Chapter 1. Purpose of and Need for Action

1.1 Summary Purpose and Need Statement

The I-70 Mountain Corridor Programmatic Environmental Impact Statement (PEIS) focuses on broad approaches to address travel demand and the performance of transportation systems, within the context of the communities and environmental setting of this corridor. This focus enables program decisions to address corridor-wide transportation system issues. The PEIS is a Tier 1 policy-level National Environmental Policy Act (NEPA) document. The I-70 PEIS will determine the future capacity, mode choice(s), and general location(s) of the preferred alternative. It assesses potential direct, indirect, and cumulative impacts to the I-70 Mountain Corridor (referred to throughout this document as the Corridor) associated with the alternatives. Subsequent site-specific Tier 2 NEPA studies will be required for any future action.

With the involvement of the public and other agencies, this **purpose and need statement** has guided the Colorado Department of Transportation (CDOT) and Federal Highways Administration (FHWA) to develop transportation alternatives for evaluation in this PEIS.

1.1.1 Underlying Need

Existing transportation congestion on the Corridor is degrading the accessibility of mountain travel for Colorado residents, tourists, and businesses. Congestion is impeding freight-related services and affecting the connectivity of intra- and interstate traffic. Tight curves, steep grades, and outmoded interchanges in various locations along the Corridor contribute to a degradation of mobility and safety. Congestion along I-70 is believed to be impeding economic growth in the communities traversed by the Corridor, which are highly reliant on weekend tourism. Travel demand in the Corridor is projected to increase over the next 25 years and beyond.

The need to relieve this congestion is especially acute for extended weekend travelers seeking access between the Denver metropolitan area and US 40 (to Grand County), as well as through the Eisenhower-Johnson Memorial Tunnels (EJMT) to the Western Slope. The need is predominantly due to the number of travelers bound for Corridor-area destinations from the Front Range and from out of state. Motor carriers, which provide freight services necessary to serve mountain residents, businesses, and visitors, as well as interstate commerce, also add to the I-70 traffic.

Weekday commuting traffic into and within the western portions of the Corridor is also becoming congested, particularly in previously more rural Eagle County. In contrast, the portion through Jefferson County is within the greater Denver metropolitan area, where congestion is an acknowledged circumstance.

Because of the programmatic approach, a broad corridor between Glenwood Springs and C-470 was defined for evaluation of transportation problems and alternatives. Because of the role that air travel plays in Corridor visits, the travel demand from Denver International Airport (DIA) to Eagle County Airport was considered in developing future travel projections and alternative mode choices.

The underlying **need** represents the transportation challenges of the Corridor – to ***increase capacity, improve accessibility and mobility,*** and ***decrease congestion.*** Alternatives that meet the need would accommodate the projected 2025 travel demand for the Corridor, and could also address the continued growth beyond 2025. Therefore the measure of meeting the underlying need is based on the 2025 Baseline. Before the preferred alternative is identified for the Final PEIS, a decision will be made as to whether to plan for accommodating transportation needs projected for 2025 or beyond 2025 (50-year vision).

1.1.2 Effects of I-70 Over the Years

I-70 traverses the rugged terrain and outstanding scenery of the Rocky Mountains, including the steep grades leading up to the Continental Divide and Vail Pass, and narrow, steep-walled Clear Creek and Glenwood canyons between C-470 and Glenwood Springs. Numerous rivers and creeks run parallel to I-70 within the Clear Creek, Blue River, Eagle River, and Upper Colorado watersheds. The Corridor region is rich in its historic significance to the gold and silver mining eras, which were key to Colorado's success in the 1800s and to the growth of communities within the Rocky Mountains.

The complexities of the high-altitude ecosystems create a sensitive natural environment and a wilderness backdrop to the mountain communities along the Corridor. The historic and recreation-oriented communities, as well as the recreation areas within the White River National Forest (WRNF) and the Arapaho and Roosevelt National Forests (ARNF), are destinations for summer and winter visitors from Colorado, other parts of the US, and around the world. Tourism is Colorado's second-largest industry and is vital to the economies of the Corridor communities.

Supporting Documentation
- Appendix B, Transportation Analysis and Data
- Appendix C, Description and Assumptions of the Travel Model
- Appendix D, Documentation of the I-70 Ridership Survey
- Appendix E, Operational Characteristics of Alternatives

Over the initial 30 years of I-70 operation the presence of the highway and increasing congestion have affected the adjacent environment and communities in various ways throughout the Corridor. Interstate access has stimulated local economies, increased recreational travel, and enhanced highway users' driving experience in the Rocky Mountains. The roadways over Vail Pass and through Glenwood Canyon are good examples of improvements in the highway driving experience.

However, the growth of the mountain communities and the construction of I-70 also have led to increased dust and vehicle emissions, truck and traffic noise, and stress on the historic setting and local community resources such as emergency response services to highway accidents. Roadside erosion, land use changes, and winter maintenance practices have affected wetlands and the water quality of streams already stressed by lingering mine waste. The highway and growth have affected adjacent wildlife habitat and animal movement corridors that cross the highway. Several geologic hazard areas along the Corridor pose a danger to motorists as well as presenting a threat of physical damage to the transportation infrastructure.

1.1.3 Summary Statements

In summary, alternatives were developed to meet the underlying need, with consideration of the effects of I-70 over the years. The alternatives fully evaluated in this PEIS are measured against the following underlying need and the project purposes.

1.1.3.1 Project Need

To increase capacity, improve accessibility and mobility, and decrease congestion. Alternatives would meet the underlying need by addressing capacity deficiencies, providing I-70 users with transportation mode choice(s), reducing hours of congestion, and improving travel time, particularly during periods of peak use in the Corridor.

1.1.3.2 Project Purposes

The overall purpose of the proposed action will be to determine the future capacity, mode choice(s), and general location(s) for the future travel demand of the Corridor, in a manner that addresses the underlying need, while providing for and accommodating the listed purposes. The safety purpose as noted below is also integral to the underlying needs due to its association to roadway deficiencies.

- **Environmental Sensitivity.** A full spectrum of environmental resources, including stream sedimentation, water quality, wildlife crossings, and impacts on wetlands, will be considered in the selection of a preferred alternative.
- **Respect for Community Values.** Issues associated with air quality, historic resources, noise, visual resources, and social and economic values, as well as the impact of the transportation system's footprint on the mountain communities, will be considered in the selection of a preferred alternative. The possible growth changes and economic effects that might occur, depending on the ease or difficulty of access, will also be disclosed.
- **Safety.** Problematic roadway geometric conditions, such as tight curves and lane drops, as well as the safety characteristics of the modes of travel, will be considered in the selection of a preferred alternative.
- **Ability to Implement.** Technical feasibility (that is, overall use of a mode and the feasibility of the technology), as well as affordability in terms of capital costs, maintenance and operational costs, user costs, and environmental mitigation costs, will be considered in the selection of a preferred alternative. Implementation includes consideration of construction impacts on existing mobility and the communities along the Corridor.

CDOT's Environmental Stewardship Ethic

Beyond the purpose and need for the PEIS, it is important that Colorado residents understand that CDOT has an environmental ethic. The term "environment" includes the natural environment, the built environment, the cultural and social fabric of Colorado's communities, and the quality of life of Colorado residents. CDOT's Environmental Stewardship Guide, March 2003, states, "CDOT will support and enhance efforts to protect the environment and quality of life for all of Colorado's citizens in pursuit of providing the best transportation systems and services possible." CDOT's environmental ethic establishes a moral foundation of environmental responsibility that helps guide transportation policy and systems planning decisions. As the planning and decision-making process becomes more project-oriented, this environmental ethic is incorporated into environmentally responsible engineering, construction, and maintenance practices.

CDOT recognizes the complex interrelationship of the environment and economic vitality and mobility, and is committed to balancing these factors when developing and implementing transportation planning decisions. CDOT has adopted the following environmental ethics statement to guide its work and accomplish its mission:

> *Environmental stewardship means to go beyond environmental compliance and strive for environmental excellence; to promote a sense of environmental responsibility for all employees in the course of all CDOT actions; to ensure that measures are taken to avoid or minimize the environmental impacts of construction and maintenance of the transportation system and that mitigation commitments are implemented and maintained; and to design, construct, maintain, and operate the statewide transportation system in a manner that helps preserve and sustain Colorado's historic and scenic heritage and fits harmoniously into communities and the natural environment.*

Consistent with CDOT's *Environmental Stewardship Guide,* both FHWA and CDOT are committed to identifying and establishing programs to enhance and potentially improve existing aquatic and terrestrial habitats influenced by I-70. These programs include CDOT's Stream and Wetland Ecological Enhancement Program (SWEEP) and A Landscape Level Inventory of Valued Ecosystem Components (ALIVE). The role of SWEEP is to develop a plan for the management practices and enhancement of the ecosystems (including fisheries) associated with the streams, wetlands, riparian areas, and watersheds in the Corridor. The ALIVE program will target management strategies for high value conservation sites to wildlife, including federally endangered and candidate species, and develop cooperative agreements with regulatory and resource agencies. In addition, resource agencies have defined wildlife crossings needed along the Corridor. The Record Of Decision (ROD) will outline a process for implementing these programs.

1.2 Related Studies

1.2.1 Feasibility Study

In 1989, CDOT released the findings of a feasibility study for I-70 and the need for additional capacity in Clear Creek County, primarily between Floyd Hill and Idaho Springs. This study was to be followed up with the appropriate environmental study. However, it was not until 1996 that CDOT initiated an additional planning study: the I-70 Mountain Corridor Major Investment Study (MIS).

1.2.2 Major Investment Study

This I-70 MIS, completed in 1998, resulted in a 50-year "Vision for the Corridor." The focus of the MIS encompassed the area from Glenwood Springs to C-470. The MIS Vision included a desire to change Corridor users' travel behavior in a meaningful way with the introduction of high-speed transit and limited changes to the highway's capacity. This document also recommended the preparation of a PEIS to examine elements of the Vision and potential impacts.

In response to the MIS recommendations, the I-70 Mountain Corridor PEIS has been prepared as a Tier 1 Environmental Impact Statement (EIS) in accordance with the Council on Environmental Quality (CEQ) regulations (40 CFR 1502.20) and FHWA regulations [23 CFR 771.111(g)].

1.2.3 Incident Management Plan

The I-70 Mountain Corridor Incident Management Program, developed in 2000, addresses procedural and coordination aspects of managing unplanned incidents on the highway that affect the flow of traffic. These incidents include naturally occurring events (such as inclement weather, rockslides, or avalanches), stalled vehicles, multi-vehicle crashes, or hazardous materials incidents that could affect the shoulder or close the entire highway. The incident management program was developed with representation from affected response agencies in the Corridor area. The program outlines procedures for informing system users and the media and provides guidance for program implementation and management. The program includes an incident response manual that provides a quick, in-the-field reference for response personnel to ensure effective, consistent response to incidents on the Corridor.

1.2.4 Urban Maglev Transit Technology Development Program

CDOT and the Federal Transit Administration (FTA) have sponsored an Urban Maglev Transit Technology Development Program for the Corridor in conjunction with the PEIS. This research involves the Maglev Transit Group, Sandia National Laboratories, CDOT, and the former Colorado Intermountain Fixed Guideway Authority (CIFGA). The research assesses the introduction of high-speed transit in the Corridor through the application of a magnetic levitation (maglev) transit system. A June 2004 FTA Colorado Maglev Project report proposed a high-speed surface transport (HSST) CM200 design for the Corridor (FTA 2004).

1.2.5 Colorado Tolling Enterprise

CDOT created the Colorado Tolling Enterprise (CTE) to finance, build, operate, and maintain toll highways. The CTE was made possible by legislation in 2002 that enabled CDOT and the state Transportation Commission to issue bonds for new or additional highway capacity toll projects throughout Colorado. CTE has embarked on a toll system traffic and revenue feasibility analysis and has included I-70 from C-470 to the Eagle County Airport as a candidate corridor. The analysis will determine the viability of assessing tolls on all or portions of any new highway capacity created on I-70. Results of this analysis are expected by late 2004 and will be incorporated into this PEIS as available.

1.2.6 Other Transportation Studies

Chapter 2, Description and Comparison of Alternatives, discusses other transportation studies, such as the *Eagle County Airport Interchange Environmental Assessment,* the *SH 9 Environmental Impact Statement,* the *Gaming Area Access Environmental Impact Statement,* and the *Hogback Parking Facility Environmental Assessment*.

1.2.7 Land and Resource Management Plans

Land and Resource Management Plans for the WRNF (2002) and the ARNF (1997) provide guidance for all resource management activities on these forests. I-70 traverses lands within these forests and provides one of the primary access routes for forest recreation opportunities.

1.3 Project Termini

The study Corridor extends from Glenwood Springs (milepost 116) east to the connection with C-470 (milepost 260) as shown on Figure 1-1. This 144-mile stretch of I-70 traverses five counties – Garfield, Eagle, Summit, Clear Creek, and Jefferson – and more than 20 communities. While the overall project termini capture the full Corridor, the termini for each alternative vary to match needed infrastructure changes for the I-70 problematic areas. The termini for different alternatives also vary depending on the connectivity needed to match the alternative's mode of transportation. Travel demand projections for the alternatives have been coordinated with the travel demands generated from the Denver metropolitan area (including DIA), as well as counties traversed by the Corridor (Garfield, Eagle, Summit, Clear Creek, and Jefferson), the surrounding counties (Pitkin, Grand, Gilpin, Lake, Park, and Routt), and other counties included in the statewide transportation network.

1.4 System Linkage

I-70 is the only east-west interstate crossing Colorado and is the only continuous east-west highway in the study area. Therefore, the Corridor is the lifeblood of east-west travel in Colorado, providing for the movement of people, goods, and services across the state. I-70 is a major corridor for access to many of Colorado's recreation and tourism destinations. In addition, it is a link in the national interstate highway system, the principal purposes of which are to connect major metropolitan areas and industrial centers by direct routes and to provide a dependable highway network to serve in national emergencies. I-70 extends to the East Coast in Maryland. The portion of I-70 west of Denver linking with I-15 in Utah was added to the interstate system plan in 1957 to provide a major tie from Denver to the West Coast. I-70 is designated as a national defense route. Figure 1-1 illustrates the route of I-70 across the US, with the Corridor highlighted.

When the interstate was being built, route location decisions were necessary. I-70 between Glenwood Springs and Denver primarily follows portions of US 6 and US 40 that had existed since the 1930s. Portions of US 6 still intertwine with I-70, in some places on the same road, in some places exiting off and running parallel to I-70. Due to the listing of Georgetown-Silver Plume as Colorado's first National Historic Landmark (NHL) in 1966, I-70 was located on a large fill to the north of Georgetown, which is now commonly known as Georgetown Hill. In the towns of Lawson, Downieville, and Dumont, and Idaho Springs, some portions of US 6 serve as a local route.

A key route issue during design of the interstate was where the highway would cross the Continental Divide, through the Straight Creek location or the Snake River location. In 1959, the Straight Creek location through the Continental Divide was recommended.

Figure 1-1. US Map Highlighting I-70

Two tunnels along the Straight Creek alignment (located at the border between Summit and Clear Creek counties) were later named the Eisenhower-Johnson Memorial Tunnels (EJMT). The tunnels through the Divide were opened in 1973 (Eisenhower tunnel, westbound) and 1979 (Johnson tunnel, eastbound). Before 1973, travelers crossing the Continental Divide used Loveland Pass, a narrow, two-lane mountain road reaching 11,992 feet at its peak. Currently, vehicles carrying hazardous materials are still required to use Loveland Pass rather than the EJMT.

Construction over Vail Pass was completed in 1978. This portion of I-70 followed a road that had been in place since 1941 between Dowd Canyon and Wheeler Junction.

In 1992, the last section of I-70 was completed: the 13-mile section through winding Glenwood Canyon in Garfield and Eagle counties. This section included the construction of additional tunnels at Hanging Lake and in the area known as the "Reverse Curves" in Glenwood Canyon. The completed project received numerous awards and recognition for the construction techniques used to minimize damage to the sensitive canyon environment.

See section 1.7 for a description of towns, highway linkages, and landmarks along the Corridor, as well as a physical description of the roadway from west to east.

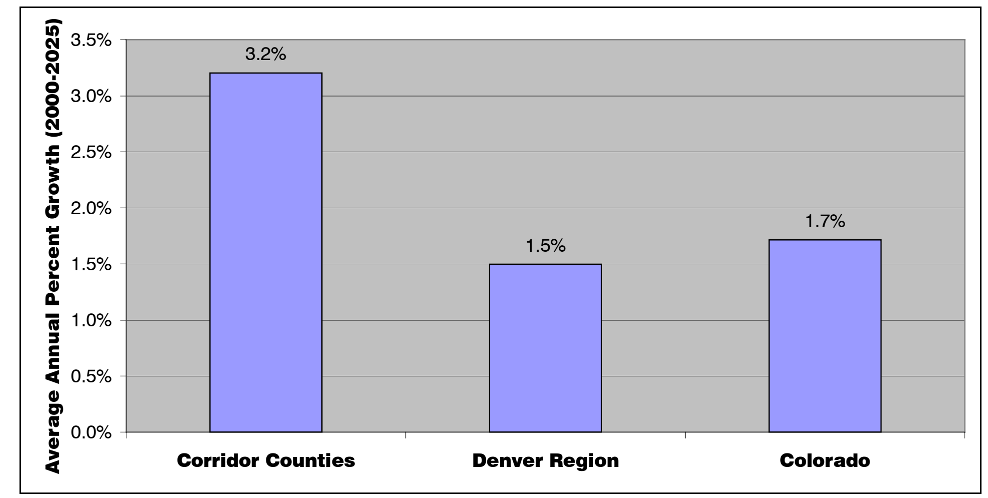
1.5 Social Demand Issues

Because of the growth projected for the Corridor communities and the importance of tourism and recreation to these communities, the following social demand issues are key to the understanding of the need for the proposed action:

- **Corridor communities' population projected to double.** By 2025, the permanent population of the Corridor communities is projected to reach almost 350,000 – an increase of almost 175,000, or more than double the 2000 population of 172,276 (DOLA 2002). The "Corridor communities" consist of a **nine-county area** that includes the counties traversed by the Corridor (Garfield, Eagle, Summit, Clear Creek, and Jefferson), as well as contiguous counties (Gilpin, Grand, Lake, and Park).
- **Denver metropolitan area population also projected to have extensive growth.** The population of the Denver metropolitan area (Adams, Arapahoe, Boulder, Denver, Douglas, and Jefferson counties) is expected to grow approximately 46 percent by 2025 (DOLA 2002).
- **Tourism is Colorado's second largest industry** and constitutes 12 to 14 percent of Colorado's economy – $7 billion in 2000 (DOLA 2002). The aesthetic, natural, and recreational attractiveness of lands and communities in the Corridor is expected to continue to stimulate tourism and community expansion.
- **Corridor-area economy driven by tourism.** The economy of the Corridor's nine-county area is largely driven by tourism and recreation, resulting in employment of 125,000 persons and generating $4.8 billion in annual personal income (DOLA 2002). The economic engine of tourism sustains the residents of the Corridor communities with employment and income and drives additional growth in these communities, resulting in increased employment, housing, population, and transportation demands.
- **Growth in Corridor-area second home construction fuels job growth.** Related factors fueling job growth have been the construction of second homes, real estate sales, and the strengthening of industries that support new home development.
- **More jobs than available housing projected.** Job growth projected for Eagle, Summit, and Garfield counties is expected to outpace the ability to house workers within these counties (see section 3.9, Social and Economic Values).
- **Large percentage of tourism comes from within state.** According to the Center for Business and Economic Forecasting, approximately 30 percent of Colorado's total tourism and recreation jobs were generated from the activities of those living and vacationing within the state (CBEF 2002).
- **Skier and snowboarder visits to Corridor destinations an important component of Colorado tourism.** During the 2000-2001 winter season, recreation-seekers made about 11.7 million skier visits (one person skiing or snowboarding for any part of a day) at ski areas throughout Colorado (CSCUSA 2002).
- **Recreation trips expected to meet or exceed population growth projections.** Winter day recreation trips from the Denver metropolitan area are expected to keep pace with population growth (CSCUSA 2002), while by 2025, summer day recreation trips are expected to grow by about 7 percent above the Denver metropolitan area population growth rate (USFS 2002).
- **Out-of-state air passengers projected to increase.** Between 2000 and 2025, the number of out-of-state air passengers arriving (based on projected enplanements – see Table 1-1 on page 1-6) is projected to increase by 25 to 45 percent in winter and 30 percent in summer.
- **Recreation uses expanding winter and summer.** Recreational uses are expected to continue to diversify, from an economy once dominated by winter sports to a year-round economy driven by summer activities, such as golfing, hiking, mountain biking, river rafting, and fishing (USFS 2002).
- **Gaming activity projected to increase substantially.** By 2025, the number of gaming devices and the number of casino employees in Black Hawk are both projected to increase by more than 130 percent over their 2000 levels. Central City is expected to have a 185 percent increase in gaming devices, and a 270 percent increase in casino employment (CDOT 2004). Contact CDOT for further information.

Chart 1-1 illustrates the large population growth expected for the Corridor communities from 2000 to 2025 as compared to that of the state as a whole and of the Denver metropolitan area. Details regarding population growth in the Corridor communities are provided in section 3.9.

Chart 1-1. 2000 to 2025 Projected Average Annual Population Growth Rate



Source: DOLA 2002

1.5.1 Tourism Economy

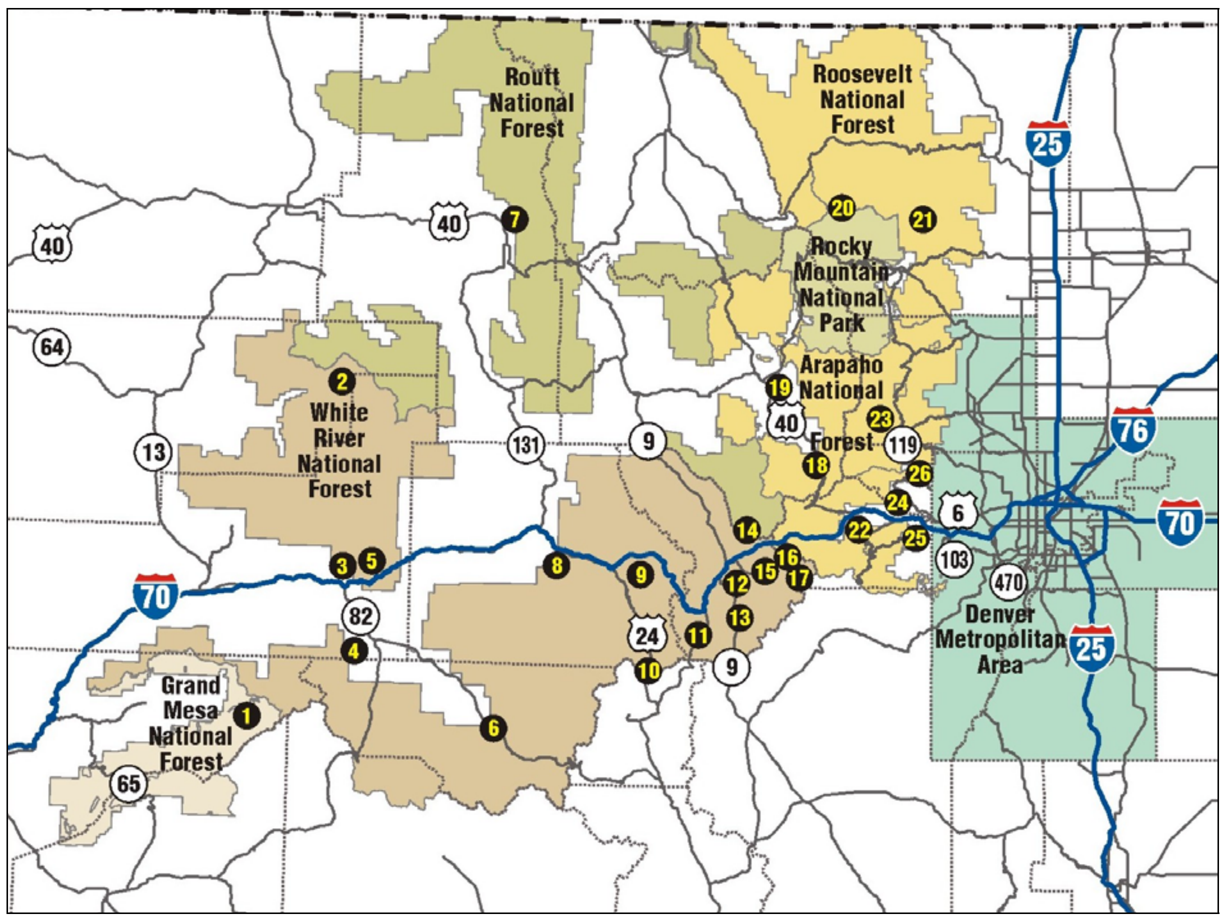
Tourism and recreation travel is the primary source of weekend congestion in the Corridor. The following is a summary of tourist attractions reached by traveling on the Corridor. Details regarding the tourist economy of the Corridor region are described in section 3.9.

According to a Longwoods International travel study performed in 2001, Colorado was ranked first in the nation for 2001 overnight ski trips at 16.9 percent of total trips to US ski areas. Colorado consistently has over 11.5 million skiers annually, more skiers than California and Utah combined, according to Colorado Ski Country USA, the official recorder of statewide skier visits for Colorado's ski areas (CSCUSA 2004).

The WRNF and the ARNF, whose lands encompass most of the Corridor area, are the most visited national forests in the US. Figure 1-2 illustrates the ski areas in proximity to the I-70 Corridor in the WRNF and ARNF. The public demand for use of the national forests for both summer and winter recreation is expected to continue at about the same proportional rate as the growth in Corridor-area population from 2000 to 2025. The WRNF and ARNF project an annual increase in recreational use of between 2 and 3 percent for their plans that were developed for 2010 (ARNF) and 2020 (WRNF). The PEIS projects that summer recreation visitor days would increase by 76 percent between 2000 and 2025, and skier visits are anticipated to increase by 13 percent. The WRNF estimates that approximately 30 percent of all recreation uses of the forest are dispersed, and 70 percent of recreation use occurs in developed sites, primarily ski areas. Forest uses are more dispersed during summer months, when activities such as hiking, mountain biking, rock climbing, river rafting, and fly fishing are popular. In addition, as the nondispersed or developed sites endure heavier uses, it is anticipated that visitors will seek more remote recreation experiences in backcountry locations (USFS 2002).

Colorado's more than 35 winter recreation areas offer activities such as snowshoeing, snowmobiling, snowcat tours, sleigh rides, ice skating, cross-country skiing, and the largest recreational attraction in Colorado: downhill skiing and snowboarding. The most popular Colorado attractions reached by traveling on the Corridor, including those listed by the CBEF and Longwoods International's Colorado Visitors Study 2001, are shown on a map in Figure 1-2. As this map indicates, many of Colorado's most popular destinations are reached *only* by traveling on the Corridor.

