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LJ Consulting LLC

September 8, 2017

Central Wasatch Commission
Mayor Tom Dolan, Sandy City
Mayor Jackie Biskupski, Salt Lake City
Mayor Ben McAdams, Salt Lake County
Councilmember Jim Bradley, Salt Lake County
Mayor Kelvyn Cullimore, Cottonwood Heights
Councilmember Andy Beerman, Park City
Carlos Braceras, Utah Department of Transportation
210 West Sego Lily Drive (10000 South)
Sandy, UT 84070

Dear Commissioners:

Attached is a memo with transportation recommendations for the Cottonwood Canyons. This is my final report after spearheading the Mountain Accord effort for the past 4 years. It has been a great honor for me to serve the community that cares so much about the Central Wasatch. I love these mountains, and as a private land owner and resident of the canyons, I am proud to have contributed to their preservation.

At the time of this memo, I am not employed or contracted with the Mountain Accord effort or the Central Wasatch Commission (CWC). The viewpoints and recommendations in this report are my own. They reflect years of stakeholder and public feedback from the Mountain Accord process, my experiences as a canyon resident/land owner and user, relationships with canyon stakeholders, extensive analysis, and professional judgement from my 20+ years of transportation, transit, and environment experience previous to Mountain Accord.

Because the formalization of the CWC has been delayed, public presentation and discussion of the Cottonwoods transportation work has not occurred. In lieu of a presentation, I included a Question and Answer section that addresses the questions I hear the most and my viewpoint at this time. I hope that a robust public dialogue on canyon transportations solutions will be initiated as soon as possible.

Thank you for the opportunity to serve you and the many others that love the Central Wasatch and the Cottonwood Canyons.

Thank you,

Laynee B. Jones

Laynee Jones
Principal, LJ Consulting

MEMO

To: Central Wasatch Commission
From: Laynee Jones, LJ Consulting
Date: September 8, 2017
Re: Cottonwood Canyons Transportation Recommendations

Contents

INTRODUCTION

This memo transfers institutional knowledge gathered during the Mountain Accord program. Laynee Jones of LJ Consulting LLC served in the role of Program Director for Mountain Accord from October 2013 to July 2017. This memo reflects her understanding of the needs of a wide range of stakeholders, including those that are responsible for the canyons and those that use and enjoy the canyons, and it offers context and a foundation for transportation and stewardship improvements in the Cottonwood canyons. Last, it proposes specific recommendations for further evaluation and public discussion.

The Wasatch Front Regional Council (WFRC) contracted with LJ Consulting for Program Management activities and with WSP/PB for transportation analysis in 2016. These contracts were funded through an interlocal agreement between many public partners as a part of the Mountain Accord program. The Central Wasatch Commission was formed in July 2017 as the next chapter of the Mountain Accord effort.

This memo is based on analysis from WSP/PB and LJ Consulting, the Mountain Accord process, many previous studies, public and stakeholder feedback to date, and preliminary discussions with transportation agencies (WFRC, UDOT, and UTA) and the US Forest Service. The proposed transportation recommendations are practical and based on common-sense; however, arriving at them took intense evaluation of many strategies and approaches. WSP/PB inventoried over 100 ideas to address transportation problems generated throughout the Mountain Accord process and previous studies.

WSP/PB compiled their analysis into a series of reports; however, the reports were not publicly reviewed or adopted due to the delayed creation of the Central Wasatch Commission. Recommendations in this memo are based on a wide range of input and information, including WSP/PB information and other sources. Recommendations in this memo to not correspond directly to those in the WSP/PB reports.

Last and most important, this is the first time this recommendation is being presented to the stakeholders and public. ***Robust public dialogue is recommended before any action is taken.***

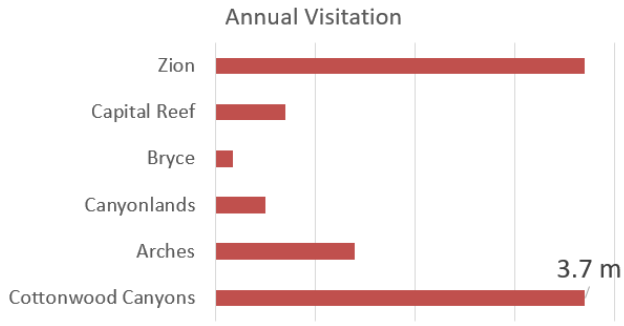
SUMMARY

Purpose

The purpose of improvements in the Cottonwood canyons is to accommodate and manage growth in recreation uses while minimizing impacts to natural resources and maintaining positive recreation experiences. *Safety is also always a critical factor. There are opportunities to improve safety associated with avalanche mitigation, incident/emergency response, and pedestrians/cyclists, among others.*

Problems

The Cottonwood canyons had over 3.7 million visitors in 2015, and there are over 11,000 cars entering the canyons on peak days. Winter use is growing at 5-10% per year, and summer use is growing at 10-20% per year. Growth has resulted in challenges not only for transportation, but also for visitor amenities such as restrooms, enforcement, canyon stewardship, and watershed health.



Specific issues include:

- Traffic on peak days and road closure days
- Informal, overflow parking impacting:
  - Visitor experience
  - Road operations and safety
- Impacts to natural resources from informal roadside parking and associated user-created, spiderweb trails
- Lack of parking to take the bus and carpool (only 700 parking spaces at base of canyons)
- Not enough winter bus service – frequency, fare ($9), travel times, crowding
- Virtually no summer bus service
- Limited restrooms, pedestrian/bike/ADA facilities, amenities

Public Opinion: Public feedback during the Mountain Accord process stressed the importance of natural resources, watershed, and quality recreation experiences. The Utah State University (USU) Central Wasatch Visitor Study conducted in 2014 found that the three most important aspects of the Mountain Accord study area to those surveyed are **scenery, environmental conditions, and trails**. People were concerned with parking, environment, and trails. Sixty-six percent of those surveyed wanted to see **more public transportation opportunities,** and, on average those surveyed were willing to **pay $48 per year for parking or access to the canyons.**

Proposed Scenario for Further Evaluation and Public Discussion

- The scenario proposes to manage growth by shifting from more impactful modes (autos) to less impactful modes (transit, walking, biking) and by directing higher levels of use to key recreation nodes that have the facilities to handle higher concentrations of people.
- Roadside parking would be formalized in limited areas and restricted in other areas, making room for bike lanes (at least in the uphill direction) and reducing safety and environmental impacts associated with roadside parking.
- Recreation nodes would include bus stops and pullouts, restrooms, ADA facilities, cross-walks, and connections to nearby trails.

- For winter peak days, the scenario is based *on increasing* ***transit ridership from 4-5% to 20%*** and ***increasing the carpool rate from 1.8 to 2.2 people per car***, *reducing the number of cars in the canyons from 11,000 to 8,000 on peak days (based on 2015 conditions).*
- The scenario is designed to address needs for Big Cottonwood and Little Cottonwood canyons, for winter and summer conditions, and for resorts and trailheads.

Projects and actions needed to achieve the scenario include:

  - Parking structures in the valley to access canyon bus routes
  - Significant increase in winter bus service (busses every 5 minutes in canyons)
  - New summer bus service
  - Capital and operational improvements in Big and Little Cottonwood canyons (see Pages 19 and 20), and on Wasatch Boulevard
  - Price Incentives to take transit and carpool
  - Purchase of additional ski busses to meet peak demand
  - Real-time information system for parking availability, bus information
  - Funding for operations and maintenance (O&M)

Comparison of Current Conditions and Proposed Scenario

	Current Conditions	Proposed Scenario
Number of Cars on Peak Days	11,000	8,000
Average Occupancy Rate	1.8 people per car	2.2 people per car
Winter Transit Use	4-5%	20%
Summer Transit	Virtually no summer transit	New service, schedule TBD
Parking Spaces in the Valley	2,900	5,400 to 5,900
Parking Spaces in the Canyons	9,600 formal and informal spaces (*There are at least 6,000 formal spaces at ski resorts and most of the remaining parking spaces are informal.)*	Parking to be formalized, restricted, and enforced. Number of formal spaces to be determined through NEPA process, but assumed to be much less than 9,600.
Cycling Facilities	Shoulders of varied width	Bike lane in uphill direction

Benefits

The benefits of the proposed scenario need to be weighed against cost. Preliminary benefits include:

- responsibly accommodates growth
- preserves canyons
  - eliminates need to expand parking in canyons
  - reduces environmental impacts associated with overflow parking
- maintains positive recreation experiences
  - improves travel times for those in cars and busses
  - expands options to access the canyons
  - improves safety for transit users, cyclists, pedestrians, and families

RECOMMENDATIONS

1. **Initiate a robust public conversation on transportation solutions in the Cottonwood Canyons and the information in this memo. Use the Central Wasatch Commission Stakeholder Council to its full extent when formed**. Invite discussion on two major questions:

   What scale transit system is appropriate - i.e. large enough to make a difference but still affordable?

   How will the system be funded? If tolling is the only viable method of paying for a bus system, is the bus system still desirable? How will operations and maintenance for current and proposed visitor facilities be funded? Should tolling be a part of the proposed action for capital improvements in the Cottonwoods?

2. **Continue a multi-jurisdictional approach with the Utah Department of Transportation (UDOT) leading the overall effort in close coordination with the US Forest Service, Utah Transit Authority (UTA), Central Wasatch Commission, and other partners**.

   Transportation issues in the canyons are complex and implementing a system like the one outlined in this memo will require a comprehensive approach and actions by several jurisdictions. Timing and integration matter – benefits will not be realized if only one component is implemented. UDOT does not need to be responsible for the implementation of every component (buying or operating busses, for instance), but they are in a good position to oversee integration and phasing of the overall system to ensure goals are met.

3. **Act now**.

   Specifically, UDOT can begin the National Environmental Policy Act (NEPA) process for capital improvement projects in Big Cottonwood and Little Cottonwood canyons by initiating consultation with the US Forest Service, UTA, and other stakeholders. The US Forest Service, as a part of the Mountain Accord process, has been anticipating a proposed action to address transportation issues in the Cottonwoods.

   Rigorous analysis on the need for bus/carpool lanes can and should begin as soon as possible as a part of the NEPA process for Little Cottonwood canyon. Agreeing on the overall goal, scale, and funding of the transit system early in the NEPA process will streamline the analysis and the public dialogue.

4. **Make it a priority to time implementation so that benefits to the environment and recreation experiences are realized**.

   Fund and procure new busses and additional parking capacity in the valley before or at the same time as implementing any additional bus/carpool lanes (if they are determined to be needed) in Little Cottonwood. Busses and parking facilities are already at or nearing capacity at peak times.

5. **Ensure the proper facilities (restrooms, crosswalks) and environmental protections are in place to handle concentrations of people at bus stops and trailheads before initiating summer transit service in the canyons**.

   These stops should be strategically located based on environmental conditions, trail capacity, demand, and safety, among other things.

TECHNICAL BACKGROUND

CONTEXT

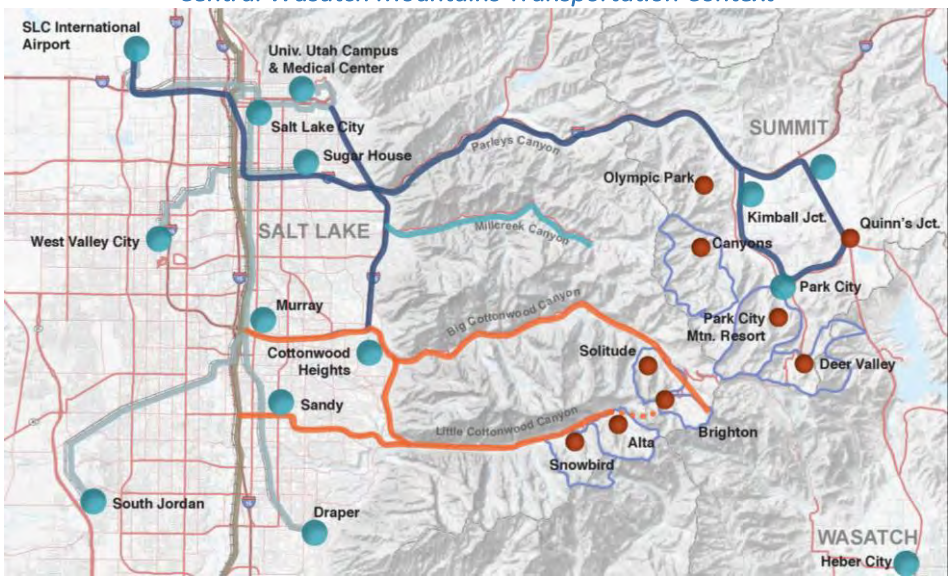
The Central Wasatch mountain range offers diverse recreational experiences that promote active lifestyles and enhance quality of life in the region. They are a key component of Utah's tourism industry and help attract businesses and quality jobs to Utah. The Central Wasatch mountains are a critical source of drinking water for Salt Lake and Sandy cities and both cities carefully manage and protect their watersheds.

The Mountain Accord effort was a local, public, and consensus-based process initiated to address the impacts of growing use and traffic, land use conflict, and piecemeal decision-making in the Central Wasatch. Public feedback during the Mountain Accord process stressed the importance of natural resources, watershed, and quality recreation experiences.

Regional Context

It is important to recognize the regional importance and connectivity of the Central Wasatch mountains to both the Wasatch Front and the Wasatch Back. Although the Mountain Accord study area included a more comprehensive area, as shown below, this memo focuses on transportation challenges specifically in the Cottonwood Canyons. A separate study addresses the transportation needs between the Salt Lake valley and Park City (Valley to Mountains Alternatives Analysis, Summit County and HDR).

Central Wasatch Mountains Transportation Context



The Accord

After an extensive 2-year public process, over 30 key public and private leaders and many members of the public signed an Accord in August 2015. The Accord focuses on watershed preservation, quality recreation experiences, and transportation improvements focused on transit. Specific outcomes related to transportation are:

- To increase transit use, walking, and biking and decrease single-occupancy vehicle use
- To provide a sustainable, safe, efficient, and multi-modal transportation system that:
  - Provides year-round choices to residents, visitors and employees
  - Connects to the overall regional network
  - Serves a diversity of commercial and dispersed recreation uses

    - Is integrated within the fabric of community values and lifestyle choices
    - Is compatible with the unique environmental characteristics
- To design a balanced recreation system…that will reduce the degradation of natural resources caused by [recreation] uses
    - To focus recreation infrastructure at strategically located and designed nodes
    - To provide convenient access at these nodes
    - To accommodate and manage growth in recreation uses
    - To integrate trail access and road cycling facilities with transit solutions
- To address road cycling needs in Big Cottonwood Canyon, Little Cottonwood Canyon, Millcreek Canyon, and Parley's Canyon (including the approaches to each canyon)
- To reduce risks associated with avalanches, winter weather, rock slides, incidents, and other hazards and to improve emergency response capabilities and evacuation routes

Central Wasatch National Conservation and Recreation Area

The Central Wasatch National Conservation and Recreation Area Act was introduced in the US House of Representatives in July 2016 and is intended to preserve watershed, scenic ridgelines, and recreation activities in the Cottonwood canyons and surrounding area. The draft bill:

- applies only to federal US Forest Service land,
- allows for transportation improvements (with the exception of new roads), trails, restrooms, and visitor amenities,
- restricts ski lifts and other development on federal US Forest Service land outside of ski resort boundaries - preserving watershed, natural resources, and view sheds;
- supports land exchanges between the ski resorts and US Forest Service,
- adjusts wilderness boundaries to facilitate mountain biking on the Bonneville Shoreline Trail, and
- adjusts wilderness boundaries to facilitate transportation improvements in Little Cottonwood canyon.

Transportation Corridors

UDOT is responsible for the roads in Big Cottonwood and Little Cottonwood canyons (SR 190 and SR 210, respectively). The US Forest Service owns much of the land beneath and adjacent to the road. UTA operates busses in the canyons but does not own land associated with bus stops. UTA's winter busses operate out of several park and ride lots in the valley and at the base of the canyons; however, some of those park and ride lots are owned by entities other than UTA (US Forest Service, cities, etc.).

Substantial improvements to the road corridor would require a NEPA decision by the US Forest Service.

Solutions Already Implemented or Underway

Transportation solutions that were implemented in 2016/17 or are underway include:

1. Major UTA Ski Bus Service Changes - re-structured bus service from 8 routes to 3 routes
2. Carpool Program - Cottonwood ski resorts offered incentives to carpool
3. UDOT Traffic Management - UDOT added traffic cameras, actively managed traffic signals to alleviate traffic, and added canyon patrol truck to provide roadside assistance

4. UDOT Avalanche Program - UDOT plans to install permanent remote exploders (Gazex and O'Bellx) and radar avalanche detection units in some parts of Little Cottonwood to improve safety and decrease road closure times

PURPOSE AND PROBLEM STATEMENT

The purpose statement describes what purpose the transportation infrastructure serves and the reason improvements are needed in the Cottonwood canyons. The main purpose of the transportation system in the Cottonwood canyons today is to serve recreation activities (commercial and dispersed) for locals as well as tourists. Residents of the canyons (estimated at fewer than 500) and employees of the ski resorts and other canyon businesses also use the roads. The ski resorts estimate about 2,000 employees travel into the canyons on a peak winter day (out of a total of 20,900 people travelling into Big and Little Cottonwood canyons).

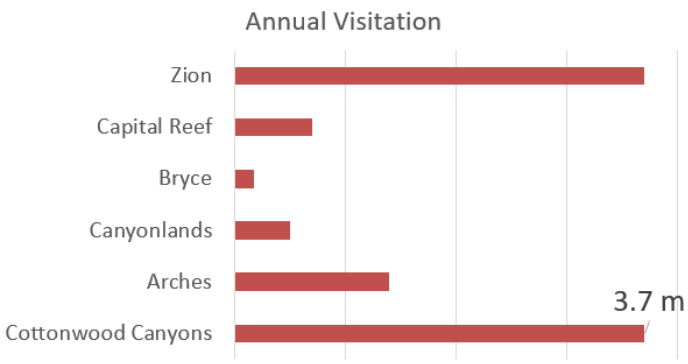
Transportation and canyon stewardship improvements are needed because the growth in recreation use is exceeding the capacity of the current auto-based infrastructure and impacting natural resources.

> *The proposed purpose for improvements in the Cottonwood canyons is* ***to accommodate and manage growth in recreation uses while minimizing impacts to natural resources and maintaining positive recreation experiences.*** *Safety is also always a critical factor. There are opportunities to improve safety associated with avalanche mitigation, incident/emergency response, and pedestrians/cyclists, among others.*

The proposed purpose is based on public feedback, the problems described below and further documented in WSP/PB reports, the Accord, and Mountain Accord System Group reports (Existing Conditions, Idealized Systems). The purpose statement will undergo agency and public review if a NEPA process is initiated.

Growth in Recreation Use

The Salt Lake Valley is growing and more and more people are using Big and Little Cottonwood Canyons for a variety of recreation activities. The number of visitors to the Cottonwoods, ***3.7 million per in 2015***, is greater than most national parks in Utah, as shown on the figure to the right. For comparison, Zion National Park has similar visitation for an area twice the size of the Cottonwood Canyons.



Growth has resulted in challenges not only for transportation, but also for visitor amenities such as restrooms, enforcement, canyon stewardship, and watershed health (see photo narrative in Appendix A). These problems are becoming more widespread and more frequent due to the growing number of people using the canyons year round. Visitation statistics by season are shown below.

Visitation Statistics

	Summer (May-Oct 2015)	Winter (Nov-Dec 2015, Jan-Apr 2015)	Total
BCC	974,416	698,295	1,672,711
LCC	980,697	1,045,069	2,025,766
Total Both Canyons	1,955,113	1,743,364	3,698,477
Annual Growth Rate (2013-2015)	10-20%	5-10%	
% Locals	*84% (USU 2014)*	*~50% (approximation from ski resorts)*	

Source: WSP/PB visitation estimates are based on UDOT 2015 traffic counts and estimated occupancy rates from limited data collected by L2 Data in 2016. Additional occupancy data collected in 2017 through contract with WFRC is not reflected here. Estimate does not include transit, walking, or biking (there were approximately 100,000 round trips on the ski bus in 2014-15). Growth rates are from WSP/PB Draft Mountain Accord Transportation Framework Report, Exhibit 15, Page 15.

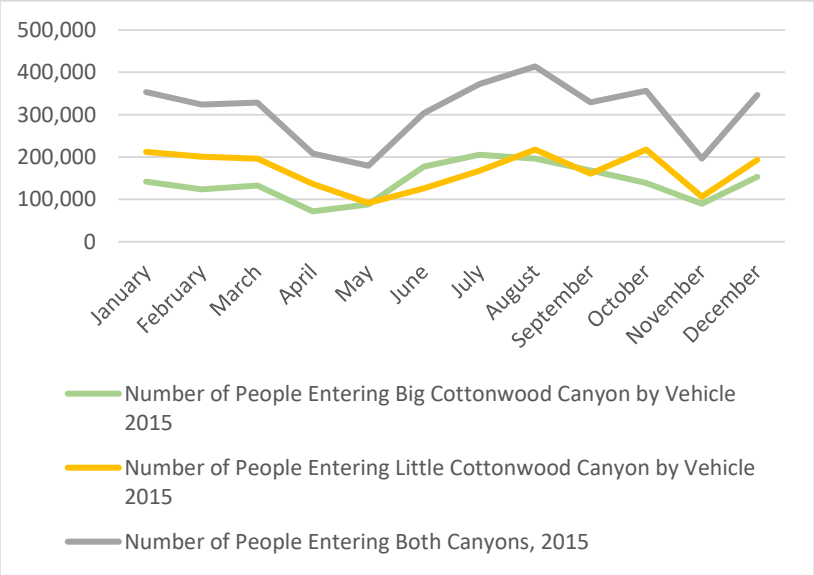
Locals and Tourists

According to rough ski resort estimates, about 50% of skiers at the Cottonwood resorts are locals on peak winter days (the remainder are tourists). The number of locals may be higher on other days. According to the Utah State University (USU) Central Wasatch Visitor Study conducted in 2014, 84% of those surveyed in the summer were locals that had travelled less than 40 miles. (Note that the study area included the Cottonwoods, Bell Canyon, Millcreek, Parleys, and Park City.)

Summer and Fall

On an annual basis, visitation for the 6 months encompassing summer and fall is greater than the 6 months encompassing winter and spring (2.0 million versus 1.7 million). Additionally, monthly traffic volumes are highest from July to October, as shown on the graph below, and summer traffic is growing at a faster rate than winter traffic.

Number of People Entering Canyons by Month, 2015



According to data from the 2011/2012 Salt Lake County Cottonwood Canyons Parking Study (and referenced in Mountain Accord Existing Conditions and Future Trendlines for Transportation):

- In the summer, about 82% of vehicles in Little Cottonwood canyon are parked at the resorts.
- In the summer, about 59% of the vehicles in Big Cottonwood canyon are parked at trailheads or the road shoulder.

Snowbird commercial activities include rides, food, and concerts in summer and Oktoberfest in late summer and fall. Alta sees high numbers of visitors to see flowers in Albion Basin in July and August. Non-resort parking occurs near the base of the canyon (for rock climbing and hiking) and at White Pine.

People visit Big Cottonwood in summer and fall for a variety of dispersed activities and to visit Solitude, Brighton, and the Silverfork Lodge.

Summer Activities in the Central Wasatch from USU Survey, 2014

Activity	% of Those Surveyed
Hiking, walking, or trail running	55%
Mountain biking	8%
Rock climbing	4%
Road cycling	4%

Peak Days

On peak days, there are over 20,000 people and 11,000 cars travelling into the Cottonwood canyons, as shown in the table below (there are 20,900 people in winter and 20,100 in summer according to WSP/PB Short Term Transportation Memo, Figure 1). These numbers do not include those residents, visitors, and employees staying in the canyons.

Peak winter days create problems for parking near the resorts and backcountry trailheads and cause increased travel times entering and exiting the canyons. Conditions are particularly congested in Little Cottonwood for over 30 days per year when travel times increase, as discussed in the section below. Big

Cottonwood also sees increased travel times in the afternoon unloading period on peak days and when Little Cottonwood is closed for avalanche control.

