

Chapter 7: Traffic and Transportation

7.1 Introduction

This chapter discusses the existing travel patterns on and adjacent to State Route (S.R.) 210 and considers the expected effects of the project alternatives on these travel patterns. Travel patterns were analyzed for vehicles only. Information about pedestrian and bicyclist facilities is provided in Chapter 9, *Considerations Related to Pedestrians and Bicyclists*.

Traffic and Transportation Impact Analysis Area. The traffic and transportation impact analysis area includes the roads that could be beneficially or adversely affected by the project alternatives. The impact analysis area includes Wasatch Boulevard and S.R. 210 from 6200 South to the town of Alta including the Alta Bypass Road, and the signalized intersections on S.R. 210 and connecting roads (see Figure 1.1-1, *Transportation Needs Assessment Study Area*, in Chapter 1, *Purpose and Need*). The impact analysis area also includes 9400 South and Highland Drive adjacent to the proposed 9400 South and Highland Drive mobility hub.

What is the traffic and transportation impact analysis area?

The traffic and transportation impact analysis area includes the roads that could be beneficially or adversely affected by the project alternatives.

7.2 Regulatory Setting

Technical Advisory T 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, from the Federal Highway Administration (FHWA 1987) recommends an analysis of travel patterns and accessibility in an Environmental Impact Statement (EIS).

7.2.1 Methodology

7.2.1.1 S.R. 210 – Wasatch Boulevard

The transportation analysis for Wasatch Boulevard uses data obtained from the Wasatch Front Regional Council's (WFRC) travel demand model. The model provides data about traffic operations in terms of level of service.

- **Level of Service (LOS).** Level of service is measurement of the vehicle-carrying capacity and performance of a street, freeway, or intersection. 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). LOS B through LOS E describe progressively worse traffic conditions (Figure 7.2-1).

What is a travel demand model?

A travel demand model is a computer model that predicts the number of transportation trips (travel demand) in an area at a given time. The travel demand model used for the S.R. 210 Project is maintained by WFRC.

To achieve the Utah Department of Transportation’s (UDOT) goal of optimizing mobility, proposed roadway projects are evaluated in terms of the road’s modeled level of service. UDOT has set a goal of maintaining roads in the urban parts of the state at LOS D or better. Typically, in urban areas, LOS E and F are considered unacceptable operating conditions and LOS D and above are considered acceptable operating conditions.

To evaluate the proposed Wasatch Boulevard alternatives, UDOT used WFRC’s travel demand model to generate data about the level of service on the road network in the Wasatch Boulevard portion of the traffic and transportation impact analysis area for the existing (2018) conditions and the future (2050) no-action and action conditions. The data for the existing and future conditions were then compared to determine how the action alternatives would alter operating conditions on the local road network.

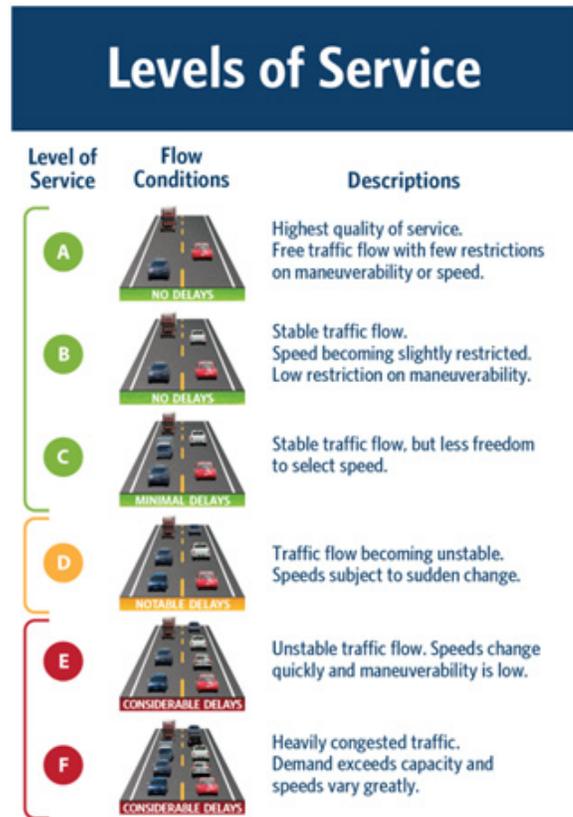
7.2.1.2 S.R. 210 – North Little Cottonwood Road to Alta

For the analysis of winter mobility on S.R. 210, UDOT used travel time per person to evaluate mobility improvements. To determine travel times for the roadway alternatives, UDOT used the 30th-highest hourly traffic volume of the year. A design hour is an hour with a traffic volume that represents a location-specific peak-hour value for designing the geometric and control elements of a road. This selected peak hour would allow the designed facility to accommodate traffic during most of the peak hours.

The design hour is a key characteristic in estimating the expected demand for a proposed transportation facility. Typically, the hour corresponding to the 30th-highest hourly traffic volume of the year is considered as the design hour as stated by the Highway Performance Monitoring System.

In nonurban settings similar to S.R. 210 in Little Cottonwood Canyon, the customary practice in the United States is to base highway design on the 30th-highest hour of the year. The 30th-highest hour is used because it falls in the range of subsequent highest hours that have similar traffic volumes. Even though a considerable variance might be observed between the peak (highest) and 30th-highest hourly traffic volumes of a year, designing for the peak hour would not be deemed economical and feasible in many regions (FHWA 2018). Therefore, travel times in this chapter for S.R. 210 from North Little Cottonwood Road to Alta are based on the 30th-highest hourly traffic volumes.

Figure 7.2-1. Level of Service



What is a design hour?
A design hour is an hour with a traffic volume that represents a location-specific peak-hour value for designing the geometric and control elements of a road.

7.3 Affected Environment

7.3.1 Roadway System

The full length of S.R. 210 is 12.5 miles. It is the primary link for Cottonwood Heights and communities in 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 at Albion Basin Road in the town of Alta, a distance of 8.6 miles. Little Cottonwood Canyon Road is primarily two lanes, with three short segments having three lanes that provide opportunities for passing slower-moving vehicles.

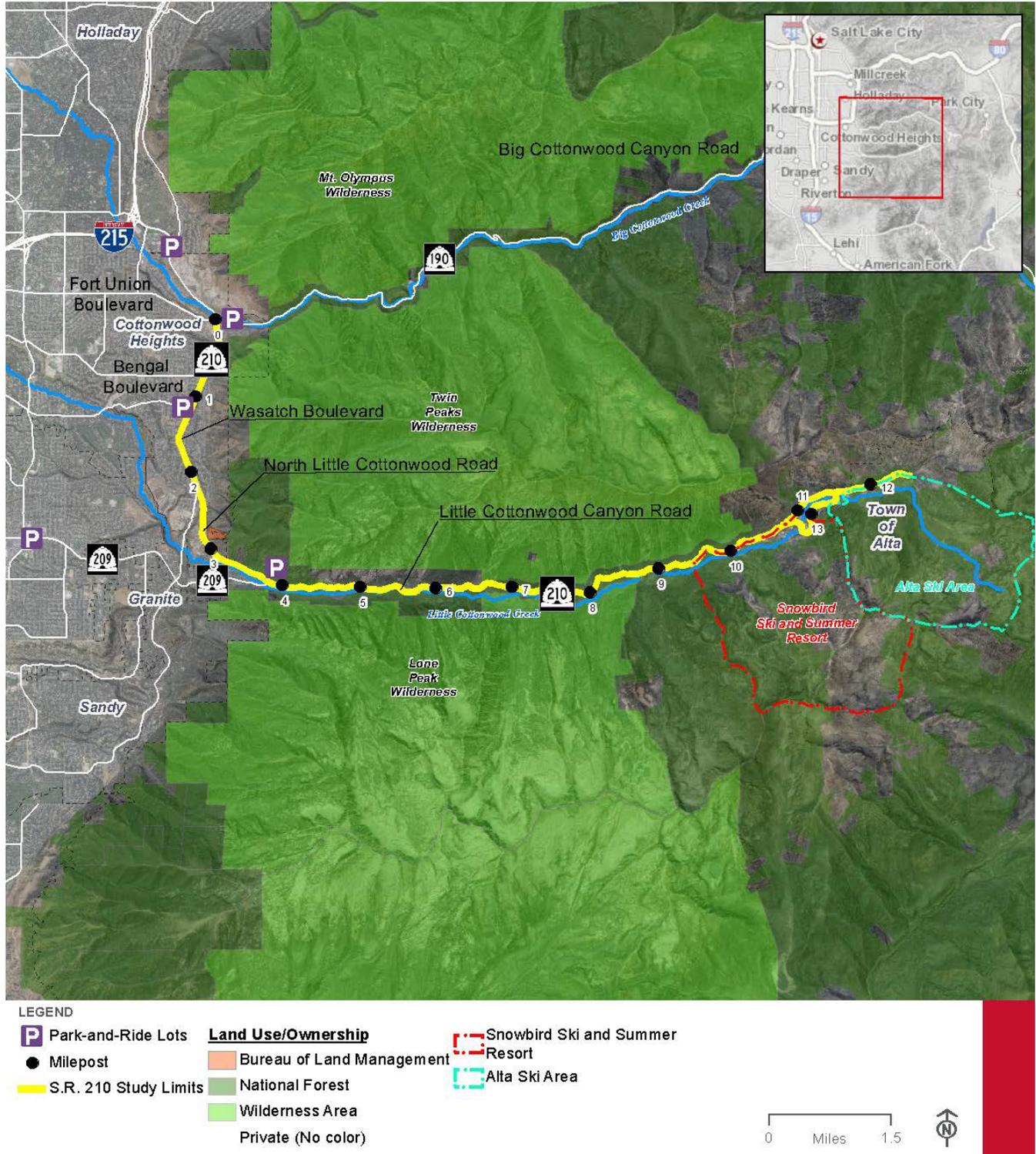
The Alta Bypass Road is a 1.1-mile, two-lane route that splits south from S.R. 210 at Snowbird Entry 4 and rejoins S.R. 210 just below Alta. It provides additional access to and between the resorts and serves as a bypass of the Superior avalanche path during certain high-hazard periods.