Figure 1-2. Colorado Destinations Reached by I-70



Legend (west to east):

1. Grand Mesa National Forest
2. White River National Forest
3. Glenwood Springs/Hot Springs/Pool
4. Ski Sunlight
5. Glenwood Canyon
6. Aspen/Snowmass/Buttermilk/Aspen Highlands
7. Steamboat
8. Arrowhead Ski Area
9. Vail/Beaver Creek
10. Ski Cooper
11. Copper Mountain
12. Frisco
13. Breckenridge
14. Silverthorne
15. Keystone
16. Loveland Ski Area
17. Arapahoe Basin Ski Area
18. Winter Park/Mary Jane Ski Areas
19. Sol Vista
20. Rocky Mountain National Park
21. Arapaho and Roosevelt National Forests
22. Georgetown (including Georgetown Loop Railroad)
23. Eldora Ski Area
24. Idaho Springs
25. Mount Evans
26. Central City/Black Hawk

1.5.2 Current Corridor Transit Use

Various transit modes and services currently operate in the Corridor area. During the summer, transit trips make up 4 to 7 percent of the total person trips made within or to the following transit use area (counties with transit systems that use I-70: Boulder, Clear Creek, Eagle, Garfield, Gilpin, Grand, Jefferson, Lake, Park, Pitkin, and Summit counties). In winter, transit trips account for 7 percent of the person trips in this transit use area. Some Corridor-area transit providers target specific trip-making niches, while others serve a broader customer base. These transit operators may be generally described as one of the following:

- **Shuttle vans and charter vans.** Several private carriers offer scheduled van service from DIA to mountain resorts for fares ranging from 40 to 60 cents per mile. These vans can carry up to 15 passengers, and bring the passenger to his or her lodging. Similar vans can be chartered by groups from DIA and other Colorado airports. Some charter van companies also offer limousines for hire. Approximately 12 percent of the air passenger person trips from DIA to destinations in the Corridor utilize this mode in the winter, as do 6 to 7 percent in summer.
- **Intercity buses and trains.** Some private and quasi-private operators such as Greyhound and Amtrak provide a limited number of daily vehicle trips between Corridor cities as part of cross-country connections.
- **Casino buses.** The gaming establishments in Black Hawk and Central City contract with private bus operators to provide routine service from the Denver metropolitan area to the gaming areas. In exchange for a $5 to $20 fare, a passenger receives coupons redeemable at the sponsoring casino or other promotional items. Seventeen to 22 percent of total gaming person trips use transit. Gaming person trips (using auto or transit) are about 4 percent of all person trips on weekdays to or within the transit use area, and 12 to 15 percent of weekend person trips.
- **Charter buses.** Ski clubs, tour groups, and other organizations may charter a private bus to provide transportation to a particular destination. These buses are not generally open to the public, nor do they necessarily have a published or repeating schedule.
- **Ski Train.** This private company provides one morning vehicle trip from Denver Union Station to Winter Park and one evening return vehicle trip on winter Fridays, Saturdays, and Sundays. A summer schedule also operates, attracting customers attending the many Winter Park festivals. Fares cost approximately $45 to $70 per passenger, depending on the class of service desired, and are valid for return on the day of issue only. That is, an overnight person trip requires twice the fare of a day person trip. The numbers of passenger trains are limited due to heavy freight traffic on the rail line.
- **Local public transit agencies.** Some counties and towns in the mountain region operate bus services for visitors and workers to the large resorts, and for commuting, shopping and other personal business. Local public transit agencies operating on I-70 include the Roaring Fork Transportation Authority (RFTA), which provides commuter bus service from Aspen to Glenwood Springs, intracity service in Aspen and Glenwood Springs, and a variety of other seasonal services; and Eagle County's transit service, ECO Transit. These buses may be as large as 40-passenger buses, or smaller van shuttles, which may seat up to 20 persons. Some providers charge no fare. Most of the person trips using these local transit services – 3 to 8 percent of total person trips depending on the season – are made for commuting and personal errands. The larger county-based providers do not currently connect at common stops, although there are some plans to do this in the future. Thus, it is not currently possible to make cross-Corridor trips using these types of systems.

1.5.3 Role of Air Travel in Corridor Travel Patterns

Airports in or near the Corridor also play a role in Corridor travel patterns. About 3 to 4 percent of all person trips within the transit use area surrounding the Corridor are made by air passengers. Much of the privately operated shuttle and charter van services are geared to serving passengers originating from DIA, Eagle County Airport (EGE) or Aspen/Pitkin County Airport (ASE). EGE and ASE also have public transit access through ECO Transit and RFTA, respectively.

Table 1-1 summarizes the current and projected annual enplanements at DIA, Colorado Springs (COS), EGE, and ASE. An enplanement is counted when a passenger boards an aircraft. DIA is the busiest airport, with about 18 million enplanements in 2000; however, most of these are transferring passengers who make no trips in the Denver metropolitan area or on the Corridor. COS, a medium-sized hub, handled more than 1.2 million enplanements in 2000.

Table 1-1. Annual Colorado Enplanements by Airport (Current and Projected)

Aspen/Pitkin County Airport	**1991** 206,041	**1998** 249,651	**2000** 215,091	**2005/2006** 281,000	**2010** 359,000	**2015** 428,000
Eagle County Airport	**1991** 30,308	**1998** 171,272	**2000** 188,745	**2002** 171,182	**2025** 582,000	
Colorado Springs Airport	**1991** 620,088	**1998** 1,240,549	**2000** 1,205,552	**2007** 1,300,000		
Denver International Airport (Stapleton Airport in 1991)	**1991** 14,173,874	**1998** 18,415,700	**2000** 18,382,940	**2007** 24,677,000	**2010** 26,300,000	**2015** 29,000,000

Note: Shaded areas indicate that projections are not available for that time frame.

Sources: FAA ACAIS Database, E-470 Senior Board Report.

1.5.4 Slow-Moving Vehicles on the Corridor

In addition to a predominance of recreational traffic, I-70 is an important freight corridor in Colorado for both interstate and intrastate travel. The use of heavy vehicles – trucks, buses, and recreational vehicles (RVs) – along the Corridor varies greatly (3 to 14 percent) by time of use (weekday use being generally greater) and by area along the Corridor. The interaction between heavy vehicle movements and congestion is important for several reasons:

- Most trucks or large RVs cannot go up or down the steep grades (up to 7 percent) as fast as most passenger cars. The resulting variation of vehicle speeds on I-70 has safety implications, and slow-moving vehicles on grades would perform the equivalent to several passenger cars.
- For trucks delivering goods to customers within the Corridor area, there is no reasonable alternative to I-70, and clients often control delivery times, because most vending locations do not have adequate storage space.
- On steep two-lane segments, a truck passing a slower vehicle will block all faster vehicles, causing congestion in both lanes.

Annual Average Daily Traffic (AADT) for trucks is presented in Table 1-2 for several locations along the Corridor. The volume of trucks at the Utah state line is less than half the volume at Genesee. Also, truck AADT grows slowly as one proceeds east on I-70 until past the EJMT. The junction of US 40 influences the more rapid increase in truck AADT in the eastern part of the Corridor at Empire due to the US 40 connection to Utah and rail spurs, and by denser economic activity near the Denver metropolitan area.

Table 1-2. Semi-Trailer Annual Average Daily Traffic

Source	Location	Approximate Milepost	AADT
b	West of Loma	15	1,200
a	No Name	119	1,300
a	West of SH 91 / Copper Mountain / Leadville	195	1,400
a	Georgetown Hill	227	1,500
b	East of US 40 / Empire Junction	234	1,800
a	East of Genesee	255	2,400

Sources:
a. CDOT Division of Transportation Development (DTD) data for 1998 to 2003.
b. Department of Revenue counts for Dumont and Loma weigh stations, 1998 to 2001.

Other slow-moving vehicles on I-70 include RVs and buses. Depending on the distance from Denver, up to 5 percent of the vehicles on the Corridor are RVs. Table 1-3 shows the percentages of heavy vehicles (trucks, buses, and RVs) that are used to calculate capacity for this PEIS. These assumptions are made by comparing the semi-trailer AADT counts to the overall AADT counts.

Table 1-3. Percent of Heavy Vehicles Assumed for Capacity Analysis (2000)

Segment		Summer Weekday (%)	Summer Weekend (%)	Winter Weekend (%)
Percentage Trucks and Buses				
Glenwood Springs	Eagle	8	6	6
Eagle	Edwards	8	6	6
Edwards	Minturn	8	6	6
Minturn	Vail Main Entrance	6	5	5
Vail Main Entrance	Copper Mountain	9	7	6
Copper Mountain	Silverthorne	7	5	5
Silverthorne	Empire Junction	8	6	4
Empire Junction	Floyd Hill	9	7	5
Floyd Hill	Evergreen	8	5	4
Evergreen	C-470	8	5	4
Percentage Recreational Vehicles				
Glenwood Springs	Minturn	1	5	4
Minturn	Vail West Entrance	1	4	4
Vail West Entrance	Copper Mountain	3	5	4
Copper Mountain	C-470	4	5	4

1.6 Changes in Travel Patterns

Changes in travel patterns between 2000 and 2025 are described in this section. Current travel patterns cause congestion in portions of the Corridor, and the extensive growth in trips that is projected for the Corridor by 2025 is expected to increase that congestion. This section describes the changes from 2000 travel patterns to the 2025 Baseline projections, based on the I-70 Corridor travel model, which is described in Chapter 2, Description and Comparison of Alternatives, and Appendix C, Description and Assumptions of the Travel Model. The "Baseline" is a projection of what the travel conditions would be like if all of the demand for travel on a peak model day in 2025 were to be satisfied on the existing highway network without any future changes to the capacity of I-70 (except those noted under the No Action alternative).

Congestion in the Corridor is the result of travel patterns that vary by **location** in the Corridor. Contributing to changes in travel patterns are the types of trips **(trip purposes),** the representative **model days** on which trips are taken, and the **person trip volumes**.

1.6.1 Location: Corridor Study Segments and Focal Points

Travel patterns are described in the Corridor within 10 **study segments** to illustrate the projected growth in trips between 2000 and 2025 Baseline projections. The study segments (from west to east) are displayed on a map on Figure 1-3 and include:

1. Glenwood Springs to Eagle County Line
2. Eagle County Line to Edwards
3. Edwards to Vail East Entrance
4. Vail East Entrance to Copper Mountain
5. Copper Mountain to Silverthorne
6. Silverthorne to Loveland Pass interchange
7. Loveland Pass interchange to Downieville
8. Downieville to Hidden Valley
9. Hidden Valley to Beaver Brook
10. Beaver Brook to C-470

Each segment contains one **focal point** where travel patterns were examined in detail. Information derived at these focal points includes existing and projected traffic volumes and LOS. This information was used to assess the travel demand.

1. No Name Tunnels (milepost 118)
2. East of Eagle (milepost 147)
3. Dowd Canyon (milepost 172)
4. Vail Pass (milepost 190)
5. West of Silverthorne (milepost 204)
6. EJMT (milepost 214)
7. East of Empire Junction (milepost 233)
8. Twin Tunnels (milepost 242)
9. Top of Floyd Hill (milepost 246)
10. Genesee (milepost 254)

The discussions that follow address travel patterns within the study segments, sometimes broadly within the segment and sometimes specifically at the focal point.

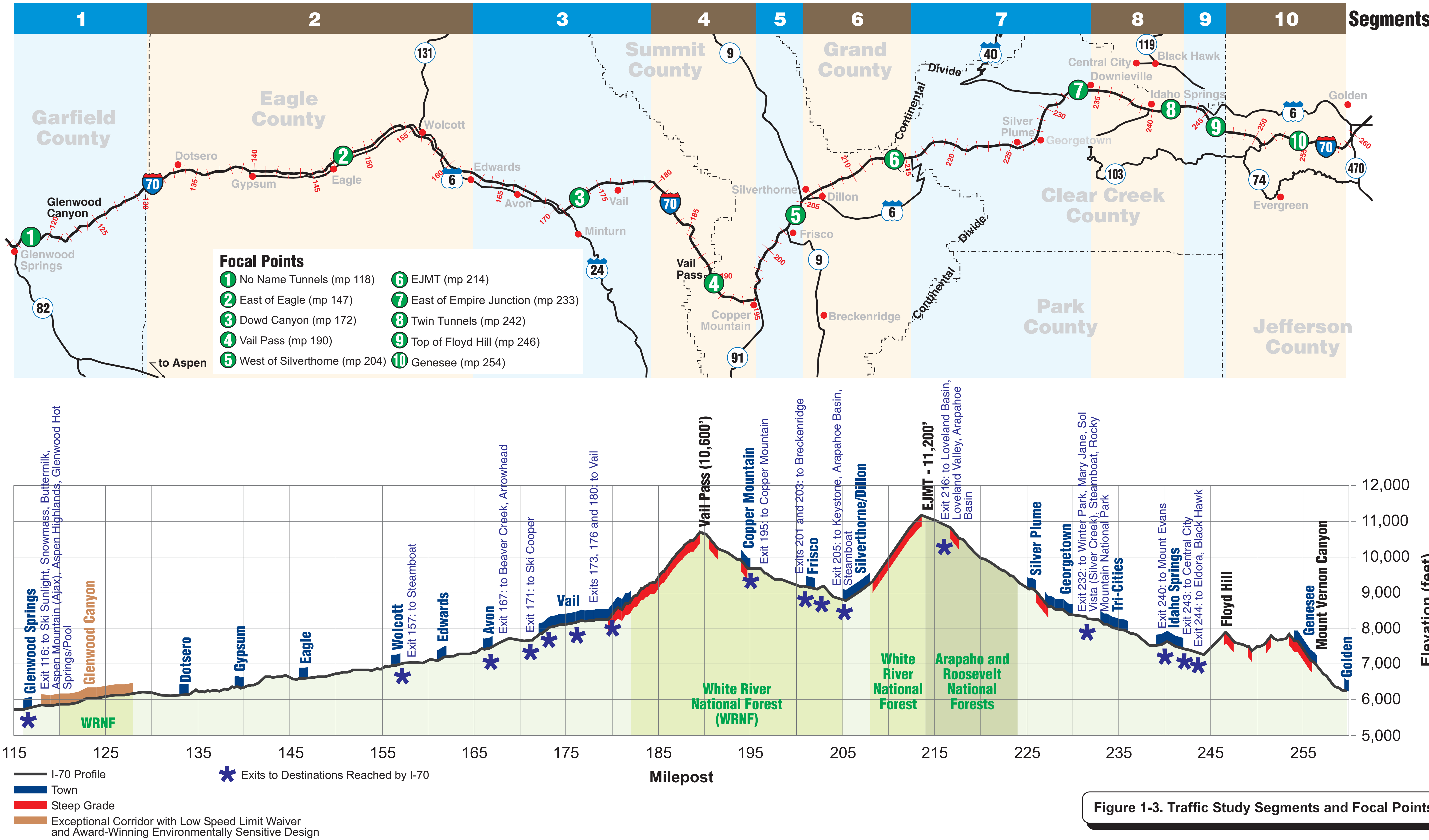


Figure 1-3. Traffic Study Segments and Focal Points

1.6.2 Trip Purposes

People travel for many reasons. Each reason – or trip purpose – has certain characteristics that make it similar to some trips and different from others. Some of these characteristics include the type and location of the origin and destination, the reason for travel, the type of vehicle used, and the average number of passengers per vehicle. Trip purposes were established for the travel model to assign volumes of travel and determine future demand based on the reasons that people travel on the Corridor.

Bar charts showing the number of person trips, by purpose, for six groups of person trip purposes on three representative model days are shown on Figure 1-4 to Figure 1-6. The person trip purpose groups displayed on these charts include:

1. **Truck RV External –** person trips made by trucks, RVs, and other heavy vehicles, plus automobiles from external locations (for example, out of the Corridor area or out of state)
2. **Stay Over and Colorado Non-Work (CNW) –** longer distance and overnight person trips by both Coloradoans and out-of-state air visitors. These travelers may stay overnight at a resort or hotel, a second home in the Corridor area, or the home of a friend or relative. This purpose includes overnight stays in the Corridor area and person trips to the Front Range (the area from Fort Collins through Denver, south to Pueblo) made by Corridor-area residents
3. **Day Recreation –** day person trips by Front Range residents traveling to and from the Corridor area for recreational purposes, and day recreation by Corridor-area residents
4. **Gaming –** person trips destined for gambling locations in Central City or Black Hawk
5. **Local Non-Work –** person trips that include shopping, medical, and social person trips, and the "Non-Home-Based" person trips found in urban travel demand models
6. **Work –** person trips to, from, or within the Corridor area, the Roaring Fork Valley, or the Denver metropolitan area for the purpose of employment

Appendix C, Description and Assumptions of the Travel Model, contains the full list of the 21 purposes that were used to form these groups of trip purposes.

1.6.3 Volumes of Person Trips by Model Day

Certain days in certain seasons were selected for the travel model to represent the travel patterns that are typical of a weekend or weekday in that season. Table 1-4 through Table 1-6 and Figure 1-4 through Figure 1-6, beginning on page 1-10, give a representation of the growth in traffic and changes in trip purposes that occur in the model between 2000 and 2025. Three model days that represent weekday and peak weekend traffic patterns are described in this section: **winter Saturday, summer Thursday,** and **summer Sunday.** Appendix C contains the model forecasts for five days in 2000 (calibration days) for the current scenario and five days in 2025 (forecast days) for the various project alternatives. The additional days include **summer Friday** and **summer Saturday.** These five days can then be extrapolated to an entire year for 2000 or 2025.

Summer Sundays have the greatest overall person trip volumes. Winter Saturday represents the peak during the winter. Summer Thursdays have the lowest overall person trip volumes; yet on the western portion of the Corridor, summer Thursday represents the peak in overall person trip volumes. Person trip volumes may be higher on a few extreme days – primarily the final day of a holiday weekend – or lower on days during the off-season (spring and fall) or hunting seasons. Person trip volumes would be generally lower on the western side of the Corridor, although specific segment-to-segment changes vary. As discussed in this section, improved access to the gaming area (2025 Baseline) is projected to have a profound effect on the composition of person trip purposes of I-70 travelers from Hidden Valley to C-470.

The changes in trip purpose and volume are described in percentages of person trips. A person trip is a trip by one person in any mode of transportation. If more than one person is on the trip, each person is considered to be making one person trip. For example, four persons traveling together in one auto account for four person trips.

1.6.4 Changes in Trip Purposes

Table 1-4 and Figure 1-4 describe and illustrate the person trip distribution for a winter Saturday. Summer Thursday person trips are shown on Table 1-5 and Figure 1-5, and summer Sunday in Table 1-6 and Figure 1-6.

The tables correspond to the charts in the trip purpose figures on their facing pages to summarize and compare existing (represented by the year 2000) and projected 2025 Baseline travel patterns through the Corridor based on model days, relative trip volumes, and trip purposes. Each table shows person trip and vehicle trip ranges, describes the distribution of trip purposes, and highlights some of the changes in trip purposes projected for that model day from 2000 to 2025. (Vehicle trips correspond to the traffic counts that CDOT collects and are used to determine highway capacity. Person trips are a more natural measure of measuring the movement of people, especially when projecting for transit. The highest and lowest volumes of both person trips and vehicle trips on the Corridor are shown on these tables to provide a reference for both types of discussion.)

The charts in each figure on the facing page of each table show the 24-hour travel volume for one of the three representative peak days selected as model days. Each figure shows four bar charts for the same model day, which represent the westbound and eastbound for 2000 and 2025. Within each page, bar charts representing year 2000 travel are always shown on the left side, and westbound travel is consistently shown in the upper bar charts.

The charts show the distribution of person trips from Glenwood Springs (the western terminus) on the left side, to C-470 (the eastern terminus) on the right. The charts for a particular model day are set to have the same vertical scale so that comparisons may be made across travel directions and from 2000 to 2025 person trip volumes.

The need to reduce congestion in the Corridor is illustrated by the trip volumes and purposes shown on these tables and figures. For example, some of the heaviest congestion currently occurs on winter Saturdays, with up to 125,000 trips occurring in both directions in the Beaver Brook to C-470 segment. But the winter Saturday travel volumes that are projected for Baseline 2025 in that area are more than double that amount.

Summer person trips are projected to almost double between 2000 and 2025. Summer Thursdays, which currently have the lowest overall person trip volumes, are projected for 2025 to be within 10,000 person trips of the 2000 *winter Saturday* demand between Downieville and Hidden Valley, which has a high percentage of Local Non-Work trips. Local Non-Work trip percentages on summer Thursdays stay fairly consistent between 2000 and 2025, except in the Eagle County Line to Edwards segment, where the percentage of these person trips doubles. Because these Local Non-Work trips have lower than average vehicle occupancy rates, vehicle trip growth in that segment would be even greater. The trip purpose tables and figures on the following pages clearly demonstrate the need to reduce congestion in the Corridor – and show how much that need is increasing.

Table 1-4. Winter Saturday Changes in Person Trip Purpose and Volume

	2000	2025
Total person trip ranges	21,400 at No Name Tunnels 126,000 at Genesee	60,800 at No Name Tunnels 299,300 at Genesee
Total vehicle trip ranges	11,700 at No Name Tunnels 62,300 at Genesee	29,500 at No Name Tunnels 136,300 at Genesee
Trip purpose: Truck RV External	• Garfield and Eagle counties: 7 to 8 percent (percentage of these travelers is greater in Glenwood Canyon, where overall volumes are lowest) • In the rest of the Corridor: about 3 to 4 percent of person trips	• No Name Tunnels: 5 or 6 percent of person trips. (Percentage projected to decline, but volume projected to roughly double from 2000 to 2025.) • Jefferson County: 2 percent of person trips (However, Jefferson County would have the highest absolute volumes of these person trips Corridor-wide: 3,200 person trips eastbound and 2,900 westbound.)
Trip purpose: Stay Over and Colorado Non-Work	• Edwards to Vail East Entrance: 38 percent (23,900) • West of Silverthorne: 40 to 44 percent of person trips (35,800) • Vail Pass: 61 percent (22,200 person trips) • Clear Creek County: 34 to 36 percent (32,800 to 39,100 person trips) • Jefferson County: 31 percent (39,200 person trips)	• Edwards to Vail East Entrance: 38 percent (45,600 person trips) • West of Silverthorne: 43 percent (52,200) • Vail Pass: highest percentage projected with 61 percent of westbound travelers (23,700) and 56 percent of eastbound travelers (18,900) • Clear Creek County: 37 to 38 percent (second most common trip purpose) (68,800 to 70,700) • Jefferson County: 22 percent (64,500)
Trip purpose: Day Recreation	• Edwards to Vail East Entrance: 30 percent (18,500 person trips) • West of Silverthorne: 34 percent of person trips (28,800) • Clear Creek County: 43 to 47 percent (41,200 to 51,900 person trips) • Jefferson County: 39 percent (48,500 person trips)	• Edwards to Vail East Entrance: just under 30 percent of all person trips (made primarily by Eagle County residents) (33,600) • West of Silverthorne: 31 percent (38,100) • Clear Creek County: 46 to 48 percent (most common trip purpose) (86,300 to 87,900) • Jefferson County: about 25 percent of person trips (74,200)
Trip purpose: Gaming	• **Gaming** trips are about 8 to 10 percent of the person trips from C-470 to Beaver Brook (6,000 person trips each direction), because most year-2000 **Gaming** trips use US 6 and SH 119 to reach Gilpin County gaming destinations from Denver metropolitan area locations • Edwards to Vail East Entrance: 1 percent (300 person trips) • Downieville to Hidden Valley: less than 1 percent (300 westbound person trips and 200 eastbound) • Beaver Brook to C-470: 9 percent (11,400 person trips)	• **Gaming** trips from C-470 to Hidden Valley are projected to reflect the new access from I-70 (Central City Parkway) and the proposed access (Black Hawk Tunnel) to Gilpin County gaming destinations. These **Gaming** person trips would increase volumes in these segments of I-70 to approximately 50,000 person trips for eastbound and 60,000 for westbound travel directions. **Gaming** is projected to increase to 35 to 40 percent of all person trips, representing the primary trip purpose through the C-470 to Beaver Brook.
Trip purpose: Local Non-Work	• Eagle County Line to Edwards: 7 percent (2,600) • Edwards to Vail East Entrance: 17 percent (10,400) • Downieville to Hidden Valley: about 4 percent (2,300 westbound and 2,200 eastbound)	• **Local Non-Work** is projected to extend to all of Eagle County, tripling in some areas to 15 to 20 percent (18,100 to 18,700) • West of Silverthorne: 9 percent (11,100) • Silverthorne to Loveland Pass: 2 percent (2,100)
Trip purpose: Work	• Eagle County Line to Edwards: 9 percent (3,400) • Summit County: about 10 to 12 percent (3,400 to 9,400) • Clear Creek County: 10 percent (8,900 to 10,900) • Jefferson County: 10 percent (12,800)	• Eagle County Line to Edwards: 24 percent of person trips (21,200) • Summit County: 8 to 11 percent of person trips (10,200 to 13,300) • Clear Creek County: 7 to 9 percent of person trips (15,600 to 17,600) • Jefferson County: 7 to 9 percent of person trips (23,900)
Trip purpose overview	• Year 2000 winter Saturday travel conditions reflect the dominance of **Day Recreation** person trips and, to a lesser extent, of **Stay Over and Colorado Non-Work (CNW)** person trips (including person trips to second homes and hotels). Westbound and eastbound are similar in volume and trip purpose. • Eagle County travel is heaviest from Edwards to Vail East Entrance where **Local Non-Work** person trips are substantial, in addition to **Stay Over and Colorado Non-Work** and **Day Recreation** person trips. • **Day Recreation** and **Stay Over and Colorado Non-Work** trips make up 70 percent of winter Saturday person trips in Jefferson County. About 40,000 to 48,000 people travel beyond the Genesee focal point for these trip purposes.	• About 60,000 persons (eastbound and westbound) – triple the year-2000 level – are projected to pass through the No Name Tunnels, representing both commuting person trips between Garfield and Eagle counties and some of the longest recreation person trips in the Corridor. • **Day Recreation** and **Stay Over and Colorado Non-Work** are projected to make up about 45 percent of the person trips between C-470 and Beaver Brook, with **Gaming** trips growing to equal amounts. About 139,000 people would travel beyond the Genesee focal point for these trip purposes. • **Day Recreation** and **Stay Over and Colorado Non-Work** trips are projected to make up 48 percent of winter Saturday person trips in western Jefferson County. • Elsewhere, **Day Recreation** and **Stay Over and Colorado Non-Work** are projected to continue to dominate the trip purposes but at up to twice the 2000 levels.
Conclusions	• The heaviest 2000 westbound travel – 40,000 to 60,000 persons – is projected to take place from C-470 in Jefferson County to Copper Mountain in Summit County. • Overall 2000 person trips are greatest in the Beaver Brook to C-470 segment (approximately 65,000 westbound person trips). Overall existing person trips are lowest in the Glenwood Springs to Eagle County Line segment (just over 10,000 person trips each direction). • Baseline 2025 winter Saturday travel patterns would generally include a doubling of the 2000 person trips (to approximately 143,000 eastbound and 156,000 westbound at the Beaver Brook to C-470 segment). • **Local Non-Work** and **Work** person trips would make up a far greater percentage of Eagle County trips on 2025 winter Saturdays than in 2000 (more than double in some locations) due to projected population and employment growth. Corridor-wide, the highest percentages of person trips made for **Work** and **Local Non-Work** trips would occur in the segment between the Eagle County Line and Edwards, where trips are projected to triple between 2000 and 2025. • By 2025, total person trips between Copper Mountain and Silverthorne are projected to be roughly equal to those between Silverthorne and Loveland Pass. However, more trips between Silverthorne and Loveland Pass would be for **Day Recreation** and fewer for **Local Non-Work,** compared to the Copper Mountain to Silverthorne segment. • Overall volumes from the Eagle County Line west are projected to nearly double from 2000 levels; however, the 2025 levels are below those experienced in 2000 from Copper Mountain east. • The largest percentage gain in trips would be for **Gaming,** which is projected to grow from 12,000 trips in 2000 to 110,000 trips in 2025. • Second to the volumes projected from Hidden Valley east, which are influenced greatly by **Gaming** trips from the Denver metropolitan area, would be travel between Hidden Valley and the EJMT, which would be dominated by **Day Recreation** and **Stay Over and Colorado Non-Work.**	