The loading and unloading pattern of the canyons is more dispersed in summer and therefore travel times are not affected nearly as much as during ski season. Parking is an issue on summer peak days, as discussed below.

Peak Winter Day Profile

Ski Season	~120-150 days per year ~50 weekends & holidays ~5-10 powder days on weekdays
Peak Winter Day Statistics	
# Peak Days Per Season	~20 days in 2015
# People Travelling into Canyons *(does not include those staying in the canyons at lodging or residents of the canyons)*	20,900+ *8,000+ in Big Cottonwood* *12,000+ in Little Cottonwood*
# Cars Per Day Both Canyons	~11,000
# Single Occupancy Vehicles	~3,000 (28%)
# People Travelling on Bus	~750-1500
Approximate % Locals (from Utah) *(ski resort estimate)*	~50%
Approximate # of Employees Travelling into Canyons *(ski resort estimate)*	~2,000

Source: WSP/PB, UDOT traffic counts, UTA, L2 Data.
Note that in 2015, there 55 days with over 18,000 people travelling into the canyons.

Parking

Increasing traffic levels and a fixed number of parking stalls in the canyons has led to informal overflow parking on the road shoulder. (According to the USU Central Wasatch Visitor Study conducted in 2014, visitors were least satisfied with the availability of parking, parking lot conditions, cleanliness of restrooms, and trail signage.) Overflow parking is occurring in both canyons, at the resorts and trailheads, both in winter and summer. It has the following impacts:

- Visitor Experience: During peak times it is hard to find a parking space at the resorts and trailheads. People search for a space at their desired destination and if they are not successful, they either go to a different destination or park in questionable/unsafe areas (on vegetation or in the travel lane). Once parked, the pedestrian experience can be uncomfortable or unsafe.
- Safety and Road Operations: Overflow parking near the resorts and trailheads in winter is not ideal for plow operations and incident/emergency response. On the most crowded days, people park partially in the lane of traffic.
- Natural Resources: Informal parking off the pavement impacts the watershed in several ways. Initially it impacts native vegetation, leads to erosion and increased sedimentation into water bodies, and creates disturbance where invasive weeds can take root. Repeated parking compacts soils and contributes to user-created spider web trails. Impacts from user-created

trails extend beyond the road corridor. User-created trails further impact native vegetation and increase erosion, in addition to impacting wildlife habitat and forage areas.

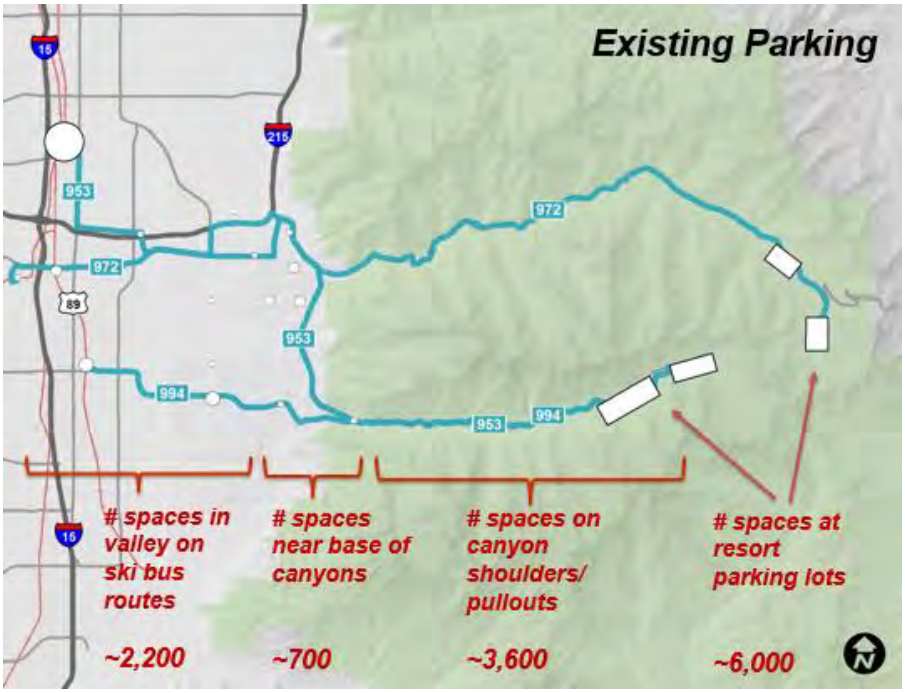
- Bike/Pedestrian Conflicts: Roadside parking conflicts with growing number of people walking, running, and biking in the canyons.

Examples of these conditions are included in the photo narrative, attached in the Appendix.

Canyon Parking Conditions

Number of cars accessing canyons on 20 peak days (2015)	11,000+
Number of formal and informal parking spaces in the canyons *There are at least 6,000 formal spaces at the ski resorts.* *Most of the remaining parking spaces are informal.*	~9,600
Number of parking spaces near the base of the canyons to take the bus or carpool	~700
Number of parking spaces on 3 ski bus routes beyond the base of the canyons	~2,200

Existing Parking Spaces Serving Big and Little Cottonwood Canyons



Source: WSP/PB Short Term Transportation Memo Table 1 and Figure 3.

[Note there are discrepancies between the data from the 2012 Canyons Parking Study conducted by Avenue and data from the WSP/PB Short Term Transportation Memo. Discrepancies may be due to the year data was collected. There is no official determination on what constitutes a parking space on the shoulder of the road or in lots that are not striped. The number of parking spaces in the canyons varies based on snow storage, parking lot management, UDOT paving, and other factors. Each summer, more informal parking spaces are unintentionally created as more people park on the road shoulder.]

The parking facilities in the valley are reaching capacity, limiting transit use and carpooling. Finding a parking space near the base of the canyons can be difficult on weekends, holidays, and powder days. There are only about 700 parking spaces at the base of the canyons and overflow parking and traffic around the base of the canyons is impacting neighborhoods and increasing congestion and travel times.

Additional discussion on parking problems can be found on Page 9 of WSP/PB Short Term Transportation Memo.

Travel Times and Congestion

In 2015, Little Cottonwood highway was over-capacity 36 days resulting in increased travel times (WSP/PB Transportation Framework Report, Page 13, Exhibit 12). In the worst conditions, it can take several hours to reach Alta or Snowbird from I-215. In normal conditions, the travel time is less than 30 minutes. There are around 50 weekends, holidays, and powder days out of a 120-150 day ski season.

Residents at the base of Little Cottonwood canyon have difficulty leaving and returning to their homes during congested periods. It is particularly difficult when the road is closed due to avalanche conditions (see discussion below).

Transit

The ski bus is a popular way to access the resorts in winter and busses are over-capacity on peak days. In the 2015-16 season, the ski bus system carried about 4-5% of the trips (WSP/PB Short Term Transportation Memo, Page 8, Figure 1). Ridership for the 2016/17 season was higher after the ski bus routes were reconfigured (see discussion later in this memo). There are 3 routes serving the canyons. Two routes have busses running every 15 minutes in the peak hours and every 30 minutes other times. One route has very infrequent service. More frequent bus service would address the capacity issue and would also make taking the bus more convenient. Additional parking spaces in the valley are needed on ski bus routes if additional ridership is desired.

The bus fare may also be an obstacle to gaining more riders. Currently the cost to take the ski bus ($9 round trip) is higher than the cost to drive (parking is free). Most of the riders on the bus (~80%) are employees or season pass holders who ride for free. The four Cottonwood ski resorts currently pay UTA for employee and season pass holder trips. For the 2014-15 season, UTA's operating expense was about $1.5 million, revenue from fares was about $160K, and the ski resort contribution was approximately $350K.

There is virtually no bus service in summer/fall. Infrastructure such as restrooms, Americans with Disabilities Act (ADA) facilities, cross-walks, and bus pull outs are needed at trailheads before summer bus service can be initiated.

Carpooling

Recent data from a peak Saturday in February 2017 showed that 28% of the cars accessing the canyons were single-occupancy vehicles (SOVs). The average number of people per car is about 1.8 on peak days, as shown in the table below.

Occupancy Rates, 2016

			Occupancy
Little Cottonwood Canyon	Winter	Weekday	1.58
		Weekend	1.84
	Summer	Weekday	1.53
		Weekend	1.89
Big Cottonwood Canyon	Winter	Weekday	1.9
		Weekend	1.77
	Summer	Weekday	2.02
		Weekend	2.13

Source: WSP/PB summarized data from L2 Data collected in 2016. L2 collected additional data in 2017.

Restrooms

Recent discussions among canyon users and the entities responsible for the watershed have highlighted the need for restrooms in the canyons. Specific issues include:

- New restrooms needed or being requested at trailheads that are seeing more use
- Not enough toilet seats where restrooms do exist (long lines)
- Feasibility of flush toilets versus vault toilets
- Resources needed to upgrade and replace toilets when needed
- Resources needed to clean and maintain existing and any new restroom facilities

Responsibility for management of toilets in the canyons falls to several different agencies - Salt Lake City, Salt Lake County, and the US Forest Service. Salt Lake City and Salt Lake County have provided support for restrooms this year; however, there are still many outstanding needs. The US Forest Service is facing a lack of funding for operations and maintenance and therefore has deferred needed maintenance on restrooms, trails, and infrastructure (this is referred to as the 'deferred maintenance gap').

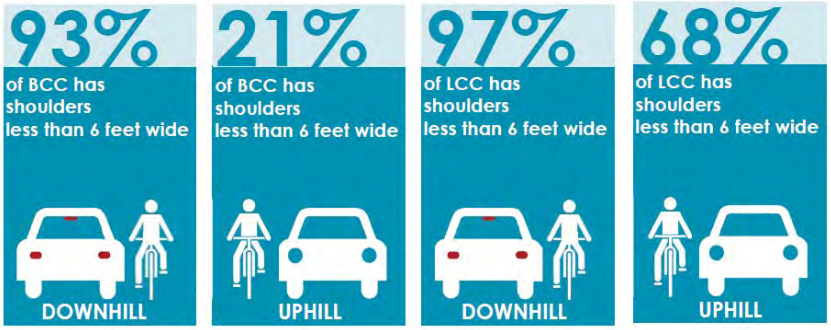
Biking and Walking

There are a growing number of people road biking, mountain biking, and running or walking on the road shoulder. The USU Central Wasatch Visitor Use Study indicates that almost 9% of those surveyed in the summer of 2014 had walked or biked to their location. (Note this study included a broader area than the Cottonwood canyons). Those that drive into the canyons eventually become pedestrians to access their destination (picnic area, campground, trailhead, resort). Specific issues include:

- The shoulder is less than 6 feet for most of the canyons (see figure below), which is not enough space to accommodate parking, cycling, and pedestrians.
- The walking and biking experience can be uncomfortable and unsafe. In the summer, pedestrians sometimes walk in the lane of traffic or in the vegetation if cars are parked on the shoulder. On peak days when the ski resort parking lots are full, skiers often walk in the snowbank or in the lane of traffic with skis and/or with children. High vehicle volumes and the speed differential between vehicles and cyclists degrade the cycling experience and impact safety.
- People cross the road (sometimes with skis, climbing, or picnic gear) to access trailheads, camping, and picnic areas. This requires waiting for a gap in traffic and often requires running.

- Other than the ski resorts and park and ride lots, there are no Americans with Disabilities Act (ADA) facilities (ramps, parking spaces, cross-walks) in the canyons.

Shoulders in Big and Little Cottonwood Canyons

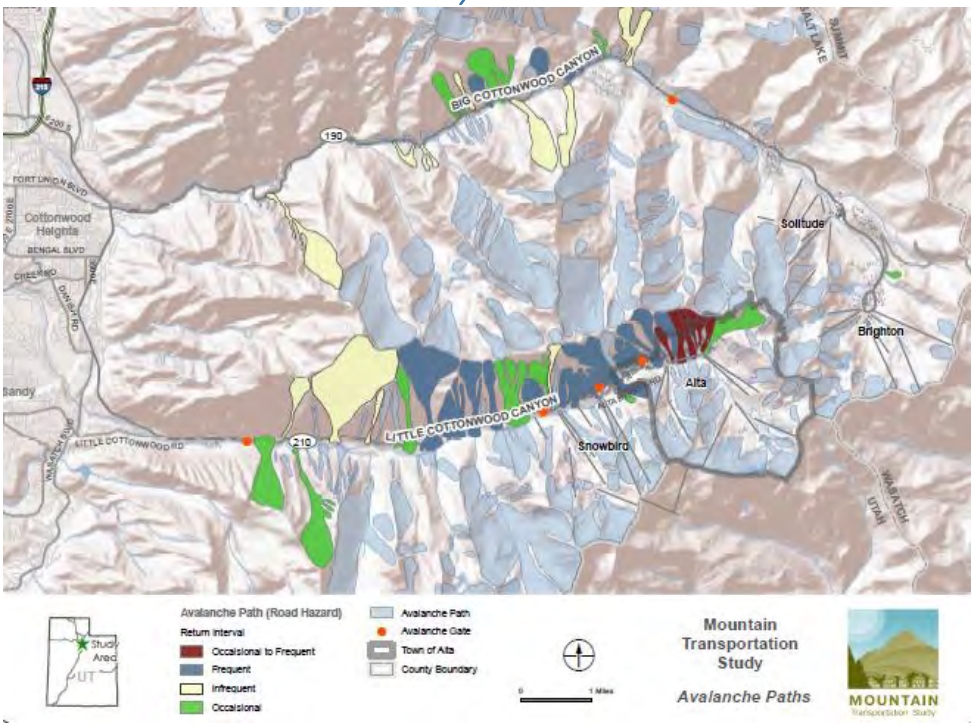


Source: WSP/PB Draft Framework Report, Page 18

Road Closures and Avalanche Control

Avalanche paths cross the roads in the Cottonwood canyons, as shown in the figure below. UDOT is responsible for keeping the roads and the canyons safe (excluding the ski resort areas) and they have a complex and sophisticated system in place to mitigate avalanche risk. Avalanche risk increases with the number of avalanche paths that cross a road, the frequency of avalanches, the number of vehicles, and the amount of time the vehicles spend in avalanche paths (speed).

Cottonwood Canyons Avalanche Paths



Road Closures

When the avalanche danger is high, UDOT closes Little Cottonwood canyon and sometimes, although not as often, Big Cottonwood canyon. While the road is closed, avalanche control work includes shooting US Department of Defense military artillery to trigger avalanches and clearing the road of snow. Traffic backs up at the base of the canyons when the road is closed as skiers wait to enter the canyon. The system requires close coordination and communication with many entities including the US Forest Service, ski resorts, Unified Police, Town of Alta, Utah Avalanche Center, public and backcountry skiers, etc.

The number of days the road is closed varies based on snow and avalanche conditions. In some winters, the road is closed on 10 to 15 days for several hours at a time.

Sustainability of Current System

UDOT has managed avalanche risk to the public in the Cottonwoods for many years. However, the current system is not sustainable indefinitely. Using military artillery has inherent risks to those personnel using the system and to anyone who may be in the path of the target or subsequent avalanche. Backcountry use and road traffic are both growing, requiring more and more safety precautions and resources. Also, the artillery UDOT is using may not be available in the future. The impacts of road closures to the neighborhoods and roads near the base of the canyons are growing as the number of visitors and traffic increases. Ski resort business and the skier experience is obviously adversely impacted when the road is closed.

Potential Solutions

Avalanche safety is a separate and distinct issue from the other canyon issues discussed above. Like the other concerns, growth is exacerbating the issue. The solutions contemplated in this memo, such as increasing bus ridership and carpooling, will improve traffic flow once the road is open - but they will not help the road open sooner. Some avalanche mitigation solutions may decrease the number or duration of road closures, whereas others decrease the exposure of avalanche control personnel, the travelling public, or backcountry users. Measures intended to improve avalanche safety may or may not improve environmental conditions or the recreation experience.

Installing permanent remote exploders (such as Gazex or O'Bellx) and radar avalanche detection units would reduce the need for military artillery and could decrease the time the road is closed; some of these systems are being implemented in parts of the Little Cottonwood canyon. However, installing these systems in other sections of Little Cottonwood canyon would require small structures in wilderness. This and many other solutions (such as avalanche sheds) have been studied in the past. A final resolution should be a part of the overall transportation plan for Little Cottonwood canyon.

Recent Public Surveys

USU conducted the Central Wasatch Visitor Study in 2014 as a part of the Mountain Accord process (*http://extension.usu.edu/iort/research/cw-visitor-use-study*). The study area included the Cottonwoods, Bell Canyon, Millcreek, Parleys, and Park City. Highlights from the survey are:

- The three most important aspects of the Mountain Accord study area are **scenery, environmental conditions, and trails**.
- People were concerned with parking, environment, and trails and least satisfied with the availability of parking, parking lot conditions, cleanliness of restrooms, and trail signage.
- 66% wanted to see **more public transportation opportunities**.
- 87% supported bike lanes in the Cottonwoods.

- Those surveyed, on average, **were willing to pay $48 per year for parking or access to the canyons.**

The Mountain Accord survey conducted online in 2016 (*http://mountainaccord.com/survey-transportation/*) showed:

- 78% of respondents supporting more winter bus service,
- 56% supporting new summer service, and
- 48% willing to pay an entrance fee to support public transportation and canyon stewardship.

SCENARIO PROPOSED FOR FURTHER EVALUATION AND PUBLIC DISCUSSION

The scenario described below is proposed for evaluation and public discussion. The system is comprised of components that need to be integrated and phased and that fall under the jurisdiction of several different agencies (UDOT, UTA, US Forest Service and others).

The scenario is based on ***i***ncreasing ***transit ridership from 4-5% to 20%*** and ***increasing the carpool rate from 1.8 to 2.2 people per car***. The ridership goal is a key factor for public discussion as it determines the scale of the transit system and the infrastructure (such as parking structures or bus lanes) needed to support it. The ridership goal should be contemplated in the context of the cost and feasibility to achieve it.

The goal of 20% transit ridership is recommended as a starting point for discussions. It is based on the strategy of managing auto use to fit within the formal parking spaces in the canyons (accounting for turnover rate) and accommodating the remaining demand through bus ridership and carpooling. The proposed scenario would reduce the number of cars accessing the canyons by about 3,000 (28%) from 2015 conditions, which would significantly reduce overflow parking problems and improve travel times. Note these numbers are preliminary and should be verified through a future NEPA process.

The purpose of the proposed scenario is not to increase transportation capacity or to induce more travel into the canyons. Rather, the intent is to shift from more impactful modes to less impactful modes. Taking transit and carpooling is generally not as convenient as driving single-occupancy vehicles.

Comparison of Current Conditions and Proposed Scenario (for Both Cottonwood Canyons)

	Current	Proposed Scenario
Number of Cars on Peak Days	11,000	8,000
Average Occupancy Rate	1.8 people per car	2.2 people per car
Winter Transit Use	4-5% *(before 2016/17 ski bus route changes)*	20% 4,000 people per day capacity
Summer Transit	Virtually no summer transit	New summer transit, schedule TBD
Parking Spaces in the Valley on Canyon Bus Routes	2,900	5,400 to 5,900
Parking Spaces in the Canyons	9,600 formal and informal spaces *There are at least 6,000 formal spaces at ski resorts. Most of the remaining parking spaces are informal.*	Parking to be formalized, restricted, and enforced. Number of formal spaces to be determined through NEPA process, but assumed to be much less than 9,600.
Cycling Facilities	Shoulders of varied width	Bike lane in uphill direction, at minimum
Ski Bus Fare	$9 round trip Free for employees and season pass holders	To be determined, but recommended less than $9
Annual Canyon Bus O&M Cost (not including fares or ski resort contributions)	~1.5 million	$5-6 million winter $1-2 million summer

PROJECTS AND ACTIONS TO ACHIEVE PROPOSED SCENARIO

Achieving the proposed scenario would require an integrated system with the following components:

1. **Parking Structures**: About 2,500 to 3,000 parking stalls in the valley on ski bus routes at a cost of $60-100 million
2. **New ski busses** at a capital cost of approximately $30 million (estimate from UTA)
3. **Increase in winter bus service** to handle 4,000 people on peak winter days at a cost of $4-5 million per year (not including fare revenue or ski resort contributions)
4. **New summer bus service** at a cost $1-2 million per year depending on frequency/schedule (not including fare revenue or ski resort contributions
5. **Capital and operational improvements in Big Cottonwood** (see description below)
6. **Capital and operational improvements in Little Cottonwood** (see description below)
7. **Capital or operational improvements on Wasatch Boulevard** (such as bus priority on peak days near Big Cottonwood canyon and I-215, or operational solutions to allow resident access near Little Cottonwood)
8. **Incentives to take transit and carpool** (currently it is $9 to take the ski bus and minimal cost to take a car)

9. **Real-time information system** that inventories and communicates parking availability, bus arrival times, road/weather information and that is readily accessible on mobile devices
10. **Funding for operations and maintenance (O&M)** of new infrastructure and current infrastructure, including parking enforcement. The US Forest Service has deferred maintenance due to budget shortfalls.

Additional information on capital improvements is included in the WSP/PB Short Term Transportation Memo.

Recreation Nodes and Capacity

The Accord outlines two strategies to responsibly manage growth:

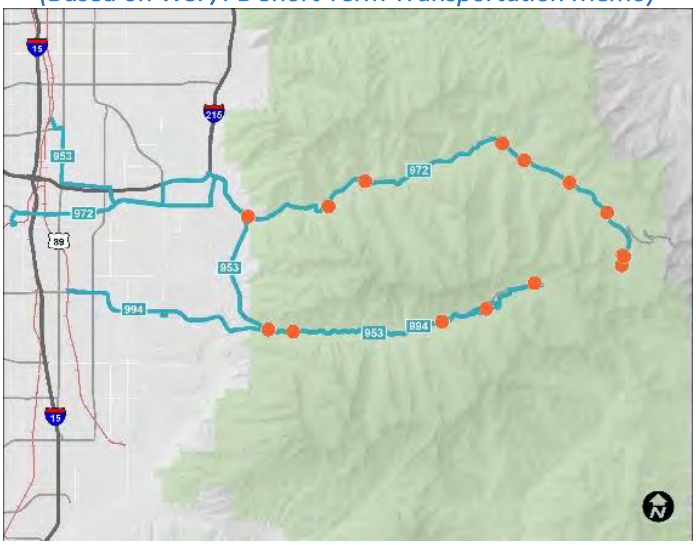
- Shift from more impactful travel modes to less impactful modes (transit, walking, biking)
- Direct higher levels of use to key nodes that have the infrastructure to handle higher concentrations of people (such as the base of the ski resorts and yet-to-be developed recreation nodes/trailheads)

These strategies allow higher numbers of people to enjoy the canyons with less collective damage to the environment. These strategies will allow also solitude experiences to be preserved in other areas.

High-use recreation nodes include bus stops and pullouts, a manageable level of parking, restrooms, hard surfaces where appropriate, wayfinding/information, ADA facilities, cross-walks, amenities such as picnic tables, and connections to trails. High-use nodes should be strategically located based on environmental conditions, trail capacity, demand, and safety, among other things.

Preliminary recommendations for the location of these nodes are shown on the figure below and a sample of recreation node improvements prepared by US Forest Service is attached in the Appendix. The final locations should be determined through a NEPA process. The US Forest Service has a key role in determining how these nodes and the transportation system as a whole can support environmental goals and the recreation experience. The Environmental Dashboard developed through the Mountain Accord process can also inform this analysis.

Preliminary Recreation Node Locations
(Based on WSP/PB Short Term Transportation Memo)



Roadside Parking and Bike Lanes

The proposed scenario includes formalizing parking spaces (paving, striping) in the canyons where desired based on feasibility, environmental conditions, demand, safety, and other factors, and restricting roadside parking in all other areas. The number of parking spaces would be determined as a part of the NEPA process proposed for each canyon. Bike lanes are proposed in the uphill direction at minimum. (Special pavement markings may be applied where space does not allow for a full 5 or 6 foot wide bike lane). Roadside parking can be restricted through signage, design, and/or increased enforcement.

