parking is priced and managed.

User Information Systems

These systems collect and distribute parking information to visitors, who voluntarily use the information to decide if, when, and where they visit Mill Creek Canyon. They provide parking availability information to visitors before they arrive at their destination. Knowing where parking is available or constrained can help visitors decide where to go, or adjust their expectations of quickly finding a parking space. A key element of user information systems is the interception locations - the information must reach the visitor well before they arrive at their destination. If visitors learn that parking in Big Water is full after they have passed all the other parking lots, then the information is not valuable.

User information systems include:

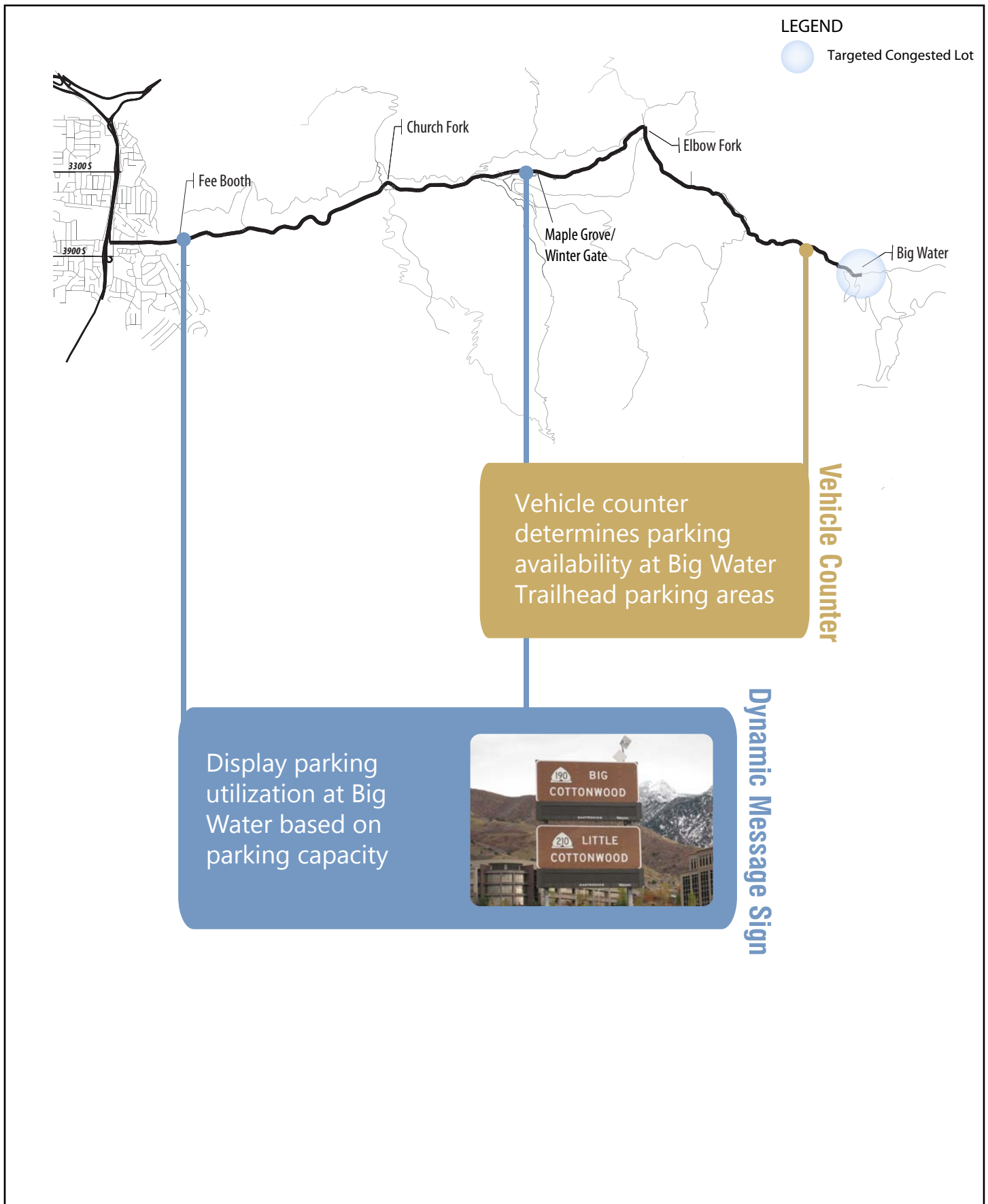
- **Dynamic Message Signs (DMS):** These message boards contain embedded electronic displaying real-time information on parking availability in parts of Mill Creek Canyon. Dynamic message signs expose all canyon users to a relatively simple message. For instance, a DMS sign could indicate “Big Water Parking: Full” or count down the number available parking spaces. A DMS system would rely on vehicle counters, and communication infrastructure (cellular or satellite) to transmit information between parking areas and visitor interception locations. See Figures 13 and 16 for an illustration of DMS concepts in Mill Creek Canyon.
- **Staff-based systems:** This “low-tech” concept includes placing stationary signs at the fee booth or other relevant locations. These signs would indicate “Parking Full” and encourage users to find other destinations or try again at a later time. Salt Lake County or Forest Service staff in the canyon would relay parking utilization reports to fee booth staff via radio, and fee booth staff would place signs on the roadway when parking became full. See Figure 14 for an illustration of a staff-based concept.
- **Web-based systems:** Web-based information systems offer information in greater detail, but require visitors to make a proactive effort. Parking availability information would be collected by automated vehicle counters and transmitted to a web-accessible platform. This could be implemented in parallel with a DMS system. CommuterLink, operated by the Utah Department of Transportation, is a good example of a web-based system. Another applicable example would be SFPark, in San Francisco, which uses in-pavement monitoring hardware to relay parking availability information to drivers via web platform and smart phone application. In order to maximize utility of such a system in Mill Creek Canyon, cell service should be improved. See Figure 15 for an illustration of a web-based system concept.

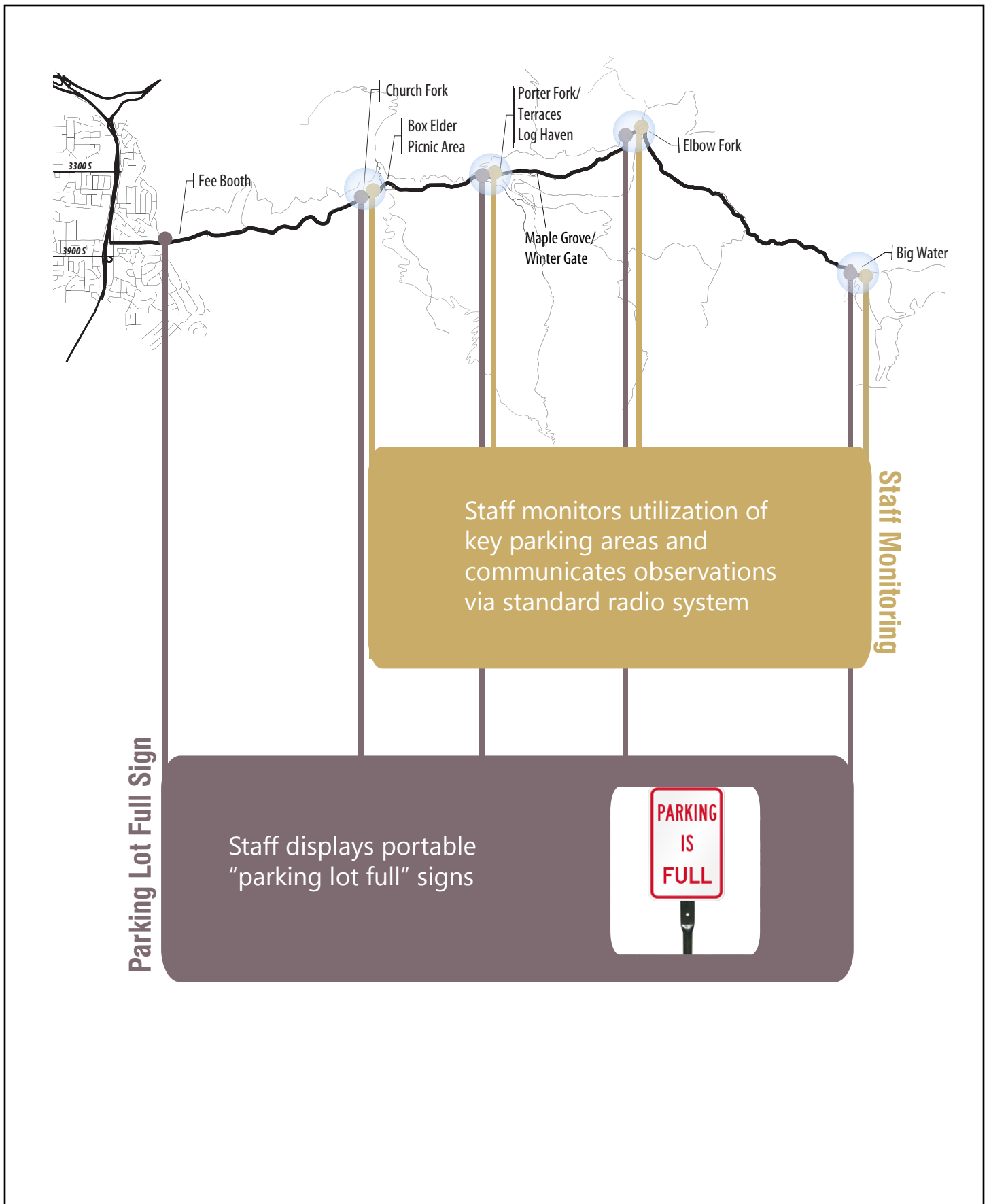
Parking Pricing and Management Systems

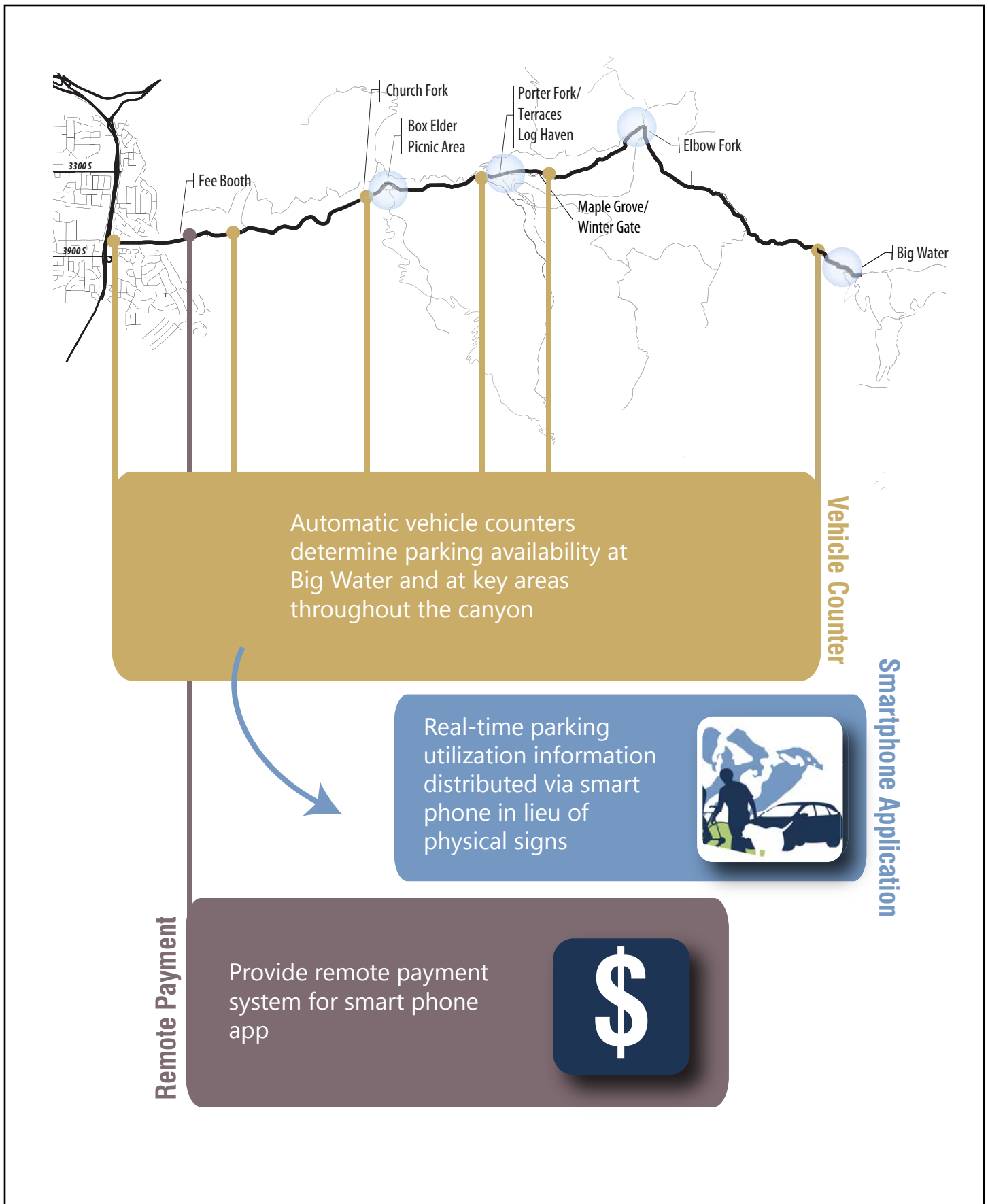
These systems change how parking is managed through variable rate pricing, requiring a reservation to park vehicles, or closing areas to automobile access. The current management of Mill Creek Canyon is based on two fundamental tenets – access to destinations within the canyon is not restricted (except for seasonal closures and group picnic areas) and an access fee is imposed on passenger vehicles. Pricing and management tools can effectively address parking congestion, and can be strategically implemented during problematic periods. Any of the following concepts can be integrated into the user information systems described above. It is recognized that pricing mechanisms are in some ways inequitable and potentially limit access to lower income individuals; however, there are ways to compensate. For instance, funds collected from premium parking fees could subsidize access to reduced fee areas within the canyon.