Winter Saturday Person-Trips by Location and Purpose

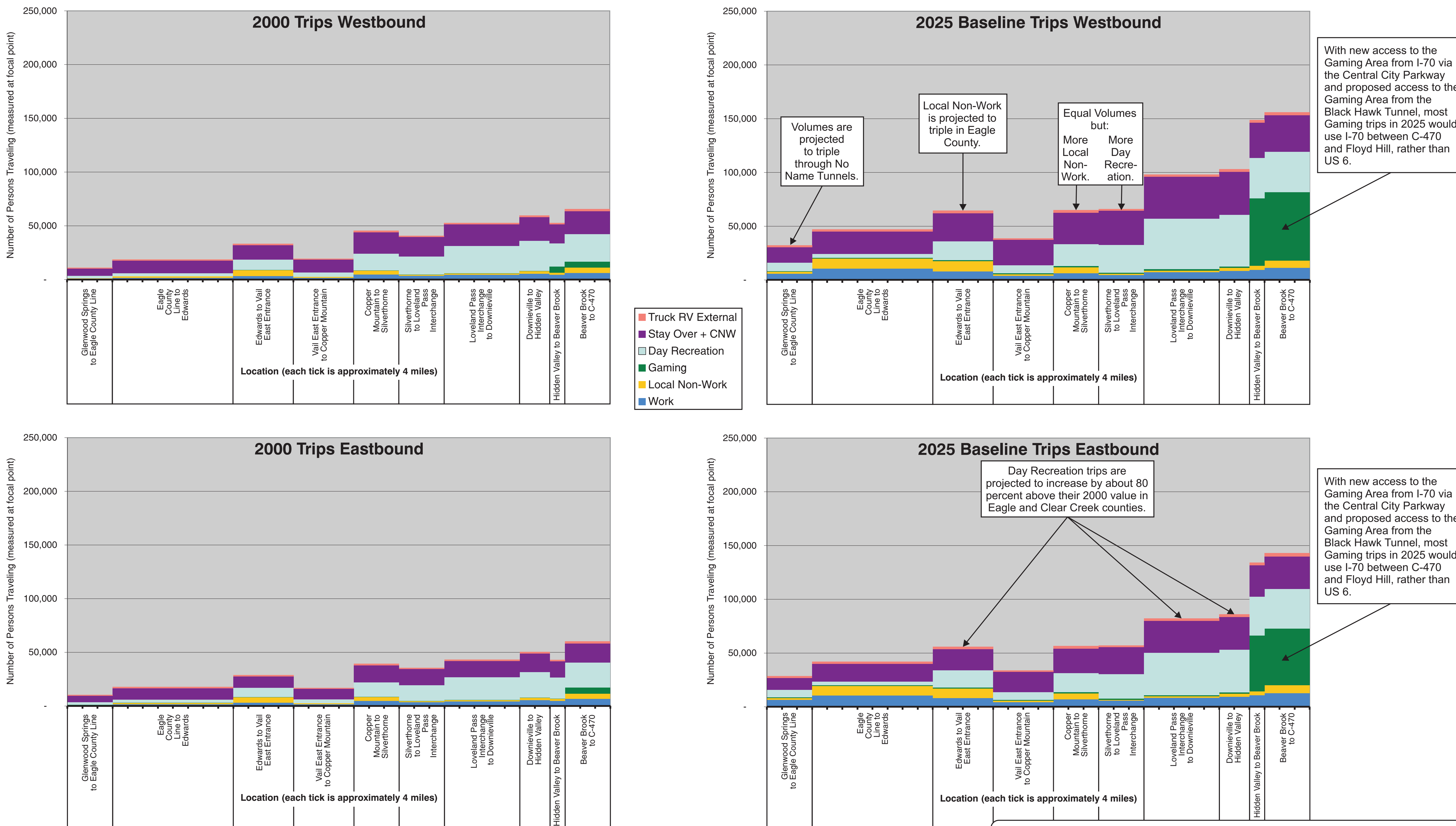


Figure 1-4. Winter Saturday Person-Trips by Location and Purpose

Table 1-5. Summer Thursday Changes in Person Trip Purpose

	2000	2025
Total person trip ranges	38,300 at No Name Tunnels to 105,300 at Genesee	49,400 at No Name Tunnels to 199,800 at Genesee
Total vehicle trip ranges	20,900 at No Name Tunnels to 69,400 at Genesee	32,400 at No Name Tunnels to 124,200 at Genesee
Trip purpose: Truck RV External	• Glenwood Canyon: 12 to 14 percent (5,000) • Edwards to Vail East Entrance: 8 percent (5,800) • Silverthorne to Loveland Pass Interchange: 9 percent (5,200) • Clear Creek County: 9 or 10 percent (6,200 to 6,900) • Jefferson County: 8 percent (smaller percentage, but greatest number of these person trips—8,300 in both directions combined)	• Glenwood Canyon: 12 percent (5,800 – a projected increase of less than 1,000 trips both directions) • Edwards to Vail East Entrance: 8 percent (10,300, a projected increase of approximately 2,000 each way from 2000 travel conditions) • Silverthorne to Loveland Pass Interchange: 9 percent (8,700) • Clear Creek County: 9 percent (9,600 to 10,400) • Jefferson County: 7 percent (13,700)
Trip purpose: Stay Over and Colorado Non-Work	• Glenwood Canyon: approximately 53 percent (20,300 person trips) • East of Eagle: 45 percent (19,700) • Vail Pass: 45 to 50 percent (20,300) • Summit County (West of Silverthorne): 30 percent (12,000 people traveling westbound and 10,000 people eastbound)	• Glenwood Canyon: 43 to 49 percent (22,500) • East of Eagle: 25 percent (24,600) • Vail Pass: 41 percent (30,300) • West of Silverthorne: 25 percent (two-way total of 27,800 person trips)
Trip purpose: Day Recreation	• Overall in Corridor: Less than 10 percent of all person trips • In Corridor west of Copper Mountain: less than 5 percent of all person trips • Beaver Brook to C-470: 6 to 8 percent of total demand (7,200) – greatest number and percentage in the Corridor	• Corridor-wide **Day Recreation** trips are projected to have little change, amounting to 1 percent at No Name Tunnels (300 person trips) to 6 percent at Loveland Pass Interchange to Downieville (6,200) • Genesee: 5 percent (10,800 person trips)
Trip purpose: Gaming	• Beaver Brook to C-470: 11 percent (11,600 person trips)	• Beaver Brook: 24 percent of total trips (41,100) • Genesee: 20 percent (39,400)
Trip purpose: Local Non-Work	• Eagle County Line to Edwards: 19 percent (8,300 person trips) • Edwards to Vail East Entrance: 39 percent (26,800) • Vail Pass: 11 percent (4,900) • West of Silverthorne: about 24 percent (17,500) • Silverthorne to Loveland Pass Interchange: 10 percent (5,500) • Loveland Pass Interchange to Downieville: 12 to 14 percent (8,400) • Jefferson County: 27 percent (28,600)	• Eagle County Line to Edwards: 40 percent (39,700) • Edwards to Vail East Entrance: 36 percent (44,500) • Vail Pass: about 13 percent (9,800) • West of Silverthorne: 24 percent (26,800) • Silverthorne to Loveland Pass Interchange: 10 percent (9,600) • Loveland Pass Interchange to Downieville: 12 percent (12,600) • Jefferson County: 22 percent (44,400)
Trip purpose: Work	• Glenwood Canyon: 22 to 24 percent of all person trips (8,800) • Eagle County Line to Edwards and Edwards to Vail East Entrance: 23 to 25 percent (10,100 to 17,300) • Over Vail Pass (Vail East Entrance to Copper Mountain): 27 to 30 percent (12,200) • Summit County (West of Silverthorne): 31 to 35 percent (24,000) • Loveland Pass Interchange to Downieville: 41 percent (eastbound) (26,700) • C-470 to Beaver Brook: 31 percent (33,100)	• Glenwood Canyon: 28 percent (14,000) • Eagle County Line to Vail East Entrance: 27 to 30 percent (26,700 to 37,500) • Vail East Entrance to Copper Mountain: 33 to 37 percent (24,400) • West of Silverthorne: 36 to 48 percent (42,600) (most common trip purpose) • Loveland Pass Interchange to Downieville: 46 percent (48,700) • Beaver Brook to C-470: 34 percent (67,800)
Trip purpose overview	• Less than 10 percent of all trips are for **Day Recreation.** West of Copper Mountain they account for less than 5 percent of all trips. • On summer Thursday, the greatest number and percentage of **Day Recreation** person trips occur in the Beaver Brook to C-470 study segment. • The highest percentages of **Gaming** trips in the Corridor occur in Jefferson County on weekdays; most **Gaming** trips use US 6 and SH 119 to reach Gilpin County gaming destinations • **Work** trips represent 25 percent of the trips on the west end of the Corridor and 30 to 45 percent of the trips from Vail east. From Copper Mountain to Beaver Brook, **Work** trips dominate.	• Projected summer Thursday travel conditions reflect the dominance of **Work** and **Local Non-Work** trips east of Eagle, and of **Stay Over and Colorado Non-Work** west of Eagle. • **Truck RV External** trips are projected to double throughout the Corridor, with the exception of Glenwood Canyon, where this trip purpose gains by 16 percent. • **Stay Over and Colorado Non-Work** trips are projected to start to increase shares by 2025 from Hidden Valley to Copper Mountain. • Weekday travel for **Day Recreation** is projected to have little change in share by 2025, in contrast to weekend travel, for which **Day Recreation** is the biggest contributor. • The largest projected percentage growth in number of trips is with **Gaming** – growth from 8,000 trips in 2000 to 40,000 trips in 2025. **Gaming** is projected to be barely perceptible west of Beaver Brook. • **Local Non-Work** and **Work** trips are projected to increase 150 percent along the Eagle County Line to Edwards segment due to projected population and employment growth.
Conclusions	• While the percentages of each trip purpose are projected to remain the same between 2000 and 2025, person trip volumes are projected to double from 2000 to 2025 on summer Thursdays, mirroring or exceeding 2000 weekend peak travel conditions. • The total person trip volume at the EJMT (52,000 person trips westbound and 45,000 person trips eastbound) is projected to be about 85 to 90 percent of the person trip volume at West of Silverthorne. The person trip volume over Vail Pass is only two-thirds of that at West of Silverthorne. These results suggest that Summit County would have closer economic ties to the Eastern Slope than it would to Eagle County. • Baseline 2025 summer Thursday person trips are projected to increase to approximately 100,000 person trips each way between Beaver Brook and C-470, about double the 2000 summer Thursday person trip level. • Weekday 2025 person trips (99,600) are projected to be more than double the 2000 winter Saturday volumes (36,400 person trips) between the Eagle County Line and Edwards. Vehicle trip growth would be even greater, because weekday trips are more likely to be lower-occupancy **Work** and **Local Non-Work** person trips. • From Vail East Entrance, the area is projected to become more urbanized west to the Eagle County Line. Urban-type trips (**Local Non-Work**) are projected to be 36 to 40 percent of total trips. • Between Downieville and Hidden Valley, 2025 weekday demand levels (115,300 person trips) are projected to be within 10,000 person trips of the 2000 winter Saturday demand (110,000 person trips). Further, 2025 summer Thursday demand is projected to consist of a much higher proportion of **Work** and **Local Non-Work** trips (60 to 65 percent of person trips) than winter Saturday (about 15 percent). Because these trip purposes have lower average vehicle occupancy rates, greater levels of congestion would be expected on future weekdays. • The relative prevalence of **Local Non-Work** trips and **Stay Over and Colorado Non-Work** trips gives an indication of where Eagle County is expected to be most urbanized. In 2000, west of Vail Pass, **Stay Over and Colorado Non-Work** dominates except between Edwards and Vail. In 2025, **Local Non-Work** is projected to be dominant from the Eagle County Line to Vail. • Weekday travel in 2025 between Hidden Valley and C-470 is projected to be about 50 percent more than the 2000 winter Saturday person trip volumes, primarily due to the growth in **Gaming** trips.	

Summer Thursday Person-Trips by Location and Purpose

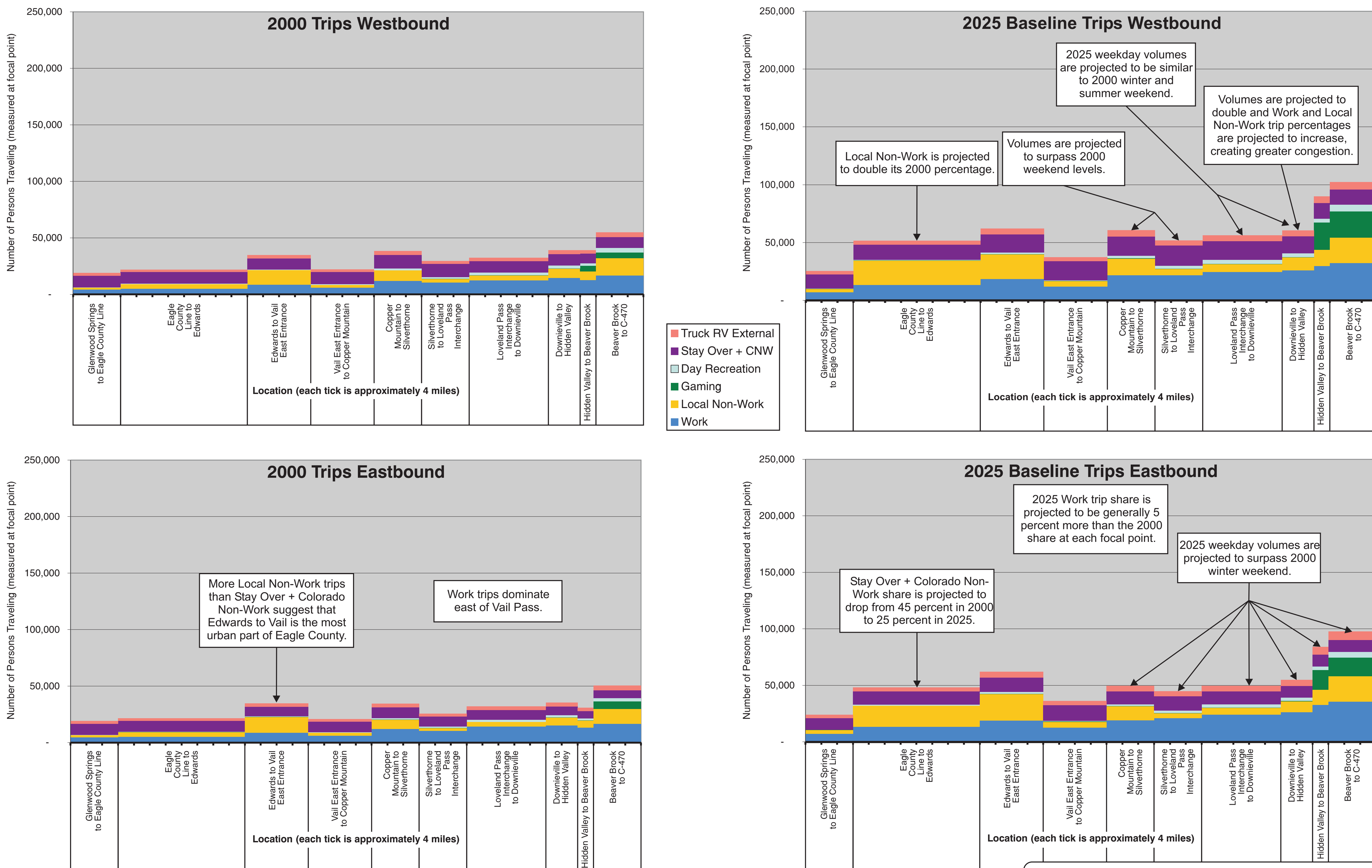


Figure 1-5. Summer Thursday Person-Trips by Location and Purpose

Table 1-6. Summer Sunday Changes in Trip Purpose

	2000	2025
Total person trip ranges	44,500 at No Name Tunnels to 175,300 at Genesee	88,300 at No Name Tunnels to 358,700 at Genesee
Total vehicle trip ranges	24,300 at No Name Tunnels to 83,100 at Genesee	40,000 at No Name Tunnels to 151,300 at Genesee
Trip purpose: Truck RV External	• **Truck RV External** generally ranges from 2 to 4 percent of all person trips, with the exception of Eagle and Garfield counties where the range is 5 to 6 percent.	• **Truck RV External** is projected to be the second most common trip purpose in Glenwood Canyon, but percentages throughout the Corridor projected to account for less than 5 percent of all trips.
Trip purpose: Stay Over and Colorado Non-Work	• Glenwood Springs to Eagle County Line: 86 to 91 percent (21,500 person trips eastbound and 18,000 westbound) • West from Copper Mountain, **Stay Over and Colorado Non-Work** person trips are 73 to 85 percent of person trips (51,900 to 59,600) • West of Silverthorne: more than 72 percent (76,900) • EJMT: 74 percent (78,600 person trips) • Clear Creek County: 66 to 68 percent (89,000 to 95,000) • Genesee: Approximately 50 percent each direction (about 48,000 person trips eastbound and 35,000 westbound)	• Glenwood Springs to Eagle County Line: eastbound 90 percent (45,300); westbound 83 percent (31,600) (77,000 both directions) • Eagle County Line to Edwards: 72 to 83 percent (93,300) • Dowd Canyon: 67 to 83 percent (99,600) • Vail Pass: 87 percent (106,800) • West of Silverthorne: 70 to 78 percent (122,400) • Clear Creek County: approximately 75 percent eastbound (90,000) and 65 percent westbound (57,000) (147,000 both directions) • Genesee: 41 percent (148,500) Eastbound **Stay Over and Colorado Non-Work** person trips (99,100) outnumber the total of eastbound **Gaming** (37,800) and **Day Recreation** (58,400) person trips.
Trip purpose: Day Recreation	• **Day Recreation** person trips drop off significantly west from Copper Mountain, from about 20 percent of person trips in Summit County (20,200) to 10 percent between Copper Mountain and Edwards (4,300 to 7,500), 5 percent between Edwards and the Eagle County Line (2,700), and 2 or 3 percent in Glenwood Canyon (1,100)	• Eagle County Line to Edwards: 5 to 7 percent (6,800) • Dowd Canyon: 10 percent (12,900) • Vail Pass: 4 to 5 percent of person trips (5,800) • West of Silverthorne: 15 percent (23,700)
Trip purpose: Gaming	• Jefferson County: 8 percent of all person trips (8,300 person trips eastbound and 5,400 person trips westbound)	• **Gaming** trips from C-470 to Hidden Valley are projected to reflect the new access from I-70 (Central City Parkway) and the proposed access (Black Hawk Tunnel) to Gilpin County gaming destinations. These **Gaming** person trips would increase volumes in these segments of I-70 to approximately 57,000 person trips westbound (about 38 percent) and 38,000 person trips eastbound (18 percent) • Between C-470 and Beaver Brook, westbound **Gaming** volumes are projected to be greater than **Day Recreation** (30,000 person trips westbound, 21 percent) and **Stay Over and Colorado Non-Work** (50,000 person trips westbound, 33 percent)
Trip purpose: Local Non-Work	• Edwards to Vail East Entrance: 10 percent (8,100) (**Local Non-Work** person trips exceed **Day Recreation** person trips in both directions of the study segment: just over 3,500 person trips to just under 3,500 person trips eastbound, and 4,600 person trips versus 4,000 person trips westbound) • Summit County: less than 5 percent (3,800) • Jefferson County: 3 to 5 percent (2,200 to 7,000)	• Eagle County Line to Edwards: 6 to 10 percent (9,000) • Edwards to Vail East Entrance: 7 to 11 percent (11,700) • Summit County: 4 percent (6,100) • At the EJMT and at East of Empire Junction: 1 percent (1,100 to 1,900 person trips) • Genesee: 3 percent (about 6,100 people westbound and 5,600 eastbound)
Trip purpose: Work	• No Name Tunnels: 2 percent (800 person trips) • East of Eagle: 2 percent (1,300 person trips) • Edwards to Vail East Entrance: 3 percent (2,800 person trips, including 1,600 westbound and 1,200 eastbound) • Vail Pass: 2 percent (1,200 person trips) • Summit County: 2 percent (2,700 person trips) • Genesee: 2 percent (3,700 person trips)	• Eagle County Line to Edwards: 5 percent (5,400) • Dowd Canyon: 3 to 5 percent (5,200) • Jefferson County: no more than 3 percent of person trips (4,300 person trips eastbound and 4,000 westbound)
Trip purpose overview	• Year 2000 summer Sunday travel conditions shown in Figure 1-6 reflect the dominance of recreational travel in **Stay Over and Colorado Non-Work** person trips and **Day Recreation** person trips. • Eastbound demand for all purposes combined is greatest from C-470 to Beaver Brook, with more than 100,000 person trips, about 20 percent more than the eastbound person trips east of Empire Junction. • In general, on summer Sunday, higher volumes travel eastbound than westbound because travelers are returning to the Denver metropolitan area (and other eastern residences) from Corridor-area vacation and recreational activities. However, westbound **Truck RV External** traffic is slightly higher than eastbound traffic for the same purpose, throughout the Corridor (although this is one of the smallest trip purposes on a summer Sunday). • As with other model days, the amount of person trip-making generally decreases further west in the Corridor, with the exception of the Edwards to Vail East Entrance area. • The eastbound person trip volume at the EJMT is about 3,000 person trips more than at West of Silverthorne. • Eastbound person trips decrease from 88,000 at the Twin Tunnels to 78,000 person trips ascending Floyd Hill; many travelers exit to take US 6 through Clear Creek Canyon to Golden. • Overall westbound travel during the year 2000 is lowest in the Glenwood Springs to Eagle County Line segment (approximately 20,000 person trips). This demand is about 80 percent of the westbound person trips west of Copper Mountain, in the second-least traveled study segment. • Overall westbound travel during the year 2000 is greatest in the Beaver Brook to C-470 segment (approximately 75,000 person trips, or 50 percent more than the person trip volume between Downieville and Hidden Valley).	• The total eastbound (peak-direction) demand is projected to be fairly constant between the Eagle County Line and Copper Mountain: 70,900 trips. • The volume of person trips in each direction at the EJMT is projected to be 200 people fewer than the corresponding number of person trips at West of Silverthorne, due to local Summit County trips. This small amount highlights the prevalence of long-distance travel **(Stay Over and Colorado Non-Work)** on summer Sundays. • Baseline 2025 summer Sunday travel patterns would generally include double the person trip volumes of 2000 person trips in the Beaver Brook to C-470 study segment (approximately 200,000 person trips eastbound and 150,000 westbound). • Baseline summer Sunday volumes are not projected to exceed those of winter Saturday for the westbound C-470 to Beaver Brook segment.
Conclusions	• Generally, 2025 Baseline summer Sunday volumes are projected to exceed those of 2025 winter Saturday at almost all focal points. (However, peak *hourly* winter Saturday volumes, which are not shown on Figure 1-6, may exceed those of summer weekends, because winter volumes peak very quickly. In contrast, summer weekends tend to have several consecutive hours of similarly heavy travel demand.) • **Local Non-Work** and **Work** trips would make up a greater percentage of Eagle County (especially the Eagle County Line to Edwards segment) person trips on 2025 summer Sundays due to projected population and employment growth. • Recreational travel is projected to dominate throughout the Corridor, primarily due to travelers staying overnight and returning to the Denver metropolitan area on Sunday. • Whereas travel peaked between Edwards and Vail East Entrance in 2000, travel by 2025 is projected to be fairly constant for a greater distance for all of Eagle County.	

Summer Sunday Person-Trips by Location and Purpose

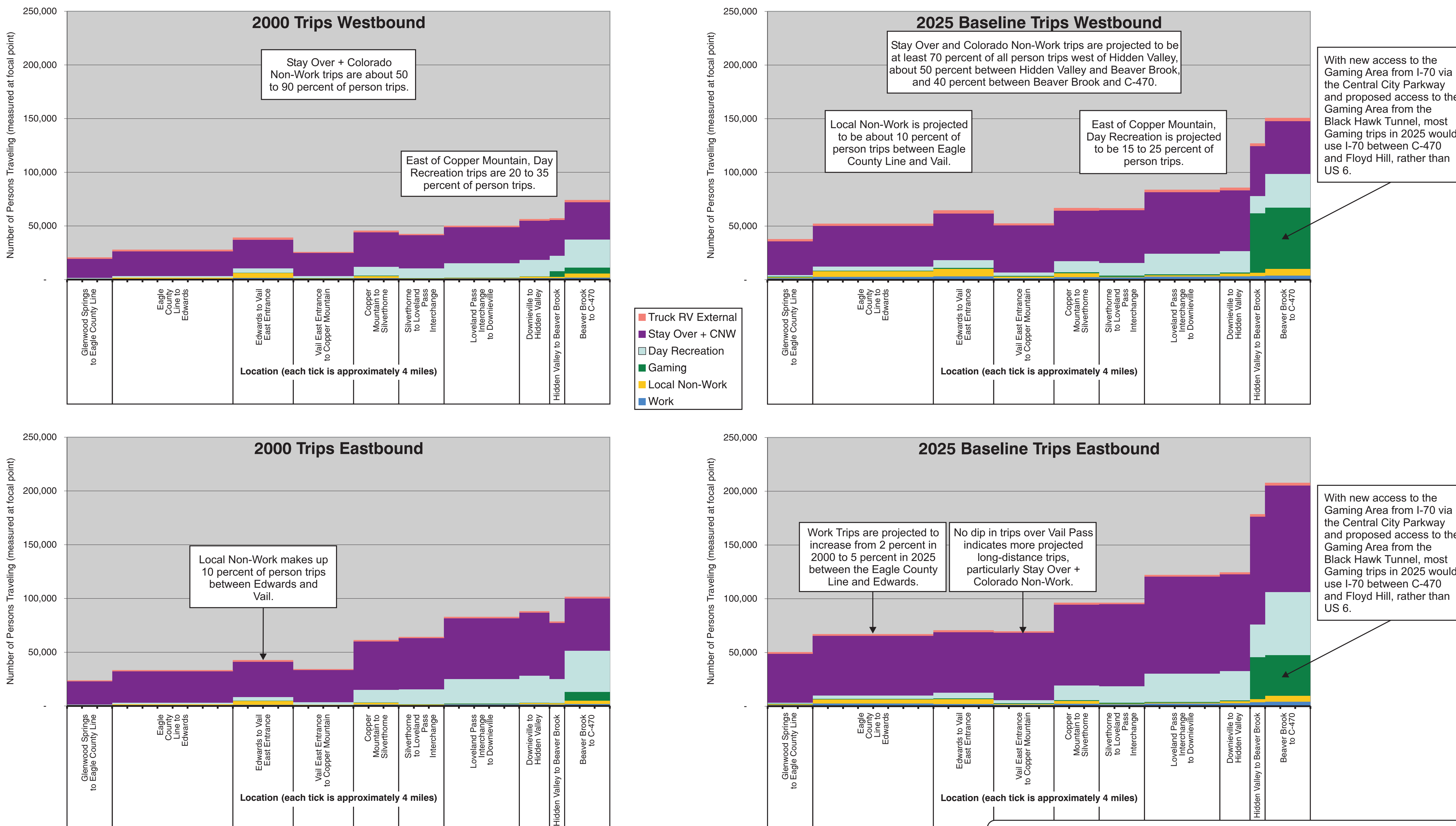


Figure 1-6. Summer Sunday Person-Trips by Location and Purpose

1.7 Corridor Travel Demand by Study Segment

Not surprisingly, a wide variety of travel patterns can be observed within the 144-mile section of I-70 under study. Some portions are dominated by long-distance trips, while others are primarily commuting trips. Recreational trips for both outdoor attractions and indoor casinos compose a large portion of travel in other locations on certain days.

To develop a more coherent and complete discussion of travel patterns, the PEIS study area was divided into 10 segments. These segments, shown on Figure 1-3, were chosen so that each segment represents a particular pattern of trips – when these trips occur and for what purposes. Segments were also chosen to reflect similar land uses along I-70 and to have natural breakpoints in congestion.

For example, over the course of a year, travelers crossing Vail Pass – the study segment between Vail East Entrance and Copper Mountain – are making primarily long-distance trips, for day and overnight recreation, and freight movement purposes. (Annually, 13 percent of the vehicles crossing Vail Pass are trucks.) In contrast, between Copper Mountain and Silverthorne, a greater percentage of annual trips are made for local commuting and shopping within Summit County.

Travel patterns on the Corridor also vary throughout the week and throughout the year. On the eastern end of the Corridor, weekend travel routinely exceeds weekday travel during the tourism and recreational seasons of summer and winter. On the western end, commuters cause weekday travel to exceed weekend travel. Summer and winter travel patterns vary.

Each segment contains one **focal point** where travel demand and capacity are examined in detail. For each focal point, three or four typical days were studied, including a weekday and a weekend in both winter and summer. In the western part of the Corridor, a Friday was also examined because the combination of weekday commuting and weekend recreation travel often results in Fridays having greater traffic volumes than Thursdays, the typical weekday in this study.

Levels of Service (LOS) are described in terms of:

- Speed
- Travel time
- Freedom to maneuver
- Traffic interruptions
- Comfort and convenience

The six levels of service are designated by the letters **A** through **F,** with A representing the best operating conditions (light, free-flow traffic) and F the worst (stop-and-go traffic). Each level represents a range of operating conditions.

The lower boundary of LOS E (between LOS E and LOS F) is considered to be operating **at capacity,** at which point the traffic stream cannot dissipate any traffic disruptions, such as stalled vehicles or crashes.

The winter season is represented by February, while August travel volumes are typical of the whole summer. Thursday count and model data are used to study weekday travel patterns; although Mondays and Fridays may have higher volumes, their demand patterns mix typical weekday trips (such as commuting to work) with typical weekend trips (such as traveling between a primary residence and a second home in the Corridor area). Because most weekday trips are not discretionary, weekday travel patterns in the summer and winter are similar. Therefore, only the summer weekday is presented. Generally, summer weekdays have somewhat higher volumes than in winter.

Moving east from the western Corridor terminus, this section discusses the Corridor one segment at a time, with highway **capacity** and **level of service (LOS)** shown for both 2000 and 2025 for each segment. Levels of service are measurements that characterize the quality of operational conditions within a traffic stream and their perception by motorists and passengers.

The 2025 Baseline LOS projects what the travel conditions would be like ***if*** all of the demand for travel on a peak model day in 2025 were to be satisfied on the existing and planned (No Action) highway network. Chapter 2, Description and Comparison of Alternatives, provides a definition of Baseline and describes the No Action alternative.

This section examines the important question of whether the existing transportation system in the Corridor can accommodate the expected growth in development, population, employment, and recreation. It examines this question one study segment at a time in a consistent format. For each segment, the information provided is organized as follows:

- Length and termini of the study segment
- Corridor towns, highway linkages (major interchanges), and landmarks
- A map of the segment, including areas of concern
- Photographs of the segment
- A discussion of current roadway deficiencies, such as curves, grades, safety concerns, or capacity bottlenecks
- Results of the analysis of the traffic counts
- Results of computer modeling for 2025 Baseline demand

Table 1-9 through Table 1-37 report the weekend daily volume as the highest of either the Saturday or Sunday peak model day for that season. The highest hourly volume during the 48-hour weekend period is shown for the peak hour. In some cases, the highest daily volume occurs on one day and the highest hourly volume on a different day.