The WSP/PB Short Term Transportation Memo (page 12, Table 2) includes analysis and preliminary recommendations for formal parking. The report recommends paving 180 spaces. For comparison, the report states there are sometimes 900 cars parked informally. The recommendation was based on many factors but did not take into consideration environmental impacts (such as more impermeable surface, erosion, vegetation impacts, stream impacts, or indirect impacts from induced use).

Big Cottonwood Canyon Improvements

Improvements in Big Cottonwood canyon would contemplate the overall buildout of the road corridor to address the problems discussed above, including:

1. Recreations nodes for summer and winter:
    - Bus stops, shelters, bus pullouts
    - Restrooms
    - Connections to nearby trails
    - ADA/wheelchair accommodations, hard surfaces, and cross-walks/safe road crossings where appropriate
    - Amenities such as picnic tables
    - Wayfinding and information
    - *The preliminary recommendation is for 1 recreation node at the park and ride at the base of the canyon, 3 at the ski resorts, and 5 at trailheads (as shown in above diagram).*
2. Bike lanes and pedestrian facilities

    An obvious solution to improve the cycling environment is bike lanes. WSP/PB recommends a bike lane in the uphill direction. The pedestrian issue is harder to solve, as sidewalks are not likely feasible. Crosswalks would improve pedestrian conditions at some hot spot locations. WSP/PB made recommendations for pedestrian improvements on Figure 8 of Short Term Transportation Memo).

3. Parking formalization and management (limited new parking, parking restrictions and enforcement)
4. New summer bus service
5. Reconfiguration of entrance/exits at park and rides and ski resorts to improve bus travel time
6. Real time information and parking inventory system including detection units at parking areas
7. Evaluation of funding mechanisms such as tolling

It is recommended that the NEPA process begin as soon as possible. The Environmental Dashboard, developed as a part of the Mountain Accord program, should inform the process. Low impact measures that would not preclude alternatives considered in the NEPA process can and should be implemented as the NEPA process is ongoing. Note that some of the improvements listed above could be implemented as separate projects. Additional information on capital improvements is included in the WSP/PB Short Term Transportation Memo (Page 22 and Appendix C).

Little Cottonwood Canyon Capital Improvements

Improvements in Little Cottonwood canyon would contemplate the overall buildout of the road corridor to address the problems discussed above, including:

1. Recreations nodes for summer and winter:
    - Bus stops, shelters, bus pullouts
    - Restrooms
    - Connections to nearby trails
    - ADA/wheelchair accommodations, hard surfaces, and cross-walks/safe road crossings where appropriate
    - Amenities such as picnic tables
    - Wayfinding and information
    - *The preliminary recommendation is for 1 recreation node at the park and ride at the base of the canyon, 2 at the ski resorts, and 2 at trailheads (as shown in above diagram).*
2. Parking formalization and management (limited new parking, parking restrictions and enforcement)
3. Evaluation of additional lane to operate proposed bus system.

    Achieving a 20% transit goal would require bus headways of about 3 minutes in Little Cottonwood. A bus system of that scale may need an exclusive lane to operate successfully. WSP/PB evaluated the addition of 2 dedicated bus lanes (one in each direction) in the Long Term Transportation Memo. Another less impactful concept worth consideration is a third bus/carpool lane. This would allow for one lane of general purpose traffic and one lane for bus and carpooling in the eastbound direction in the morning (with one lane for westbound traffic). The direction of one lane could be reversed in the afternoon.

4. Avalanche safety improvements
5. Bike lanes and pedestrian facilities

    An obvious solution to improve the cycling environment is bike lanes. WSP/PB recommends a bike lane in the uphill direction. The pedestrian issue is harder to solve, as sidewalks are not likely feasible. Crosswalks would improve pedestrian conditions at some hot spot locations. WSP/PB made recommendations for pedestrian improvements on Figure 8 of Short Term Transportation Memo).

6. New summer bus service
7. Operational or capital improvements to reduce impacts and improve access for residents near the base of the canyons on peak days and road closure days
8. Reconfiguration of entrance/exits at park and rides and ski resorts to improve bus travel time
9. Real time information and parking inventory system including detection units at parking areas
10. Evaluation of funding mechanisms such as tolling

Long Term Options: If possible, major improvements should be designed to allow for, or at least not preclude, long term options such as rail. The trade-offs of doing this should be disclosed in the NEPA process. The analysis should include life-cycle cost-effectiveness and capacities needed today and in the future. Specifically, the NEPA process should disclose the capacity of the bus system and its ability to handle expected growth. Long term options are inventoried and evaluated in the WSP/PB Long Term Transportation Memo; although no formal decision has been made on this topic.

It is recommended that the NEPA process begin as soon as possible. The Environmental Dashboard, developed as a part of the Mountain Accord program, should inform the process. Low impact measures that would not preclude alternatives considered in the NEPA process can and should be implemented as the NEPA process is ongoing. Note that some of the improvements listed above could be implemented

as separate projects. Additional information on capital improvements is included in the WSP/PB Short Term Transportation Memo (Page 22 and Appendix C).

Canyon Bus Service

The proposed scenario assumes 20% of the people entering the canyons on peak winter days will be on the ski bus (about 4,000 people per day). A system based on park and rides and frequent service is proposed to meet this capacity. The capacity of the current system is about 1,200-1,500 people and is limited by the frequency of the bus and the parking availability in the valley. Achieving a system with the capacity of 4,000 people per day will require parking structures to access the bus system, new busses, and very frequent service (busses every 3 to 5 minutes in peak times). New busses are needed to meet peak demand.

Proposed Scenario for Evalutation – Bus Service

	BCC	LCC	Total
Bus Capacity (# People Per Bus)			35
# of People on Bus to Meet 20% Ridership	1,600	2,400	4,000
# Busses Needed Up Canyons in AM Peak	49	70	119
Assumed Load in Period in AM (hours)			4
Proposed Headways in Canyons to Meet 20% Ridership (Based on Needed Capacity)	Bus every 5 minutes	Bus every 3 minutes	

Note: The numbers in this table are preliminary and should be refined by UTA.

Incentives to Fill Busses

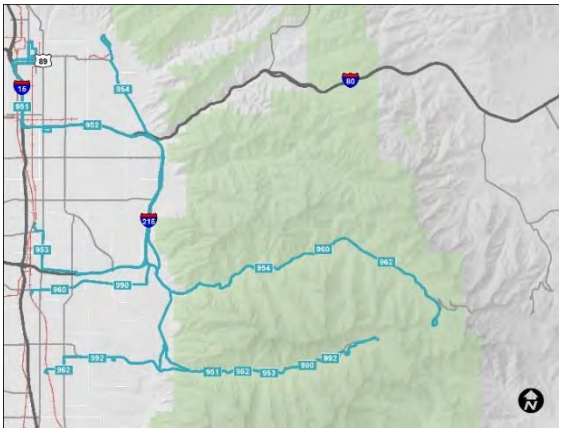
To ensure the busses are full once the system is operating, incentives may be needed. One incentive that exists already is lack of parking in the canyons. The frequent service would also encourage ridership as no schedule would be needed. Additional incentives such as reducing the ski bus fare or charging for automobile access may be needed to ensure the expected ridership goals are met. It is worth noting that single-occupancy vehicles offer the greatest benefit for shifting to transit. A family of 4 in a car already exceeds the carpool goal of 2.2.

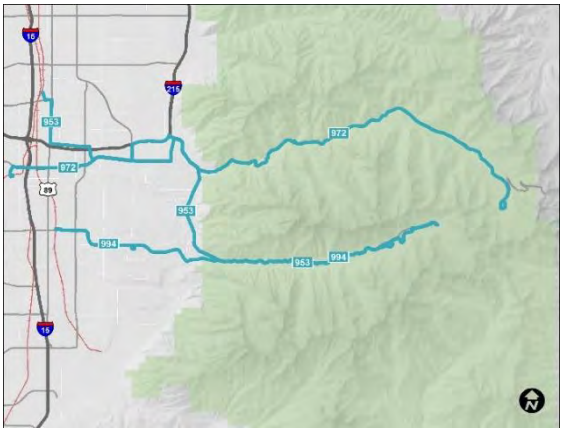
Routes

WSP/PB recommends that future service focus on the 3 routes currently operating in winter. (A fourth route serving Salt Lake City could be considered in the future if sufficient funding is available to maintain frequent service on the current 3 routes). In the 2015/16 season, UTA operated 8 routes with much less frequent service. The transition from the coverage-based system to the frequency-based system resulted in 30% more bus service in the canyons at peak times and an increase in ridership (see map below for a comparison of routes). The change increased costs only marginally, and UTA contributed $200K in service as a part of the Mountain Accord Phase II Interlocal Agreement.

UTA monitored the success of the ski bus routes in 2016/17 and their analysis will be valuable in refining plans moving forward. UTA planners and operational staff have a sophisticated understanding of ski bus ridership dynamics. More detailed information is available in the WSP/Parson Brinkerhoff Winter 2016-2017 Transportation Solutions Plan.

Maps of UTA Ski Bus Service for 2015/16 Season (8 Routes) and 2016/17 Season (3 Routes)





Summer Bus Service

The scenario proposes that UTA provide bus service to the canyons in the summer on the same routes as winter. The benefit of this is streamlined signage and operations, predictability and consistency for riders, availability of ski busses already owned by UTA, and the ability to provide the needed high capacity service (see Page 26 of WSP/PB Short Term Transportation Memo for further discussion). Private, smaller shuttles could complement the UTA system by servicing minor trailheads, the Guardsman pass area, and/or Millcreek canyon.

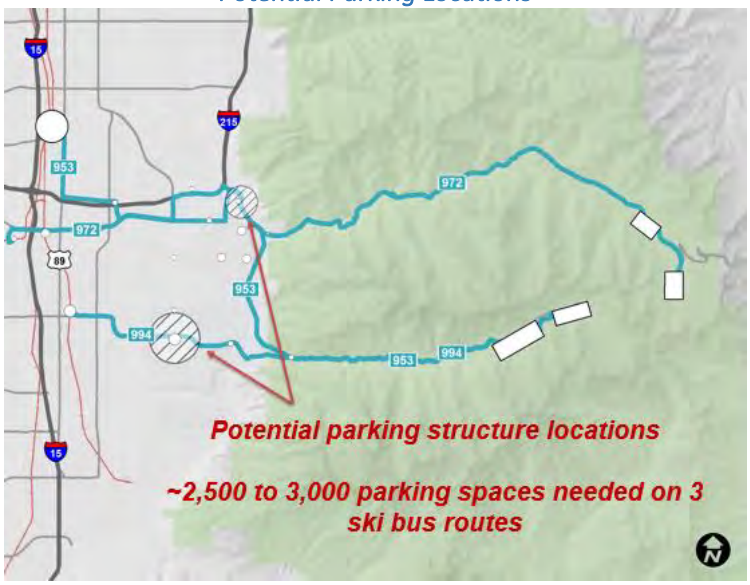
Proposed Parking in the Valley

To meet the bus and carpool goals for the proposed system, about 2,500-3,000 new/additional parking spaces are needed in the valley on the 3 ski bus routes. There are currently 2,900 spaces at 9 key park and ride lots (show on map) serving the ski bus routes and they are reaching capacity. It is presumed that many of these lots are being used for carpooling in addition to accessing the ski bus since there are 2,900 spaces and the current ski bus takes around 750-1,500 people into the canyons. UTA measured the utilization of the park and rides lots in the 2016/2017 season and can use their findings to refine the plan. UTA is investigating opportunities to use parking spaces at businesses or schools that are on the current bus routes to reduce the need for structured parking.

WSP/PB evaluated many potential sites for parking structures in their Short Term Transportation Memo. Two potential sites are shown on the map below. Placing parking structures at the park and ride lots at the entrance to the canyons is not ideal due to their small size and aesthetic impacts. Additionally, the park and ride at the entrance to Little Cottonwood canyon does not have good access. The roads approaching Little Cottonwood are only 2 lanes wide and are already backed-up on peak days and avalanche closure days.

Parking structures should be sized to meet current and future demand for each particular location. Long term options such as rail may also affect the demand at particular locations.

Potential Parking Locations



BENEFITS OF PROPOSED SCENARIO

The benefits of the proposed scenario should be considered in the context of the cost of the system (to users and to taxpayers) and this should be a topic for public discussion as soon as possible. A preliminary assessment of benefits, subject to public feedback, is as follows:

- Responsibly accommodates growth
- Preserves canyons by reducing impacts from overflow parking (through formalizing and restricting roadside parking) and eliminating the need to expand parking in canyons (by shifting trips from auto to bus)
- Maintains positive recreation experiences
    - Reduces the time spent searching for parking
    - Gives more options to access the canyons
    - Improves safety for transit users, cyclists, pedestrians, and families
    - Improves travel times for those in cars or on busses
- Addresses needs for both canyons
- Addresses winter and summer needs
- Addresses needs at resorts and trailheads
- Builds on current travel patterns and is scalable for the future

QUESTIONS & ANSWERS

1. What other options are there for the scale of the system?

   WSP/PB recommended a 25% increase in current winter bus service. The capacity of that system, if full, would bring transit ridership from 4 to 5% of overall trips. While this is still a worthy investment to explore, it will not make a significant difference in the number of cars in the canyons.

   Many people have suggested a Zion-like system where cars are banned and everyone coming into the canyons is on a bus. Carrying 20,000 people into the canyons on peak winter mornings would require a bus at least every minute, and probably more. Lanes for busses would not be needed since only busses and necessary vehicles would be on the road. It is not likely feasible from a cost perspective, but it provides a good illustration of what the trade-offs in setting the overall scale of the system.

2. What options are there for phasing summer bus service?

   Summer service could be initiated to the ski resorts where there are existing bus stops, restrooms, and ADA facilities. Summer bus service to Snowbird and Alta would not require capital improvements and would serve a majority of traffic in Little Cottonwood.

3. What options are there for phasing increases in winter bus service?

   Frequency on two routes (994 and 972) could be increased to 15-minute service all day. Frequency on the third route (993) could be increased to 30-minute service all day. Increasing service at peak times will require purchasing more busses and increased operating costs.

4. What about private shuttles and other needs?

   Private, smaller shuttles could complement the UTA system by servicing minor trailheads, the Guardsman pass area, Millcreek canyon, trips between canyons, and/or trips between Park City and the Cottonwoods. Private shuttles operators would need permission to access park and ride lots. They also may need sponsorships or other financial assistance so that fares are reasonable.

   Shuttle service for hikers could also be helpful in reducing parking problems. Private shuttles are serving mountain bikers on the Guardsman pass. UTA busses cannot operate on the Guardsman Pass road due to their size. Transportation proposals for this area should be integrated with Park City's plans for Bonanza Flats.

5. What things can be done now, without waiting for a NEPA process?

   The CWC and canyon partners could dedicate funds for restrooms and trail maintenance. Additional parking enforcement in winter and summer should be a priority. Last, there are many ideas on how to save ski bus travel time and some concepts can be tested with traffic cones and police/traffic personnel on a trial basis. An entity like UDOT or UTA would need to plan and execute the trials and obtain traffic permits.

6. What long term options are on the table?

   The bus system outlined in this memo, or a similar one, will go a long way today in addressing needs in the canyons today. However, at some point in the future, higher capacity may be needed. Cog rail poses many concerns – environmental impacts, impacts to neighborhoods at the base of Little Cottonwood, protecting the overhead power system, cost. But it is still an option that may be more attractive than a bus system at some point in the future. At this time, aerial systems are too slow to meet transportation needs from the valley into the canyons.

The life of a UTA bus is about 12 years, and the proposed bus system outlined in this memo will have a useful life of many decades. The parking structures that serve both canyons would be needed even if a rail option is explored in the future (depending on their size).

The WSP/PB Long Term Transportation Memo evaluates long term options.

7. What options are there for funding?

   There are not a lot of options to fund a public transit system of this magnitude. Federal, state, and local governments are all facing more demands and less money. Tolling should be explored as a sustainable way to fund a system into the future. Tolling could incentivize transit and allow for a reduction in ski bus fare. It would be more effective to implement than paid parking in the canyons or the US Forest Service proposed fee system. Impacts to ski resort business, residents of the canyons, low income populations are all concerns. Public feedback to date indicates support to explore this option. (Also note that University of Utah civil engineering students conducted a study of transportation in Big Cottonwood in the spring of 2017 and their study recommended tolling as a funding mechanism.)

   A tolling system, if implemented, should replace the US Forest Service proposed fee system and should not be implemented in addition to a US Forest System fee system. A portion of the toll revenue would need to support the US Forest Service deferred maintenance gap (through direct funding or by funding projects). Last, tolling should be considered in the context of both Cottonwood canyons (otherwise the canyon that is not tolled could receive higher visitation and traffic).

   Other funding options include: Central Wasatch Commission partner contributions (currently $925K per year), bus fares (but the higher the fare, the fewer people ride), ski resorts (they contribute $300-$400K per year currently), annual appropriation from the state legislature (this would be unusual), a referendum to increase sales tax.

8. What about trails?

   Trails are an important component for recreation experiences in the Cottonwoods and many people would like to see more trails. For now, the priorities should be to improve trailhead conditions (restrooms, busses, parking), to find long term funding to maintain trails and trailheads, to make trail connections that reduce driving, and to finish the Bonneville Shoreline Trail. Completing the Bonneville Shoreline Trail at the interface of the foothills and the valley could reduce the demand to drive into the canyons to access trails.

APPENDIX A: PHOTO NARRATIVE

Congestion, Overflow Roadside Parking, Skiers Walking to Resort, Cars Turning Around Due To Full Resort Lots

Big Cottonwood below Solitude

Little Cottonwood Canyon Traffic Backed Up to Fort Union

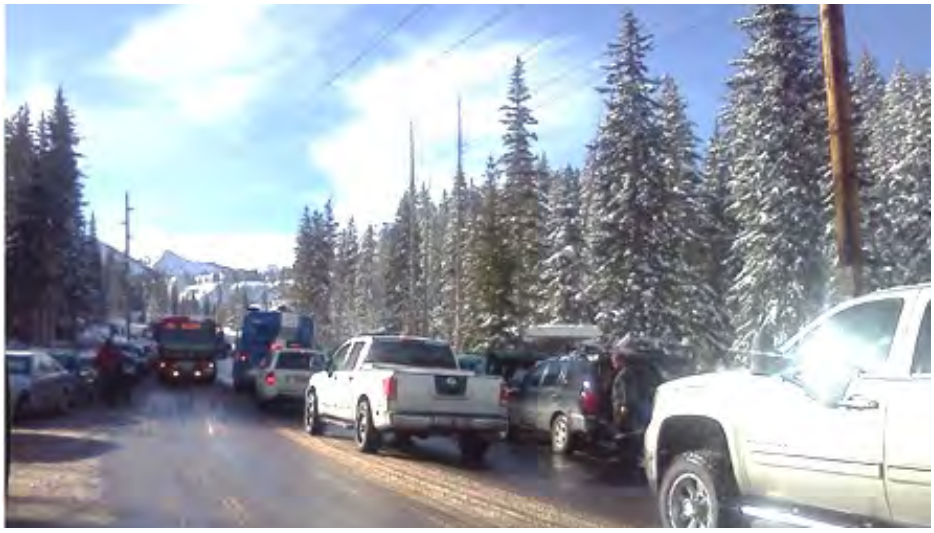
Cottonwood Heights

Full Ski Resort Parking Lots

Alta/Little Cottonwood

Overflow Parking

Little Cottonwood



Congestion and Overflow Roadside Parking

Big Cottonwood

Overflow Roadside Parking

Snowbird/Little Cottonwood

Overflow Parking at Backcountry Trailhead

Big Cottonwood

Overflow Roadside Parking

Big Cottonwood

Ski Bus Crowding

Little Cottonwood

Ski Bus Crowding

Big Cottonwood

Overflow Parking

Guardsman Pass between Big Cottonwood and Park City

Overflow Parking

Mill B/Lake Blanche Trailhead, Big Cottonwood

Overflow Parking

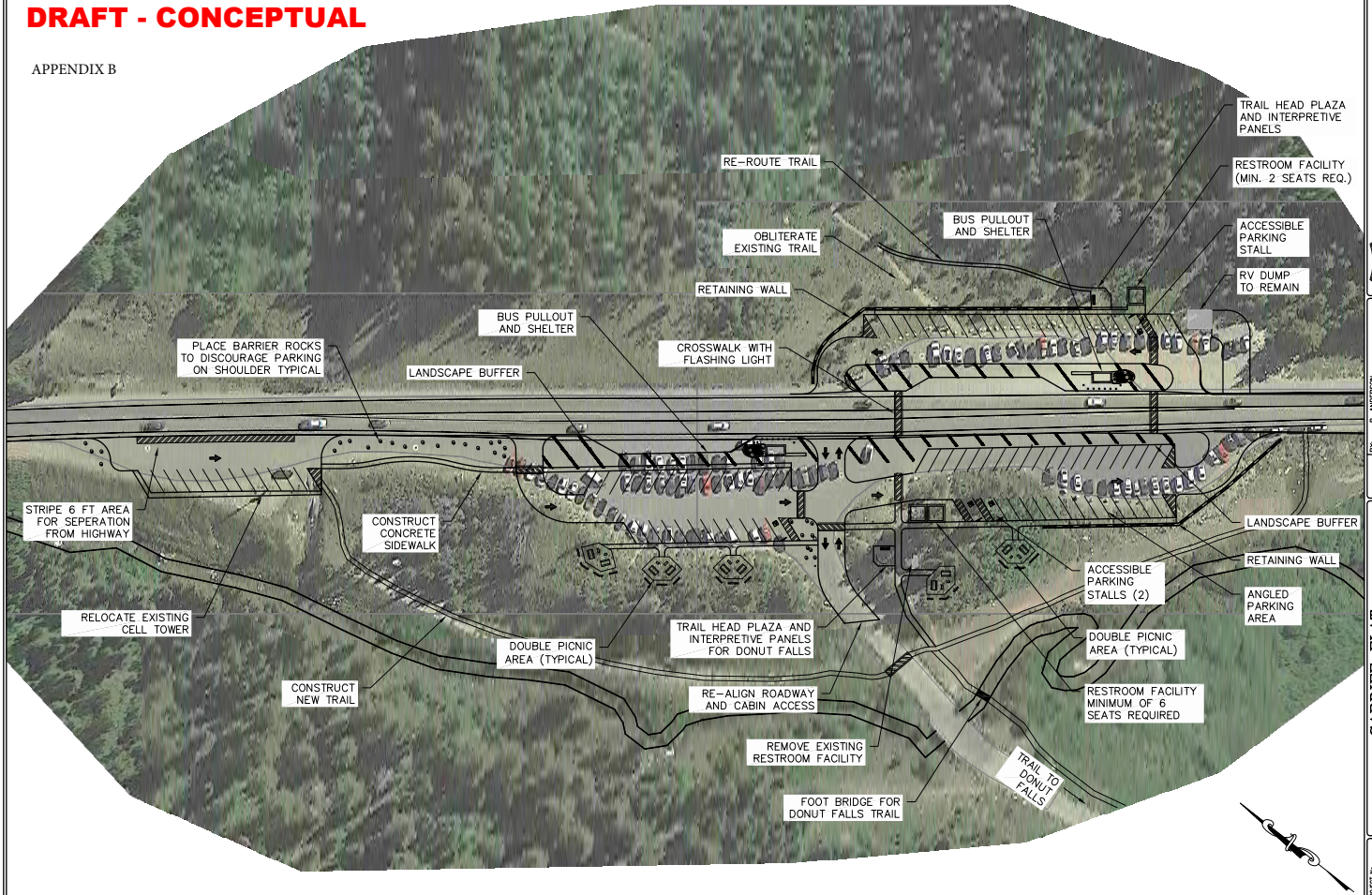
Reynolds Flat/Doughnut Falls, Big Cottonwood

Overflow Parking

Reynolds Flat/Doughnut Falls, Big Cottonwood

DRAFT - CONCEPTUAL

APPENDIX B



U. S. Department of Agriculture
FOREST SERVICE
Intermountain Region 4
Engineering
UINTA-WASATCH-CACHE NATIONAL FOREST

DESIGN BY: R. ANDERSON
DRAWING CHECK: D. JEPPSEN
CHECK: D. JEPPSEN
APPROVED: DIRECTOR, ENGINEERING
DATE

CARDIFF FLAT
BUS STOP & TRAILHEAD
SITE PLAN OVERVIEW

PROJECT No.
DRAWING SITE
SHEET 0

ATTACHMENT C: Technical Information from WSP/PB

WSP/PB prepared the following reports under contract with the Wasatch Front Regional Council, in consultion with the Utah Department of Transpotation and the Utah Transit Authority, and with funds from the Mountain Accord program. The reports are provided for information purposes and have not been publicly reviewed or adopted.