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 (Figure 7.3-1).

What are peak periods?

Peak periods are the periods of the day with the greatest amounts of traffic. The AM (morning) peak period is from 6 AM to 9 AM, and the PM (afternoon) peak period is from 3 PM to 6 PM. Peak periods are looked at by transportation officials when examining the need for a project.

Figure 7.3-1. Transportation Network



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 traffic and transportation impact analysis area are described below and shown in Figure 7.3-1 above.

- **I-215** is the major interstate highway link that provides recreation access from the Salt Lake City metropolitan area to four of the Wasatch Front canyons in the Salt Lake Valley: Parley's, Mill Creek, Big Cottonwood, and Little Cottonwood Canyons.
- **S.R. 190/Fort Union Boulevard** is an east-west arterial south of I-215. West of its intersection with S.R. 210, Fort Union Boulevard is a two-lane road from Wasatch Boulevard to 3000 East and a 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. During the winter, S.R. 190 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.
- **Bengal Boulevard** is a two-lane arterial with a 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** is a two-lane arterial that connects to S.R. 210 at the entrance to Little Cottonwood Canyon. It primarily serves the traffic from southern parts of Salt Lake County heading to and from Little Cottonwood Canyon.

7.3.2 S.R. 210 – Wasatch Boulevard

The purpose of the improvements on the Wasatch Boulevard segment of S.R. 210 related to traffic and transportation is to improve the level of service to LOS D or better in 2050; therefore, this section focuses on congestion levels and level of service on Wasatch Boulevard from Fort Union Boulevard to North Little Cottonwood Road. As shown in Table 7.3-1, the segment of Wasatch Boulevard from 3500 East to Kings Hill Drive currently operates at an unacceptable level of service of LOS E. Figure 7.3-2 shows the roadway segments on Wasatch Boulevard.

Table 7.3-1. Wasatch Boulevard – Travel Demand Analysis by Direction and Segment in 2018

Conditions	Travel Time from Fort Union Blvd. to North Little Cottonwood Road (minutes)		Level of Service by Segment			
	Northbound in AM/PM Peak Hour	Southbound in AM/PM Peak Hour	Fort Union Blvd. to Bengal Blvd.	Bengal Blvd. to 3500 East	3500 East to Kings Hill Drive	Kings Hill Drive to North Little Cottonwood Road
Existing conditions (2018)	4:08 / 4:10	3:38 / 4:37	B	C	E	C

Source: Fehr & Peers 2019

Red shading = Does not meet level of service goal of LOS D or better.

Table 7.3-2 shows the intersection level of service on Wasatch Boulevard in the traffic and transportation impact analysis area. As shown, only the intersection at 3500 East currently does not meet UDOT’s level of service goal of LOS D or better; it has a level of service of LOS E.

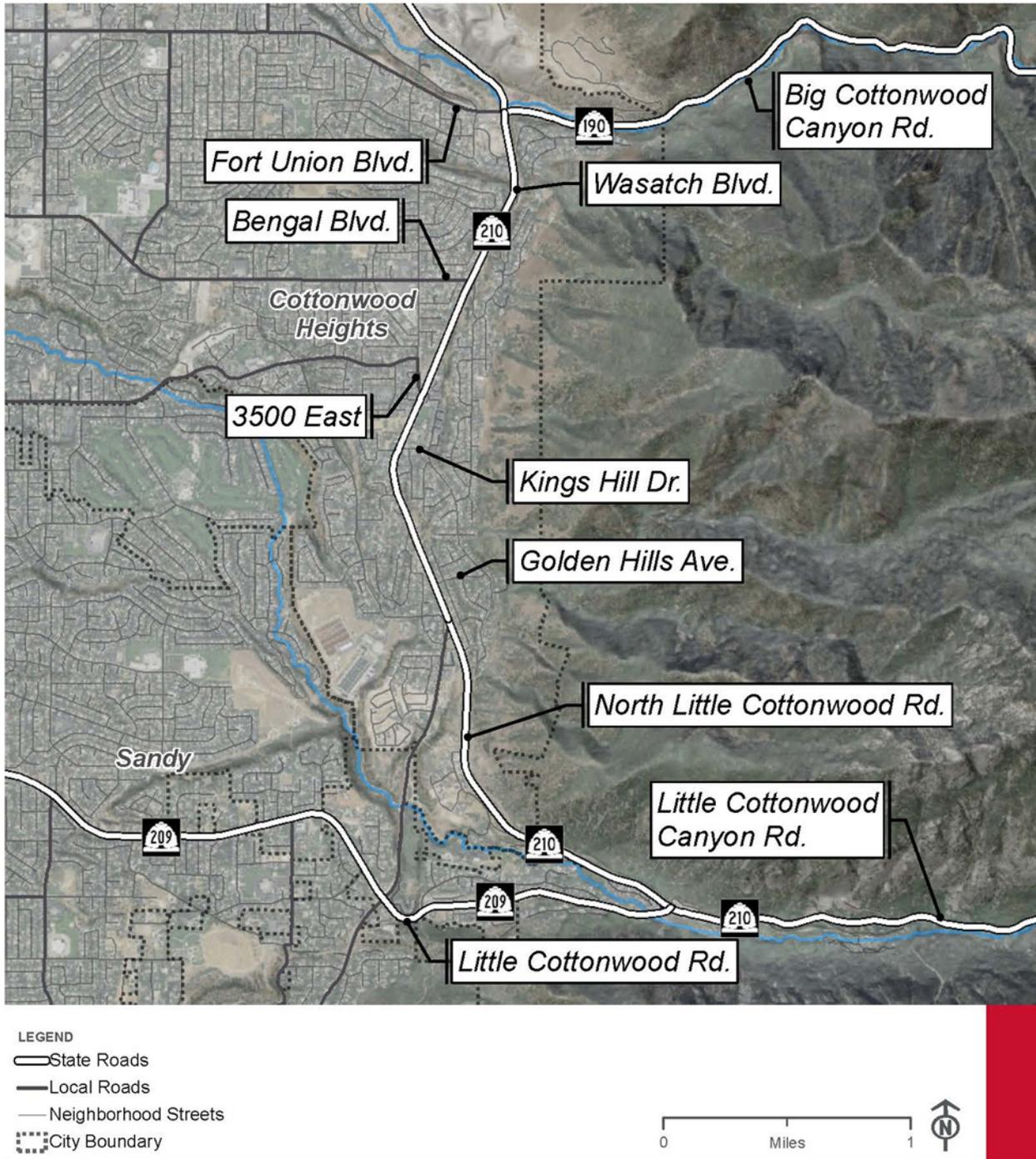
Table 7.3-2. Wasatch Boulevard – Travel Demand Analysis by Intersection in the AM and PM Peak Hours in 2018

Conditions	Level of Service by Intersection									
	Fort Union Blvd./ Wasatch Blvd.		Bengal Blvd./ Wasatch Blvd.		3500 East/ Wasatch Blvd.		Kings Hill Drive/ Wasatch Blvd.		North Little Cottonwood Road/ Wasatch Blvd.	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Existing conditions (2018)	B	B	B	C	B	E	B	C	B	B

Source: Fehr & Peers 2019

Red shading = Does not meet level of service goal of LOS D or better.