Modeling future travel demand is based on estimated levels of population and employment growth and projections of Corridor uses by 2025. The details of the travel model are given in Appendix C, Description and Assumptions of the Travel Model, and generally included the following:

- Existing and projected highway system and transit system networks
- Land use zoning and master plans from each county and local government and federal lands
- Trip generation rates derived from the I-70 User Study and other sources
- Trip distribution factors
- Mode choice factors
- Seasonal controls
- Day of week factors
- Time of day factors
- Highway operation and delay procedures
- Transit route choice factors

To assist in the determination of future demand and future need for mobility, the Baseline condition represents the magnitude of the projected need for travel based on the factors outlined above. The travel demand for the Baseline condition is not the same as for the No Action alternative. The Baseline traffic condition is based on the existing transportation network and the travel demands resulting from the recreation, population, and employment forecasts. The No Action differences are explained in Chapter 2, Description and Comparison of Alternatives.

Recreation forecast. Recreation trips into, out of, and within the Corridor area are forecast directly and are based on industry marketing surveys, then compared on an order-of-magnitude basis with other data, such as hotel beds by town or second homes by town. Because of the proprietary nature of some of these data, it is difficult to determine the absolute number of trips for different types of recreation. However, forecast volumes for each recreational category were discussed with local tourism bureaus, the Forest Service, and others to determine the reasonableness of each estimate.

Population and employment forecast. The 2025 Baseline population and employment forecast was developed from socioeconomic data projected by the Colorado Department of Local Affairs (DOLA) and the counties, and assumes that future Corridor transportation capacity will not limit development between 2000 and 2025. That is, the 2025 Baseline population and employment forecast represents the anticipated levels of growth, from which different transportation alternatives may be tested. Because the 2025 Baseline population and employment forecast was developed without regard to the transportation network, the 2025 Baseline condition (travel performance) does not represent an equilibrium that may be observed in the future, but only a theoretical basis for comparison. The true future traffic equilibrium will depend on the selected alternative. Some alternatives may have inadequate infrastructure to support the Baseline demands, and thus result in trip suppression, while other alternatives may have adequate or extra capacity and result in better traffic conditions than in 2000. (Chapter 2, Description and Comparison of Alternatives, provides comparisons of the alternatives; however, some context of this comparison is helpful for understanding what the 2025 Baseline demand and travel performance condition represents.)

Furthermore, it is not reasonable to expect the Baseline population, employment, and recreation use forecasts to be realized if severe congestion is experienced on I-70 or if the congestion is greatly reduced due to the implementation of high-capacity alternatives. That is, congestion may cause people to make fewer trips or not to live or work in the Corridor area. Conversely, congestion relief may allow Corridor users to make more trips or encourage more people to relocate to the Corridor area. Note that the comparisons of alternative performance in Chapter 2 reflect suppressed or induced travel, as appropriate for each alternative, including the No Action alternative. The concepts of suppressed and induced travel are explored further in Appendix C, Description of the Travel Model.

The Baseline travel demand need not equal that of the No Action alternative. Because no improvement would be made to the transportation network under the No Action and Minimal Action alternatives, these alternatives would represent a suppression of demand if the Baseline demand would result in intolerable levels of congestion. All other alternatives (the action alternatives) have been sized to address the future Baseline demand. All alternatives are examined in Chapter 2. All of the following discussion in Chapter 1 concerns the 2025 Baseline travel demand based on the future demand expected in 2025 by Corridor community governments and the state demographer, and the expected demand from Front Range travelers.

1.7.1 Data Sources for Current Congestion

Calibrating a travel model requires specific information on current traffic patterns. This PEIS uses several types of traffic counts:

- Mainline traffic counts
- Selected interchange ramp counts based on known volume patterns
- Crossing road counts at interchanges
- Interchange turning movement counts
- Vehicle classification counts

Table 1-7 indicates the locations of the different types of counts that were performed. The results of the traffic counts are discussed in Appendix C.

Table 1-7. Location of Traffic Counts

Type	Location
Mainline traffic counts (hourly)	East of Glenwood Springs (No Name Creek) Eagle to Wolcott (east of Eagle) West of Vail West Entrance (Dowd Canyon) West of CO 91 (Copper Mountain, east of Vail Pass) EJMT East of Idaho Springs (near the Twin Tunnels) East of Genesee Mountain
Interchange ramp counts (hourly)	On- and off-ramps of 39 interchanges between mileposts 133 and 259
Crossing road counts at interchanges (hourly)	Locations near 22 interchanges in winter and 13 interchanges in summer
Interchange turning movement counts (hourly)	18 interchanges on the Corridor
Vehicle classification counts	Dowd Canyon

1.7.2 Safety Issues

Safety issues in the roadway were determined by measuring the **weighted hazard index (WHI).** The WHI compares the weighted accident rate, measured as follows: comparing **weighted accidents** at a location (higher weight given to a higher severity accident) per **million vehicle miles of travel** to the statewide average weighted accident rate for similar roadways, and determining whether the observed rate is higher than the statewide average. If a WHI is greater than zero, it signifies that the location in question has a higher weighted accident rate than the statewide average and is, therefore, a potentially problematic area in terms of either the number of accidents observed or their severity.

1.7.3 Corridor Capacity

The travel model also considers any constraints to the current capacity of I-70 due to steep and twisting mountain grades (for example, extended grades of up to 7 percent at Vail Pass, on the west side of the EJMT, and at Mount Vernon Canyon in Jefferson County) and by slow-moving vehicles. Note that heavy vehicles use a considerable portion of the ideal roadway capacity both on up grades where engine power to haul heavy loads is limited, and on longer down grades where low gears must be used to regulate speed through engine break, and thus maintain control of the vehicle.

Calculating Capacity

Capacity is calculated using various factors, including:

- Lane width
- Shoulder width
- Number of lanes
- Geometric constraints
- Drivers' familiarity
- Percentage of slow-moving vehicles
- Weather

The combined effects of these steep mountain passes, sharp curves, and slow-moving vehicles are key factors that limit the capacity of the Corridor. Additional factors affecting capacity include winter driving conditions, lack of familiarity of some travelers with the mountain conditions, inadequate capacity at certain interchanges, and the cross-sectional dimensions of the roadway.

Capacity analysis provides a means of estimating the maximum amount of traffic that can be accommodated by the roadway while maintaining its prescribed operational qualities. It includes a set of procedures for estimating the traffic-carrying ability of the highway over the range of LOS.

1.7.4 Corridor Segment Descriptions, Existing and Projected Baseline Travel Demand

The following sections profile each Corridor segment, including physical descriptions, maps, photographs, details of roadway deficiencies including capacity and safety issues, and existing and Baseline travel demand for the segment. Note that the Baseline scenario does not assume any new Corridor-wide transit systems. The segment focal point descriptions provide an overview of the roadway segment, current and 2025 level of service, Baseline annual peak hours of congestion, and Baseline peak hour travel time. Current and future mainline capacity constraints are also described including average daily traffic, peak hour volume, peak hour LOS hours of congestion, and the hourly capacity at LOS E. This information is provided for 2000 and 2025.

1.7.4.1 Segment 1, Glenwood Springs to Eagle County Line

Segment Description

Study Segment 1 (mileposts 116 to 130) is located within Garfield County and extends a total of 13.9 miles between the town of Glenwood Springs and the Garfield/Eagle County line (See Figure 1-7). At Glenwood Springs, SH 82 leads south from I-70 to Pitkin County, the town of Aspen, and the surrounding ski areas.

This segment is dominated for much of its distance by the narrow Glenwood Canyon, which is approximately 12 miles long. I-70 is two lanes in each direction throughout this segment and parallels the Colorado River.

Within Glenwood Canyon, a series of exits provide recreational access and rest area facilities before entering twin bores of the 3,900-foot Hanging Lake Tunnels. The Hanging Lake Tunnels allow I-70 not to impact the scenery in this area popular among hikers. About 2 miles to the east, the westbound (upper terrace) lanes of I-70 go through the short Reverse Curve Tunnel through a rock outcropping (see Figure 1-8). Bair Ranch (milepost 129) is the last exit and rest area before the canyon widens and the speed limit increases from 50 mph to 75 mph at the start of the next study segment.

Figure 1-7. Glenwood to Eagle County Line Study Segment

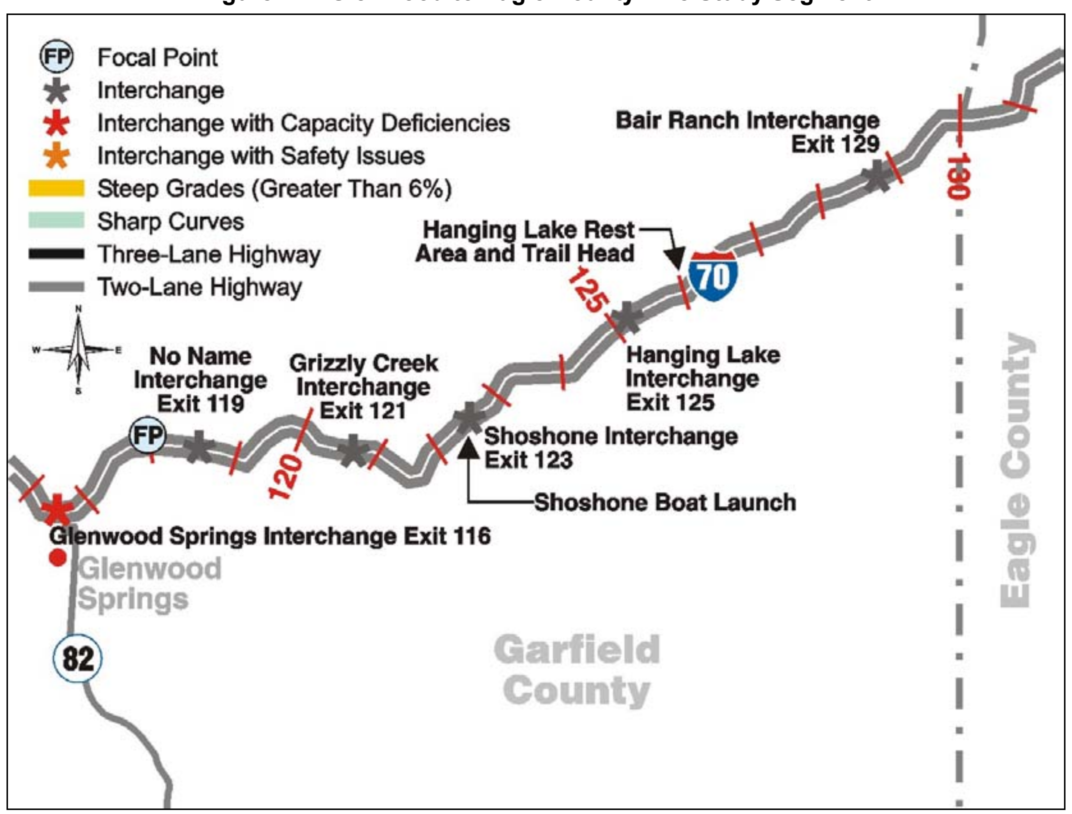
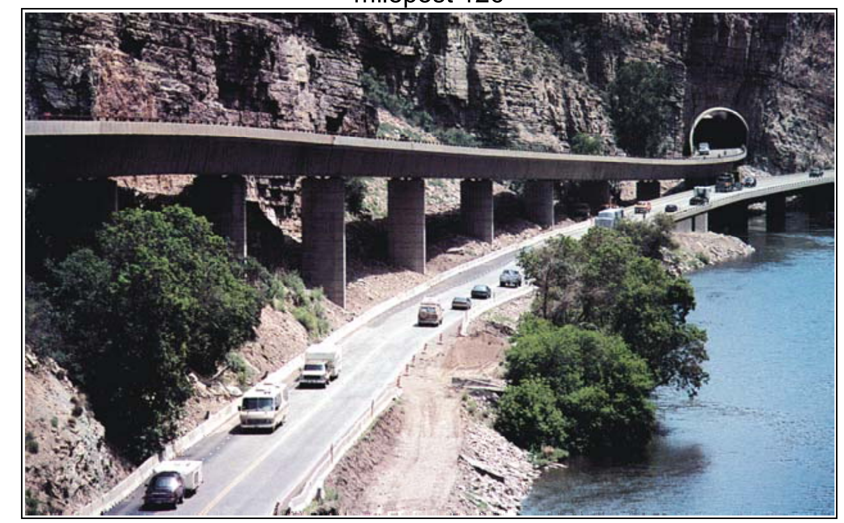


Figure 1-8. Representative Photograph of the Glenwood Springs to Eagle County Line Study Segment

View East of Reverse Curve Tunnel
milepost 126



Roadway Deficiencies

While this segment was analyzed for potential roadway and interchange deficiencies, it was determined that this segment does not include steep grades (over 6 percent), sharp curves, or lane drops. The Glenwood Springs interchange (milepost 116), however, has inadequate ramp geometry, and off-ramp traffic currently backs up onto I-70. As shown in Table 1-8, the Glenwood Springs interchange is not considered to have safety issues.

Table 1-8. Roadway Deficiencies and Safety Assessment, Glenwood Springs to Eagle County Line

Location	Milepost	Deficiencies	Length (Miles)	Safety Issues (Measured by WHI[1])
Glenwood Springs interchange	116	Capacity: inadequate ramp geometry	N/A	-0.6

[1] *WHI = weighted hazard index. Positive WHI values indicate an above average accident rate. See Glossary.*

Segment Focal Point: No Name Tunnels (Milepost 118)

Because this segment has few deficiencies and I-70 has been relatively recently reconstructed within Glenwood Canyon, few changes are considered necessary. Because this segment lacks a natural bottleneck, the No Name Tunnels location, which is the location of an automatic traffic recorder (ATR), was selected as the focal point of this segment. Information derived at this focal point included existing and projected traffic volumes and LOS. This information was used to assess the travel demand and eventually to compare the alternatives in response to this study segment. While peak-hour LOS at the focal point (No Name Tunnels) is B, occasional local congestion does occur during the summer on I-70 about 4 miles east of the focal point. This congestion is due to heavy recreation use at the Hanging Lake rest area and trailhead as well as at the Shoshone boat launch. The USFS currently employs two to three full-time employees in the summer to keep traffic flowing at Shoshone. A bus system has been suggested from Glenwood Springs to Hanging Lake on key summer weekends to keep people from parking on the interstate shoulders.

Existing LOS. Traffic in the canyon currently flows at LOS A during winter weekends in either direction, and eastbound during weekdays. During a few hours of Fridays and summer weekends, LOS B is observed in both directions. LOS B also occurs westbound on weekdays.

2025 Baseline LOS. In the future, LOS D or better is expected on weekends, and LOS B or C is expected on weekdays. Due to rigorous planning and design to maintain/enhance natural environment, this is regarded as the ultimate roadway capacity the canyon would offer. In the Baseline scenario, this segment would have no peak-day hours of congestion in 2025.

Table 1-9. 2000 Capacity and Travel Performance, Glenwood Springs to Eagle County Line[1]

Direction and Time		Average Daily Traffic (ADT)	Peak-Hour Volume (PHV)	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	10,500	790	A	0	3,290
	Friday	11,900	880	B	0	3,290
	Winter Weekend	5,700	450	A	0	2,950
	Summer Weekend	13,000	1,040	B	0	2,970
Westbound	Weekday	10,400	880	B	0	3,180
	Friday	12,500	1,040	B	0	3,180
	Winter Weekend	6,000	550	A	0	2,950
	Summer Weekend	11,300	980	B	0	2,890

Focal point: No Name Tunnels (milepost 118)

[1]See section 2.3 for discussions related to capacity and travel performance factors provided on this table.

Table 1-10. 2025 Baseline Capacity and Travel Performance, Glenwood Springs to Eagle County Line[1]

Direction and Time		Average Daily Traffic (ADT)	Percent Increase in ADT from 2000	Peak-Hour Volume (PHV)	Percent Increase in PHV from 2000	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	15,700	49	1,170	57	B	0	3,290
	Friday	19,900	67	1,692	111	C	0	3,290
	Winter Weekend	13,800	143	1,450	226	C	0	2,950
	Summer Weekend	22,800	76	2,080	100	D	0	2,980
Westbound	Weekday	16,700	61	1,340	57	C	0	3,180
	Friday	22,800	82	1,850	88	C	0	3,180
	Winter Weekend	15,700	162	1,823	224	D	0	2,950
	Summer Weekend	18,800	66	1,680	72	C	0	2,890

Focal point: No Name Tunnels (milepost 118)

[1]See section 2.3 for discussions related to capacity and travel performance factors provided on this table.

Baseline annual hours of congestion (out of a possible 17,520 hours per year for both directions or 8,760 daytime hours)**:** none

Baseline Peak-Hour Travel Times

Baseline peak-hour travel times for the 13.9 miles of Segment 1, Glenwood Springs to Eagle County Line, are projected to be **15** minutes at **57** mph in either direction, which are also the free-flow time and speed.

Mainline Capacity Constraints Beyond 2025

Assuming the growth rate in traffic between 2000 and the 2025 Baseline condition continues indefinitely, demand in Glenwood Canyon would first exceed the available westbound capacity on a 2035 winter weekend. (Note that this level of demand would correspond to 1 hour of LOS F on a winter Saturday, or under 50 hours of congestion annually.) Eastbound, demand would first begin to exceed capacity on both winter and summer weekends around 2040.

1.7.4.2 Segment 2, Eagle County Line to Edwards

Segment Description

Study segment 2 (mileposts 130 to 163) is located within Eagle County and extends a total of 32.5 miles between the Garfield/Eagle County border and the Edwards interchange (see Figure 1-9). In this segment, the posted speed limit increases from Glenwood Canyon's 50 mph limit to 75 mph east of the Eagle County line. This segment of I-70 passes through the towns of Dotsero, Gypsum, Eagle, Wolcott, and Edwards. At Wolcott, SH 131 begins at I-70 and leads north to Routt County.

The western portion of this segment is characterized by the broad Eagle River Valley. East of Eagle I-70 traverses the more confined Red Canyon. The Red Canyon area includes a sharp curve west of Wolcott, locally known as the Wolcott curve.

West of Gypsum, the environment traversed by the Corridor is rural in character, while portions of the Corridor area between Gypsum and Eagle are more urban in character with more development and larger populations. Between Eagle and Edwards, the Corridor environment is also rural in character.

Figure 1-9. Eagle County Line to Edwards Study Segment

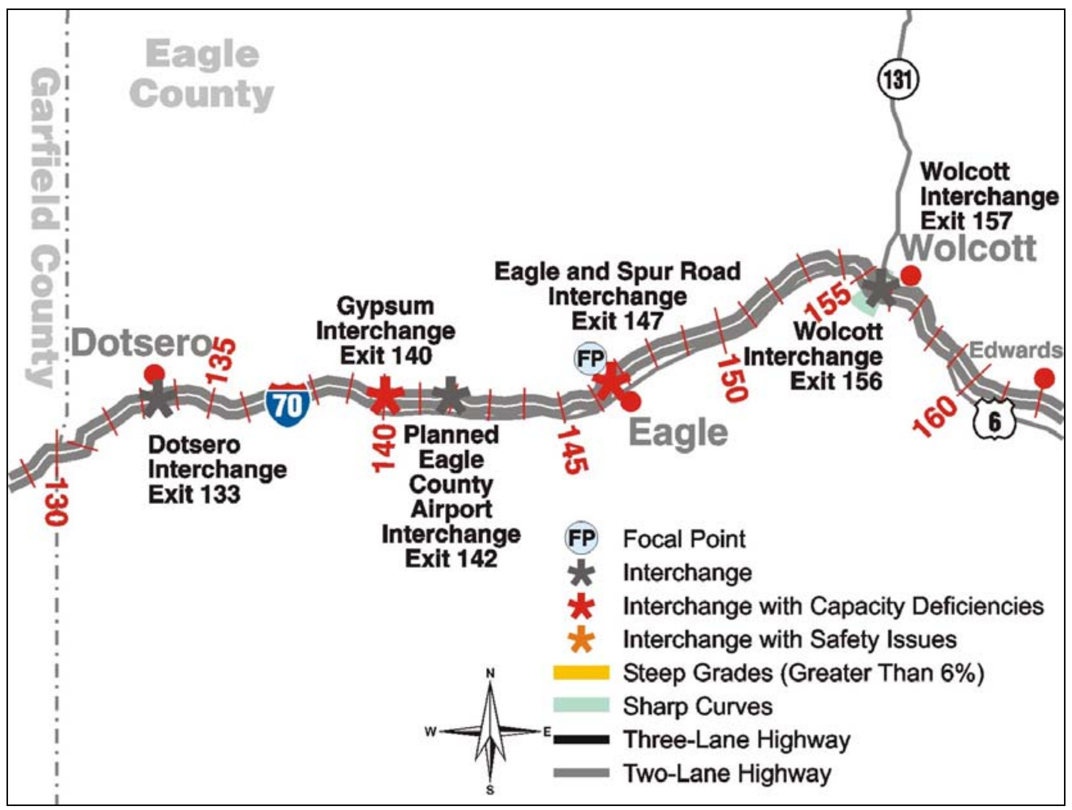


Figure 1-10. Representative Photographs of the Eagle County Line to Edwards Study Segment

Roadway Deficiencies

Sharp Curves. In this study segment, several sharp curves are present on either side of Wolcott. The curves east of Wolcott are signed with a 70 mph advisory speed. West of Wolcott, the sharpest curve has an advisory speed of 65 mph eastbound and 60 mph westbound. This Wolcott curve has the lowest capacity between the Eagle County line and Edwards. The sharp curves west of Wolcott have an effect on the accidents observed there. This is evident from the high number of overturning and fixed object accidents (suggesting loss of control) recorded there, leading to a high WHI. The main accidents observed east of Wolcott are animal-vehicle collisions along with fixed object accidents.

Interchange Deficiencies. The populations of Gypsum and Eagle have grown rapidly over the last decade and are predicted to continue increasing in size. The predicted traffic associated with future growth is anticipated to exceed the capacity of the two local interchanges, as shown on Table 1-11.

Table 1-11. Roadway Deficiencies and Safety Assessment, Eagle County Line to Edwards

Location	Milepost	Deficiencies	Length (miles)	Safety Issues (Measured by WHI)	
				Below Average Accident Rate	Above Average Accident Rate
Gypsum interchange	140	Capacity: Unsignalized intersection; inadequate for future demand	N/A	-2.25	
Planned Eagle County Airport interchange	142	Capacity: New interchange planned to prevent overloading local roads	N/A	WHI cannot be calculated because this interchange did not exist in 2000	
Eagle and Spur Road interchange	147	Capacity: Inadequate ramp termini; signal configuration; traffic expected to back onto I-70	N/A	-1.08	
West of Wolcott eastbound and westbound (Wolcott curve)	Between 155–156	Safety: Sharp curve speed is 10 to 15 mph less than surrounding roadway; safety issue	0.4		2.11

Note: Positive WHI values indicate an above average accident rate.

Segment Focal Point: East of Eagle (Milepost 147)

This section represents a transition from the wider Western Eagle Valley (from Dotsero to Eagle) to the narrower, more winding section near Avon. Posted speed limits are 75 mph in the section, although advisory speeds for curves are posted 65 mph eastbound and 60 mph westbound just west of Wolcott. Therefore, I-70 between Eagle and Wolcott is the focal point for this segment. Slight grades between Gypsum and Eagle also cause a minor capacity reduction in this segment.

Existing LOS. This segment, as in the rest of the west end of the Corridor, generally has a higher percentage (but not number) of heavy vehicles than the east end near Denver. As shown in Table 1-12, this section of roadway operates at LOS B or better in 2000, for the four analysis days considered. ADT ranges from 10,000 vehicles in either direction to 16,000, with heavier volumes occurring during the summer. Peak-hour volumes range from 900 to 1,400 vehicles per hour (vph).

Table 1-12. 2000 Capacity and Travel Performance, Eagle County Line to Edwards

Direction and Time		Average Daily Traffic (ADT)	Peak-Hour Volume (PHV)	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	12,900	1,010	B	0	3,400
	Friday	15,200	1,220	B	0	3,400
	Winter Weekend	9,600	940	B	0	2,960
	Summer Weekend	15,300	1,430	B	0	3,110
Westbound	Weekday	13,100	1,060	B	0	3,550
	Friday	16,200	1,270	B	0	3,550
	Winter Weekend	10,100	1,100	B	0	3,250
	Summer Weekend	13,100	1,290	B	0	3,220

Focal point: East of Eagle (milepost 147)

2025 Baseline LOS. In 2025, daily traffic is expected to roughly double on all model days, with peak-hour volumes increasing accordingly. With these increases, volume would reach 3,000 vph during the westbound Friday peak hour. Eastbound, LOS D is expected on summer weekends, and other eastbound peak hours would experience LOS C. These travel volumes would be primarily associated with commuting and other local trips. Westbound weekday and Friday peak hours would operate at LOS D and winter weekend peak hours would operate at LOS C.

Baseline annual hours of congestion (out of a possible 17,520 hours per year for both directions or 8,760 daytime hours)**:** none

Table 1-13. 2025 Baseline Capacity and Travel Performance, Eagle County Line to Edwards

Direction and Time		Average Daily Traffic (ADT)	Percent Increase in ADT from 2000	Peak-Hour Volume (PHV)	Percent Increase in PHV from 2000	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	31,500	144	2,310	129	C	0	3,400
	Friday	32,200	112	2,260	85	C	0	3,400
	Winter Weekend	22,800	138	1,850	97	C	0	2,960
	Summer Weekend	29,800	94	2,430	70	D	0	3,110
Westbound	Weekday	33,700	158	2,910	174	D	0	3,550
	Friday	35,600	120	2,990	135	D	0	3,550
	Winter Weekend	25,500	153	2,100	91	C	0	3,250
	Summer Weekend	30,300	131	2,400	86	D	0	3,220

Focal point: East of Eagle (milepost 147)

Baseline Peak-Hour Travel Times

Free-flow travel times and speeds for the 32.5-mile Segment 2, Eagle County Line to Edwards are:

Westbound: **26** minutes at **74** mph   Eastbound: **26** minutes at **75** mph

Baseline peak-hour travel times and speeds are projected to be:

Winter westbound: **39** minutes at **49** mph   Winter eastbound: **40** minutes at **48** mph

Summer westbound: **41** minutes at **47** mph   Summer eastbound: **37** minutes at **52** mph

Mainline Capacity Constraints Beyond 2025

Demand would first exceed capacity in the Wolcott curve area westbound on weekdays, including Fridays, in 2030. Eastbound demands would not exceed capacity until weekdays and summer weekends in 2035.

1.7.4.3 Segment 3, Edwards to Vail East Entrance

Segment Description

Study Segment 3 (mileposts 163 to 180) is located within Eagle County and extends a total of 17.1 miles between the town of Edwards and the Vail East Entrance (see Figure 1-11). At the Minturn interchange along Dowd Canyon, US 24 leads south from I-70 to Lake County, the towns of Minturn and Leadville, and the Holy Cross Wilderness Area. East of Edwards, I-70 passes through the towns of Avon and Vail.

This segment of I-70 represents an area where two distinct travel patterns overlap. Many overnight recreation travelers – primarily from the Front Range – are destined for Vail, while employees working at the Vail ski area generally live farther west in Eagle County or Garfield County. Existing volumes within Vail are lower than those of Dowd Canyon; many workers from the west likely exit I-70 at the West Entrance and use either frontage road to reach their destination. As a resort area, Vail can be expected to have a higher share of unfamiliar drivers. These drivers may come from Eagle County Airport, DIA, or the Front Range.