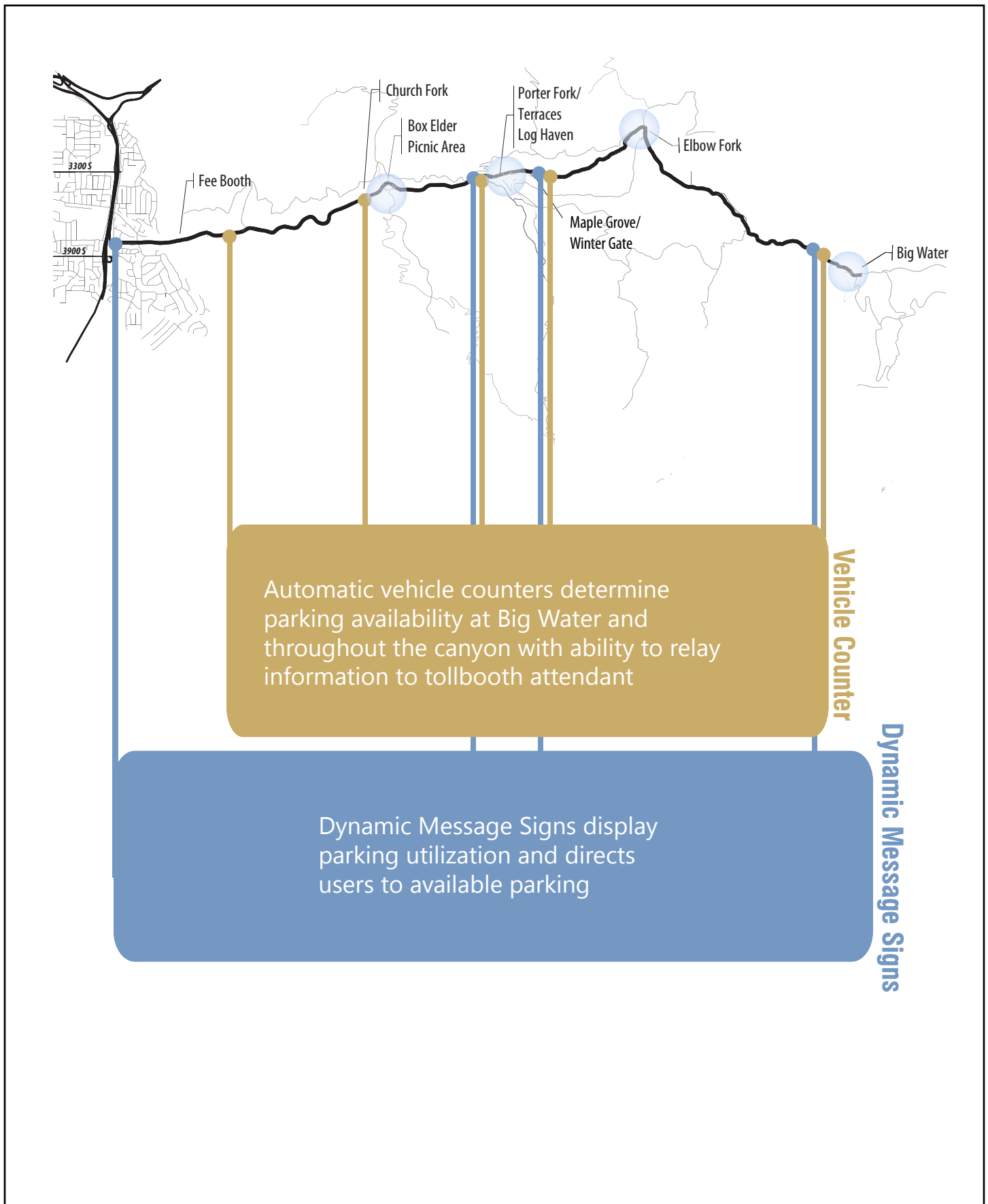
- **Price increase:** the canyon user fee could be raised to sufficiently reduce crowding in the canyon. Additional fees could be levied on vehicles below a certain degree of occupancy; for instance, carpools with three or more occupants pay less than single occupant vehicles, which may encourage more efficient use of available parking supply.
- **Paid parking systems:** this would institute paid parking in some or all areas of Mill Creek Canyon. Since parking problems in Mill Creek Canyon occur during specific time periods (e.g. weekends) and at specific areas (e.g. Big Water Trailhead), pricing tactics could discourage some visitors from visiting specific areas during peak times. This approach can also be used to strategically disperse visitors throughout the canyon during peak periods by offering less expensive parking in areas that are under-utilized. This concept could lead to higher revenues in the canyon as well, depending on how parking pricing is handled in tandem with the existing canyon user fee. See Figure 17 for an illustration of paid parking concepts in Mill Creek Canyon.
- **Reservation-based systems:** these allow visitors to schedule a parking space in advance of their visit. Currently visitors can reserve group picnic areas through Salt Lake County Office of Parks and Recreation; smaller picnic sites are first-come-first served. This approach could be extended to parking, and could be independent or integrated into a variable rate pricing system.
- **Restricting automobile access:** Mill Creek Canyon could be closed to private vehicles periodically or only in specific areas. Use of mass transit in conjunction with automobile restrictions is a common technique to address parking issues in similar settings (such as Zion National Park). This strategy has the added benefit of converting the road – closed to general traffic - into a recreational amenity that disperses visitors. Many people are observed using the closed portion of the road in May and June, before the road is opened to general traffic and after the snow has melted. City Creek Canyon in Salt Lake City is a local example of automobile restrictions: on even-numbered days between Memorial Day and Labor Day, private vehicles are allowed in City Creek Canyon. On odd-numbered days, and during the non-summer season, private vehicles are prohibited.

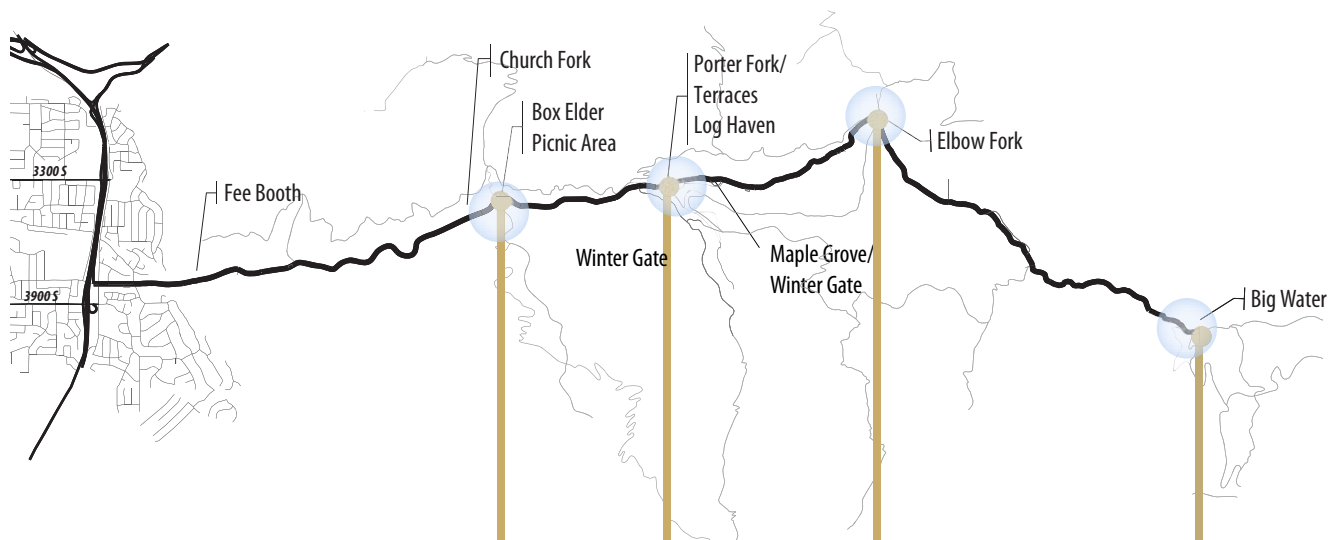
Parking management systems are summarized and compared in Figure 18.











Eliminate tollbooth fee collection and use paid parking system throughout the canyon

Variable parking prices (optional)
 Seasonally
 Weekend/Weekdays
 Peak Hours

Pay to Park



	CONCEPT	PROBLEMS ADDRESSED	ATTRIBUTES	CHALLENGES	OPPORTUNITIES
A	Big Water focused parking management	Reduce parking congestion specifically at Big Water area	- Strategically located Dynamic message signs (DMS) displaying Big Water parking utilization. - Data collection system - Vehicle counters with the ability to relay information to toll booth attendant.	- Detracts from natural setting - Power, communication - Accuracy of data - Sign vandalism and maintenance	- Directs users to available parking - Provides information at key decision points - Provides real-time information - May encourage users to take an alternative mode of transportation
B	Canyon-wide staff-based parking management	Manage parking congestion at Box Elder area, Porter Fork area, Terraces, Elbow Fork, and Big Water.	- Staff displays portable “parking lot full” signs at Pay Station and lots. - Communicate via radio - Static signs – guide signs, directional signs	- Additional staff - Labor intensive - Enforcement - Staff safety	- Easily implemented - May encourage users to take an alternative mode of transportation
C	Canyon-wide Web based parking management		- Inform drivers of parking utilization with smartphone application in lieu of physical signs - Web - Data collection system - Vehicle counters	- Cell phone service in canyon - Limited user group - Vehicle detection system - Power, communication, hardware, maintenance - Management of software application	- Provides real-time information - Convenience and payment amenity (via smartphone) - May encourage users to take an alternative mode of transportation - May provide parking information at 3900 South Park-and-Ride
D	Canyon-wide DMS parking management		- Inform drivers of parking utilization with DMS at Big Water, Terraces, and Wasatch Boulevard. - Data collection system - Vehicle counters with the ability to relay information to toll booth attendant.	- Detracts from natural setting - Power, communication - Accuracy of data - Sign vandalism and maintenance	- Informs users of available parking prior to arrival - Directs users to available parking - Provides information at key decision points - Provides real-time information - May encourage users to take an alternative mode of transportation
E	Paid parking system		- Single space hourly pay and display parking meter or automated controlled access system. - Variable parking prices - Seasonally - Weekend/Weekdays - Peak hours	- Enforcement - Meter vandalism & maintenance - Collection (cash, coins, debit, credit, passes) - Inconvenience to canyon users - Spillover to unrestricted areas - Equity/accessibility of canyon to low-income groups - Power sources for meters	- Pricing flexibility - Encourages users to take an alternative mode of transportation - Encourages faster turnover rate - Encourages dispersed use
F	Other parking management systems		Parking by reservation	- Requires canyon users to plan ahead - Administration of reservation system	- System used in City Creek Canyon - Use for high-demand lots only - Use during high-demand periods (e.g. weekends)
		Text Message Alerts	- Cell phone service in canyon - Management of text message system	- Provides real-time information - Direct users to available parking area	
		Highway Advisory Radio (HAR)	- Labor intensive (regular message updates) - Radio coverage limitations due to topography	- Provides en-route traffic information at key decision points - Encourages users to take an alternative mode of transportation - Ties in with Utah Department of Transportation – Traffic Operations Center	
		Parking clarification through signage and striping	- Regular maintenance of pavement striping - Enforcement of parking regulations	- Optimize existing parking supply - Reduce impacts associated with informal parking	
		Toll increase	Public tolerance	- Increases revenue - Encourages users to take an alternative mode of transportation	

Communications and Electricity

Agency staff within the canyon use radio devices for communication. The two main types of radio devices used are 150 Mhz Very High Frequency (VHF), and 800MHz radios networked by the Utah Communication Agency Network (UCAN). UCAN is a state-wide radio network that serves public safety agencies including police, fire, and UDOT.

Cellular phone communication in the canyon is non-existent above Maple Grove. Cellular reception varies by service provider – Verizon was observed to have the best coverage in the canyon, including reception at Maple Grove. The coverage of most other cellular service providers did not reach to Maple Grove, and no providers were observed to have reception along the highway above Maple Grove. Where cellular coverage is available, it is feasible to use cellular modems to transmit information from data collection devices or to DMS signs.

Comcast internet cable extends to the Porter Fork cabin area, which could be utilized to establish a cable modem for data transmission at- and below Maple Grove. Satellite communication is a viable option for locations that are outside the cellular service areas and beyond the cable reach. This service functions similar to a cellular or cable-based modem; data is uploaded and transmitted to a server location. Generally the devices used to collect traffic/parking information have small data rates, and transmission does not require high-bandwidth alternatives like fiber optic cable.

Electricity needed to power various data collection devices (e.g. vehicle counters, cameras) is available along much of the corridor. Electrical transmission lines generally parallel the highway and provide service to cabins in Porter Fork and The Firs. In the uppermost reaches of the canyon, near Big Water Trail parking areas, no electrical service exists. Extension of the electrical transmission lines is an option, but unlikely to be cost effective given the relatively low power needs of data collection and communication devices needed to monitor traffic and parking conditions. Solar arrays with one or two panels can generate sufficient energy to power data collection and communication devices.

TRANSIT CONCEPTS

Transit concepts were designed to address parking congestion at key areas in Mill Creek Canyon, and accommodate a range of users and their gear: dogs, bikes, picnic hampers, skis, snowshoes, and other accessories. For the purpose of this study, it was assumed that transit vehicles would be equipped to accommodate a range of gear. The transit concepts are categorized into rubber-tire shuttle buses, and cable-propelled technology.

Shuttle Buses

Shuttle bus systems are used in many public lands to provide visitor access and address traffic congestion and air quality. Several comparable systems are described in Appendix A, including transit shuttles in Zion National Park, Albion Basin, Acadia National Park in Maine, and Sabino Canyon in Arizona. All comparable systems evaluated are operated by private contractors instead of public transit agencies. A shuttle bus system in Mill Creek Canyon would likely be weekend-only based on current conditions. Data and observations gathered during the course of this study revealed that parking overflow is typically only problematic on weekends during the peak summer and winter seasons. A weekend-only system may be complementary to Utah Transit Authority operational needs: UTA runs reduced service on weekends, and may have vehicles available for use as a Mill Creek Canyon shuttle. However, as established in the case studies, UTA is not the only potential transit provider for such a service.

Dogs are a major factor influencing Mill Creek Canyon visitation, and it is not the goal of this study to evaluate the advantages and disadvantages of canine regulations in the canyon. Transit concepts in the canyon should be accessible to dogs. This influences both vehicle layout (open-floor vehicles allow more space for dogs to sit near their owners) and behavioral rules. Some transit systems (for instance, Metro Transit in King County, Washington, servicing the Seattle area) allow for companion animals to accompany their owners on board. Transit operators may require dogs to have “Good Canine Companion” certification, verifying that they are trained and will be well behaved on the vehicle. Some operators charge additional fees for each pet, and others restrict dogs above a certain weight or size. In general, dogs using the transit system should be trained, leashed, and capable of coping with the situation; for some dogs, this may not be feasible. Kennel containers may also be used on transit shuttles to transport dogs.



behavioral rules. Some transit systems (for instance, Metro Transit in King County, Washington, servicing the Seattle area) allow for companion animals to accompany their owners on board. Transit operators may require dogs to have “Good Canine Companion” certification, verifying that they are trained and will be well behaved on the vehicle. Some operators charge additional fees for each pet, and others restrict dogs above a certain weight or size. In general, dogs using the transit system should be trained, leashed, and capable of coping with the situation; for some dogs, this may not be feasible. Kennel containers may also be used on transit shuttles to transport dogs.