1. Short Term Tech Memo
2. Summer Transit Tech Memo
3. Winter 2016-17 Tech Memo
4. Long Term Tech Memo
5. BCC vs LCC Memo
6. 7200 South vs 9400 South Memo
7. Transportation Framework

MOUNTAIN ACCORD

Mountain Accord Cottonwood Canyons Short to Mid-Term Transportation Solutions Technical Memorandum

May 2017

This report was prepared by WSP/PB under contract with Wasatch Front Regional Council, in consultation with the Utah Department of Transportation and the Utah Transit Authority, and with funds from the Mountain Accord program. The report is provided for information purposes and has not been publicly reviewed or adopted.

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Appendices

1 Short to Mid-Term Goals

The intent of this memo is to present transportation solutions for Big and Little Cottonwood Canyons (the canyons) that are responsive to existing transportation issues and can be implemented within a five to ten year horizon. Building on more immediate solutions presented in the Summer Transit Pilot Program Technical Memo, the solutions in this memo are aimed to address the needs and goals of the canyons as defined by the Mountain Accord, which include:

- To accommodate and manage growth in use while maintaining positive recreation experiences and minimizing impacts to natural resources
- To provide a sustainable, safe, efficient, and multi-modal transportation system that provides year-round choices to residents, visitors and employees that connects to the overall regional network, serves a diversity of commercial and dispersed recreation uses, is integrated within the fabric of community values and lifestyle choices, and is compatible with the unique environmental characteristics of the canyons.
- To increase transit use, walking, and biking and decrease single-occupancy vehicle use.
- To address road cycling needs in Big Cottonwood Canyon and Little Cottonwood Canyon.

Following is a discussion of existing conditions as well as a focused discussion of transportation issues facing canyon users. The issues and solutions span multiple components of the canyon transportation system. Thus, this memo will describe each of the six components listed below separately. The final section will provide a summary of the proposed solutions as well as the benefits that the proposed solutions will provide to canyon users.

1) Parking
2) Transit
3) Real-time communications
4) Walking and Biking
5) Active Traffic Management
6) Auto Pricing

2 Existing Conditions

2.1 Transportation Infrastructure

As will be described in greater detail below, visitation and auto use create a strain on all types of transportation infrastructure, from buses to roads to parking areas, both in the canyons and in the Valley. Table 1 below documents the available capacity and scope of existing infrastructure.

Table 1: Summary of Existing Transportation Infrastructure (2016-2017) by Study Component

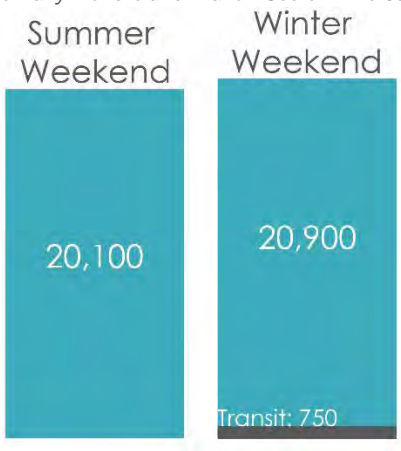
	Valley Characteristics	Big Cottonwood Canyon	Little Cottonwood Canyon
Parking	- 10 park and ride lots - Approx. 2,900 spaces - Avg. utilization: 50% - Peak utilization: 85%	- 2,570 spaces at resorts; 96% peak utilization - 2,260 shoulder & pullout spaces; 26% peak utilization	- 3,460 spaces at resorts; 95%peak utilization - 1,390 shoulder & pullout spaces; 22%peak utilization
Transit Service	Transit routes noted in subsequent boxes originate in the Valley.	Served by: - Route 972: Bingham Junction to BCC - Route 953: Murray Central Station to LCC (requires transfer to BCC)	Served by: - Route 953: Murray Central Station to LCC - Route 994: Historic Sandy Station to LCC
Real Time Communications	Real time roadway conditions are monitored generally through apps such as Google Maps, Apple Maps, UDOT's traffic app and UTA's app. Real time transit information is available through various third-party mobile apps.	Utah Department of Transportation has roadside cameras that provide real-time views of roadway conditions; this site is accessible to the public online and through the UDOT and UTA Traffic apps. VMS signs along SR 210 and at mouth of canyons convey roadway conditions.	
Active Transportation	Some pedestrian and cyclist facilities exist on roads leading into canyons; SR 210 between the canyons has a bike lane.	Bicyclists and pedestrians share roadway and shoulders with other vehicles in canyons.	
Active Traffic Management	N/A	N/A	SR 210 has roadside VMS signs
Tolling	Tolling facilities exist on I-15 Express Lanes in Salt Lake City and in American Fork and Mill Creek Canyons.	N/A	N/A

2.2 Canyon User Profiles

Year-round visitation in the canyons creates a number of transportation challenges. Addressing these challenges require tailored solutions that both reduce the impact of canyon visitors and also provide a reasonable alternative to single occupancy auto use in the canyons. Winter and summer canyon visitors, while roughly equal in number, access different attractions and require different transportation services and facilities.

- Winter Visitors:
  - The primary visitor destination in the winter are the ski resorts, located in the easternmost end of each canyon. Between 90-95% of parked cars in the canyons in the winter months are in a ski resort parking lot.
    - Issue: Due to the location of ski resorts, and that they are the primary destination for winter canyon users, there is congestion the entire length of the canyon during peak travel periods
  - Annual growth of winter canyon visitors has been relatively steady at about 3% per year between 2012 and 2015.
  - In the 2015-16 ski season, the Utah Transit Authority (UTA) operated eight Ski Bus routes. On average, 750 people used this transit service daily.
- Summer Visitors
  - Summer visitors in the canyons access a number of varied recreational uses including hiking trails, fishing spots, and rock climbing locations. Road cyclists utilize the shoulders to ride in the canyon, while mountain bikers access trails through formal and informal parking areas.
    - Issue: the dispersed nature of activities causes motorists to park along canyon roads and in the shoulder, creating unsafe interactions between cars and pedestrians
  - Annual growth of summer canyon visitors is considerably higher than that of winter visitors – an average of 8% annually between 2012 and 2015.
  - There is no existing transit service provided by UTA in the summer. Private shuttle providers provide a pick up and drop off service for mountain bikers – often accessing trails via unpaved dirt roads.

Figure 1: Average Daily Visitors and Transit Users in the Canyon, By Season

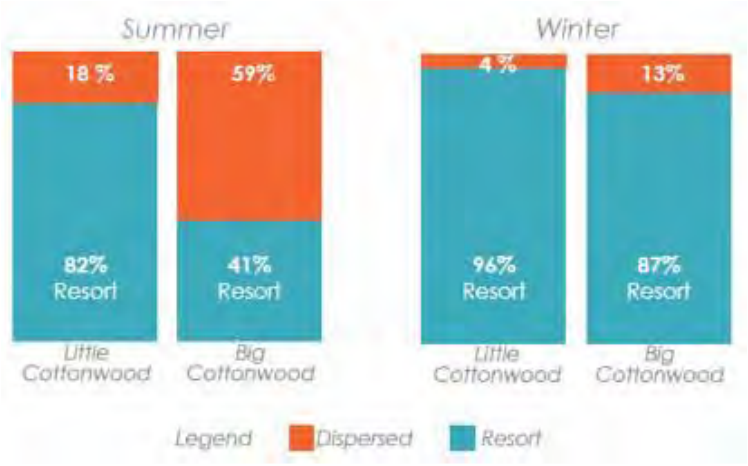


3 Parking Conditions, Facilities, and Strategies

3.1 Problem Statement

A number of parking specific issues occur in the canyons in both the summer and winter months. General, seasonal parking trends are shown in Figure 2. Specific issues are summarized below.

Figure 2: Parking Location Preference, Winter vs. Summer

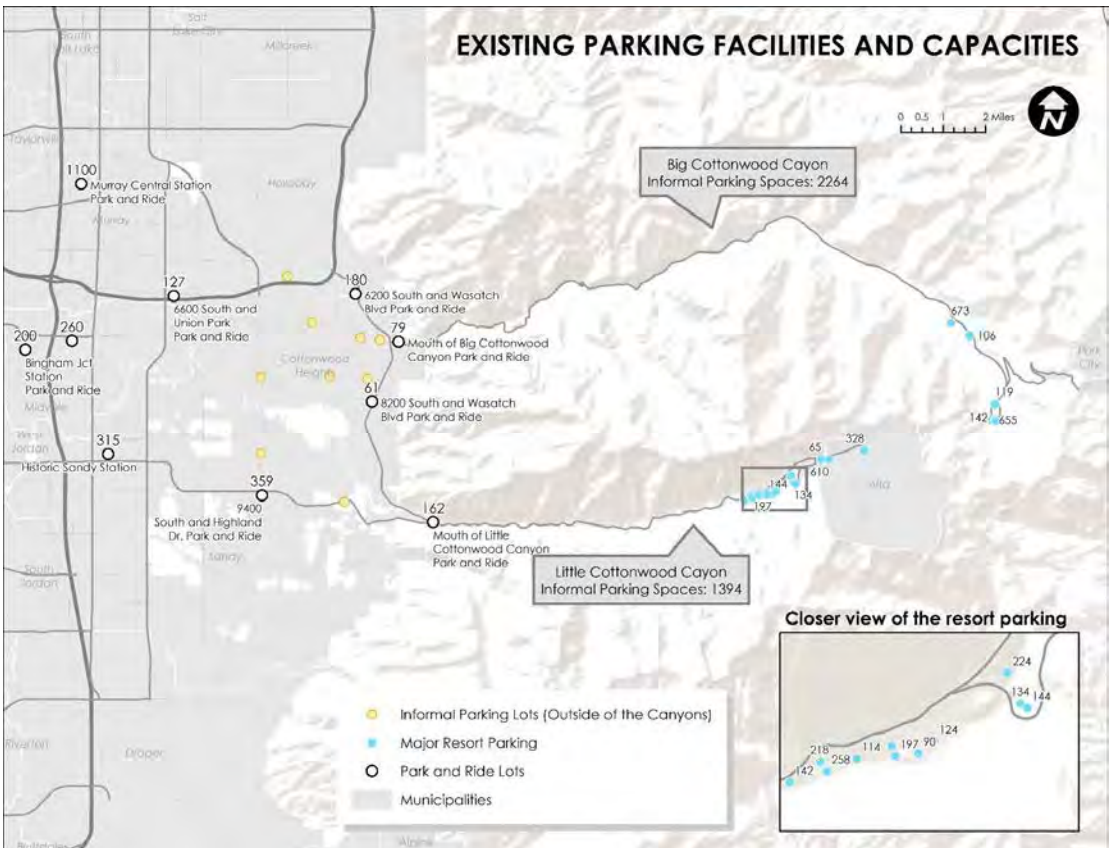


Source: WSP | Parsons Brinckerhoff

- Lack of parking - During peak times, congestion in Big and Little Cottonwood Canyons causes significant parking issues on the canyon roadways, at trailhead parking lots, at the ski resorts, and also in and around the mouths of the canyons.
- Unregulated and unenforced parking - Shoulder and pull-out parking in Big and Little Cottonwood Canyons is largely unregulated.
- Roadside parking creates unsafe conditions - Parking on the roadside narrows the roadway for through-traffic, inhibits snow plow operations during winter months and reduces space available for cyclists and pedestrians to safely travel the corridor to access destinations in the summer.
- Excessive wear and tear creates unintentionally wide shoulders - Due to the dispersed nature of recreation in Big and Little Cottonwood Canyons in the summer time, many users park in areas that have not been designated for parking. Pulling off of the asphalt pavement has created an erosion effect called edge rut. When maintenance crews repair the edge rut they place additional road base in eroded area causing a widening of the gravel shoulder.
- Informal parking creates damaging trails – People park in informal spaces in the shoulder and hike on non-designated trails. This has the effect of creating a network of trails that destroy native vegetation often called “spider web” trails.
- Lack of real time information - In addition to lack of parking spaces and safe parking conditions, canyon users currently have no real-time information about the availability of parking in the canyons. When parking at a destination fills up, overflow along roadway shoulders is common.

Figure 3 below presents a summary of formal and informal parking spaces in the Canyons and Valley.

Figure 3: Existing Parking Conditions in and near Cottonwood Canyons



3.1.1 Winter-specific Issues

Each season in the canyons brings about different transportation challenges. In addition to those issues noted above, winter brings a secondary set of challenges to parking in the canyons. Utah Transit Authority (UTA) park and ride lots are at or over capacity days following heavy snow, particularly when a snow event occurs on weekdays when daily commuters are also utilizing the lots. During busy periods, overflow parking from users accessing UTA park & ride lots affects nearby neighborhoods outside the mouth of the canyon. As park and ride lots fill up skiers begin to utilize street parking in neighborhood subdivisions which creates congestion on the local roadways and impacts residents who can no longer park in front of their houses. Additionally, skiers at the mouth of the canyon may decide to proceed to ski resorts, only to find that the available parking has already been taken. This creates an unnecessary trip adding to the congestion and winter air pollution.

3.1.2 Summer-specific Issues

As may be seen in Figure 2 above, summer parking demand occurs at roadside parking locations throughout the corridor. Some dispersed recreational destinations, including hiking trails, fishing spots, and rock climbing areas, do not have formal parking facilities. When the users of these types of facilities access the canyon they park in areas not originally intended for parking and access areas that do not have a formal trailhead. This creates edge rut at the edge of the pavement and a network of "spider web" trials that promote erosion and weed infestation. It also creates a hazard for bicyclist and pedestrians accessing the canyon along the shoulder of the road who need to compete with other cyclists and vehicles utilizing the narrow roadway. Many of the formal parking lots are inadequate to handle the demand at some of the popular destinations. As such, people park outside of the designated parking areas which erodes vegetated areas.

3.2 Proposed Short Term Parking Solutions

3.2.1 Canyon Parking Strategies

3.2.1.1 Limit roadside parking within the canyons

In order to encourage transit use, it is recommended to limit free parking near proposed United States Forest Service (USFS) fee sites and resort parking lots. In most cases the USFS proposed fee sites are near proposed transit stops. Free parking would not be allowed for a distance of at least a half mile in each direction around proposed USFS fee sites. This parking would be limited to the capacity of the area and would not allow illegal parking. Canyon parking limitations will likely need to be phased in over time to allow for the expansion of transit service and the addition of parking improvements in the valley to accommodate users who switch from driving to using transit.

3.2.1.2 Improve and formalize pullouts and safe shoulder parking

A large component of non-winter recreational use in the canyons consists of dispersed non-resort activities such as hiking, fishing and hunting. Since a large portion of these trips occur where access points are not served by a USFS proposed fee site or a transit stop, it is recommended to improve nearby parking areas to accommodate users. These parking areas would be developed from selected existing pullouts and shoulder parking. Improvements including paving, signing and striping, as necessary, would ensure that the space is used efficiently and that users can understand clear definitions between allowed and prohibited parking. USFS policy, as described in the 2003 Wasatch-

Cache National Forest Management Plan (p. 4-160), does not allow an increase in parking capacity in the canyons unless necessary for watershed protection or to facilitate transit service. Coupled with the enforcement of no parking areas, the provision of these parking areas would not increase parking capacity in the canyons and would therefore be in accordance with this USFS policy. Areas that would merit the provision of free parking in the canyons include the following:

Table 2: Proposed Parking in Canyons

Description	Location	Attractions	App. # Parking Spaces
Big Cottonwood Canyon			
Dogwood	Mile Marker 3, North Side	Climbing, Fishing	10
Ledgemere	Mile Marker 3.4, North Side	Climbing, Fishing	30
Mineral Fork Trailhead	Mile Marker 7.6, South Side	Hiking	10
Pullout	Mile Marker 8.7, South Side	Hiking, Fishing, Backcountry skiing	20
Argenta Trailhead	Mile Marker 9.1, South Side	Hiking, Backcountry skiing	30
Butler Fork	Mile Marker 10, North Side	Hiking	15
Little Cottonwood Canyon			
Gate Buttress Trailhead	Mile Marker 5.1, North Side	Hiking	20
Shoulder Parking	Mile Marker 5.6, North Side	Hiking, Backcountry skiing	10
Lisa Falls Trailhead	Mile Marker 6.6, North Side	Hiking	20
	Mile Marker 6.6, South Side	Hiking	15
		Total Parking Spaces in Canyons	**180**

In all, the recommended parking areas listed above would provide approximately 180 parking spaces, in contrast to the estimated 900 parked cars observed during peak summer activity documented in the 2012 Avenue Consultants Parking Study. It is anticipated that this reduction in parking may induce users to choose transit, once offered, as an alternate mode of transportation into the canyons. Proposed transit service concepts to address this need is discussed in Section 3. Additionally, the availability of real-time information on the availability of parking in the canyons will empower users to know ahead of time whether it makes sense to drive into the canyons, or whether transit will save them time and better serve their needs. This concept will be discussed further in Section 5.

3.2.1.3 Support the Implementation of Proposed USFS Fee Sites

The United States Forest Service (USFS) is in the process of proposing to implement fee collection at ten locations in the canyons, listed below with the proposed number of regulated parking spaces.

- Mill B South Trailhead: 103 spaces
- Cardiff/Mill D South Trailhead: 286 spaces
- Donut Falls Trailhead: 38 spaces
- Silver Lake Recreation Complex: 82 spaces
- Spruces Winter Trailhead: 76 spaces
- Guardsman Pass Trailhead: 90 spaces
- Temple Quarry Trailhead and Interpretive Site: 36 spaces
- White Pine Trailhead: 152 spaces

- Catherine's Pass: 30 spaces
- Cecret Lake Trailhead: 30 spaces
- TOTAL: 923 spaces

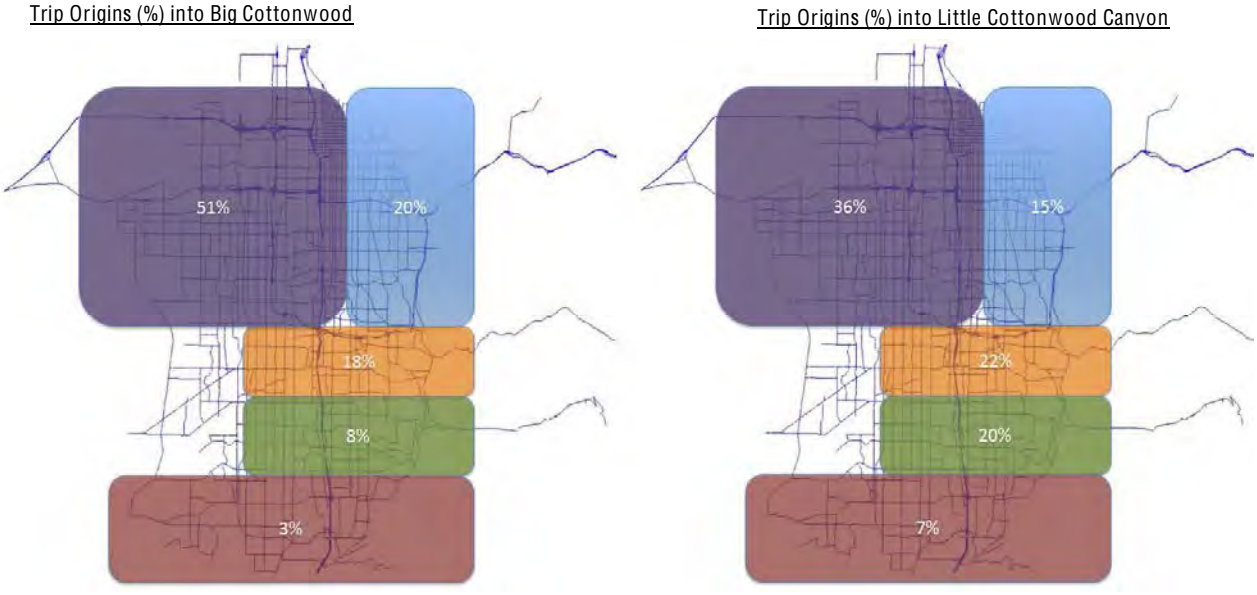
The locations of the free parking areas listed in the previous section were chosen with the proposed USFS standard-amenity fee sites in mind. It is preferable to have free parking located far enough from any fee site so as to encourage users to participate in the financial support of the fee site. The sites selected by the USFS as standard amenity fee sites have the following amenities: designated developed parking; a permanent toilet facility; a permanent trash receptacle; interpretive signs, exhibits, or kiosks; picnic tables; and security services. Users to these sites are paying for these amenities and funds generated would be used for recreation site facility improvements, operations, and maintenance. As of the date of this memo, public comments on the fee proposal are being reviewed and the proposal is under review at the Washington Office of the USFS, after which approval would also be required from the USFS Fee Board and subsequently the Recreational Resource Advisory Committee. If approved, implementation is not expected sooner than the fall of 2017.

3.2.2 Valley Parking Strategies

3.2.2.1 Canyon Trip Origins

Proposed parking strategies outside of the canyons are driven by existing observed as well as estimated travel markets. The goal of the proposed valley parking strategies is to utilize existing or create parking facilities that incentivize canyon visitors to park their cars in the valley and board a bus or find carpool opportunities outside of the canyons, thus reducing the number of single occupancy autos entering the canyons. Figure 4 below shows where trips into each canyon originate. These travel patterns were estimated as a result of a sketch-planning model, completed by project staff. Insights on travel patterns are presented below.

Figure 4: Trip Origination for Big and Little Cottonwood Canyons



Source: WSP | Parsons Brinckerhoff

Figure 4 presents results of all trips that take place on a daily basis. However, there are four types of trips represented in the results. These include:

1) Home based work trips
2) Non-home based trips
3) Home based recreation trips
4) Hotel based recreation trips

Over 90% of all trips modeled are made up of the latter two categories: home based recreation and hotel based recreation trips, each making up a roughly equal amount. Detailed results by trip type may be found in Appendix B. Canyon specific observations follow.

- Little Cottonwood Canyon Trip Observations: Based on the results of the sketch mode, there are nearly 20,000 daily trips within Little Cottonwood Canyon. Approximately 50% of the trips entering Little Cottonwood Canyon begin north of the canyons. The next largest portion – about 40% - of trips begin closer to the mouth of the canyons, with the balance of trips coming from the south.
- Big Cottonwood Canyon Trip Observations: there is an estimated 16,000 daily trips within Big Cottonwood Canyon. Trips into this canyon include a significantly higher portion of trips from the north – over 70%.

3.2.2.2 Canyon Parking Demand, Solutions

It is proposed that the parking management strategies incorporate the use of multiple parking lots strategically located along the bus routes that access the canyons along with a real time communication strategy that will inform users of the canyons of the availability of valley parking and easy access to transit. Because of the separate transit service and parking needs of Big and Little Cottonwood Canyons, recommendations tailored to the user needs for each canyon are discussed separately below.

3.2.2.2.1 Big Cottonwood Canyon

Canyon visitation is consistently higher and more concentrated in the winter than in the summer. Thus, it is proposed to plan for winter volumes when planning for future parking needs. In lieu of available projections of canyon visitation, the following ski resort capacity numbers were used to determine a cap of future canyon visits. Solitude and Brighton ski resorts have the infrastructure (lifts) to accommodate approximately 7,500 additional skiers in Big Cottonwood Canyon. This assumes that there are no limitations on parking or roadway capacity. This level of visitation is estimated to require 4,200 additional parking spaces. Additionally, given the travel markets described above, it is recommended that the proposed parking facilities be located so as to serve the largest portions of Big Cottonwood Canyon users. Given that nearly 70 percent of users originate north of the mouth of the canyon, parking facilities along I-15 and/or I-215 would best respond to the needs of users. Responsive locations and strategies are noted below.