Figure 1-11. Edwards to Vail East Entrance Study Segment

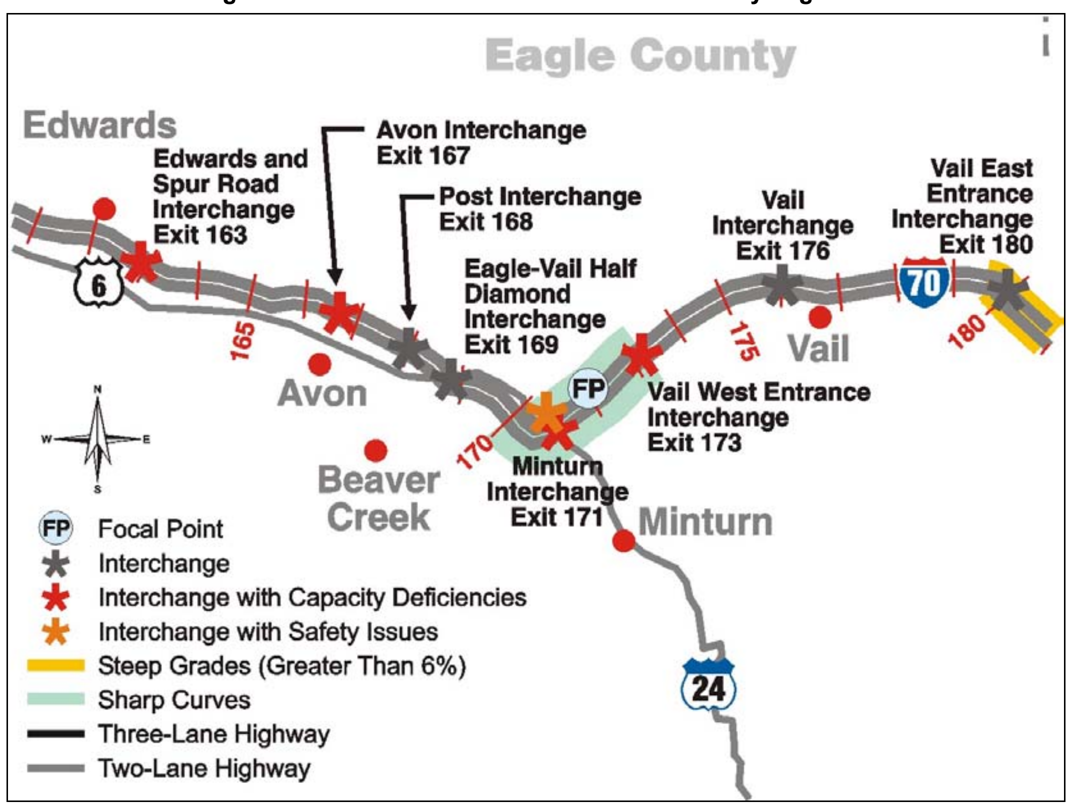
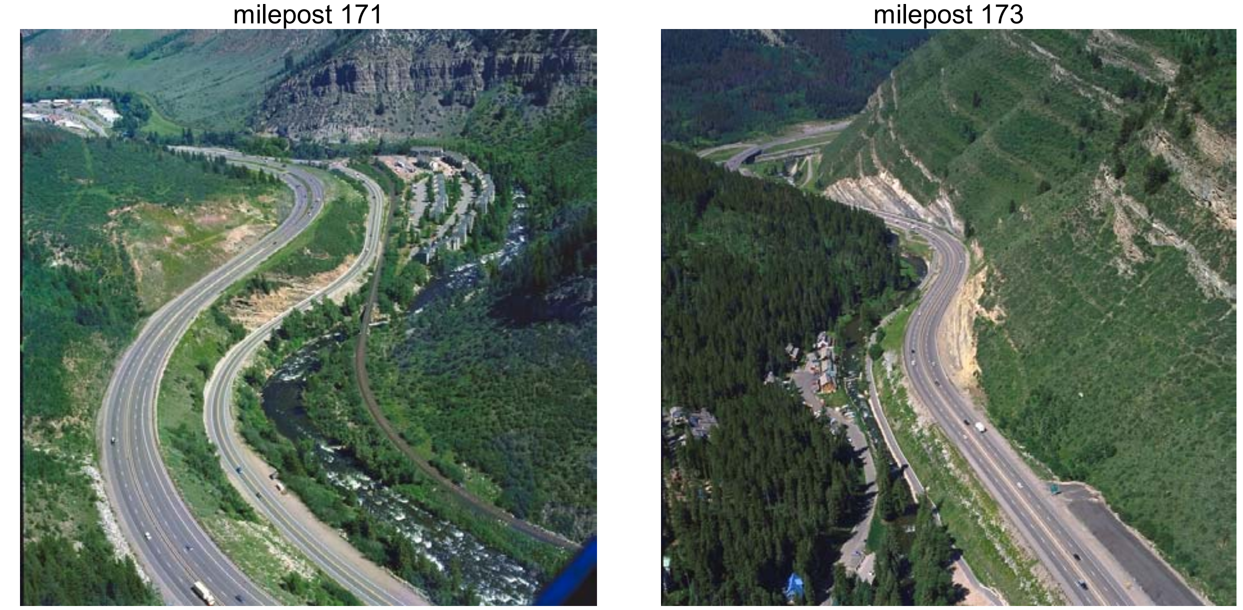


Figure 1-12. Representative Photographs of Edwards to Vail East Entrance Study Segment

View West at Dowd Canyon
milepost 171

View West toward Minturn Interchange
milepost 173



Roadway Deficiencies

Table 1-14 lists the following roadway deficiencies:

Sharp Curves. Most accidents in this area are in the sharp curves on either side of the Minturn interchange. Many occur when the road is icy or snowy. The I-70 alignment along Dowd Canyon is constrained by steep slopes of Eagle Valley, resulting in many tight curves. Dowd Canyon is the site of numerous collisions and landslide issues. The Whiskey Creek landslide complex in this area is on the state's landslide priority list due to the potential loss of service to I-70 and potential damming of the Eagle River. A continual eastbound grade of up to 4 percent further reduces capacity. Eighty-six percent of the accidents in this area occur during the winter. Seventy-seven percent of the accidents occur within the first 0.8 miles east of Minturn interchange. I-70 through Dowd Canyon is in need of increased lighting coverage to help address nighttime accident problems.

Interchange Deficiencies. Projected traffic in this area is anticipated to exceed the capacity of all interchanges in this study segment. Currently, there is a high level of intersection crashes at both the eastbound on-ramp and the eastbound off-ramp of the Minturn interchange.

Table 1-14. Roadway Deficiencies and Safety Assessment, Edwards to Vail East Entrance

Location	Milepost	Deficiencies	Length (miles)	Safety Issues (Measured by WHI)	
				Below Average Accident Rate	Above Average Accident Rate
Edwards interchange	163	Capacity: Inadequate ramp termini; signal configuration; traffic expected to back up onto I-70	N/A	0.00	
Avon interchange	167	Capacity: Future westbound off-ramp volume backs up onto I-70	N/A	-0.58	
Avon to Post Boulevard (eastbound)	166.6–167.6	Safety: Moderate uphill grade, high truck volumes, and merging traffic decrease safety and capacity	1.0	-1.25	
Dowd Canyon					
West of Dowd Canyon [eastbound and westbound]	170 to 170.7	Safety: Sharp curve; design speed of curve is less than surrounding highway	0.7		1.96
Minturn interchange	171	Capacity and safety: Need right turn lane for eastbound ramps to reduce crashes	N/A		3.28
Dowd Canyon to Vail West Entrance	170.9 to 171.8	Safety: Design speed of sharp curve is less than surrounding highway	0.9		7.04
Vail West Entrance interchange	173	Capacity: Eastbound acceleration lane too short. Eastbound off-ramp traffic currently backs onto I-70 because of roundabouts also handling a large volume of local traffic	N/A	-1.02	

Note: Positive WHI values indicate an above average accident rate.

Segment Focal Point: Dowd Canyon (Milepost 172)

Edwards, Avon, and Eagle-Vail have close economic ties to Vail. The Beaver Creek ski area, south of Avon, is owned by Vail Resorts, and many winter visitors purchase packages allowing them to ski at both areas. ECO Transit's most heavily used route serves the area between Edwards and Vail on US 6. The Dowd Canyon to Vail portion of I-70 is important, because US 6 is not available as a parallel alternate route. Therefore, this portion is chosen as the focal point. I-70 between Avon and Dowd Canyon has similar curves. Interchanges at Post Boulevard and US 6 (the Eagle-Vail Half-Diamond) and the attraction of new access to development and "big box" stores affect the capacity of I-70 by introducing weaving movements between interchanges.

Existing LOS. Table 1-15 shows that I-70 between Dowd Canyon and Vail West Entrance functions at LOS D eastbound on Fridays and summer Sundays. The highway functions at LOS C westbound, and for all other analysis days in 2000.

2025 Baseline LOS. As shown in Table 1-16, the greatest growth in peak-hour travel between 2000 and 2025 is projected to occur on winter weekends. However, the worst congestion is expected on Fridays in 2025, which have almost as high a peak-hour growth rate as winter weekends. Hours of congestion on Fridays would be 3 hours eastbound and 4 hours westbound. Other westbound weekdays would have the next worst congestion, with 2 hours of LOS F. Eastbound, I-70 also would operate at LOS E for 7 hours on weekdays and 5 hours on summer Sundays.

Baseline annual peak-day hours of congestion (out of a possible 17,520 hours per year for both directions or 8,760 daytime hours)**:** 660

Baseline Peak-Hour Travel Times

For the 17.1-mile Segment 3, Edwards to Vail East Entrance, the free-flow travel time in either direction is **15** minutes, for a speed of **69** mph. The 2025 Baseline peak-hour travel times are projected to be:

Winter westbound: **36** minutes at **29** mph Winter eastbound: **19** minutes at **55** mph

Summer westbound: **62** minutes at **17** mph Summer eastbound: **39** minutes at **27** mph

Table 1-15. 2000 Capacity and Travel Performance, Edwards to Vail East Entrance

Direction and Time		Average Daily Traffic (ADT)	Peak-Hour Volume (PHV)	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	21,700	1,680	C	0	3,090
	Friday	23,800	1,860	D	0	3,090
	Winter Weekend	13,900	1,070	B	0	2,700
	Summer Weekend	21,100	1,720	D	0	2,850
Westbound	Weekday	22,000	1,900	C	0	3,150
	Friday	24,600	2,080	C	0	3,150
	Winter Weekend	16,300	1,690	C	0	2,930
	Summer Weekend	21,500	1,660	C	0	3,020

Focal point: Dowd Canyon (milepost 172)

Table 1-16. 2025 Baseline Capacity and Travel Performance, Edwards to Vail East Entrance

Direction and Time		Average Daily Traffic (ADT)	Percent Increase in ADT from 2000	Peak-Hour Volume (PHV)	Percent Increase in PHV from 2000	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	40,400	86	2,860	82	E	0	3,090
	Friday	44,400	95	3,160	70	F	3	3,090
	Winter Weekend	28,000	102	2,020	59	D	0	2,700
	Summer Weekend	32,700	55	2,600	51	E	0	2,850
Westbound	Weekday	40,900	86	3,310	74	F	2	3,150
	Friday	45,800	79	3,620	74	F	4	3,150
	Winter Weekend	32,900	102	2,570	52	E	0	2,930
	Summer Weekend	31,800	48	2,370	43	D	0	3,020

Focal point: Dowd Canyon (milepost 172)

Future Mainline Capacity Constraints

Demands in Dowd Canyon would first exceed the LOS E capacity westbound on Fridays in 2020. By 2025, as Table 1-16 shows, demand would exceed capacity on other weekdays westbound and Fridays eastbound.

1.7.4.4 Segment 4, Vail East Entrance to Copper Mountain

Segment Description

Study Segment 4 (mileposts 180 to 195) spans both Eagle and Summit counties and extends a total of 15.4 miles between the town of Vail and Copper Mountain (see Figure 1-13). Vail Pass (milepost 190) at 10,666 feet constitutes the second-highest pass along the Corridor and the dividing line between Eagle and Summit counties.

Figure 1-13. Vail East Entrance to Copper Mountain Study Segment

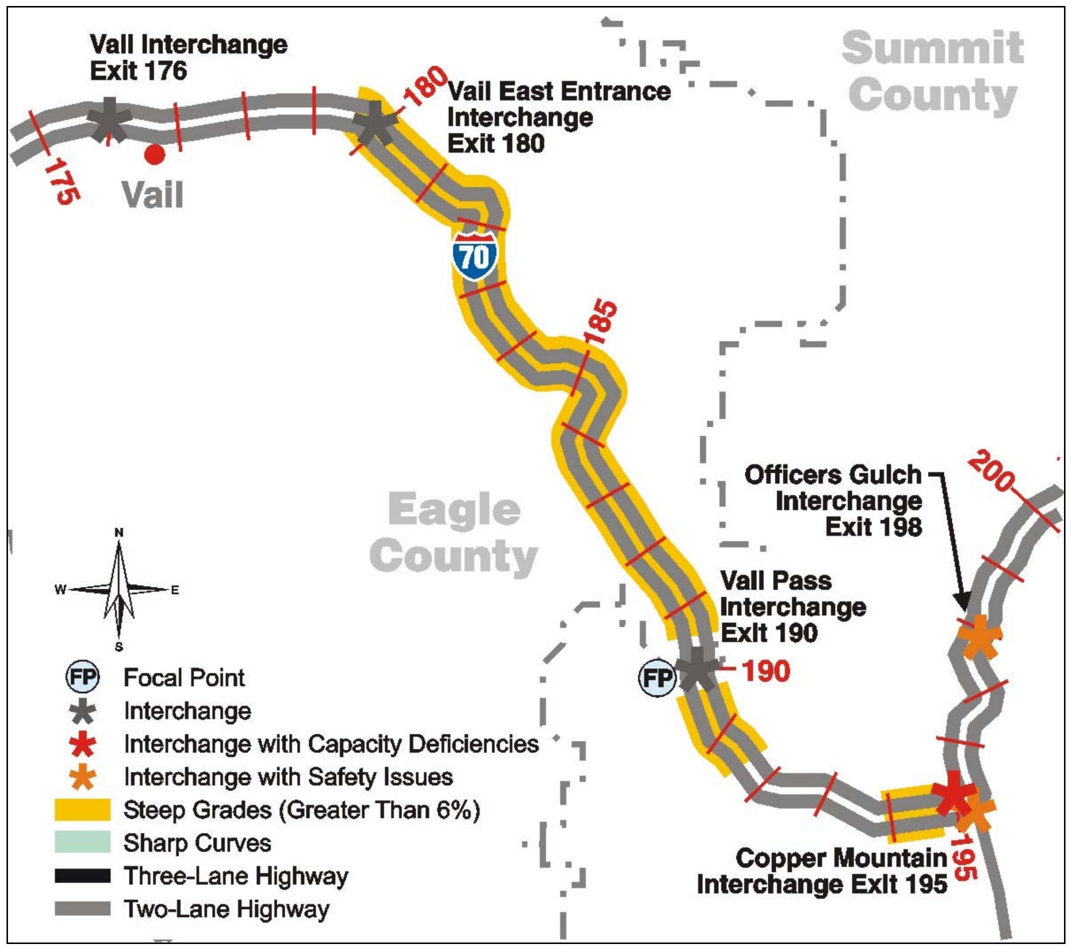
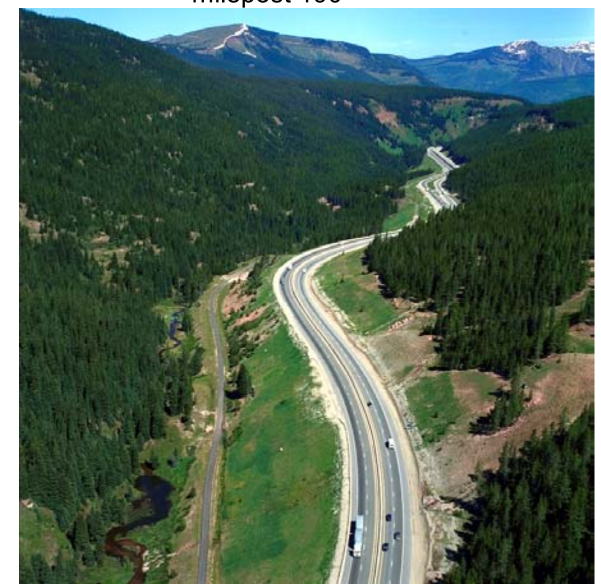
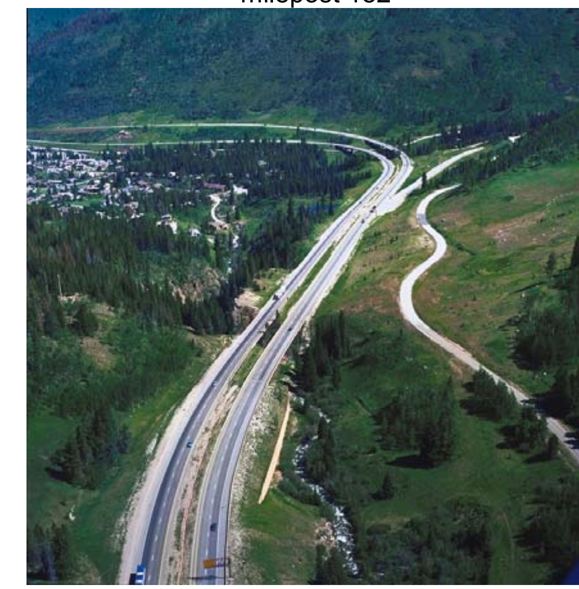


Figure 1-14. Representative Photographs of Vail East Entrance to Copper Mountain Study Segment

View West over Vail Pass
milepost 190



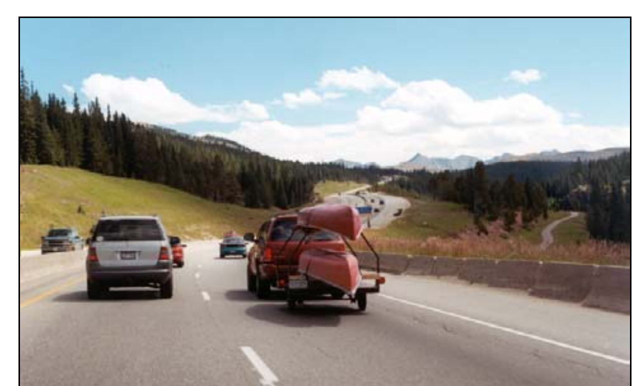
View West over East Vail
milepost 182



View West toward Vail
milepost 176

View West toward Vail
milepost 178

View East along Vail Pass
milepost 187



View East along Vail Pass/Tenmile Canyon
milepost 189

Roadway Deficiencies

Table 1-17 lists the following roadway deficiencies:

Steep Grades. A high frequency rate of traffic collisions occurs on Vail Pass. Two runaway truck ramps are provided along the steep downhill westbound lanes from Vail Pass to Vail Valley. Grades of up to 7 percent, sharp curves, lack of climbing lanes for slow-moving vehicles, and high-altitude weather all contribute to reduced capacity on the approaches to the Vail Pass summit. The steep downhill grades westbound west of Vail Pass along with curves and high altitude create unsafe driving conditions. Consequently, most accidents observed on the west side of Vail Pass are loss-of-control accidents occurring during bad weather conditions.

Table 1-17. Roadway Deficiencies and Safety Assessment, Vail East Entrance to Copper Mountain

Location	Milepost	Deficiencies	Length (miles)	Safety Issues (Measured by WHI)	
				Below Average Accident Rate	Above Average Accident Rate
West side of Vail Pass, Uphill (eastbound)	Between 180–190	Capacity: Steep 7% grades limit highway capacity	9.5	-0.92	
West side of Vail Pass, Downhill (westbound)	Between 180–190	Safety: High amount of incident-related delay; steep grades, tight curves, and winter weather contribute to increased incident rate	9.5		0.77

Note: Positive WHI values indicate an above average accident rate.

While Figure 1-13 shows steep grades on the east side of Vail Pass from milepost 190.3–191.6 and milepost 193.9–194.7, these are not indicated as having a safety or capacity deficiency.

Segment Focal Point: Vail Pass (Milepost 190)

Traffic volumes are lower over Vail Pass in comparison with both Eagle County to the west and Summit County to the east. At present, local trips primarily occur within the economic centers east and west of Vail Pass. Without these local trips in the traffic stream over the pass, trucks make up a larger portion of the traffic, and thus have a large influence on its capacity. Furthermore, the auto trips going over Vail Pass are more likely to be made by unfamiliar drivers. Grades are steepest on the west side of Vail Pass (up to 7 percent). East of Vail Pass, grades range from 2 to 6 percent.

Existing LOS. In 2000, Vail Pass is congested eastbound on summer weekends, and experiences LOS C on the ascent from Vail. During the peak hours of other days, the pass operates at LOS B.

2025 Baseline LOS. In 2025, summer weekends eastbound are expected to remain the most congested days and direction for Vail Pass, with increased traffic exceeding capacity for 4 hours. All days westbound and winter weekends eastbound would see the next greatest change in LOS, from B in 2000 to D in the future. In 2025, eastbound weekday and Friday travelers should experience LOS C conditions when crossing the pass during the peak hour.

Baseline annual peak-day hours of congestion (out of a possible 17,520 hours per year for both directions or 8,760 daytime hours)**:** 100

Baseline Peak-Hour Travel Times

At free-flow, the eastbound travel time for the 15.4-mile Vail to Copper Mountain segment, Segment 4, is longer than the westbound travel time because vehicles must ascend from Vail East Entrance (elevation 8,300 feet) to Vail Pass, at 10,666 feet, before descending to Copper Mountain (elevation 9,700 feet) for a net ascent of 1,400 feet. The westbound movement in this segment represents a net descent. The free-flow travel times and speeds are:

Westbound: **15** minutes at **63** mph　　Eastbound: **16** minutes at **59** mph

Baseline peak-hour travel times are projected at:

Winter westbound: **22** minutes at **42** mph　　Winter eastbound: **20** minutes at **47** mph

Summer westbound: **33** minutes at **28** mph　　Summer eastbound: **54** minutes at **17** mph

Table 1-18. 2000 Capacity and Travel Performance, Vail East Entrance to Copper Mountain

Direction and Time		Average Daily Traffic (ADT)	Peak-Hour Volume (PHV)	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	12,600	990	B	0	2,670
	Friday	12,200	990	B	0	2,670
	Winter Weekend	8,400	800	B	0	2,170
	Summer Weekend	15,600	1,380	C	0	2,560
Westbound	Weekday	13,400	1,110	B	0	2,400
	Friday	14,400	1,130	B	0	2,400
	Winter Weekend	9,600	760	B	0	2,340
	Summer Weekend	13,000	1,070	B	0	2,540

Focal point: approaches to Vail Pass (mileposts 189 eastbound and 191 westbound)

Table 1-19. 2025 Baseline Capacity and Travel Performance, Vail East Entrance to Copper Mountain

Direction and Time		Average Daily Traffic (ADT)	Percent Increase in ADT from 2000	Peak-Hour Volume (PHV)	Percent Increase in PHV from 2000	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	22,600	80	1,830	85	C	0	2,670
	Friday	21,600	77	1,790	58	C	0	2,670
	Winter Weekend	16,900	102	1,780	128	D	0	2,170
	Summer Weekend	29,900	92	2,680	94	F	4	2,560
Westbound	Weekday	23,200	74	1,760	59	D	0	2,400
	Friday	25,400	77	1,890	87	D	0	2,400
	Winter Weekend	19,300	102	1,760	133	D	0	2,340
	Summer Weekend	24,300	86	2,130	99	D	0	2,540

Focal point: approaches to Vail Pass (mileposts 189 eastbound and 191 westbound)

Future Mainline Capacity Constraints

As shown in Table 1-19, demand is projected to exceeds the LOS E capacity on summer Sundays eastbound in 2025. Westbound demand is projected to first exceed capacity on Fridays shortly after the year 2025. Note that these two peaks correspond to summer overnight recreation trips.

1.7.4.5 Segment 5, Copper Mountain to Silverthorne

Segment Description

Segment 5 (mileposts 195 to 205) is located within Summit County and extends a total of 10.2 miles between Copper Mountain and Silverthorne (see Figure 1-15).

East of Copper Mountain, I-70 winds alongside Tenmile Creek, gently descending past Officers Gulch and Frisco exits at Main Street and Summit Boulevard (SH 9). Two access points are provided near Frisco, which then connect to SH 9 (milepost 203) and the town/resort area of Breckenridge. East of Frisco, I-70 ascends to a scenic overlook of Dillon Lake on the eastbound side, before descending to Silverthorne. Two lanes are provided eastbound, which causes a local drop in capacity. Westbound, an auxiliary lane allows for a three-lane segment between Silverthorne and the exit to SH 9.

Figure 1-15. Copper Mountain to Silverthorne Study Segment

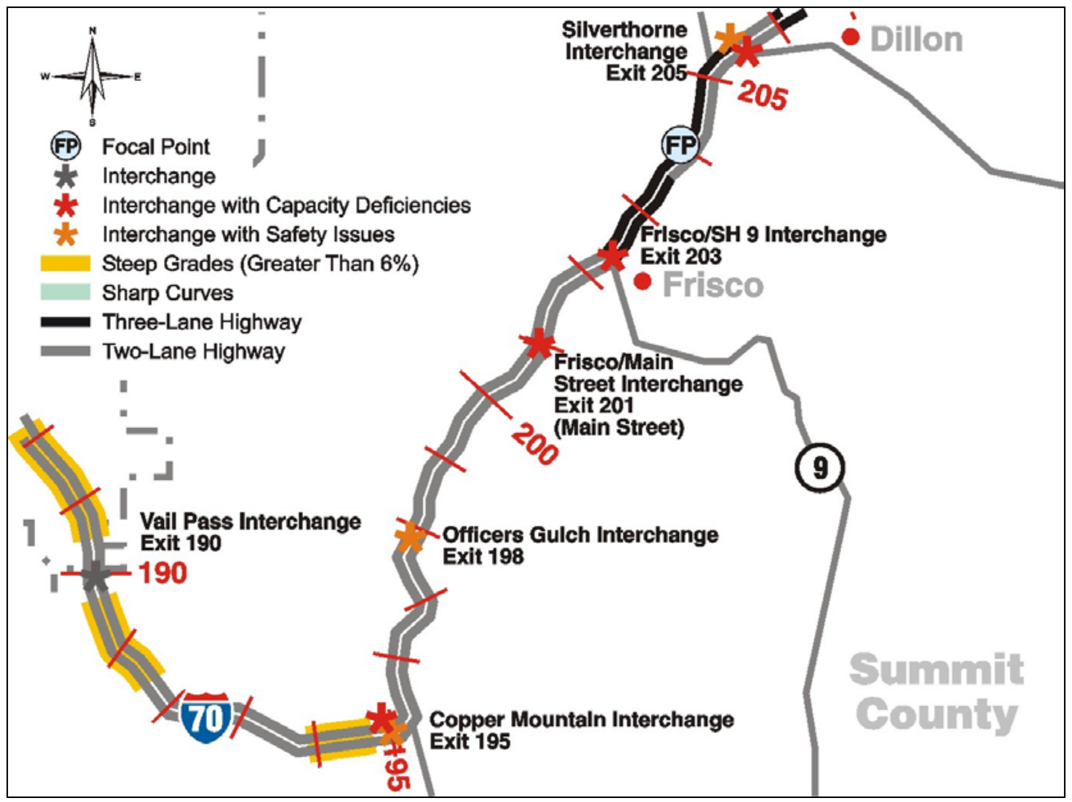
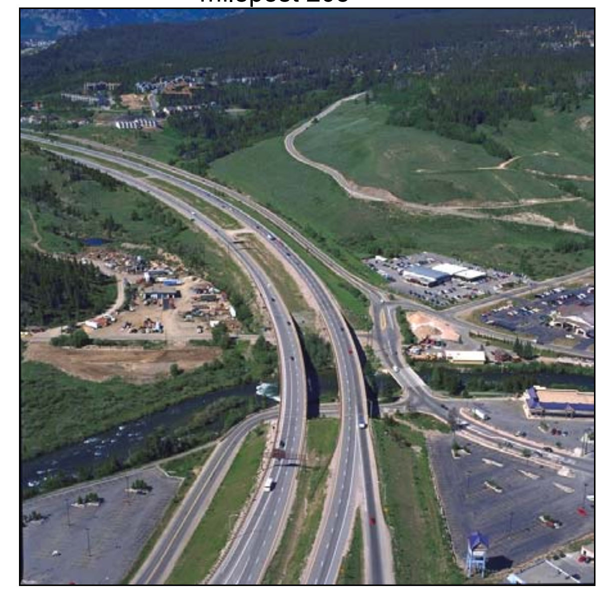


Figure 1-16. Representative Photographs of Copper Mountain to Silverthorne Study Segment

View West over Silverthorne Interchange
milepost 205



View South over Officers Gulch toward Copper Mountain Interchange
milepost 195

View East toward Frisco Interchange
milepost 201

View West Silverthorne Interchange
milepost 205

Roadway Deficiencies

Interchange Deficiencies. Safety concerns at Copper Mountain and Officers Gulch are caused by weather and interchange geometry. Curves near these two interchanges contribute to higher accident rates (as shown on Table 1-20) due to short sight distances and reduced traction during winter weather, as is implied by a high percentage of loss-of-control accidents (fixed object, overturning, and sideswipe) observed at both locations. At the two Frisco interchanges, future traffic demand is projected to exceed capacity.