Figure 7.3-2. Wasatch Boulevard and Connecting Roads



7.3.3 S.R. 210 – North Little Cottonwood Road to Alta

7.3.3.1 Existing Congestion Levels

The peak traffic periods on S.R. 210 from North Little Cottonwood Road to Alta typically occur on weekends and holidays during the winter. High seasonal demand can cause traffic conditions resembling a traffic jam consisting of a very long line of vehicles heading into or out of Little Cottonwood Canyon.

Traffic congestion is greatest during the morning and late afternoon as skiers travel to and from the ski resorts. Traffic in the morning becomes congested at the intersection of S.R. 209 and S.R. 210, causing substantial traffic backups on both roads that can extend for miles. In 2018, during the 30th-highest hour (that is, the hour with the 30th-highest hourly traffic volumes during the year), per-person travel time on S.R. 210 from Fort Union Boulevard to Alta was about 40 to 45 minutes. For reference, the travel time for this approximately 12-mile distance during light travel conditions is about 21 minutes. During the 30th-highest hour in 2018, traffic backed up on S.R. 210 from the intersection with S.R. 209 about 2,775 feet and on S.R. 209 from the intersection with S.R. 210 about 50 feet.

Traffic leaving the two ski resort parking lots in the afternoons can cause heavy congestion on S.R. 210 near the parking lot exit points and where traffic from the two resorts intersect. This can often cause traffic to become congested on S.R. 210 down to the intersection of S.R. 209 and S.R. 210. Travel times from the ski resorts to Fort Union Boulevard during the 30th-highest hour are about 40 to 45 minutes.

7.3.3.2 Avalanche Mitigation

The purpose of the S.R. 210 Project related to avalanche closures is to improve S.R. 210's reliability by substantially reducing the number of days and hours when the road is closed for avalanche mitigation and incidents. Therefore, this section focuses on avalanche closure related to UDOT's avalanche-control work in the canyon.

Based on data recorded by UDOT, from 1999 to 2018, UDOT closed the road 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 2018). 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. Closures are mostly due to avalanche-mitigation operations.

Following overnight or early-morning road closures to facilitate avalanche-mitigation activities and snow removal, 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 entrance to the canyon. Vehicles waiting to enter the canyons can back up onto Wasatch Boulevard from the canyon entrance onto I-215 (a distance of about 5.5 miles) and on S.R. 209 to about 2300 East (see Figure 7.3-1, *Transportation Network*, above). These backups cause substantial congestion; affect the reliability of access for people traveling to residences off Wasatch Boulevard, North Little Cottonwood Road, and S.R. 209; and can substantially interfere with emergency vehicles' access.

7.3.4 Mobility Hubs

7.3.4.1 Gravel Pit

The gravel pit is located in Cottonwood Heights off Wasatch Boulevard just north of Fort Union Boulevard. The site is an active aggregate mine with a substantial number of trucks entering and exiting the site. When loaded, the slow-moving trucks reduce mobility on Wasatch Boulevard; however, the level of service on Wasatch Boulevard still meets UDOT's level of service goal of LOS D or better.

What is a mobility hub?

A mobility hub is a location where users can transfer from their personal vehicle to a bus.

7.3.4.2 9400 South and Highland Drive

There is an existing Utah Transit Authority (UTA) park-and-ride lot at 9400 South and Highland Drive in Sandy. The park-and-ride lot is used primarily during the winter by skiers to access the bus service to the ski resorts. There are no known transportation issues associated with the operation of this park-and-ride lot.

What is the gravel pit?

The gravel pit is an active aggregate (gravel) mine in Cottonwood Heights off Wasatch Boulevard just north of Fort Union Boulevard.

7.3.5 Trailhead Parking

Recreationists in Little Cottonwood Canyon experience difficulty finding parking near trailheads. Trailhead parking is limited and can quickly reach capacity early in the morning, causing many people to park on the side of the road and walk along the roadway to trailheads, which creates a safety issue. Roadside parking also causes cyclists to move from the shoulder into the vehicle travel lane. One of the most congested parking areas is the White Pine Trailhead (Mountain Accord 2014), which is located at a curve with limited sight distance and narrow shoulders.

7.3.6 Winter Parking

Winter travel is mostly linked to ski resort visitation. The ski resorts, Snowbird and Alta, have space to accommodate about 4,300 vehicles depending on weather conditions (Avenue Consultants 2012). Skiers arriving at the ski resorts might find that the available parking has already been taken and parking is available only on the roadside of S.R. 210. Parking on the roadside 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 reduce mobility as the travel lane widths are reduced and vehicles slow down as they move through the area. In the afternoon when skiers leave the resorts, some vehicles parked on the roadside facing up canyon make U-turns to head down canyon, which further reduces mobility. Roadside winter parking also makes snow removal during snow events difficult since there are limited places to store snow.

7.3.7 Transit Service

Figure 1.4-4, *Transit Routes and Park-and-ride Lots*, in Chapter 1, *Purpose and Need*, shows the locations of the UTA bus routes that serve the transportation needs assessment 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 resorts and operate from the end of November to mid-April. During the winter of 2019–2020, Route 953 provided 16 trips into the canyon per day with service every 15 to 30 minutes during peak periods and every 2 hours during off-peak periods. During the same period, Route 994 provided 26 trips into the canyon per day with service every 15 to 30 minutes. Each bus provided multiple stops along the route for users to board near their home or at an existing park-and-ride lot. During the 2019–2020 ski season, UTA no longer used the Little Cottonwood Canyon park-and-ride lot as a bus stop. In the peak hour, the bus service has a capacity of 336 riders (8 buses × 42 people per bus).

7.4 Environmental Consequences and Mitigation Measures

This section analyzes how the project alternatives would affect the travel patterns on key roads in the traffic and transportation impact analysis area (the effects would be experienced by both motorists and bus transit users). This section also analyzes the expected closure of Little Cottonwood Canyon from avalanche-mitigation work.

This section does not specifically address construction-related transportation impacts (see Chapter 19, *Construction Impacts*). However, during construction, there would be increased congestion on S.R. 210 and some of the connecting roads. The delays associated with construction would be temporary, and alternate routes to minimize effects on motorists would be identified with signs if possible.

7.4.1 No-Action Alternative

This section describes the traffic and transportation impacts of the No-Action Alternative in the Wasatch Boulevard segment of S.R. 210, in the segment of S.R. 210 from North Little Cottonwood Road to the town of Alta, at the gravel pit, and at the park-and-ride lot at 9400 South and Highland Drive.

7.4.1.1 S.R. 210 – Wasatch Boulevard

With the No-Action Alternative, no improvements to Wasatch Boulevard would be made. As shown in Table 7.4-1, as a result of regional population growth, the level of service on Wasatch Boulevard would decline compared to current conditions, with Wasatch Boulevard from Fort Union Boulevard to Kings Hill Drive operating at unacceptable levels of service of LOS E and F. In addition, travel time during the PM peak hour would more than double compared to existing conditions (from 4:37 minutes to 10:15 minutes) for the 2.2-mile segment of Wasatch Boulevard.

The reasons for the increase of about 6 minutes of travel time in the PM southbound direction are the longer wait times at signalized intersections, the merge lane south of Bengal Boulevard, and PM peak travel being more focused between 5 PM and 6 PM. The northbound AM peak period would not experience a substantial increase in travel time because traffic during the morning commute is more dispersed between 7 AM and 9 AM and because S.R. 210 does not have a lane merge in the northbound direction.

Table 7.4-1. Wasatch Boulevard – Level of Service by Segment for the Existing Conditions (2018) and the No-Action Alternative (2050)

Conditions or Alternative	Travel Time from Fort Union Blvd. to North Little Cottonwood Road (minutes)		Level of Service by Segment (Passing Criteria Are LOS A–D)			
	Northbound in AM/PM Peak Hour	Southbound in AM/PM Peak Hour	Fort Union Blvd. to Bengal Blvd.	Bengal Blvd. to 3500 East	3500 East to Kings Hill Drive	Kings Hill Drive to North Little Cottonwood Road
Existing conditions (2018)	4:08 / 4:10	3:38 / 4:37	B	C	E	C
No-Action Alternative (2050)	4:22 / 4:40	3:53 / 10:15	F	E	E	D

Source: Fehr & Peers 2019

Red shading = Does not meet level of service goal of LOS D or better.

Table 7.4-2 shows the intersection levels of service on Wasatch Boulevard evaluated for the traffic and transportation impact analysis area for the No-Action Alternative in 2050. As shown, of the five intersections on Wasatch Boulevard in the impact analysis area, four would operate at unacceptable levels of service of LOS E or F.