All transit services need to connect with park-and-ride facilities, and should be complemented by user information and parking management systems such as those discussed in the previous section of this report. If visitors are expected to access Mill Creek Canyon via transit, they will need a place to leave their car behind. Furthermore, if parking supplies in the canyon are at capacity, visitors need this information before they enter the canyon. Intercepting them before they enter the canyon allows visitors to take transit or choose a different destination. Shuttle bus concepts are described below.

- **Winter shuttle:** this concept would connect the 3900 South park-and-ride to Maple Grove (the location of the Winter Gate), with stops at major activity centers such as Rattlesnake Gulch, Church Fork, and Porter Fork. The shuttle would be voluntary, and would be equipped with racks to carry skis, snowshoes, poles, and other types of winter sporting gear, as well as accommodations for dogs. Shuttles would turn around at the Winter Gate; adequate space is available at the gate to accommodate a turnaround maneuver, if some parking spaces are eliminated. Adequate space is available near the potential shuttle stop locations for a vehicle to pull off the roadway and load or unload riders.
- **Summer all-canyon shuttle:** this concept would connect the 3900 South park-and-ride to the Big Water trailhead at the eastern terminus of the canyon, with stops at major activity centers. The shuttle would be voluntary and able to carry people, gear, and dogs. Adequate space is available for shuttle vehicle pullouts in the section of the canyon below the Winter Gate; however, in the upper section of the canyon, pullout locations will be more limited. Shuttle vehicles may stop in the roadway, blocking passage of vehicles behind them until all riders are loaded or unloaded. The Forest Service could evaluate improvements to accommodate transit in these instances.
- **Summer upper-canyon shuttle:** this concept would connect the Terraces Roadside parking lot to the Big Water trailhead at the eastern terminus of the canyon, with stops at major activity centers in the upper canyon. This shuttle could be mandatory, coupled with periodic closures of Mill Creek Canyon above the Winter Gate. Private property owners and administrative vehicles would still be allowed to drive beyond the gate.

Shuttle concepts are illustrated in Figures 19 – 22, and described in more detail in Figure 23.

Cable-Propelled Transit

Cable-propelled transit consists of small pods, suspended from an above-ground cable. Cable-propelled transit can be seen across the Wasatch Front and Back, in the form of gondolas and trams at various ski resorts. A cable-propelled transit system in Mill Creek Canyon would connect the 3900 South park-and-ride to activity centers in the canyon, such as Church Fork/Box Elder, the Terraces, Elbow Fork, and Big Water. Cable-propelled transit vehicles could be adapted to accommodate gear such as bicycles or skis, and would allow visitors with dogs to ride separately from other groups. Vehicles arrive on a regular basis and the flow of the vehicles can be controlled to meter visitation in the canyon.

A cable-propelled transit system would not likely supplant all vehicle access in the canyon. Private owners would still require access to their property. Moreover, it may be cost-prohibitive to build stations at all activity centers in the canyon. This means that either canyon access would be limited to those locations where stations are built, or that the canyon road would remain open for visitors to access locations without stations. While shuttle buses would likely run on weekends only, a cable-propelled transit system could potentially run on a daily basis: it may be politically untenable for an investment of this scale to sit idle during the week. An illustration of the cable-propelled transit concept is provided in Figure 22, and more information is available in Figure 23.

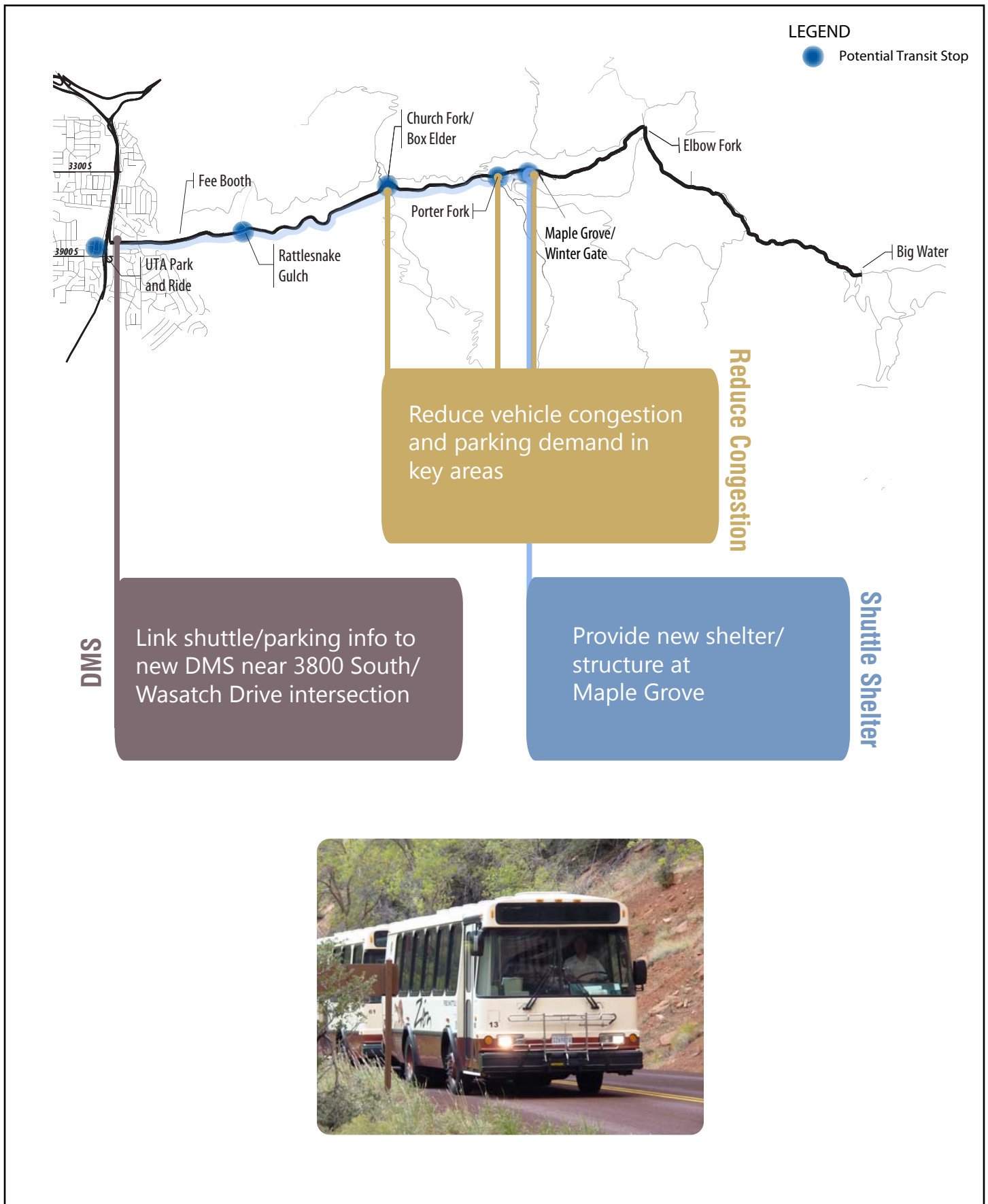
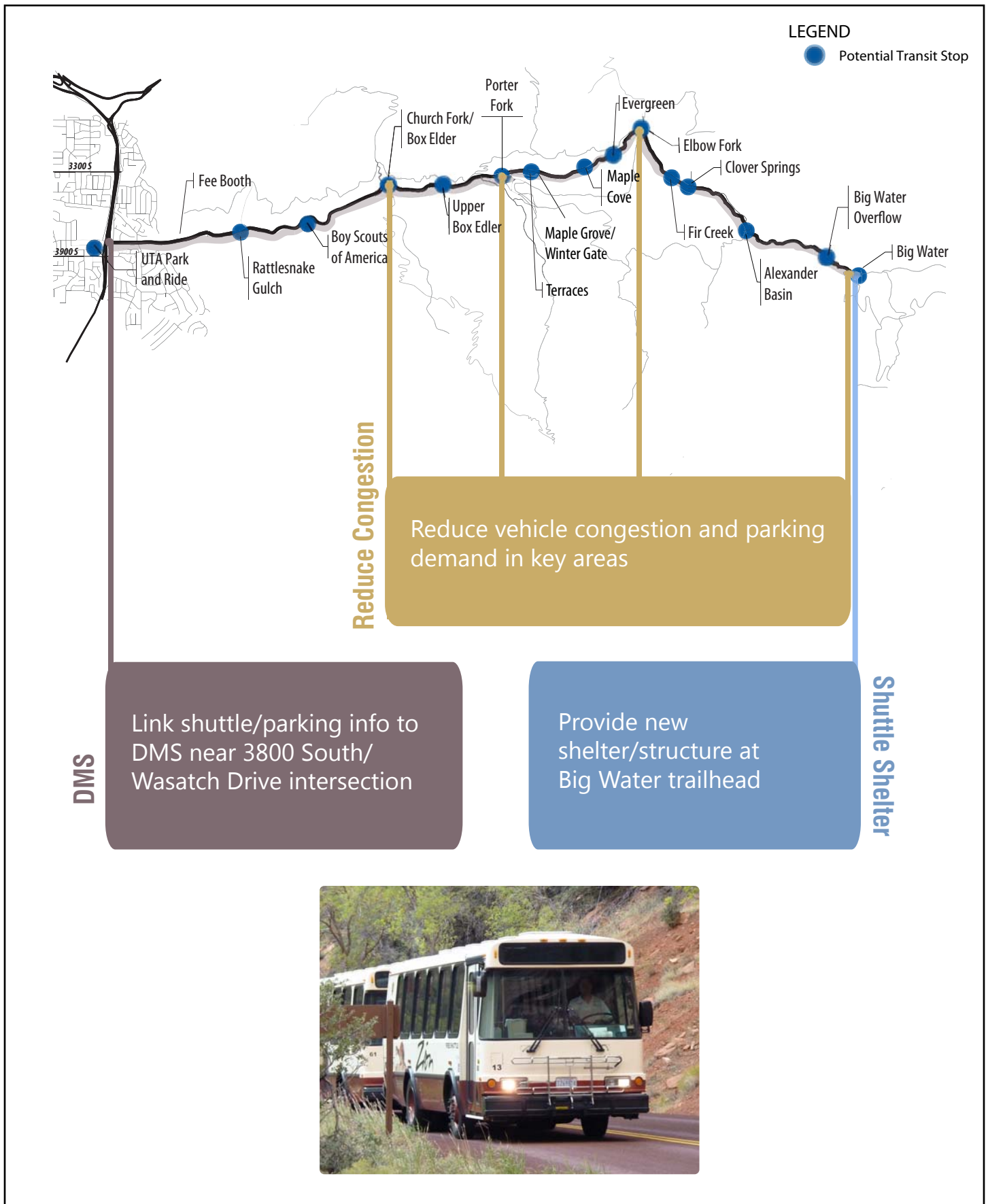
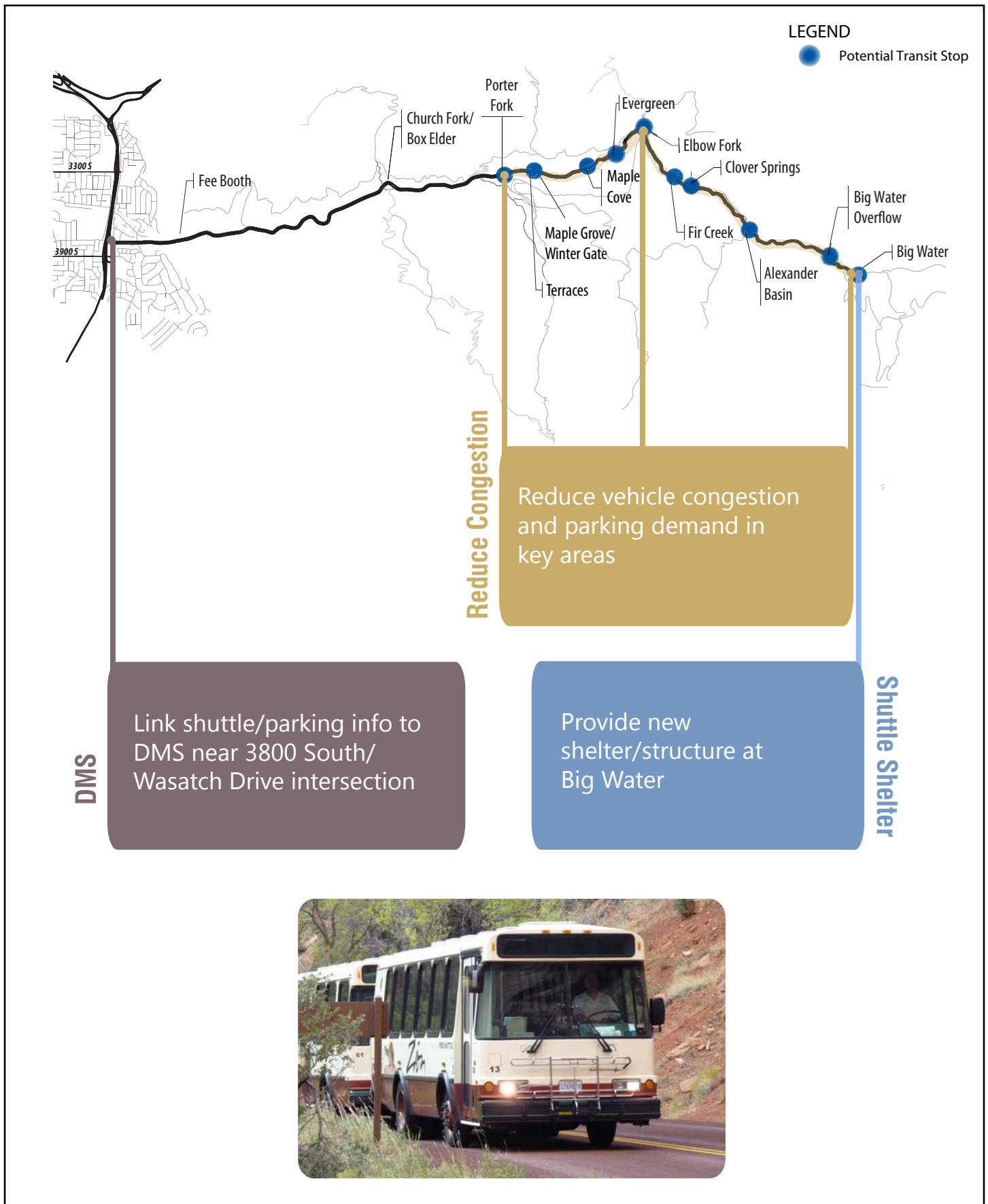
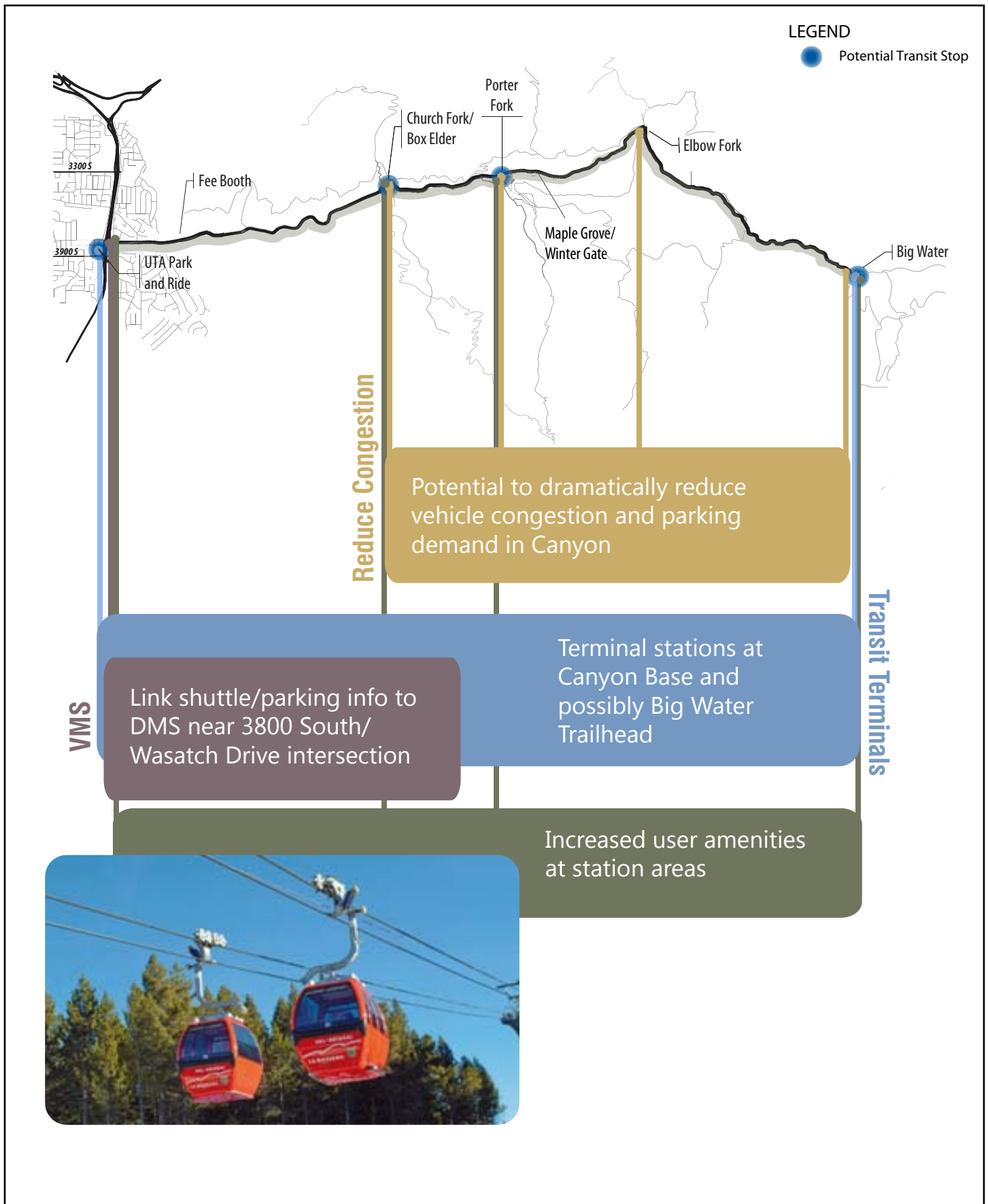