Table 1-20. Roadway Deficiencies and Safety Assessment, Copper Mountain to Silverthorne

Location	Milepost	Deficiencies	Length (miles)	Safety Issues (Measured by WHI)	
				Below Average Accident Rate	Above Average Accident Rate
Copper Mountain interchange	195	Capacity and safety: ramp geometry in addition to grade and weather contribute to higher incident rate	N/A		1.01
Officers Gulch interchange	198	Safety: interchange is located on a curve; icy conditions contribute to higher incident rate	N/A		0.73
Frisco / Main Street interchange	201	Capacity: unsigned intersections have inadequate capacity; off-ramp traffic currently backs up onto I-70.	N/A	-2.07	
Frisco / SH 9 interchange	203	Capacity: westbound off-ramp has inadequate storage.	N/A	-0.75	
Northbound SH 9 to eastbound I-70 on-ramp	202.5–203	Capacity: eastbound on-ramp has inadequate capacity and acceleration lanes; a project is under design to address this ramp	0.5	-1.35	

Note: Positive WHI values indicate an above average accident rate.

Segment Focal Point: West of Silverthorne (Milepost 204)

In addition to topography, this segment is a focus of traffic analysis because it is an area where local Summit County traffic combines with long-distance through movements. On many days, it is common for the traffic volume between Frisco and Silverthorne to be greater than that crossing the Continental Divide a few miles east. Mild grades and curves between Copper Mountain and the Frisco Main Street interchange reduce capacity elsewhere in this study segment.

Existing LOS. In 2000, the heaviest traffic between Copper Mountain and Silverthorne occurs on weekends. Eastbound I-70 operates at LOS D, with westbound I-70 experiencing LOS C or better. Limitations of the on-ramp from SH 9 in Frisco may further compound eastbound travelers' experience of this focal point. Weekday peak-hour travelers experienced LOS C during 2000. Capacity and travel performance for Segment 5 are shown in Table 1-21.

2025 Baseline LOS. These general patterns – lighter traffic on weekdays and better levels of service westbound – are projected to continue 25 years from now, as shown on Table 1-22. However, by this time, eastbound travel would exceed the LOS E capacity, experiencing congestion for 8 hours during typical summer weekends. On winter weekends, I-70 eastbound is expected to operate at LOS E during the peak 2 hours. On weekdays, eastbound travelers should see LOS D or better conditions. Westbound travelers should expect LOS D on both summer and winter weekends, and no worse than LOS C on weekdays.

Baseline annual peak-day hours of congestion (out of a possible 17,520 hours per year for both directions or 8,760 daytime hours)**:** 174

Baseline Peak-Hour Travel Times

For the 10.2-mile Segment 5, Copper Mountain to Silverthorne, the free-flow travel times and speeds are **9** minutes at **68** mph for either direction. Baseline peak-hour travel times are projected to be:

Winter westbound: **14** minutes at **42** mph   Winter eastbound: **23** minutes at **27** mph

Summer westbound: **13** minutes at **45** mph   Summer eastbound: **75** minutes at **8** mph

During peak eastbound summer Sunday travel conditions, the 8 mph average speed reflects a considerable queue that would back up from the lane drop just west of the EJMT west portal, to beyond the Silverthorne interchange.

Table 1-21. 2000 Capacity and Travel Performance, Copper Mountain to Silverthorne

Direction and Time		Average Daily Traffic	Peak-Hour Volume	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	20,900	1,871	C	0	3,530
	Winter Weekend	18,600	2,615	D	0	3,050
	Summer Weekend	29,500	2,739	D	0	3,450
Westbound	Weekday	24,100	2,060	C	0	4,230
	Winter Weekend	21,300	2,391	C	0	4,250
	Summer Weekend	25,400	2,324	C	0	4,450

Focal point: west of Silverthorne, SH 9 (milepost 204)

Table 1-22. 2025 Baseline Capacity and Travel Performance, Copper Mountain to Silverthorne

Direction and Time		Average Daily Traffic (ADT)	Percent Increase in ADT from 2000	Peak-Hour Volume (PHV)	Percent Increase in PHV from 2000	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	32,100	54	2,630	34	D	0	3,530
	Winter Weekend	26,900	45	2,783	32	E	0	3,052
	Summer Weekend	41,100	40	3,776	32	F	8	3,450
Westbound	Weekday	39,300	63	2,938	46	C	0	4,230
	Winter Weekend	30,800	44	2,818	30	D	0	4,450
	Summer Weekend	35,900	41	3,325	35	D	0	4,450

Focal point: West of Silverthorne, SH 9 (milepost 204)

Current and Future Mainline Capacity Constraints

Eastbound summer Sunday demand would first exceed the LOS E capacity around the year 2015. Westbound summer weekend traffic would experience LOS F soon after 2025, but other westbound demand is projected to remain under capacity until about 2050, when weekday travel demand is projected to be higher than weekend traffic based on projected growth trends from 2000 to 2025. (Note that between 2000 and 2025, westbound weekday peak-hour traffic is expected to grow about 11 percent more than westbound summer weekend peak-hour traffic.)

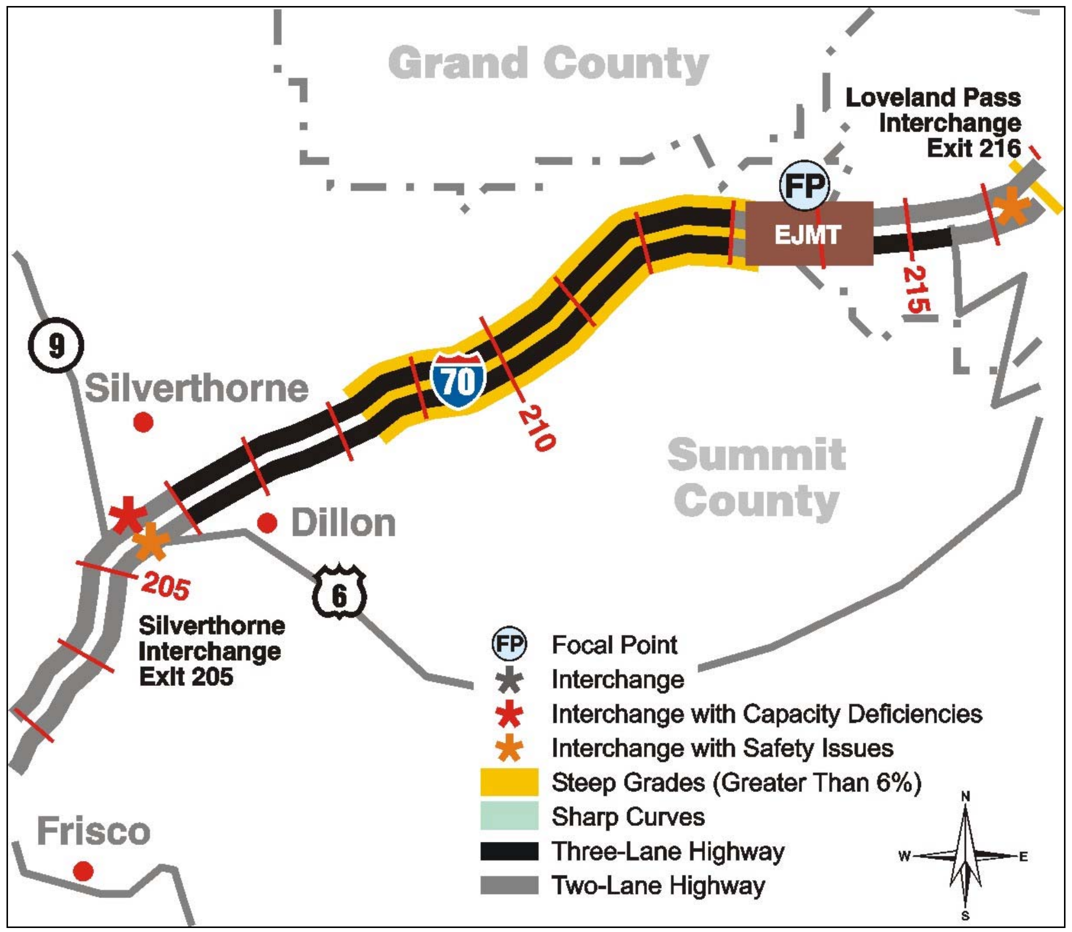
1.7.4.6 Segment 6, Silverthorne to Loveland Pass Interchange

Segment Description

Study Segment 6 (mileposts 205 to 216) is located within Summit and Clear Creek counties and extends a total of 10.8 miles between Silverthorne and the Loveland ski area (see Figure 1-17).

The Silverthorne exit off I-70 provides access to US 6, which travels past the Keystone and Arapahoe Basin ski areas and then over Loveland Pass, which rejoins I-70 on the east side of the EJMT. To the north of Silverthorne is SH 9, towards the town of Kremmling in Grand County.

Figure 1-17. Silverthorne to Loveland Pass Interchange Study Segment



Roadway Deficiencies

Table 1-23 describes the following roadway deficiencies:

Steep Grades. There is a steep grade (average of 6 percent) along Straight Creek Canyon from milepost 208 to the west portal of the EJMT (milepost 213). The majority of the accidents observed in this section in the westbound direction occur in the winter during bad weather and roadway conditions. This is to be expected given the steep grades observed here. The accidents occurring most often are fixed object and rear-end accidents. A relatively high percentage of accidents involving rocks in the roadway are also observed here.

Interchange Deficiencies. High volumes on US 6 and SH 9 near the Silverthorne interchange, along with closely spaced intersections, contribute to incidents as vehicles turn on and off the interchange ramps. At Loveland Pass, the ramp acceleration and deceleration lanes are too short for safe merging.

Figure 1-18. Representative Photographs of Silverthorne to Loveland Pass Interchange Study Segment

View West over Straight Creek at the Continental Divide milepost 213.5

View West of Loveland Pass Interchange and EJMT East Portal – milepost 216

View West toward Loveland Pass Interchange milepost 216

View East toward Loveland Pass Interchange area milepost 216.5

Table 1-23. Roadway Deficiencies and Safety Assessment, Silverthorne to Loveland Pass Interchange (US 6)

Location	Milepost	Deficiencies	Length (miles)	Safety Issues (Measured by WHI): Below Average Accident Rate	Safety Issues (Measured by WHI): Above Average Accident Rate
Silverthorne / US 6 / SH 9 interchange	205	Capacity and safety: High volumes at nearby intersections on US 6 and SH 9 contribute to congestion and incidents; future traffic expected to back up onto I-70	N/A		1.14
Straight Creek Canyon (westbound)	208–213	Safety: Steep grades and lane drop at west portal of EJMT	5		2.01
Loveland Pass interchange	216	Safety: Inadequate acceleration and deceleration lanes for safe merging	N/A		3.96

Note: Positive WHI values indicate an above average accident rate.

Segment Focal Point: EJMT (Milepost 214)

From Silverthorne to the EJMT, I-70 is three lanes each direction. There is a steep climb along Straight Creek Canyon (average grades of 6 percent) from milepost 208 to the west portal of the EJMT (the segment's focal point) at approximately milepost 213. At the EJMT west portal, I-70 narrows to two lanes in each direction. I-70 crosses into Clear Creek County as it bores through the Continental Divide. The twin bores of the EJMT form the highest vehicular interstate tunnel in the nation at 11,158 feet.

On high volume days, queues are observed at the approaches to the tunnels. The primary bottleneck appears to be the eastbound uphill lane drop (from three to two lanes, with the left lane merging right) just before the tunnel entrance. Primarily trucks use the extra right-hand lanes. On the west side of the EJMT, two runaway ramps are provided in the westbound (downhill) direction. The three westbound lanes going uphill are narrower – at 11 feet each – than standard 12-foot lanes. Furthermore, volume within the tunnel is regulated so that queues from farther east do not spill back into the tunnel, to ensure adequate ventilation and avoid fire hazards. It is worth noting that in all cases, the tunnels do not reduce capacity nearly as much as do the interaction of steep grades at either approach and heavy vehicles in the traffic stream. At one time the heavy eastbound movement was helped by reducing westbound movements to one lane to allow three lanes eastbound through the tunnel. This practice was stopped once the westbound flow became too significant, causing congestion in that direction.

On the Clear Creek County side of the divide, there is a 3 to 5 percent grade from the exit to the Loveland and Arapahoe Basin ski areas (milepost 216) to the east portal (milepost 215). Eastbound I-70 widens from two lanes to three lanes between the east portal and the Loveland Pass on-ramp, yet its short distance (approximately 1 mile) provides limited benefit due to the left lane merging right and other downstream constraints.

Existing LOS. In 2000, congestion occurred on winter and summer weekends, with LOS F experienced eastbound (summer weekends for 2 hours and winter weekends for 2 hours) and westbound (winter weekends for 1 hour). Eastbound travel is more congested because three travel lanes climbing up from Silverthorne must merge into two before entering the EJMT. In contrast, westbound I-70 has only two lanes from Floyd Hill—about 30 miles east of the Divide—and some of that westbound traffic leaves I-70 at Empire Junction or at the Loveland ski area (or in summer, at the trailheads at Bakerville and Herman Gulch), so less flow ultimately reaches the EJMT approach. Weekday traffic operates at LOS C or better because little weekday commuting currently occurs through the tunnels. Existing capacity and travel performance (as represented by year-2000 data) for Segment 6 is shown in Table 1-24.

2025 Baseline LOS. By 2025, the model indicates that travel volumes would have increased sufficiently so that both approaches would operate at LOS F on weekends of both seasons, as shown in Table 1-25. Weekday travel growth at the Divide would be most pronounced, increasing by about 70 to 80 percent over 2000 levels. Weekday growth is projected to be such that eastbound traffic would operate at LOS E for 1 hour, while westbound traffic would be congested for 2 hours. The greatest eastbound projected demand remains on summer Sunday (8 hours of LOS F) and winter Sunday (9 hours of LOS F). Westbound weekends of both seasons also are expected to experience LOS F (8 hours in summer and 7 hours in winter).

Baseline annual peak-day hours of congestion (out of a possible 17,520 hours per year for both directions or 8,760 daytime hours)**:** 1,299

Baseline Peak-Hour Travel Time

For the 10.8-mile Silverthorne to Loveland Pass Interchange (US 6) segment, the free-flow travel times and speeds are:

Westbound: **10** minutes at **64** mph — Eastbound: **12** minutes at **53** mph

The eastbound travel time is longer than westbound because of the ascent from Silverthorne (elevation 8,800 feet) to the Loveland Pass interchange (elevation 10,900 feet). Baseline peak-hour travel times in Segment 6 are projected to be:

Winter westbound: **15** minutes at **41** mph — Winter eastbound: **50** minutes at **13** mph

Summer westbound: **14** minutes at **45** mph — Summer eastbound: **78** minutes at **8** mph

As with the previous segment (Copper Mountain to Silverthorne), an eastbound queue exists during the peak hours of a typical summer Sunday.

Table 1-24. 2000 Capacity and Travel Performance, Silverthorne to Loveland Pass Interchange (US 6)

Direction and Time		Average Daily Traffic (ADT)	Peak-Hour Volume (PHV)	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	16,000	1,300	C	0	2,700
	Winter Weekend	16,900	2,500	F	2	2,280
	Summer Weekend	29,500	2,810	F	2	2,710
Westbound	Weekday	18,500	1,450	C	0	2,440
	Winter Weekend	19,400	2,450	F	1	2,430
	Summer Weekend	23,900	2,270	D	0	2,630

Focal point: Approaches to EJMT (milepost 213 eastbound and 215 westbound)

Table 1-25. 2025 Baseline Capacity and Travel Performance, Silverthorne to Loveland Pass Interchange (US 6)

Direction and Time		Average Daily Traffic (ADT)	Percent Increase in ADT from 2000	Peak-Hour Volume (PHV)	Percent Increase in PHV from 2000	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	29,200	82	2,420	87	E	0	2,700
	Winter Weekend	27,100	61	2,790	26	F	9	2,400
	Summer Weekend	41,000	39	3,890	45	F	8	2,850
Westbound	Weekday	33,700	83	2,490	72	F	2	2,440
	Winter Weekend	31,100	61	3,000	51	F	7	2,430
	Summer Weekend	34,000	42	3,290	45	F	8	2,630

Focal point: Approaches to EJMT (milepost 213 eastbound and 215 westbound)

Current and Future Mainline Capacity Constraints

Eastbound summer and winter weekend travel and westbound winter weekend travel are currently exceeding capacity. Westbound, summer weekend travel is expected to exceed capacity before other days, by about the year 2010. Eastbound weekday travel is expected to be accommodated by current capacity until about 2040.

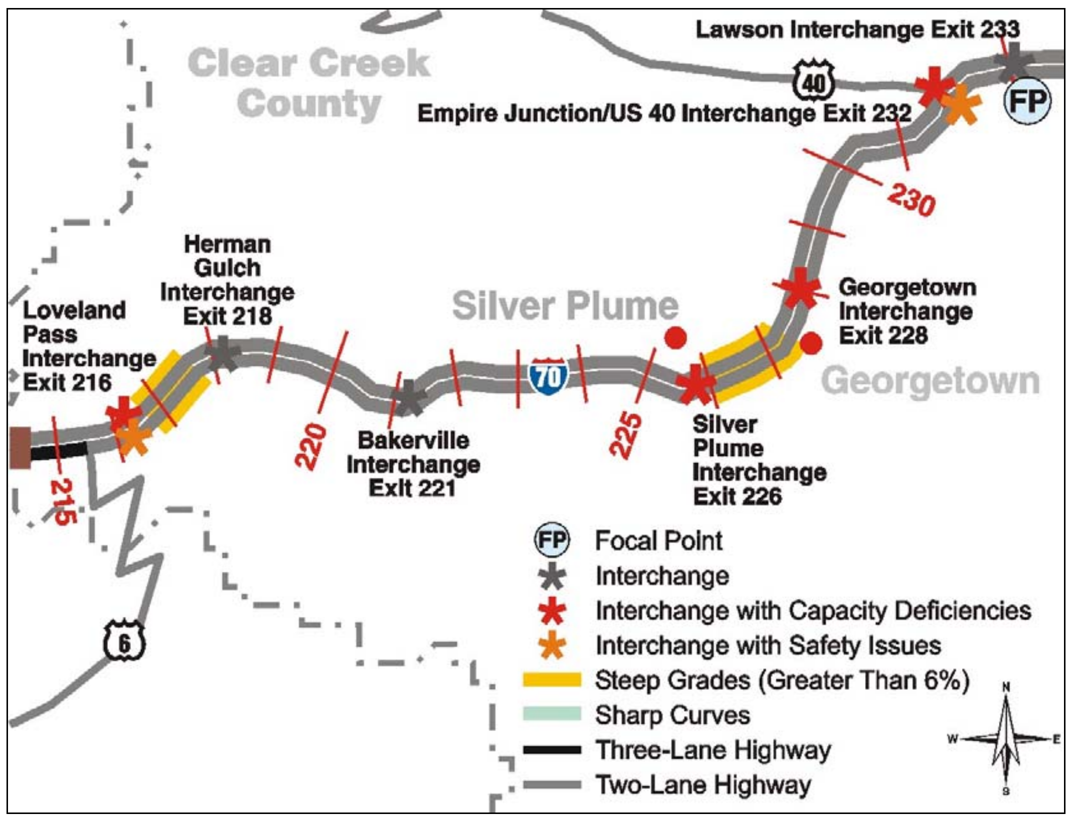
1.7.4.7 Segment 7, Loveland Pass Interchange to Downieville

Segment Description

Study Segment 7 (mileposts 216 to 234) is located in Clear Creek County, between the junction of US 6 at the Loveland Pass interchange and the town of Downieville (see Figure 1-19).

I-70 descends from about 11,000 feet in elevation at the east portal of the EJMT to about 8,300 feet at Empire Junction, where US 40 joins I-70. US 40 provides access to the town of Empire, Berthoud Pass, Winter Park, and Grand County. From the EJMT, I-70 follows Clear Creek through the towns of Bakerville, Silver Plume, and Georgetown. The 6 percent grade along Georgetown Hill – between Silver Plume and Georgetown – requires eastbound (downhill) trucks to use a low gear. The up grade on Georgetown Hill often slows westbound trucks to 30 mph. The sheer cliff walls on the north of I-70 constitute the number one rockfall hazard in the state.

Figure 1-19. Loveland Pass Interchange (US 6) to Downieville Study Segment



Roadway Deficiencies

Table 1-26 lists the roadway deficiencies for Segment 7.

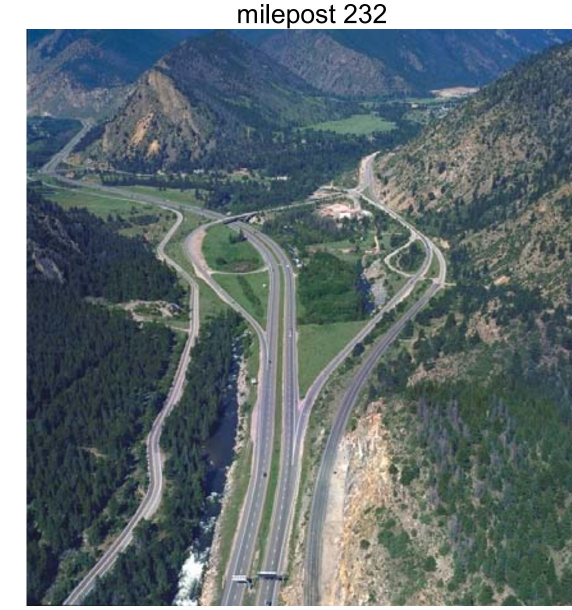
Steep Grades. While not greater than 6 percent, the uphill grades westbound from Bakerville to the EJMT cause trucks to slow. Trucks predominantly travel in the right westbound lane, making it difficult for traffic exiting or entering at the Loveland Pass and Bakerville interchanges to find a sufficient gap. Trucks navigating the grades of over 6 percent on Georgetown Hill tend to slow and use the right lane. Differences in speed contribute to a greater than average incident rate. Although not as steep, the roadway from the weigh stations at the Downieville interchange to the Empire Junction interchange experiences similar traffic patterns. A high percentage of accidents observed at Georgetown involve rocks on the roadway, which can be attributed to the sheer cliffs on the north side. Insufficient clearance between roadway and medians or embankments could explain the high percentage of fixed object accidents observed here. The eastbound section from Downieville to Empire experiences a high number of rear-end accidents, observed mostly during the evening peak period.

Interchange Deficiencies. At Silver Plume, short ramps are close to existing development. At the Georgetown interchange, future traffic volumes are forecast to exceed capacity. The eastbound direction of the Empire Junction interchange sees high incident rates caused by high volumes of mainline and merging traffic, short ramps, and inadequate acceleration and deceleration lanes.

Figure 1-20. Representative Photographs of Loveland Pass Interchange (US 6) to Downieville Study Segment

View East above Georgetown Hill
milepost 227

View West toward Empire Junction Interchange
milepost 232



View Eastbound toward Georgetown Interchange
milepost 228

View East toward US 40 Interchange
milepost 232

Table 1-26. Roadway Deficiencies and Safety Assessment, Loveland Pass Interchange (US 6) to Downieville

Location	Milepost	Deficiencies	Length (miles)	Safety Issues (Measured by WHI) Below Average Accident Rate	Safety Issues (Measured by WHI) Above Average Accident Rate
EJMT to Bakerville (westbound)	216.7–217.6	Safety: Steep grades contribute to many rear-end and side-swipe incidents near Bakerville and Loveland Pass; inadequate acceleration lanes	0.9		0.35
EJMT to Herman Gulch (eastbound)	216.7–217.6	Safety: Steep grades and narrow (2-foot) shoulders, left lane drops before eastbound Loveland Pass merges, violates driver expectation and contributes to incidents	0.9		1.21
Silver Plume interchange	226	Capacity: Ramps are close to existing developments; noise issues; public interest in moving ramps west	N/A	-1.47	
Georgetown to Silver Plume (westbound)	225.7–227.9	Capacity and safety: Steep 6% grades limit highway capacity	2.2		2.06
Silver Plume to Georgetown (eastbound)	225.7–227.9	Safety: Large number of rear-end, side-swipe and fixed object incidents; steep grades and speed differential among vehicles contribute to incidents	2.2		2.82
Georgetown interchange	228	Capacity: Unsignalized intersection, inadequate for future demand; expected to back up onto I-70	N/A	-0.77	
Empire Junction / US 40 interchange	232	Capacity and safety: High eastbound volumes, curve and short eastbound on and off-ramps, deceleration and acceleration lanes contribute to incidents	N/A		1.04
Downieville to Empire Junction (westbound)	232–234	Safety: Moderate grades and weaving movements between trucks returning from weigh station and autos exiting at Empire Junction reduced capacity	1.91	-1.05	
Empire Junction to Downieville (eastbound)	232–234	Safety: Moderate grades and frequent rear-end incidents as eastbound congestion causes vehicle to slow, stop, and/or change lanes	1.92		0.70

Note: Positive WHI values indicate an above average accident rate.

Segment Focal Point: East of Empire Junction (Milepost 233)

A truck weigh station, located at Downieville, is sometimes shut down during periods of heavy I-70 volumes. Nevertheless, westbound trucks re-entering the traffic stream must climb an uphill grade. Additional capacity constraints occur eastbound as traffic from US 40 merges at a location of high turbulence due to the presence of numerous interchanges with very short ramps, as well as inadequate acceleration and deceleration lanes.

On weekends, and especially Sundays, heavy eastbound US 40 traffic merging into the heavy I-70 mainline can result in queues reaching as far back as the east portal of the EJMT. About 1 mile east of the US 40 Empire Junction interchange, a single off-ramp at Lawson (milepost 233) allows frustrated eastbound travelers to exit to the frontage road, trying to escape the I-70 congestion, because the frontage road continues through Idaho Springs to Hidden Valley, where it ends as it re-enters I-70.

Other bottlenecks in this study segment are Georgetown Hill—with a moderate curve on a 6 percent grade—and the steep grades between Loveland Pass and Herman Gulch.

Existing LOS. As is shown on Table 1-27, travelers experience congestion for 2 to 5 hours on winter weekends in both directions and on summer weekends eastbound. On weekdays, the westbound lanes operate at LOS C, while the eastbound lanes offer LOS B or better.

2025 Baseline LOS. By 2025, both directions will be projected to experience LOS F on weekends, as shown on Table 1-28. Weekday traffic is projected to have worsened to LOS E westbound and LOS C eastbound. The greatest congestion is expected to occur westbound on a winter Saturday, when 12 hours of congestion would occur.

Baseline annual peak-day hours of congestion (out of a possible 17,520 hours per year for both directions or 8,760 daytime hours)**:** 1,080

Table 1-27. 2000 Capacity and Travel Performance, Loveland Pass Interchange (US 6) to Downieville

Direction and Time		Average Daily Traffic (ADT)	Peak-Hour Volume (PHV)	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	21,500	1,600	B	0	3,880
	Winter Weekend	22,400	3,650	F	2	3,590
	Summer Weekend	38,800	4,086	F	5	3,730
Westbound	Weekday	21,700	1,740	C	0	3,210
	Winter Weekend	27,200	3,420	F	2	3,230
	Summer Weekend	30,100	3,400	F	1	3,260

Focal point: East of Empire Junction (milepost 233)

Table 1-28. 2025 Baseline Capacity and Travel Performance, Loveland Pass Interchange (US 6) to Downieville

Direction and Time		Average Daily Traffic (ADT)	Percent Increase in ADT from 2000	Peak-Hour Volume (PHV)	Percent Increase in PHV from 2000	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	34,100	59	2,720	70	C	0	3,880
	Winter Weekend	38,600	72	3,800	17	F	4	3,590
	Summer Weekend	52,000	34	4,600	34	F	10	3,730
Westbound	Weekday	38,500	77	3,060	76	E	0	3,210
	Winter Weekend	45,600	67	4,630	57	F	12	3,230
	Summer Weekend	42,900	43	3,970	36	F	9	3,260

Focal point: East of Empire Junction (milepost 233)

Baseline Peak-Hour Travel Time

The 18.0-mile Segment 7 descends eastbound, and the free-flow travel times and speeds are:

Westbound: **18** minutes at **60** mph Eastbound: **16** minutes at **68** mph

Baseline peak-hour travel times for the Loveland Pass Interchange (US 6) to Downieville segment are projected to be:

Winter westbound: **47** minutes at **24** mph Winter eastbound: **85** minutes at **13** mph

Summer westbound: **49** minutes at **22** mph Summer eastbound: **105** minutes at **11** mph

Current and Future Mainline Capacity Constraints

Demand currently exceeds the LOS E capacity both westbound and eastbound on winter and summer weekends. Westbound weekday volumes are projected to exceed capacity shortly after 2025, while the existing roadway is projected to be able to accommodate eastbound weekday traffic until about 2040.

1.7.4.8 Segment 8, Downieville to Hidden Valley

Segment Description

Study Segment 8 (mileposts 234 to 243) is located within Clear Creek County and extends a total of 8.8 miles between Downieville and Hidden Valley (see Figure 1-21).

I-70 through this study segment passes the towns of Downieville, Dumont, and Idaho Springs. Directly east of Idaho Springs, I-70 traverses through the Twin Tunnels before encountering the Hidden Valley interchange. By 2005, this interchange will provide access to the gaming area of Central City.

Fall River Road, located between Dumont and Idaho Springs, is considered a high accident location due to its tight curves. Because Fall River Road currently has no connection to the frontage road, nearby residents and emergency services must take I-70 to reach other local destinations.

Figure 1-21. Downieville to Hidden Valley Study Segment

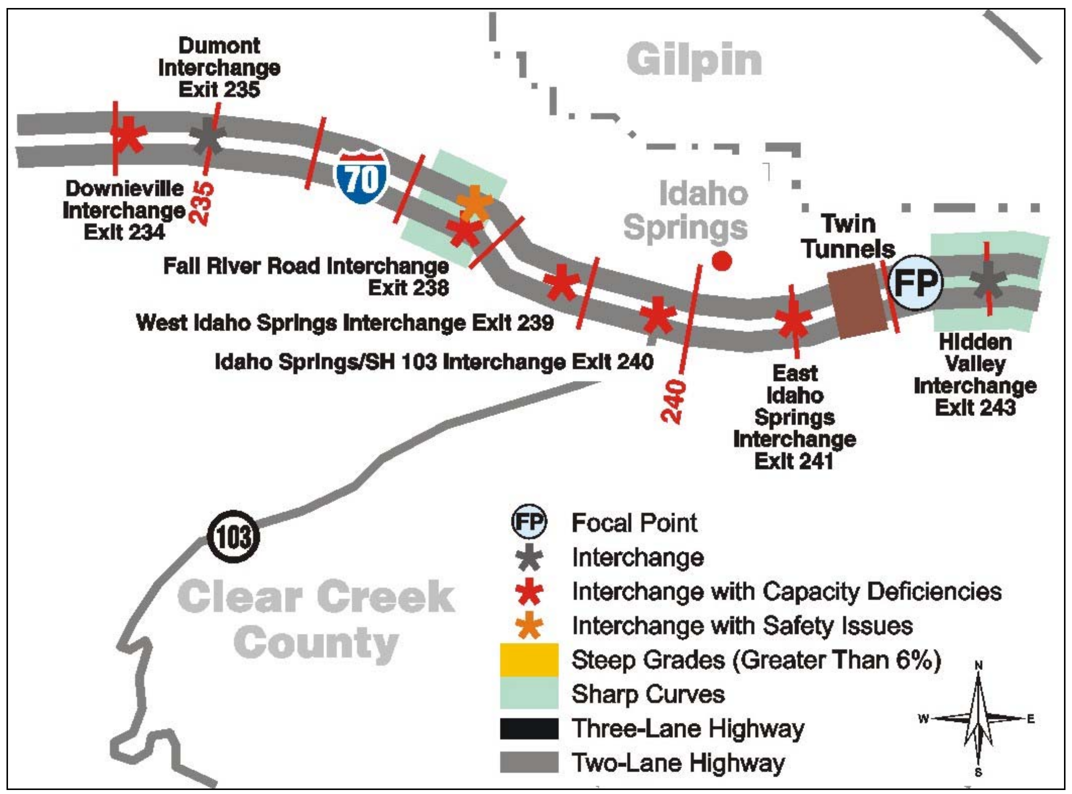
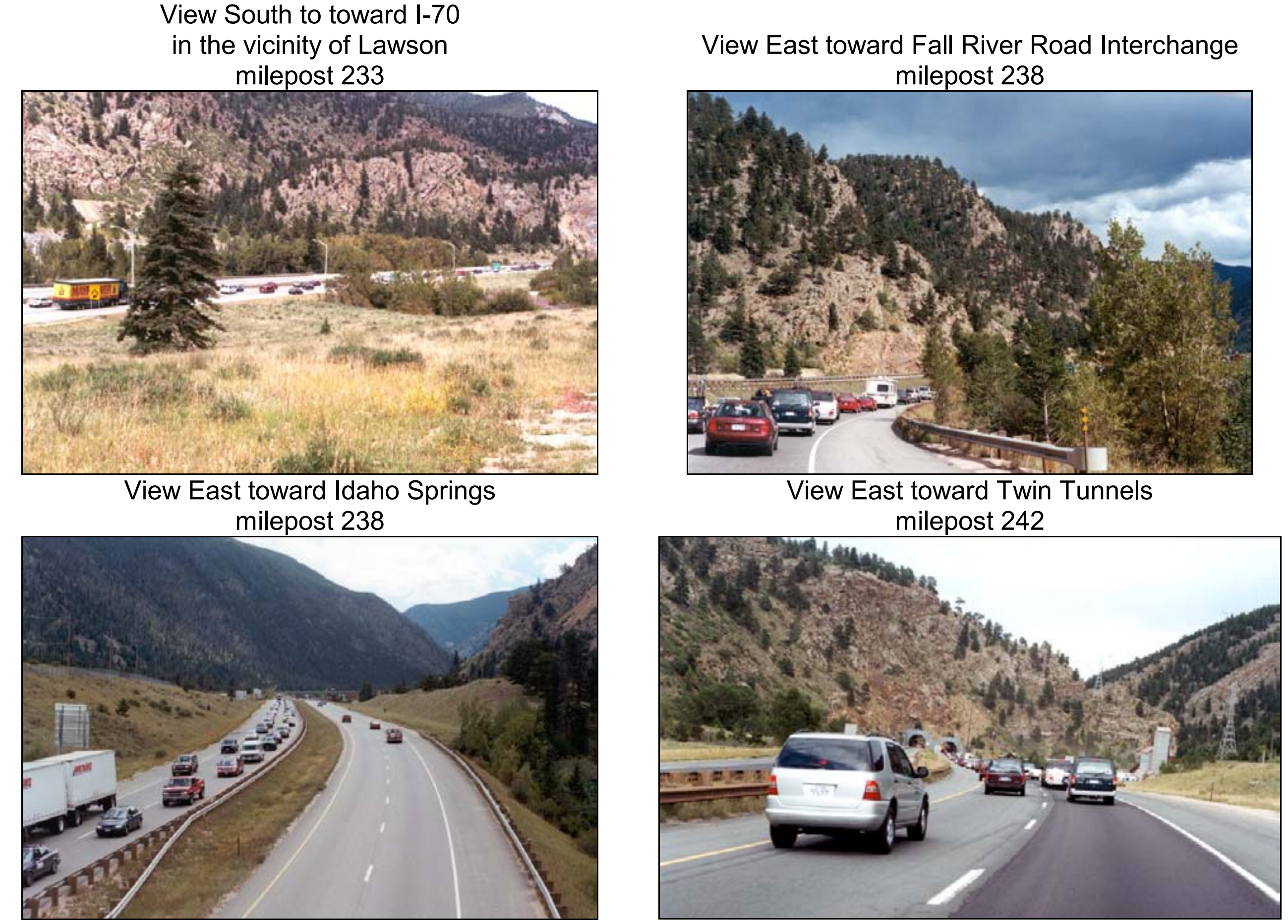


Figure 1-22. Representative Photographs for Downieville to Hidden Valley Study Segment



Roadway Deficiencies

Table 1-29 describes the following roadway deficiencies for Segment 8:

Sharp Curves. Sharp curves near the Fall River Road interchange contribute to higher accident rates, especially during winter weather. This is evident in the high percentage of overturning and fixed object accidents observed.

Interchange Deficiencies. Most of the interchanges in this study segment have capacity and/or safety deficiencies. The Downieville interchange has insufficient capacity at the intersection of the ramps and the frontage road. The Fall River Road interchange has inadequate ramps and deceleration lanes. At the West Idaho Springs interchange, the Baseline levels of traffic are projected to exceed capacity. Both the SH 103 and the East Idaho Springs interchanges have substandard geometry. Heavy eastbound on-ramp volumes at the East Idaho Springs interchange prevent local eastbound traffic from exiting.

Table 1-29. Roadway Deficiencies and Safety Assessment, Downieville to Hidden Valley

Location	Milepost	Deficiencies	Length (miles)	Safety Issues (Measured by WHI) Below Average Accident Rate	Above Average Accident Rate
Downieville interchange	234	Capacity: Unsignalized intersection, inadequate for current demand; future traffic expected to back up onto I-70	N/A	-0.50	
Fall River Road (eastbound and westbound)	237.1–237.8	Safety: Design speed of sharp curve is less than that of surrounding portions of highway; affects incident rate and then incident congestion	0.7		1.31
Fall River Road interchange	238	Capacity and safety: Eastbound off-ramps and westbound acceleration lanes inadequate; no access to frontage road for local traffic	N/A		1.43
West Idaho Springs interchange	239	Capacity: Future intersection congestion expected	N/A	-1.58	
SH 103 interchange	240	Capacity: Narrow ramps; no turn bays on SH 103 between ramps; heavy pedestrian use	N/A	-1.09	
East Idaho Springs interchange	241	Capacity: Acceleration and deceleration lanes inadequate; very sharp curves (15 mph) on two off-ramps; heavy eastbound on-ramps traffic blocks eastbound off-ramps; future traffic expected to back up onto I-70	N/A	-1.77	

Note: Positive WHI values indicate an above average accident rate.

Segment Focal Point: Twin Tunnels (Milepost 242)

Three exits provide access to Idaho Springs (mileposts 239 to 241). In the eastbound direction, much of the traffic that may have diverted to the frontage road re-enters I-70 at the East Idaho Springs interchange (milepost 241). This results in turbulence as traffic merges and adjusts to the new flow rate as it prepares to enter the Twin Tunnels: two short two-lane tunnels at milepost 242 (one eastbound, one westbound), which constitute the focal point. As would be expected, the Twin Tunnels have narrow shoulders, which reduce capacity, and the tunnels are viewed as a bottleneck area of I-70.

East of the Twin Tunnels there is a stretch of the interstate with numerous lower-speed sharp curves as I-70 winds its way through Clear Creek Canyon. Capacity reductions also occur at the curves near Fall River Road, and at a moderate crest between the SH 103 (Mount Evans) interchange and the East Idaho Springs interchange.

Existing LOS. As shown on Table 1-30, the Twin Tunnels currently experience congestion for 3 hours on winter weekends westbound and 2 hours eastbound. Summer weekends currently function at LOS F eastbound and LOS E westbound. Weekday traffic flows at LOS C or better.

Projected Baseline LOS. By 2025, the congestion on I-70 is projected to increase, as shown on Table 1-31. Eastbound demand is projected to exceed capacity the longest (11 hours) on summer weekends; eastbound winter weekends are projected to experience 6 hours of congestion. Westbound travel would experience congestion on all days, but demand would be highest on winter Saturdays, when capacity is projected to be exceeded for 9 hours.

Baseline annual peak-day hours of congestion (out of a possible 17,520 hours per year for both directions or 8,760 daytime hours)**:** 1,430

Baseline Peak-Hour Travel Time

In this gently sloping Downieville to Hidden Valley segment, eastbound and westbound free-flow travel times are approximately equal, **8** minutes at **66** mph. Baseline peak-day, peak-hour travel times for the 8.8-mile Segment 8 are projected to be:

Winter westbound: **25** minutes at **20** mph — Winter eastbound: **25** minutes at **20** mph

Summer westbound: **28** minutes at **18** mph — Summer eastbound: **25** minutes at **20** mph

Table 1-30. 2000 Capacity and Travel Performance, Downieville to Hidden Valley

Direction and Time		Average Daily Traffic (ADT)	Peak-Hour Volume (PHV)	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	23,700	2,020	C	0	3,570
	Winter Weekend	26,100	3,510	F	2	3,420
	Summer Weekend	41,200	3,820	F	3	3,430
Westbound	Weekday	26,200	2,070	C	0	3,570
	Winter Weekend	30,900	3,910	F	3	3,420
	Summer Weekend	34,600	3,020	E	0	3,430

Focal point: Twin Tunnels (milepost 242)

Table 1-31. 2025 Baseline Capacity and Travel Performance, Downieville to Hidden Valley

		Average Daily Traffic (ADT)	Percent Increase in ADT from 2000	Peak-Hour Volume (PHV)	Percent Increase in PHV from 2000	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	38,000	60	2,960	47	E	0	3,570
	Winter Weekend	40,300	55	4,160	26	F	6	3,420
	Summer Weekend	53,100	29	4,380	29	F	11	3,430
Westbound	Weekday	42,000	61	3,600	74	F	2	3,570
	Winter Weekend	47,800	54	5,020	28	F	9	3,420
	Summer Weekend	45,400	31	4,060	34	F	5	3,430

Focal point: Twin Tunnels (milepost 242)

Current and Future Mainline Capacity Constraints

The westbound tunnel already exceeds capacity on peak hours of winter weekends, and the eastbound tunnel is congested on both summer and winter weekends, as shown on Table 1-30. The summer weekend demand in 2010 is expected to clog the westbound tunnel. Weekday trips are projected to saturate the westbound tunnel in 2025, and the eastbound tunnel by about 2035.

1.7.4.9 Segment 9, Hidden Valley to Beaver Brook

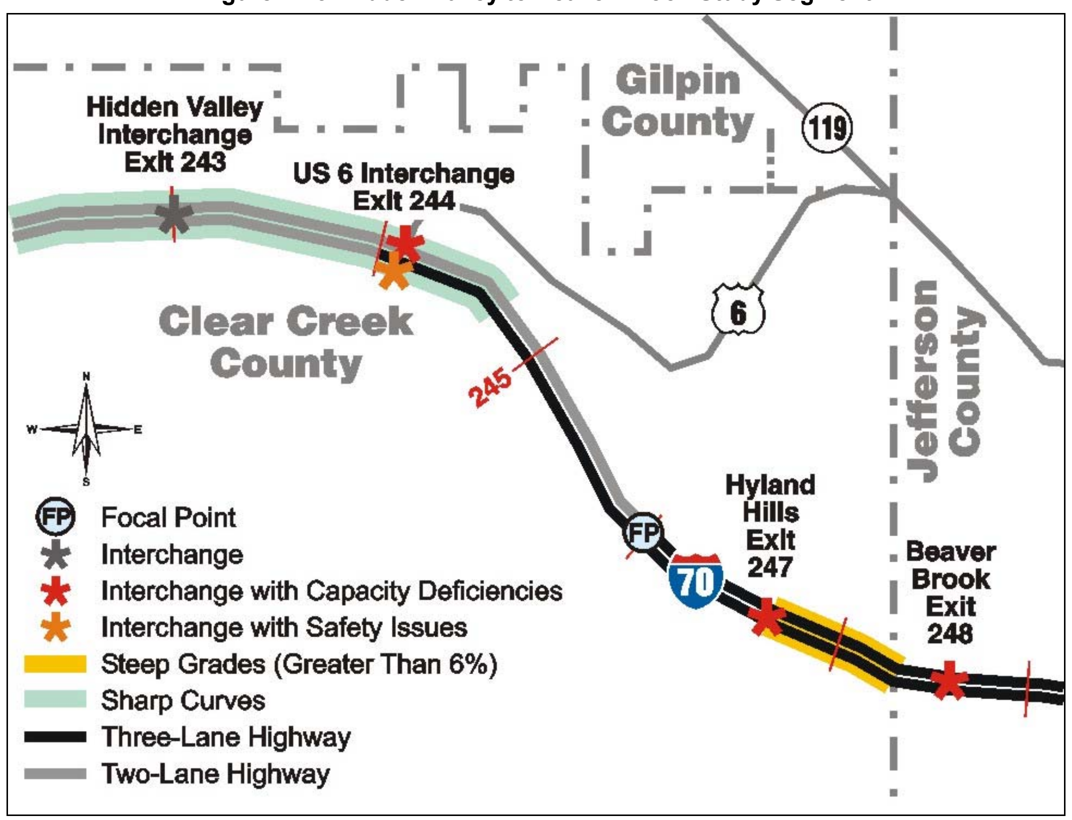
Segment Description

Study Segment 9 (mileposts 243 to 248) is located primarily within the eastern portion of Clear Creek County and extends less than 1 mile into Jefferson County (see Figure 1-23). I-70 through this segment extends a total distance of 4.6 miles between Hidden Valley (milepost 243) and Beaver Brook (milepost 248). This segment is characterized by steep slopes and sharp curves and includes lane drops and interchange deficiencies. I-70 follows Clear Creek from Hidden Valley to US 6, where I-70 heads to the south toward Denver, and US 6 paralleling Clear Creek branches off to the north toward SH 119 or Golden.

Initial construction of I-70 exposed a landslide at the bottom of Floyd Hill—now called the Floyd Hill slide (see Figure 1-24)—during removal of material at the base of the slope. The Floyd Hill slide remains active; major movements can follow extended periods of heavy precipitation.

Both the Hidden Valley and US 6 interchanges are slated to provide new accesses to the gaming communities of Central City and Black Hawk within this segment. The Central City Parkway (CCP) serving Central City is being built to connect at Hidden Valley. In addition, a new tunnel connection from the base of Floyd Hill and US 6 is proposed for quicker access to SH 119 and Black Hawk. Both facilities are proposed to provide two lanes in each direction to the gaming areas of Gilpin County.

Figure 1-23. Hidden Valley to Beaver Brook Study Segment



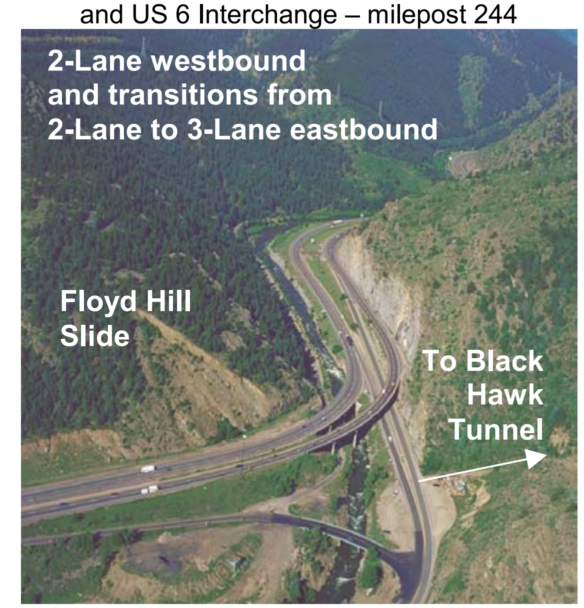
Roadway Deficiencies

Table 1-32 shows the roadway deficiencies in Segment 9:

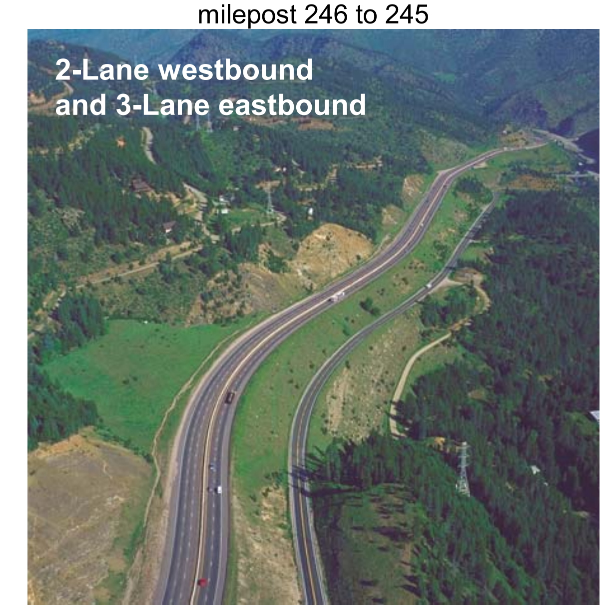
Steep Grades. Floyd Hill is one of the steepest sections of I-70, where it goes from its lowest point in Clear Creek County to the highest point in the Mount Vernon Canyon (mileposts 244 to 247). The Jefferson County line is near the split diamond interchanges of Beaver Brook (milepost 248), which provides the eastern movements, and Hyland Hills (milepost 247), which provides the western movements.

Figure 1-24. Representative Photographs of Hidden Valley to Beaver Brook Study Segment

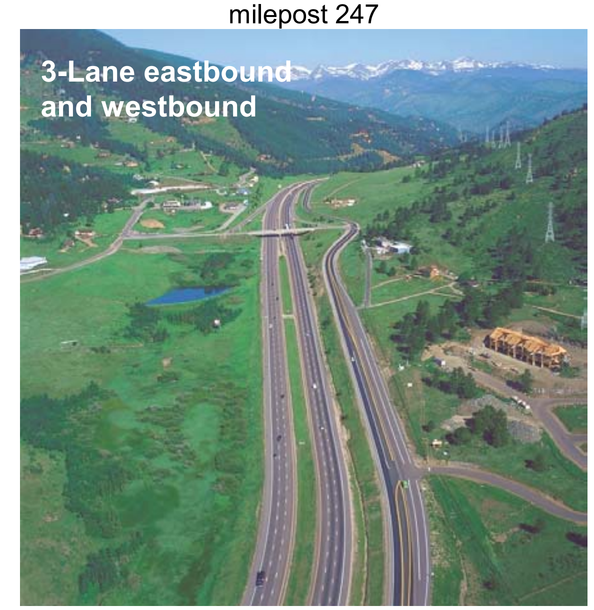
View West toward Base of Floyd Hill and US 6 Interchange – milepost 244



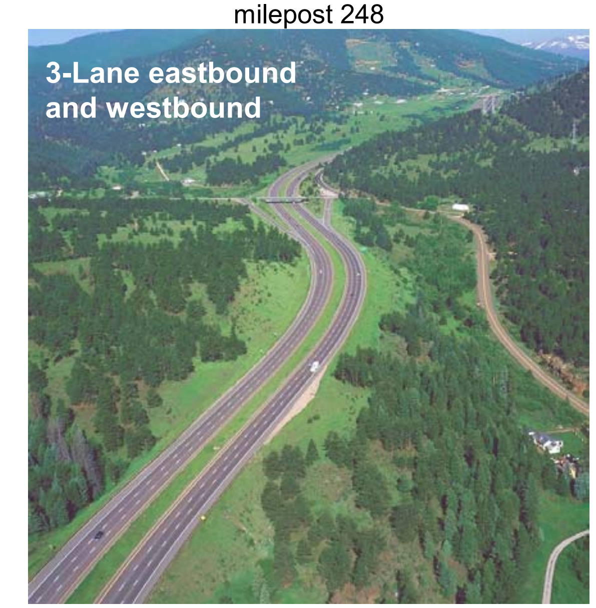
View West toward Floyd Hill milepost 246 to 245



View West toward Hyland Hills Interchange milepost 247



View West toward Beaver Brook Interchange milepost 248



Sharp Curves. I-70 passes through a series of sharp curves on either side of the Hidden Valley interchange (milepost 243) from the Twin Tunnels to US 6. The curves on the westbound descent into Clear Creek Canyon and the particularly sharp left at the intersection with US 6 result in a significant bottleneck with a speed limit reduction to 50 mph. These sharp curves along with inadequate clearances cause a high number of fixed object accidents.

Lane Drops. Along this stretch of I-70, eastbound lanes widen from two to three lanes all the way into the Denver metropolitan area, and westbound lanes transition from three lanes to two. West of milepost 244, I-70 essentially becomes a four-lane interstate through the Corridor.

Interchange Deficiencies. Two interchanges along I-70 in this study segment are considered to have capacity deficiencies: US 6 (milepost 244) and Hyland Hills (milepost 247). In addition to capacity deficiencies, the US 6 interchange also has safety issues. Most accidents at the bottom of Floyd Hill (US 6 interchange, milepost 244) occur in the westbound direction (74 percent; 83 of 112). This can be attributed to the steep grade and problematic left-hand on-ramp. The westbound on-ramp is at the base of a steep hill, is on a sharp curve, has a sight distance problem, and feeds into high traffic volumes on the mainline highway that is often near capacity during peak hours.

Table 1-32. Roadway Deficiencies and Safety Assessment, Hidden Valley to Beaver Brook

Location	Milepost	Deficiencies	Length (miles)	Safety Issues (Measured by WHI)	
				Below Average Accident Rate	Above Average Accident Rate
Twin Tunnels to base of Floyd Hill (eastbound and westbound)	242.3–244.7	Safety: Sharp curves; design speed is lower than surrounding portions of I-70	2.4		2.66
US 6 interchange	244	Capacity and safety: Heavy mainline volumes; left on and off-ramps; inadequate sight distance	N/A		0.96
Hyland Hills interchange	247	Capacity: Future eastbound traffic is expected to back up onto the I-70 mainline	N/A	-2.57	
Floyd Hill (eastbound and westbound)	246.7–247.6	Safety: Steep grades	0.9		0.16

Note: Positive WHI values indicate an above average accident rate.

Segment Focal Point: Top of Floyd Hill (milepost 246)

The stretch of I-70 along Floyd Hill between mileposts 244.5 and 247 represents the most severe constraints within this study segment. Due to these constraints, the focal point for this segment falls within this stretch of I-70. Note that with the planned third westbound lane continuing to the base of Floyd Hill for the planned US 6 and Black Hawk Tunnel interchange, the westbound bottleneck would then be the three-lane ascent from Beaver Brook to Hyland Hills.

Existing LOS. Currently, the most severe congestion in this segment occurs westbound where I-70 drops from three to two lanes, west of the Hyland Hills interchange. Severe queues form westbound due to this lane drop, especially on winter weekends with 3 hours of LOS F, and summer weekends with 2 hours of LOS F. Eastbound on a summer weekend, the steep grades along Floyd Hill result in a peak-hour LOS of D for about 9 hours. On winter weekends, eastbound travel is at LOS D for 2 hours. Weekday travel in this area is at LOS D or better in either direction. Table 1-33 shows the existing capacity and travel performance of this segment, as represented by the year 2000.

2025 Baseline LOS. Projected year 2025 eastbound capacity assumes a new acceleration lane from the proposed Black Hawk Tunnel on-ramp to 1,000 feet east of the Hyland Hills exit. Westbound 2025 capacity assumes continuation of a third lane from beyond the current lane drop west of Hyland Hills to the new Black Hawk Tunnel exit. With this change as well as the new Central City Parkway route to Central City at the Hidden Valley interchange, I-70 is expected to provide an attractive option to Denver metropolitan area residents bound for the gaming area. The projected increase in traffic on I-70 associated with these two new gaming accesses – from about 30 to 80 percent of existing volumes – are anticipated to result in 10 hours of congestion westbound on summer and winter weekends and 3 hours of congestion on weekdays. Eastbound, drivers are projected to experience LOS D on weekdays and F on weekends, with 4 hours of congestion expected on summer weekends and 2 hours on winter weekends. This eastbound congestion would be exacerbated by traffic backing up from lower-capacity sections to the east, before the Evergreen exit (shown in Segment 10).

Baseline annual peak-day hours of congestion (out of a possible 17,520 hours per year for both directions or 8,760 daytime hours)**:** 1,392

Table 1-33. 2000 Capacity and Travel Performance, Hidden Valley to Beaver Brook

Direction and Time		Average Daily Traffic (ADT)	Peak-Hour Volume (PHV)	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	20,700	2,480	D	0	4,200
	Winter Weekend	22,200	3,007	D	0	4,680
	Summer Weekend	36,700	3,067	D	0	4,480
Westbound	Weekday	26,200	2,697	D	0	3,720
	Winter Weekend	27,200	3,889	F	3	3,510
	Summer Weekend	27,500	3,459	F	2	3,580

Focal point: Top of Floyd Hill

Table 1-34. 2025 Baseline Capacity and Travel Performance, Hidden Valley to Beaver Brook

Direction and Time		Average Daily Traffic (ADT)	Percent Increase in ADT from 2000	Peak-Hour Volume (PHV)	Percent Increase in PHV from 2000	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E[a]
Eastbound	Weekday	53,100	76	4,020	59	D	0	5,600
	Winter Weekend	61,600	75	5,290	35	F	2	5,810
	Summer Weekend	75,300	47	6,050	56	F	4	5,910
Westbound	Weekday	56,700	65	4,190	58	F	3	4,020
	Winter Weekend	67,800	59	6,480	49	F	10	4,480
	Summer Weekend	70,000	50	5,490	44	F	10	4,300

Focal point: Top of Floyd Hill

[a] *Note: 2025 eastbound capacity assumes a new acceleration lane from the Black Hawk Tunnel on-ramp continues 1,000 feet east of the Hyland Hills exit. On weekends, the limiting capacity would become the three lanes between Hyland Hills and Beaver Brook. 2025 westbound capacity assumes continuation of three lanes beyond the current lane drop west of Hyland Hills to the new Black Hawk Tunnel exit, so the limiting section would become Beaver Brook to Hyland Hills.*

Baseline Peak-Hour Travel Times

For this short 4.6-mile segment, eastbound and westbound free-flow travel times and speeds are both **5** minutes at **60** mph. Baseline peak-hour travel times in Segment 9 are projected to be:

Winter westbound: **28** minutes at **10** mph — Winter eastbound: **8** minutes at **34** mph

Summer westbound: **21** minutes at **13** mph — Summer eastbound: **12** minutes at **23** mph

Current and Future Mainline Capacity Constraints

I-70 westbound (2-lane) currently experiences LOS F during both winter and summer weekends. Continuation of the third lane westbound may bring only temporary relief; westbound weekend demands are expected to exceed the three-lane capacity by 2010 or sooner. On summer weekdays westbound and weekends eastbound, demand is expected to exceed capacity by 2025. The three lanes plus the continuous acceleration lane uphill should accommodate eastbound weekday demand through 2045.

1.7.4.10 Segment 10, Beaver Brook to C-470

Segment Description

Study Segment 10 (mileposts 248 to 260) is located within Jefferson County and extends a total distance of 12.2 miles between the Beaver Brook interchange and C-470 (see Figure 1-25). This segment is characterized by steep grades and includes interchange deficiencies. Eastbound, I-70 passes half-diamond interchanges for El Rancho (milepost 251) and the Evergreen Parkway (milepost 252) before crossing a crest at Genesee (milepost 254), a focal point area.

The Genesee interchange is another peak of I-70 in Mount Vernon Canyon. The Genesee Bridge over I-70 is a clear span bridge, which is locally known as the "picture bridge" because of the westbound framed views under the bridge of the Continental Divide, and the eastbound framed views of the Denver area (see Figure 1-26).

Figure 1-25. Beaver Brook to C-470 Study Segment

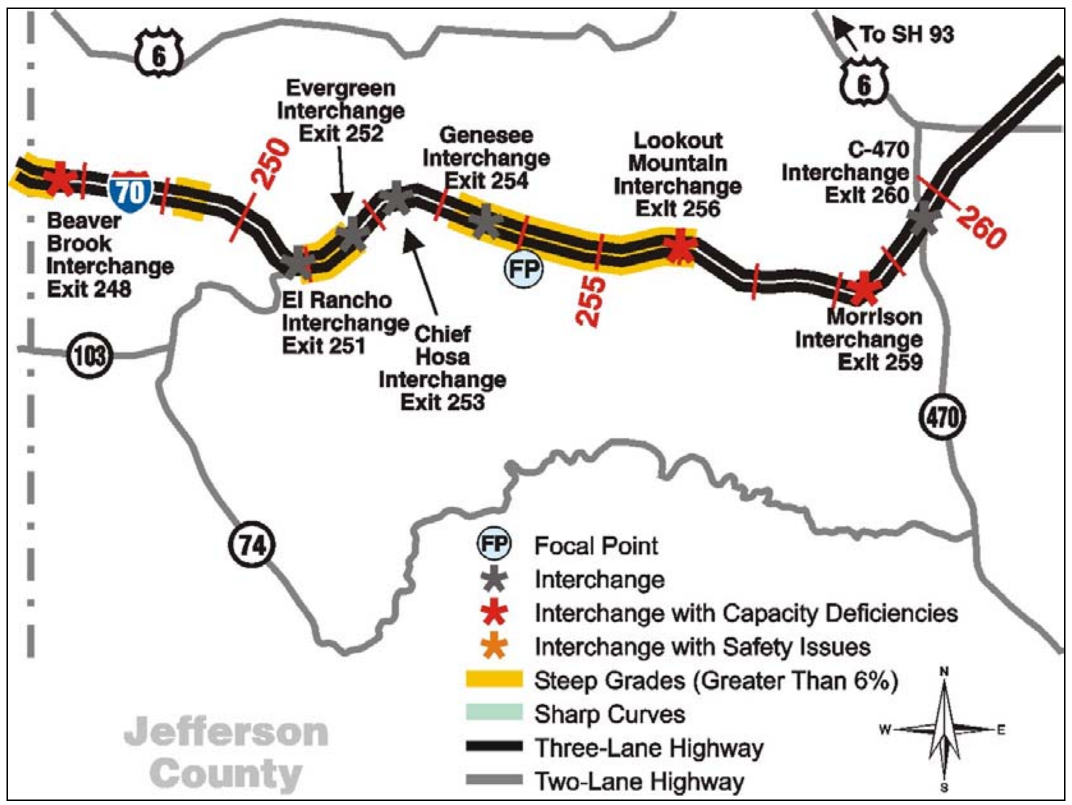
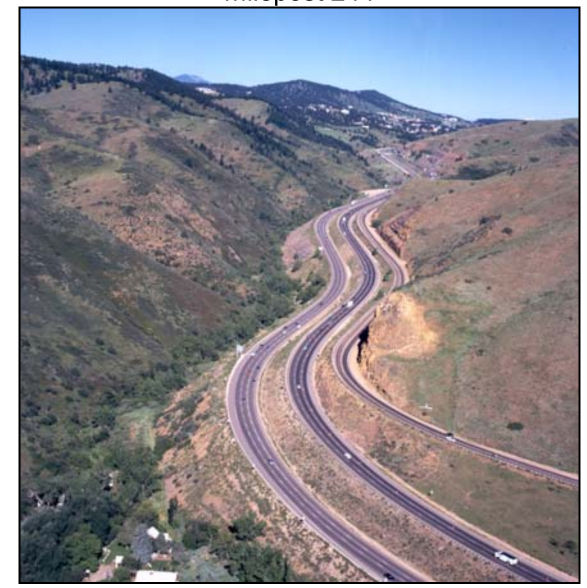


Figure 1-26. Representative Photographs of Beaver Brook to C-470 Study Segment

View West Mount Vernon Canyon
milepost 244



View West toward Hogback
milepost 259

View West toward C-470 and Hogback
milepost 260

Genesee Park Interchange Bridge ("Picture Bridge") – milepost 254

Roadway Deficiencies

Table 1-35 describes the following roadway deficiencies in Segment 10:

Steep Grades. Trucks are restricted to lower gears, and an eastbound runaway ramp is provided between Genesee and Lookout Mountain. Because a large number of trucks travel on this section—which also has several curves to conform to the terrain—the effect of heavy vehicles on capacity is considerable. It is assumed that the quick transition between flat and steep grades encourages drivers to switch lanes and reduce speed, contributing to the high percentage of sideswipe and rear-end accidents observed in the steep section between Chief Hosa and Lookout Mountain. Two fatalities were also recorded in this section.

Interchange Deficiencies. Future traffic volumes at the Beaver Brook, Lookout Mountain, and Morrison interchanges are expected to exceed capacity.

Table 1-35. Roadway Deficiencies and Safety Assessment, Beaver Brook to C-470

Location	Milepost	Deficiencies	Length (miles)	Safety Issues (Measured by WHI)	
				Below Average Accident Rate	Above Average Accident Rate
Beaver Brook interchange	248	Capacity: Inadequate westbound off-ramps intersection capacity; future traffic expected to back onto I-70	N/A	-2.40	
Lookout Mountain interchange	256	Capacity: Unsignalized ramp intersection has insufficient capacity; future traffic expected to back up onto I-70	N/A	-1.08	
Chief Hosa to Lookout Mountain interchange (Hogback) (eastbound)	253.2–256.1	Safety: Steep (6%) grades limit highway capacity	3.0	-0.42	
Morrison (Hogback) interchange	259	Capacity: US 40 to I-70 eastbound on-ramps turn capacity is inadequate for future demand	N/A	-0.72	

Note: Positive WHI values indicate an above average accident rate.

Segment Focal Point: Genesee (milepost 254)

I-70 traverses rolling terrain eastbound from Beaver Brook to the Evergreen Parkway interchange. Auxiliary lanes between the Evergreen Parkway interchange and the Chief Hosa interchange provide a momentary increase in capacity (and accompanying demand). The roadway curves east of Chief Hosa and gradually ascends to the picturesque view under the Genesee overpass, before beginning the steep, winding descent to the Denver metropolitan area.

In proximity to the Denver metropolitan area, US 40 diverges from I-70 (at milepost 259) and heads north through the town of Golden. The interchange at milepost 259 is also the location of the Hogback parking facility, which offers Corridor travelers a free place to park when carpooling. SH 93 to the Boulder area can be accessed from Golden. From the junction with US 40, I-70 then travels less than a mile to reach the project area's eastern terminus, the junction with highway C-470 (milepost 260).

Existing LOS. Currently, the worst traffic in this study segment is seen on summer weekends eastbound (4 hours of LOS E). Westbound traffic operates at LOS D during weekdays and winter weekends. On weekdays and winter weekends, eastbound I-70 experiences LOS C or better. Table 1-36 shows the existing capacity and travel performance for Segment 10, represented by year-2000 data.

2025 Baseline LOS. By 2025, both directions of I-70 are projected to operate at LOS F during the peak periods of all model days, as shown on Table 1-37. Summer weekends would experience the worst congestion: 13 hours westbound and 6 hours eastbound. Winter weekend travel is expected to experience LOS F for 6 hours westbound and 2 hours eastbound.

Baseline annual peak-day hours of congestion: 2,134

Table 1-36. 2000 Capacity and Travel Performance, Beaver Brook to C-470

Direction and Time		Average Daily Traffic (ADT)	Peak-Hour Volume (PHV)	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	33,200	2,750	C	0	4,450
	Winter Weekend	29,800	3,030	C	0	4,900
	Summer Weekend	48,000	4,060	E	0	4,690
Westbound	Weekday	36,200	2,850	D	0	4,200
	Winter Weekend	32,500	3,300	D	0	4,720
	Summer Weekend	44,700	3,860	E	0	4,490

Focal point: Genesee (milepost 254)

Table 1-37. 2025 Baseline Capacity and Travel Performance, Beaver Brook to C-470

Direction and Time		Average Daily Traffic (ADT)	Percent Increase in ADT from 2000	Peak-Hour Volume (PHV)	Percent Increase in PHV from 2000	Peak-Hour LOS	Hours of Congestion	Hourly Capacity at LOS E
Eastbound	Weekday	60,600	82	4,560	66	F	1	4,450
	Winter Weekend	65,300	119	5,120	69	F	2	4,900
	Summer Weekend	87,500	82	6,950	71	F	6	4,690
Westbound	Weekday	63,600	76	5,060	77	F	5	4,200
	Winter Weekend	71,000	118	6,370	93	F	6	4,720
	Summer Weekend	82,500	84	5,950	54	F	13	4,490

Focal point: Genesee (milepost 254)

Baseline Peak-Hour Travel Times

For the 12.2-mile Beaver Brook to C-470 segment, free-flow times and speeds are:

Westbound: **12** minutes at **62** mph   Eastbound: **11** minutes at **66** mph

Baseline peak-hour travel times for Segment 10 are projected to be:

Winter westbound: **103** minutes at **7** mph   Winter eastbound: **15** minutes at **48** mph

Summer westbound: **89** minutes at **8** mph   Summer eastbound: **21** minutes at **35** mph

Westbound peak-day, peak-hour travel during both the winter and summer seasons involves queued conditions for much of the length of this study segment.

Current and Future Mainline Capacity Constraints

Summer weekend demand is projected to exceed capacity in about 2005 eastbound and 2010 westbound. Westbound weekday demands are projected to outgrow capacity around 2015. Eastbound weekday and winter weekend demands should be accommodated by the existing roadway until just before 2020.

1.7.4.11 Summary of Corridor Segment Issues

The following summarizes Corridor study segment issues under the 2025 Baseline demand. Note that the travel model predicts that transit use on I-70 under the 2025 Baseline scenario is an insignificant mode share percentage (0 to 3 percent of total person trips on I-70).

- Even with suppression of travel in the Corridor, traffic congestion has become a fact of life for motorists on I-70 during ski season and summer weekends. Congestion on I-70, the main artery into and out of the mountains, is increasing as Colorado's population grows. The average number of vehicles that pass through the Eisenhower Tunnel daily has jumped from about 26,000 in 1998 to roughly 30,000 in 2004, an increase of 4,000 vehicles per day.
- It is anticipated that such continued congestion would be a further negative influence on economic growth in the Corridor communities. Unless improvements are made to mobility in the Corridor, the congestion is anticipated to worsen, and this would have a dampening effect on growth in demand for tourism services.
- Through Glenwood Canyon, traffic is expected to flow smoothly throughout the year, with the possibility of isolated incidents of parking on the shoulder at certain locations during peak summer weekends.
- From Dotsero to Edwards, the interchanges are projected to experience a demand higher than intersection capacity at the ramps. Mainline I-70 demand should generally flow freely throughout the year.
- The major portion of growth in Eagle County is expected to occur in the area from Gypsum to Vail. Vail and Avon would continue to act as a major recreational anchor for visitors staying overnight. Residences also would be densely developed in this area. Summer overnight traffic from the Denver metropolitan area going to the Roaring Fork Valley, western Colorado, and Utah are projected to combine with the urban-type weekday traffic and cause congestion westbound on I-70. This congestion would be most severe at the tight curves within Dowd Canyon during Friday afternoons.
- Traffic over Vail Pass is expected to be sluggish on summer Sunday afternoons eastbound as weekend visitors head back to the Denver metropolitan area and to DIA, and slow-moving trucks reduce the capacity of I-70 because of the 7 percent grades.
- Between Frisco and Silverthorne, westbound traffic during peak hours of winter and summer weekends is projected to be heavy, averaging between 40 and 50 mph. Westbound traffic would not be as severe as eastbound traffic, which is projected to encounter LOS F conditions for 174 hours annually, concentrated on weekends. (Note that this is in the context of a possible 17,520 hours per year for both directions or 8,760 daytime hours.) Eastbound congestion in this part of Summit County is projected to be exacerbated by long-distance travelers queuing before entering the east portal of the EJMT.
- The areas of greatest traffic congestion on the Corridor are expected to occur between the EJMT and C-470. Eastbound I-70 changes from two lanes to three lanes at the US 6 interchange, and westbound I-70 changes from three lanes to two west of Hyland Hills. During the summer, westbound overnight and day traffic on I-70 would cause heavy delays for motorists from the Denver metropolitan area as they travel to the mountains. Westbound traffic peak periods would spread over both Friday evening and Saturday morning to access the mountain communities and forests. However, most of these Corridor visitors would return eastbound on Sunday afternoon, causing the months of July and August to have the highest directional volumes of the year.
- Compounding the congestion problem near Denver would be gaming traffic headed to and from Black Hawk and Central City, using the new Central City Parkway to Central City at the Hidden Valley interchange, and the proposed new Silver Dollar Metro District (Black Hawk) Tunnel at US 6. Over 3 percent of the future population of the Denver metropolitan area is expected to travel to the gaming area and back each day of each summer weekend, compared to under 2 percent in 2000.
- Given the large increase in travel demand between 2000 and 2025, without significant transportation improvements, travel times may reach levels never seen before, particularly from C-470 to the EJMT. Some travelers may then choose not to make a Corridor trip; they may instead choose to do something else to avoid being stuck in I-70 traffic. This is known as "trip suppression." Suppressed trips in 2025 are those trips compared to the Baseline that would have been made, but the transportation system was less convenient, slower, or more costly than the current system. (Some observers believe that current traffic on I-70 appears to be suppressed from historical levels.) This suppression of demand would have economic consequences to the Corridor-area residents and businesses, and to the state as a whole, especially if out-of-state trips are suppressed.
- If a major improvement is made that expands capacity and allows traffic to move faster because of highway widening or diversion of highway trips to transit (or both), variations of "induced" trips over the volumes shown in the 10 segment descriptions would be expected. Induced trips are those extra trips compared to the Baseline that are made solely because the improvements make trips more convenient, faster, or less costly. Likewise, these extra, induced trips would also have economic consequences to the Corridor-area residents, businesses, and the state (especially if more out-of-state trips are induced).

1.8 Summary of Need and Problematic Areas

The Baseline travel data described in this chapter provide a summary of the need for increased mobility on the Corridor. Mobility can be affected by the choice to travel during periods of peak demand, restricted by physical properties of the roadway, or reduced when the interaction of roadway capacity and travel demand results in congestion.

1.8.1 Areas of Safety Concern

Providing for safe travel is one of the purposes to be achieved by this PEIS. Factors such as roadway geography, weather, traffic volumes, and driver characteristics can contribute to increased accident rates. Areas of safety concern were identified by a weighted hazard index (WHI) greater than zero, which indicates an above-average accident rate. WHIs were calculated for interchanges and mainline sections between interchanges. The following safety locations are shown on Figure 1-27:

- The Wolcott curve (milepost 156)
- The curves in Dowd Canyon (milepost 170 to 172)
- The west side of Vail Pass (milepost 182 to 189)
- The Copper Mountain interchange (milepost 195)
- The Officers Gulch interchange (milepost 198)
- The Silverthorne interchange (milepost 205)
- Straight Creek Canyon to EJMT (mileposts 208 to 213)
- The portion of I-70 between Loveland Pass and Bakerville (mileposts 216 to 221)
- Georgetown Hill (mileposts 226 to 228)
- Empire Junction to Dumont (mileposts 232 to 234)
- The curves near Fall River Road (mileposts 237 to 238)
- The curves and grades from the Twin Tunnels to the Hyland Hills interchange (mileposts 242 to 247)

1.8.2 Capacity Deficiencies

The problematic areas defined by capacity deficiencies reflect portions of I-70 where the 2025 Baseline demand would exceed the existing roadway capacity. Such portions may be problematic because their capacity is lower than that of surrounding roadway sections, or because travel demand is exceptionally high in that area. Analysis of demand and capacity was undertaken for both interchanges and the mainline. Because capacity deficiencies relate to travel demand in excess of capacity, strategies to reduce or manage congestion must increase capacity or change demand characteristics either at interchanges or on the mainline.

Problematic interchanges were defined as any location where ramp traffic is expected to back onto the I-70 mainline under the Baseline condition. Such a situation would violate drivers' expectations that interstate highways offer (relatively) smooth traffic flow not affected by intersection controls such as stop signs or signals. The following interchanges have been projected as being over capacity in 2025:

- Glenwood Springs interchange (milepost 116)
- Gypsum interchange (milepost 140)
- Eagle County Airport interchange and Spur Road (milepost 147)
- Edwards interchange and Spur Road (milepost 163)
- Avon interchange (milepost 167)
- Minturn interchange (milepost 171)
- Vail West Entrance (milepost 173)
- Copper Mountain interchange (milepost 195) (also has safety issues)
- Frisco/Main St. (milepost 201)
- Frisco/SH 9 (milepost 203)
- Silverthorne (milepost 205) (also has safety issues)
- Loveland Pass interchange (milepost 216)
- Silver Plume interchange (milepost 226)
- Georgetown interchange (milepost 227)
- Empire Junction interchange (milepost 232)
- Downieville interchange (milepost 234)
- Fall River Road interchange (milepost 238)
- West Idaho Springs interchange (milepost 239)
- SH 103 interchange (milepost 240)
- East Idaho Springs interchange (milepost 241)
- US 6 interchange (milepost 244)
- Hyland Hills interchange (milepost 247)
- Beaver Brook interchange (milepost 248)
- Lookout Mountain interchange (milepost 256)
- Morrison interchange (milepost 259)

Several other interchanges have been identified as in need of modification due to geometric issues or due to local interest (see Chapter 2, Description and Comparison of Alternatives, for details).

The following is an explanation of the depiction of problematic areas in Figure 1-27. "Annual hours of congestion" was determined to be the best measure reflecting the severity of mainline capacity deficiencies. While peak-hour LOS is easily calculated, it only gives a description of 1 hour. For a roadway as constrained as I-70, capacity shortfalls must be prioritized to ensure the greatest benefit to the traveling public. Therefore, annual hours of congestion are identified to explain the performance of I-70 at times other than the single peak hour of each model day.

The threshold of 365 annual hours of congestion in either direction was adopted. Just over 6 hours of congestion a day occurring during 40 to 60 peak days of the year (summer and winter) would produce a similar amount of annual congestion.

The bottom portion of Figure 1-27 shows the number of annual hours that are congested or that would be congested in 2025, with the peak-hour speed indicated by color code. Note that the focal points exceeding the 365-hour threshold are Dowd Canyon, plus the EJMT, and every focal point to the east. In fact, the focal points at the EJMT and east would have greater than 365 annual hours under congestion in *both* directions. The problematic area was then expanded to include the area of influence related to the congestion at focal points.

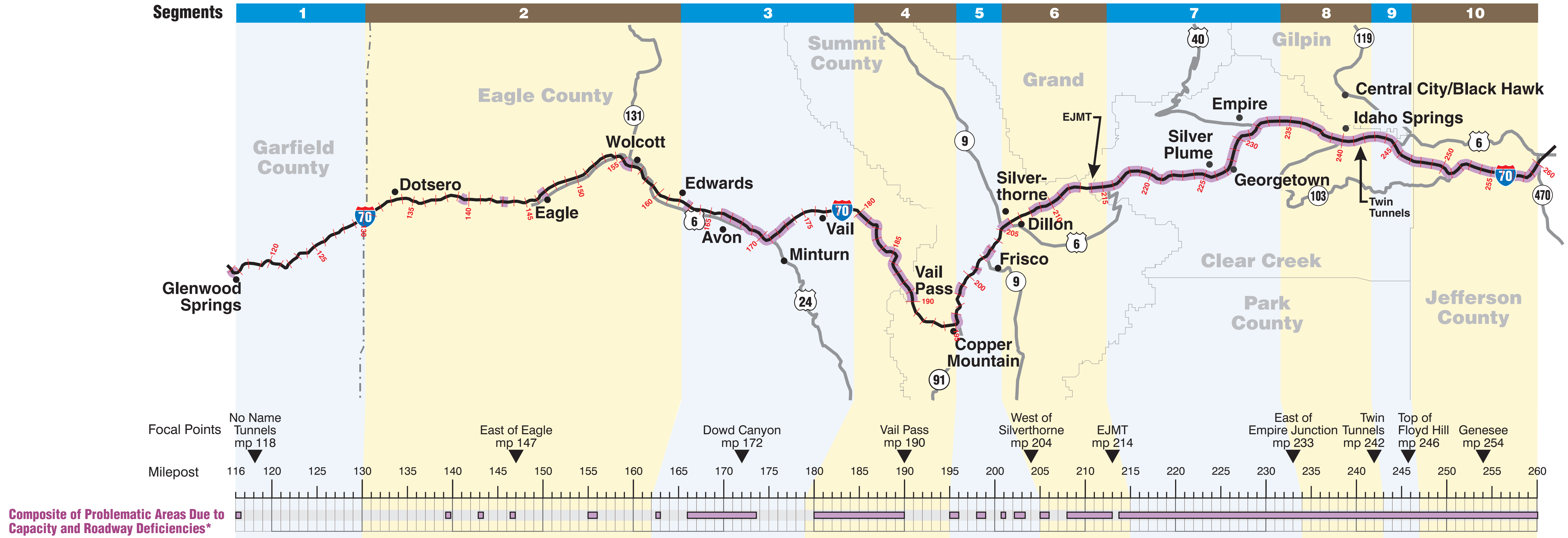
The Dowd Canyon focal point indicates capacity limitations between the Eagle-Vail interchange (milepost 169) and Vail West Entrance (milepost 173). This problematic area is characterized by sharp curves, moderate grades, and weaving traffic from closely spaced interchanges.

For the EJMT through Genesee focal points, the problematic area was established as the west portal of the EJMT to C-470. This is a 46-mile problematic area. The bottlenecks relating to the EJMT are the approaches, the westernmost being the eastbound lane drop (from three to two lanes) just outside the west portal. CDOT tunnel operational policies call for metering traffic through the eastbound Johnson bore when downstream queues – backing up as far as from Empire Junction – would result in stopped traffic in the tunnel. Similarly, it is not unusual for queues to back up from the Twin Tunnels to Empire Junction, especially under incident (accident) conditions. Therefore, the problematic area was defined as a continuous portion of I-70 between these focal points.

The portion of I-70 between the Twin Tunnels and Floyd Hill represents an area of reduced capacity because of sharp curves, and steep grades. Steep grades are also present at various locations in Mount Vernon Canyon, and under the Baseline demand, it is possible for westbound queues to back from the Twin Tunnels or the interchanges leading to the Gaming Area to as far as C-470. (Travel times could reach as much as 1 hour and 43 minutes for the easternmost 12-mile study segment.)

The final row of the roadway constraints in the middle of Figure 1-27 represents the composite of both types of problematic areas described above. The composite problematic area reflects the set of I-70 locations meeting any of the problematic characteristics: capacity deficiencies and safety issues. Together, the problematic areas represent the extent of the project need in the Corridor.

While eastbound and westbound conditions are illustrated in Figure 1-27, only eastbound summer Sunday travel times are shown, because the greatest congestion is projected to occur on this day in this direction. Appendix B, Transportation Analysis and Data, and Chapter 2, Description and Comparison of Alternatives, provide details about westbound travel, the winter season, and other weekdays.



Baseline Travel Characteristics

Hours of Congestion

Daily Range = Typical Weekday to Worst Day

Annual = Hours in the year when highway is congested (out of 8,760)

		Glenwood Springs to Garfield/Eagle County Line (13.5 miles)	Garfield/Eagle County Line to Edwards (32 miles)	Edwards to East Vail (17.5 miles)	East Vail to Copper Mountain (15.5 miles)	Copper Mountain to Silverthorne (10 miles)	Silverthorne to Loveland Pass (10.5 miles)	Loveland Pass to Downieville (18.5 miles)	Downieville to Hidden Valley (8.5 miles)	Hidden Valley to Beaver Brook (4.5 miles)	Beaver Brook to C-470 (12.2 miles)
Westbound	2000 Daily Range	0	0	0	0	0	0 to 1	0 to 2	0 to 3	0 to 3	0 to 1
Westbound	2025 Daily Range	0	0	2 to 4	0 to 1	0 to 2	2 to 8	0 to 12	2 to 9	3 to 10	5 to 13
Westbound	2000 Annual	0	0	0	0	0	20	80	130	130	30
Westbound	2025 Annual	0	0	560	10	50	719	590	690	1,100	1,550
Eastbound (Same as above)	2000 Daily Range	0	0	0	0	0	0 to 2	0 to 5	0 to 3	0	0
Eastbound (Same as above)	2025 Daily Range	0	0 to 1	0 to 3	0 to 4	0 to 6	0 to 11	0 to 10	0 to 11	0 to 3	2 to 12
Eastbound (Same as above)	2000 Annual	0	0	0	0	0	120	260	200	0	0
Eastbound (Same as above)	2025 Annual	0	10	100	100	130	580	490	740	165	1,120

Travel Times

By 10 Segments (Eastbound)

	Glenwood Springs to Garfield/Eagle County Line	Garfield/Eagle County Line to Edwards	Edwards to East Vail	East Vail to Copper Mountain	Copper Mountain to Silverthorne	Silverthorne to Loveland Pass	Loveland Pass to Downieville	Downieville to Hidden Valley	Hidden Valley to Beaver Brook	Beaver Brook to C-470
Free Flow	0:15 / 57 mph	0:26 / 75 mph	0:15 / 69 mph	0:16 / 59 mph	0:09 / 68	0:12 / 53 mph	0:16 / 68 mph	0:08 / 66	0:05 / 66	0:11 / 66 mph
2000 Summer Sunday	0:15 / 57 mph	0:32 / 61 mph	0:18 / 57 mph	0:22 / 42 mph	0:12 / 51	0:27 / 24 mph	0:42 / 25 mph	0:15 / 34	0:06 / 46	0:15 / 49 mph
2025 Summer Sunday	0:15 / 57 mph	0:35 / 56 mph	0:34 / 30 mph	0:54 / 17 mph	1:15 / 8	1:18 / 8 mph	1:45 / 10 mph	0:20 / 27	0:12 / 23	1:05 / 11 mph

By 3 Segments (Eastbound)
• Glenwood Springs to Vail East Entrance
• Vail East Entrance to Copper Mountain
• Copper Mountain to C-470

	Glenwood Springs to Vail East Entrance	Vail East Entrance to Copper Mountain	Copper Mountain to C-470
Free Flow	0:55 / 69 mph	0:16 / 59 mph	1:01 / 64 mph
2000 Summer Sunday	1:05 / 59 mph	0:22 / 42 mph	1:54 / 34 mph
2025 Summer Sunday	1:24 / 46 mph	0:54 / 17 mph	5:16 / 12 mph

Entire Corridor - Glenwood Springs to C-470 (Eastbound)

	Glenwood Springs to C-470
Free Flow	2:12 / 65 mph
2000 Summer Sunday	3:24 / 42 mph
2025 Summer Sunday	8:05 / 18 mph

Worst Hour Speed

- > 55 mph
- 45 - 55 mph
- 35 - 45 mph
- 25 - 35 mph
- 15 - 25 mph
- < 15 mph

Note: Capacity Deficiencies are defined as:
- any interchange where future ramp traffic is expected to back up onto the I-70 mainline
- any mainline location where more than 365 hours (4% annual congestion) of queuing in either direction is expected during 2025 (under the Baseline condition)

Safety Issues are identified where either the mainline or interchange weighted hazard index (WHI) is greater than one; that is, where there is an above-average accident rate.

Figure 1-27. Problematic Areas

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