- BCC Parking Scenario 1 - Prioritize parking near the mouth of the canyon: This scenario emphasizes parking close to the mouth of the canyon, which has been observed to be the preference of park and ride users. Using a park and ride as close as possible to the final destination reduces travel time for users and thus becomes an incentive to use transit over park and ride locations further out in the valley. Because of the limited footprint available at the

existing park and ride locations at the mouth of BCC, and at 6200 S and Wasatch Boulevard, a structure height of seven stories may be required to accommodate the maximum number of parking stalls needed. This option has the challenge of building a parking structure in an area that does not currently have structures 7 stories tall. This may create a visual barrier to the canyons and would likely be controversial. The following table identifies potential costs of building parking structures near the mouth of BCC.

Table 3: BCC Scenario 1 Estimated Cost, Mouth of Canyons

Park & Ride	Ownership	# Levels	Parking added	Cost to Construct
Potential new Park and Ride lot	Unowned	5	2,650	$53,000,000
6200 S & Wasatch	UDOT	7	1,080	$25,000,000
Mouth of BCC	Cottonwood Heights	7	560	$11,000,000
Total			4,290	$89,000,000

- BCC Parking Scenario 2 - Parking dispersed through the Valley: This scenario examined properties currently owned by transportation agencies. The existing park and ride lots have a relatively small foot print to build a parking garage. In order to increase the capacity necessary for future growth Big Cottonwood Canyon, it would require more structures dispersed throughout the valley. This scenario provides for future growth without the need to purchase additional right of way. The following table identifies potential costs of building parking structures dispersed throughout the valley.

Table 4: BCC Scenario 2, Estimated Cost, Dispersed

Park & Ride	Ownership	# Levels	Parking added	Cost to Construct
Mouth of BCC	Cottonwood Heights	6	400	$9,500,000
6200 S & Wasatch	UDOT	7	1,080	$25,000,000
7200 S Trax Park & Ride	UTA	7	1,600	$37,000,000
Bingham Junction	UTA	7	1,200	$29,000,000
Total			4,280	$100,500,000

3.2.2.2.2 Little Cottonwood Canyon

Even with the reduction of roadside parking described above, Little Cottonwood Canyon would not need additional parking spaces to accommodate current visitation levels. Since canyon visitation is consistently higher in the winter than in the summer the following estimation of needs assumes winter demand levels. In lieu of available growth projections of canyon visitation, the ski resort capacity numbers are used to determine a projection of future canyon visits. Alta and Snowbird currently have the infrastructure capacity to support an additional 7,000 skiers. This would require approximately 3,800 additional parking spaces. Two scenarios are proposed for meeting parking needs of users of Little Cottonwood Canyon, both of which include the development of parking structures at existing park & ride locations that would occur in the short-to-mid-term period of 5 to 10 years. As with the BCC parking strategy above, it is recommended that the location of proposed parking facilities be located so as to serve the largest portions of Little Cottonwood Canyon users. Approximately 50 percent of users originate north of the mouth of the canyon, parking facilities along I-15 and/or I-215 would best respond to the needs of users. The next significant market are those trips that begin west of the mouth of the

canyon. Parking facilities along 7200 S and 9400 S and near the mouth of the canyon would best serve these trips. Responsive locations and strategies are noted below.

- LCC Parking Scenario 1 - Prioritize parking near the mouth of the canyon: Similar to the BCC Parking Structure Scenario 1, this scenario prioritizes proximity to the mouth of Little Cottonwood Canyon to allow users to minimize travel times. It should be noted that a there are currently no building structures that are 7 to 9 stories high in this area. Since parking structures this tall would likely block the scenic vistas of the canyon it may be controversial to build a structure this tall. The following table details LCC Parking Structure Scenario 1.

Table 5: LCC Scenario 1, Estimated Cost, Mouth of Canyon

Park & Ride	Ownership	# Levels	Parking added	Cost to Construct
9400 S & Highland Dr.	UTA	9	2,850	$64,000,000
Mouth of LCC	Federal Gov't (USFS)	7	950	$22,500,000
Total			3,800	$86,500,000

- LCC Parking Scenario 2 – Prioritize parking dispersed through valley: the existing park and ride lots have a relatively small foot print to build a parking garage. In order to increase the capacity necessary for future growth and to minimize the height of the parking structures, it would require more structures dispersed throughout the valley. This scenario would cost a little more per parking stall but may function better because it takes less time for the user to access the upper levels of the structure. With a higher number of parking structures that could quickly fill to capacity it is necessary to provide real time communication with the users of the system to they can plan their trip with a minimum of frustration.

Table 6: LCC Scenario 2, Estimated Cost, Dispersed

Park & Ride	Ownership	# Levels	Parking added	Cost to Construct
Mouth of LCC	USFS	5	650	$16,000,000
8200 S & Wasatch Blvd	Salt Lake Co	4	180	$5,000,000
9400 S & Highland Dr	UTA	5	1,400	$37,500,000
Historic Sandy	UTA	6	1,570	$35,500,000
Total			3,800	$94,000,000

3.2.3 Resort Parking Strategies

3.2.3.1 Implement Parking Fees at Resorts

Parking at the four canyon ski resorts is currently free of charge. Paid parking may help encourage more people to use transit or to carpool to travel to the canyon resorts. Increased transit use would relieve roadway congestion, which would reduce travel times and improve the experience of all canyon travelers. Additionally, resorts would collect revenue from parking. Comparable ski resorts in other parts of the country use a variety of methods to charge parking fees. Table 7 provides a summary of these below.

Table 7: Parking Fee Summary, National Ski Resorts

Strategy	Resorts Using Strategy	Comments
Fee for premium parking Free non-premium parking	Breckenridge, Vail, Whistler, Beaver Creek, Keystone, Steamboat, Park City, Aspen Snowmass, Heavenly, Northstar	Premium lots are closer and more convenient, whereas the free lots require riding a shuttle or walking longer distances.
Variable pricing (e.g., free 0-2 hours, $15 2-3 hours, and up)	Vail, Whistler, Beaver Creek, Aspen Snowmass, Heavenly	Users who are staying for less than a full day don't have to pay the full amount.
Lower price for late arrival	Northstar	Preferred parking price drops by 50% after 11 am. This incentivizes some users to arrive later and avoid the morning rush. It also allows the resort to gain more value from spaces that clear out when morning half-day skiers leave. This might appeal more to locals who can be selective about ski times.
Volume discounts (e.g., monthly pass, Ten Day Punch Pass)	Whistler, Beaver Creek, Heavenly	This might be attractive to locals or long vacationers. Paying a reduced fee for multiple days of parking upfront would alleviate the feeling of having to pay each time.
Super premium parking (e.g., reservations, valet)	Northstar	In addition to other options (including free parking with a shuttle) Northstar users have the option of paying $100 for reserved "Platinum Valet" parking to make their experience quicker

3.2.3.2 Incentivize Carpooling

Currently, Snowbird resort hosts a carpooling incentive program, called Snowbird RIDE (Reducing Individual Driving for the Environment). The Snowbird R.I.D.E. program rewards carpools with 3 or more riders with VIP parking closest to the lifts. Using a carpool tracking card, rider can earn a half price transferable lift ticket with 10 trips. Alta, Brighton and Solitude also have carpooling incentives which include priority parking and gift vouchers to help reduce single occupancy vehicles in the canyons.

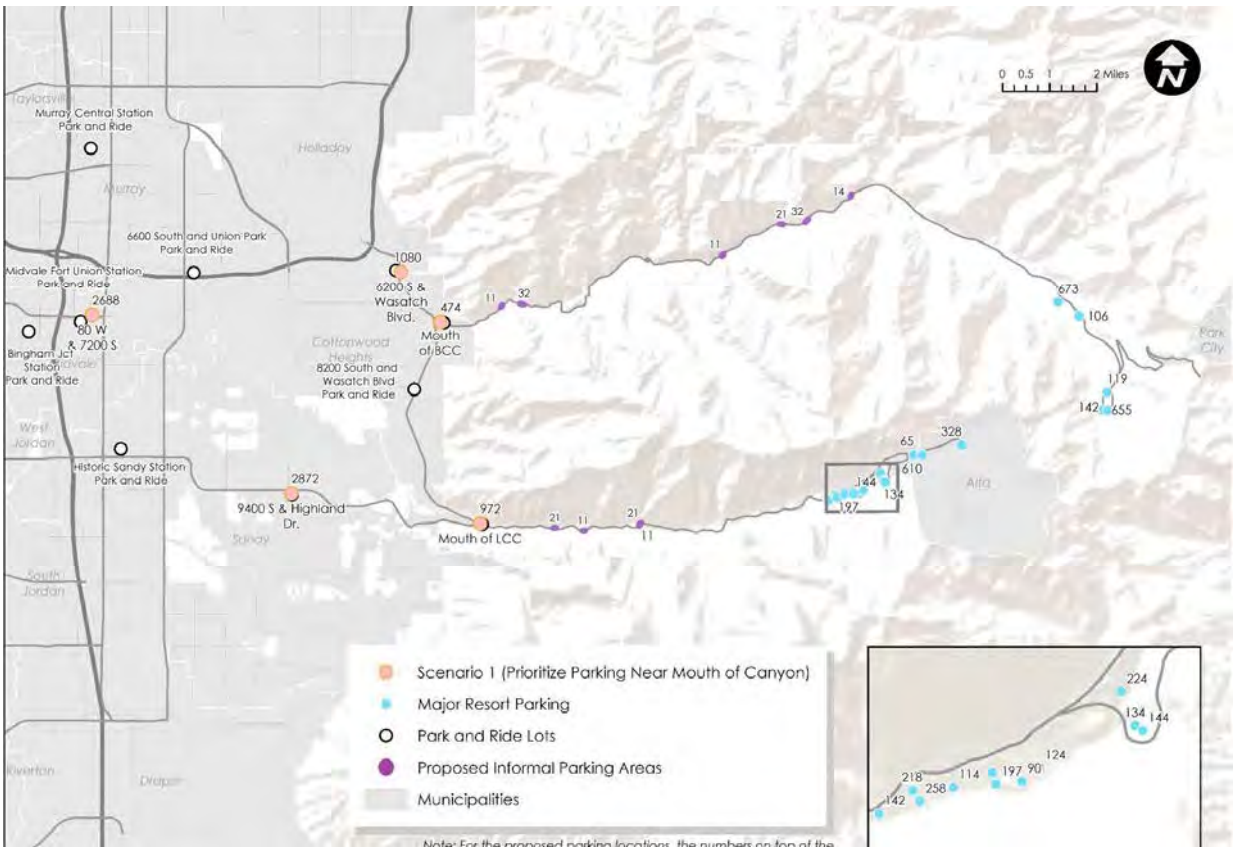
3.2.4 Recommended Short Term Parking Strategy

Figure 5 below presents the proposed short term parking strategy. Given the travel markets and the location of available facilities, the following locations are considered the most compatible to expand the parking supply in order to meet demand.

- Big Cottonwood Canyon: Mouth of BCC, 6200 S & Wasatch, and Bingham Junction
- Little Cottonwood Canyon: Mouth of LCC, 9400 S

In addition to the proposed facilities, the locations of the proposed in-canyon parking spaces are noted on Figure 5 below.

Figure 5: Proposed Short Term Parking Strategy



3.3 Next Steps

In order to implement the proposed short term parking strategies, the following steps are recommended:

- Public involvement – Each of the proposed parking strategies will impact users both in the canyons and in the valley. It is recommended to involve the public and solicit input early in the planning process.
- Conduct parking study – The analysis presented above includes a number of high level assumptions such as seasonal effect on canyon travel, the sizing of parking facilities, and the appropriate height of structures, particularly those located near the mouths of the canyons and residential areas.
- Property Acquisition – Expand the inventory of park and ride lots by identifying properties along the bus corridors servicing the Cottonwood Canyons that can be converted to a park and ride.
- Environmental studies (NEPA) – Implement the studies that will be required for pullout and shoulder parking where recommended inside the canyons. Due to the length of time to complete these studies this effort should start as soon as possible. Additionally, if Federal funding would be used for any Park & Ride location improvements, NEPA studies for these project should start as soon as possible.

3.4 Tasks/Responsibilities

Parking strategies both in and outside of the canyons will require effort, cooperation, and coordination from a variety of entities, including the following:

- Central Wasatch Commission (CWC) – The CWC will provide coordination and oversight, including co-leading any potential funding opportunities
- USFS – Manage proposed fee sites
- UTA – Park & Ride lot management
- UDOT – Paving pullouts/pavement removal
- Alta, Brighton, Snowbird, and Solitude Ski Resorts – Parking fee structures, implementation
- Salt Lake County Sheriff, Sandy City, Cottonwood Heights– Enforcement of 'No Parking' areas
- Midvale – Park & Ride development
- City of Sandy – Park & Ride development

4 Transit Strategies

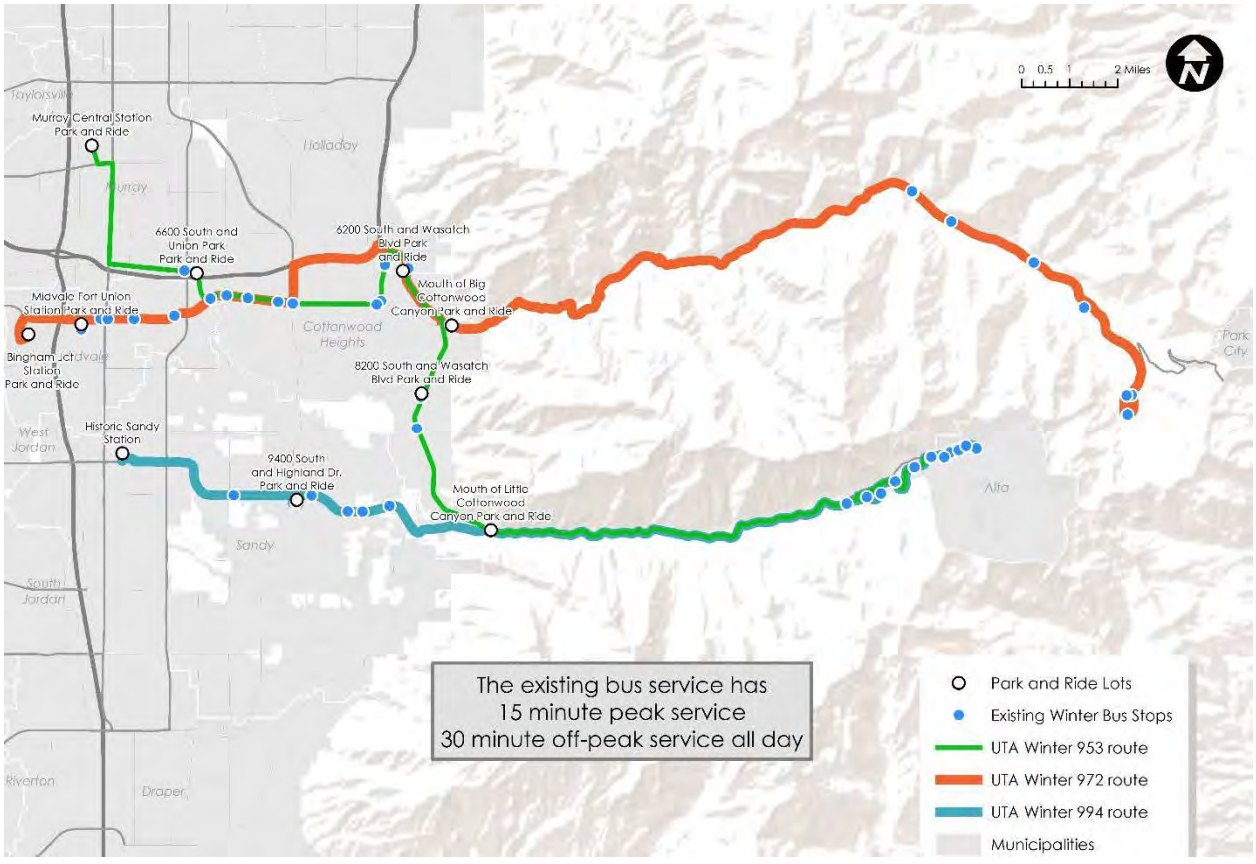
Transit serves as an essential tool to reduce SOVs in the canyons and serve the growing demand of visitors in the canyons. Coupled with parking management strategies, transit allows for the ability to transport visitors and employees while decreasing the amount of parking in the canyons. Additionally, bus service can reduce the delay and congestion on the roadways in the canyon.

4.1 Problem Statement

4.1.1 Lack of Year Round Transit Service

Due to the varied needs of winter and summer travel markets in the canyons, it is difficult to establish a "one size fits all" year-round transit service in the canyons. Thus transit needs and services are characterized separately for the winter and summer seasons. The existing winter-only Ski Bus service caters to the high demand at the ski resorts, as well as within the canyons for backcountry skiing and snowshoeing. A map of existing Ski Bus service is presented in Figure 6 below.

Figure 6: Existing (2016-17) Ski Bus Service



During the summer, there are limited public transit options. UTA runs route 990 to Snowbird, which consists of one trip up the canyon in the morning and one trip back down in the evening. Within the canyons, the Town of Alta and Snowbird each operate shuttles. Additionally, private operators also provide shuttle service into the canyons and to trailheads. These operators provide shuttle service for mountain bikers, and generally have trailers or additional equipment allowing them to haul bikes in and out of the canyons and also access trailheads along dirt roads. UTA Ski Buses are unique vehicles within

the UTA fleet – they have special traction and transmission systems that allow them to operate in the canyons efficiently. However, this fleet has limitations in meeting the varied demands of summer visitors in the canyons. Ski Buses have bike racks with space for only two bikes. Additionally, these buses are not intended to operate on dirt roads and in many areas, do not have sufficient space to turn around or stop for passengers without significant improvements to road and transit infrastructure. Thus, given the differing transit needs between seasons, and the availability of private operators to supplement these needs, separate fixed UTA routes are proposed for winter and summer services. Summer services may require additional/different stops than those used for the winter Ski Bus service. The proposed routes will be discussed in greater detail below.

4.1.2 Operational Challenges

There are two primary areas where Ski Bus operations face delays and slower travel times: accessing park and ride lots and entering/leaving resort areas. Each will be discussed in greater detail below. While these conditions are found during the existing winter operations, it is likely that these are applicable to year-round service as well – particularly during heavily congested times in the canyons.

4.1.2.1 Challenge 1: Access, Circulation within Park and Ride Lots

Park and ride lots allow canyon users the opportunity to easily access transit services for the existing Ski Bus service and proposed summer services. However, park and ride lots also create a number of challenges that inhibit circulation within the lot, create travel time delays for transit users, and can cause transit vehicles to get stuck in congested conditions. Specific issues include:

- Flow in and out of Park and Ride – the time it takes a transit vehicle to access the park and ride lot, pick-up customers, and then turn back onto either a Valley or canyon roadway is significant – often upwards of 5 minutes or more. Further delays may be experienced as the transit vehicle attempts to re-enter the road during congested conditions.
- Chain up locations – commercial vehicles use the Big Cottonwood park and ride lot to chain up. This inhibits the flow of both transit and private vehicles within the lot, creating delays.

4.1.2.2 Challenge 2: Accessing Resort Areas

Access into and egress out of resort parking lots is time consuming for transit vehicles. The circulation within resort lots accounts for 5 to 10 minutes of travel time along a route. There are specific resort and access locations that are problematic.

4.1.3 High Demand for Ski Bus service

UTA performed an analysis of observed ridership patterns for the 2015-16 Ski Bus season. As a result of the findings, UTA reconfigured the 2016-17 Ski Bus routes to better meet the preferences of its users. The findings indicated that users board Ski Buses at park and ride lots and generally prefer to board a bus close to the mouth of each canyon. Additionally, a high concentration of users boarded buses over a 2-hour period in the mornings – likely to get to resorts upon opening, and over a 1-hour period in the afternoon as resorts closed. Midday and evening are also critical in not only transporting employees but also those only looking to ski half days. There is an observed need for a consistent, all-day service with evening trips provided to serve night skiing at Brighton.

4.2 Proposed Short Term Transit Solutions

4.2.1 Proposed Summer Service

4.2.1.1 Proposed Summer Bus Stops and Methodology

Seasonal recreation is a primary factor in the different demand and usage of the canyons between winter and summer. During the summer months, recreational uses tend to be more dispersed across various trailheads and recreational facilities. Due to the different seasonal demands from canyon users, a summer transit service is proposed that will focus on known and accessible summer destinations. In determining potential bus stops, the study team reviewed sites within the canyon for summer demand and the likelihood for each site to attract riders. Potential bus stops include trailheads and recreational destinations. Because the summer transit service is intended to complement the parking management strategy, sites were also considered from the Cottonwood Canyons Parking Study. The methodology used to determine which of the potential stops were most feasible included several factors:

- Roadway characteristics - Current UTA buses will not be able to handle the sharp curves along Guardsman Pass.
- Accessibility to recreational destinations - A significant share of summer transit users will consist of hikers. Thus, popular trailheads should be included in the route. Other recreational activities, such as fishing and hunting, may not be as compatible with transit.
- Proximity to other bus stops
- Demand based on parking occupancy
- Locations of proposed USFS standard-amenity fee sites - The proposed USFS standard-amenity fee sites may encourage visitors to consider transit as an alternative mode. Thus, these areas should also be included in the route.

A total of four new stops are proposed for summer service. Table 8 summarizes the existing winter and proposed bus stops for the short term summer transit service. Greater detail is provided in Appendix C.

Table 8: Existing and Proposed Bus Stops, By Season

Big Cottonwood Canyon			*Little Cottonwood Canyon*		
Bus Stop	Existing Winter Bus Stop	Proposed Summer Bus Stop	Bus Stop	Existing Winter Bus Stop	Proposed Summer Bus Stop
BCC Park & Ride	X	YES	LCC Park & Ride	X	YES
Storm Mountain	X	YES	Grit Mill		YES
Mill B South/S-Curves	X	YES	White Pine		YES
Cardiff/Mill D South/Donut Falls	X	YES	Snowbird Creekside	X	
Spruces	X	YES	Snowbird Center	X	YES
Silver Fork	X	YES	Snowbird @ Cliff Lodge	X	
Solitude @ Moonbeam Lodge	X	YES	Bypass Rd at Blackjack Condos	X	
Solitude @ Nordic Center/Silver Lake	X	YES	Alta @ Peruvian Lodge	X	
Brighton	X	YES	Alta @ Goldminers Daughter	X	
Brighton Downhill	X	YES	Alta @ Alta Lodge	X	

Big Cottonwood Canyon			*Little Cottonwood Canyon*		
Bus Stop	Existing Winter Bus Stop	Proposed Summer Bus Stop	Bus Stop	Existing Winter Bus Stop	Proposed Summer Bus Stop
			Alta @ Rustler Lodge	X	
			Alta @ Snowpine	X	
			Alta @ Albion Basin	X	YES

Per ADA standards, buses are requires to have a 5' x 8' landing pad connected to a pathway. The slope of any ramps should be less than 2%. All new UTA bus stops need to be ADA compliant. Currently, the existing winter bus stops are "grandfathered" in; any additional new summer stops will need to go through an evaluation process to determine if the design meets ADA standards. Additionally, an accessible route may be required between bus stops and nearby accessible amenities (e.g. picnic areas, restrooms, accessible parking stalls, etc.).

With new parking restrictions and the addition of summer transit service, the canyons are expected to draw a larger concentration of visitors to trailheads and destinations. The higher concentration of visitors at trailheads may warrant the need for USFS to reevaluate restroom facilities. Typically, USFS plans one toilet for every 35 visitors; however, this ratio could be reconsidered when evaluating the anticipated number of visitors at given sites. A greater number of visitors may warrant the need for additional restroom facilities.