Figure 19 TRANSIT CONCEPT A: WINTER SHUTTLE







Common to all Transit Concepts: Must accommodate recreational users and their gear (skis, trailers, bikes, dogs, picnic supplies, etc) | Funding needed for construction, operations, and maintenance | Unintended consequences of increasing access to canyon | Integrate transit with Parking Management/User Information systems to communicate parking availability and transit options to public | Interpretive features on-board to enhance user experience | Transit service on weekends only | Consider coordinating with UTA to use fleet buses or vans rather than private concessionaire during weekends

	CONCEPT	PROBLEMS ADDRESSED	ATTRIBUTES	CHALLENGES	OPPORTUNITIES
A	Winter Shuttle	Reduce vehicle congestion and parking overflow in key areas.	9AM-4PM 15-minute headways - Stops between 3900 South Park-and-Ride and Maple Grove (winter gate) - Create shelter/structure at winter gate	- Subject to winter roadway conditions - Displacement of parking at Maple Grove	- Recreational amenities at Maple Grove - Reduce congestion at Church Fork, Maple Grove - Generally space is available at stop locations to accommodate bus pullouts
B	Summer Shuttle – All Canyon	Reduce vehicle congestion and parking overflow in key areas. Reduce conflicts between vehicles and bicycles on the roadway.	7AM-7PM 15-minute headways 6 vehicles total - Stops include all recreational destinations between 3900 South Park-and-Ride and Big Water - Create shelter/structure at Big Water	- Turn radius and pullout locations in upper canyon - Could add to congestion near transit stops	- Potential to make upper canyon accessible only through transit service - Combine upper canyon transit service with bicycle concepts to enhance user experience for non-auto modes - Possible to increase bicycle capacity on buses to accommodate mountain bikers on even days - Reduce congestion in lots throughout canyon
C	Summer Shuttle – Upper Canyon Only	Reduce vehicle congestion and parking overflow in key areas. Reduce conflicts between vehicles and bicycles on the roadway.	7AM-7PM 15- minute headways 4 vehicles total - Stops between Terraces Roadside parking lot and Big Water - Create potential shelter/structure at Big Water	- Potential for parking congestion at Maple Grove and overflow lots - Turn radius and pullout locations are more constrained on narrow upper road - If mid-canyon gate is closed, upper picnic areas are accessed by non-motorized only.	- Reduce congestion at Elbow Fork, Porter Fork, upper canyon lots - Improved user safety from lower exposure for users on roadway - Potential to make upper canyon accessible only through transit service
D	Cable propelled transit	Potential to dramatically reduce vehicle congestion at key areas. This would also reduce cyclist conflicts due to potentially lower traffic volumes on the roadway.	15-30 passengers per unit - Total capacity of upwards of 3000 pph. - Stations at major activity centers only.	- Environmental and visual impacts - Proportionally larger in terms of impact and cost than the problems identified - Station sizing and location - Height and ground clearance requirements - Operational costs: staff at stations, or in units - Must allow vehicle access if stations are not located at all major activity centers.	- More attractive to users due to less exposure to strangers. - Potential to locate stations on existing parking areas at 3900 South Park-and-Ride, and Big Water. - Unaffected by weather conditions. - Increased user amenities at station areas

Figure 23 TRANSIT CONCEPT COMPARISON MATRIX

BICYCLE AND PEDESTRIAN CONCEPTS

Bicycle Concepts

Mill Creek Canyon is a popular destination for cyclists. The length and grade of the corridor offer an obtainable challenge, and traffic volumes are lower than in adjacent canyons. In the context of growing demand for recreation, road cycling is an ideal activity to encourage in Mill Creek Canyon since it represents a way for people to utilize public lands without vehicle tailpipe or noise emissions and does not use parking spaces in constrained areas. Strategies for improving cycling conditions in Mill Creek Canyon are outlined below. See Figure 24 for illustrations of bicycle concepts.

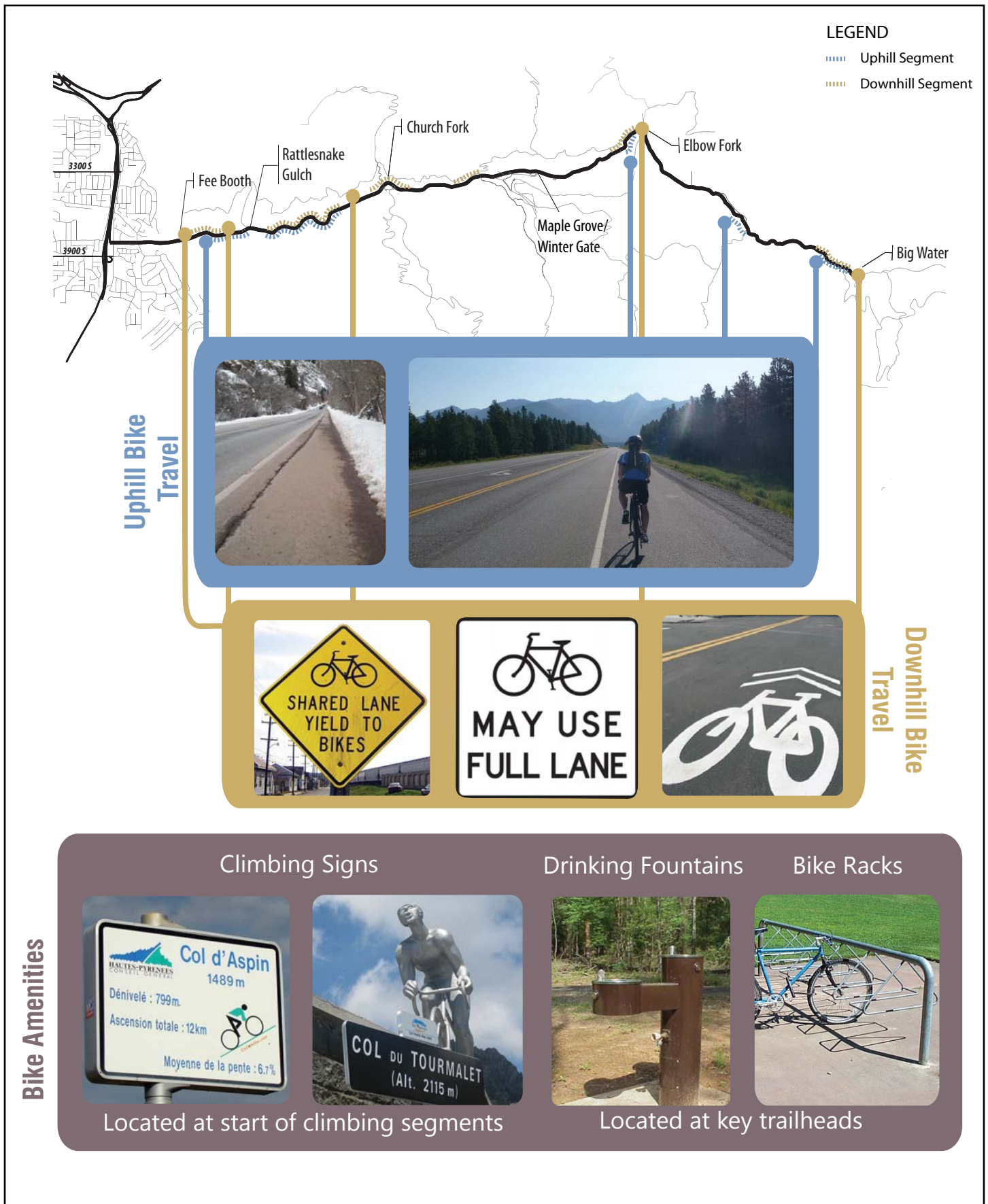
- ***Uphill bike lane (eastbound):*** cyclists traveling uphill are moving slowly relative to passing vehicles, particularly in segments with steep grades. An uphill bike lane would provide a separate space for cyclists. A continuous bike lane may be more feasible in the lower canyon (between the fee booth and the Box Elder picnic area) than above Elbow Fork where the roadway is more constrained. An intermittent uphill bike lane could be accomplished by expanding paved road shoulders as done recently in Big Cottonwood Canyon. Priority sections would be areas of steep grade, curves where passing is unsafe, and locations where the roadway is wide and bike lane can easily be added.
- ***Downhill shared lane markings:*** downhill cyclists travel much closer to the general speed of vehicle traffic, and prefer to avoid debris near the roadway's edge. Signs and pavement markings could indicate segments where sight distance is limited and in which downhill cyclists may take the full travel lane. This would discourage drivers from encroaching into the opposing vehicle travel lane to pass when unsafe to do so (e.g. sight distance less than 1,000 feet). At the end of the designated segments, signs can communicate that passing with caution is allowed. This treatment allows downhill cyclists to ride in travel lane to avoid shoulder hazards like pavement cracks/holes, gravel, and vegetation.
- ***Bicycle amenities:*** drinking fountains and bike racks could be added at activity centers to improve the experience of canyon users. Candidate locations are primary visitor destinations, such as Maple Grove, and trailheads at Elbow Fork and Big Water.
- ***Bike-themed roadside signage:*** information related to distance and grade would be an interesting way to further recognize and encourage cycling in Mill Creek Canyon. Examples of signs used elsewhere are more aesthetic than traditional "share the road" signs, but in many ways communicate a similar message. These signs could potentially be sponsored by local bike shops or cycling advocacy groups.