Table 7.4-2. Wasatch Boulevard – Level of Service by Intersection for the Existing Conditions (2018) and the No-Action Alternative (2050)

Conditions or Alternative	Level of Service by Intersection (Passing Criteria Are LOS A–D)									
	Fort Union Blvd./ Wasatch Blvd.		Bengal Blvd./ Wasatch Blvd.		3500 East/ Wasatch Blvd.		Kings Hill Drive/ Wasatch Blvd.		North Little Cottonwood Road/ Wasatch Blvd.	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Existing conditions (2018)	B	B	B	C	B	E	B	C	B	B
No-Action Alternative (2050)	B	F	C	F	B	E	B	F	D	C

Source: Fehr & Peers 2019

Red shading = Does not meet level of service goal of LOS D or better.

7.4.1.2 S.R. 210 – North Little Cottonwood Road to Alta

With the No-Action Alternative, there would be no improvements to S.R. 210 and no increase in bus service. Between 2017 and 2050, the populations of Salt Lake County and Utah County are expected to increase by 36% and 108%, respectively. This population growth is expected to increase the winter recreation use of Little Cottonwood Canyon, causing the number of vehicles in the 30th-highest hour to increase from 1,061 in 2018 to 1,555 in 2050. The 30th-highest hour is in the morning peak hour between 8 AM and 9 AM and occurs before the parking lots at the ski resorts are full.

As shown in Table 7.4-3, the increase in traffic would cause per-person travel times on S.R. 210 from Fort Union Boulevard to Alta to increase from 40 to 45 minutes in 2018 to 80 to 85 minutes in 2050 with the No-Action Alternative. In the 30th-highest hour, traffic backups on S.R. 209 would increase from 50 feet to 6,700 feet, or past the intersection of Wasatch Boulevard and 9400 South. On S.R. 210, traffic backups would increase from 2,775 feet to 13,000 feet, or past the intersection of Wasatch Boulevard and North Little Cottonwood Road. This increase in traffic backup lengths would make it increasingly difficult for residents who live along S.R. 209 and S.R. 210 to leave or return to their homes during the morning on busy ski days.

Table 7.4-3. S.R. 210 – 30th-highest-hour Travel Times and Vehicle Backup Lengths for the Existing Conditions (2018) and the No-Action Alternative (2050)

Conditions or Alternative	30th-highest-hour Per-person Travel Time ^a (minutes)	Vehicle Backup Distance from S.R. 209/S.R. 210 Intersection (feet)	
		On S.R. 209	On S.R. 210
Existing conditions (2018)	40–45	50	2,775
No-Action Alternative (2050)	80–85	6,700	13,000

^a Fort Union Boulevard to Alta ski resort

With the No-Action Alternative, traffic leaving the two ski resort parking lots during the afternoons would take longer to leave Little Cottonwood Canyon than under the existing conditions, with an 80-to-85-minute per-person travel time from the resorts to Fort Union Boulevard.

UDOT assumes that, with the No-Action Alternative, ski bus service would be similar to what is in place today.

7.4.1.3 Mobility Hubs

7.4.1.3.1 Gravel Pit

With the No-Action Alternative, Cottonwood Heights City is planning for development of the gravel pit. Current plans include a mix of commercial and residential uses. With the development, traffic would increase over that with the current gravel pit operation. Depending on the density of the development, the traffic entering and leaving the site during peak periods could increase congestion on Wasatch Boulevard. Before the gravel pit site is developed, a traffic plan would be prepared to improve access to and from the site to minimize traffic impacts to Wasatch Boulevard.

7.4.1.3.2 9400 South and Highland Drive

With the No-Action Alternative, there would be no change to the operation of the park-and-ride lot at 9400 South and Highland Drive as a bus park-and-ride lot. Therefore, traffic conditions would be same as existing conditions.

7.4.1.4 Avalanche Mitigation Alternatives

As shown in Table 7.4-4, with the No-Action Alternative in 2050, Little Cottonwood Canyon is projected to be closed up to about 21 days and 108 hours per winter season for avalanche-mitigation work. The increase in closures over current conditions is based on the greater risk with higher traffic volumes in 2050 compared to 2018. The avalanche risk increases with more vehicles because of the greater potential for an avalanche to strike a vehicle, which results in more avalanche-mitigation efforts. The potential average increase in road closures would result in more days when traffic backs up from the intersection of S.R. 209 and S.R. 210 into residential neighborhoods along 9400 South, Wasatch Boulevard, and North Little Cottonwood Road. The increase in the number of closures would cause greater impacts to the residents in Sandy, Cottonwood Heights, and Salt Lake County since access to their homes during these closures would be increasingly difficult.

Table 7.4-4. S.R. 210 – Average Days and Hours of Road Closures with the Existing Conditions (2018) and the No-Action Alternative (2050)

Conditions or Alternative	Average Days with Closures	Average Hours of Closures ^a
Existing conditions (2018)	10.8	56.3
No-Action Alternative (2050) ^b	10.5 to 21	56 to 108+

Source: Dynamic Avalanche Consulting 2018

^a See Section 2.2.1, *Range of Alternatives To Be Considered – June 2020*, in Chapter 2, *Alternatives*, for a discussion regarding how climate change was considered in the analysis.

^b For the existing conditions, there is history of data to develop the average number of days and hours of closure. For 2050, there are no historical supporting data; the average number of days and hours of closure will be within the range provided.

7.4.1.5 Trailhead Parking Alternatives

With the No-Action Alternative, there would be no change to trailhead parking and no elimination of roadside parking near trailheads. However, as the population continues to grow along the Wasatch Front, more people would recreate in Little Cottonwood Canyon. The transportation conditions with the No-Action Alternative would be the same as the existing conditions described in Section 7.3.5, *Trailhead Parking*, but conditions would worsen as more recreationists access Little Cottonwood Canyon and look for parking on S.R. 210 near the trailheads.

7.4.1.6 No Winter Parking Alternative

With the No-Action Alternative, there would be no change to roadside winter parking. The transportation conditions would be the same as those described in Section 7.3.6, *Winter Parking*.

7.4.2 Enhanced Bus Service Alternative

This section describes the traffic and transportation impacts of the Enhanced Bus Service Alternative, which includes improvements to the Wasatch Boulevard segment of S.R. 210, two mobility hubs, avalanche mitigation alternatives, trailhead parking alternatives, and the No Winter Parking Alternative.

7.4.2.1 S.R. 210 – Wasatch Boulevard

This section describes the traffic and transportation impacts of the Imbalanced-lane Alternative and the Five-lane Alternative, which would both widen the Wasatch Boulevard segment of S.R. 210.

7.4.2.1.1 Imbalanced-lane Alternative

With the Imbalanced-lane Alternative, vehicle capacity would be added to Wasatch Boulevard, and the level of service and associated congestion levels on Wasatch Boulevard would improve from LOS D through LOS F with the No-Action Alternative to LOS B or C (Table 7.4-5). In addition, with the Imbalanced-lane Alternative, Wasatch Boulevard would be improved to meet current UDOT design and safety standards, and the safety deficiencies described in Chapter 1, *Purpose and Need*, would be corrected. Because design standards would be met, the limited sight distance at the Kings Hill Drive intersection would be improved, and the entire segment of Wasatch Boulevard would include right- and left-turn lanes that would improve safety and access into residential areas.

Table 7.4-5. Wasatch Boulevard –Level of Service by Segment for the No-Action Alternative and Wasatch Boulevard Action Alternatives (2050)

Alternative	Travel Time from Fort Union Blvd. to North Little Cottonwood Road (minutes)		Level of Service by Segment (Passing Criteria Are LOS A–D)			
	Northbound in AM/PM Peak Hour	Southbound in AM/PM Peak Hour	Fort Union Blvd. to Bengal Blvd.	Bengal Blvd. to 3500 East	3500 East to Kings Hill Drive	Kings Hill Drive to North Little Cottonwood Road
No-Action Alternative	4:22 / 4:40	3:53 / 10:15	F	E	E	D
Imbalanced-lane Alternative	4:05 / 4:37	3:32 / 4:21	C	C	C	C
Five-lane Alternative	3:51 / 4:00	3:32 / 4:12	C	B	B	C

Source: Fehr & Peers 2019

Red shading = Does not meet level of service goal of LOS D or better.

With the Imbalanced-lane Alternative, the level of service and associated congestion levels at key intersections on Wasatch Boulevard would improve from LOS B through F with the No-Action Alternative to LOS A through D (Table 7.4-6). LOS D meets UDOT’s level of service goal for Wasatch Boulevard.

Table 7.4-6. Wasatch Boulevard – Level of Service by Intersection for the No-Action Alternative and Wasatch Boulevard Action Alternatives (2050)

Alternative	Level of Service by Intersection									
	Fort Union Blvd./ Wasatch Blvd.		Bengal Blvd./ Wasatch Blvd.		3500 East/ Wasatch Blvd.		Kings Hill Drive/ Wasatch Blvd.		North Little Cottonwood Road/ Wasatch Blvd.	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
No-Action Alternative	B	F	C	F	B	E	B	F	D	C
Imbalanced-lane Alternative	C	D	C	C	A	B	C	D	C	D
Five-lane Alternative	C	C	B	B	A	B	B	C	C	D

Source: Fehr & Peers 2019

Red shading = Does not meet level of service goal of LOS D or better.

7.4.2.1.2 Five-lane Alternative

The transportation benefits with the Five-lane Alternative would be similar to those with the Imbalanced-lane Alternative since all key segments and key intersections on Wasatch Boulevard would meet UDOT’s level of service goal of LOS D or better (see Table 7.4-5 and Table 7.4-6 above). However, because of the additional lane provided with the Five-lane Alternative, two of the four key segments would operate at LOS B versus LOS C with the Imbalanced-lane Alternative. In addition, out of the five key intersections on Wasatch Boulevard in the traffic and transportation impact analysis area, three would have better traffic performance (Fort Union Boulevard, Bengal Boulevard, and Kings Hill Drive). Overall, the Five-lane Alternative would provide greater transportation performance than the Imbalanced-lane Alternative.

7.4.2.2 S.R. 210 – North Little Cottonwood Road to Alta

With the Enhanced Bus Service Alternative, there would be no improvements to S.R. 210, but bus service would be substantially increased and personal vehicle use on S.R. 210 in Little Cottonwood Canyon would be reduced by implementing a toll. The purpose of the toll is to reduce personal vehicle use by 30% to the ski resorts by incentivizing transit use.

As shown in Table 7.4-7, by increasing bus use and reducing personal vehicle use, the per-person travel times in 2050 would decrease from 80 to 85 minutes with the No-Action Alternative to 45 to 50 minutes with the Enhanced Bus Service Alternative (these are average combined travel times for buses and personal vehicles). The 45-to-50-minute travel time in 2050 would be similar to the existing travel time in 2018 of 40 to 45 minutes. The analysis in Table 7.4-7 is based on the 30th-highest-hour traffic volume on S.R. 210 at the entrance to the canyon, which is expected to occur on about 49 days per ski season. The peak backup lengths would last about an hour and then start to decrease. The bus service would also be delayed, which would result in a total travel time of 45 to 50 minutes (Fehr & Peers 2018).

On S.R. 210 in 2050, traffic backups would decrease from 13,000 feet, or past the intersection of Wasatch Boulevard and North Little Cottonwood Road, to 4,300 feet. On S.R. 209 in 2050, traffic backups would decrease from 6,700 feet, or past the intersection of 9400 South and Wasatch Boulevard, to 1,275 feet. The decrease in traffic backup lengths would improve access to the residential neighborhoods along S.R. 209 and S.R. 210 on busy ski days. Figure 7.4-1 illustrates the backup distances on S.R. 209 and S.R. 210.

With the Enhanced Bus Service Alternative, the current UTA ski bus routes into Little Cottonwood Canyon would be eliminated, and bus users would need to drive to a mobility hub to board a bus. This could be seen as a negative impact to current bus users who board a bus near the homes along the bus service route. In the future, UTA could add ski bus service to the mobility hubs from areas in the Salt Lake Valley.

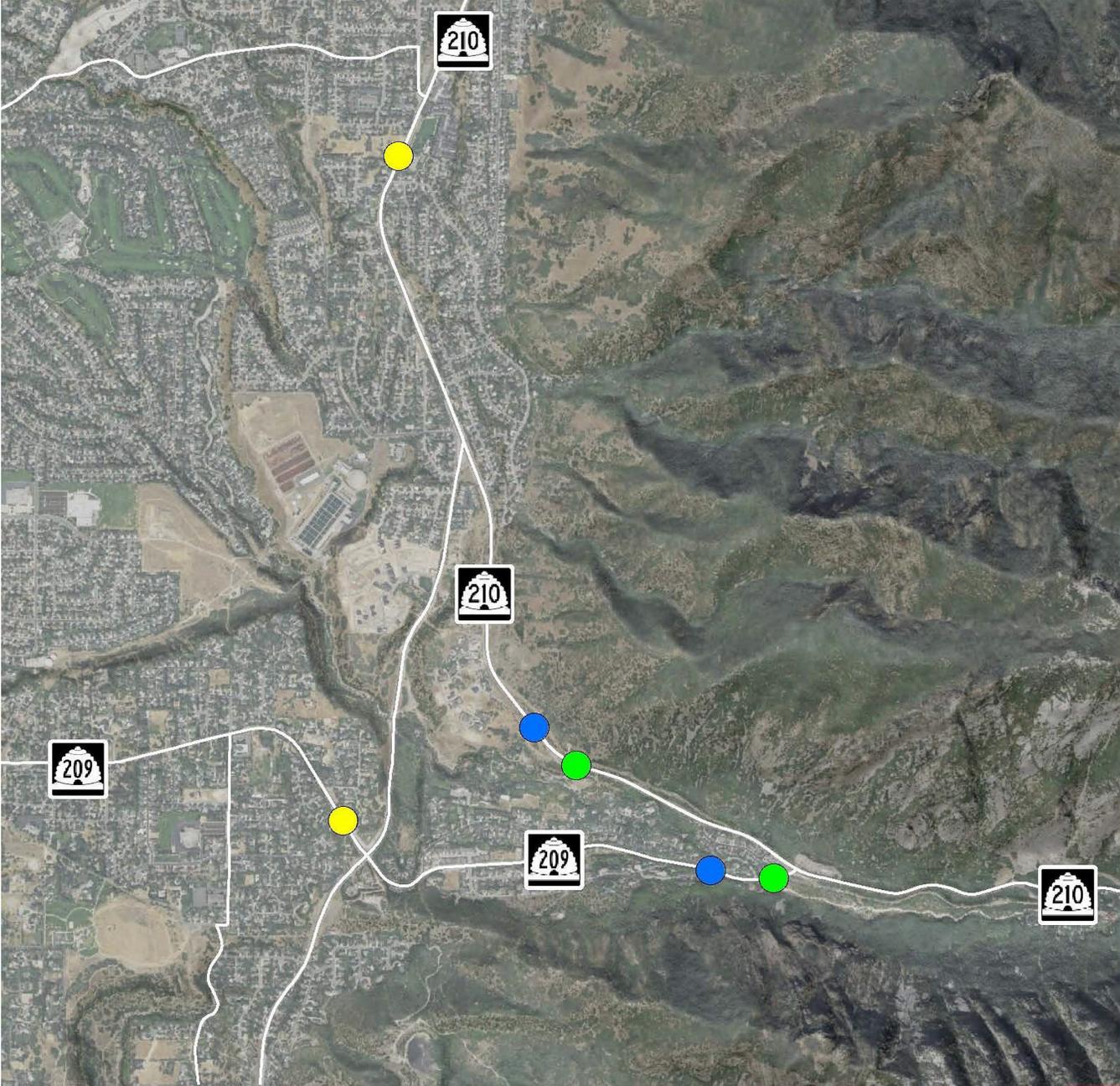
Table 7.4-7. S.R. 210 – 30th-highest-hour Travel Times and Vehicle Backup Lengths for the No-Action and Action Alternatives (2050)

Alternative	30th-highest-hour Per-person Travel Time ^a (minutes)	Vehicle Backup Distance from S.R. 209/S.R. 210 Intersection (feet) ^b	
		On S.R. 209	On S.R. 210
No-Action Alternative	80–85	6,700	13,000
Enhanced Bus Service Alternative	45–50	1,275	4,300
Enhanced Bus Service in Peak-period Shoulder Lane Alternative	35–40	350	3,050
Gondola Alternatives A and B	45–50	350	3,050
Cog Rail Alternative	45–50	350	3,050

^a Fort Union Boulevard to Alta ski resort.

^b Analysis is based on 30th-busiest-hour traffic volumes in 2050.

Figure 7.4-1. Vehicle Backup Lengths by Alternative



Vehicle Backup Length

- Enhanced Bus Service in Peak-period Shoulder Lane, Gondola Alternatives A and B, and Cog Rail Alternative
- Enhanced Bus Service
- No Action

0 Feet 3,000



7.4.2.2.1 Tolling or a Ban on Single-occupant Vehicles

With the Enhanced Bus Service Alternative, there would be no improvements to S.R. 210, but bus service would be substantially increased and personal vehicle use on S.R. 210 in Little Cottonwood Canyon would be reduced by implementing a toll or a ban on single-occupant vehicles. The purpose of the toll or ban would be to incentivize transit use by reducing personal vehicle use by 30% to the ski resorts. S.R. 210 in Little Cottonwood Canyon is the only road that serves the ski resorts. It ends at the top of the canyon. Therefore, tolling would not increase traffic on other routes into Little Cottonwood Canyon since there are no bypass routes for avoiding the vehicle-restriction policy. The enhanced bus service to the ski resorts would be the only option to not paying the toll. The toll would not apply to residents, resort and other business employees, employees with the U.S. Department of Agriculture Forest Service, or freight traffic.

An indirect impact of a toll or a ban on single-occupant vehicles on S.R. 210 could be that skiers would visit other ski resorts that are not accessed by roads with restrictions. The main traffic impact would be to S.R. 190 in Big Cottonwood Canyon, which provides access to two ski resorts (Brighton and Solitude) and is about 3 miles north of Little Cottonwood Canyon. If skiers use S.R. 190 to avoid a toll or ban on single-occupancy vehicles on S.R. 210, congestion levels on S.R. 190 could increase substantially, causing long delays to reach the ski resorts in Big Cottonwood Canyon and traffic backups on Fort Union Boulevard and Wasatch Boulevard. To mitigate the potential for causing indirect effects in the form of increased congestion on S.R. 190, UDOT would likely implement a toll or a ban on single-occupant vehicles on this road so that both S.R. 190 and S.R. 210 have similar congestion-management policies. For more information, see Chapter 20, *Indirect Effects*.

The only freight traffic that uses S.R. 210 in Little Cottonwood Canyon serves the ski resorts and other commercial businesses. Freight traffic would likely be exempt from paying the toll, so the toll would not restrict freight traffic to these locations.

7.4.2.3 Mobility Hubs Alternative

The Enhanced Bus Service Alternative includes two mobility hubs: a mobility hub at the gravel pit and a mobility hub at the park-and-ride lot at 9400 South and Highland Drive.

7.4.2.3.1 Gravel Pit

With this mobility hub alternative, a 1,500-space parking garage and bus maintenance facility would be built at the gravel pit along with other commercial and residential development planned by Cottonwood Heights City. During the AM peak hour, about 700 vehicles could access the parking garage. The gravel pit mobility hub would include a diamond interchange designed to handle the volume of traffic and thereby minimize congestion impacts on Wasatch Boulevard. During peak travel periods, the traffic signals at the interchange would be designed to give priority to vehicles going to the parking garage.

7.4.2.3.2 9400 South and Highland Drive

With this mobility hub alternative, a 1,000-space parking garage would be built at the existing UTA park-and-ride lot at 9400 South and Highland Drive. During the AM peak hour, about 430 vehicles could access the parking garage. Given the current site configuration, no additional access or access improvements would be required. Traffic on both 9400 South and Highland Drive would increase to some extent, but no substantial

traffic congestion is anticipated. Most of the increase in traffic would be during the morning during off-peak travel periods such as on weekends and holidays.

7.4.2.4 Avalanche Mitigation Alternatives

The Enhanced Bus Service Alternative includes two alternatives for avalanche mitigation: the Snow Sheds with Berms Alternative and the Snow Sheds with Realigned Road Alternative.

7.4.2.4.1 Snow Sheds with Berms Alternative

With the Snow Sheds with Berms Alternative, the snow sheds would reduce the number of days and hours of S.R. 210 closures from avalanches. As shown in Table 7.4-8, by 2050, the duration of avalanche closures would decrease from 21 days and 108 hours with the No-Action Alternative to 6 days and 11 hours with the snow sheds. The decrease in closure time would result in fewer vehicles waiting to enter Little Cottonwood Canyon and less traffic backing onto S.R. 210 and S.R. 209. With the snow sheds, the decrease in the number and hours of closure would substantially improve closure-related congestion and the reliability of access for people traveling to residences off Wasatch Boulevard, North Little Cottonwood Road, and S.R. 209.

Table 7.4-8. S.R. 210 – Average Days and Hours of Road Closures with the No-Action Alternative and the Avalanche Mitigation Action Alternatives (2050)

Alternative	Average Days with Closures ^a	Average Hours of Closures ^a
No-Action Alternative	10.5 to 21	56 to 108+
Snow Sheds with Berms Alternative	4 to 6	2 to 11

^a For 2050, there are no historical supporting data; the average number of days and hours with closure will be within the range provided.

7.4.2.4.2 Snow Sheds with Realigned Road Alternative

The transportation impacts from the Snow Sheds with Realigned Road Alternative would be the same as from the Snow Sheds with Berms Alternative.

7.4.2.5 Trailhead Parking Alternatives

The Enhanced Bus Service Alternative includes three alternatives to address trailhead parking:

- Trailhead Improvements and No S.R. 210 Roadside Parking within ¼ Mile of Trailheads Alternative
- Trailhead Improvements and No Roadside Parking from S.R. 209/S.R. 210 Intersection to Snowbird Entry 1 Alternative
- No Trailhead Improvements and No Roadside Parking from S.R. 209/S.R. 210 Intersection to Snowbird Entry 1 Alternative

7.4.2.5.1 Trailhead Improvements and No S.R. 210 Roadside Parking within ¼ Mile of Trailheads Alternative

This alternative would reduce travel friction between roadside parked vehicles and vehicles in the travel lane adjacent to trailheads. The reduction in travel friction would improve overall mobility. The accesses into and out of the trailheads would also be improved to meet design standards, thus improving overall safety compared to the No-Action Alternative. Eliminating roadside parking within ¼ mile of the trailheads would reduce conflicts between cyclists and roadside parked vehicles and also vehicles in the travel lane, thereby improving the overall safety of the transportation system.

7.4.2.5.2 Trailhead Improvements and No Roadside Parking from S.R. 209/S.R. 210 Intersection to Snowbird Entry 1 Alternative

The transportation impacts from this alternative would be similar to those from the Trailhead Improvements and No S.R. 210 Roadside Parking within ¼ Mile of Trailheads Alternative. However, by removing all roadside parking in Little Cottonwood Canyon, the travel friction between roadside parked vehicles and vehicles in the travel lane would be eliminated, further improving mobility. In addition, by eliminating roadside parking, safety for both cyclists and pedestrians would be improved compared to eliminating parking along only portions of the road.

7.4.2.5.3 No Trailhead Improvements and No Roadside Parking from S.R. 209/S.R. 210 Intersection to Snowbird Entry 1 Alternative

The transportation impacts from this alternative would be the same as those from the Trailhead Improvements and No Roadside Parking from S.R. 209/S.R. 210 Intersection to Snowbird Entry 1 Alternative regarding the elimination of roadside parking. However, there would be no improvements to the substandard access points at the Lisa Falls and White Pine Trailheads. Both of the access points to these trailheads have limited sight distances, making entering and exiting the trailheads difficult.

7.4.2.6 No Winter Parking Alternative

By eliminating winter parking on S.R. 210, about 230 parking spaces on S.R. 210 would be removed adjacent to the ski resorts. The elimination of roadside parking during the winter would substantially improve mobility by removing the conflicts between roadside parked vehicles and vehicles in the travel lane. In addition, in the afternoon when skiers leave the resorts, some vehicles currently make U-turns in the roadway, blocking traffic and causing congestion. With the elimination of roadside winter parking, some of these types of conflicts would be reduced. Finally, with the elimination of roadside parking, snow-plowing operations would improve since there would be more areas for storing snow and more room for snow plows to maneuver.

7.4.3 Enhanced Bus Service in Peak-period Shoulder Lane Alternative

This section describes the traffic and transportation impacts of the Enhanced Bus Service in Peak-period Shoulder Lane Alternative, which includes improvements to the Wasatch Boulevard segment of S.R. 210, improvements to the segment of S.R. 210 from North Little Cottonwood Road to the town of Alta, two mobility hubs, avalanche mitigation alternatives, trailhead parking alternatives, and the No Winter Parking Alternative.

7.4.3.1 S.R. 210 – Wasatch Boulevard

The traffic and transportation impacts from the Imbalanced-lane and Five-lane Alternatives with the Enhanced Bus Service in Peak-period Shoulder Lane Alternative would be the same as with the Enhanced Bus Service Alternative.

7.4.3.2 S.R. 210 – North Little Cottonwood Road to Alta

With the Enhanced Bus Service in Peak-period Shoulder Lane Alternative, dedicated bus shoulder lanes would be added on S.R. 210 from North Little Cottonwood Road to the Alta Bypass Road. The shoulder lanes would have signs stating that the shoulder lanes are a bus lane only, and personal vehicles would not be allowed. As with the Enhanced Bus Service Alternative, a toll would be added on S.R. 210 in Little Cottonwood Canyon with the goal to reduce personal vehicle use by about 30%.

As shown above in Table 7.4-7, *S.R. 210 – 30th-highest-hour Travel Times and Vehicle Backup Lengths for the No-Action and Action Alternatives (2050)*, by increasing bus use and reducing personal vehicle use, the per-person travel times in 2050 would decrease from 80 to 85 minutes with the No-Action Alternative to 35 to 40 minutes with the Enhanced Bus Service in Peak-period Shoulder Lane Alternative. The 35-to-40-minute travel time would be a slight improvement over the existing travel time in 2018 of 40 to 45 minutes. The reason for the reduction in backup lengths on S.R. 210 and travel time for the Enhanced Bus Service in Peak-period Shoulder Lane Alternative compared to the Enhanced Bus Service Alternative is that the 24 buses per hour would be able to bypass the congested S.R. 210/S.R. 209 intersection in a bus-only lane.

On S.R. 210, traffic backups would decrease from 13,000 feet, or past the intersection of Wasatch Boulevard and North Little Cottonwood Road, with the No-Action Alternative to 3,050 feet with this alternative. On S.R. 209, traffic backups would decrease from 6,700 feet, or past the intersection of 9400 South and Wasatch Boulevard, with the No-Action Alternative to 350 feet with this alternative. The decrease in traffic backup lengths would improve access to the residential neighborhoods along S.R. 209 and S.R. 210 on busy ski days.

The impacts to the existing ski bus service and tolling impacts would be the same as with the Enhanced Bus Service Alternative.

7.4.3.3 Mobility Hubs Alternative

The traffic and transportation impacts from the mobility hubs with the Enhanced Bus Service in Peak-period Shoulder Lane Alternative would be the same as with the Enhanced Bus Service Alternative.

7.4.3.4 Avalanche Mitigation Alternatives

The traffic and transportation impacts from the avalanche mitigation alternatives with the Enhanced Bus Service in Peak-period Shoulder Lane Alternative would be the same as with the Enhanced Bus Service Alternative.

7.4.3.5 Trailhead Parking Alternatives

The traffic and transportation impacts from the trailhead parking alternatives with the Enhanced Bus Service in Peak-period Shoulder Lane Alternative would be the same as with the Enhanced Bus Service Alternative.

7.4.3.6 No Winter Parking Alternative

The traffic and transportation impacts from the No Winter Parking Alternative with the Enhanced Bus Service in Peak-period Shoulder Lane Alternative would be the same as with the Enhanced Bus Service Alternative.

7.4.4 Gondola Alternative A (Starting at Canyon Entrance)

This section describes the traffic and transportation impacts of Gondola Alternative A, which includes a gondola alignment from the entrance to Little Cottonwood Canyon to the Snowbird and Alta ski resorts, improvements to the Wasatch Boulevard segment of S.R. 210, two mobility hubs, avalanche mitigation alternatives, trailhead parking alternatives, and the No Winter Parking Alternative.

What are gondola base and terminal stations?

As used in this chapter, the term *terminal station* refers to the first and last stations on a passenger's gondola trip. Passengers board and disembark the gondola cabins at the terminal stations.

The *base station* is the terminal station at the bottom of the canyon, and a *destination station* is a terminal station at the top of the canyon.

7.4.4.1 S.R. 210 – Wasatch Boulevard

The traffic and transportation impacts with the Imbalanced-lane and Five-lane Alternatives with Gondola Alternative A would be the same as with the Enhanced Bus Service Alternative.

7.4.4.2 S.R. 210 – North Little Cottonwood Road to Alta

With Gondola Alternative A, there would be no improvements to S.R. 210, but the gondola system would be used along with a toll on personal vehicle use on S.R. 210 in Little Cottonwood Canyon to substantially reduce personal vehicle use. Similar to the Enhanced Bus Service Alternative, the goal of the toll would be to reduce personal vehicle use by about 30%. As shown above in Table 7.4-7, *S.R. 210 – 30th-highest-hour Travel Times and Vehicle Backup Lengths for the No-Action and Action Alternatives (2050)*, the per-person travel times would decrease from 80 to 85 minutes with the No-Action Alternative to 45 to 50 minutes with Gondola Alternative A. The 45-to-50-minute travel time would be similar to the existing travel time in 2018 of 40 to 45 minutes.

As shown above in Figure 7.4-1, *Vehicle Backup Lengths by Alternative*, on S.R. 210, traffic backups would decrease from 13,000 feet, or past the intersection of Wasatch Boulevard and North Little Cottonwood Road, with the No-Action Alternative to 3,050 feet with this alternative. On S.R. 209, traffic backups would decrease from 6,700 feet, or past the intersection of 9400 South and Wasatch Boulevard, with the No-Action Alternative to 350 feet with this alternative. The decrease in traffic backup lengths would improve access to

the residential neighborhoods along S.R. 209 and S.R. 210 on busy ski days. With this alternative, which would include a gondola base station located at the Little Cottonwood Canyon park-and-ride lot, there is the potential that buses' access the base station could be delayed with other S.R. 210 traffic.

With Gondola Alternative A, UTA would not provide ski bus service on S.R. 210 to the ski resorts, since the gondola would provide the transit service. This arrangement would require gondola users to drive to a mobility hub to board a bus to the gondola base station. This could be seen as a negative impact to current bus users who board a bus near the homes along the ski bus service route. In the future, UTA could add bus service to the mobility hubs from areas in the Salt Lake Valley.

The tolling impacts would be the same as with the Enhanced Bus Service Alternative.

7.4.4.3 Mobility Hubs Alternative

The traffic and transportation impacts from the mobility hubs with Gondola Alternative A would be the same as with the Enhanced Bus Service Alternative.

7.4.4.4 Avalanche Mitigation Alternatives

The traffic and transportation impacts from the avalanche mitigation alternatives with Gondola Alternative A would be the same as with the Enhanced Bus Service Alternative.

7.4.4.5 Trailhead Parking Alternatives

The traffic and transportation impacts from the trailhead parking alternatives with Gondola Alternative A would be the same as with the Enhanced Bus Service Alternative.

7.4.4.6 No Winter Parking Alternative

The traffic and transportation impacts from the No Winter Parking Alternative with Gondola Alternative A would be the same as with the Enhanced Bus Service Alternative.

7.4.5 Gondola Alternative B (Starting at La Caille)

This section describes the traffic and transportation impacts of Gondola Alternative B, which includes a gondola alignment from La Caille to the Snowbird and Alta ski resorts, improvements to the Wasatch Boulevard segment of S.R. 210, improvements to the segment of S.R. 210 on North Little Cottonwood Road, avalanche mitigation alternatives, trailhead parking alternatives, and the No Winter Parking Alternative.

7.4.5.1 S.R. 210 – Wasatch Boulevard

The traffic and transportation impacts from the Imbalanced-lane and Five-lane Alternatives with Gondola Alternative B would be the same as with the Enhanced Bus Service Alternative.

7.4.5.2 S.R. 210 – North Little Cottonwood Road to Alta

The traffic and transportation impacts from Gondola Alternative B would be the same as with Gondola Alternative A except that a 2,500-space parking garage would be located at the gondola base station. Traffic

studies were performed to determine the reduction in mobility on S.R. 210 from vehicles traveling to the gondola base station at La Caille (Fehr & Peers 2020, 2022). The traffic studies showed that S.R. 210 would operate at acceptable levels of service (LOS A–D) with the following design measures:

- Two southbound lanes on North Little Cottonwood Road to the gondola base station
- An underground exit from the gondola base station parking garage under North Little Cottonwood Road for northbound traffic
- A traffic signal at new intersection for the parking garage
- A new one-way access road from Wasatch Boulevard north of Little Cottonwood Creek heading east to the base station parking structure.

On S.R. 210, traffic backups would decrease from 13,000 feet, or past the intersection of Wasatch Boulevard and North Little Cottonwood Road, with the No-Action Alternative to 3,050 feet with Gondola Alternative B. The traffic studies showed that the backups would not interfere with the vehicles entering the gondola base station (Fehr & Peers 2020, 2022). On S.R. 209, traffic backups would decrease from 6,700 feet, or past the intersection of 9400 South and Wasatch Boulevard, with the No-Action Alternative to 350 feet with Gondola Alternative B. The decrease in traffic backup lengths would improve access to the residential neighborhoods along S.R. 209 and S.R. 210 on busy ski days. The new access road from Wasatch Boulevard is designed to capture traffic from the southern parts of Salt Lake County that would use 9400 South or Wasatch Boulevard to access the gondola base station. Without the access road, the traffic would use 9400 South to North Little Cottonwood Road to access the base station. The new access road would help alleviate traffic on S.R. 210 (North Little Cottonwood Road) near the base station.

With Gondola Alternative B, UTA would not provide ski bus service on S.R. 210 to the ski resorts, since the gondola would provide the transit service. This arrangement would require gondola users to drive to or be dropped off at the gondola base station. This could be seen as a negative impact to current ski bus users who board a bus near their homes along the bus service route. In the future, UTA could add bus service to the base station from areas in the Salt Lake Valley.

7.4.5.3 Mobility Hubs Alternative

Because the Gondola Alternative B base station at La Caille would include a 2,500-space parking structure, there would be no need for a mobility hub at the gravel pit or at the existing 9400 South and Highland Drive park-and-ride lot. The changes in traffic at the gravel pit and at the existing 9400 South and Highland Drive park-and-ride lot with Gondola Alternative B would be the same as with the No-Action Alternative.

The analysis of the 2,500-space parking structure at the Gondola Alternative B base station is included in Section 7.4.5.2, *S.R. 210 – North Little Cottonwood Road to Alta*.

7.4.5.4 Avalanche Mitigation Alternatives

The traffic and transportation impacts from the avalanche mitigation alternatives with Gondola Alternative B would be the same as with the Enhanced Bus Service Alternative.

7.4.5.5 Trailhead Parking Alternatives

The traffic and transportation impacts from the trailhead parking alternatives with Gondola Alternative B would be the same as with the Enhanced Bus Service Alternative.

7.4.5.6 No Winter Parking Alternative

The traffic and transportation impacts from the No Winter Parking Alternative with Gondola Alternative B would be the same as with the Enhanced Bus Service Alternative.

7.4.6 Cog Rail Alternative (Starting at La Caille)

This section describes the traffic and transportation impacts of the Cog Rail Alternative, which includes a cog rail alignment from La Caille to the Snowbird and Alta ski resorts, improvements to the Wasatch Boulevard segment of S.R. 210, improvements to the segment of S.R. 210 on North Little Cottonwood Road, avalanche mitigation alternatives, trailhead parking alternatives, and the No Winter Parking Alternative.

What are cog rail base and terminal stations?

As used in this chapter, the term *terminal station* refers to the first and last stations on a passenger's cog rail trip. Passengers board and disembark the cog rail vehicles at the terminal stations.

The *base station* is the terminal station at the bottom of the canyon, and a *destination station* is a terminal station at the top of the canyon.

7.4.6.1 S.R. 210 – Wasatch Boulevard

The traffic and transportation impacts from the Imbalanced-lane and Five-lane Alternatives with the Cog Rail Alternative would be the same as with the Enhanced Bus Service Alternative.

7.4.6.2 S.R. 210 – North Little Cottonwood Road to Alta

With the Cog Rail Alternative, no improvements to the S.R. 210 travel lanes would be made, but the cog rail system would be used along with a toll on personal vehicle use on S.R. 210 in Little Cottonwood Canyon to substantially reduce personal vehicle use. The Cog Rail Alternative would include adding an 8-foot-wide shoulder to S.R. 210 to provide for snow storage and a safety area between the S.R. 210 travel lane and the cog rail alignment. Similar to the Enhanced Bus Service Alternative, the goal of the toll would be to reduce personal vehicle use by about 30%.

As shown above in Table 7.4-7, *S.R. 210 – 30th-highest-hour Travel Times and Vehicle Backup Lengths for the No-Action and Action Alternatives (2050)*, the per-person travel times would decrease from 80 to 85 minutes with the No-Action Alternative to 45 to 50 minutes with the Cog Rail Alternative. The 45-to-50-minute travel time would be similar to the existing travel time in 2018 of 40 to 45 minutes.

A traffic study was performed to determine the potential reduction in mobility on S.R. 210 from vehicles traveling to the cog rail base station at La Caille (Fehr & Peers 2020 and 2022). The traffic study showed that S.R. 210 would operate at acceptable levels of service (LOS A–D) with the following design measures:

- Two southbound lanes on North Little Cottonwood Road to the cog rail base station
- An underground exit from the cog rail base station parking garage under North Little Cottonwood Road for northbound traffic
- A traffic signal at new intersection for the parking garage
- A new one-way access road from Wasatch Boulevard north of Little Cottonwood Creek heading east to the base station parking structure

As shown above in Figure 7.4-1, *Vehicle Backup Lengths by Alternative*, on S.R. 210, traffic backups would decrease from 13,000 feet, or past the intersection of Wasatch Boulevard and North Little Cottonwood Road, with the No-Action Alternative to 3,050 feet with the Cog Rail Alternative. On S.R. 209, traffic backups would decrease from 6,700 feet, or past the intersection of 9400 South and Wasatch Boulevard, with the No-Action Alternative to 350 feet with the Cog Rail Alternative. The decrease in traffic backup lengths would improve access to the residential neighborhoods along S.R. 209 and S.R. 210 on busy ski days. The new access road from Wasatch Boulevard is designed to capture traffic from the southern parts of Salt Lake County that would use 9400 South or Wasatch Boulevard to access the gondola base station. Without the access road, the traffic would use 9400 South to North Little Cottonwood Road to access the base station. The new access road would help alleviate traffic on S.R. 210 (North Little Cottonwood Road) near the base station.

Removing snow from the cog rail tracks could delay snow-removal operations on S.R. 210 and reduce traffic mobility. Delaying snow removal from S.R. 210 could increase roadway closure times and slow traffic entering or exiting the canyon. The following issues were identified:

- Snow would need to be removed from the cog rail tracks and pushed or blown onto S.R. 210.
- Removing snow from the cog rail tracks would likely require a blower, which would require S.R. 210 to be closed periodically. The blower could be operated during off-peak travel times on S.R. 210 (such as early morning).
- Once snow is pushed or blown onto S.R. 210 from the cog rail tracks, UDOT would then need to push it to the south side of S.R. 210. The extra snow removal could delay opening S.R. 210 during heavy snow events.
- Removing snow from the cog rail tracks would add to the complex snow-removal operations on S.R. 210, requiring additional equipment and staff-hours.

The expected impacts to existing UTA bus service and bus service users with the Cog Rail Alternative would be the same as with Gondola Alternative B.

The tolling impacts would be the same as with the Enhanced Bus Service Alternative.

7.4.6.3 Mobility Hubs Alternative

The traffic and transportation impacts from the mobility hubs with the Cog Rail Alternative would be the same as with Gondola Alternative B.

The analysis of the 2,500-space parking structure at the cog rail base station at La Caille is included in Section 7.4.6.2, *S.R. 210 – North Little Cottonwood Road to Alta*.

7.4.6.4 Avalanche Mitigation Alternatives

The traffic and transportation impacts from the mid-canyon snow sheds would be the same as with the Enhanced Bus Service Alternative. However, two additional snow sheds would be constructed in the upper canyon between the west- and east-end connections of the Alta Bypass Road to S.R. 210 to minimize avalanche risk to the cog rail system. These snow sheds would cover the cog rail alignment and not S.R. 210; therefore, vehicle mobility on S.R. 210 would not change from the operation of the upper-canyon snow sheds since vehicles would continue to use the Alta Bypass Road when S.R. 210 is closed for avalanche-mitigation operations.

7.4.6.5 Trailhead Parking Alternatives

The overall traffic and transportation impacts from the trailhead parking alternatives would be the same as with the Enhanced Bus Service Alternative except at locations where the cog rail alignment crosses the access to the trailheads (Alpenbock, Grit Mill, Gate Buttress, and Lisa Falls Trailheads). At these trailheads, trail users could be briefly delayed while entering or exiting the trailheads when a cog rail vehicle passes by. This would occur 8 times per hour during the winter and 4 times per hour during the summer.

7.4.6.6 No Winter Parking Alternative

The traffic and transportation impacts from the No Winter Parking Alternative would be the same as with the Enhanced Bus Service Alternative.

7.4.7 Mitigation Measures

No mitigation for transportation impacts is proposed.

7.5 References

Avenue Consultants

2012 Cottonwood Canyons Parking Study – Existing Conditions. April 12.

Dynamic Avalanche Consulting

2018 Snow Avalanche Hazard Improvement Options Report, Little Cottonwood Canyon Environmental Impact Statement. October 4.

Fehr & Peers

2018 2050 Forecast Traffic Volumes, S.R. 210 Little Cottonwood Canyon. May 16.

2019 S.R. 210 EIS Traffic Study – Fort Union to North Little Cottonwood Road. May.

2020 Gondola Base Station Traffic Analysis – La Caille Site. August 10.

2022 Gondola Base Station Traffic Analysis – La Caille Access Road. February 3.

[FHWA] Federal Highway Administration

1987 Guidance for Preparing and Processing Environmental and Section 4(f) Documents. Technical Advisory T 6640.8A.

2018 Traffic Data Computation Method Pocket Guide. Publication No. FHWA-PL-18-027. August.

Mountain Accord

2014 Existing Conditions and Future Trend Lines of the Transportation System.