4.2.1.2 Proposed Operations and Schedule

In order to provide the most optimal schedule, UTA will need to provide transit travel time analysis to determine the most efficient bus route(s). For example, some stops in the existing winter ski bus service may not necessarily have the same ridership during summer months. Depending on the demand and certain special events, it may be possible for UTA to provide "Express" services from the Valley to specific destinations. For example, it may be possible to provide Express service to Snowbird during Oktoberfest weekends, which tend to draw larger crowds to these special events.

Buses for the summer service should be capable of traversing the canyon roadways, as well as able to accommodate bicycles. The current fleet of buses used in the winter for ski bus service can be retrofitted for bicycle racks, accommodating mountain bikers in the canyons. As demand and service grows, it may be possible for UTA to reevaluate buses that could be added to the summer transit service fleet.

Headways for the proposed summer transit service are as follows:

- Weekend service: 15-minute headways all day
- Holiday service: 15-minute headways all day
- Weekday service: 30-minute headways all day

Headways of 15-minutes should be maintained all-day during weekends and holidays, which are anticipated to draw the largest crowds into the canyons. Within transit planning, headways of 15-minutes or less are considered frequent service, which is a general threshold for riders to have an

acceptable wait time without memorizing schedules. Providing more frequent service during the weekend can also accommodate higher demand in visitors and maintain a level of service to passengers.

4.2.2 Proposed Infrastructure Solutions

4.2.2.1 Bus Pullouts

In order to optimize travel time and reduce the dwell time, bus pullouts should be utilized wherever possible. Having buses circulate park and ride lots can add to the overall transit travel time, and therefore diminish the level of service. Given the steep and often narrow nature of the roadway in each canyon, consideration should be taken to provide long enough pull outs to ensure safe operation of buses and maximum visibility of all road users.

4.2.2.2 Park & Ride, Resort Improvements

It is recommended that bus circulation within both park and ride lots as well as at a number of resort stops be adjusted to maximize efficiency. In particular, it is recommended that bus boarding areas at both the LCC and BCC Park and Ride lots be moved to the periphery of the parking lot so that buses do not have to enter the lot. In addition, it is proposed to relocate stops that do not serve the primary lodge for each resort to the road. These improvements would save travel time for buses and would also free up space for more surface parking spaces. Pedestrian improvements, such as signalization and/or crosswalks to access the relocated stops, are recommended. Pedestrian infrastructure may include steps or trails from the main park and ride lot to the bus stop.

It is recommended that strategies be implemented to redirect demand toward underutilized Park & Ride locations. Strategies may include the use of real-time parking information that users can access before leaving home to see whether their preferred Park & Ride location is at or reaching capacity, and whether an alternative Park & Ride might serve their needs better.

4.2.3 Proposed Winter Service and Capital Solutions

Building from the changes in route and transit services made by UTA during the 2016-2017 ski season, UTA will focus continued improvement of ski bus services on increasing frequency and expanded service. In general, one of the key strategies is to provide more frequent bus service during peak times and improve mid-day headways. The following are the service improvements proposed for short-term ski bus service:

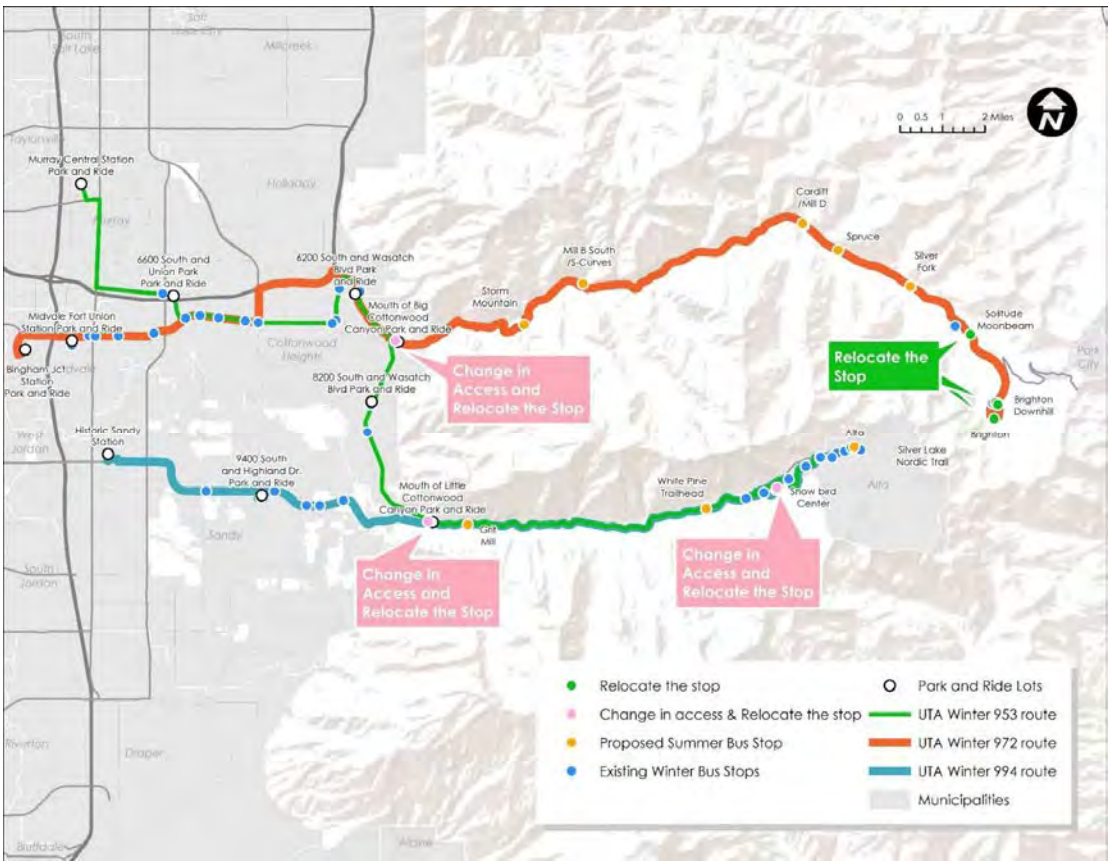
- Improve mid-day headways, creating a 15-minute frequency all day; 15-minute headways between 6:00 AM and 6:00 PM
- Add additional night service to Brighton; provide 30-minute headways from 6:00 PM to 9:00 PM
- Begin ski bus service earlier in the season; Operate ski bus service from November 15th (mid-November) thru March 31st (end of March)

The proposed winter short-term service will increase transit service levels by 25%. This increase in service should be supported by the procurement of additional ski buses. Based on current operations, 10 new buses would need to be procured to support the increased services.

4.2.4 Recommended Short Term Transit Solution

Figure 7 below displays the proposed transit service routing, winter and summer stops, and proposed changes to access and egress.

Figure 7: Proposed Winter and Summer Transit Service, Improvements



4.3 Private Operators

Currently, UTA owns the Common Carrier Rights within the canyons. There is potential for UTA to partner with other private operators to supplement areas that UTA service does not currently serve, such as Guardsman Pass. These areas may be inaccessible to buses due to the steep grades and sharp curves; however, private operators may be able to provide transfers that supplement UTA service. Additionally, these private services could serve minor trailheads that are not feasible for UTA service due to travel time impacts.

In other recreation locations, private shuttles have worked to successfully supplement public transit. This bridge of transportation allows for visitors to utilize alternative modes of transportation and helps to reduce the number of vehicles at these sites. Some of these successful programs include:

- Lake Tahoe: Tahoe Truckee Area Regional Transit (TART)
- Yosemite National Park: Yosemite Valley and El Capitan shuttle services

4.4 Next Steps

4.4.1.1 Winter Service

Data collection: As a part of the winter 2016-2017 ski bus service, transit ridership data should be collected for the 2016-2017 winter season. With the condensed routes (shifting from eight routes to three routes), increased headways, and added mid-day service, the improvements made for the 2016-2017 ski bus service should be evaluated for effectiveness. Data collection should include ridership data, transit capacity, bus headways, and travel times. This information will provide transit utilization and transit frequency. Evaluating ridership patterns and transit travel times can also be telling toward developing the short to mid-term UTA winter ski bus service.

Coordination with Summer Transit Service: From a transit operations perspective, it would be ideal for the winter ski bus route structures to match the summer transit routes. Having a common year-round transit route structure would simplify operations in signing, bus stops, and ridership predictability. However, due to differing seasonal demands and recreational uses within the canyons, it may be more practical for riders to have a separate summer route and winter route. By catering to ridership demands and seasonal uses in the canyons, it may be more likely for UTA to garner more transit riders.

Long Term Solutions: Continued monitoring and analysis of ski bus service data should be used in evaluating the effectiveness and performance of the services. Looking into the long term solutions, there may be opportunities to provide either a fixed guideway (cog rail) or fixed roadway (bus rapid transit) in the canyons. Regular evaluation of the UTA ski bus service can help drive planning and development of these long term transit solutions.

4.4.1.2 Summer Service

Formal Proposal and Public Outreach: Building off the recommendations for summer 2017, the Mountain Accord and Cottonwood Canyons would need to start any specific improvement process by first providing a formalized proposal. This proposal will then go through a development process between stakeholders, various agencies, and the general public. Having the general public weigh in on the proposal should help with expediting the NEPA review, as well as ensuring that the solution is most comprehensive and includes input from all voices.

NEPA Evaluation: In order to implement the proposed summer bus stops, several evaluations and approvals will need to occur. Due to the nature of the new bus stops and the environmental clearance needed, the new bus stops will likely undergo a degree of NEPA evaluation. While this list is not extensive, some of the possible evaluations and approvals that need to occur include:

- USFS Permitting
- Impacts on USFS land
- USFS Plan Agreement

For federal funding through the Federal Transit Administration (FTA), the Central Wasatch Commission (CWC) will serve as the lead in funding efforts, in partnership with UTA, UDOT, and the USFS.

Data Collection: As the summer transit program goes into operation, it will be useful to collect data that can be used toward gaining a better understanding of ridership, demands, and transit patterns. While not extensive, the following information should be obtained during the summer transit pilot program:

- Transit ridership by boarding/alighting
- Type of recreational users (hiker, rock climber, cyclists, etc.)
- Number of employees for services within canyons
- Travel time

This data should be aimed at providing better understanding of site demand, environmental capacity, and trailhead capacity. Please see the Avenue parking study for additional counts done during the previous summers. Surveys of riders from the pilot program can be done either on-board the bus or online.

Long Term Solutions: In building toward the Mountain Accord long term transportation solutions, data should be continually gathered and analyzed to evaluate how the transit program and roadway systems are performing, in addition to how well it syncs with other transportation solutions such as parking management and real time communication.

- A potential long term project for transit improvement is placing a visitor center and transit hub near the mouth of Big Cottonwood Canyon, by the existing gravel pit.

5 Real Time Communications

Providing travel information through websites and smartphone applications can be a cost effective means of influencing travel behavior as it is relatively low cost to the agency and typically low cost (or free) to the user while reducing user frustration of utilizing the system. The objective of real time communications systems is to provide travelers with enough information that they make an efficient decision in real time based on available travel options. For maximum efficacy, applications should be provided on numerous platforms with a consistent message. As basis for regional real time communication systems, the region should evaluate and modify websites and mobile phone applications (apps) first, as these are the tools that will reach the greatest portion of the traveling public.

5.1 Problem Statement

There are currently no real time communications applications deployed specifically for use by travelers into the canyon areas. However, there are a multitude of general travel apps on the market that may be used to navigate within and obtain travel time information regarding canyon destinations; Google Maps, Waze and Apple Maps being to notable examples. Salt Lake City residents can also view a website and smart phone application maintained by UDOT that relies on roadside sensing equipment throughout the region to monitor traffic volumes and view traffic conditions. SR 190 and SR 210 are both equipped with cameras that allow viewing of roadway conditions through this website. This website is also connected with the UDOT traffic application. Additionally, UDOT maintains a series of variable message signs (VMS) along SR 210 that convey various information on roadway conditions.

5.2 Short Term Solution

One of the most critical features of any real time communication service deployed in the canyon areas will be the ability to provide information on parking availability – both in the canyons and at the ski resorts. If canyon visitors are aware that available parking is limited and dwindling, they might be motivated to utilize modes that do not require the parking of a personal vehicle. In order to obtain parking data, the placement of sensing technology to monitor the flow of vehicles into lots and in parking areas is required. This can be accomplished through any number of devices including both pavement imbedded and roadside-based sensing equipment. Roadside equipment, such as microwave, infrared and Bluetooth, can be installed relatively quickly and inexpensively. Alternatively, a system may be developed and employed that is located at the base of each canyon. This configuration may help to reduce maintenance of facilities in the canyon, which is particularly useful during periods of inclement weather.

It is recommended that vehicle detection systems be installed at heavily utilized and high volume parking lots. With this parking monitoring equipment in place, data collection and analysis can begin during the first winter season. The collection of baseline data on vehicles entering instrumented parking lots, coupled with visual inspection of lot availability, will facilitate the subsequent development, refinement and deployment of algorithms that detect vehicles entering instrumented lots and calculate remaining available parking spots. This information can then be incorporated into the area transportation data website recommended for immediate implementation in the canyons area.

6 Walking/Biking

6.1 Problem Statement

Walking, hiking, running and biking are all popular activities within the canyons. However, the lack the adequate facilities along or parallel to the roadway make it hard for these users to not only access their destination, but also there is a lack of safe facilities to bike and walk on canyon roadways.

Bike and pedestrian use of the canyons contributes to a number of transportation issues on roadways. With no dedicated paths or sidewalks along the roadways, bikes and pedestrians must share the roadway and shoulders with cars moving through the canyons. This can lead to conflicts on the narrow canyon roads. Shoulders, where present and available, are often littered with road debris, which can be dangerous for bikes. In other places, shoulders are narrow or are obstructed by cars informally parked on the roadside. When sharing the roadway on inclines, cyclists can slow car travel significantly where passing is difficult, or may lead to cars attempting unsafe passes. For example, American Fork has enforcement that helps to control traffic speeds, creating a safer environment for walkers and cyclists; a similar approach for LCC can also be explored.

6.1.1 Shoulder Use

The best available facility for active transportation is using existing and improved shoulders along the roadway for pedestrian and bicycle movements. The difference in travel speeds between diverse travel (cars and buses versus bikes and pedestrians) modes could lead to modal conflict along the roadways. To this end both National Association of City Transportation Officials (NACTO) and American Association of State Highway and Transportation Officials (AASHTO)—the leading sources of bike facility design—have developed guidelines that incorporate design elements that seek to mitigate the potential of modal conflicts. Table 9 below describes recommended and minimum recommended widths for bike lanes.

Table 9: NACTO and AASHTO Recommended Bike Facility Design Guidelines

	NACTO	AASHTO
Minimum	3’ is the minimum lane width when bike lane is adjacent to the street edge 5’ is recommended for lanes adjacent a curb.	5’ When adjacent to parking
Recommended (or maximum)	4’ is the desirable lane width when bike lane is adjacent to the street edge. 6’ is preferred for lanes adjacent to a curb.	7’ When high vehicle turn over or next to a narrow parking lane

Special Contexts	Where width allows bike lanes should allow for riders to be two-abreast (typically 6') and buffered lanes are preferred. 5' bike lanes preferred where illegal parking is prevalent or likely.	Additional width where speed limit exceed 50 mph. 6' – 8' desire to accommodate higher bicycle traffic.
Source	*NACTO Design Guidance for Conventional Bike Lanes* http://nacto.org/publication/urban-bikeway-design-guide/bike-lanes/conventional-bike-lanes/	*AASHTO Guide for the Development of Bikeways 2012 Edition* Page 4-15, 4-14,

A substantial portion of canyon roadways lack the sufficient shoulder width to accommodate dedicated active transportation facilities like bike lanes. In addition to narrow shoulders, cyclists must also compete with automobiles using the shoulders for roadside parking. In some cases cyclists must move into travel lanes to avoid opening doors and parked vehicles. Current AASHTO design guidelines for bike lanes on roadways incorporate allowances and bike lane widths that assist in mitigating these interactions.

6.1.1.1 In the Valley

Pedestrian and cyclist facilities on valley access roads to Big and Little Cottonwood Canyon, including SR 210, exist but are incomplete or fragmented. During the summer of 2016, UDOT striped and, where necessary, widened SR 210 to provide bike lanes in both directions between the mouth of Big Cottonwood Canyon and the mouth of Little Cottonwood Canyon. The addition of dedicated bicycle facilities on valley access roads could increase the number cyclists on Canyon roadways, highlighting the importance of dedicated bicycle lanes in the canyons. Additionally, the development of bicycle facilities in the valley will assist transit users in accessing park and ride that serve the canyons via bike.

6.1.2 Pedestrian Patterns

The vast majority of pedestrian trips using canyon roadways are relatively short and originate from a parking lot, shoulder parking, or transit stop and end at a resort or intra-canyon recreational amenity. As such, pedestrians tend to walk short distances along or across canyon roadways to reach destinations. On heavy use summer days, visitors will cross the road and walk along the road to reach recreational amenities potentially creating pedestrian-vehicle conflicts. At resorts on heavy use days visitors often use roadside parking near resorts when ski area lots are full, requiring them to travel along canyon

Snowbird resort has added crosswalks from parking facilities to the ski lifts, providing dedicated and formal pedestrian access points.

roadways to access the resorts. The lack of dedicated pedestrian facilities in these area increase the risk of pedestrians-vehicular conflicts.

Informal trailheads (or social trailheads) created by people straying from official USFS access locations have developed as people access a myriad of dispersed recreational opportunities. Informal trailheads contribute to erosion, mineral soil loss, loss of vegetation, and can be unsafe for users. Unregulated roadside shoulder parking contributes to informal trailheads when users are not funneled to official access points. Regulation and control of roadside parking within the canyon can help alleviate this problem.

6.1.3 Access to Official Trailheads

With a few exceptions, most outdoor canyon amenities have official parking located nearby. The locations that lack parking lots accommodate user with shoulder parking along the roadway.

Bike amenities such as racks, lockers, shelters and maintenance stations are not currently available at most of locations. While no comprehensive inventory of bike amenities has been undertaken, observational assessments suggests that many—if not all—of the trailheads lack any bike amenities. The addition of bike amenties may encourage alternative transporation in the canyons, and partially mitigate the effects of congested roadways and full parking areas.

Some heavily frequented trailheads in Colorado's Front Range have added bike racks to reduce parking impacts and to encourage alternative transportation.

6.1.4 Backcountry Winter Recreation Access

While summer recreation areas (trails, camping areas, fishing areas, climbing areas) are well documented in both canyons, backcountry winter recreation areas are not. Working the USFS and local backcountry enthusiast groups a comprehensive survey of these areas should be conducted. Once these have been identified it is important to analyze the area between their entrances and the nearest parking areas in order to determine if there is safe pedestrian access.

6.1.5 Resort Entrances

Near every resort entrance where shoulder parking is allowed or where transit stops exist, pedestrians will walk along and across the roadway. Currently there is only one dedicated pedestrian crossing near the entrance to the Snowbird resort. Pedestrian amenities in these areas are particularly important on overflow days when shoulder parking results in a higher than normal numbers of pedestrians and cars sharing snowy roadways near the ski resorts.

6.1.6 Canyon Residents

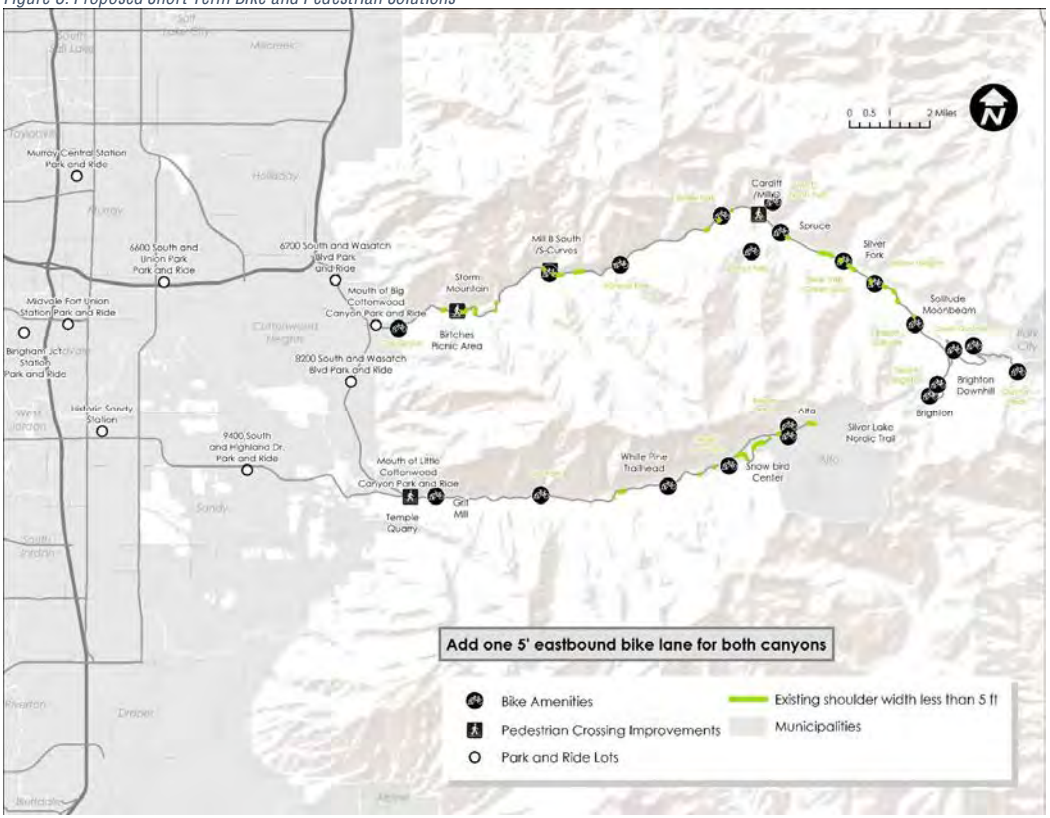
While most of the focus of active transportation in the canyons is focused on visitors, it's also important to consider residents that call the canyons home. Observational analysis suggests that residents and visitors staying in canyon neighborhoods use roadways as pedestrian routes. As part of a more extensive study of active transportation in the canyons, the needs of the residents should be given special consideration. Depending the outcome, dedicated pedestrian routes should be considered to serve canyon residents.

Roadside pedestrians using the shoulder in a residential section of Big Cottonwood Canyon

6.2 Proposed Bike and Pedestrian Solutions

Figure 8 below provides an overview of the existing and proposed conditions for cyclists and pedestrians.

Figure 8: Proposed Short Term Bike and Pedestrian Solutions



6.2.1 Cycling Improvements

6.2.1.1 Continuous Bike Lane

The improvement that will provide an advantage for active transportation users with the addition of a continuous 5' bike lane (AASHTO Guidelines) in the uphill direction. This will provide a dedicated facility for cyclists climbing the canyon roadways where cyclists speeds tend be dramatically slower than that of vehicles, thus helping to alleviating bike-car conflicts. Proposed cycling facilities suggested for canyon roadways are aimed at specific types of road cyclists. Typical users for this type of facility will be cyclist who are comfortable riding next to faster moving vehicular traffic. Less experienced and families are less likely to use these facilities because of the adjacency to the roadways. With the addition of a bike lane, it is important that specific operation and maintenance measures are taken to ensure that debris is cleared from the bike lane and parking restrictions are strictly enforced.

6.2.1.2 Informational Elements

Signs informing drivers that cyclists traveling downhill have the right to ride in traffic and to expect them will help prevent conflicts too. In addition, there will be a 3' shoulder on the downhill side of canyon roadways which will let cyclist move over so cars can pass when they are comfortable. In the downhill direction cyclist speeds and vehicular speeds will be much closer so providing room to pass is more appropriate. Additionally, signs that inform drivers of safety measures when driving around cyclists (for example the 3' of room when passing a cyclist and 2-4 second rule when trailing a cyclist) will help drivers and cyclists coexist on one facility.

6.2.1.3 Bike Amenities

Bike lanes and informational signage will ease vehicular conflicts with cyclist going up and down the canyon, but providing bike amenities at activity nodes (resort entrances, trailheads, etc.) will encourage people to cycle to these nodes knowing that their equipment can be stored securely. Bike amenities include, but are not limited to, maintenance stations, secure parking areas (bike lockers for example), high capacity parking areas, and should be in proximity to transit stops.