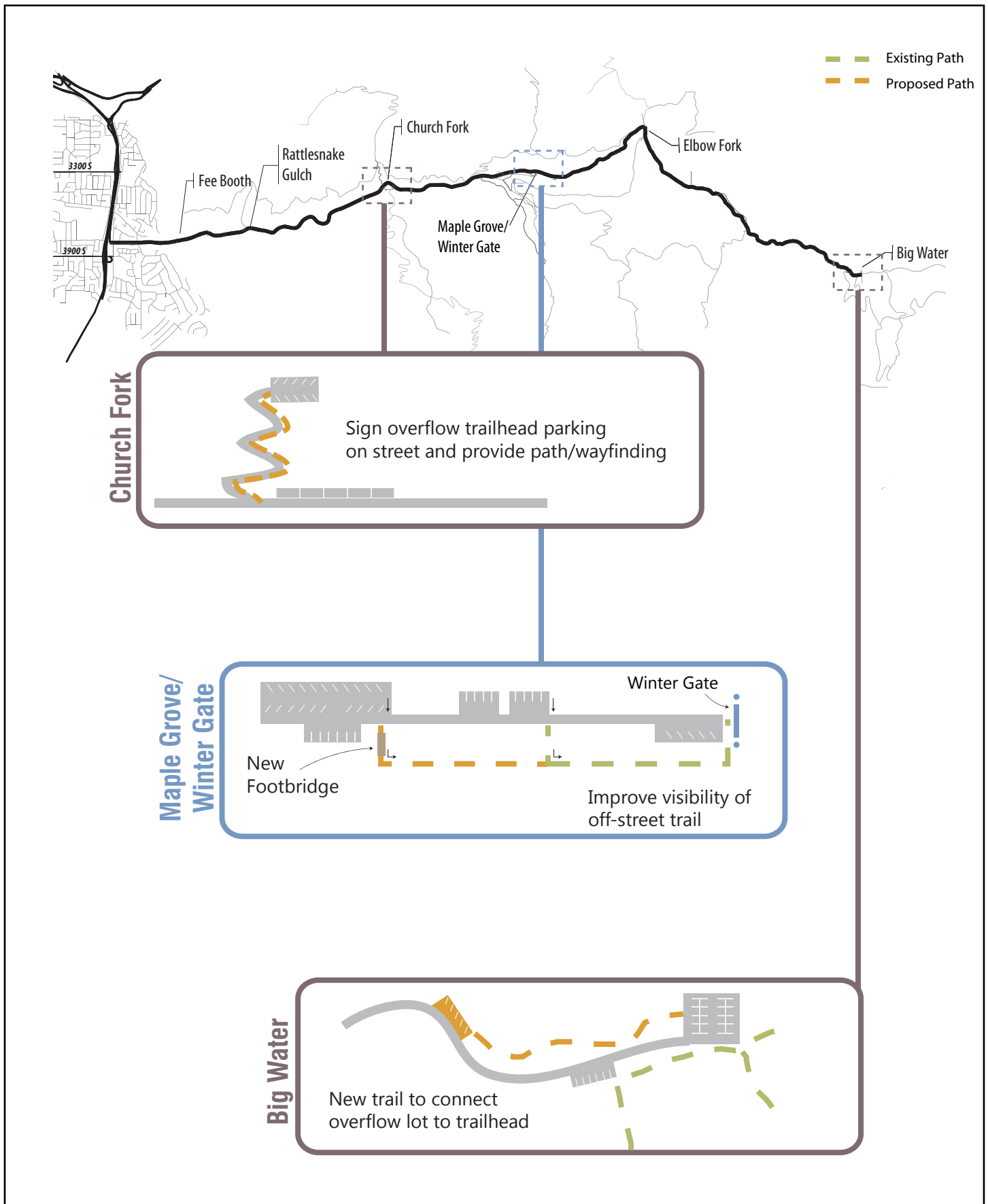
Pedestrian Concepts

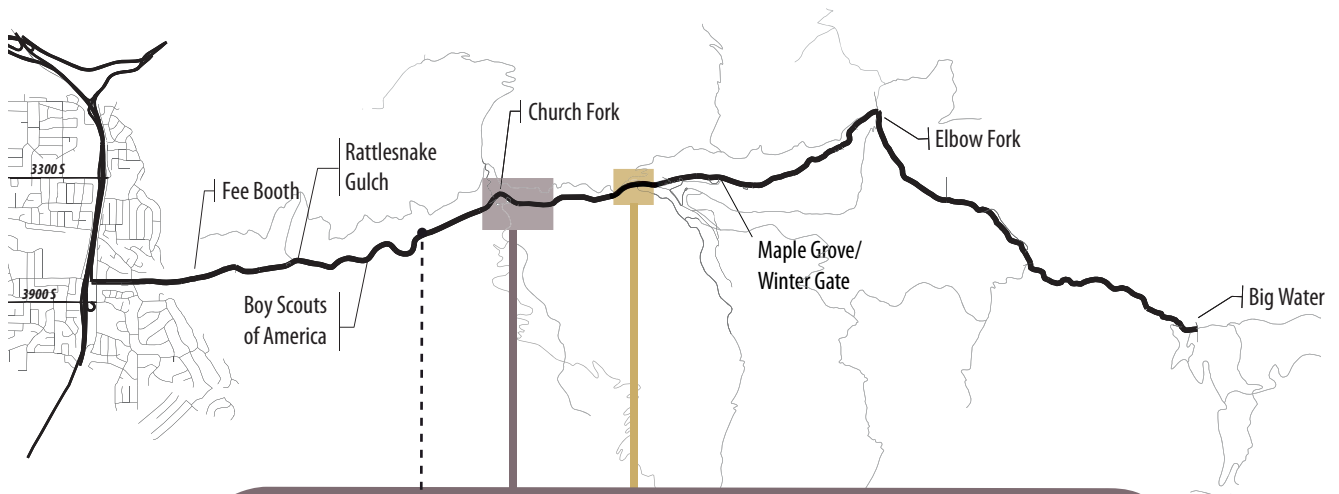
Pedestrian strategies are focused on improving safety by reducing conflicts with vehicles, either by slowing vehicles or by removing pedestrians from the roadway. Pedestrian concepts are described on the following page, and illustrated in Figures 25 and 26.

- **Off-street trail improvements at Winter Gate:** improve and expand the existing trail between Maple Grove/Winter Gate and Terraces parking area. The bridge to Terraces Group Picnic area connects to an off-street trail linking overflow parking to the Winter Gate. Additional wayfinding signage will help direct people to the path. The existing trail could be enhanced by providing hand rails or fencing where the trail has a steep drop off near the creek. This trail could also be extended about 400-feet farther down canyon to provide more convenient access from the larger parking areas. A new footbridge crossing the creek would be required to complete the path.
- **Off-street trail improvements at Big Water:** build a trail connecting Big Water Trailhead to overflow parking. Pedestrians currently walk on the canyon road to access the trailheads from the overflow lots. An off-street trail would increase pedestrian safety and reduce road user conflicts through this narrow corridor. This would also accommodate a portion of the Great Western Trail that is currently on the road.
- **Church Fork trailhead improvements:** formalize the connection between the Church Fork Trailhead and on-street overflow parking. Add signage for on-street trailhead parking at entrance to Church Fork road.
- **Traffic calming:** create a reduced speed zone in the Box Elder/Church Fork area by changing posted speed limits from 30 to 20 or 25 miles per hour. Speed tables can be installed to reduce vehicle speeds and delineate crosswalks. Solar-powered speed feedback signs installed at Box Elder and on either side of the Camp Tracy entry points can slow road users and increase driver alertness. Installing new warning signs in advance of a blind driveway at Log Haven can encourage westbound drivers to reduce speeds.









Speed Control at Activity Centers



Speed Feedback Sign



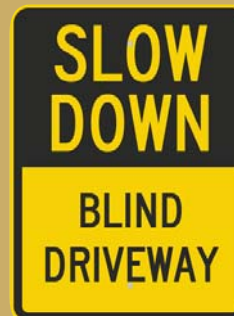
Reduce Speed Zone



Speed Table



Advanced warning signs at Log Haven



	CONCEPT	PROBLEMS ADDRESSED	ATTRIBUTES	CHALLENGES	OPPORTUNITIES
A	Downhill Bike Travel	Mitigate conflicts between road users by clarifying lane use rules. Minimize unsafe passing maneuvers.	- Signs and pavement markings indicate downhill cyclists may take the full travel lane for specific segments. - Apply in segments where sight distance is limited. Discourage drivers from encroaching into opposing vehicle travel lane to pass when unsafe to do so (e.g. sight distance less than 1,000 feet). - Allows downhill cyclists to ride in travel lane to avoid shoulder hazards like pavement cracks/holes, gravel, and vegetation. - Downhill cyclists generally travel at speeds similar to vehicles, so driver delay is tolerable.	- Public education needed - Compliance enforcement - Driver frustration - Durability of pavement markings - Defining passing areas	- Increase bicycle prominence - Appropriate for space-constrained roadways
B	Uphill Bike Travel	Mitigate conflicts between road users by separating travel paths. Minimize unsafe passing maneuvers.	- Provide uphill bicycle lanes by expanding paved road shoulder for specific segments. - Use in segments with steep grade where cyclists are moving slowly and speed differential relative to vehicles is high. - Use in segments where sight distance is limited. This prevents drivers from encroaching into opposing vehicle travel lane to pass when unsafe to do so (e.g. sight distance less than 1,000 feet).	- Physically constrained corridor & environmental impact of expansion - Drivers parking in bike lane - Winter snow plowing - Debris removal & street sweeping - Steep slopes and unstable embankment - Vegetation obstructions	- Creates a buffer from traffic - Provides space for bicyclist, while maintaining vehicular flow - Reduces sight-distance problems related to passing cyclists
C	Bike Amenities	Does not address specific problems.	- New bike racks and drinking fountains at primary visitor destinations, such as Maple Grove, Elbow Fork, and Big Water. - Bike-specific roadside signage with information related to distance and grade.	- Maintenance - Water source/piping	- Provide amenities that improve the experience of canyon users. - Encourage bicycling in canyon as active transportation. - Reduce vehicle trips and parking demand.
D	Safety in Activity Areas	Reduce likelihood and severity of collisions between road users in areas of concentrated activity.	- Reduced speed zones at Box Elder/Church Fork from 30 mph to 20mph. - Use speed feedback signs or flashers to slow road users and increase alertness. - Use speed tables to encourage speed compliance and delineate crosswalks. - Install new warning signs in advance of blind driveway at Log Haven. - Use a speed feedback sign in downhill direction in advance of BSA area.	- Power sources (can be solar powered) - Additional parking signage needed –potential visual clutter. - Public education on back-in parking - Coordination required with private property owners	- Promote alertness and safety for all road users - Increased pedestrian safety - Decreased vehicle and bike speed near pedestrian activity centers
E	Pedestrian Linkages	Mitigate conflicts between road users by separating travel paths.	- Trails and pathways connect parking to trailheads and picnic areas to minimize pedestrian mixing with vehicles and bikes. - New trail connection for Big Water Trailhead and overflow parking area. - Formalize trail connection for Church Fork Trailhead and on-street overflow parking area. Add signage for on-street trailhead parking at entrance to Church Fork road. - Improve wayfinding for existing trail between Maple Grove/Winter Gate and Terraces parking area.	- Available right-of-way - Constructability - Environmental impact - Facility design and purpose	- Add interpretive facilities - Better wayfinding - Increased bike and pedestrian safety

SCREENING AND SELECTING CONCEPTS

The Project Team went through a multi-tiered process for screening and selecting concepts. First, the Project Team discussed a wide range of potential parking, transit, and bicycle and pedestrian concepts, some of which were discarded and others refined or revised. The Project Team presented these concepts to the stakeholders in a March 2012 meeting, followed by an April 2012 public open house. Documentation of the feedback obtained from stakeholders and the public is provided in Chapter 7 and Appendix B of this document.

Screening Criteria

In May and June 2012, the Project Team created a set of screening criteria based on the original goals outlined in the grant application. The screening criteria were used to rank and prioritize concepts, and to eliminate items that did not meet stated goals. The goals and criteria are outlined below.

GOAL: Manage traffic congestion and crowding in parking areas

Criteria:

- Reduce automobile traffic or parking demand in constrained areas
- Leverage existing under-utilized parking supply (e.g. off-site or overflow)
- Disperse visitors to less-concentrated destinations
- Parking and transit compatibility

GOAL: Enhance visitor mobility, experience & safety

Criteria:

- Reduce severity and likelihood of conflicts between road users
- Concept is intuitive and easy to use
- Enhance ability to access destinations
- Improve emergency evacuation capability

GOAL: Consistency with Mill Creek Canyon context

Criteria:

- Ability to integrate concept with natural context of canyon setting or “sense of place”
- Flexibility to respond to changing demand
- Acceptable public tolerance of concept
- Minimize impact to natural resources (air, water, visual, view shed, and noise pollution)

GOAL: Operational efficiency and financial feasibility

Criteria:

- Ability to phase implementation
- Capital and operations/maintenance costs are within scale of problem
- Potential for partnerships (i.e., public/private, interagency)

Parking, transit, and bicycle and pedestrian concepts were evaluated and assigned points based on how well they met the goals and criteria outlined here. This scoring system was used to select and prioritize recommended improvements.

Concepts Eliminated

Following the screening process, several previously-considered concepts were eliminated from further discussion. These included:

- **Cable-Propelled Transit:** This alternative had a higher level of environmental impacts, capital and operational costs, and public controversy. While vehicle congestion could be significantly reduced if Mill Creek Canyon were limited to cable-propelled-transit access only, it is likely that only a handful of stations could be constructed due to cost, leading to high levels of visitor concentration and associated environmental impacts in these areas. In addition, the cost of building this system was considered to be out-of-scale with the degree of the problems experienced in Mill Creek Canyon.
- **Winter Shuttle:** Parking congestion is a problem during the winter, and a winter shuttle would help alleviate this problem. However, Mill Creek Canyon winter visitation is roughly one-third its summer visitation, and problems are generally limited to one or two key areas (primarily the Winter Gate). Relocation of the Winter Gate down-canyon to the Terraces Roadside lot may improve vehicle circulation. This concept is discussed in further detail in the following section.
- **Paid Parking System:** Mill Creek Canyon users already pay a user fee. Adding to the pay structure or changing it was not a popular concept among Project Team members or the public. Furthermore, a paid parking system requires infrastructural improvements such as parking meters, fee boxes, or other elements, and enforcement staff to monitor payment and parking rules.
- **Toll Increase:** A toll increase for the purpose of managing parking demand and controlling access has minimal operational requirements or environmental impacts, but may not be as effective as other options for dispersing users to under-utilized areas or protecting environmental resources; rather, those members of the public who can afford to pay an increased fee will continue to visit the canyon, to the exclusion of those who cannot afford to do so. Therefore, the concept of a toll increase solely for the purpose of managing parking demand was eliminated. However, a toll increase may be revisited in the future as a method of funding increased services, such as transit shuttles or improved recreational facilities, as needed.
- **Bicycle Amenities:** This concept included items such as bike racks, drinking fountains, and bicycle-specific informational signage. With the exception of the signage, this

element received a low amount of public support. The Project Team agreed that the amenities discussed largely did not achieve the goals and criteria. There are further complications with providing drinking fountains: water supply, meeting health department criteria, and seasonal fountain maintenance are all issues. Furthermore, many visitors to Mill Creek Canyon are already accustomed to bringing water with them, and relatively few people will be cycling to the canyon only to stop, park their bikes, and engage in another activity. The bike racks and drinking fountains were thus removed from consideration, although bicycle-specific signage was retained as a recommendation.

4. RECOMMENDATIONS

PROPOSED IMPROVEMENTS

Following the screening and evaluation process, concepts for improvements in Mill Creek Canyon were packaged by phase and compatibility. Phases included three time frames:

- Pilot projects, to be implemented within one year to two years
- Short term projects, to be implemented within two to five years
- Long term projects, to be implemented after five years

Project packages are described below. Cost considerations and environmental issues for pilot and short-term projects are also discussed. In general, canyon managers should periodically evaluate visitor activity and conditions within the canyon to assess the need for future improvements and the appropriateness of facilities on the ground. As an example, improvements to overflow parking areas at trailheads are short term solutions that may be unnecessary if a shuttle system is successful. In such instances, restoration of overflow parking areas might be appropriate.

PILOT PROJECTS

Pilot projects address major issues in the canyon such as parking congestion at Big Water in the summer or Maple Grove/Winter Gate in the winter using small-scale or temporary measures. Pilot projects include a summer shuttle for the upper canyon, staff-based parking information strategies, portable real-time parking information units, and shifting the location of the Winter Gate.

