Little Cottonwood Canyon ENVIRONMENTAL IMPACT STATEMENT
Wasatch Boulevard to Alta

Draft Purpose and Need Chapter

Little Cottonwood Canyon Environmental Impact Statement Wasatch Boulevard to Alta

Lead agency:
Utah Department of Transportation

October 30, 2019

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1.1 Introduction

This Environmental Impact Statement (EIS) for the Little Cottonwood Canyon Project has been prepared according to the provisions of the National Environmental Policy Act (NEPA) and other laws, regulations, and guidelines of the Federal Highway Administration (FHWA). This document conforms to the requirements of the Utah Department of Transportation (UDOT), the project sponsor and lead agency.

What is the lead agency for the Little Cottonwood Canyon EIS?

The Utah Department of Transportation is the project sponsor and lead agency.

FHWA has assigned its responsibilities under NEPA and other federal environmental laws to UDOT for highway projects in Utah, pursuant to 23 United States Code Section 327, in a Memorandum of Understanding (MOU) dated January 17, 2017. In accordance with the assignment MOU, UDOT is carrying out the environmental review process for the Little Cottonwood Canyon Project in lieu of FHWA and serves as the lead agency in the NEPA process. The assignment MOU does not change the roles and responsibilities of any other federal agency whose review or approval is required for the project.

As part of the environmental review process, the lead agency is required to identify and involve cooperating and participating agencies, develop coordination plans, provide opportunities for the public and participating agencies to be involved in defining the purpose and need statement and determining the range of alternatives, and collaborate with cooperating and participating agencies to determine methodologies and the level of detail for analyzing alternatives.[1] The lead agency must also provide oversight with regard to managing the NEPA process and resolving issues.

Table 1.1-1 lists the cooperating and participating agencies for the Little Cottonwood Canyon EIS.

What are cooperating and participating agencies?

A cooperating agency is an agency, other than a lead agency, that has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposed project or project alternative. A state or local agency of similar qualifications may, by agreement with the lead agency, become a cooperating agency (40 Code of Federal Regulations Section 1508.5).

A participating agency is a federal, state, tribal, regional, or local government agency that might have an interest in the project.

[1] These steps are required by 23 United States Code Section 139, which establishes an environmental review process that must be used when preparing an EIS for a highway or transit project.

Table 1.1-1. Cooperating and Participating Agencies for the Little Cottonwood Canyon EIS

Agency or Government[a]	Type of Agency Involvement
Federal Agencies	
U.S. Army Corps of Engineers	Cooperating and participating
U.S. Department of Agriculture (USDA) Forest Service	Cooperating and participating
U.S. Environmental Protection Agency	Cooperating and participating
State Agencies[b]	
Resource Development Coordinating Committee/ Public Lands Policy Coordinating Office	Participating
Utah Division of Air Quality	Participating
Utah Division of Forestry, Fire and State Lands	Participating
Utah Division of Indian Affairs	Participating
Utah Division of Water Quality	Participating
Utah Office of Tourism	Participating
Regional Governments or Agencies	
Central Wasatch Commission	Participating
Utah Transit Authority	Cooperating and participating
Wasatch Front Regional Council	Participating
Local Governments	
Salt Lake County	Participating
Salt Lake City	Participating
Salt Lake City Department of Public Utilities	Cooperating and participating
City of Cottonwood Heights	Participating
Murray City	Participating
Sandy City	Participating
Town of Alta	Participating
Metropolitan Water District of Salt Lake and Sandy	Participating

[a] The following tribes were invited to participate: Cedar Band of Paiutes, Eastern Shoshone Tribe of the Wind River Reservation, Northwestern Band of Shoshone Nation, Shivwits Band of Paiute Indians, Shoshone-Bannock Tribes of the Fort Hall Reservation, Ute Indian Tribe of the Uintah and Ouray Reservation, and the Confederated Tribes of the Goshute Reservation. None of the tribes responded to the request. Tribal representatives will also be contacted as part of the Native American consultation process associated with this EIS.

[b] This is a list of state divisions that accepted the participating agency invitation. All state agency participation will also be coordinated through the Resource Development Coordinating Committee.

1.1.1 Description of the Study Area

The study area used for the Little Cottonwood Canyon Project extends along State Route (S.R.) 210 from its intersection with S.R. 190/Fort Union Boulevard in Cottonwood Heights, Utah, to its terminus in the town of Alta, Utah, and includes the Bypass Road (Figure 1.1-1). UDOT developed the study area to include an area that's influenced by the transportation operations in Little Cottonwood Canyon and to provide logical termini for the project. Separate impact analysis areas have been developed for each environmental resource evaluated in this EIS.

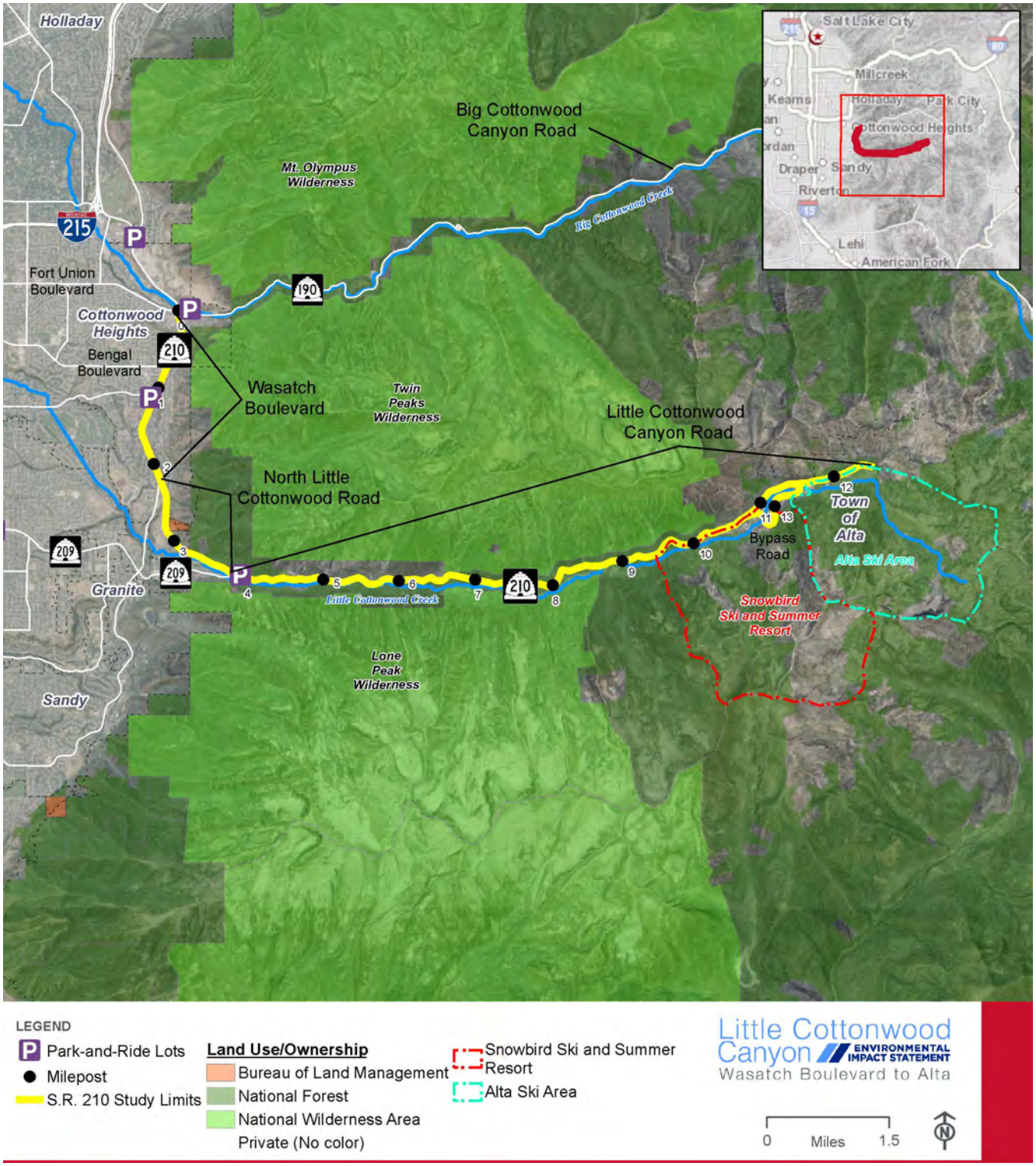
The intersection of S.R. 190/Fort Union Boulevard was selected as the western terminus because it's the point where traffic splits between Big Cottonwood Canyon and Little Cottonwood Canyon. Traffic south of this intersection is mostly related to trips into and out of Little Cottonwood Canyon and commuter traffic on Wasatch Boulevard. The end of the paved road in Little Cottonwood Canyon was selected as the eastern terminus because this is where S.R. 210 terminates in the town of Alta at Albion Basin Road. The project does not include Albion Basin Road.

The study area also includes the S.R. 210 Bypass Road in the town of Alta. The Bypass Road was included in the evaluation because it functions as an alternate route when S.R. 210 is closed for avalanche control.

Through the study area, S.R. 210 is designated with different street names. For clarity in this EIS, the following segments of S.R. 210 use the following naming conventions (shown in Figure 1.1-1):

- **Wasatch Boulevard** – S.R. 210 from Fort Union Boulevard to North Little Cottonwood Road
- **North Little Cottonwood Road** – S.R. 210 from Wasatch Boulevard to the intersection with S.R. 209
- **Little Cottonwood Canyon Road** – S.R. 210 from the intersection of North Little Cottonwood Road and S.R. 209 through the town of Alta, including the Bypass Road, up to but not including Albion Basin Road

Figure 1.1-1. Study Area for the Little Cottonwood Canyon EIS



1.1.2 Background of the S.R. 210 Project

1.1.2.1 Environmental Impact Statement

Little Cottonwood Canyon is in the Uinta-Wasatch-Cache National Forest, which is on the eastern edge of the Salt Lake City metropolitan area located in Salt Lake County. Salt Lake County has a population of about 1.12 million. The canyon is home to two internationally recognized ski resorts, Alta and Snowbird, and includes parts of two National Wilderness Areas: Twin Peaks Wilderness to the north and Lone Peak Wilderness to the south. Winter recreation activities include skiing at the resorts, backcountry skiing, snowshoeing, and ice climbing. In the summer, the resorts offer abundant recreation opportunities, and land administered by the U.S. Department of Agriculture (USDA) Forest Service is used extensively for hiking, cycling, rock climbing, fishing, camping, and picnicking. The canyon also supports habitat for native wildlife communities and native plants. Little Cottonwood Canyon receives about 2.1 million visitors per year (Lamborn and Burr 2016).

The canyon is also defined as a watershed area by Salt Lake Valley Board of Health (Salt Lake Valley Health Department 2006). The purpose of the watershed area is to protect and promote health and promote conditions that contribute to preserving and protecting drinking water quality. The watershed provides water for Salt Lake City and numerous cities in eastern Salt Lake County.

Transportation into and out of Little Cottonwood Canyon is limited to S.R. 210, which parallels Little Cottonwood Creek for much of the canyon. Parking is provided at the resorts, at some trailheads, and at park-and-ride lots at the base of the canyon. The Utah Transit Authority (UTA) provides winter ski bus service from park-and-ride lots to the resorts and summer employee transit for workers at the resorts.

Before the EIS process was initiated, UDOT, UTA, and other agencies and planning organizations conducted studies on traffic, parking, transit use, and avalanche impacts in Little Cottonwood Canyon and on S.R. 210. Numerous studies were conducted as part of a process known as the Mountain Accord. The Mountain Accord brought together disparate interests in a collaborative manner to create a sustainable plan for preserving the central Wasatch Mountains (which include Little Cottonwood Canyon) including short- and long-term transportation recommendations that would provide sustainable and year-round access for everyone.

Although detailed alternatives were not developed under the Mountain Accord, the general recommendations included increasing transit service in winter and summer, formalizing parking to designated areas, making avalanche safety improvements, improving bicycle and pedestrian facilities, making operational traffic improvements, and considering tolling. At the time, aside from a project in the Wasatch Front Regional Council's (WFRC) 2015 to 2040 *Wasatch Front Regional Transportation Plan* (RTP; WFRC 2015) to add a snow shed over Little Cottonwood Canyon Road, none of the Mountain Accord recommendations were included in state or regional transportation plans.

UDOT considered the Mountain Accord recommendations as it developed a preliminary purpose of and need for the Little Cottonwood Canyon Project. UDOT also considered WFRC's 2019 to 2050 RTP, which showed a need to improve portions of S.R. 210/Wasatch Boulevard from Bengal Boulevard to S.R. 209 (see Section 1.3, Regional Transportation Planning). The *Cottonwood Heights General Plan* (City of Cottonwood Heights 2005) and the *Wasatch Boulevard Master Plan* (City of Cottonwood Heights 2019) also note the need to increase capacity and improve the Wasatch Boulevard portion of S.R. 210.

In 2017, the State of Utah passed Senate Bill 277, which included funding for transportation improvement projects that "have a significant economic development impact associated with recreation and tourism within the state" and that "address significant needs for congestion mitigation" (Senate Bill 277, Highway General Obligation Bonds Authorization). The bill charged the Utah Transportation Commission with prioritizing projects. The Commission ranked Little Cottonwood Canyon as a top priority area because of its high recreational use and economic benefit from tourism to the State. With authorization under Senate Bill 277, UDOT initiated the NEPA process to identify and evaluate transportation improvement alternatives for S.R. 210.

On March 9, 2018, FHWA, on behalf of UDOT, published a Notice of Intent (NOI) to prepare the Little Cottonwood Canyon EIS for proposed improvements to S.R. 210. The NOI stated UDOT's proposal to make operations improvements, introduce demand-management measures, and facilitate implementation of improved public transit service on S.R. 210. UDOT requested public and agency input to the scope of the EIS during a 57-day scoping period from March 9 to May 4, 2018.

After reviewing scoping comments and the need for the project, UDOT revised the scope of this EIS to focus on enhancing safety and improving wintertime mobility through avalanche mitigation, improving parking at existing USDA Forest Service trailheads, and making roadway improvements to Wasatch Boulevard from S.R. 190/Fort Union Boulevard to North Little Cottonwood Canyon Road. FHWA published a revised NOI on March 5, 2019, describing UDOT's revised scope for the project and initiating a new scoping process.

During that second scoping period, WFRC released its 2019 to 2050 RTP (WFRC 2019), which includes a project to widen Little Cottonwood Canyon Road from two to three lanes from Wasatch Boulevard to the end of the canyon. The 2019 to 2050 RTP also includes special bus service in Little Cottonwood Canyon. With the addition of these projects, UDOT revised the scope of the Little Cottonwood Canyon EIS, adding roadway capacity and mobility improvements to the list of project elements, and released a new NOI on May 15, 2019. With the release of the new NOI, the second scoping period was extended to 102 days: from March 5 to June 14, 2019.

1.2 Summary of Purpose and Need

1.2.1 Purpose of the Project

UDOT intends to improve the commuter, recreation, and tourism experiences for all users of S.R. 210 through transportation improvements that improve safety, reliability, and mobility on S.R. 210. In developing alternatives for these improvements, UDOT will consider the character, natural resources, watershed, diverse uses, and scale of Little Cottonwood Canyon.

What are reliability and mobility?

Reliability refers to the degree of certainty and predictability in travel times on the transportation system. *Mobility* refers to the ability and level of ease to travel along a highway facility.

UDOT's purpose is reflected in one primary objective for S.R. 210: to substantially improve safety, reliability, and mobility on S.R. 210 from Fort Union Boulevard through the town of Alta for all users on S.R. 210.

UDOT also considered the goals put forward by the City of Cottonwood Heights in its *Wasatch Boulevard Master Plan*, goals such as a connected network of paths and trails for transportation and recreation and a balance of livability, roadway capacity, and sustainable canyon access (City of Cottonwood Heights 2019). These goals are a secondary objective of the project that UDOT used to develop and refine the project alternatives for this segment of S.R. 210, not to eliminate alternatives from consideration.

As another secondary objective and in recognition of the importance of the Little Cottonwood Canyon watershed to Salt Lake City's water supply (see Section 1.1.2, Background of the S.R. 210 Project), UDOT will mitigate short-term impacts and minimize potential long-term transportation system impacts to water quality.

These secondary objectives were used to further refine the project alternatives (for example, to consider different best management practices) but were not used to determine whether an alternative was reasonable or practicable.

Through the NEPA process and compliance with all applicable environmental requirements covered under this process, UDOT will analyze impacts caused by the proposed alternatives and look at opportunities to avoid, minimize, rectify, or reduce potential impacts to the human and natural environment from the transportation improvements through standard operating procedures and mitigation measures. This process will include coordinating with the Salt Lake City Department of Public Utilities, the Metropolitan Water District of Salt Lake and Sandy, and Sandy City to consider alternatives and develop management practices that maintain the quality of the Little Cottonwood Canyon watershed.

1.2.2 Need for the Project

The transportation needs in the study area are related primarily to traffic during peak periods, avalanche risk and avalanche control in Little Cottonwood Canyon, multiple on-road users in constrained areas, and anticipated future increases in visitation to Little Cottonwood Canyon as a result of population growth in Utah. The following deficiencies occur in the study area:

- Decreased mobility in winter during the morning (AM) and afternoon (PM) peak travel periods related to visits to ski areas, with the greatest traffic volumes on weekends and holidays and during and after snowstorms.
- Decreased mobility on Wasatch Boulevard resulting from weekday commuter traffic.
- Safety concerns associated with avalanche hazard and traffic delays caused by the current avalanche-control program in Little Cottonwood Canyon. Periodic road closures for avalanche control can cause 2-to-4-hour travel delays or longer, which can cause traffic to back up in the neighborhoods at the entrance of the canyon.
- Roadway elements that do not meet current design standards; for example, shoulders that are narrow, and horizontal and vertical curves that are steep and/or sharp.
- Limited parking at trailheads and ski areas that leads to on-road parking. The consequences of on-road parking include:
  - Reduced mobility on S.R. 210 near trailheads and at ski areas
  - Loss of shoulder area for cyclists and pedestrians, which forces them into the roadway travel lane and creates a safety concern
  - Creation of informal trailheads that contribute to erosion, mineral soil loss, the spread of invasive weeds, and loss of native vegetation in the canyon
  - Damage to the pavement along the roadway edge, which causes increased soil erosion and runoff into nearby streams.

What are peak periods?

Peak periods are the periods of the day with the greatest amounts of traffic. For Little Cottonwood Canyon, the winter daily peak periods are tied to the ski areas opening and closing, whereas peak summer traffic occurs in the early afternoon. Peak periods are looked at by transportation analysts when examining the need for a project.

Section 1.3, Regional Transportation Planning, and Section 1.4, Need for the Project, present data that document the need for improvements to S.R. 210. UDOT determined the need for the project by reviewing the safety and operational issues identified in previous planning studies and through public and agency input and by quantifying the change in anticipated travel demand between existing (2015) and forecasted (2050) conditions.

What is travel demand?

Travel demand is the expected number of transportation trips in an area. Travel demand can be met by various modes of travel, such as automobile, bus, light rail, carpooling, and cycling.

1.3 Regional Transportation Planning

WFRC is the metropolitan planning organization for the region that includes the project study area. WFRC develops the RTP for Davis, Salt Lake, and Weber Counties.

The RTP is a fiscally constrained, 20-to-30-year plan of the anticipated highway and transit projects that would be needed to meet travel demand in WFRC's planning area. In general terms, *fiscally constrained* means that a metropolitan planning organization can approve a plan only if the state department of transportation or other transportation agency determines (and FHWA concurs) that enough funding is reasonably anticipated to be available to carry out the projects in the plan.

Transportation needs are based on projected and planned socioeconomic factors and land use in a region. Under federal law, WFRC must update its RTP every 4 years. WFRC's most recent RTP, the 2019 to 2050 RTP, was adopted in 2019 and includes improvements to portions of S.R. 210 in the study area for the Little Cottonwood Canyon EIS as well as transit infrastructure and service improvements (WFRC 2019).

The 2019 to 2050 RTP identifies three timeframes, or phases, for constructing planned projects:

- Phase 1: 2019 to 2030
- Phase 2: 2031 to 2040
- Phase 3: 2041 to 2050

Table 1.3-1 lists the planned highway and transit projects in the 2019 to 2050 RTP that influence the Little Cottonwood Canyon Project. Specific to S.R. 210, the 2019 to 2050 RTP includes (1) widening Wasatch Boulevard from two lanes to five lanes between Bengal Boulevard and North Little Cottonwood Road and (2) widening S.R. 210 from Wasatch Boulevard to the end of the canyon from two to three lanes.

In addition, the 2019 to 2050 RTP lists construction of a snow shed in Little Cottonwood Canyon. The 2019 to 2050 RTP also includes several transit projects on Wasatch Boulevard and in Little Cottonwood Canyon and includes improvements to the Little Cottonwood Canyon park-and-ride lot.

What is a snow shed?

A snow shed is a structure that shields a road from an avalanche flow.

Table 1.3-1. Planned and Funded Transportation Improvements in the 2019 to 2050 RTP in the Study Area

Facility	RTP Identification Number	Limits	Existing Number of Lanes	Future Number of Lanes	Project Type	Needs Phase	Funding Phase
Highway Projects							
Fort Union Blvd.	R-S-38	3000 East to Wasatch Blvd.	3 or 5	5 or 7	Widening	1	1
S.R. 210	R-S-53	Little Cottonwood Canyon Road from Wasatch Boulevard to end of canyon (10.2 miles)	2	3	Widening	2	3
S.R. 209	R-S-56	Eastdell Drive to Wasatch Blvd. (1.6 miles)	2	2	Operational	1	2
Wasatch Blvd.	R-S-163	Bengal Blvd. to S.R. 209 (2.7 miles)	2 or 3	5	Widening	1	1
S.R. 210	R-S-216	Snow shed over Little Cottonwood Canyon Road at White Pine Chutes	NA	NA	New construction	1	3
Transit Projects							
Cottonwood Canyons Transit Hub	T-S-75	Transit hub near Big Cottonwood Canyon	NA	NA	Transit hub	1	3
Little Cottonwood Corridor – Special Service Bus	NA	From mouth of Little Cottonwood Canyon to Alta Ski Resort (8.57 miles)	NA	NA	Transit service	3	3
Foothill Drive – Wasatch Blvd. Corridor South	NA	From 3900 South to Little Cottonwood Canyon Park and Ride (9.09 miles)	NA	NA	Transit service	3	3
Cottonwood Midvale Corridor Mode: Core Service 15	NA	From Bingham Junction TRAX Station to Little Cottonwood Canyon park-and-ride lot (7 miles)	NA	NA	Transit service	1	2
East Sandy Daybreak Corridor Mode: Core Service 15	NA	From South Jordan Parkway TRAX Station to Little Cottonwood Canyon park-and-ride lot (16.6 miles)	NA	NA	Transit service	1	3
Little Cottonwood Canyon Park-and-Ride	NA	NA	NA	NA	Transit facility	3	3

Source: WFRC 2019
NA = not applicable; RTP = Regional Transportation Plan; S.R. = State Route

1.4 Need for the Project

The 2019 to 2050 RTP identifies a need for improvements to S.R. 210 in the study area. This section evaluates that need based on projected population growth and travel demand data, the existing transportation system and planned improvements, and the identified transportation and safety and operational issues in the study area.

1.4.1 Planning for Future Conditions

UDOT considered the planning horizon of the RTP to establish a planning horizon for the Little Cottonwood Canyon EIS. The planning horizon is used to assess how well project alternatives would support future travel demand. A no-action condition (that is, the condition of transportation operations of the road and transit system without the Little Cottonwood Canyon Project) is used to inform the needs assessment.

1.4.1.1 Planning Horizon

The planning process for the Little Cottonwood Canyon EIS started in February 2018. The planning horizon in WFRC's current RTP is 2019 to 2050. In developing the study area, purpose and need, and alternatives for the Little Cottonwood Canyon EIS, UDOT aligned the EIS's planning horizon to match the current RTP's planning horizon. This planning horizon also aligns with UDOT's timeline for preparing its 2019 to 2050 *Long-Range Transportation Plan*.

WFRC's travel demand model is applicable to the Wasatch Boulevard portion of S.R. 210, but it does not include North Little Cottonwood Road or Little Cottonwood Canyon Road, in part because recreation travel patterns and trip purposes in Little Cottonwood Canyon are very different than typical urban activity. For this reason, UDOT developed a custom transportation model for the Little Cottonwood Canyon EIS process to estimate travel conditions in the canyon segment of S.R. 210.

What is a travel demand model?

A travel demand model predicts future travel demand based on projections of land use, socio-economic patterns, and transportation system characteristics.

For this EIS, UDOT coordinated with WFRC and obtained WFRC's 2050 travel demand model for use in developing this EIS. The model includes the socioeconomic forecast and RTP projects through 2050.

1.4.1.2 Projected Growth in Population, Employment, and Households

Salt Lake County is projected to have large increases in population, employment, and households by 2050 (see Table 1.4-1). The increase in population is expected to result in continued increased travel demand on all main roads in the transportation system and in Little Cottonwood Canyon. Utah County, to the south of Salt Lake County, is also projected to experience substantial growth in population, employment, and households, as shown in Table 1.4-1. This growth would likely contribute to increased travel demand on roads in Salt Lake County.

Table 1.4-1. Projected Regional Population, Employment, and Household Growth

Area	Population		Employment		Households	
	2017	2050 Projection (Percent Change from 2017)	2017	2050 Projection (Percent Change from 2017)	2017	2050 Projection (Percent Change from 2017)
Salt Lake County	1,127,117	1,531,282 (36%)	899,836	1,341,790 (49%)	394,665	606,036 (54%)
Utah County	623,706	1,297,515 (108%)	341,957	689,992 (102%)	177,092	419,678 (137%)

Source: Kem C. Gardner Policy Institute 2017

1.4.1.3 2050 No-action Conditions

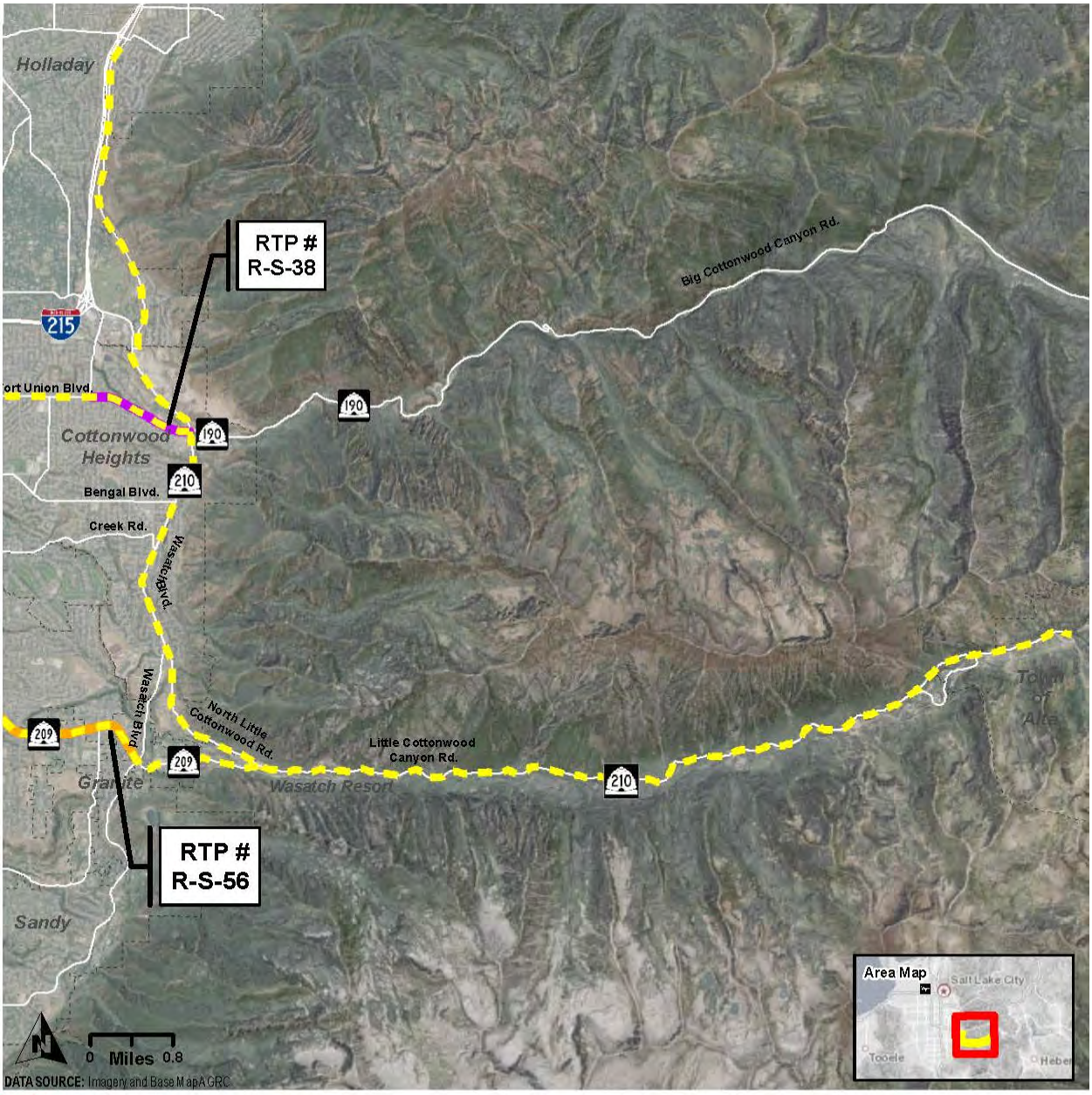
For the 2050 no-action conditions, UDOT used a socioeconomic forecast for 2050 (Kem C. Gardner Policy Institute 2017) and assumed that all funded transit and roadway projects in the 2019 to 2050 RTP would be in place, except for improvements to S.R. 210 (identified as projects T-S-75, R-S-53, R-S-163, and R-S-216 in Table 1.3-1). The 2050 no-action conditions do not include the planned improvement to S.R. 210 south of Fort Union Boulevard because those improvements are evaluated in this EIS as part of the alternatives.

What are the 2050 no-action conditions?

The no-action conditions are the conditions that would be present in the study area in 2050 if the Little Cottonwood Canyon Project were not implemented.

Figure 1.4-1 shows the locations of planned no-action roadway and transit projects in the study area except improvements to S.R. 210 from Fort Union Boulevard through the town of Alta.

Figure 1.4-1. Future (2050) No-action Transportation Network



1.4.2 Importance of S.R. 210 in the Local and Regional Transportation Systems

1.4.2.1 Roadway Network

The full length of S.R. 210 is 12.5 miles, with an additional 1.1 miles included in the Bypass Road. S.R. 210 is the primary link for Cottonwood Heights and communities in the north part of the Salt Lake Valley to access Little Cottonwood Canyon. S.R. 210 provides a direct connection to Little Cottonwood Canyon from Interstate 215 (I-215). Major intersections on S.R. 210 are with S.R. 190/Fort Union Boulevard, Bengal Boulevard, Wasatch Boulevard, and S.R. 209. S.R. 210 is also an important commuter road for southeast valley residents to access I-215 and employment centers throughout the Wasatch Front.

- The first 2.2 miles of S.R. 210 south of Fort Union Boulevard are designated Wasatch Boulevard, which is a four-lane arterial for 0.7 mile from S.R. 190/Fort Union Boulevard to Bengal Boulevard and continues as a two-lane arterial for 1.5 miles from Bengal Boulevard to a split where S.R. 210 diverges from Wasatch Boulevard and continues as North Little Cottonwood Road heading into Little Cottonwood Canyon.
- S.R. 210 continues as North Little Cottonwood Road for 1.7 miles to its intersection with S.R. 209, where it becomes Little Cottonwood Canyon Road to its terminus to Albion Basin Road in the town of Alta, a distance of 8.6 miles. Little Cottonwood Canyon Road is primarily two lanes, with three relatively short segments having three lanes (Figure 1.4-2) that provide opportunities to pass slower-moving vehicles.
- The Bypass Road is a 1.1-mile, two-lane route south of Little Cottonwood Canyon Road and Little Cottonwood Creek. It provides additional access to ski areas and related development.

Wasatch Boulevard and North Little Cottonwood Road are designated by UDOT as principal arterials. Principal arterials are intended to serve major activity centers and typically have the highest traffic volume and longest trip demands. Little Cottonwood Canyon Road including the Bypass Road are designated a minor arterial. Minor arterials provide service for trips of moderate length and serve geographic areas that have smaller populations.

Figure 1.4-2. Number of Current Travel Lanes on S.R. 210

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As Wasatch Boulevard, S.R. 210 is part of a major north-south corridor at the base of the Wasatch Mountains providing primary access to both Big and Little Cottonwood Canyons. Travelers into Little Cottonwood Canyon on S.R. 210 are primarily recreation users in the canyon. Residential property owners and resort employees in Little Cottonwood Canyon also use S.R. 210 for commuting and trips for goods and services. Other roads of importance in the study area include the following.

- **I-215** is the major interstate highway link that provides recreational access from the Salt Lake City metropolitan area to four of the Wasatch Front canyons in the Salt Lake Valley: Parley's, Millcreek, Big Cottonwood, and Little Cottonwood Canyons.
- **S.R. 190/Fort Union Boulevard** is an east-west arterial south of I-215. East of its intersection with S.R. 210, S.R. 109 is known as Big Cottonwood Canyon Road. In winter, Big Cottonwood Canyon Road terminates at the top of Big Cottonwood Canyon at the Brighton ski resort, but in summer the road is open across Guardsman Pass to Park City. West of its intersection with S.R. 210, Fort Union Boulevard is a two-lane road from Wasatch Boulevard to 3000 East and five-lane road west of 3000 East. Fort Union Boulevard provides access across the Salt Lake Valley to Cottonwood Heights and both Big and Little Cottonwood Canyons. Travelers on I-215 access S.R. 190 via 6200 South/Wasatch Boulevard.
- **Bengal Boulevard** is a two-lane arterial with center turn lane providing east-west access from neighborhoods in southern Cottonwood Heights to commercial areas and major arterials, including Highland Drive at the road's western terminus.
- **S.R. 209** provides east-west access across the Salt Lake Valley to Little Cottonwood Canyon. From Highland Drive to 2300 East, the road is five lanes. Heading east after 2300 East, the road narrows to two lanes and ends at its intersection with S.R. 210 at the entrance to Little Cottonwood Canyon.

1.4.2.2 Recreation and Tourism Access

Many people choose to live in the Salt Lake City metropolitan area because of the easily accessible and abundant outdoor, year-round recreation opportunities (Utah State University 2015). Little Cottonwood Canyon also draws tourists from outside the region because of its easy access from Salt Lake City International Airport, which is less than 30 miles away.

S.R. 210 is the only road access into Little Cottonwood Canyon. It's a State Scenic Byway that's recognized for its views of dramatic mountain peaks and steep canyon walls. Wilderness areas are located on both sides of the steep canyon. The canyon also has a small number of residents. Recreational activities in Little Cottonwood Canyon include rock climbing, cycling, camping, picnicking, hiking, skiing, ice climbing, and snowshoeing. The canyon is home to two ski and summer resorts, Alta and Snowbird. Figure 1.4-3 identifies designated recreation areas in the study area.

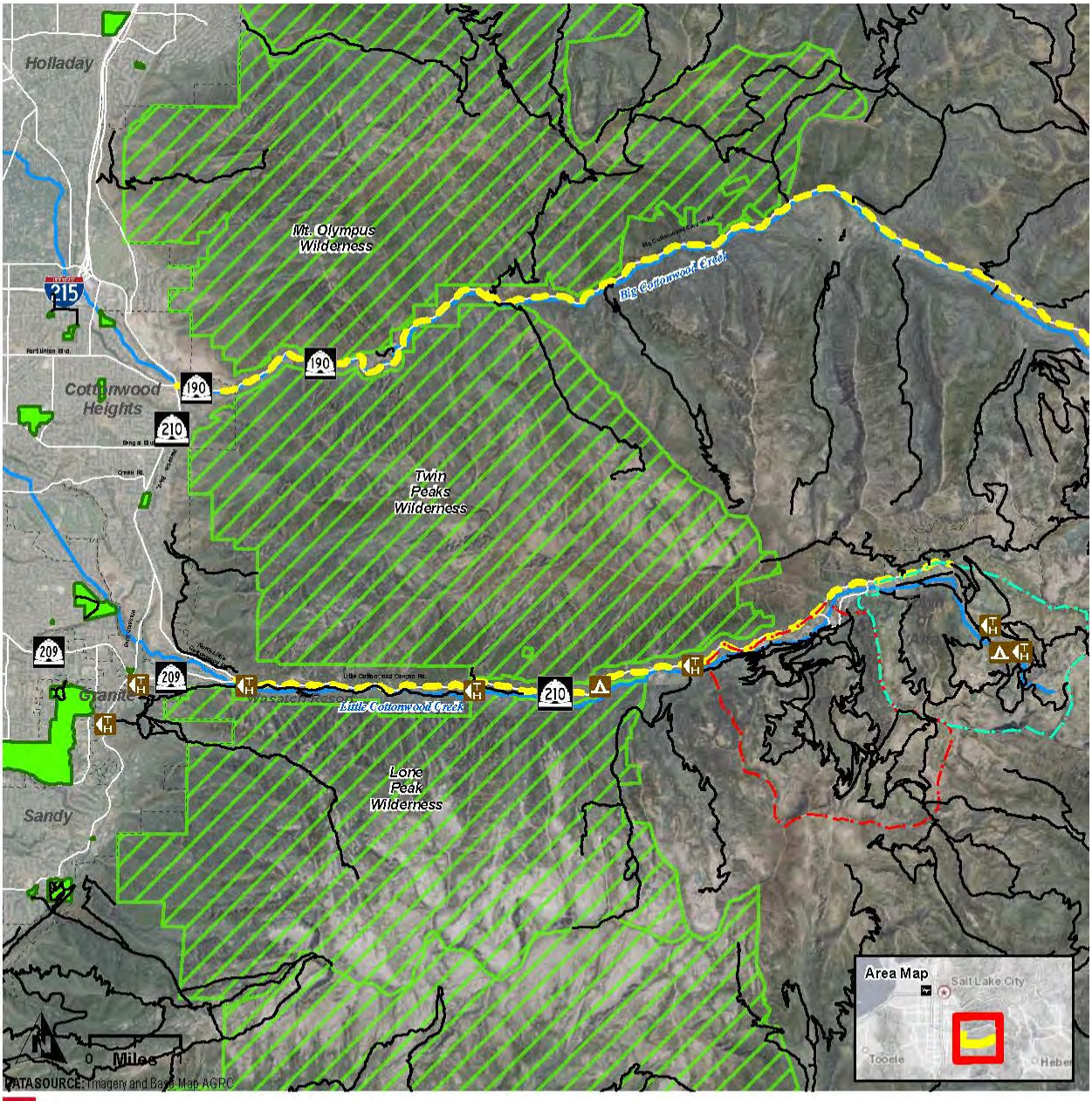
The substantial recreational opportunities in Little Cottonwood Canyon and its proximity to a large metropolitan area generate about 1.2 million vehicle trips into the canyon per year, which carry about 2.1 million visitors. Visitation into the canyon is equally distributed between winter and summer uses, with winter use more focused on peak ski weekends and holidays, and summer use occurring throughout the season (Mountain Accord 2015).

Given that the populations of Salt Lake and Utah Counties are expected to grow by 36% and 108%, respectively, through 2050, the number of travelers into Little Cottonwood Canyon will also increase. Because of the vast number of recreational opportunities in the central Wasatch Range, in addition to other recreational assets throughout the state, the Outdoor Industry Association estimates that Utah travel, tourism, and recreation industry generated about $12.3 billion in annual consumer spending, 110,000 jobs, $3.9 billion in wages and salaries, and $737 million in state and local tax revenue in 2017 (OIA 2017).

In addition, the leisure and hospitality sector of Utah's economy grew by 5.1% in 2017, making it the sector of the state's economy with the second-highest growth (Utah Economic Council 2018). According to the 2018 *Economic Report to the Governor*, travel-related sales tax revenues in 2017 were trending from 6% to 13% above 2016 revenues (Utah Economic Council 2018).

Reliable and convenient access to Utah's recreational areas supports the tourism industry and the leisure and hospitality sector of the economy. Senate Bill 277 is indicative of the State's interest in supporting growth in this sector by reducing congestion on roads and improving access to and the user experience in recreation and tourist areas. The traffic issues in Big and Little Cottonwood Canyons have implications beyond inconvenience to travelers. Though quantitative data are not available, ski industry experts report that reduced reliability for travelers has reduced the number of available skier days and therefore decreases the revenue at the ski resorts. In the context of a 120-day ski season, closures for avalanche control and related delays can have a substantial economic effect on the ski areas, particularly if closures occur on weekends or holidays (Mountain Accord 2014).

Figure 1.4-3. Little Cottonwood Canyon Recreation Destinations



1.4.2.3 Transit Routes

Transit is an important transportation option for winter recreation in Little Cottonwood Canyon. Figure 1.4-4 shows the locations of the UTA bus routes that serve the study area and use S.R. 210. Two UTA bus routes provide winter service in Little Cottonwood Canyon: Route 953 from Murray Central Station and Route 994 from Historic Sandy Station. These routes are served by dedicated transit ski buses for visitors to the Snowbird and Alta ski areas and operate from mid-December to mid-April. During the winter of 2018/2019, Route 953 provided 11 trips into the canyon per day with service every 30 to 15 minutes during peak hours and every 2 hours during off–peak hours. During the same period, Route 994 provided 26 trips into the canyon per day with service every 30 to 15 minutes.

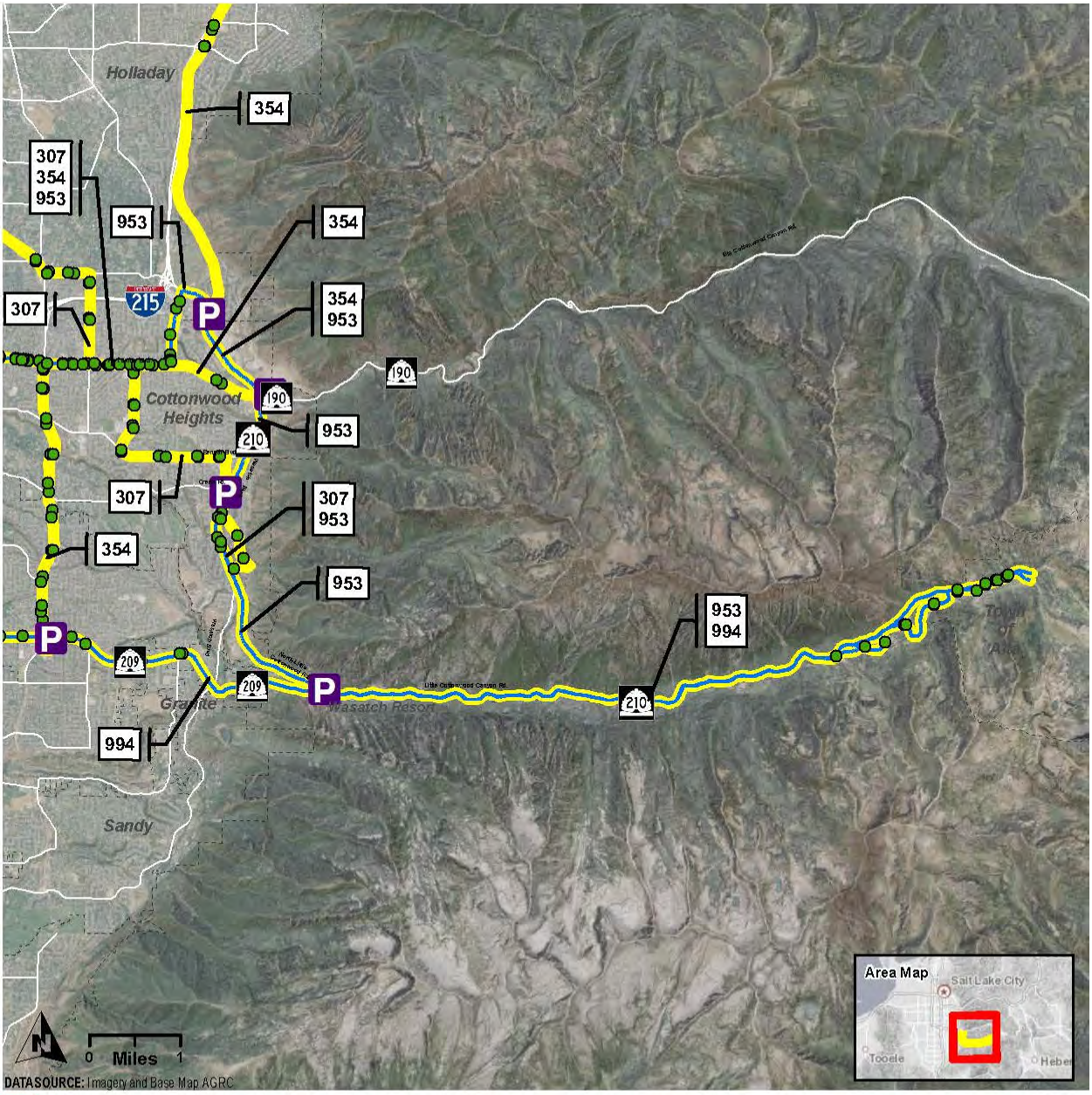
During the winter of 2016/2017, UTA revised the winter bus service to both Big and Little Cottonwood Canyons by changing routes and increasing frequency. The revision increased the number of ski bus trips over 2015/2016 levels by 35%. The increase in service contributed to a 26% increase in ridership from the 2015/2016 season to the 2016/2017 season (UTA 2018a). The winter bus service reduces vehicle trips on Little Cottonwood Canyon Road every day during the ski season.

The one-way fare for ski bus service in Little Cottonwood Canyon is $4.50. UTA has cooperative programs with the ski industry to promote transit use. Season pass holders and resort employees ride ski buses at no cost because the ski resorts compensate UTA for these trips. During the 2017–2018 season, about 76% of ski bus passengers were season pass holders or employees, 18% paid as they boarded (cash, mobile application, or FAREPAY cards), and 6% paid by SuperPass. This indicates that the average ski bus rider is either a resort employee or a dedicated resident skier (UTA 2018b). Data from the Ski Utah survey (presented in Mountain Accord 2015) show that about 7% of the visitors to the ski areas in Big and Little Cottonwood Canyons use public transit, whereas 78% arrive by private or rental vehicle. The remaining survey respondents reported themselves as being ski-in/ski-out visitors or as arriving by other carrier (for example, shuttle van). Snowbird Resort has an employee shuttle and vanpool program to reduce vehicle parking demand in Little Cottonwood Canyon.

During the summer, UTA operates one bus trip on S.R. 210 up the canyon in the morning and one bus trip down the canyon in the evening, primarily for Snowbird resort employees. There is no summer transit service with stops at trailheads in the canyon. As a result, the number of vehicles in the canyon often exceeds the number of available parking spaces at trailheads and resorts during special events, thereby requiring vehicles to park on the roadway shoulder.

Two other bus routes provide daily service on Wasatch Boulevard: Route 354 is on Wasatch Boulevard north of Fort Union Boulevard, and Route 307 is on Wasatch Boulevard between 3500 East and Golden Hills Drive.

Figure 1.4-4. Transit Routes and Park-and-Ride Lots



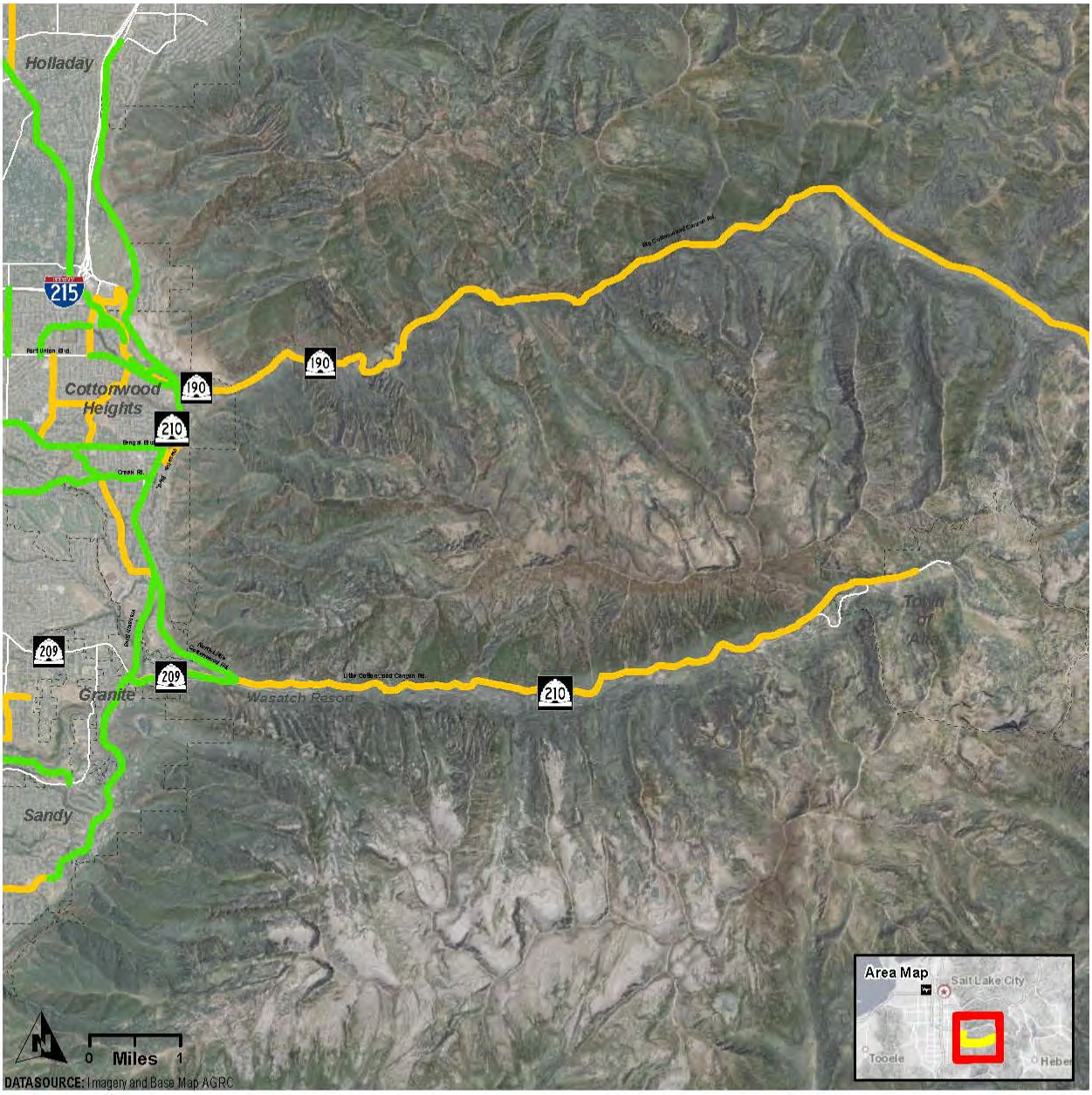
1.4.2.4 Bicycle and Pedestrian Facilities

Access into Little Cottonwood Canyon for pedestrians and cyclists is generally available along S.R. 210. Figure 1.4-5 shows bicycle facilities in the study area. In 2016, UDOT striped, and where necessary widened, S.R. 210 from Big Cottonwood Canyon to the entrance of Little Cottonwood Canyon, providing a continuous bicycle lane along the approximately 3.7-mile segment of S.R. 210 and connection to the canyons. The 2017 Bikeways Map of Salt Lake City and Salt Lake County identifies S.R. 210 as a low-comfort bicycle route because the bicycle facilities (bicycle lane and shoulders) are on a busy street or moderate-volume road (Salt Lake City and others 2017). Narrow and unpaved shoulders in Little Cottonwood Canyon force many cyclists into the vehicle travel lane.

The designated bicycle lane on S.R. 210 from Fort Union Boulevard to Little Cottonwood Canyon Road could increase bicycle use in Little Cottonwood Canyon. Although it has no formal bicycle lanes, S.R. 209 is a bicycle route for accessing Little Cottonwood Canyon. Currently, Little Cottonwood Canyon Road does not have formal bicycle or pedestrian facilities; however, some shoulder-widening improvements were recently completed in the canyon (Mountain Accord 2015).

Cycling the canyon has become a popular activity and is listed on several cycling websites as a challenging but scenic ride. In addition, the annual Snowbird Bicycle Hill Climb, which has about 200 participants, starts at the UTA park-and-ride lot at Highland Drive and S.R. 209 and ends at Snowbird Entry 2. The Tour of Utah, an annual professional cycling race, has a stage during this multi-day event that uses Little Cottonwood Canyon Road. This event attracts hundreds of riders and thousands of spectators. For more information about the condition of bicycle and pedestrian facilities in Little Cottonwood Canyon, see Section 1.4.3.2, Little Cottonwood Canyon Road – North Little Cottonwood Road to Alta.

Figure 1.4-5. Bicycle Facilities



LEGEND

- Bike Lane or Separated Shared-Use Path
- Shared Lane or Shoulder Bikeway
- City Boundary

Little Cottonwood Canyon ENVIRONMENTAL IMPACT STATEMENT
Wasatch Boulevard to Alta

1.4.3 Current and Future Transportation System Needs

1.4.3.1 Wasatch Boulevard – Fort Union Boulevard to North Little Cottonwood Road

The Wasatch Boulevard segment of S.R. 210 supports local transportation for residents along the Wasatch Front as well as recreation and tourism travel into Little Cottonwood Canyon. According to the *Wasatch Boulevard Master Plan* (City of Cottonwood Heights 2019), 42% of the traffic on Wasatch Boulevard just north of Fort Union Boulevard is commuting to or from home, and 12% is traveling to or from Little Cottonwood Canyon. The primary traffic mobility issue for Wasatch Boulevard occurs during the weekday morning and evening commutes, although mobility is also an issue during busy ski days, particularly when they occur on holidays and weekends.

Traffic on Wasatch Boulevard between Fort Union Boulevard and North Little Cottonwood Road can become heavy and reduce mobility for residents and visitors. The following sections describe the transportation issues on the Wasatch Boulevard segment of S.R. 210.

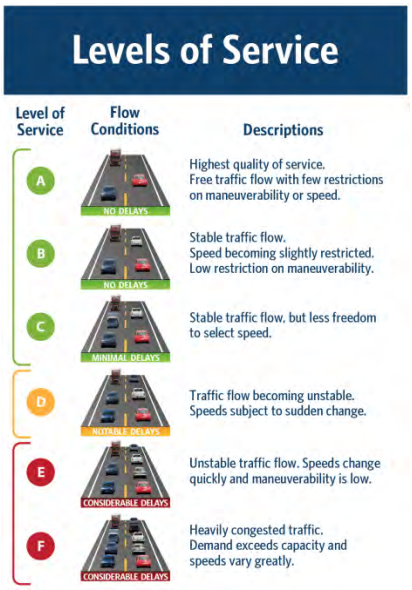
Mobility

One of the goals in UDOT's 2018 Strategic Direction online report (UDOT 2018a) is to optimize mobility. To achieve this goal, proposed roadway projects are typically evaluated in terms of the road's modeled level of service. Level of service (LOS) is measure of the vehicle-carrying capacity and performance of a street, freeway, or intersection (Figure 1.4-6). When the capacity of a road is exceeded, the result is congestion, delay, and a poor level of service. Level of service is represented by a letter "grade" ranging from A for excellent conditions (free-flowing traffic and little delay) to F for failure conditions (extremely congested, stop-and-go traffic and excessive delay).

UDOT has set a goal of maintaining roads in urban parts of the state at LOS D or better during the peak travel periods. Typically, in urban areas, LOS E and F are considered unacceptable operating conditions, and LOS A through D are considered acceptable operating conditions. UDOT chose LOS D as the threshold for determining whether capacity improvements are needed on Wasatch Boulevard from Fort Union Boulevard to North Little Cottonwood Road.

A level of service analysis conducted for Wasatch Boulevard looked at the PM peak hour in 2015 and at the no-action conditions in 2050. The PM peak hour is used in the analysis because it's typically the most congested travel period.

Figure 1.4-6. Level of Service



What are the AM and PM peak hours?

The AM or PM peak hour is the 1-hour period of the morning (AM) or afternoon (PM) during which there is the greatest number of vehicles on the roadway system.

Table 1.4-2 lists and Figure 1.4-7 shows the Wasatch Boulevard road segments and intersections in the study area and their levels of service under existing (2015) conditions. As shown in Table 1.4-2 and Figure 1.4-7, Wasatch Boulevard operates at LOS E from Bengal Boulevard to 3500 East. This is likely due to the lane reduction south of Bengal Boulevard where Wasatch Boulevard transitions from four travel lanes to two travel lanes. In addition, the 3500 East and Wasatch Boulevard intersection operates at an unacceptable level of service of LOS E.

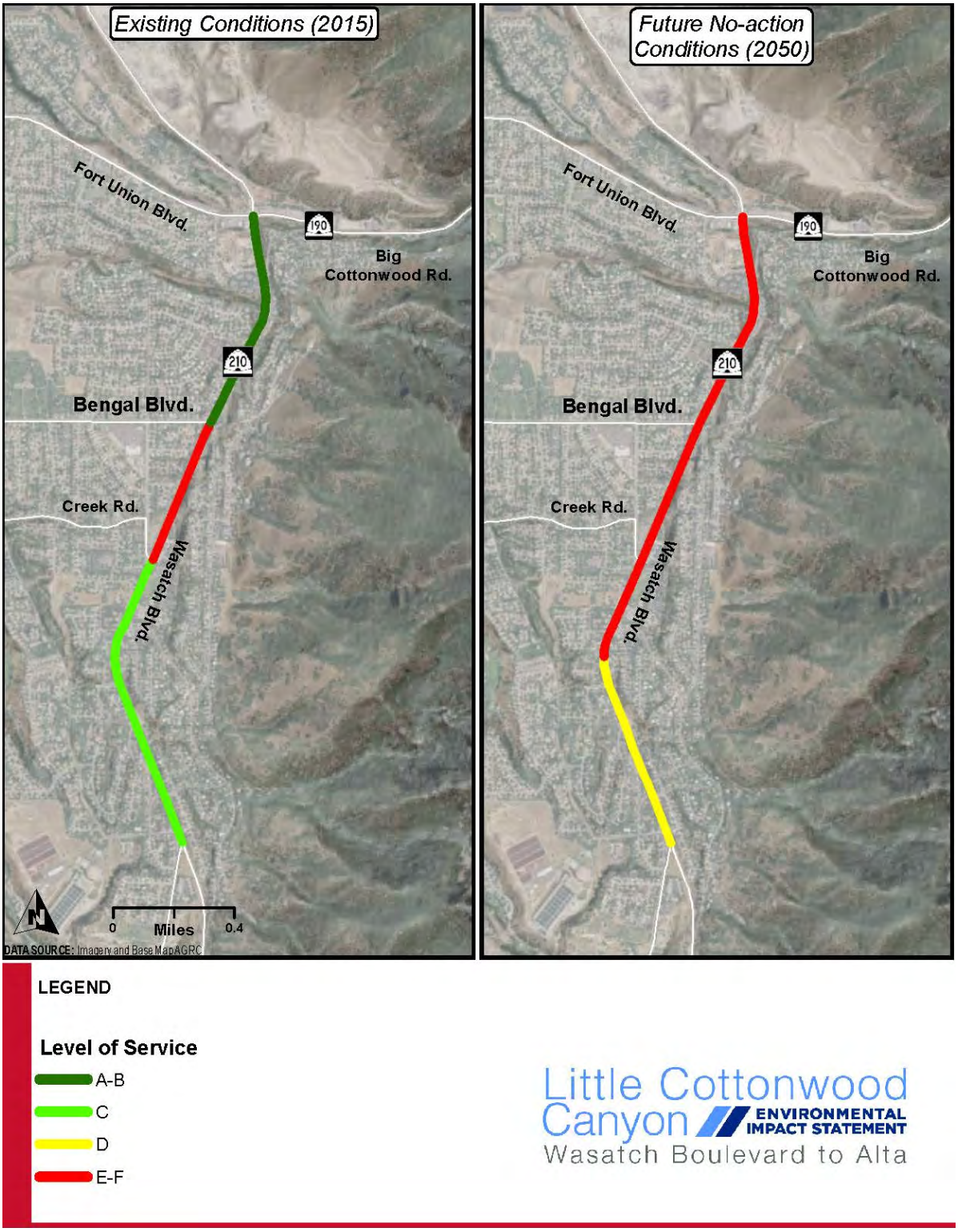
Table 1.4-2. Roadway and Intersection Levels of Service in the PM Peak Hour under Existing (2015) Conditions and Future (2050) No-action Conditions

Roadway Segment or Intersection	Level of Service	
	2015	2050
Roadway Segment of Wasatch Blvd.		
Fort Union Blvd. to Bengal Blvd.	B	F
Bengal Blvd. to 3500 East	E	E
3500 East to Kings Hill Drive	C	E
Kings Hill Drive to North Little Cottonwood Road	C	D
Intersection		
Fort Union Blvd. and Wasatch Blvd.	B	F
Bengal Blvd. and Wasatch Blvd.	C	F
3500 East and Wasatch Blvd.	E	E
Kings Hill Drive and Wasatch Blvd	C	F
North Little Cottonwood Road and Wasatch Blvd.	B	D

Table 1.4-2 also lists the level of service for the roadway segments and intersections in the study area under future (2050) no-action conditions. As shown in the table, the entire segment of Wasatch Boulevard from Fort Union Boulevard to Kings Hill Drive during the PM peak hour is projected to operate at an unacceptable level of service of LOS E or F in 2050 as a result of the increased population in the area (see Section 1.4.1.2, Projected Growth in Population, Employment, and Households). In addition, Fort Union Boulevard, Bengal Boulevard, 3500 East, and Kings Hill Drive intersections are projected to operate at an unacceptable level of service of LOS E or F. Figure 1.4-7 illustrates the level of service on these segments of S.R. 210 under existing and future conditions.

The existing (2015) operations on S.R. 210 support the need to improve the segment of Wasatch Boulevard from Bengal Boulevard to 3500 East. The projected future (2050) conditions indicate that the congestion issue will worsen over time and affect the segment from Fort Union Boulevard to Kings Hill Drive of Wasatch Boulevard.

Figure 1.4-7. Levels of Service in the PM Peak Period under Existing (2015) and Future (2050) No-action Conditions on Wasatch Boulevard from Fort Union Boulevard to North Little Cottonwood Road and on North Little Cottonwood Road



In addition to daily mobility issues for commuters on Wasatch Boulevard, issues in Little Cottonwood Canyon can affect traffic mobility on Wasatch Boulevard, making travel in the area unreliable during the winter. Closures of Little Cottonwood Canyon for avalanche control (which occur about 10.8 days per year) typically last 1.5 to 2 hours, delaying motorists who want to enter the canyon. Vehicles waiting to enter the canyons can back up onto Wasatch Boulevard from the canyon entrance to I-215. In addition to affecting the reliability of access to the canyon, these backups limit the mobility of residents and commuters along Wasatch Boulevard, Big Cottonwood Canyon Road, I-215, the 6200 South interchange on I-215, North Little Cottonwood Road, and S.R. 209 and can substantially interfere with emergency vehicles' access in these areas.

Safety

Table 1.4-3 summarizes the crash rates and severe crash rates for S.R. 210 from Fort Union Boulevard to S.R. 209 for the period 2010–2018 compared with the statewide averages for crashes and severe crashes on similar roads (arterial roads). A severe crash is defined as a crash resulting in at least one severe injury or a fatality. The crash rates are based on crashes per million vehicle-miles traveled.

As shown in Table 1.4-3, the crash rate for S.R. 210 from Fort Union Boulevard to S.R. 209 is below the statewide average, but the severe crash rate in the segment from Bengal Boulevard to North Little Cottonwood Road is above the statewide average. This is likely caused by vehicles entering and exiting S.R. 210 at the numerous non-signalized cross streets, conflicting with the through-traffic on S.R. 210. Residents along Wasatch Boulevard commented during the EIS scoping period regarding the difficulty entering and exiting side streets because of the congestion and speed of vehicles on Wasatch Boulevard.

During the period 2010–2018, there were four cyclist and two pedestrian crashes involving vehicles on S.R. 210 between Fort Union Boulevard and S.R. 209. Two the crashes resulted in serious injuries.

Table 1.4-3. Comparison of Crash Rates for S.R. 210 from Fort Union Boulevard to S.R. 209 (2010–2018) to the Statewide Averages for Arterial Roads (2011–2015)

Crash Rate				Severe Crash Rate			
Fort Union Blvd. to Bengal Blvd.	Bengal Blvd. to North Little Cottonwood Road	North Little Cottonwood Road to S.R. 209	Statewide Average for Arterial Roads	Fort Union Blvd. to Bengal Blvd.	Bengal Blvd. to North Little Cottonwood Road	North Little Cottonwood Road to S.R. 209	Statewide Average for Arterial Roads
2.43	1.46	1.44	2.89	2.90	8.67	6.24	7.10

Source: Fehr & Peers 2018b

Crash rates are based on crashes per million vehicle-miles traveled.

Pursuant to 23 United States Code Section 409, the data in this table shall not be subject to discovery or admitted into evidence in a federal or state court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location included in the data.

Data are from January 1, 2010, through January 8, 2018.

UDOT reviewed the conditions of S.R. 210 from Fort Union Boulevard to S.R. 209 and identified the following substandard design elements:

- The standard shoulder width for this segment is 8 feet. The current shoulder width varies from 4 feet to 10 feet, with 4 feet being the typical width.
- The intersection sight distance is insufficient at Kings Hill Drive.
- The length of the deceleration lane for the center left turn at Golden Hills Avenue is substandard.
- Per UDOT's roadside design guidance, the suggested clear zone is 20 to 22 feet. There are some unprotected hazards within the clear zone including substandard barrier end treatments, trees, and steep slopes.

What is a clear zone?

A clear zone is an unobstructed, traversable roadside area that allows a motorist to stop safely or regain control of a vehicle that has left the roadway.

1.4.3.2 Little Cottonwood Canyon Road – North Little Cottonwood Road to Alta

Road access into Little Cottonwood Canyon is limited to the one access point at the junction of S.R. 210 and S.R. 209, which is at the entrance to the canyon. Travel on Little Cottonwood Canyon Road can be affected by numerous natural hazards and roadway features such as steep grades, blind curves with posted speed limits of 25 and 35 miles per hour, debris, rock falls and slides, few passing zones, and sheer canyon slopes above and beside the road. Avalanches, vehicle crashes, weather (mainly snow), and other problems can cause delays in this area with no alternative travel routes, and any issues in the canyon can have major impacts on the mobility to get from the canyon to connecting roads. In addition, formal parking in the canyon is limited, and parking on the side of the road reduces safety for motorists, cyclists, and pedestrians.

The following sections describe the transportation issues on the Little Cottonwood Canyon Road segment of S.R. 210.

Mobility

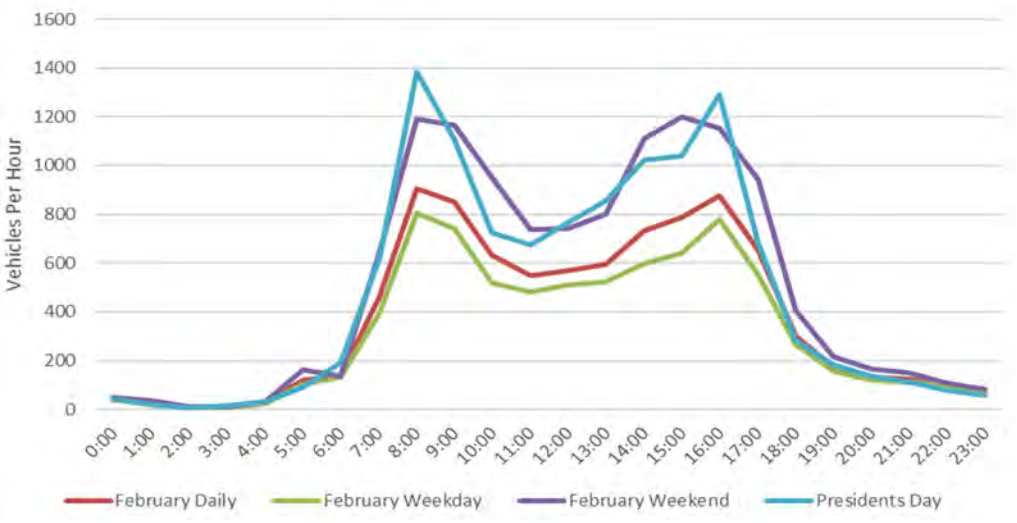
Existing Conditions

The peak traffic periods in Little Cottonwood Canyon typically occur on weekends and holidays during the winter and summer. During the winter, traffic levels are greatest during the morning and late afternoon when skiers travel to and from the ski resorts during these times (Figure 1.4-8). Vehicles leaving the ski resort parking lots in the afternoons can be slowed considerably at the lots' exit points and experience substantial delay. Summer traffic is more dispersed, with one broad peak in the afternoon (Figure 1.4-9). The ability for vehicles to move freely is typically compromised when traffic exceeds about 900 to 1,000 vehicles per hour depending on road conditions.

Average annual daily traffic on Little Cottonwood Canyon Road is 6,600 vehicles based on UDOT traffic volume data from 2010 to 2016 (Fehr & Peers 2018a). In the winter, when daily vehicle volumes can be 12,000 vehicles on peak days, travel times into and out of Little Cottonwood Canyon can often be over 2 hours, while during free-flow conditions, the travel time from the bottom to the top of the canyon is 15 minutes. The heavy traffic waiting to enter the canyons can back up onto Wasatch Boulevard and on S.R. 209. These backups reduce the reliability of access for people traveling to and from their residences off

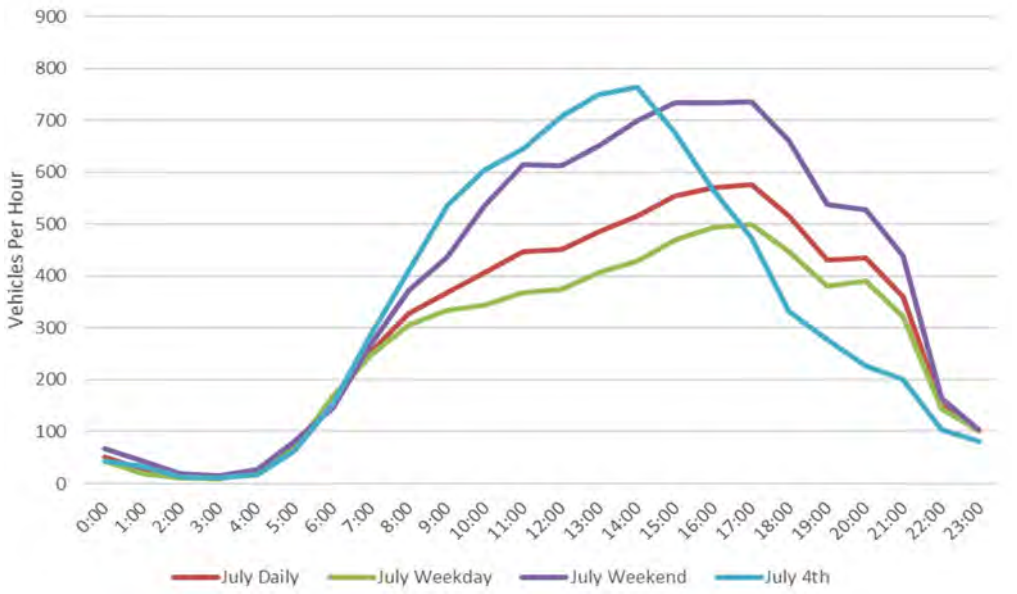
of Wasatch Boulevard, North Little Cottonwood Road, and S.R. 209, and can substantially interfere with emergency vehicles' access.

Figure 1.4-8. Traffic in Little Cottonwood Canyon in February 2017



Source: UDOT 2017; Congestion occurs when traffic exceeds about 900 to 1,000 vehicles per hour.

Figure 1.4-9. Traffic in Little Cottonwood Canyon in July 2017



Source: UDOT 2017

Little Cottonwood Canyon experiences over 30 days per year during which traffic volumes exceed roadway capacity (all during the typical 90-100 day peak winter season). High seasonal demand can cause traffic conditions resembling a traffic jam (Figure 1.4-10) consisting of a very long line of cars heading into or out of Little Cottonwood Canyon (Mountain Accord 2014). The lack of standard shoulders in some parts of the canyon reduces motorists' ability to drive around an incident. Even small incidents, such as a vehicle that is broken down in the travel lane or a vehicle without snow tires or chains that cannot maneuver on ice, can stop traffic and thereby cause substantial delays and reduce the road's reliability.

The days of greatest congestion are associated with large snowfalls, which attract more skiers. The traffic congestion during large snowfalls is exacerbated by poor driving conditions, snowplows on the road, and road closures for avalanche control (see the section titled Avalanche Control and Related Traffic Congestion on page 1-33). Mobility in summer in Little Cottonwood Canyon is at acceptable levels with the exception of about 3 days when events are held at ski resorts.

Figure 1.4-10. Congestion in Little Cottonwood Canyon

2050 No-action Conditions

As stated in Section 1.4.1.2, Projected Growth in Population, Employment, and Households, by 2050 population in Salt Lake and Utah Counties is expected to increase by 36% and 108%, respectively, which is expected to result in an increase in the number of visitors to Little Cottonwood Canyon and exacerbate the traffic problems there.

The average annual daily traffic on Little Cottonwood Canyon Road is expected to grow from 6,600 vehicles (existing conditions in 2015) to about 8,500 vehicles (in 2050). The traffic growth is based on a historical growth rate from 2003 to 2017 of 1.2% extrapolated assuming a linear growth in traffic each year to 2050. The greatest growth in traffic is likely to occur during off-peak days (mid-week), assuming that visitors will shift away from weekends and holidays to take advantage of less busy days during the middle of the week. This shift will result in a greater number of days during which drivers will experience delays due to traffic (Fehr & Peers 2018c).

Table 1.4-4 shows the expected growth in high-traffic days through 2050. On the busiest day in 2017, about 14,300 vehicles were counted by UDOT's automated traffic counters. Based on historic growth, that number could increase to about 18,500 vehicles on the busiest day in 2050 based on a 1.2% traffic growth rate (Fehr & Peers 2018c).

Table 1.4-4. Days of High Traffic Volumes in Little Cottonwood Canyon by Year

Threshold Volume (Vehicle Trips)[a]	Number of Days per Year When Threshold Volume Is Exceeded				
	2015–2017	2020	2030	2040	2050
10,000	48	≥50	≥50	≥50	≥50
12,000	13	22	41	≥50	≥50
14,000	1	2	9	23	42
16,000	0	0	0	3	12
18,000	0	0	0	0	2

Source: Fehr & Peers 2018c

[a] Two-way traffic flow, which equates to half the traffic going up the canyon and the other half going down the canyon.

There are many variables to consider when predicting the number of visitors to Little Cottonwood Canyon in future years, variables such as the availability of parking, trends in recreation use, and how visitors react to crowded recreation activities (that is, whether they adapt to increased crowds or shift to a less crowded location or different activity). However, it is likely that the yearly visitation will be greater than the 2.1 million visitors per year estimated for 2013 in *An Estimation of Visitor Use in Little Cottonwood, Big Cottonwood, and Millcreek Canyons. Institute of Outdoor Recreation and Tourism* (Lamborn and Burr 2016). Using the same formula to estimate the 2.1 million visitors in 2013, based on predicted population growth and associated potential increase in traffic, the number of visitors in 2050 could increase to about 3.4 million (Fehr & Peers 2018c).

Avalanche Control and Related Traffic Congestion

Avalanche Hazard

Avalanches in Little Cottonwood Canyon present a hazard to the traveling public. Avalanche risk is measured using an avalanche hazard index (AHI), which is a numeric expression of the potential threat of an avalanche. A number of factors are combined to determine the AHI of a road, factors including snowfall abundance, terrain steepness, and traffic volume. As shown in Table 1.4-5, the AHI rating system characterizes risk in a range from Very Low (numerical value < 1) to Very High (numerical value > 150).

The AHI can be reduced through active and passive control measures. Active measures include using artillery or explosives to create a controlled avalanche release, during which time the road is closed. Passive measures include placing snow sheds over the road or realigning the road outside the avalanche path.

Table 1.4-5. Hazard Category as Defined by the Avalanche Hazard Index

Hazard Category	Avalanche Hazard Index (AHI)
Very Low	Less than 1
Low	1 to 10
Moderate	10 to 40
High	40 to 150
Very High	Greater than 150

Source: Dynamic Avalanche Consulting 2018a

Little Cottonwood Canyon Road has one of the highest avalanche risks in North America based on AHI calculations without any control program (UDOT 2006). With no avalanche control and using 2018 traffic volumes, the AHI for Little Cottonwood Canyon is about 7,300. Using projected traffic volumes for 2050, the AHI increases to about 7,900 because increased traffic results in a higher risk.

With UDOT's active avalanche-control program (artillery and remote avalanche-control systems) in the canyon and the use of the Alta Bypass Road to avoid the Superior and Hellgate avalanche paths along S.R. 210, the AHI is reduced to about 90 in 2018 and 96 in 2050 with the increase in traffic related to population growth (Dynamic Avalanche Consulting 2018b). The AHI with active control is still categorized as High; however, the avalanche risk is about 1% of the risk without the active control program.

The most critical avalanche paths with respect to uncontrolled, observed road events and residual avalanche risk are the Tanners, White Pine Chutes, White Pine, and Little Pine avalanche paths (Figure 1.4-11).UDOT's active avalanche-control program in these paths consists primarily of using artillery to cause a controlled avalanche release. From 2004 to 2017, an average of 163 artillery shells per ski season were fired into these avalanche paths (Dynamic Avalanche Consulting 2019).

Figure 1.4-11. Avalanche Paths in Little Cottonwood Canyon

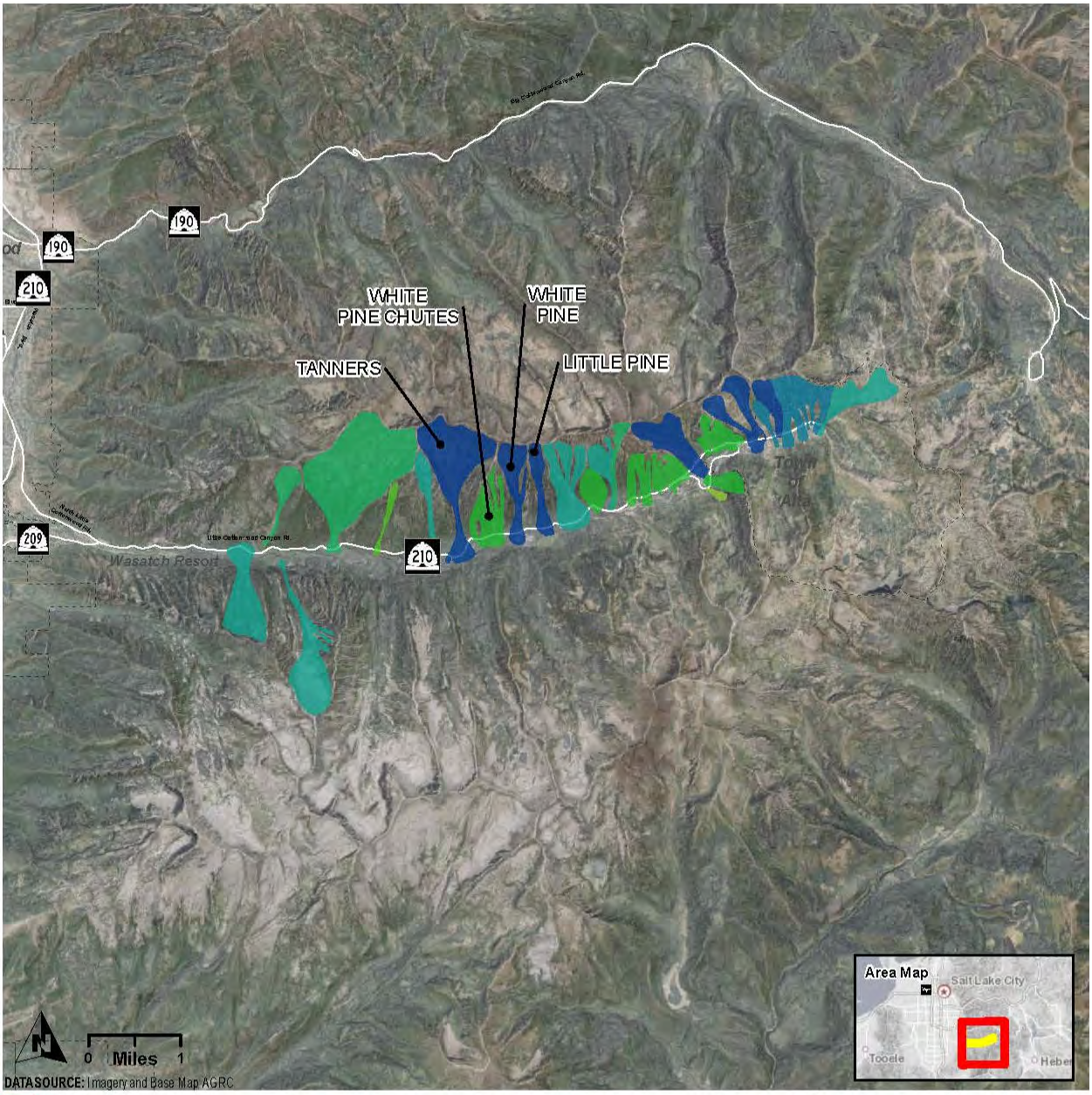


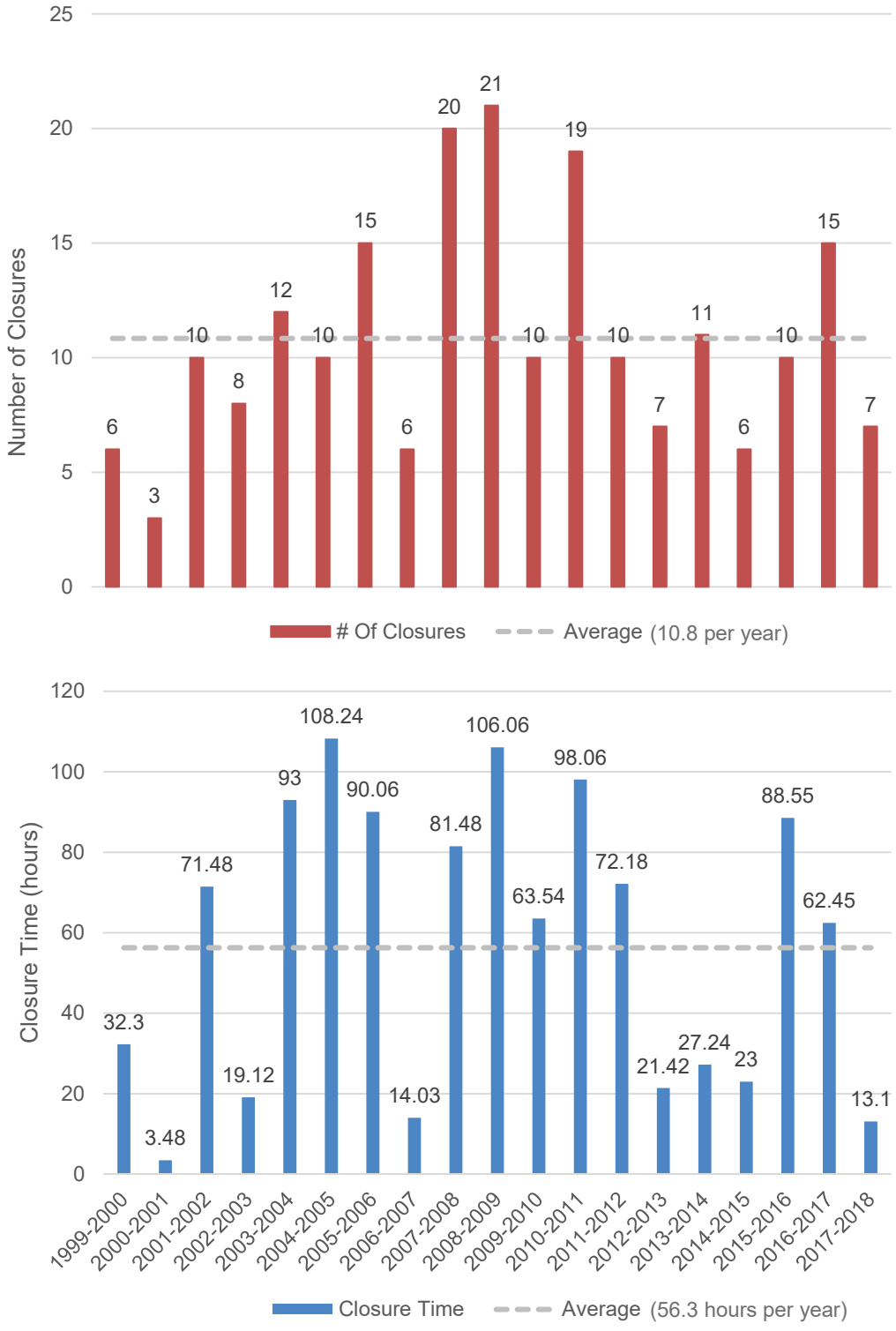
Figure 1.4-12 is a photograph of an avalanche at White Pine Chutes that crossed S.R. 210 in Little Cottonwood Canyon.

Figure 1.4-12. Avalanche at White Pine Chutes on March 14, 1998

Avalanche-related Road Closures and Winter Traffic Congestion

Based on data recorded by UDOT, from 1999 to 2018, UDOT closed S.R. 210 in Little Cottonwood Canyon an average of 10.8 days per year for part of the day to conduct avalanche control. During this period, there were an average of 56.3 hours of road closure per year, or about 5 hours of road closure per avalanche-control event (Dynamic Avalanche Consulting 2018b). The greatest number of closures between 1999 and 2018 occurred during the 2008–2009 winter season, which had 21 closure days and a total of 106 hours of closure (Figure 1.4-13). Closures are mostly due to controlled avalanche releases.

Figure 1.4-13. Number of Winter Closures and Total Closure Hours for Little Cottonwood Canyon Road (1999–2018)



Source: Dynamic Avalanche Consulting 2018a

During days of avalanche closures, UDOT tries to open the road by 8 AM, but even short delays in opening the road can cause substantial traffic delays of between 2 and 4 hours as traffic builds behind the road closure point at the base of the canyon. Vehicles waiting to enter the canyons can back up onto Wasatch Boulevard (Figure 1.4-14) from the canyon entrance onto I-215 (a distance of about 5.5 miles) and on S.R. 209 to about 2300 East. These backups substantially reduce vehicle mobility; reduce the reliability of access for people traveling to residences off of Wasatch Boulevard, North Little Cottonwood Road, and S.R. 209; and can substantially interfere with emergency vehicles' access to those neighborhoods.

Figure 1.4-14. Traffic Stopped on Wasatch Boulevard from Avalanche Closure in Little Cottonwood Canyon

Roadway Safety

Roadway Design

In Little Cottonwood Canyon, the geometry of the roadway does not meet current design standards. About 79% of the crashes (see the section titled Crashes below) are related to roadway geometry. Tight curves require motorists to reduce speeds as they move through the curve because of the sharp curve and reduced sight distance. Motorists must also slow down in sections of steep terrain to navigate tight curves and areas with poor sight distances. Shoulders are important for safety and roadway maintenance because they allow disabled vehicles to pull off the road, errant vehicles to recover, and room for cyclists to maneuver. In some locations along Little Cottonwood Canyon Road, the shoulders are inadequate because they are less than 1 foot wide.

UDOT reviewed the conditions of S.R. 210 from S.R. 209 to Alta and identified the following substandard design elements with regard to UDOT's standards and guidance (UDOT 2018b):

- The standard shoulder width for this roadway classification is 8 feet, but over 85% of this segment has shoulder widths less than 8 feet.
- The stopping sight distance does not meet design guidance in several locations as a result of trees, rocks, and steep embankments blocking visibility around curves. The sight distance is insufficient in the eastbound direction through the curves near mileposts 5.45, 5.60, 5.97, 6.40, and 6.67 and in the westbound direction through the curves near mileposts 10.60, 10.43, 9.50, 9.30, 8.31, 8.04, 7.95, 7.60, 6.59, 6.49, 6.30, 5.97, 5.60, 5.25, 4.80, 4.35, and 4.14.
- The roadside design guidance suggests a clear zone of 14 to 16 feet. However, this segment does not meet the design guidance because it has a substantial number of unprotected hazards, with boulders, steep slopes, and trees being the majority of the hazards.
- The intersection sight distance is inadequate at several minor roads and parking areas at points of interest, including at the White Pine and Lisa Falls Trailheads.
- Several dedicated left-turn and right-turn lanes do not meet current standards for taper lengths and deceleration distance.
- Some curves do not meet design guidance.

Crashes

Crashes in Little Cottonwood Canyon can substantially reduce traffic mobility by blocking the travel lanes. With the road's two-lane configuration and lack of shoulders, crashes often block both travel lanes, causing congestion.

Table 1.4-6 summarizes the crash rates and severe crash rates for Little Cottonwood Canyon Road for the period 2010–2018 compared with the statewide averages for crashes and severe crashes on similar roads (rural minor arterial roads). As shown in Table 1.4-6, Little Cottonwood Canyon Road's crash rates and severe crash rates are higher than the statewide averages, which is likely a result of the steep grades, sharp curves, on-road parking, lack of shoulders, and winter weather conditions. Crashes are highest during the winter when ski resorts are in operation and weather is typically inclement. About 28% of the crashes occur when the condition of the roadway surface is compromised by snow and ice. In terms of roadway crash types, 49% of the crashes in Little Cottonwood Canyon are departure crashes in which a vehicle leaves the roadway. The sharp curves (roadway geometry) play a key factor in crashes, with 79% being related to roadway geometry. Speed also plays a factor, with 37% of crashes related to speed (Fehr & Peers 2018b).

Table 1.4-6. Comparison of Crash Rates for Little Cottonwood Canyon Road to the Statewide Average for Rural Minor Arterial Roads (2010–2018)

Crash Rate		Severe Crash Rate	
Little Cottonwood Canyon Road	Statewide Average for Rural Minor Arterial Roads	Little Cottonwood Canyon Road	Statewide Average for Rural Minor Arterial Roads
2.90	1.85	13.35	9.50

Source: Fehr & Peers 2018b

Pursuant to 23 United States Code Section 409, the data in this table shall not be subject to discovery or admitted into evidence in a federal or state court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location included in the data.

Data are from January 1, 2010, through January 8, 2018.

Parking

In Little Cottonwood Canyon, parking on the side of the road creates an uncomfortable and/or unsafe environment, impedes bicycle travel and snow removal, and degrades natural resources. Parking on the side of the road is legal unless otherwise marked; however, in many areas, there is not enough space to park on the side of the road. Occasionally, on peak winter days, cars are parked partially in the travel lane. In the winter, about 96% of the parking demand is at the ski resorts. This decreases to about 82% in the summer (Mountain Accord 2014).

Parking in Little Cottonwood Canyon at formal parking lots at trailheads and ski resorts exceeds capacity during peak visitation times, which leads to parking on the roadside. No fees are charged at the ski resorts for daily parking during the winter except at preferred locations, where users pay an annual fee. No fees are charged for trailhead parking at any time of the year. The ability to expand parking on land managed by the USDA Forest Service, which includes many of the resort parking areas, is limited per the Revised Forest Plan Wasatch-Cache National Forest (USDA Forest Service 2003). The plan states that, in the Tri-Canyon

Area (Big Cottonwood, Little Cottonwood, and Mill Creek Canyons), the parking capacities of canyon parking areas (ski area lots, summer-use homes, and developed and dispersed recreation sites) will not exceed the levels in 2000 unless modification is needed for watershed protection or to facilitate mass transit.

Winter Parking

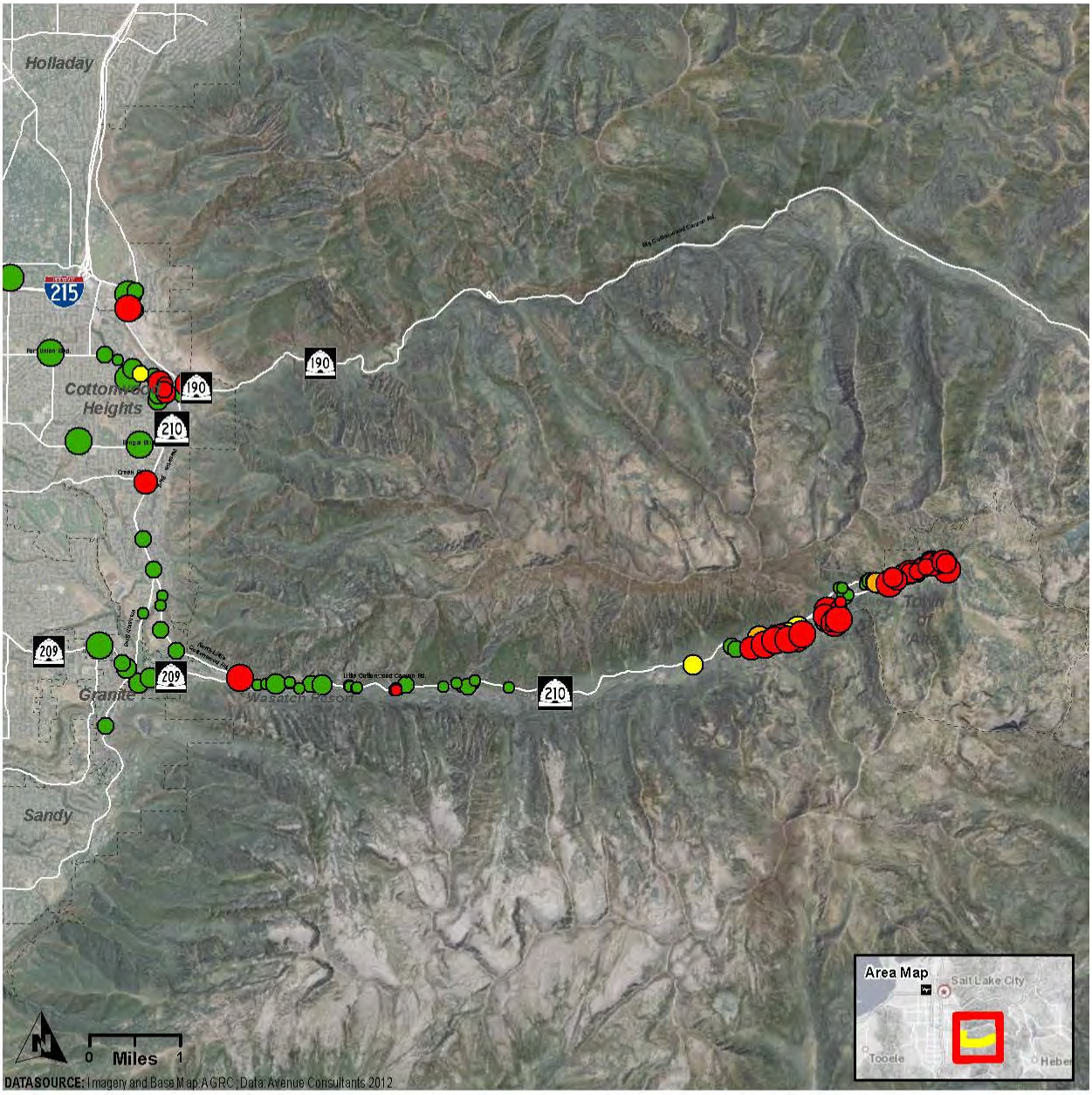
Winter travel is mostly linked to ski area visitation. The ski areas, Snowbird and Alta, have space to accommodate about 4,300 vehicles depending on weather conditions (Avenue Consultants 2012). Skiers arriving at the ski areas might find that the available parking has already been taken and parking is available only along the roadway, as shown in Figure 1.4-15 (Mountain Accord 2014).

Figure 1.4-15. Winter On-road Parking in Little Cottonwood Canyon

Backcountry winter recreation occurs throughout the canyon, including areas that have limited parking and no formal amenities, which leads to on-road parking. Most backcountry skiers access areas near the top of the canyon, adjacent to Snowbird and Alta, and park along S.R. 210, in the town of Alta, or in ski resort parking lots. Backcountry access is also provided at the White Pine Trailhead.

Parking along the road in winter often occurs during snowy conditions, which increases the hazards associated with winter travel conditions and can cause congestion and pedestrian-vehicle conflicts. Roadside parking during the winter can also increase congestion as the travel lane widths are reduced and vehicles slow down as they move through the area. Figure 1.4-16 shows the percentage of the parking areas occupied on a busy ski day (Avenue Consultants 2012).

Figure 1.4-16. Parking Area Occupancy on Presidents' Day, February 20, 2012



Summer Parking

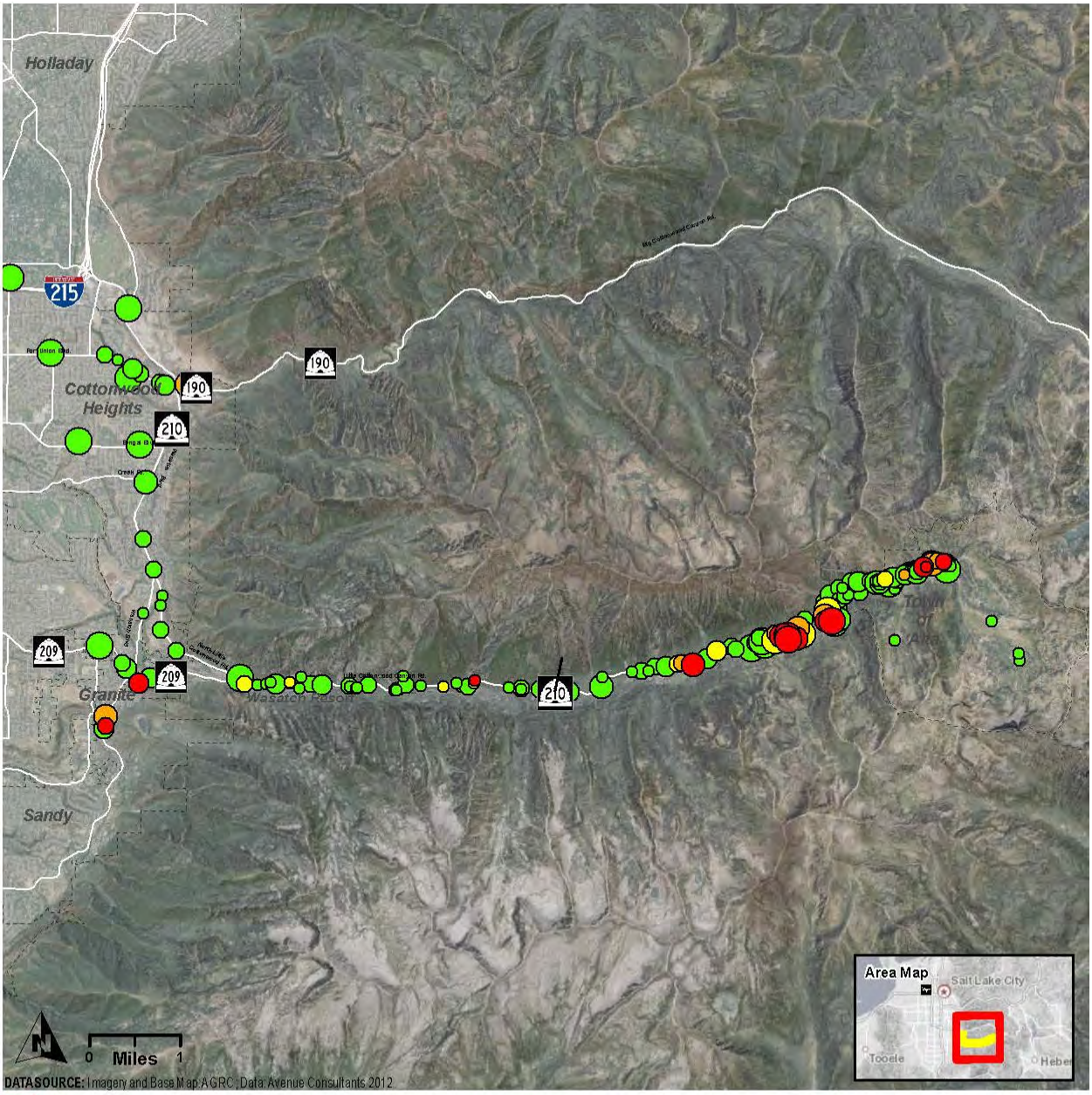
Canyon users experience difficulty finding parking near trailheads during the summer. Trailhead parking is limited and can quickly reach capacity, forcing many people to park on the side of the road and walk along the roadway to trailheads, which creates a safety issue. One of the most congested parking areas is the White Pine Trailhead (Mountain Accord 2014), which is located at a curve with limited sight distances and narrow shoulders. Roadside parking at this trailhead increases safety-related issues for motorists, cyclists, and pedestrians (Figure 1.4-17).

Figure 1.4-17. Summer On-road Parking at the White Pine Trailhead

Some dispersed recreational destinations, including hiking trails, fishing spots, and rock-climbing areas, do not have formal parking facilities, so users of these facilities park along the road. As visitors park along the road and way-find to the dispersed recreation sites, they create a rut at the edge of the pavement and a network of “spider web” trails that promote erosion and weed infestation. Dispersed recreation makes managing the forest more difficult since new paths are created. This creation of new paths reduces the quality of the natural environment, including water quality.

On-road parking also creates a safety hazard for cyclists and pedestrians traveling along the shoulder of the road because it narrows the area in which they can travel and requires them to use part of the travel lane. Figure 1.4-18 shows the percentage of the parking areas occupied on a busy summer day (Avenue Consultants 2012).

Figure 1.4-18. Parking Area Occupancy on Labor Day, September 7, 2011



Pedestrian and Bicycle Safety

Walking, climbing, wildflower viewing, hiking, running, cycling, and other activities are all popular in Little Cottonwood Canyon, but pedestrian facilities along or parallel to the roadway are limited, and most pedestrian and bicycle access on S.R. 210 in the canyon is along the road's shoulder. The safety of cyclists and pedestrians in Little Cottonwood Canyon is diminished because the access is shared with vehicles. Between 2010 and 2018, six reported bicycle accidents with vehicles and one pedestrian accident occurred in Little Cottonwood Canyon. Of these accidents, two were considered serious.

Pedestrians

The majority of pedestrian trips on the canyon road cover a short distance from a parking lot, on-road parking, or transit stop to a destination (such as a trailhead, ski area, or other resort amenity). Compared with winter conditions, pedestrians in summer cross the road more frequently and are inclined to walk greater distances along the road to reach their destinations because the roads are clear and the activity they are engaging in is hiking. The more time pedestrians spend on the road, the greater their risk of coming in contact with vehicles. The lack of dedicated pedestrian facilities in these areas creates a greater potential for pedestrian-vehicle conflicts.

Informal trailheads (or social trailheads sometimes in a "spider web" network) created by people straying from official USDA Forest Service access locations have developed as people access various dispersed recreational opportunities. Informal trailheads contribute to erosion, mineral soil loss, the spread of invasive weeds, and loss of native vegetation and can be unsafe for users. Unregulated parking on the roadside shoulder contributes to informal trailheads because users are not funneled to official access points. Regulating and controlling roadside parking in the canyon is needed to alleviate this problem (Mountain Accord 2017). Observational analysis by UDOT suggests that residents and visitors staying in canyon neighborhoods use roadways as pedestrian routes to access recreation areas. Since there are limited shoulders or walking routes, this causes potential conflicts with vehicles (Mountain Accord 2017).

Cyclists

Roadway conditions contribute to a number of bicycle safety issues in some parts of Little Cottonwood Canyon. Since the roadway has no dedicated paths or sidewalks, bicycles must share the roadway and the limited shoulders with cars moving through the canyon. This can lead to conflicts on the narrow canyon road. Where shoulders are available, they're often in poor condition and are littered with road debris, which can be dangerous for cyclists. In other places, shoulders are narrow or are obstructed by cars parked on the roadside. In some cases, cyclists must move into the travel lane to avoid car doors or parked vehicles (Mountain Accord 2017). When going downhill, some cyclists can reach speeds similar to, or greater than, those of motor vehicles. In some locations, the roadway curves are very sharp, and cyclists prefer (and might need) to use the travel lane to safely maneuver through the curve.

When cyclists are traveling uphill and using the roadway on inclines or where passing is difficult, they can slow car travel substantially or lead motorists to pass unsafely. In part of S.R. 210 in the canyon, the shoulders are not wide enough to accommodate dedicated active-transportation facilities such as bicycle lanes.

1.5 Public and Agency Involvement in Developing the Purpose and Need

To be added at the completion of the public and agency comment period.

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