6.2.2 Pedestrian Improvements

6.2.2.1 Pedestrian Facilities

While some people use the canyon roadways as a jogging route, these trips are better facilitated with a future parallel facility especially with the addition of a bike lane. The more typical type of pedestrian trip is from one form of transportation to an activity node. In areas with shoulder parking or transit stops accommodations should be made to help pedestrians safely complete their trip and should take ADA requirements into account. Along the corridor this may include paved and/or maintained walks from designated shoulder parking to activity nodes. In some instance this may include barriers where vehicles are likely to slide off the road in icy conditions.

At points where parking or transit stops are across the roadway from an activity node, the use of cross walks, traffic or hawk signals, and signs warning drivers about pedestrian crossings will help prevent conflict between cars and people. Year-round maintenance of these facilities will encourage year-round use and help prevent potential modal conflicts.

Below are points that are of particular concern for pedestrians crossings and may benefit from the aforementioned pedestrian treatments.

Table 10: Potential Areas for Pedestrian Crossings

Crossing Area	Reason for Formal Pedestrian Crossing
Temple Quarry	Due to its proximity to the park and ride lot at the mouth of little cottonwood canyon.
Cardiff/Mill D (Lake Desolation)	People cross from the parking on the north side to use the bathroom on the south side.
Mill B North (Lake Blanche)	People cross from parking within the S curve to get to the trailhead on the north side.
Birches Picnic Area	People cross from parking on the north side to picnic sites on the south side.

6.2.2.2 Consolidate Trail Access

The first step in consolidating trail access should be identifying both formal and informal trailheads and determining which ones should remain and which should close. Using signs and obstructions are generally the two most common ways to deter people from using or creating informal trails. Signs should inform user of the dangers and impacts of informal trails, but should also make it clear where the formal trail or trailhead is.

Obstructions are typically implemented when signage does work or when informal trails or trailheads are immediately dangerous to the ecosystem or the user. Obstructions can be man-made, such as fencing, or natural, such as vegetation or large boulders.

6.2.2.3 Access to Transit

Using transit to provide access to outdoor activity nodes will help to increase access to transit for most people. The table below shows all recreation amenities and their distance to the nearest transit stop.

6.3 Next Steps

Data Collection: In the future it may be useful to understand the volume and routes of recreational users. A comprehensive study on pedestrian use up and down the canyon would assist in ascertaining the need for pedestrian facilities that traverse the length of the canyons.

NEPA Evaluation: In order to implement the proposed bicycle and pedestrian improvements, NEPA evaluations and permitting will need to occur. Some of these possible processes include:

- Public Involvement
- UDOT Coordination
- USFS Permitting
- Impacts on USFS land, USFS Plan Agreement

7 Active Traffic Management

Active traffic management (ATM) is a family of strategies that manage traffic flows on a dynamic (real time) basis to address congestion but require investment in roadside technology, telecommunications, and potentially increased roadway capacity. ATM treatments with the potential to address congestion issues in the Little Cottonwood and Big Cottonwood Canyons. These include the following:

- *Adaptive traffic signal control (ATSC)* strategies adjust traffic signal phasing and timing in response to actual traffic conditions in order to maximize vehicular throughput at intersections. This requires the continual monitoring of traffic conditions with information on vehicle queues at intersections and traffic flows upstream.
- The combination of *transit signal priority and transit shoulder running* enables transit vehicles to enjoy travel time savings over un-tolled passenger vehicles by providing an extra travel lane for their exclusive use and early green and extended green phases at traffic signals. This creates an incentive to utilize transit over travel in a passenger vehicle.

7.1 Problem Statement

There are currently no signalized intersections within the canyon areas. However, SR 190 and SR 210 feature basic Intelligent Transportation Systems (ITS) in the form of roadside variable message signs (VMS). Additionally, UDOT has installed fiber in most parts of both canyons. However, these ITS systems are not capable of being modified to perform ATM functions in and of themselves. As such, ATM treatments in the area will utilize existing telecommunications links, such as the UDOT fiber network along the canyons.

7.2 Short Term Solution

The combination of traffic signals with transit queue jump and signal priority features will enable transit vehicles (and potentially tolled or HOVs) to enjoy travel time savings over un-tolled passenger vehicles, thus creating an incentive to use it. However, these applications will require capital investment for signals and associated infrastructure and also require sufficient roadway space to create the transit bypass lane. Many stretches of SR 190 and SR 210 are unlikely to accommodate a separate lane for exclusive transit use.

Intersections in major resort areas are more likely to have sufficient roadway capacity to deploy advanced traffic signal control and are most likely to benefit from this strategy. Further study is needed to determine locations where the implementation of advanced traffic signal control may help to increase the flow of vehicles. The specific operational functions that these signals should perform include the following:

- Adaptive traffic signal control: This strategy will be critical to maximizing the benefit of this small network of advanced traffic signals. Phasing and timing of traffic signals in response to prevailing traffic conditions will help adjust traffic operations in response to ever changing traffic conditions.
- Dynamic Lane Assignment: In situations where roadway space is sufficient and multiple travel lanes are present, signals can dynamically assign turning lanes.

- Transit Signal Priority and Queue Bypass: In keeping with the objective of providing enhanced travel times for buses, signal priority and queue bypass can be provided to transit vehicles.

Greater detail on possible treatment locations and specific solutions proposed are included in Appendix D.

8 Tolling

8.1 Problem Statement

The Cottonwood Canyons suffer from an overabundance of vehicles during peak periods, namely weekends and holidays during the winter and summer. This creates congestion on limited roadway space and limited parking facilities. Tolling in the canyon areas may therefore be an effective mechanism to encourage travel by non-passenger vehicle modes and generate revenue for additional area transportation improvements and enforcement.

Traffic in the canyons fluctuates significantly from day to day and throughout the day in a manner similar to congestion in major cities. Like congestion in major cities, vehicle volumes are typically highest during a morning and evening rush to and from the resorts destinations. A major difference, however, is that city congestion is typically highest during the work week, whereas congestion in the canyon region is typically most pronounced on the weekends. Furthermore, congestion is confined to a smaller number of weekends throughout the year (as opposed to being congested every weekend, all year round).

There are several objectives that can be accomplished through tolling that have implications for overall charging structure. These are summarized in the table below:

Table 11: Objectives Addressed by Tolling

Objective	Pricing Policy Implication
Reduce travel by personal vehicles into the canyons	Charge personal vehicles for entry into the canyon
Shift travel to less congested periods of the day	Vary the charge levied by time of day
Encourage travelers to utilize higher occupancy modes	Provide toll discounts for high occupancy vehicles and free access for transit vehicles
Reduce vehicle volumes on days with significant congestion	Only toll on days where significant congestion is predicted

The optimal tolling structure is for tolls to be levied only on days where traffic is anticipated to be heavy. This means tolls would be levied on weekends during the winter season and on key weekends during the summer (if necessary). To increase transit utilization, transit vehicles should be allowed to travel toll free, and consideration should be given to providing toll free or discounted access to high occupant vehicles. Furthermore, if there is a desire to shift travel times on tolled days such that vehicles are not entering and leaving the canyons at the same time, then the area should consider implementing a variable tolling structure with fees being set on a schedule.

Tolling would charge a few to drivers, and therefore, provide a disincentive for visitors to drive their vehicle and consider alternative modes or carpooling. Because traveling in the canyon can be explained as a function of time and costs, when the cost for drivers goes up, the incentive for utilizing transit goes up. A further discussion about using the cost of parking as a disincentive for driving is provided in the *Long Term Transportation Solutions Technical Memo*.

8.2 Short Term Solution

Assuming that institutional issues regarding legislative authority for tolling, identification of tolling entity, and use of revenues have been addressed as part of immediate term activities, the consultant team recommends that the area reach a consensus on the desirability of tolling and begin developing a toll system. This will require establishing the operational goals and objectives that will inform its ultimate design. Furthermore, the team recommends that the area initiate a broader dialogue with area stakeholders regarding the need for tolling, how the system might function, and how it will benefit the area.

8.3 Next Steps

Upon the establishment of institutional toll viability and addressing of institutional issues, the area can embark upon a financial and technical feasibility assessment of tolling in the Big and Little Cottonwood Canyons. As part of this assessment, the area should determine optimal tolling points, technology to be deployed at these tolling points, optimal tolling schedules and optimal rates. The consultant team recommends that initial tolling points be considered at the mouth of each canyon where right-of-way for tolling equipment is less restricted and the maximum number of canyon destination goers can be captured (and thus incentivized to use alternate modes). The consultant team also recommends that the area consider additional tolling points immediately prior to each of the canyons' respective major resort areas. The consultant team also recommends that if tolling is considered viable for the region, that area leaders consider implementing an electronic toll collection (ETC)-based system to leverage Utah's experience with electronic tolling platforms on the I-15 Express Lanes.

The setting of toll rates can be problematic, particularly from a stakeholder acceptance perspective. The resorts in the canyons compete with resorts in nearby Park City and Colorado. A toll levied in the canyons would make trips to those resorts more expensive and could make nearby resorts (without tolled access) more attractive. As such, careful analysis will be needed in order to determine optimal toll rates for achieving mobility objectives while maintaining competitiveness for area business relative to other regional destinations.

9 Cost Estimates

This section provides an overview of the cost of the recommended solutions in the canyons and the valley. Table 12 provides the canyon-wide cost table of improvements proposed in each canyon. Costs provided are in 2021 dollars. In addition to capital costs, it is imperative that ongoing operations and maintenance costs be included when considering any capital improvement. These costs are an ongoing burden to the cooperating agencies and visibility and the ability to plan for and budget these funds are critical to the long-term success of the proposed projects. Backup and cost assumptions are included in Appendix E.

Table 12. Proposed Project Cost Estimates

Proposed Project	Capital	Annual O&M
Transit		
New Summer Bus Service (30-minute, 3 routes)		$ 1,000,000
Additional Winter Bus Service (15-minute, 3 routes)		$ 400,000
New Buses	$ 6,000,000	
Bus Priority/Hot Spots to Improve Travel Time	$ 11,000,000	
Bus Stop Improvements Valley	$ 1,000,000	
Transit data collection and analysis	$ 100,000	
Parking		
Parking Structures Valley	$ 110,000,000	
Road/Congestion		
Avalanche Control LCC (Phase II) (Source: UDOT)	$ 6,000,000	
Combined Shoulder / Transit / Parking Improvements, By Canyon		
Big Cottonwood Canyon	$ 3,000,000	
Little Cottonwood Canyon	$ 2,000,000	
Recreation Amenities		
Canyon Transit Nodes/Trailheads	$ 8,000,000	$ 150,000
Real-Time Information		
Next Bus Information	$ 600,000	
Parking Data Collection (valley and P&Rs)	$ 4,000,000	
Vehicle Occupancy, Visitation, Trailhead Data Collection		$ 25,000
Communication/Mobile Website/App	$ 1,000,000	$ 50,000
Enforcement, Safety, Security		
UPD, per year		$ 100,000
Trails		
Trail Access Operations and Maintenance		$ 500,000
Total	$ 152,700,000	$ 2,225,000

Note: analyze impact to USFS costs for maintenance above and USFS lost revenue if transit users do not pay USFS fee

Appendix A: Detailed Parking Capacity and Utilization Data

LITTLE COTTONWOOD CANYON				
	Winter (2/20/2012) President's Day		Summer (9/5/2011) Labor Day	
Parking Area	Capacity	Peak Day Occupancy	Capacity	Peak Day Occupancy
3500 E Park and Ride	61	100%	61	**
LCC Park & Ride	161	88%	161	**
Lower Snowbird (***)	1518	88%	1332	55%
Upper Snowbird (***)	925	97%	692	52%
Lower Alta	1163	89%	1163	**
Upper Alta	690	100%	690	**
Sandy Boulder	*	*	123	54%
Sandy Granite	*	*	108	47%
Lisa Falls	*	*	46	37%
White Pine	*	*	85	94%
Misc. Shoulder and Pullout Parking	248	*	523	**
Total	4766	86%	4984	11%

BIG COTTONWOOD CANYON				
	Winter (2/20/2012) President's Day		Summer (9/5/2011) Labor Day	
Parking Area	Capacity	Peak Day Occupancy	Capacity	Peak Day Occupancy
6200 S Park & Ride	412	59%	412	**
Fort Union & Neighborhood	222	73%	222	**
BCC Park & Ride & Canyon Gate	144	85%	144	44%
Ledgemere	*	*	76	51%
Mill B	46	44%	109	97%
Butler Fork	21	95%	68	25%
Mill D	124	91%	124	95%
Donut Falls	*	*	74	95%
Spruces	105	66%	105	**
Solitude	1170	88%	1170	**
Guardsman Pass	93	89%	93	**
Silver Fork	*	*	121	53%
Silver Lake	298	88%	298	82%
Scotts Peak & Great Western	*	*	11	127%
Clayton Peak	*	*	26	127%
Brighton	1481	97%	1481	**
Misc. Shoulder and Pullout Parking	411	*	16	**
Total	4527	72%	4550	28%

* Not a high occupancy parking area in the winter

** Not a high occupancy parking area in the summer

*** Winter parking capacity is higher than summer parking capacity due to efficiencies of attended parking

Appendix B: Sketch Model Results

Big Cottonwood

Origin District	Home based work	Non Home Based	Home Based Rec	Hotel Based Rec	Total	Percent
1	127	67	2,100	783	3,077	20%
2	151	46	1,738	842	2,777	18%
3	77	24	719	408	1,228	8%
4	42	10	472	15	539	3%
5	77	50	2,280	5,525	7,933	51%
Grand Total	475	198	7,309	7,573	15,555	
Percent	3%	1%	47%	49%		

Little Cottonwood

Origin District	Home based work	Non Home Based	Home Based Rec	Hotel Based Rec	Total	Percent
1	260	6	1,858	919	3,042	15%
2	414	5	2,767	1,265	4,451	22%
3	315	4	2,147	1,504	3,970	20%
4	177	2	1,148	54	1,381	7%
5	157	4	2,055	4,926	7,142	36%
Grand Total	1,323	22	9,974	8,667	19,987	
Percent	7%	0%	50%	43%		

District Map

Appendix C: Summer Transit Service Stop Data

	POTENTIAL BUS STOP	MP	Site Recommended By			Parking		User Access		Stop Characteristics			
			Mtn Accord Rec Grp	UTA Proposed Summer	MA Parking Study[1]	High Parking Occupancy[2]	Proposed USFS Fee Site	Non-Transit Compatible Users[3]	Residential Access	Existing Winter Bus Stop	Bus Stop Tier	RECOMMENDED SUMMER BUS STOP	Recommendation Comments
Big Cottonwood Canyon	BCC Park & Ride	1.9	X	X					X	X	1	YES	Existing park and ride
	Dogwood	3.0		X	X						2		
	Ledgemere	3.4		X	X						2		
	Storm Mountain	4.7	X	X	X	X					3	YES	Trailheads, rock climbing, picnic facilities, river
	Mill B South/S-Curves	6.2	X	X	X	X	X	X			3	YES	Trailheads
	Mineral Fork	7.8		X							3		
	Butler Fork	10.0			X				X		3		
	Cardiff/Mill D South/Donut Falls	10.8	X	X	X	X	X	X	X	X	2	YES	Trailheads, rock climbing, picnic facilities, river
	Spruces	11.6	X		X		X			X	2	YES	Trailheads
	Silver Fork	13.1	X		X					X	1	YES	Commercial, high user, good spacing; One business is non ADA accessible
	Solitude @ Moonbeam Lodge	14.5	X		X	X			X	X	1	YES	Existing winter stop; Trailhead connections
	Redman Campgrounds	14.9		X		X		X			2		
	Solitude @ Nordic Center/Silver Lake	16.1							X	X	1	YES	Existing winter stop; Trailhead connections
	Brighton	16.5	X		X	X	X			X	1	YES	Existing winter stop; Trailhead connections; Wildflower Festival
	Brighton Downhill	16.8								X	1	YES	Existing winter stop; Trailhead connections; End of one-way loop out of Brighton
	Guardsman Pass/Old Crest Trailhead	18.8	X		X				X				
	Guardsman Pass/New Crest Trailhead	19.9	X		X	X	X						

NOTES

[1]Site was identified in Cottonwood Canyons Parking Study (Avenue Consultants, 2012)

[2]Parking occupancy based on Google Earth aerial, dated Friday, July 8, 2016

[3]Parking recommended to accommodate non-transit compatible users (fishermen, hunters, etc.)

Bus Stop Tier Definitions

Tier 1: Existing bus stop; No NEPA actions required.

Tier 2: Proposed bus stop; Medium level of difficulty. Flat site with gravel shoulders.

Tier 3: Proposed bus stop; High level of difficulty. Steep and narrow road segment.

All bus stop improvements: May require new concrete, valley pans or curb and gutter w/ ADA ramps. May need pedestrian crossing across highway.

PROPOSED SUMMER BUS STOPS – LITTLE COTTONWOOD CANYON

	POTENTIAL BUS STOP	MP	*Site Recommended By*			*Parking*		*User Access*		*Stop Characteristics*			
			Mtn Accord Rec Grp	UTA Proposed Summer	MA Parking Study[1]	High Parking Occupancy[2]	Proposed USFS Fee Site	Non-Transit Compatible Users[3]	Residential Access	Existing Winter Bus Stop	Bus Stop Tier	RECOMMENDED SUMMER BUS STOP	Recommendation Comments
Little Cottonwood Canyon	LCC Park & Ride	3.9	X	X						X	1	YES	Existing park and ride
	Temple Quarry	4.0	X		X		X				1		
	Grit Mill	4.6	X		X	X			X		2	YES	Trailheads, rock climbing
	Gate Buttress	5.1		X	X						3		
	Lisa Falls	6.6		X	X						2		
	Tanner Flat	8.1		X							3		
	White Pine	9.2	X	X	X	X	X	X			2	YES	Trailheads, campground, picnic facilities
	Snowbird Creekside	10.0								X	1		
	Snowbird Center	10.6	X		X	X				X	1	YES	Summer special events (Oktoberfest)
	Snowbird @ Cliff Lodge	13.5								X	1		
	Bypass Rd at Blackjack Condos	12.8								X	1		
	Alta @ Peruvian Lodge	11.6								X	1		
	Alta @ Goldminers Daughter	12.0								X	1		
	Alta @ Alta Lodge	12.1								X	1		
	Alta @ Rustler Lodge	12.2								X	1		
	Alta @ Snowpine	12.2								X	1		
	Alta @ Albion Basin	12.3	X		X	X				X	1	YES	Summer special events (Wildflower Festival)
	Catherine's Pass	12.5	X		X	X	X						
	Cecret Lake	12.5	X		X		X						

NOTES

[1]Site was identified in Cottonwood Canyons Parking Study (Avenue Consultants, 2012)

[2]Parking occupancy based on Google Earth aerial, dated Friday, July 8, 2016

[3]Parking recommended to accommodate non-transit compatible users (fishermen, hunters, etc.)

Bus Stop Tier Definitions

Tier 1: Existing bus stop; No NEPA actions required.

Tier 2: Proposed bus stop; Medium level of difficulty. Flat site with gravel shoulders.

Tier 3: Proposed bus stop; High level of difficulty. Steep and narrow road segment.

All bus stop improvements: May require new concrete, valley pans or curb and gutter w/ ADA ramps. May need pedestrian crossing across highway.

Appendix D: Active Traffic Management Locations, Treatments

SR 190 at SR 210 (Wasatch Boulevard) – The intersection of Wasatch Boulevard and SR 190 leading into the Big Cottonwood Canyon is the first opportunity to implement potential ATM treatments. This location is among the most likely to benefit from ATM for two reasons. First, it represents the last signalized intersection leading into the canyon. Thus, it the only location recommended for ATM consideration that already has most the requisite technology infrastructure already in place and would therefore represent the lowest cost option. Second, it represents the last major crossroads for visitors entering the canyon. Visual inspection of this particular intersection has revealed the significant queues are present in the early day (when travelers are entering the canyon) and late in the day (when travelers are exiting the canyon). The team therefore recommends that local officials consider the implementation of adaptive traffic signal control (ATSC), dynamic lane assignment and transit signal priority with queue jump. ATSC and dynamic lane assignment will allow traffic control devices to respond to dynamic conditions at the intersection and move traffic as efficiently as possible. A transit signal priority system with queue jump will provide transit vehicles entering and exiting the canyon with travel time savings over passenger vehicles, thus providing an additional incentive to abandon travel by personal vehicle.

SR 190 at the Mouth of Big Cottonwood Canyon – The initial stretch of SR 190 after Wasatch Boulevard is desirable from a strategic standpoint because there is already a large park-and-ride facility located there and right-of-way is less restricted. This location presents an opportunity to modify the existing traffic signal with transit priority and transit que jump capability due to the (relative) abundance of right-of-way. As there are no major intersecting roads it would not have to function to regulate turning maneuvers. Rather, when transit vehicles are about to enter the canyon they will transmit location data to the traffic signal which will hold personal vehicles at the light. These vehicles will be released from the light when the transit vehicle passes. This configuration allows transit vehicles to jump ahead of potential vehicular queues it might encounter further up the mountain.

SR 190 at Mill B – This site was selected because that section of roadway has wider shoulders than other stretches of SR 190 and features extensive shoulder parking by visitors. Furthermore, because of the sharp directional changes in this particular area, it is a potential bottleneck due to slowing traffic and maneuvering from vehicles attempting to park. The relatively wider shoulder in this particular section of road presents an opportunity to consider shoulder use by transit vehicles, particularly if this segment of roadway represents a bottleneck to traffic moving through the area. Given the wider shoulder width, this section of roadway could also be evaluated as a candidate for adding a new lane, with that lane being reserved for transit use during peak periods and open for shoulder parking at all other times. This recommendation is tempered by the fact that the shoulders in this area might not be wide enough to accommodate transit running. This is particularly true given the gradient of the road and the potential slope of the ground adjacent to the roadway. Further engineering analysis will be needed in order to determine if safe shoulder operation by transit vehicles can be accommodated in this stretch of SR 190.

SR 190 Approaching Solitude Resort – This particular stretch of SR 190 presents a couple of unique opportunities for congestion management strategies. First, this particular section of road features striping along a 1.2 mile stretch that provides an additional travel lane for traffic heading into the Big Cottonwood Canyon ski resort area. Second, this is the last stretch of SR 190 prior to entering the ski resort area, meaning that it represents the last opportunity to implement management strategies.

SR 210 Approaching Tanners Flat Campground to Alta - The section of SR 210 approaching the Tanners Flat Campground and the leading into the Little Cottonwood Canyon ski resort area features numerous design elements that could lend themselves to operational treatments for congestion management. These features include additional travel lanes for inbound and outbound vehicles, existing shoulder parking bans, and intersections at major destinations. There are a couple of stretches along SR 210 leading up to Alta where roadside shoulder parking is banned due to those areas being within avalanche zones. These sections of roadway should be evaluated for the potential to run transit vehicles along the shoulder ways. As with other recommendations for shoulder running in this report, these areas will need to be carefully evaluated to ensure that shoulder width is sufficient and that the grade around the roadway is not so steep as to prevent safe running of buses. There are pockets within the two end points shown in the figure below where shoulder parking is not banned. However, for the purposes of continuity it is recommended that entire stretch be evaluated for both shoulder parking bans as well as transit shoulder use. As with other areas that are candidates for shoulder running, this section of roadway could also be evaluated for adding a third travel lane over the existing shoulder. This lane could be reserved for transit vehicles during peak periods and open to other traffic or shoulder parking during all other times. There are also two sections of SR 210 leading up to the Little Cottonwood Canyon ski repost area where an additional lane of travel is provided. The shortest stretch provides an extra lane for outbound travel, while the longer stretch, leading right up to the Snowbird resort, provides an extra travel lane for inbound traffic. Both of these sections should be evaluated for lane reversal treatments with use being restricted to transit vehicles and HOVs. As with other lane reversal recommendations in this report, these lane reversals would only need to occur during certain periods of the day on certain days of the year.