Summer Shuttle - Upper Canyon

Salt Lake County and the Forest Service should consider contracting with a service provider using 10-15 passenger vans, with the capability to carry bikes and dogs, to operate the pilot shuttle program. The pilot project would operate in the upper canyon only (above Maple Grove/Winter Gate). The shuttle should be tested for a period of one month in the summer (July or August 2013), on one weekend day only. During the pilot project the road above the Winter Gate should be closed to general traffic, including horse trailers; access for cabin owners should be maintained. Road closure during shuttle days is important. As an example, Albion Basin in Little Cottonwood Canyon has not close the road when offering a summer shuttle, leading to overcrowding and diminished visitor experiences. Closing the road in Mill Creek Canyon to vehicles while the shuttle is in operation will prevent over-visitation. Road closure also allows pedestrians and cyclists to use the road as a recreational facility, sharing it only with transit vehicles and those private property owners who require access.

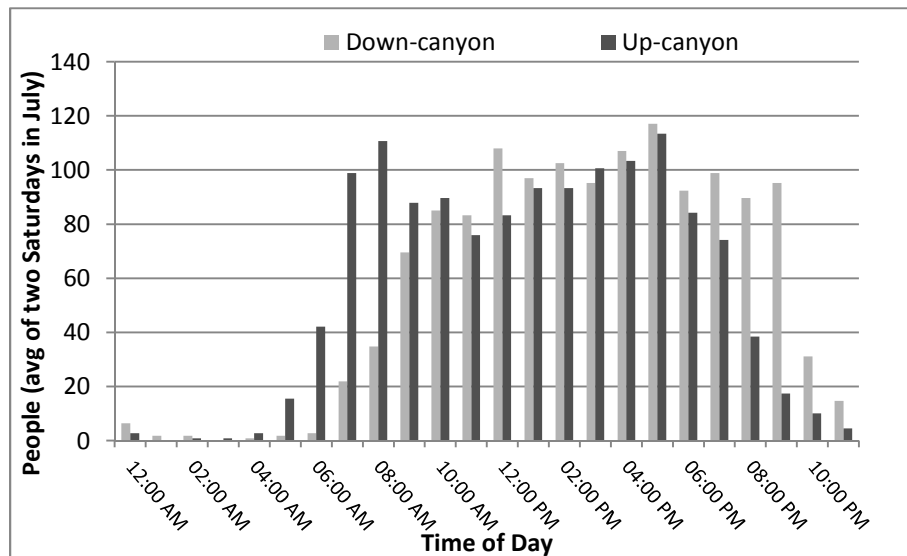


Several considerations are tied to a summer shuttle system. Salt Lake County and the Forest Service should undertake an outreach campaign to inform canyon users of the shuttle system and road restrictions, in advance of the pilot project. The outreach campaign should also clearly identify the reasons behind the shuttle system, and specific information on how to use the shuttle system (including bike and dog accommodations). Visitors who are aware of the shuttle ahead of their visit are more likely to support such a system. During the pilot, project managers should circulate a survey designed to gauge public opinion of the shuttle; survey results could provide valuable guidance when making decisions on whether to continue the shuttle beyond the test period.

Shuttle headway timing is a critical issue as well. Visitors will likely not tolerate long waiting periods on either end of their trip in Mill Creek Canyon. Therefore, a successful pilot project should plan to provide sufficient capacity to meet the existing travel demand. Figure 28 summarizes person travel demand in the upper canyon (above the Maple Grove/Winter Gate); this was estimated using average vehicle occupancy (1.8 passengers/vehicle) and average vehicle counts over two Saturdays in July. The early morning period experiences a higher up-

canyon person flow, which is reversed in the late evening. During much of the day, the flow of people up- and down-canyon is fairly consistent and balanced at about 100 people per hour.

Figure 28: Travel Demand above Maple Grove/Winter Gate



Assuming a 10-passenger van and 45-minute round trip travel time, the fleet size is calculated as follows:

- 100 passengers per hour / 10 passengers per van = 10 van trips per hour
- 10 van trips per hour / 45 minutes per trip = 7.5 vans (assume 8 vans)
- 10 van trips per hour = 6 minute headways

To accommodate existing travel demand on a typical summer Saturday, eight vans are needed to run every 6 minutes for a 12 hour period. A few additional down-canyon shuttle times will likely be necessary after 7PM to avoid leaving people stranded in the upper canyon.

The fleet estimate presented here is highly sensitive to vehicle capacity and travel time; it is reasonable that the fleet size could be reduced to six vans with modest improvements in either of these factors. Alternately, vehicles with more seating capacity could be used and thereby influence the required fleet size and frequency.

Table 3 indicates costs incurred each day the shuttle service is offered, in addition to overhead costs associated with program administration capital costs. Monthly program administration includes route planners and supervision. Monthly capital costs include a portion of the fleet cost, assuming that vehicles will be used elsewhere when not used in Mill Creek. Monthly capital costs also assume investment in transit stops and shelters. The total cost estimate assumes transit service four days per month from July through October.

Table 3: Cost Estimate - Upper Canyon Summer Shuttle

SUMMER SHUTTLE - UPPER CANYON	QUANTITY	UNIT OF MEASURE	UNIT COST	COST ESTIMATE
Daily Operation and Maintenance	1	Day	\$ 5,500.00	\$ 5,500.00
Staff to Manage Boarding Areas	1	Day	\$ 360.00	\$ 360.00
Program Administration	1	Month	\$900.00	\$900.00
Monthly Capital Cost ¹	1	Month	\$8,100.00	\$8,100.00
SUBTOTAL ²		Month		\$32,440.00
CONTINGENCIES	15%			\$ 4,866.00
TOTAL COST ESTIMATE³		Season		\$ 149,224.00

1. Capital costs include modest investment in stops and shelters, and assume canyon shuttles are utilized elsewhere when not in use in Mill Creek (e.g. UTA van pool or private shuttle).
2. Subtotal cost is monthly and assumes four 12-hour service days.
3. Total cost is for a four-month season (July-October).

Portable Real-time Parking Information

Salt Lake County and the Forest Service should consider deploying a temporary portable parking information system. A trailer can be configured to be a self-contained modular parking information system with solar panels to power a data collection device (e.g. radar vehicle detection) and an electronic display board used to communicate parking information. Similar trailers have been deployed elsewhere on the I-15 CORE project in Utah County and for road weather information systems (RWIS).

Logical deployment locations are Alexander Basin Trailhead and Elbow Fork Trailhead; these locations can reasonably estimate vehicle accumulation in the upper canyon and provide information to drivers early enough for them to alter their destination if parking is full. An added benefit of the trailers is that they can be decommissioned during the winter months when the upper canyon is closed or deployed elsewhere in the canyon as needed.



Table 4: Cost Estimate - Real-time Parking Information

DYNAMIC PARKING INFORMATION	QUANTITY	UNIT OF MEASURE	UNIT COST	COST ESTIMATE
Radar Detection	1	Each	\$ 3,500.00	\$ 3,500.00
Solar Panels	1	Each	\$ 5,000.00	\$ 5,000.00
Trail-mounted Dynamic Message Sign	1	Each	\$ 42,000.00	\$ 42,000.00
SUBTOTAL				\$ 50,500.00
CONTINGENCIES	10%			\$ 5,050.00
TOTAL COST ESTIMATE				\$ 55,550.00

Staff-Based Parking Information

Salt Lake County and the Forest Service should consider providing basic parking information to canyon users on busy days using relatively simple, staff-based parking information. Staff would observe parking conditions and communicate via handheld radio to personnel who then use “sandwich boards” or other inexpensive messaging devices to communicate key information to canyon visitors.

Staff-based parking information could be done in parallel with the upper-canyon summer shuttle pilot project. The boards can be placed and removed by canyon staff during those days the shuttle is operational. As an example, boards could display the following:

- Upper Canyon Closed to Vehicles, Take Shuttle (at canyon entrance, either on Wasatch Boulevard or four-way stop near Parkview Drive; at the Fee Booth; and at a third location approaching the Terraces Roadside parking area)
- Shuttle Parking Area (at Terraces Roadside)

Canyon managers may also want to consider intercepting visitors entering the canyon at the Fee Booth and inform them of the shuttle program. This presents an opportunity to educate visitors about the need for the shuttle, answer visitors’ questions, and present them with feedback materials or surveys. Intercepting visitors at the Fee Booth could be achieved either through adding more staff or volunteers, or rearranging the Fee Booth setup so visitors stop and pay when entering instead of exiting.

Reconfiguring the Fee Booth requires significant effort, and is not reasonable for a pilot project. However, there is adequate room on the south side of the road to accommodate a pullout where information could be presented while maintaining a bypass lane. Any changes to the Fee Booth configuration should consider vehicle queuing down canyon. Relocation of the Fee Booth or a season pass express lane are potential solutions to mitigate vehicle queuing.



Canyon managers should also consider printing and distributing a parking congestion map to visitors as they enter the canyon. This map would present the parking utilization analysis information contained within this report, in a simplified fashion: parking areas coded as “green” indicate locations where parking is generally available, “yellow” indicates areas that are generally somewhat congested, and “red” indicates areas that are typically full. This provides a simple visual aide for visitors to use in selecting a destination for the day, and disperse them to areas that are generally less congested. This would also require intercepting visitors as they enter the canyon, instead of or in addition to when they exit.

Table 5 provides a summary of estimated costs. Reoccurring costs are portable DMS rental and staff time. It is assumed that one additional staff person will be used in addition to existing staff, who will also assist in parking management to some degree.

Table 5: Cost Estimate - Staff-Based Parking Information

STAFF-BASED PARKING INFORMATION	QUANTITY	UNIT OF MEASURE	UNIT COST	COST ESTIMATE
Sandwich Boards	10	Each	\$ 50.00	\$ 500.00
Dynamic Message Sign (rental)	1	Daily	\$ 200.00	\$ 200.00
Staff	12	Hours	\$ 30.00	\$ 360.00
SUBTOTAL				\$ 1,060.00
CONTINGENCIES	25%			\$ 265.00
TOTAL COST ESTIMATE				\$ 1,325.00

Shift Winter Road Closure Location

Salt Lake County and the Forest Service should consider temporarily testing a different location for the Winter Gate. Currently the Winter Gate is located at the east end of the Maple Grove picnic area and parking lot. This lot has 23 striped parking stalls and safely accommodates approximately seven additional vehicles using informal on-street spaces. On weekends during the winter season drivers cram into the lot – 38 vehicles were observed at one time. Vehicle circulation is often effected due to illegally parked vehicles on the roadway.

Locating the gate just east of the Terraces Roadside parking lot has the following benefits:

- Emphasize use of a parking area with better circulation;
- Reducing conflicts between vehicles and pedestrians on the roadway, since more parking will be closer to the gate.

While this approach has advantages, there is a net reduction in overall parking spaces. The maximum number of parked vehicles observed during a winter day was:

- Maple Grove: 38 vehicles
- Terraces Roadside: 53 vehicles
- Burch Hollow: 16 vehicles
- Porter Fork: 7 vehicles
- Total: 114 vehicles

Depending on the location of the new gate location, total parking could be reduced by 30 stalls to 51 stalls. Therefore, there may be a shortfall in parking supply on the busiest days.

As a pilot project, Salt Lake County and the Forest Service may wish to implement this strategy in winter 2012-13 using temporary measures such as jersey barriers or manual traffic control (e.g. police). A more permanent approach is to set the gate posts in steel sleeves; the gate could then be removed as necessary. Access to private property is the main advantage of using a gate as opposed to less expensive jersey barriers.

Canyon managers should monitor the success of the strategy and determine whether to implement it as a permanent measure following the winter season. Canyon managers would need to consider accessibility for private property owners in the construction of a new gate, as



well as potential operational issues for transit vehicles in the summer (automatic vs. manual gate operations).

Table 6: Cost Estimate - Shift Winter Road Closure Location

SHIFT WINTER ROAD CLOSURE LOCATION	QUANTITY	UNIT OF MEASURE	UNIT COST	COST ESTIMATE
Gate Post, set in steel sleeve	2	Each	\$ 200.00	\$ 400.00
Gate, cantilever, manual, 24' wide	1	Each	\$ 4,700.00	\$ 4,700.00
Sign With Steel Post	2	Each	\$ 275.00	\$ 550.00
SUBTOTAL				\$ 5,650.00
CONTINGENCIES	25%			\$ 1,412.50
TOTAL COST ESTIMATE				\$ 7,062.50

SHORT-TERM PROJECTS

Short-term projects should be implemented in the two- to five-year period. These projects received a high degree of public support, and were ranked highly by the Project Team based on their ability to meet the goals established for this study. Short term projects include an integrated parking information system; parking clarification through striping and signage; downhill bike markings; uphill bike lanes; speed feedback signs; advance warning signs; and a continuous summer shuttle program.

Integrated Parking Information System

Integrate data collection devices and electronic message board units using cellular- and satellite-based communications. Expand the modular trailer units from the pilot program to transmit data to permanent DMS at the base of the canyon using a central server. Data from various locations is consolidated and interpreted to useful information that is sent out to devices that disseminate information, such as dynamic message boards, websites, text alerts, phone apps, etc. Figure 29 provides a graphical summary on the integrated system.



The recommended locations for permanent DMS signs are at the Fee Booth, and at another mid-canyon location such as Terraces Roadside. Recommended location for vehicle detection units are near Big Water/Little Water trailheads, Elbow Fork, and Terraces roadside parking area. Cameras could also be integrated into the system to provide still images of parking conditions.

Table 7 provides a cost estimate for the system hardware, including the modular trailer units recommended for the pilot program. Note that there are reoccurring monthly costs for communication services not included in the cost estimate. Cellular service is approximately \$75 per month per unit, and satellite service is \$100 per month per unit plus \$500 in startup costs. For locations that can utilize permanent power source, the electric utility company will meter and bill accordingly. Placement of devices should be selected to take advantage of existing transformers, which are needed to adjust the electrical voltage. If new transformers are installed, the cost ranges from \$15,000 to \$30,000.

Table 7: Cost Estimate - Integrated Parking Information System

INTEGRATED PARKING INFO SYSTEM	QUANTITY	UNIT OF MEASURE	UNIT COST	COST ESTIMATE
Permanent Dynamic Message Sign	2	Each	\$ 20,000.00	\$ 40,000.00
Central Server	1	Each	\$ 3,000.00	\$ 3,000.00
Cellular Modem	2	Each	\$ 1,000.00	\$ 2,000.00
SUBTOTAL				\$ 45,000.00
Radar Detection	2	Each	\$ 3,500.00	\$ 7,000.00
Solar Panels	2	Each	\$ 5,000.00	\$ 10,000.00
Satellite Modem	2	Each	\$ 1,000.00	\$ 2,000.00
Camera	2	Each	\$ 1,500.00	\$ 3,000.00
Trailer-mounted DMS	2	Each	\$ 42,000.00	\$ 84,000.00
TOTAL				\$ 106,000.00
CONTINGENCIES	10%			\$ 15,100.00
TOTAL COST ESTIMATE				\$ 166,100.00

Parking Clarification

In several locations throughout Mill Creek Canyon, existing parking spaces are unpaved, non-delineated, or otherwise ambiguous. Minor striping investments could clarify allowable parking spaces, and encourage users to maximize the space available. Emphasis should be placed on areas with high parking demand and limited space, such as trailheads at Elbow Fork, Burch Hollow, Alexander Basin, and the Big Water overflow lots.

The Church Fork Roadside parking area is unpaved, but could be clarified using pavement markings on the nearby road pavement. Small dashes, common on urban streets, are useful as a guide to drivers to conserve space. Paving parking areas is a good method to provide clear stall definition and improve capacity of existing parking areas. Pavement markings and signs can be used to define optimal parking configurations (e.g. 90-degree, parallel).

To prevent resource damage and clarify where parking is not allowed, use fencing or barriers. Rough-sawn timbers should be used to maintain the natural character of the canyon.

Table 8 provides unit costs for various parking clarification strategies. It is not the intent of this study to recommend precise lot designs.



Table 8: Cost Estimate – Parking Clarification

DOWNHILL BIKE SHARED LANE SIGNS	QUANTITY	UNIT OF MEASURE	UNIT COST	COST ESTIMATE
Asphalt Pavement	TBD	Sq. Ft.	\$ 5.75	TBD
Pavement Marking Paint	TBD	Gal	\$ 25.00	TBD
Wood Fencing/Railing	TBD	L.F.	\$ 14.00	TBD
Sign Type A-1 or A-2 w/ Post	TBD	Each	\$ 200.00	TBD

Downhill Bike Shared-Lane Signage

In select sections of Mill Creek Canyon, shared-lane signage should be installed to indicate locations where cyclists traveling downhill may take the full lane of traffic to avoid safety hazards such as blind curves, inadequate shoulder, or other considerations. The general sign configuration would define a start and end of the mandatory no-passing segment. The 2009 Manual of Uniform Traffic Control Devices (MUTCD) identifies many bicycle-related signs which may be use. Examples of custom signs are shown below.



Table 9: Cost Estimate – Downhill Shared-lane Signs

DOWNHILL BIKE SHARED LANE SIGNS	QUANTITY	UNIT OF MEASURE	UNIT COST	COST ESTIMATE
Sign Type A-1 or A-2 w/ Post	20	Each	\$ 275.00	\$ 5,500.00
SUBTOTAL				\$ 5,550.00
CONTINGENCIES	10%			\$ 550.00
TOTAL COST ESTIMATE				\$ 6,050.00

Uphill Bike Lane

Bike lanes are recommended in the uphill (eastbound) direction between approximately the Fee Booth and the Maple Grove picnic areas. This will allow cyclists traveling uphill to remain out of the vehicle travel lanes, reducing conflicts and congestion in the canyon. Some areas between the Fee Booth and Box Elder may necessitate improvements to accommodate an uphill bike lane. This could include pavement widening, clearing vegetation, right-of-way acquisition, retaining walls, or stream alterations. Bike lanes may need future maintenance as well, to keep the pavement clear of debris.



Table 10: Cost Estimate – Uphill Bike Lane

UPHILL BIKE LANE (4 MILES)	QUANTITY	UNIT OF MEASURE	UNIT COST	COST ESTIMATE
Surface Course	2,693	Ton	\$ 100.00	\$ 269,280.00
Base Course	100	Ton	\$ 32.58	\$ 3,258.00
Pavement Marking Paint	475	Gal	\$ 25.00	\$ 11,875.00
Sign Type A-1 or A-2 w/ Post	10	Each	\$ 275.00	\$ 2,750.00
Guardrail or Fencing	2,112	Feet	\$ 20.00	\$ 42,240.00
SUBTOTAL				\$ 329,403.00
Survey	1%	Lump		\$ 3,294.03
Engineering	15%	Lump		\$ 49,410.45
Mobilization	13%	Lump		\$ 41,834.18
Traffic Control	11%	Lump		\$ 36,234.33
Construction Management	25%	Lump		\$ 82,350.75
TOTAL				\$ 542,526.74
CONTINGENCIES	25%			\$ 135,631.69
TOTAL COST ESTIMATE				\$ 678,158.43

Speed Feedback Signs

The Box Elder picnic area experiences heavy pedestrian traffic at times, with considerable volumes of people crossing the road between parking and activity areas. Solar-powered speed feedback signs should be placed in advance of the Church Fork/ Box Elder picnic area, and the posted speed should be reduced to 20 or 25 mph.



Table 11: Cost Estimate – Speed Feedback Signs

SPEED FEEDBACK SIGN	QUANTITY	UNIT OF MEASURE	UNIT COST	COST ESTIMATE
15-Inch Message Board	2	Each	\$ 2,500.00	\$ 5,000.00
Solar Panel Kit	2	Each	\$ 2,300.00	\$ 4,600.00
Tubular Steel Sign Post w/ Slip Base	2	Each	\$ 393.00	\$ 786.00
Sign Type A-1 or A-2	2	Each	\$ 200.00	\$ 400.00
SUBTOTAL				\$10,786.00
CONTINGENCIES	10%			\$ 1,078.60
TOTAL COST ESTIMATE				\$11,864.60

Advance Warning Signs

The Log Haven driveway and on-street parking is located on the north side of the roadway, with poor visibility for westbound (downhill) drivers due to a blind curve in the roadway. There is an existing advance warning sign to alert westbound drivers to the presence of the driveway. A flashing beacon is an appropriate supplement to improve driver awareness.



Table 12: Cost Estimate – Advanced Warning Signs

ADVANCED WARNING SIGN	QUANTITY	UNIT OF MEASURE	UNIT COST	COST ESTIMATE
Flashing Beacon w/ Solar Panel	1	Each	\$ 2485.00	\$ 2,485.00
Mount Kit	1	Each	\$ 657.00	\$ 657.00
Tubular Steel Sign Post w/ Slip Base	1	Each	\$ 393.00	\$ 393.00
Sign Type A-1 or A-2	1	Each	\$ 200.00	\$ 200.00
SUBTOTAL				\$ 3,735.00
CONTINGENCIES	10%			\$ 373.50
TOTAL COST ESTIMATE				\$ 4,108.50

Off-street Trail Connections

It is anticipated that shifting the winter gate location will reduce parking congestion and circulation problems in the winter season, and eliminate the need for an off-street connection for canyon users to access the closed road. However, if this measure is unsuccessful and the County determines that the gate should remain in its current location, a trail connection is needed between overflow lots down-canyon and the Winter Gate. Fortunately, such a trail already exists, which parallels the south side of Mill Creek and can be accessed via the bridge to the Terraces picnic area. Signage directing pedestrians from the overflow lots to the access trail is minimal, but can be enhanced to be more visible to overflow lot users.

Similarly, providing transit service in the upper canyon during the busiest visitation days reduces the need for off-street trail connections: visitors can ride directly to their destinations on the shuttle. Salt Lake County and the Forest Service should monitor pedestrian activity on the roadway during non-shuttle days and determine if the need persists for an off-street trail connecting Big Water overflow lots to the trailhead. If there is still high pedestrian activity, or if the shuttle is not continued past a pilot stage, trail connections should be built as identified in Figure 25 in this document.

Cost estimates are not provided for these projects, as they are contingent on the relative success of other measures. If these projects are deemed necessary, cost estimates should be developed at that time.

Continuous Summer Upper-Canyon Shuttle Program

Dependent on the success of the summer upper-canyon shuttle pilot project, Salt Lake County and the Forest Service should implement the upper-canyon shuttle on a permanent basis. As stated previously, multiple users and user types utilize Mill Creek Canyon; to honor the balance between these groups, it is recommended that the shuttle run only one weekend day (Saturday) to allow opportunities for dog owners, mountain bikers, and others who wish to access Big Water on their own during non-shuttle days. Implementation of an ongoing shuttle system should include permanent measures for relocating and rebuilding the Winter Gate at Maple Grove. If Salt Lake County and the Forest Service opt to implement the shuttle on an ongoing basis, these agencies should consider increasing the canyon use fee to raise funds for the shuttle system.

LONG-TERM PROJECTS

Long-term projects should be implemented in the five-year-or-longer time span. Long-term projects include a web-based parking management system, text message alerts, a summer all-canyon shuttle, park-and-ride enhancements outside the canyon, canyon-wide DMS systems, speed tables at Box Elder, and trail connections between overflow parking and trailheads. Several long-term projects depend on results from pilot or short-term projects.

Web-based Parking Management Systems

A web-based parking management system that allows people to use smartphones or other web-enabled technology to gather parking information could be very beneficial in efficiently directing users to parking supply, or encouraging them to find an alternate destination when parking is limited. However, such a system would rely on improved cellular communications in Mill Creek Canyon. Currently many cell users drop service prior to reaching Church Fork in their travels up-canyon. Improving cell service in the canyon would benefit canyon managers as well as businesses and cabin owners, but would likely require installation of a cell tower in the canyon. In addition, monitoring devices may need to be installed to communicate space-by-space parking availability to a web-based platform. This could potentially be costly. Further study and monitoring is recommended to determine whether the demand and possible use of such a system would be worth the investment.

Text Message Alerts

The Unified Police Department in Salt Lake County provides text alerts to users of Big and Little Cottonwood Canyon, to communicate canyon conditions such as road closures or vehicle restrictions. A similar, subscription-based service could be implemented in Mill Creek Canyon. However, such a service is not useful unless reliable information is available to transmit to

users: until parking availability is monitored and communicated, there is nothing to relay to canyon users.

Summer All-Canyon Shuttle

If the pilot and short-term shuttle projects are successful, Salt Lake County and the Forest Service should consider expanding shuttle service throughout Mill Creek Canyon. As with the upper-canyon shuttle, the all-canyon shuttle could incorporate upper-canyon road closures and may operate one day per weekend during the summer season. Potential construction improvements may be associated with an all-canyon shuttle, such as bus pullout improvements in the lower canyon, bus stop signage, and parking.

Park-and-Ride Enhancements

An all-canyon shuttle should connect to a major parking source outside the canyon, and many of the available spaces near the canyon's mouth are already nearing capacity during weekend days. Other park-and-ride facilities to be explored could include Skyline High School's east parking lot, or property owned by UDOT between I-215 and Wasatch Boulevard. Salt Lake County representatives should engage Granite School District and UDOT in discussions about these possibilities.

5. NEXT STEPS

This section outlines next steps to be taken by agencies responsible for managing Mill Creek Canyon, in order to implement the proposed improvements recommended in Chapter 4. Next steps may include identifying sources of funding, beginning the environmental review process, preparing “Request for Proposals” from vendors or consultants, and other actions. For many of the projects identified, multiple agencies should collaborate to accomplish the improvements.

It is recognized that Mill Creek Canyon is under jurisdiction of Salt Lake County because it is in an unincorporated area of the county. There are current proposals to incorporate Mill Creek Township, including Mill Creek Canyon, which could change the jurisdiction and management responsibilities. In the context of this study, Salt Lake County is often referenced; however, the recommendations and next steps are generally applicable to whoever is responsible for management of the canyon.

PILOT PROJECTS

In order to implement the recommended pilot projects, the following actions should be taken between Fall 2012 and Spring 2013:

- If required by County procurement procedures, Salt Lake County may prepare a Request for Proposals (RFP) for pilot shuttle operators. If County procurement procedures do not require a competitive bid process, contact local shuttle operators to provide service in Mill Creek Canyon.
- Contact Town of Alta officials and request a copy of the Albion Basin shuttle contract documents, which may be helpful in developing an operating contract for Mill Creek Canyon.
- Work with Salt Lake County and Forest Service publicity specialists to educate the public about the shuttle pilot project.
- Outline measures of success for the pilot project, which would help determine whether to provide ongoing shuttle service. This could include but not be limited to:
 - o Degree of public satisfaction
 - o Reduced parking congestion in the upper canyon
 - o Higher levels of walking and cycling on the closed canyon road
 - o Improved dispersal of users to less-utilized sites
 - o Improved environmental quality in the upper canyon due to reduced visitation

- Prepare an RFP for provision of mobile dynamic message trailers. Salt Lake County may retain a vendor or consultant to refine and test dynamic message sign options.
- Salt Lake County may procure custom (“sandwich-board”) signs informing canyon users of road closure and pilot shuttle, and directing users to park-and-ride areas.
- Salt Lake County may procure gate materials to test proposed gate closure site.

Salt Lake County and the Forest Service should collaborate on environmental documentation for pilot projects. Some pilot projects, such as shifting the gate location and staff-based parking measures, should not require environmental documentation. Others, such as the test shuttle, may qualify under USFS regulations as projects where environmental documentation such as a categorical exclusion is not required, but may be prepared at the discretion of the responsible official (see USFS Handbook, section 36 CFR 220.6(d)(8)). Other projects, such as integrated parking information system, will likely require Categorical Exclusion documentation through the Forest Service. Salt Lake County and the Forest Service should establish environmental documentation needs in fall 2012, as these may require a longer lead time prior to project implementation.

SHORT TERM PROJECTS

Implementation of the short-term projects should take place between 2012 and 2017. Action items are outlined below.

- Review success of the pilot shuttle (based on the identified measures of success) following the 2013 summer season, and determine whether ongoing shuttle service is desirable. If so, revise or amend environmental documentation to account for ongoing service in Mill Creek Canyon.
- Salt Lake County may prepare roadway improvement and striping plans to clarify parking spaces in the canyon. Salt Lake County will likely implement plans, and it is unlikely that environmental documentation would be needed.
- Salt Lake County may retain a vendor or consultant to expand and refine the integrated parking management and dynamic message sign system. This effort may need to include an assessment of needed data transmission and electrical power infrastructure improvements, and recommendations for investment.
- Prepare signage and striping plans for downhill shared lane markings. This will not require environmental documentation.
- Salt Lake County should confer with the Utah Department of Transportation, the Forest Service, and the Wasatch Front Regional Council regarding an uphill bike lane in Mill Creek Canyon. This may require a Categorical Exclusion document, including documentation of impacts to stream corridors, wetlands, historic or cultural resources, and other elements. Salt Lake County should work with UDOT and WFRC to develop a concept report for the project, which may be used as the basis for a Categorical Exclusion. The Categorical Exclusion may necessitate involving a consultant to complete the environmental documentation.

- Salt Lake County may procure speed feedback signs through a vendor. Installation may require categorical exclusion documentation through the Forest Service.
- Prior to installing speed feedback signs, Salt Lake County should conduct a speed study near the Box Elder picnic area. After installing speed feedback signs, Salt Lake County should monitor speeds in the area to determine if the speed feedback signs are adequately addressing safety concerns.
- Salt Lake County may install advance warning signage using in-house resources.
- Salt Lake County and the Forest Service should evaluate whether moving the Winter Gate location eliminates the need for an off-street trail connecting canyon users with the trailhead at the closed road.
 - If necessary, Salt Lake County should install additional signage directing overflow lot users to the existing trail accessed via the Terraces.
- Salt Lake County and the Forest Service should evaluate whether the need remains for off-street trail connections between Big Water overflow parking and the Big Water trailhead, once the shuttle system is instituted.
 - If the trail is deemed necessary, Salt Lake County and the Forest Service should refine the conceptual trail alignment. Trails are identified under Forest Service environmental policy as requiring Categorical Exclusion documentation.

LONG TERM PROJECTS

Implementation of long-term projects is planned in the post-2017 time period. However, steps can be taken in the upcoming years to prepare for long-term implementation. These steps are outlined below.

- Continue discussions regarding cellular phone service availability in the canyon. As smart phones become increasingly prevalent, their potential usefulness in communicating canyon conditions expands. Furthermore, as technology advances, cell service up-canyon may become more feasible.
- Investigate with the Unified Police Department the steps needed to institute a text message alert system in Mill Creek Canyon. Ideally, a text message communication system should be in place by the time reliable parking information can be transmitted throughout the canyon.
- Continue monitoring the success of the summer upper-canyon shuttle (if it is extended beyond the pilot phase). If it appears to be successful as an ongoing service, consider developing an operating plan for the expansion of shuttle services throughout the canyon. This should address service levels, time schedules, facility needs, fleet requirements, and other elements.
- Salt Lake County may need to develop a concept report identifying bus pullouts and shelter locations in the lower canyon, which would provide the basis of preliminary engineering and environmental studies.

- Salt Lake County should explore with UDOT and the Granite School District opportunities for additional park-and-ride facilities near the mouth of Mill Creek Canyon.
- Salt Lake County should review before-and-after speeds at the Box Elder picnic area to determine whether raised crosswalks are necessary. If the 85th percentile speeds are not near the posted speed limit, Salt Lake County should install temporary raised crosswalks in the area to gauge public reaction and effectiveness in reducing vehicle speeds before installing permanent raised crosswalks.
- The Forest Service should explore the feasibility of a trail connection between Big Water and Elbow Fork to accommodate the Great Western Trail and expand hiking opportunities. Ideally the trail alignment would not be immediately adjacent to the highway.

FUNDING RESOURCES

While many of the projects outlined as pilot, short or long-term improvements can be implemented with relatively low cost using municipal funds, others will require more extensive funding resources. Options include:

- Section 5311 Rural Transit grants, administered through the Utah Department of Transportation, for shuttle-related capital and operating funds;
- Congestion Mitigation/Air Quality (CMAQ) funds, administered through the Wasatch Front Regional Council, may be an applicable source for parking management strategies that reduce congestion in the canyon;
- Transportation Alternatives (formerly the Transportation Enhancements, Recreational Trails, and Safe Routes to School programs) provide funding for projects such as the uphill bike lanes, downhill shared bike lanes, and off-street trails, and are administered partly by WFRC and partly by UDOT;
- Public Private Partnerships (see Case Studies in the Appendix for information on public-private partnerships funding the Island Explorer shuttle in Acadia National Park, Maine); or
- Increase in fees or tolling structure for canyon users, such as:
 - o Charging fees for cyclists
 - o Increasing fees for all users
 - o Increasing fees for single-occupant vehicles

6. PUBLIC ENGAGEMENT PROCESS

OVERVIEW

Public engagement for the Mill Creek Canyon Transportation Study occurred from June 2011 through August 2012. The project team looked to the general public to help identify issues and problems in Mill Creek Canyon, and to provide an assessment of how and when the canyon was being used. In addition to the general public, the project team worked closely with a group of Mill Creek Canyon stakeholders to identify issues, conceptualize and refine concepts, and come to consensus on a set of recommendations. In addition, the project website (www.millcreektransportation.com) was available to the public as a resource throughout the course of the study. The public engagement and stakeholder process is described in more detail below.

PUBLIC EVENTS

Venture Outdoors

The project team, including staff from Salt Lake County, hosted a booth the Venture Outdoors Festival on June 18th, 2011, at Canyon Rim Park. Almost 50 people provided feedback and comments on Mill Creek Canyon, and filled out informal surveys regarding their activities in the Canyon. In general, survey respondents typically lived in the neighborhoods near the mouth of the Canyon. Roughly half of the respondents felt that parking availability was a major problem in the Canyon. Many people reported that they carpool as a way to deal with potential crowding in the Canyon, and half of respondents said they avoid the Canyon during peak times and days. Survey results are included in Appendix B.

Public Open House

The Mill Creek Canyon Transportation Feasibility Study open house was held on April 30th, 2012, at the REI Wasatch Room. At the open house, information was available on data collection and analysis results, including detailed displays on potential concepts for bicycle, pedestrian, transit, and parking improvements. Open house attendees numbered over 100 people. The project team received valuable feedback through personal dialogue, 74 written comments, and a preference exercise in which attendees were given blue dots and asked to place those by the alternatives that they support as well as red dots which were to be placed next to alternatives they opposed. Table 13 shows the concepts that received the most and

least support. Figures 30-32 illustrate the results of the preference exercise. Table 14 summarizes the common themes of the written comments. More detailed information is included in Appendix B.



Table 13: Summary of Open House Feedback

ALTERNATIVE CATEGORY	MOST FAVORABLE CONCEPT	LEAST FAVORABLE CONCEPT
Bicycle/Pedestrian	Uphill Bike Lane	Bike Amenities
Transit	Summer Shuttle	Cable Propelled Transit
Parking Management	Big Water Parking Information Toll Increase	Reservation System

Figure 30: Results of Preference Exercise – Transit Concepts

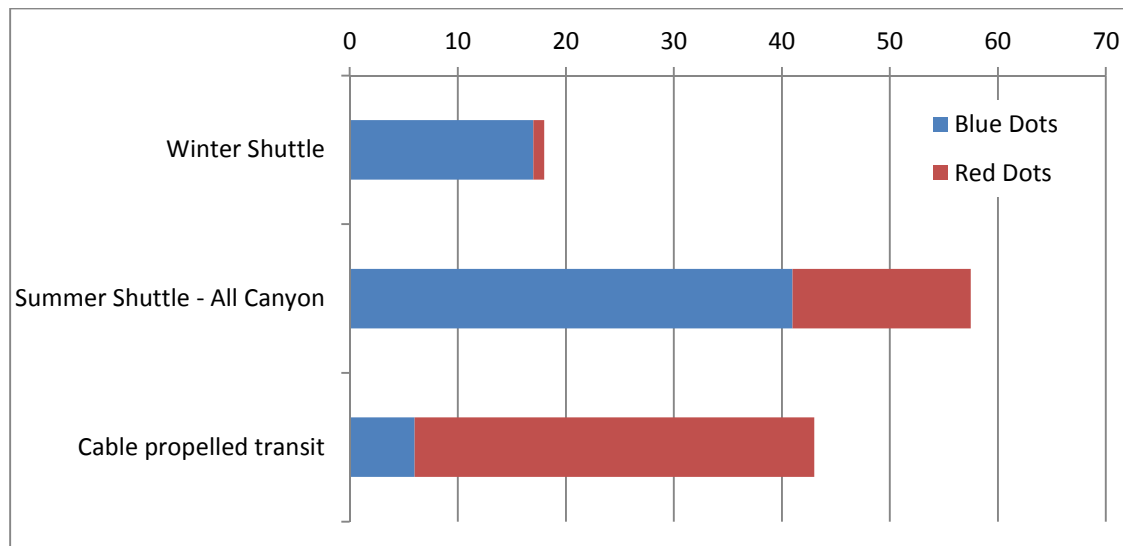


Figure 31: Results of Preference Exercise – Parking Concepts

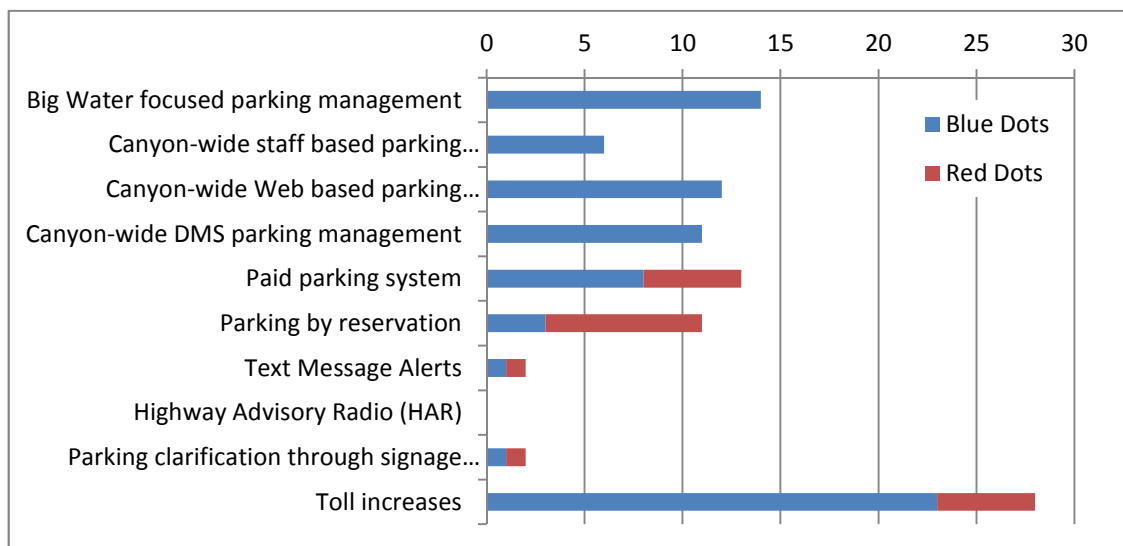


Figure 32: Results of Preference Exercise – Bike, Pedestrian, Safety Concepts

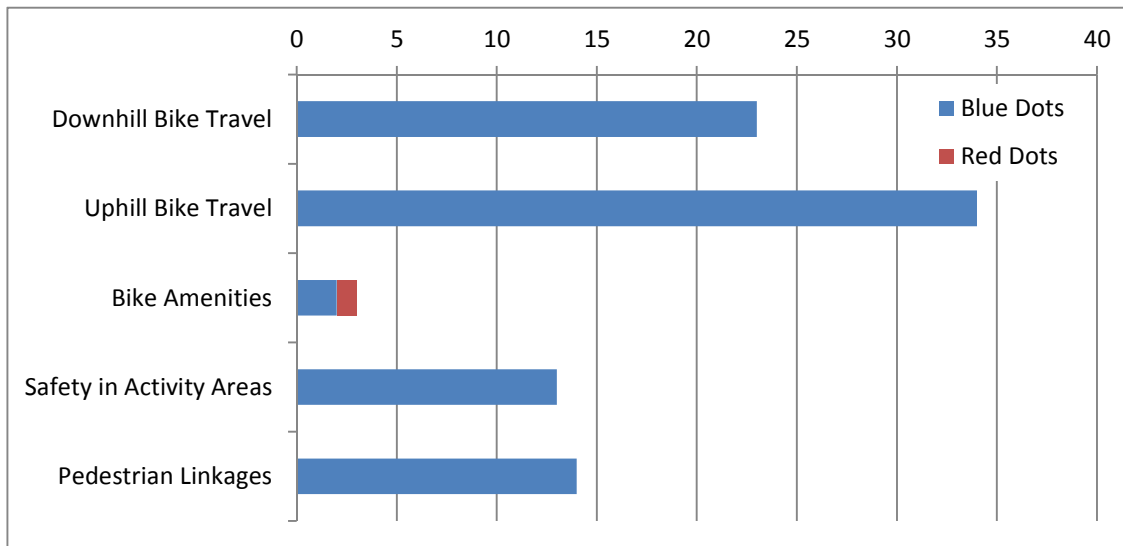


Table 14: Summary of Open House Comments

PRIMARY CONCERN	# OF RESPONSES
Support for shuttle	13
Support for uphill/downhill bike enhancements	9
Do not widen the road	7
Increase canyon user awareness, responsibility, courtesy	6
Concern about increase in number of people in canyon	5
Focus on preserving canyon	5
Intermittent road closure in upper canyon	5
No shuttle	5
Better enforcement of rules/speed limit	4
Emphasize carpooling/shuttle for Camp Tracy	4
No managed parking	4
Better information about canyon conditions	3
Concerned about safety of cyclists and joggers	3
Expand parking areas at base of canyon	3
Expand regional outdoor recreation opportunities elsewhere	3
Increase fees	3
Do not increase fees	3
No significant changes needed	3
Shuttle should not be mandatory	3
Supports speed reduction	3
Do not restrict dogs	2
No gondola	2
No reservation requirements	2
Small transit vehicle important on narrow road	2

ONLINE ENGAGEMENT

The project team developed an online and paper-form survey to be filled out by canyon users. The surveys were solicited during the two one-week data collection sessions in the canyon, in July 2011 and February 2012. The purpose of the surveys was to gather information on regularity and distribution of canyon visitors, user values, and attitudes towards crowding. Some general observations gleaned from the survey are as follows:

- Hiking, biking, and picnicking were the most popular activities in the summer, with snowshoeing or cross country skiing most popular in winter
- Most respondents found parking to be quick and easy in both summer and winter
- Around half of the respondents brought dogs with them in both seasons
- In the summer, one-third of visitors stay more than three hours in the canyon, but most others stay between one and three hours; in the winter, few people stay more than three hours but most stay between one and three hours
- Two-thirds of visitors have at least one other person with them in both seasons

Full documentation of the survey responses is available in Appendix B of this report.

The Mill Creek Canyon Transportation Feasibility Study also had a dedicated project website, at www.millcreektransportation.com. On the website, viewers could find an overview of the study's purposes, links to the project partners, an assessment of existing conditions in the canyon, illustrations and matrices explaining the conceptual concepts, and information on upcoming events.

STAKEHOLDER PARTICIPATION

The Mill Creek Canyon Transportation Study project team worked closely with a group of stakeholders representing a broad range of canyon interests. The stakeholders met several times through the course of the project to learn about canyon issues, provide insights on opportunities and constraints, and give feedback on the concepts proposed. The organizations represented by stakeholder participation are listed below; more detailed meeting minutes are provided in Appendix B.

- The Boy Scouts of America (Camp Tracy)
- Mount Olympus Community Council
- Salt Lake County
- The United States Forest Service
- REI
- PacifiCorp

- Envision Utah
- FIDOS
- Save Our Canyons
- Porter Fork Cabin Association
- Firs Cabin Association
- Wasatch Front Regional Council
- Log Haven
- Mill Creek Inn
- Utah Transit Authority

Project team members also conducted one-on-one interviews with several stakeholders interested in the project. This included representatives from the Salt Lake County Mayor's Bicycle Advisory Committee, the Boy Scouts of America, the Firs Cabin Association, Log Haven, and Mill Creek Inn. Minutes from these one-on-one interviews are included in Appendix B.