Appendix E: Capital Cost Backup, Bike, Pedestrian, Shoulder, Parking Improvements

Files comprising Appendix E:

- Big Cottonwood Canyon – broken into segments
  - App E_BCC Cost Estimate_Seg 1_MP2.8 to MP7
  - App E_BCC Cost Estimate_Seg 2_MP7 to MP11
  - App E_BCC Cost Estimate_Seg 3_MP11 to MP15
  - App E_BCC Cost Estimate_Seg 4_MP15 to END
- Little Cottonwood Canyon – broken into segments
  - App E_LCC Cost Estimate_Seg 1_MP4 to MP8
  - App E_LCC Cost Estimate_Seg 2_MP8 to MP12
  - App E_LCC Cost Estimate_Seg 3_MP12 to End

MOUNTAIN ACCORD

Mountain Accord Cottonwood Canyons Summer Transit Pilot Program Technical Memorandum

May 2017

This report was prepared by WSP/PB under contract with Wasatch Front Regional Council, in consultation with the Utah Department of Trnasportation and the Utah Transit Authority, and with funds from the Mountain Accord program. The report is provided for information purposes and has not been publicly reviewed or adopted.

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The goal of the proposed transportation solutions is to accommodate and manage growth in use while maintaining positive recreation experiences and minimizing impacts to natural resources

Summer Problem Statements:

- Overflow parking at the resorts and trailheads is resulting in spider web trails, vegetation impacts, unsafe and uncomfortable experience
- Limited parking capacity serving the canyon bus routes
- Congestion on peak days
- No summer/fall bus service
- Uncomfortable biking, walking environment
- Lack of amenities, restrooms, ADA ramps
- Real-time information not easily accessible in one location

1.0 Introduction and Overview

The summer season in Big Cottonwood Canyon and Little Cottonwood Canyon offers a variety of recreational opportunities. Some of the popular activities include hiking, fishing, rock climbing, and camping. Visitation patterns and demand during the summer tends to be more dispersed than winter, which is typically more focused around the ski resorts. Despite the generally disbursed nature of summer visitation in the canyons, two special events draw a considerable number of visitors to Little Cottonwood Canyon. Oktoberfest, hosted by Snowbird, draws over 60,000 attendees annually. The Wasatch Wildflower Festival, with scheduled hikes at each of the four ski resorts in Big and Little Cottonwood Canyon, draws a significant number of hikers. According to the Albion Basin Transportation Feasibility Report, Cecret Lake Trail has an average of 1,370 hikers during summer weekends. Alta Ski Resort, in particular, attracts large crowds during the festival and summer months due to the extensive nature program, entertainment, and onsite dining facilities. Due to this concentration of visitors and predictable event schedule, it is proposed that a limited transit route be established to serve these significant events for the summer season, possibly in 2018.

1.1 Goals and Objectives for Summer Solutions

A primary goal of the proposed limited summer transit service is to provide a stepping stone toward short to mid-term and long range transportation solutions and projects. For this transportation study, short to mid-term solutions are solutions that can be implemented within 10 to 20 years if funding were available, while long term solution(s) would be major capital improvements needed around 2040 or beyond. Additional, supplementary goals of the proposed summer transit service are to:

1. Serve as a primary basis for the short to mid-term and long term transportation solutions.
2. Provide iterative and incremental improvements intended to meet existing canyon needs, as well as building toward meeting future needs in the canyons.
3. Build the transit and non-single occupancy vehicle (SOV) travel market from users of the canyon roadways.

4. Provide summer solutions that are compatible (or non-contradictory) with winter 2016-2017 solutions.

The following memo will discuss the considerations, service plan, and next steps toward implementing the proposed summer transit service. The timeframe for the summer transit service is intended to be in the near future, likely within the next year or two. Subsequent actions and improvements will be detailed in the *Short to Mid-Term Transportation Solutions* and *Long Term Transportation Solutions* memos. One of the requirements for the summer solutions is that projects must be relatively low-cost and have minimal National Environmental Policy Act (NEPA) evaluation or permits, such as a Categorical Exclusion (CATEX). With a short timeframe before implementation, any projects requiring comprehensive NEPA analysis would be challenged to finish on-schedule. Therefore, bus stops for the proposed Summer Transit Pilot Program must be a current winter ski bus stop.

Data collection will also play an important role for the summer program. As the NEPA evaluation process for short to mid-term solutions begins, having accurate and complete data will be useful in providing a fair analysis of alternatives. This data will be essential for the planning and design of short to mid-term plans, including the implementation of a canyon-wide summer transit program and execution of new parking management strategies. Additional details on specific data to be collected and the organizations that are equipped to do so are included in the following sections.

1.2 Existing Conditions

Currently, there are limited public transit options to the canyons during the summer season. UTA operates route 990 that runs the length of Little Cottonwood Canyon to Alta, which consists of one trip up the canyon in the morning and one trip back down in the evening. Within the canyons, the Town of Alta and Snowbird each operate shuttles. Summer canyon usage is typically more focused on seasonal outdoor recreation activities and special events at the resorts. Popular summer activities within the canyons include hiking, mountain biking, fishing, camping, and rock climbing. During the summer, the Wasatch Wildflower Festival draws visitors to the resorts while Oktoberfest attracts large crowds to Snowbird for nine weekends.

With an increasing number of annual visitors in the canyons each summer, it has become necessary to reevaluate how users travel to and within the canyons. These transportation problems are further exasperated by parking issues and challenges. Parking lots at trailheads can usually fill to capacity during weekends, leading to overflow vehicles parking along the side of the highway.

Currently, private shuttles operate in the canyons and provide transportation to trailheads, including Guardsman Pass and the Wasatch Crest Trail. These private shuttles include a fleet of commercial vans and trailers designed for carrying bicycles, as shown in Figure 1. The primary customers for these private shuttle services are mountain bikers. If Utah Transit Authority (UTA) implements its own summer transit service, these private shuttles would continue to operate independently without interaction with UTA services.

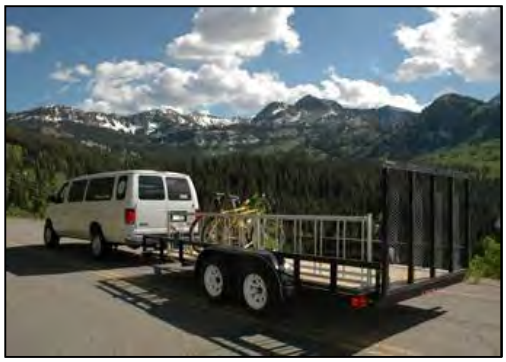

Figure 1: Examples of Private Shuttle Providers in the Canyons

Summer demand in the canyons is more dispersed than in the winter. Activity "hot spots" were identified as prime locations for summer bus stops. These hot spots are detailed in the short to mid-term transit strategy (see *Mountain Accord Cottonwood Canyons Short to Mid-Term Transportation Solutions Technical Memorandum, May 2017*). Unlike the ski resorts, which have larger surface parking lots and parking structures, many of these hot spots have limited parking. Much of this parking is either roadside or pullout parking. Limited parking capacity and increasing demand can encourage canyon visitors to take transit to these hot spot destinations.

2.0 Proposed Transit Strategy

One of the key transportation goals of the Mountain Accord is to reduce the number of SOVs in the canyons. Transit serves as an essential tool that can help reduce SOVs while serving the increasing volume of visitors in the canyons. Bus service can provide consistent, regular routes that serve demands of canyon visitors during the summer. Coupled with parking management strategies, a strong transit service strategy can help to reduce the transportation pressures on the canyons during the summer season. During the summer season, UTA could offer a summer transit pilot service if funding is available. Although the details of a service schedule have yet to be finalized, one option is to run the transit pilot program from mid-July through late October, approximately 14 weeks. This would provide new transit service to visitors of the Wasatch Wildflower Festival (late July) and Oktoberfest (mid-August through late October). Transit is most successful in alleviating congestion when service is focused to a few locations and provides frequent, all-day service. Due to the high concentration of visitors in a single location, these special events were targeted as prime stops for transit service. For the initial summer season, this pilot program would service Snowbird and Alta resorts in Little Cottonwood Canyon.

Through the Summer Transit Pilot Program, UTA hopes to establish a summer transit market in the canyons. As noted in the *Mountain Accord Transportation Framework*, data collection should include bus ridership counts, transit capacity, bus headways, and bus travel times. These are helpful in determining transit utilization and frequency. From the data obtained through the pilot program, UTA can gain a better understanding of ridership demands and patterns in the summer months. This can provide better insights and influence future summer transit service improvements, including more comprehensive routes throughout both canyons. Additionally, these metrics can help justify service improvements by showing a need and demand from ridership. Following is a description of the considerations used in implementing a summer transit service, as well as details of the proposed transit service.

2.1 Considerations for Summer Transit Pilot Program

Several factors were taken into account in planning the proposed Summer Transit Pilot Program. While in the long term, it would be ideal for UTA to provide a summer transit service to both canyons, the summer pilot program aims to address some of the existing special event traffic. Following are some of the limitations and parameters considered in developing the proposed pilot program.

1. Use existing bus stops only: Due to limited time for implementation, any proposed summer transit service should require minimal NEPA evaluation. Assuming there are no capital improvements, this evaluation would likely result in a CATEX. In planning for the summer pilot program, a select number of existing winter bus stop locations were considered based upon summer season special events. These existing stops do not require capital improvements and are "grandfathered" in without updating to current ADA standards, therefore expediting the implementation process.

   With the proposed summer transit service, bus routes would provide "Express" service to Snowbird/Alta in Little Cottonwood Canyon (LCC). These express routes have raised questions on potential ridership confusion; riders may be confused by summer buses bypassing winter

stops that are not included in the summer service. To clarify summer transit service, additional signage and information should be provided to riders that explains which stops are included in the summer routes. Additionally, public information should be provided to educate riders about the pilot service.

2. Optimize transit travel times: Travel time can impact mode choice of visitors; therefore, when determining the routing for the summer transit service, transit travel times should provide a competitive alternative for visitors. Within the Valley, it is recommended that summer bus service stops at the major park and ride locations to maximize opportunity for visitors to be funneled onto the transit routes. Bypassing additional stops within LCC allows for the bus service to provide an "Express" service route that caters specifically toward the high-demand special events. It can also optimize bus scheduling.

3. Little Cottonwood Canyon Service Only: For the summer pilot program, LCC was targeted as the preferred location for a transit service pilot program due to the large-scale special events (Oktoberfest). While Big Cottonwood Canyon (BCC) also attracts many visitors through the summer months, the usage and demands are more dispersed than Little Cottonwood Canyon. Because visitation within LCC is more focused and within a specific time period, it was preferred for the pilot program.

2.2 Bus Stops

The Summer Transit Pilot Program service would primarily serve users visiting the Wasatch Wildflower Festival at Alta Ski Resort and Oktoberfest at Snowbird Ski Resort. These services would tie into the existing shuttles provided by the Town of Alta and Snowbird resort. As such, the following stops within the canyons are proposed:

- Snowbird Center, UTA Existing Stop
- Albion Base, UTA Existing Stop

These are both current UTA bus stops for the winter ski bus service. Therefore, since they will not require capital improvements, it is likely that NEPA evaluation of this change-in-service at existing locations will result in a CATEX or no-effect determination. These existing stops are also up-to-code with current ADA standards. Additionally, the existing stops provide convenient access to parking and special event facilities, making the option of riding transit more competitive to users.

Within the Valley, bus routes would mirror two of the 2016-2017 winter ski bus routes, routes 953 and 994. It is proposed that the summer pilot routes should include the following stops:

- Route 953 – Murray Central Station to Snowbird/Alta
    - Murray Central Station
    - 6600 S 950 E Park and Ride
    - 6200 S Wasatch Park and Ride
    - Big Cottonwood Canyon Park and Ride
    - Little Cottonwood Canyon Park and Ride
    - Snowbird Center
    - Alta

- Route 994 – Historic Sandy Station to Snowbird/Alta
    - Historic Sandy Station
    - 9400 S Highland Drive Park and Ride
    - Little Cottonwood Canyon Park and Ride
    - Snowbird Center
    - Alta

2.3 Service and Operations

To accommodate the Wasatch Wildflower Festival, which typically is scheduled for the last weekend in July, and Oktoberfest, which runs weekends from August thru October, it is suggested that the Summer Transit Pilot Program operate July through October. This service would run Friday, Saturday, and Sunday and would serve riders between the Valley and Little Cottonwood Canyon. Additionally, buses would provide service the Monday of Labor Day. Buses would run 30-minute headways throughout the day. While a final operating schedule has yet to be determined, following are three options for summer service:

1. Option A: Consistent All-Day Service (8 AM – 10 PM): Of the three service options, Option A provides the most comprehensive service schedule ranging from morning (Wasatch Wildflower Festival visitors) thru late evening (Oktoberfest visitors). It allows for a consistent seasonal schedule, which can make scheduling for riders more convenient and predictable. However, it may also have lower ridership during off-event periods, such as early mornings after the Wasatch Wildflower Festival.
2. Option B: Variable Service Hours (8 AM – 6 PM and 11 AM – 10 PM): Option B is designed to complement ridership needs and demands, particularly with the varying hours of special events. During the Wasatch Wildflower Festival, service would run from 8 AM – 6 PM. During Oktoberfest, service would run from 11 AM – 10 PM. This plan would serve the peak demands for both events, while reducing service during lower demand periods. While Option B accommodates the varying event hours, it may cause confusion for riders because the schedule is not as predictable and consistent.
3. Option C: Oktoberfest Focused Service Schedule (11 AM – 10 PM): Because a majority of the weekends during the summer pilot period occur during Oktoberfest, Option C caters to providing a consistent service plan that serves the greatest demand of riders. The Wasatch Wildflower Festival is formally scheduled for one weekend, while Oktoberfest events typically span nine weekends. Providing service in a consistent service schedule can make scheduling more predictable for riders. Option C, however, may not capture the riders who would otherwise visit the Wasatch Wildflower Festival earlier in the day.

The proposed Summer Transit Pilot Program would include two bus routes that provide service to Snowbird and Alta. These routes would originate from Murray Central Station and Historic Sandy Station, with stops at multiple park and ride locations along the route. The proposed services would reflect UTA's park and ride based service philosophy for the canyons, which would mirror Routes 994 and 953 in the existing winter ski bus service. The following table provides a summary of the proposed service for the Summer Transit Pilot Program. This table presents general assumptions and is intended to be used for planning purposes. Final operating costs will need to be determined by UTA. Other

expenses, such as marketing and promotional costs, are not included in this summary; these costs should be considered when estimating funding needs.

Table 1: Summer Transit Pilot Program Service Plan

		Option A	Option B	Option C
Operations	Service Hours	8 AM - 10 PM (Full period)	8 AM - 6 PM (Wildflower Festival) 11 AM - 10 PM (Oktoberfest)	11 AM - 10 PM (Full Period)
	Headways (min)	30	30	30
	# Hours/Day	14	10	11
	Days/Week of Operation	3	3	3
	# Weeks/Season	14	14	14
Buses	# of buses	2	2	2
	# of stops	7	7	7

2.4 Next Phase of Improvements

NEPA Evaluation of Short to Mid-Term Transit Service: One of the goals of the proposed transit service is to increase annual transit ridership. Beyond the proposed summer transit service pilot, the plan is to create a comprehensive summer transit service operating in both canyons. To implement more comprehensive transit service, NEPA evaluation would need to be completed for additional bus stops to be implemented and modified to accommodate different travel markets. Future bus stops would need to be evaluated for their environmental impacts and potential changes to United States Forest Service (USFS) land use. The NEPA documentation and analysis will require coordination among UTA, USFS, and Utah Department of Transportation (UDOT). Moving forward, potential funding opportunities would be led by the Central Wasatch Commission (CWC), which will work in partnership with UTA, UDOT, and the USFS. Additional tasks and responsibilities are outlined below:

- NEPA evaluation process: USFS, UTA, and UDOT (lead agency to be determined)
- Transit travel time evaluation: UTA
- Public awareness/marketing: UTA, Ski Resorts, Wasatch Wildflower Festival, Oktoberfest
- Signage for pilot program: UTA

Data Collection: The proposed summer pilot program provides transit services primarily targeted for special events. Data should be collected by UTA to observe ridership demands, patterns, and trends. This data can be essential in evaluation and refinement of future summer transit initiatives, including full transit service within both BCC and LCC. Data collection may include some of the following:

- Ridership boarding/alighting information, by stop and by direction
- Travel time for each route; including dwell time information at stops
- On-time percentage

- Bus occupancy
- Trip purpose of riders (i.e. recreation, special events, work, etc.)
- Demand for other stops within canyons
- Park and ride occupancy at both Valley locations and mouth of canyon
- Bus operations data (revenue miles)

Metrics and findings from the summer transit pilot program can assist in developing short to mid-term and long term transit plans. This could eventually include the addition of year-round transit service to both BCC and LCC. With data from the pilot program, UTA will be able to better understand needs and demands of riders during the summer season. While this pilot program may not give a full picture of service within both canyons, it does provide a valuable sample in gauging ridership demands, parking patterns, and summer bus operations. Future transit schedules and planning will build off the results from the Summer Transit Pilot Program, so it is critical that data be analyzed to understand the successes and challenges of the program.

3.0 Short to Mid-Term Implementation Considerations

The following projects and topics for study will coincide with the implementation of the proposed transit service or require planning efforts that should begin in 2017. These projects or studies will impact or be impacted by the future transportation network. Thus, it is critical that partnering agencies work closely with the Mountain Accord to best utilize the canyons' transportation network.

3.1 Proposed USFS Standard Amenities Fee Program

Currently, the USFS is proposing to implement a Standard Amenities Fee for parking at certain sites within the Uinta-Wasatch-Cache National Forest, forest land that encompasses both LCC and BCC. Day-use sites are proposed to have fees of $6 for a 3-day pass and $45 for an annual Cottonwood Canyons pass. These fees apply to all users of USFS facilities, not only those that arrive in autos. The following sites within the canyons are included in the proposed fee program:

- Mill B South trailhead
- Cardiff/Mill D South trailhead
- Donut Falls trailhead
- Silver Lake recreation complex
- Spruces trailhead
- Guardsman Pass trailhead
- Temple Quarry trailhead and interpretive site
- White Pine trailhead
- Catherine's Pass trailhead
- Cecret Lake trailhead

The proposed fees would be charged for use of site amenities, including designated parking, restrooms, picnic tables, trash receptacles, area information/maps/exhibits, and security services. For visitors arriving by personal vehicle, payment of the proposed fee will be through a self-serve envelope at an on-site kiosk. Once inserting payment, visitors will detach a receipt/payment verification and place in their vehicle for proof of payment. For visitors arriving by transit, there will need to be further discussion as to how these visitors pay for USFS amenities. USFS may want to develop an agreement with UTA that would allow for the USFS amenities fee to be collected through ridership fare or some other mechanism.

If approved, this fee program could begin as early as fall 2017. As of the publication for this memo, the proposed fee program was still under review.

3.2 Parking

Parking issues are prevalent during peak times in Big and Little Cottonwood Canyons. Some of the issues include over capacity parking lots, overflow parking, roadside parking along narrow segments of the highway, and limited space between parked vehicles and cyclists/pedestrians. For the most part, shoulder and pull-out parking in the canyons is unregulated. The short to mid-term memo presents several strategies to improve parking within the canyons. Some of these strategies include:

- Limit roadside parking to allow for a better cycling and pedestrian environment
- Improve and formalize pullout and shoulder parking at/near trailheads.

- Expand park and ride lots
- Improve park and ride efficiency
- Implement parking fee structure at resorts
- Provide real-time parking information
- Provide enforcement for parking violations

By limiting parking capacity and enforcing parking regulations, visitors are less likely to park illegally. This should alleviate some of the existing issues with parking capacity in the canyons.

3.3 Real Time Communications

Providing travel information can be a cost effective means of influencing travel behavior as it is a relatively low cost for the agency and is typically very low cost (or free) to the user. The objective of real time traveler communications systems should be to provide travelers with enough information that they can make efficient use of their assorted travel options. Applications should be available on as many platforms as possible. At a minimum, the region should seek to promote the development of internet websites and/or mobile phone applications (apps) that provide travelers with information for use in making travel decisions.

For the summer pilot program, it is recommended that the Mountain Accord engage a web and mobile phone app developer (or developers) to initiate the development of real time communications services using currently available travel time, congestion and transit data. One example would be expanding the existing UDOT Traffic application, which would allow for one-stop location for real-time transportation decision making tools. Additionally, the team recommends that the vehicle detection systems be installed at the base of the canyon to monitor vehicles entering/exiting the canyons and at heavily utilized, high volume parking lots in advance of the winter season. This will allow for the collection of baseline data and the programming of required algorithms to monitor and predict parking lot utilization.

3.4 Walking/Biking

During the summer months, the canyons attract a significant number of visitors who come to walk, hike, run and bike. Pedestrian and cyclist use of the canyons contributes to a number of transportation issues on the roadways. Currently, there are no dedicated paths or sidewalks along the roadways; therefore, cyclists and pedestrians must share the roadway and shoulders with vehicles. At narrow sections of the road, this can lead to conflicts. In the short to mid-term memo, several solutions are recommended to improve facilities for cyclists and pedestrians within the canyons. Some of these proposed solutions include:

- Continuous bike lane
- Informational elements/signage
- Bike amenities
- Pedestrian facilities (pedestrian crossings)
- Reduce informal and spider web trails leading into trailheads
- Improve access to transit

In order to make the canyons more user-accessible for all modes of transportation, the canyons need to implement improved bicycle and pedestrian facilities. While no specific actions are called out for

improving walking and biking facilities during the summer pilot program, planning efforts should consider the specific improvements detailed in the Short to Mid-Term Transportation Memo.

3.5 Active Traffic Management

Active traffic management (ATM) is a family of strategies that manage traffic flows, often on a real-time basis, to address congestion. While typically applied on congested urban freeways, there are ATM treatments with the potential to address congestion issues in the Little Cottonwood and Big Cottonwood Canyons. These include the following:

- Adaptive traffic signal control (ATSC) strategies adjust traffic signal phasing and timing in response to actual traffic conditions in order to maximize vehicular throughput at intersections.
- The combination of transit signal priority and transit shoulder running enables transit vehicles to enjoy travel time savings over un-tolled passenger vehicles by providing an extra travel lane for their exclusive use and a combination of early green phases or extended green phases at traffic signals.

All of the treatments considered will have to be screened as a preferred regional congestion solution through NEPA processes. The NEPA process is generally initiated early in the project lifecycle and is meant to ensure that the decision making processes surrounding potential projects takes into account the full range of potential impacts, thoughtfully considers all potential alternatives, and provides an opportunity for all affected stakeholders to participate in the process. For the summer pilot program, the team recommends the Mountain Accord work to formalize a proposal to the agencies. This proposal will help with the development of a solution, allow for stakeholder and the general public to weigh in, and eventually expedite the NEPA review. Once this formal proposal has been submitted, the agencies can begin coordination for NEPA evaluation. Given these high-level objectives, additional analysis and outreach will be required in order to proceed with any of the strategic treatments proposed in this report. Furthermore, preliminary engineering activities will have to be initiated in order to identify specific operating parameters and policies for each of the solutions presented in this report.

Additionally, most of the proposed strategies incorporate some element of Intelligent Transportation Systems (ITS). In general, ITS systems must conform to the National ITS Architecture, particularly if the project is funded by the Highway Trust Fund and the Mass Transit Account. The National ITS Architecture also requires that regions deploying federally funded ITS systems must have in place a regional ITS architecture that is consistent with the National Architecture.

3.6 Tolling Systems

The Cottonwood Canyons suffer from an overabundance of vehicles during peak periods, namely weekends and holidays during the winter. This creates congestion on limited roadway space and limited parking facilities. Tolling in the canyon areas may therefore be an effective mechanism to encourage travel by non-passenger vehicle modes and generate revenue for additional area transportation improvements.

Significant institutional work must be undertaken to implement this strategy. It is unlikely that these issues may be remedied in time for the summer transit pilot program. However, a brief description of the issues that must be addressed is as follows: