# Colorado Statewide Intercity and Regional Bus Network Study

## Appendix A:
## I-70 Mountain Corridor Analysis
## (Denver to Grand Junction)

Transit Plus
Moving People & Ideas

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# INTRODUCTION

The Colorado Statewide Intercity and Regional Bus Network Study: I-70 Technical Memorandum addresses bus service needs exclusive to the I-70 Mountain Corridor (Denver to Grand Junction). As part of the broader statewide study, this technical memorandum supports the Colorado Department of Transportation (CDOT) effort in completing a comprehensive 2013 Statewide Intercity and Regional Bus Network Study that identifies intercity and regional bus service needs and priorities in the state, estimates capital and operating costs associated with various levels of service, and identifies opportunities for connecting local, regional, and intercity transit modes at intermodal stations/hub airports.

In addition to updating CDOT's current 2008 Intercity and Regional Bus Network Study, CDOT's current effort includes identifying needs for different planning horizons, preparing findings for inclusions into CDOT's State Transit and Statewide 2040 Transportation Plan, identifying possible scenarios for a preferred intercity and regional bus network plan, developing a phased implementation plan that identifies needed improvements to existing and transit networks, and funding requirements needed to implement service. This I-70 technical memorandum supports this broader effort and provides details exclusive to the I-70 mountain corridor. The reader may wish to refer to the main report for information pertinent to the statewide intercity and regional bus network, including assessments of facilities in the corridor.

Specifically, this I-70 Technical Memorandum evaluates bus service needs between Denver and Grand Junction, Colorado. It considers seasonal, weekly, and time-of-day travel patterns, identifies connectivity needs and opportunities to connect with local transit, addresses commuter, human services and recreational/other service markets, and presents options for short, medium, and long-term planning horizons. The analysis of demand in the I-70 corridor is summarized in this report, with more detail provided in Appendix C to the main study which considers demand for regional commuter buses in the north and south I-25 corridors in addition to the I-70 corridor.

The foundation for this work is a combination of the *I-70 Mountain Corridor Final Programmatic Environmental Impact Statement, March 2011 (PEIS)* and an analysis of the existing transit services and facilities in the corridor. A Technical Advisory Group (TAG) for the I-70 Corridor provided guidance in the study. This Technical Memorandum begins with a description of the long-range context from prior planning studies, followed by existing conditions, demand, and service alternatives.

# CONTEXT AND PROJECT GOALS

## LONG-RANGE CONTEXT

The long-range plan for the I-70 corridor is generally defined within the "I-70 Mountain Corridor PEIS, March 2011. This comprehensive document identified a multi-modal Preferred Alternative as the framework for improvements. Alternatives evaluated in the planning process addressed both single-mode and multi-modal solutions, including the following transit alternatives:

- The Minimal Action alternative involves a range of local transportation improvements including buses in mixed traffic serving key corridor locations, a transportation management program, interchange improvements, auxiliary lanes and curve safety modifications. These non-infrastructure transportation elements are also included in the other PEIS alternatives.
- The Rail with Intermountain Connection (IMC) alternative assumes a primarily on-grade electric facility from the west side of the metro area (Jefferson Station) to the Eagle County Airport, connecting to the IMC.
- The Advanced Guideway System (AGS) alternative assumes an elevated high-speed fixed guideway transit system that would operate from the west side of the metro area (Jefferson Station) to the Eagle County Airport.
- The Dual-Mode Bus in Guideway and Diesel Bus-in-Guideway alternatives involves a dedicated guideway with the same route structure as the Rail and AGS alternatives. Dual mode buses typically use electric power in the guideway and diesel power outside the guideway.

The PEIS provides a useful foundation for the I-70 corridor analysis as it provides an assessment of demand by mode, season, and direction for transit in the corridor. It is notable that the Bus in Mixed Traffic option was not selected as a viable "stand alone" system for the long-term, as buses would continue to be stuck in traffic, with no travel time advantage, and would not have adequate capacity for the long-term. However, buses operating in mixed traffic are included as a non-infrastructure component or strategy that could begin in advance of, or parallel with major infrastructure identified in the PEIS Preferred Alternative. As CDOT begins infrastructure work in the I-70 corridor, the timing is good to address how to begin developing transit services.

As a multi-modal analysis, actions to increase the through-flow of vehicles were analyzed and remain an important part of the PEIS. The analysis included a variety of actions at points where capacity is constrained such as the current Twin Tunnels project and proposed actions such as managed lanes. It is also notable that the analysis showed that while managed lanes would make a difference, congestion in HOV lanes would be projected because of a high volume of high occupancy vehicles.

This is a corridor in which a variety of solutions would be needed and would likely be implemented incrementally over the coming years. In the transit service alternatives in this section, the PEIS alternative for Buses in Mixed Traffic would be considered for the long-term (20+ years) and both a mid-range alternative (10 years) and a variety of short-range options have been identified. The mid- and long-range alternatives provide an understanding of where we are headed, and building transit ridership in the I-70 corridor is an important step.

## PROJECT GOALS

Following consideration of goals in the broader Colorado Statewide Intercity and Regional Bus Network Study, statements made in the PEIS, input from the I-70 TAG members, and the

consideration of applicable state policies and guidelines, intercity and regional bus service goals for the I-70 corridor were developed. They include the following:

- Provide for a network of regional transit services that serves multiple travel needs and markets.
- Develop infrastructure that supports and enhances transit efficiency.
- Provide quality regional and intercity transit services in the I-70 corridor through seamless connections to existing services.
- Provide a stable funding source for intercity and regional services.
- Develop institutional structures and policies that support quality and seamless regional and intercity transit services.

## EXISTING CONDITIONS

The I-70 mountain corridor is one of Colorado's primary thoroughfares. It connects Grand Junction and Denver over the Rocky Mountains and is critical to Colorado's recreational industry and overall economy, for freight, and connectivity between cities and towns along the corridor. The interstate covers challenging terrain, with curves and steep slopes. Weather conditions routinely impact operating conditions, particularly in the winter months. The corridor already faces significant congestion, particularly between Denver and Vail, with peak travel times occurring around weekend visitor traffic. Projected increases in traffic volumes over the next 20 years would continue to impact travel times.

### SERVICES

Existing services in the I-70 corridor are a mix of private and public services, illustrated in **Figure 1.** Privately operated services, each serving different markets, include:

- Greyhound Lines, operating a low level of service through the entire corridor.;
- A variety of private shuttle services, primarily transporting travelers from airports to resort communities, many operating hourly and on-demand services; and
- The casino shuttles with high levels of service to Black Hawk and Central City.

Services operated by the public sector have developed in Summit County (Summit Stage and Breckenridge Free Ride), Eagle County (ECO Transit, Vail Transit, and Avon), and Garfield County (Glenwood Ride and RFTA). In addition, services exist in Grand Junction (Grand Valley Transit) and the Denver metropolitan area (RTD). Initially the mountain systems were established to meet employee needs and /or reduce the need for automobiles in the small resort communities. Over time, these services have expanded to become a primary mode of transportation for residents, many of whom do not own cars, as well as visitors. Combined, these services carry over ten million riders annually.

To understand the importance and magnitude of the public and private transportation services in the corridor, it is useful to identify the general order of magnitude of services and ridership. For public services, general information is available on fleet size, miles operated, and ridership. For

private services, similar information is not available, but they must be profitable in order to remain in business. Note that the Casino shuttle services, providing access to customers and employees, are underwritten by industry so the calculus on profitability is different than for other privately operated services. The Front Range Ski Bus and University Ski Bus, each have limited weekend service from the Front Range to resorts. Ski buses are operated only during the winter months.

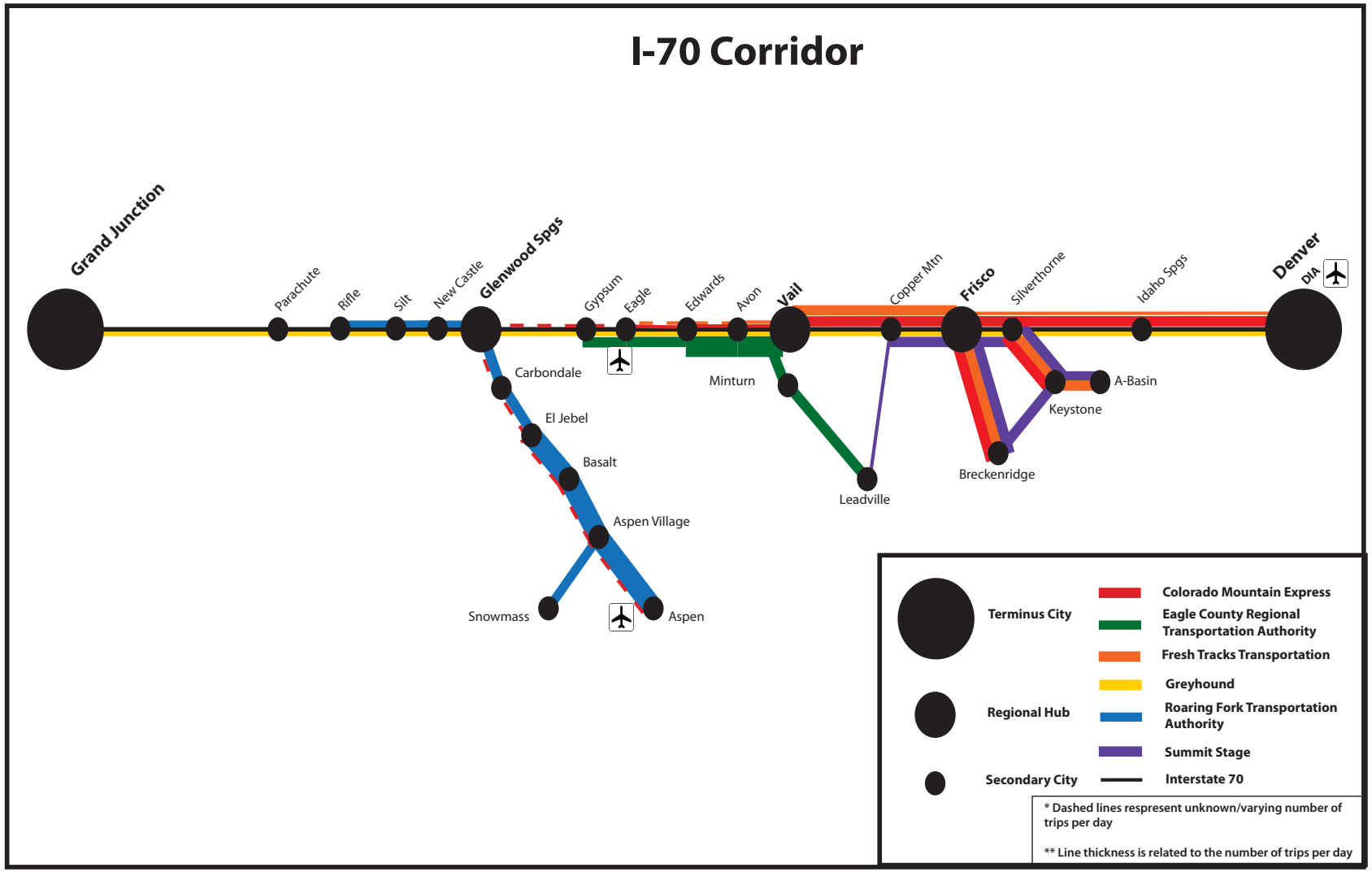
The information in Table 1 is meant to provide an order of magnitude estimate of the systems operated by the public sector. Information comes from National Transit Database for 2011, with two exceptions; Vail and Avon were collected from the Eagle County Spine Circulator Study. Public transit agencies carried over 10 million passengers in 2011, using a fleet of 220 buses and had over $41 million in annual operating expenses. The long-distance carriers charge fares but the other systems are fare-free.

**Table 1: Publicly Operated Transit Services in the Mountain I-70 Corridor**

| County and System | Active Fleet | Annual Riders | Annual Service Miles | Annual Operating Expense |
|---|---|---|---|---|
| **Summit County** | | | | |
| Summit Stage | 31 | 1,662,809 | 489,118 | $8,097,539 |
| Breckenridge Free Ride | 13 | 533,660 | 211,713 | $1,429,623 |
| **Eagle County** | | | | |
| ECO Transit | 32 | 726,390 | 1,312,184 | $5,809,465 |
| Vail Transit | 20 | 3,220,517 | 622,975 | $3,600,000 |
| Avon | 3 | 167,229 | N/A | $1,367,333 |
| **Garfield/Pitkin Counties** | | | | |
| RFTA | 117 | 3,615,965 | 3,006,816 | $19,825,808 |
| Glenwood Ride! | 4 | 448,602 | 132,391 | $908,420 |
| **TOTAL** | **220** | **10,375,172** | **5,775,197** | **$41,038,188** |

Source: National Transit Database – 2011 Rural Database and local system data for Avon and Vail

**Figure 1: Existing Bus Service in the I-70 Mountain Corridor**



The above data reflects the lower levels of service and ridership that occurred with the onset of the Great Recession (2007 through 2009). With the Recession, the number of jobs dropped sharply and many of the public sector entities lost approximately 20 percent of their revenues. While revenues, jobs, and services are increasing, this is not reflected in the 2011 numbers.

The ridership numbers underscore the key role these systems have in transporting employees. Census data shows a mode share for transit of 4.8% of workers in Eagle County (nearly 1,500) and 13.6% of workers in Pitkin County (nearly 2,500) use transit for their work trip[1]. These systems do a good job of transporting employees and visitors, with the balance between these markets different in each system. For example, Vail Transit is primarily designed for visitors and mobility in a large auto-free zone while ECO and RFTA carry a larger share of employees. These mountain transit systems have developed to the point where they can provide effective distribution of passengers traveling in the I-70 corridor. ECO Transit and RFTA are also an integral part of the transit infrastructure on I-70 corridor for employee transportation.

**Table 2: Estimate of Schedule Private Sector Service Investment in I-70 Mtn. Corridor**

| Service | Trips/Day Peak | Trips/Day Off-peak | Avg. 1-way Miles / Trip | Total Miles | Operating Cost (at $4.00/mile) |
|---|---|---|---|---|---|
| Greyhound Lines | 2 | 2 | 260 | 379,600 | $1,518,400 |
| Casino Services (Various) | 95 | 95 | 150 | 10,402,500 | $41,610,000 |
| Shuttles to Eagle County | 20 | 20 | 100 | 1,260,000 | $5,040,000 |
| Shuttles to Summit County | 50 | 35 | 75 | 1,991,250 | $7,965,000 |
| Shuttles to Winter Park | 11 | 3 | 75 | 321,750 | $1,287,000 |
| Eagle County Airport Shuttles | 8 | 4 | 70 | 260,400 | $1,041,600 |
| TOTAL | 186 | 159 | 730 | 14,615,500 | $58,462,000 |

For privately operated services, it is difficult to assess the annual operating costs. Using a cost per mile for scheduled services provides a conservative order-of-magnitude estimate. Companies only advertise a base frequency, adding vehicles as demand warrants. A company traveling between DIA and mountain communities may operate one vehicle making several stops or several vehicles each going to a separate community, based on demand. Table 2 estimates the scheduled services in the I-70 corridor and ancillary destinations such as Winter Park and Black Hawk/Central City. Those companies operating on demand only were not included, and it was assumed that shuttle services do not operate a meaningful number of trips in the ten weeks of Spring and Fall when few visitors travel to the region. These estimates are considered quite low, as the shuttle companies operate several hundred vehicles. This is only an effort to provide a baseline estimate of regularly scheduled services.

[1] **US Census Bureau, ACS 2006-2008 3yr est., Special Tabs for CTPP, as reported in Appendix B of this report**.

Source: TransitPlus. The number of trips was identified from published schedules on the Internet.

As with the publicly-funded services, employment transportation is an important aspect of the casino services. Gilpin County shows a 26 percent mode share for transit in the 2010 Census. These private services do make use of public facilities, and this is an effective way of providing support. Most of the shuttle systems have lower fares for passengers accessing the transit centers with Frisco Transit Center and Vail Transit Center used by most firms servicing those areas. Vail Transit Center also maintains a Greyhound ticket agency and is a long-standing stop for intercity services. Several of the mountain shuttle services have scheduled pick-ups and drop-offs at the Dinosaur park-and-ride lots to serve travelers who are not coming from the airport.

There is approximately a $100 million annual investment in operating transit services in the I-70 Mountain corridor. With the private sector being responsible for more than half of the total, finding ways to maintain that investment is an important strategy CDOT and other stakeholders. With the opening of RFTA's Bus Rapid Transit service in Fall of 2013, and potential expansion of service funded through CDOT, the public sector investment would increase. However, it is likely that the public sector investment would remain at less than half of the total for some time.

## Facilities and Stops

Transit infrastructure in the mountain I-70 corridor includes:

- Bus stops, ranging from transfer centers to simple bus stops;
- Maintenance and operations facilities; and,
- Park-and-ride lots.

At present, no infrastructure on I-70 specifically designed to speed the movement of buses exists. A short (3-mile) managed lane is currently being constructed as part of the renovations to the Twin Tunnels outside of Idaho Springs. CDOT is currently considering implementation of peak period shoulder lanes on I-70 between Empire Junction and Idaho Springs. I-70 roadway improvements that allow buses to bypass congestion would greatly enhance the viability of transit service in the I-70 mountain corridor.

Park-and-ride lots with sufficient capacity would need to be placed along the corridor, including in western metropolitan Denver in Jefferson County. Maintenance and operating facilities are located in Grand Junction, Glenwood Springs, Gypsum, Avon, Vail, and Frisco. The two longest distances between facilities are Grand Junction to Glenwood (90 miles) and Frisco to Denver (75 miles). Greyhound has facilities in both Grand Junction and Denver and the other maintenance facilities are operated by other providers.

Table 3 illustrates existing passenger facilities in the I-70 Corridor. Many of these facilities are owned and operated by the public sector. Exceptions include the Greyhound facility in Grand Junction (a rented facility) and the AMTRAK station in Glenwood, owned by Union Pacific railway. Local systems have a variety of additional local stops along the paths of travel between the I-70 exit and the stations, or on the frontage roads between communities.

**Table 3: Existing Passenger Facilities**

| County / Facility | Features and Connectivity | Parking |
|---|---|---|
| Greyhound | Tickets; freight services and luggage holds; staffed; indoor passenger facilities (restrooms, food). Also a maintenance facility. 2 blocks from Grand Valley Transit Center. | None |
| AMTRAK | Tickets; staffed for train arrivals/departures; indoor passenger area. 4 blocks from Grand Valley Transit Center. | 66 |
| Grand Valley TC | Tickets; staffed; Shelters | None |
| Rifle | Local stops only for RFTA Hogback route. | None |
| New Castle | Local stops only for RFTA Hogback route. | None |
| Glenwood Springs Greyhound | Uses bus stop with shelter located on Hwy 6 at Mel Ray Road & I-70, near Exit 114. Served by RFTA, Glenwood Ride, and Greyhound. | Pick-up and drop-off only |
| Glenwood Springs AMTRAK | Inside waiting facility, luggage hold, tickets, staffed when trains come through. | 0 |
| Glenwood Springs BRT | Shelter; ticket machines. | 49 |
| Gypsum | PNR at High School. ECO Transit. | 13 |
| Eagle – Chambers PNR | Shelter; served by ECO Transit | 33 |
| Avon TC | Shelters; serves Avon Transit and ECO | None |
| Hwy 24/Forest Svc. PNR | Shelter; served by ECO | 8 |
| Vail – Lionshead TC | Shelter; indoor waiting area; restrooms; served by ECO and Vail Transit | None |
| Vail TC | Shelters; indoor waiting area; staffed; tickets for multiple providers; served by Greyhound, shuttle services, Vail Transit, and ECO Transit | None |
| Copper Mountain | Stop with shelter. Served by Summit Stage | None |
| Frisco TC | Inside waiting area, staffed; Greyhound tickets and freight services. Outside shelters. | 170 |
| Silverthorne TC | Shelters, restrooms | None |
| Idaho Springs Greyhound | Bus stop sign at off-ramps | None |
| Dinosaur PNR: multiple lots | Multiple lots; served by private shuttle services. No restrooms. Security patrols. | Total of 1,375 spaces |
| West Line Federal Station Center | RTD Light rail and bus routes; ticket machines. | 1,000 |

At present Eagle County needs additional park-and-ride facilities and is currently studying the need in various locations. As ridership grows on RFTA's Bus Rapid Transit system on Highway 82, it is anticipated that additional parking would be needed in Glenwood Springs. A new facility in Glenwood Springs that would serve RFTAs BRT, Greyhound, and have service to AMTRAK is planned near the City Hall. Construction timing is dependent on obtaining funding. In addition, an upgraded facility may be considered for West Glenwood.

Options available for Metro Denver residents wishing to use transit to travel to the I-70 mountain corridor include:

- Dinosaur park-and-ride lots, with the Mastodon Lot served by several shuttle companies.
- Multiple locations in Metro Area for Casino shuttles, with most at shopping centers whose lots are otherwise not fully utilized.
- Winter ski buses (Front Range Ski Bus, University Ski Bus, Denver Ski Bus) primarily providing weekend service from downtown Denver, University of Denver, and Dinosaur park-and-ride lots.

Construction of RTD's Eagle project will link DIA to downtown via rail service. The project is scheduled be completed in 2016. Either the Federal Center Station or Jefferson County Government Center – Golden Station would have the potential to serve transit routes in the mountain I-70 corridor.

## DEMAND FOR SERVICES

This section contains a general discussion of demand. For a detailed analysis, please see Appendix C of the Colorado Intercity and Regional Bus Network Plan – 2013.

Traffic projections for the I-70 corridor demonstrate that in the long-term corridor travel demand will continue to grow and congestion will continue to worsen, particularly in peak periods. The PEIS, with a focus on the segment between Denver and Vail, demonstrated that provision of transit with a high level of service in the corridor would attract riders. The mountain communities have demonstrated demand for transit by both employees and visitors. Their experience shows also that once systems are extensive enough to provide a viable alternative to a car, the services become an integral part of the transportation and community infrastructure, widely used for all types of trips. RFTA also has, over 25 years, developed highway and transit infrastructure along Highway 82 that results in buses being able to make the trip between Glenwood Springs and Aspen faster than automobiles. RFTA's efforts culminate with the opening of VelociRFTA Bus Rapid Transit in September of 2013.

Long term

The I-70 Mountain Corridor PEIS (September 2010) performed extensive analysis of multimodal alternatives using a regional travel demand model for the planning horizon year of 2025, with an update to 2035. The alternatives focused on serving recreational demand and ranged from minimal transit to high speed, new technology fixed guideway service in the corridor between

west metropolitan Denver and Vail. In general, the PEIS demonstrated that there is high future demand for transit in the corridor for any of several technologies.

Another PEIS alternative that evaluated I-70 buses in mixed traffic also demonstrated sufficient ridership demand in 2025. The alternative assumed several routes of frequent express buses between Denver and multiple resorts, with limited stops. This level of service resulted in a weekend transit mode share of up to 5 percent, and a weekday transit share of up to 2 percent, on most segments of the I-70 corridor between Denver and Vail.

The PEIS results fostered a follow-up feasibility study, currently in progress, to more closely examine technological, financial, and ridership potential for an Advanced Guideway System (AGS). The vision of the AGS system is a high-speed transit system for the 120-mile segment of the I-70 Mountain Corridor from C-470 in Jefferson County to Eagle County Regional Airport. The intent of an AGS is to offer a new choice of travel and increase mobility, while also reducing congestion and improving safety by removing some portion of the automobile and truck traffic on I-70.

As a build-up to the potential AGS vision, a long-term transit scenario could be the provision of regional bus service in the corridor. The buses would operate in mixed traffic, or on managed lanes as available. The bus service would be relatively frequent on weekdays, and have higher levels–of-service on weekends during peak seasons. The buses would generally serve the human, commuter, and recreation travel markets.

Mid-term

In advance of implementation of a long-term transit system, a mid-term scenario of buses has been developed to serve the variety of travel markets in the I-70 mountain corridor. This mid-term scenario with moderate levels of bus service would be implemented over 10 to 20 years, and would require associated investments in supporting infrastructure such as park-and-ride lots, stations, and maintenance facilities.

As service is developed in the I-70 mountain corridor, actual ridership on services would relate to quality of service factors, including:

- Level of service, as measured in frequency and span of service;
- Travel time, as compared to auto travel times;
- Fares;
- Safe and secure parking and/or ease of transfer to other transit services; and,
- Amenities on vehicles such as room for storing recreational equipment and luggage, WiFi, wheelchair access, etc.

The public transit services that have developed in segments of the I-70 mountain corridor illustrate the significant ridership that can be garnered when viable service is provided. At this point, the public transit services have developed in segments of the corridor rather than the whole corridor. While visitor transportation is an important aspect of these services, they do not

serve the Denver to mountain resort market nor do they address the significant congestion issues that occur in peak travel periods between Denver and Vail.

As service is developed in the I-70 corridor, it is anticipated that levels of service would be based on demand, follow infrastructure improvements, and be held to standards similar to those that Summit Stage, ECO Transit, and RFTA use. The service plan would need to allow for time to build ridership in each segment.

## SERVICE SCENARIOS

Over the past several years, mobility and congestion in the I-70 mountain corridor has been the subject of several CDOT studies and projects. Moreover, CDOT considers existing and proposed transit service as a critical element to these mobility and congestion issues for I-70 commuters. Organized by long, middle, and short-term operational scenarios, CDOT has proposed service characteristics, identified below, that would be developed in more detail as CDOT's statewide intercity and regional bus program is further analyzed. The I-70 Mountain corridor poses several challenges for intercity and regional bus service. As a result, a variety of solutions would be required to respond to the varying transportation needs in the coming years; moreover, these solutions would need to be implemented incrementally in order to keep pace with ridership demands and future funding availability.

Key to the success of Intercity and regional bus service in the I-70 Mountain corridor is CDOT's ability to manage expectations while realizing major changes in the policy context for such services. These changes include:

- The creation of a new state Division of Transit and Rail with significantly broader powers and state funding to operate or contract for services, set fares and establish schedules.
- Federal policy under MAP-21providing the statutory authority for an in-kind match program that has been used successfully by Colorado to build a network of rural intercity services without having to use local or state funds.
- Policies and competition of the carriers combined with the uncertainty as to whether or not the state would be required to financially support these carriers.

Prior to implementing any of the proposed service characteristics identified below, policy and funding implications would need to be evaluated before any of the proposed bus services may be implemented by CDOT.

### LONG-TERM OPERATING SCENARIO

The long-term operating scenario for the I-70 corridor is generally defined in the *I-70 Mountain Corridor Final Programmatic Environmental Impact Statement, March 2011 (PEIS)*. The PEIS provides a useful foundation for long-term operating scenarios for the I-70 corridor analysis as it provides an assessment of demand by mode, season, and direction for transit in the corridor. The purpose of the transportation improvements, as presented in the PEIS, are to increase capacity, improve accessibility and mobility, and decrease congestion for travel demand

(projected to occur in 2050) to destinations along I-70 as well as for interstate travel, while providing for and accommodating environmental sensitivity, community values, transportation safety, and the ability to implement the proposed solutions for the corridor.

The PEIS examined multimodal alternatives using a regional travel demand model for the planning horizon year of 2025, with an update to 2035. The alternatives focus on serving recreational demand and range from minimal transit to high speed, new technology fixed guideway service in the corridor between west metropolitan Denver and Vail. In general, the PEIS demonstrates that there is high future demand for transit in the corridor for any of several technologies.

One option analyzed was buses in mixed traffic, or on managed lanes as available. Such bus service would be relatively frequent on weekdays, and have higher levels of service on weekends during peak seasons. Although this alternative was not selected as one of the final options due to the lack of capacity, the alternative provides a viable option as a build-up to the potential AGS vision. The bus in mixed traffic alternative is presented here as one option. Much has changed since this was developed, but it provides a useful perspective on a service design and the level of service that was considered. The service plan included several routes of frequent express buses between Denver and multiple resorts, with limited stops. This level of service resulted in a weekend transit mode share of up to 5 percent, and a weekday transit share of up to 2 percent, on most segments of the I-70 corridor between Denver and Vail.

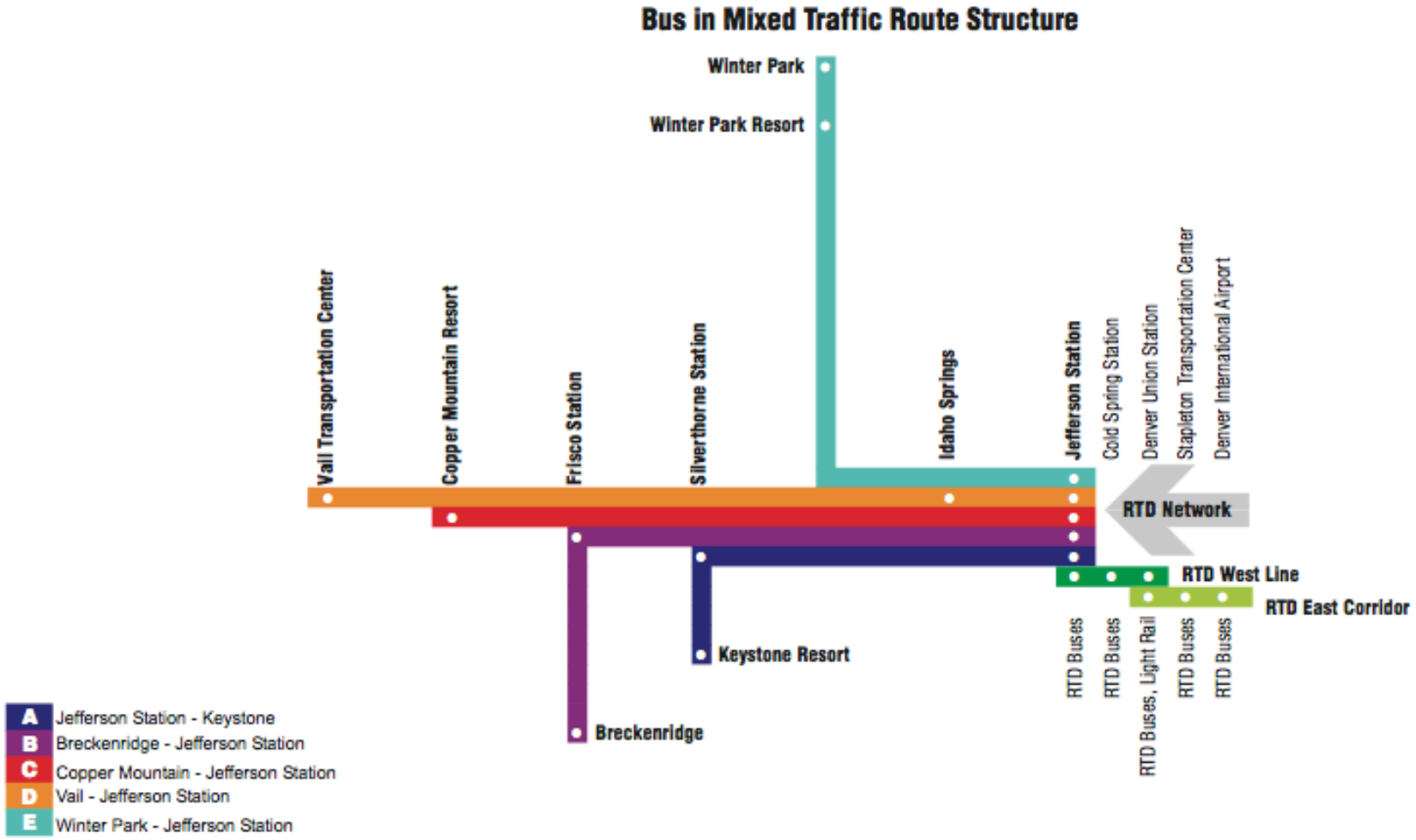
The results of the PEIS fostered a follow-up feasibility study, just being completed, to more closely examine technological, financial, and ridership potential for an Advanced Guideway System (AGS). The vision of the AGS system is a high-speed transit system for the 120-mile segment of the I-70 Mountain Corridor from C-470 in Jefferson County to Eagle County Regional Airport. The intent of the proposed AGS is to offer a new choice of travel and increase mobility, while also reducing congestion and improving safety by removing some portion of the automobile and truck traffic on I-70. The AGS study has found that while technologically feasible to operate a high-speed system, at this point it is not likely to be financially feasible.

As a multi-modal analysis, actions to increase the through-flow of vehicles were analyzed and remain an important part of the PEIS. These include a variety of actions at points where capacity is constrained (such as the current Twin Tunnels project) and management actions such as managed lanes. It is also notable that the analysis showed that while managed lanes would make a difference, congestion in HOV lanes is also projected because of a high volume of high occupancy vehicles.

***Proposed Service Characteristics***

*Bus in Mixed Traffic (PEIS)* – A conceptual bus service plan was developed for the PEIS in order to represent and evaluate a "buses traveling in mixed traffic" scenario, as illustrated in **Error! Reference source not found.**. It included five routes traveling between Denver and key resort activity centers. It generally consisted of express services with, at most, one intermediate stop. The five routes include:

**Figure 2: PEIS Service Scenario for Bus in Mixed Traffic (Prepared in 2011)**



Route A: Jefferson Station to Keystone, with a stop at the Silverthorne Station

- Route B: Jefferson Station to Breckenridge, also stopping at the Frisco Station
- Route C: Jefferson Station to Copper Mountain
- Route D: Jefferson Station to Vail Transportation Center, with a stop in Idaho Springs
- Route E: Jefferson Station to Winter Park, serving a stop at the transportation center in the Town of Winter Park and a stop at the base of the ski lifts

This plan illustrates the level of service deemed appropriate to the demand. Note that the routes go through to final major destinations, but riders could also transfer to local buses. For example, Route B goes to Breckenridge station but also stops at Frisco. The PEIS did not evaluate potential service west of Vail as ECO Transit services that area.

*Frequencies* – The highest demand would occur on winter weekends, when all routes would operate at 20-minute headways during peak periods. The plan has varied service levels by time of year. Table 4 below illustrates the frequencies. Where a range is shown, the more frequent service is provided in the peak period and the less frequent service is operated in times of lower ridership.

**Table 4: Proposed Frequencies of Bus in Mixed Traffic Option (I-70 PEIS)**

| | Winter Peak Weekend | Summer Peak Weekend | Weekday |
|---|---|---|---|
| A: Keystone | 20 | 30 | 60 |
| B: Breckenridge | 20 | 20 | 40 – 60 |
| C: Copper Mountain | 20 | 40 | 60 |
| D: Vail | 20 | 20 | 20 – 60 |
| E: Winter Park | 20 | 20 | 60 |

This operating plan results in 15 buses departing each hour in the Winter peak and 12 buses departing each hour in the Summer peak, all leaving from the station at the west side of the Denver Metro area.

Fares (I-70 PEIS) – Fares were proposed based on $0.10 per mile, resulting in a fare competitive to the auto based on vehicle occupancy rates and the IRS cost of owning and operating a car at that point in time: $0.365 per mile. With auto costs now at $0.565 per mile, the equivalent fare rate would be about $0.15 per mile, assuming similar auto occupancy rates.

The PEIS demonstrated that long-term corridor travel demand would continue to grow from today's levels, and that provision of transit with a high level of service in the corridor would attract riders. While viable options for transit service would change over time and available funding, and on-going improvements to corridor would impact demand, the PEIS serves as a useful benchmark from which long-term service scenarios may be measured, evaluated and considered.

## MID-TERM OPERATING SCENARIO

In advance of implementation of a long-term transit system, a mid-term operating scenario has been developed to serve the variety of travel markets in the I-70 mountain corridor. This mid-term scenario, with moderate levels of bus service, would be implemented over 10 to 20 years, and would require associated investments in supporting infrastructure such as park-and-ride lots, stations, roadway improvements, and maintenance facilities. It would serve each of the market segments (commuter, recreational, and human services), start at a lower level of service, expand over time, and would provide an example of how publicly funded services may operate after several years of development and implementation.

The mid-term scenario is developed at a conceptual level of detail. It is meant to provide a starting point for discussion and highlight issues related to the development of services in a corridor where there are a variety of public and private transportation providers. While this service scenario focuses on publicly funded transit services, the intention is that these would operate within a broader network that includes the full range of private transportation operators as well. It is anticipated that the services described in this scenario would be provided under contracts and infrastructure investments would benefit both public and private providers.

### *Service Characteristics of Proposed Mid-term Alternative*

*Routing* – The routing pattern for the I-70 corridor would be comprised of the following segments:

- Denver-Frisco
- Frisco-Vail
- Vail-Eagle
- Eagle-Gypsum
- Gypsum-Glenwood Springs
- Glenwood Springs-Rifle
- Rifle-Grand Junction

The proposed segments reflect natural travel patterns, show where differences in headways are warranted, and are developed from current operational divisions among publicly funded transit providers. Table 5 depicts a potential plan for the mid-term scenario with moderate levels of bus service in the corridor. The service would consist of seven interlined routes between Denver and Grand Junction, and a separate route between Denver and Winter Park. The level of service would vary by segment per expected levels of demand. The service level would typically be higher on weekends and lower on weekdays. In general the routes would fully connect communities and serve all the various travel markets, including commuter, human service, and recreational.

The service plan includes two levels of service:

- Extended Service Days: 103 days per year, generally Friday – Sunday during the winter and summer seasons with some additional days during holidays
- Regular Service Days: 262 days per year, generally Monday – Thursday during the winter and summer seasons and daily during the shoulder seasons.

## Table 5: Mid-Term Operating Scenario

| Segment | Service Level | One-way Length | One-way Time | Vehicles Days | Vehicles Peak | Vehicles Base | Span Peak | Span Base | Frequency Peak | Frequency Base | Trips -1-way Peak | Trips -1-way Base | Annual by Season Hours | Annual by Season Miles | Daily Capacity Peak | Daily Capacity Base |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Denver – Frisco** | Extended | 75 | 1.75 | 103 | 7 | 3.5 | 6 | 9 | 30 | 60 | 12 | 9 | 7,571 | 324,450 | 1,200 | 900 |
| | Regular | 75 | 1.75 | 262 | 0 | 1.75 | 0 | 15 | 0 | 120 | 0 | 8 | 7,336 | 314,400 | 0 | 800 |
| **Denver – Winter Park** | Extended | 72 | 1.85 | 103 | 3.7 | 3.7 | 6 | 9 | 60 | 60 | 6 | 9 | 5,717 | 222,480 | 600 | 900 |
| | Regular | 72 | 1.85 | 262 | 0 | 1.85 | 0 | 15 | 0 | 120 | 0 | 7 | 6,786 | 264,096 | 0 | 700 |
| **Frisco – Vail** | Extended | 28 | 0.66 | 103 | 1.32 | 1.32 | 6 | 9 | 60 | 60 | 6 | 9 | 2,039 | 86,520 | 600 | 900 |
| | Regular | 28 | 0.66 | 262 | 0 | 0.66 | 0 | 15 | 0 | 120 | 0 | 7.5 | 2,594 | 110,040 | 0 | 750 |
| **Vail – Eagle** | Extended | 32 | 0.66 | 103 | 2.64 | 1.32 | 6 | 9 | 30 | 60 | 12 | 9 | 2,855 | 138,432 | 1,200 | 900 |
| | Regular | 32 | 0.66 | 262 | 2.64 | 1.32 | 0 | 15 | 30 | 60 | 0 | 15 | 5,188 | 251,520 | 0 | 1,500 |
| **Eagle – Gypsum** | Extended | 8 | 0.33 | 103 | 1.32 | 0.66 | 6 | 9 | 30 | 60 | 12 | 9 | 1,428 | 34,608 | 1,200 | 900 |
| | Regular | 8 | 0.33 | 262 | 1.32 | 0.66 | 6 | 9 | 30 | 60 | 12 | 9 | 3,631 | 88,032 | 1,200 | 900 |
| **Gypsum – Glenwood** | Extended | 24 | 0.66 | 103 | 2.64 | 1.32 | 6 | 9 | 30 | 60 | 12 | 9 | 2,855 | 103,824 | 1,200 | 900 |
| | Regular | 24 | 0.66 | 262 | 0 | 0.66 | 0 | 15 | 0 | 120 | 0 | 7.5 | 2,594 | 94,320 | 0 | 750 |
| **Glenwood – Rifle** | Extended | 30 | 0.75 | 103 | 0 | 1.5 | 0 | 15 | 0 | 60 | 0 | 15 | 2,318 | 92,700 | 0 | 1,500 |
| | Regular | 30 | 0.75 | 262 | 0 | 0.75 | 0 | 15 | 0 | 120 | 0 | 7.5 | 2,948 | 117,900 | 0 | 750 |
| **Rifle – Grand Junction** | Extended | 63 | 1.25 | 103 | 0 | 2.5 | 6 | 9 | 0 | 60 | 0 | 9 | 2,318 | 116,802 | 0 | 900 |
| | Regular | 63 | 1.25 | 262 | 0 | 1.25 | 0 | 15 | 0 | 120 | 0 | 7.5 | 4,913 | 247,590 | 0 | 750 |
| TOTAL | Extended | | 7.91 | | 18.62 | 15.82 | | | | | | | 63,091 | 2,607,714 | | |
| | Regular | | 7.91 | | 3.96 | 8.9 | | | | | | | | | | |

It is recognized that consistent year-round operating schedules are likely warranted in Eagle County and the RFTA service area and in most cases they already provide a higher level of service than suggested here. However, the plan presented here purposely identifies a similar operating pattern throughout the corridor as a staring point for discussions.

It is useful to think of the service plan in terms of the following routes:

- **Denver to Vail via Frisco**: For Extended service, 30-minute frequency is scheduled from Denver to Frisco, with half the buses continuing to Vail on 60-minute frequencies in the peak periods. During base periods, 60-minute service is scheduled on the entire route. The Regular service days have service every two hours the entire length of the route.

- **Denver to Winter Park**: For Extended service, 60-minute service is scheduled. The Regular service days have service every two hours.

- **Vail to Gypsum**: 30-minute peak and 60-minute base frequency is scheduled in this stretch for both Extended and Regular service days. Note that this is less service than ECO Transit currently operates in much of their current services. It serves to illustrate how this service plan is for a nominal level of service and that once service is developed demand is expected to exceed the available capacity.

- **Gypsum to Glenwood**: 30-minute peak and 60-minute base frequency is scheduled in this stretch for Extended service days. 120-minute service is scheduled for Regular service days. Again, this stretch is projected to be able to support higher levels of service, with consistent service during the entire winter season, and reflects the nominal level of service in this plan.

- **Glenwood to Rifle**: 60-minute service is scheduled all day on Extended service days and 120-minute service is scheduled on Regular service days. As with the Gypsum to Glenwood stretch, consistent service is warranted during the entire winter season and likely all year.

- **Rifle to Grand Junction**: 60-minute service is scheduled on Extended service days and 120-minute service on Regular service days. This is the portion of the corridor with the lowest levels of demand, yet in the 20-year time frame of this plan these service levels may be warranted. The travel patterns in this section of the corridor are different than in the resort-based economies east of Rifle.

It is important to note that service would need to be built incrementally along with the implementation of infrastructure. Park-and-ride lots with sufficient capacity would need to be placed along the corridor, including in western metropolitan Denver in Jefferson County. I-70 roadway improvements that allow buses to bypass congestion would greatly enhance the viability of transit service in the I-70 mountain corridor. CDOT is currently considering

implementation of peak period shoulder lanes on I-70 between Empire Junction and Idaho Springs.

Note that Table 5 indicates the daily capacity per segment but not the ridership. The capacity requirements are based on the overall demand levels, but this planning is relatively high level. More detailed service planning would be needed to estimate ridership. It will be useful to gain some experience with initial low levels of service to determine travel patterns and gain an understanding of the level of two-way traffic and the degree to which riders use the service to travel long distances (such as Denver to Vail) versus shorter distances (such as Frisco to Vail). The more bi-directional traffic and the more there are short trips, the higher the actual ridership numbers will be.

The capacity ranges from 900 seats available daily in the Rifle to Grand Junction segment, to between 1,500 and 2,100 seats available between Denver and Rifle. The capacity numbers include both east and west-bound vehicles.

With long-distance services, ridership is often measured in terms of the passengers per trip (especially for publicly funded long-distance services where riders travel to a single destination such as a downtown work location). The private sector typically considers revenue per mile, setting fares so that total revenues exceed total expenses per mile. The budget calculations assume an ridership levels that are in line with Colorado's experience on other regional services, between .60 and .80 passenger boardings per mile and between 17 and 22 passengers per trip. As it is difficult to define "trips" on a system with so many segments, the passenger boardings per mile can be used to estimate ridership. The low estimate of .60 passenger boardings per mile is used because some segments are long (75 miles).

The total system, with 2.6 million miles of service per year, would be expected to carry 1.6 million annual passengers, based on 0.6 passengers per mile. On a daily basis, this equates to between 4,300 average daily riders. Looking at a single segment, Denver to Frisco, and applying the same factors provides an estimate of 383,000 annual riders or 2,600 daily riders.

When considering congestion, the level of riders during peak periods is important. Applying these same factors to service levels in the regular and extended seasons, the Denver-Frisco segment would be expected to carry between 700 passengers per day in the regular season and 1,900 passengers on an average extended season day.

While average auto occupancy rates are reported at between 2.7 and 3.2 persons per car, the pricing of this service will likely encourage its use by more single passengers than autos that are fully loaded. Using the lower rate of 2.7 passengers per vehicle, on peak days this service would be expected to replace between 700 cars in the segment between Denver and Frisco on a typical extended season day.

### *Special Considerations*

This scenario illustrates special considerations in the I-70 corridor. This is a corridor in which there are a variety of public and private transit providers, many of which provide long-distance and regional services. This provides the potential of having a wide range of regional services in place serving all markets and the challenge of doing so in a manner that is seamless for the traveler and supports private sector investment. In addition, implementing this scenario requires:

- Service improvements in all segments except Vail to Eagle / Gypsum and perhaps Glenwood to Rifle where quality service is already provided.
- Infrastructure improvements, including park-and-ride lots, stations/stops, and roadway improvements.
- Policy considerations regarding how to support private and public sector providers in the corridor, fares, joint facility development, etc.
- The role of CDOT and local governments in funding service costs (operating and capital) and sharing revenues.

### *Financial Characteristics of Mid-term Alternative*

*Operating Costs*

**Table 6** illustrates the financial characteristics of each segment in the mid-term operating scenario. The costs illustrated in the table are intended to provide an order-of-magnitude understanding of the mid-term scenario. The table shows the relative operating cost of each segment, calculated at $5.00 per mile. This is a fairly high cost, but indicative of the costs of operating in the I-70 Mountain Corridor. It also allows for administrative costs. Capital costs are not included, but are discussed below.

The segments in Eagle County and from Glenwood Springs to Rifle present interesting facets of developing service in the corridor. ECO Transit already operates the proposed level of service in the corridor and has plans for expansion. RFTA operates service between Glenwood Springs and Rifle, with nine westbound trips and seven eastbound trips daily. Although the service has been reduced from previous levels there is a desire among communities between Glenwood and Rifle to expand this service. The existing service segments in Eagle County are shown as "locally financed" and all revenues generated would go to Eagle County. For the segments from Gypsum to Glenwood Springs and Glenwood Springs to Rifle, local financing is assumed to cover half of the service while State financing would cover the other half. Half of the revenues are shown as going to local agencies and half to the State.

**Table 6: Financial Characteristics of Mid-term Operating Scenario**

| Segment | Service Level | Annual Miles | $5.00/mile Cost | Local Financing (1) | Operating Revenues (1) (2) |
|---|---|---|---|---|---|
| Denver – Frisco | Extended<br>Low | 324,450<br>314,400 | $1,622,250<br>$1,572,000 | | $584,010<br>$565,920 |
| Denver – Winter Park | Extended<br>Low | 222,480<br>264,096 | $1,112,400<br>$1,320,480 | | $333,720<br>$396,144 |
| Frisco – Vail | Extended<br>Low | 86,520<br>110,040 | $432,600<br>$550,200 | | $155,736<br>$198,072 |
| Vail – Eagle | Extended<br>Low | 138,432<br>251,520 | $692,160<br>$1,257,600 | $692,160<br>$1,257,600 | |
| Eagle – Gypsum | Extended<br>Low | 34,608<br>88,032 | $173,040<br>$440,160 | $173,040<br>$440,160 | |
| Gypsum – Glenwood | Extended<br>Low | 103,824<br>94,320 | $519,120<br>$471,600 | $259,560<br>$235,800 | $77,868<br>$70,740 |
| Glenwood – Rifle | Extended<br>Low | 92,700<br>117,900 | $463,500<br>$589,500 | $231,750<br>$294,750 | $111,240<br>$141,480 |
| Rifle – Grand Junction | Extended<br>Low | 116,802<br>247,590 | $584,010<br>$1,237,950 | | $140,162<br>$297,108 |
| **TOTAL** | | **2,607,714** | **$13,038,570** | **$3,584,820** | **$3,072,200** |

Notes:
(1) 100 percent of the segments from Vail to Eagle and Eagle to Gypsum are locally funded; 100 percent of revenues are credited to ECO Transit. Fifty percent of the segments from Gypsum to Glenwood and Glenwood to Rifle are locally funded; fifty percent of the fares are credited to local providers.
(2) Revenues calculated at $0.12 per passenger mile.

The breakout of costs is arbitrary and meant to illustrate a key issue that would need to be resolved over time. As mentioned earlier, the issue is that it will be necessary to establish policies regarding the financial responsibility of the State of Colorado and that of local governments in building a regional network of services along I-70 and other key corridors. Traditionally, local governments in Colorado have funded transit services. ECO Transit and RFTA are outstanding examples of local residents stepping up to this challenge. As the State implements the regional transit services envisioned in the PEIS, it would be necessary to consider the role of the State in funding these services.

*Vehicle Costs*

Depending of the segments and their connectivity, it is estimated that the mid-term operating scenario would require between 23 and 25 vehicles, including spares. Overall, the vehicles are expected to travel 2.6 million miles annually, resulting in mileage of between 104,000 and 114,000 per vehicle per year. Given this level of use, a twelve-year life span is appropriate based on industry standards

Using an initial cost of $600,000 per vehicle for over-the-road coaches, the total capital investment would be between $13.8 and $15 million for 23-25 buses. Depreciation over 12 years would result in an annual capital cost of between $1.15 and $1.25 million.

*Fares*

The Farebox Recovery Ratio is the percentage of fares from riders that cover the costs of operation. It is computed by dividing the system's total fare revenue by its total operating expenses. Flexible fare structures and annual ridership effect farebox recovery. However, variable fare rates that attract more riders require more management time and investment in higher-level ticket vending technologies.

An average passenger fare per mile has been used to establish fares in zones oriented to key destinations. The long-term scenario presented above used a fare of $0.10 per mile, and its equivalence today would be approximately $0.15 per mile. CDOT has been evaluating $0.12 to $0.16 per mile for the express services in the I-25 corridors.

Public sector providers have varying fare structures: Summit Stage is free to riders; ECO Transit has a flat cash fare that equates to about $0.08 per mile for the longest rides; and RFTA has a zone fare that equates to $0.17 per mile in the Glenwood Springs to Rifle corridor. Both ECO and RFTA have a range of passes where cost per ride is significantly lower than the cash fare. Most workers use monthly or annual passes with employers often providing transit passes as part of the job benefits.

On the private sector side, fares range from about $0.20 to $0.30 per mile for Greyhound intercity services and $0.45 - $0.50 for point-to-point shuttle services. Shuttle services that are door-to-door are a higher rate.

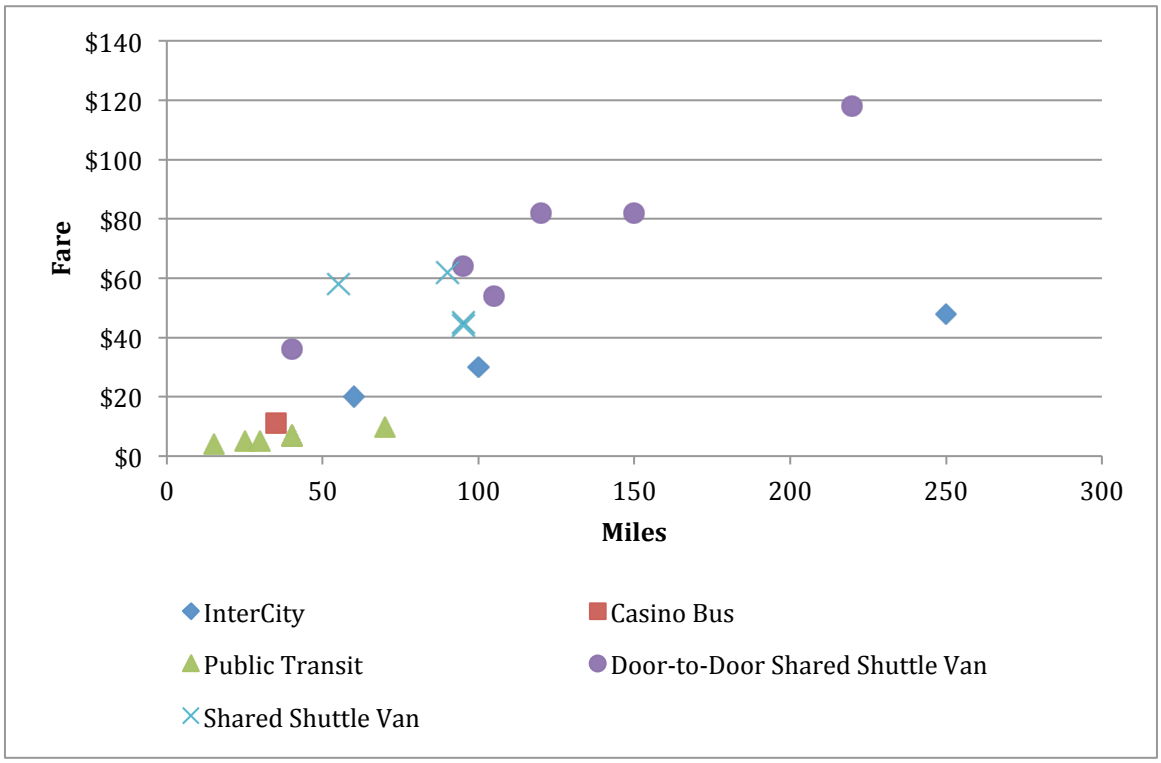
A list of typical fares is illustrated in Table 7. This is followed by Figure 3 that illustrates a range of fares by type of provider and distance. Fares will need to reflect quality of service and markets served. As most Eagle County residents have an employer-provided pass, they will not likely ride a service for which there is an out-of-pocket cost.

The net operating costs (total expenses less farebox revenues) of the mid-term alternative is estimated at nearly $10 million annually. Using the low estimate for ridership (1.6 million annually), the subsidy per passenger is expected to be $6.40 per passenger. For a typical automobile carrying about 3 passengers, this subsidy would equate to approximately $19 per vehicle

**Table 7: I-70 Corridor Service: Fares and Distance**

| Casino Bus | Miles | Fare ($) | Fare / Mile |
|---|---|---|---|
| Denver to Black Hawk | 35 | $11 | $0.31 |
| **InterCity** | | | |
| Denver to Vail – Greyhound | 100 | $30 | $0.30 |
| Glenwood Springs to Vail – Greyhound | 60 | $20 | $0.33 |
| Grand Junction to Denver – Greyhound | 250 | $48 | $0.19 |
| **Public Transit** | | | |
| Aspen to Rifle – RFTA | 70 | $10 | $0.14 |
| Aspen to Glenwood Springs – RFTA | 40 | $7 | $0.18 |
| Basalt to Glenwood Springs – RFTA | 25 | $5 | $0.20 |
| Glenwood Springs to Rifle – RFTA | 30 | $5 | $0.17 |
| Edwards to Vail – ECO Transit | 15 | $4 | $0.27 |
| Leadville to Vail – ECO Transit | 40 | $7 | $0.18 |
| **Door-to-Door Shared Shuttle Van** | | | |
| DIA to Frisco – Colorado Mountain Express | 95 | $64 | $0.67 |
| DIA to Eagle – Colorado Mountain Express | 150 | $82 | $0.55 |
| DIA to Aspen – Colorado Mountain Express | 220 | $118 | $0.54 |
| DIA to Breckenridge – Powderhorn Transport | 105 | $54 | $0.51 |
| Vail to Breckenridge – Powderhorn Transport | 40 | $36 | $0.90 |
| Denver to Vail – Colorado Mountain Express | 120 | $82 | $0.68 |
| **Shared Shuttle Van** | | | |
| DIA to Frisco – FasTracks | 95 | $45 | $0.47 |
| DIA to Idaho Springs | 55 | $58 | $1.05 |
| DIA to Silverthorne – Go Alpine | 90 | $62 | $0.69 |
| DIA to Frisco – Peak One Express | 95 | $44 | $0.46 |

**Figure 3: Fares by Provider and Distance**




### *Infrastructure Needs*

Key to the success of the mid-term operating scenario is the investment in supporting infrastructure in the corridor. Infrastructure improvements include, but are not limited to, roadway and intersection improvements, park-and-ride lots, stations, and passenger amenities. As CDOT begins to build the system from short-term to mid-term service, the analysis of the supporting infrastructure needs would be a key element. Two keys to successfully developing service between Denver and Frisco/Vail are to enable the bus to travel more quickly than autos in congested areas and to provide adequate parking in the west metro area.

### *Park-and-Ride Lots*

There are presently two examples of Park-and-Ride lots in the region, both using surface lots. At the Dinosaur Lots in Morrison, many cars are parked in a single area of interconnected lots. This is primarily for carpools, but also used by private shuttle services. The casino shuttles use a series of privately owned lots across the metro area, with buses departing from diverse locations. Both models may be applicable to the development of bus service to serve visitors to the mountain communities. The mid-term alternative provides 1,050 westbound seats on buses departing Denver to Vail, with 600 in peak periods. An additional 750 seats are provided for service departing Denver for Winter Park, with 300 in the peak period. Assuming the average car arriving at the Park-and-Ride lot carried 1.5 persons and 50 percent of bus seats were filled

on an average weekday, 600 parking spaces would be needed. Peak periods would be expected to have higher ridership, increasing the number of parking spaces required. This number of spaces is not available on peak days at the Dinosaur Lots; additional capacity would be needed. Investigation of options and provision of parking would be necessary before significant service is initiated between Denver and Frisco/Vail.

If 750 spaces were provided in Metro Denver, is estimated at $4.5 million. RTD has found the cost of construction varies significantly by location, with examples as low as $3,000 per space and as high as $13,000 per space. For planning purposes they commonly use a range of $6,000 to $7,500. A unit cost of $6,000 per space is used here. If peak weekend demand were met through a combination of new and existing spaces, the overall cost would be expected to be lower, as the number of peak spaces would be less.

While there are existing transit centers in Frisco and Vail, a new facility is planned for Glenwood Springs near City Hall. As Eagle County develops its spine system, additional transfer centers will be needed in Edwards and Eagle. A new park-and-ride is being constructed in Eagle as a joint project of the Town of Eagle and Eagle County. Similarly, additional park-and-ride spaces are needed in Glenwood Springs and Gypsum, and Edwards. An estimated 300 parking spaces located in these communities, along with transfer facilities, would cost $2.25 million at an average cost of $6,000 per space.

*Traffic Flow Improvements*

CDOT has undertaken a variety of projects to improve traffic flow for all vehicles. Ramp metering and informational signage are two examples. The -s that would be a part of the Twin Tunnels project are another example, and one that would directly affect bus services. The Twin Tunnels project includes expanding the eastbound bore of the tunnels and adding an additional lane that would be managed during peak periods. It is a relatively short segment (3 miles) but also a congestion bottleneck. The managed lanes would enable vehicles to save about 3 minutes over travel in the general traffic lanes,[2] increasing travel reliability.

The *"I-70 Peak Period Shoulder Lane Traffic Analysis Feasibility Study"* (March, 2013) is another important project. Shoulder lanes have been evaluated for eastbound traffic between the US 40 interchange and the western edge of the Twin Tunnels project (near the east Idaho Springs exit) a distance of about nine miles. The concept is to create a lane during peak periods only, using the right shoulder lane. During other periods of time it would continue to serve as a breakdown lane. This additional lane was evaluated as a managed lane with a toll. The analysis included a variety of options and tolls, but overall resulted in approximately a 33 percent time-savings with a managed lane. The project is envisioned as being operational in 2015.

[2] Source: Twin Tunnels Environmental Assessment, Twin Tunnels Technical Memorandum (May 2012)

As CDOT considers infrastructure issues, the following items may be addressed:

- Condition and capacity of existing infrastructure (park-and-ride lots would be needed in Glenwood Springs, Eagle, and metro Denver)
- Roadway/Bus-way improvements
- Right-of-way/easements for new infrastructure.
- Land use, Transit Orientated Development (TOD) and opportunities for profit sharing

Infrastructure needs, CDOT policy, and funding constraints would dictate the extent to which supporting infrastructure is involved in the proposed service characteristics. Information gathered from the I-70 TAG indicates existing service providers are interested in CDOT's involvement in infrastructure as such improvements would support the providers' ability to expand and increase the quality of their service. Specific improvements have not been identified.

## SHORT-TERM SCENARIOS

Service in this corridor would be phased with the intent of building success and a foundation that, over time, may lead to a mid-term operation scenario. A combination of strategic service and infrastructure improvements can provide a foundation for larger steps forward. For example, once ample parking is made available for the service in the Denver area, service may begin in peak periods; building over time to service operating throughout the day.

This section describes proposed short-term operating scenarios that would provide a starting point and foundation for services. These options include those identified by CDOT as possible for funding through their Regional Commuter Bus project as well as others that respond to CDOT's mobility goals for of the I-70 mountain corridor: they are affordable, supported by transit users and stakeholders, and would lead to services proposed in the mid and long-term operating scenarios. These are relatively small steps based on needs identified by stakeholders and the analysis completed for this study. They are grouped as:

- Intercity Bus "Local"
- Transportation to Serve the Human Service Market
- CDOT Multipurpose / Connectivity

Some of the scenarios focus on entire corridor while others focus on specific services in limited areas of the corridor. The scenarios vary in how they would be funded, the ease of implementation, strategic value in achieving long-term objectives, connectivity, and the degree to which they would form a foundation for future growth of comprehensive service in the corridor.

Each type of service is described below. Financial and operating characteristics of the scenarios are shown in Table 8, after the narrative description of services. It should be noted the estimates are based on conceptual planning. Actual costs and ridership would depend on

final schedules, fares, and marketing efforts. These estimates are meant to provide an order of magnitude understanding of what might be expected with each service option. A scenario might be funded through different sources, including, but not limited to, some combination of Federal Transit Administration Section 5311 funds, FTA 5311(f) funds, local funds, human service agency funding, Colorado FASTER funds, and private sector funding. The information in this section is intended to provide a concept of each scenario adequate to compare them, identify those worth pursuing, and the priorities for such service. Additional refinement would be needed to advance selected service to the point where they are ready for implementation.

***Intercity Bus "Local"***

Intercity service is currently provided by Greyhound Lines. Historically, this service has been complicated by consistently poor quality. Complaints include reliability and lack of passenger capacity; e.g., the bus does not have seats available for ticketed passengers when the service reaches the I-70.. Lack of reliability is a result of the route originating on the west coast, almost 30 hours prior to reaching the western border of Colorado.

During CDOT's May 2013 I-70 TAG meeting, Greyhound announced they would be offering new service exclusive to Colorado along I-70 from Denver to Grand Junction. The service would provide additional stops and would coordinate with the existing route and existing stops at Glenwood Springs, Vail, Frisco, and Idaho Springs. The addition of the Grand Junction to Denver bus addresses both capacity and reliability issues.

Greyhound's ridership on the eastbound service is sufficient, but is light on the westbound route. Financial support of this service or a statewide effort to support the marketing of this intercity service would increase the awareness and mobility options of corridor travelers.

Prior to the new service proposed by Greyhound, a local inter-service alternative was identified to address the need for improved intercity services in the corridor. This has been retained as an alternative for future consideration. At present, the primary objective is to support the private sector intercity bus (ICB) service. The most cost-effective way to do this is to:

- Establish a means to exchange tickets so that riders can use tickets on either the CDOT or Greyhound services; and,
- Actively market both services together to raise awareness of the service option and how to use the services.

In order to provide a baseline for the cost of operating separate service, the local intercity bus alternative has been retained.

*Proposed Service Characteristics- Intercity Bus "Local"*

- The service would operate daily. Travel time is estimated at 5 hours, 35 minutes; 20 minutes longer than the regular schedule, allowing for additional stops, with Rifle identified as one for consideration.

- A smaller capacity vehicle could be used along the I-70 corridor, as opposed to a 50-passenger over-the-road coach, to reduce operating costs and respond to anticipated passenger loads. Retaining the ability to carry luggage is important.
- The proposed service would require two vehicles, one traveling in each direction daily. The operator schedule would be approximately 7 hours, allowing for check-in, check-out, and both pre- and post-trip inspections.
- In cases where the regular schedule is late, this additional route could pick-up passengers at the intermediate stops, allowing the regular bus to bypass the stop if no passengers are being dropped off.
- There is also the option of a CDOT owned vehicle leased back to the licensed operator to provide ICB service in the corridor.

*Potential Fund Sources*: 5311(f), matching funds from Greyhound

***Transportation to Serve the Human Service Market***

There is also a short-term need to serve the travel market of human-oriented service trip purposes from the corridor to metropolitan Denver and Grand Junction. This category of trip purpose includes those to medical and pharmaceutical facilities, banking, general commerce, social, and other trips. Medical facilities have increased in the corridor in the last five years. The number of Medicaid clients now accessing transportation services to Denver is low, but many Colorado counties in the I-70 corridor don't have services available to meet the need. An example of "need" would include dialysis treatment centers located in Denver and Grand Junction, with no services provided in between the two locations. While the reports indicate that some service is needed, it is believed that a good deal of the need is latent and will gradually emerge as it becomes known that the service option is available.

Input from the stakeholders indicates the initial route should extend between Vail and Denver and a second priority is a route between Eagle and Grand Junction. Prior to operation of a route, it is recommended the locations for transferring passengers and for traveling the "last mile" while in Denver be explored. A modest amount of service would be provided, as noted below. While this service is geared to meet the human service transportation needs, marketing it to the general public will begin to build a foundation for more extensive service. It is important to implement this service such that it does not compete with ICB service but rather complements it, allowing for riders to use tickets on both services. The schedule times would be offset from the schedule of Greyhound in the corridor.

*Proposed Service Characteristics – Human Service Market Orientation*

- Denver service: options include one round-trip operating weekdays (5 days) and one with service operating three days a week. Trips operating twice weekly are proposed for Grand Junction. If paired with 3-day-a-week service to Denver, a single vehicle could be used for both trips.

- The trip to Denver would start at the Vail Transportation Center and serve the Frisco Transportation Center, and Idaho Springs. Consideration may be given to stopping in Georgetown or another location, perhaps on an on-call basis. This is a 100-mile trip to downtown Denver. If the service continued to the Anschutz Medical Center and the new Veterans Affairs (VA) hospital, the total trip length would be 108 miles and require an additional 20 minutes in travel time.
- The trip to Grand Junction could start either in Gypsum or Glenwood Springs. The advantage to Gypsum is that it connects to ECO Transit and makes the connection between Gypsum and Glenwood Springs. If connecting service is provided between Gypsum and Glenwood Springs, it is not necessary that the route begin in Gypsum. Starting in Gypsum adds 24 miles and 30 minutes of time to a one-way trip. Starting in Gypsum the total distance is 111 miles and travel time is two hours. This includes serving the BRT stop in Glenwood Springs; starting in Glenwood Springs the total one-way distance is 86 miles and the travel time is 1.5 hours.
- Trips would be scheduled to arrive in Denver or Grand Junction around 9:30 AM and depart for the return trip at 3:00 PM. Some time for deviations in Denver or Grand Junction would be provided. Alternately, an agreement with a local provider could be arranged for taking passengers to and from disparate locations within the urban areas.
- Goals are to provide passengers with at least four hours in which to conduct business and the ability to transfer to a wide variety of destinations, including making intermodal connections.

*Potential fund sources:* Section 5311, human service funds such as NEMT, Aging Services, or Veterans' funds, local funds, fares.

***CDOT Multipurpose/Connecting Service***

CDOT has proposed, as part of its Regional Commuter Bus initiative, operating bus service in the I-70 corridor. The existing services provided by ECO Transit, RFTA, and Summit Stage already do an excellent job of serving commuter trips, although more capacity is desired by ECO Transit. Commuter demand is reasonably well served but there is a major need to provide connections between the three mountain systems (Summit Stage, ECO Transit, and RFTA). In addition to serving existing riders, this will leverage the investment in the corridor and result in a high level of transit service from Silverthorne to Rifle, over a 100-mile stretch of the mountain I-70 corridor. As noted in the long-term needs section, transit services would be a part of the solution to congestion relief on peak travel days between Denver and Vail over the long-term. While connecting service is still needed from Denver to Frisco, a 70-mile stretch, connecting the existing mountain systems is a major step.

CDOT initially proposed connecting service between Grand Junction and Denver. Recognizing that demand is limited between Grand Junction and Glenwood Springs, this was revised to having a western terminus of Glenwood Springs.

*Potential fund sources*: FASTER funds, Section 5311, local funds, fares

Likewise, the I-70 TAG has indicated strong support for connecting service between existing providers. As a result, the CDOT alternative presented here involves providing connectivity between systems that presently do not have transit services. This proposed service is anticipated to serve wide markets including commuters, non-work trips among people who do not own a car, visitors, those seeking recreation, and human service trips. The degree to which each market is served would vary by corridor segment.

Two distinct types of services are proposed: inter-regional express service and regional connecting services to connect existing systems.

*Proposed Service Characteristics*

- Inter-regional Service between Glenwood Springs and Denver. This service would start with one round trip daily, or two one-way trips, growing to two round trips. The second round trip would only operate between Vail and Denver, allowing for a shorter service day that enables riders to get to Denver by (AM and depart around 3 PM). A one-way travel time of 3.4 hours is scheduled from Glenwood to Denver and 1.75 hours from Vail to Denver. Additional travel time is scheduled to provide for connections in the Denver area. This service is proposed to operate daily. Additional trips might be considered on weekends in summer and winter once service is stable at two round trips daily.

- Regional Connecting Services:

  Glenwood to Gypsum/Eagle: This service would operate daily, with 12 round trips (24 one-way trips each direction) connecting the RFTA BRT station with Eagle County Airport/Town of Eagle. This is a 45-minute one-way trip or 1.5 hour round trip. The service could operate on 1.5-hour headways. Two vehicles would be needed and some interlining would improve efficiency. The *"Canyon Connector Study"* prepared for RFTA and ECO Transit in 2010 documents demand for connecting service between Eagle and Glenwood Springs.Some interlining of vehicles is desirable to make efficient use of vehicles and reduce the need to transfer.

  Vail to Frisco: This service would operate daily, starting with 2-3 round trips oriented to commuters and growing to 12 round trips daily (24 one-way trips each direction) connecting the Frisco and Vail Transportation Centers. This is a 35-minute one-way trip or 75-minute round trip. The service could operate on a 1.25 or 1.5-hour headway. For even headways, two vehicles would be needed and some interlining would be desirable to make efficient use of buses. It is possible that operating this as an extension of the existing Summit Stage service to Copper Mountain would provide the most seamless and cost-effective network design. Depending on how schedules are set, this service may also have the potential of serving students traveling from Summit County to Eagle County for classes.

**Table 8: Characteristics of Short-term Operating Scenarios**

| Alternative | One-way | | | | Daily | Annual | | | | Annual Operating Cost | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Length | Time | Days | Buses | 1-way Trips | Hours | Miles | Annual Riders | Annual Fares | Gross | Net of Fares |
| | | | | | | | | | | | |
| ICB Local | 250 | 5.5 | 365 | 2 | 2 | 4,015 | 182,500 | 7,300 | $228,000 | $730,000 | $502,000 |
| | | | | | | | | | | | |
| Human Service Orientation: Vail to Denver | 100 | 1.8 | 259 | 1 | 2 | 2,590 | 51,800 | 5,000 | $60,000 | $194,000 | $134,000 |
| | 108 | 2.25 | 156 | 1 | 2 | 1,560 | 33,696 | 3,000 | $39,000 | $117,000 | $78,000 |
| | | | | | | | | | | | |
| Human Service Orientation: Eagle-Glenwood-Grand Junction | 88 | 2 | 104 | 1 | 2 | 1,040 | 18,304 | 1,000 | $11,000 | $78,000 | $67,000 |
| | 112 | 2.5 | 104 | 1 | 2 | 1,040 | 23,296 | 1,000 | $13,000 | $78,000 | $65,000 |
| | | | | | | | | | | | |
| CDOT: Frisco-Vail | 28 | 0.66 | 365 | 2 | 12 | 2,891 | 122,640 | 88,000 | $296,000 | $613,000 | $317,000 |
| CDOT: Frisco-Denver | 100 | 1.75 | 365 | 2 | 4 | 2,555 | 146,000 | 22,000 | $264,000 | $730,000 | $466,000 |
| CDOT: Eagle - Glenwood Springs | 36 | 0.75 | 365 | 2 | 12 | 3,285 | 157,680 | 66,000 | $285,000 | $788,000 | $503,000 |
| | | | | | | | | | | | |
| Connecting: Frisco - Vail | 28 | 0.66 | 365 | 1-2 | 24 | 5,782 | 245,280 | 175,000 | $588,000 | $1,226,000 | $638,000 |
| Connecting: Frisco - Denver | 100 | 1.75 | 365 | 2 | 8 | 5,110 | 292,000 | 44,000 | $528,000 | $1,460,000 | $932,000 |
| Connecting: Eagle - Glenwood | 36 | 0.66 | 365 | 1-2 | 24 | 5,782 | 315,360 | 131,000 | $566,000 | $1,577,000 | $1,011,000 |

- Ridership for these identified new routes for short-term implementation is estimated conservatively. Ridership would range from 18 to 28 daily riders (4,600 to 7,200 annual riders) on the inter-regional express route, and between 125 and 500 daily riders (40,000 to 175,000 annual riders) on the multipurpose/connecting service routes.

***TAG Comments***

Feedback from the Transit Advisory Group for the I-70 Corridor included:

- Connecting service is the priority, especially in the segments between Frisco and Vail and between Eagle to Glenwood Springs
- Infrastructure improvements that would speed bus travel (so it is not caught in the automobile congestion that occurs in peak hours) should be implemented prior to starting Denver to Frisco/Vail service.
- One trip bus that responds to general travel needs is recommended.

Based on the above TAG comments and Greyhound's new local bus, the most appropriate starting service option might be a combination of:

(1) One round-trip between Glenwood Springs and Denver, operating on a schedule that would be oriented to meeting general travel needs and would complement the existing Greyhound schedule; and

(2) Connecting service between Frisco and Vail and between Eagle/Gypsum and Glenwood Springs.

Once demand warrants additional service, an inter-regional trip operating only between Vail and Denver is the next logical expansion. This could be scheduled to arrive in Denver earlier as the route is shorter, and return by 4 PM, providing a means for mountain residents to travel to Denver, conduct business, and return home the same day.

Another future route would be to operate service twice weekly between Glenwood Springs and Grand Junction, scheduled to allow riders 4 hours in Grand Junction for conducting business.

The service plan in the next chapter illustrates how service and facility development might occur over the planning horizon of this long-range plan. It identifies the level of resources that would be needed and potential funding sources. This would allow the TAG to make final recommendations to Transit Advisory Committee for the CO Intercity and Regional Bus Network Study under development.

## SERVICE AND IMPLEMENTATION ACTIVITIES

The last chapter described long-term, mid-term, and short-term service plans, as well as a discussion of the support equipment and facilities. In this chapter the recommended services

and related implementation activities are programmed over the course of the long-range planning horizon extending from 2014 through 2040.

The long-term scenario is the Alternative Guideway System (AGS). Planning and programming for the AGS is occurring in a separate study, outside the scope of this report. Implementation is expected to occur after 2040.

The mid-term alternative includes the development of frequent service between the Denver Metro Area and both Vail and Winter Park. This is anticipated for implementation in the 10-20 year time frame, or approximately 2025-2035. While implemented in this period, the mid-term alternative is anticipated to extend through the time when the AGS is implemented. Operating costs are identified as first incurred in 2030, with initial expenses (the purchase of vehicles and construction of park-and-ride spaces) occurring prior to this. A comprehensive park-and-ride study is included in 2020 as it will be necessary to determine how best to provide the parking capacity and proceed with acquiring land if necessary. Note that this service could be implemented as much as five years earlier if the infrastructure to speed buses on I-70 is provided.

The short-term alternative begins with connecting services and limited service oriented to human service transportation needs, each with the potential to expand as demand warrants. The short-term period is important in developing transit services in the I-70 corridor. Additional activities are included in support of the overall development of transit services, and described in the following section on short-term activities and strategies. They are also listed in the financial plan following the narrative description.

Table 9 summarizes the range of management, service, and infrastructure development activities that will be needed as service is implemented over the period of this plan.

## Table 9: Implementation Activities

| Management Activities | Services | Infrastructure |
|---|---|---|
| **SHORT-TERM – 2014 - 2020** | | |
| ***Develop policies and procedures:***<br>- Partnerships with local govt, transit providers, to address service development, facilities & equipment use, customer information, etc.<br>- Supporting continued private sector investment<br>- Basic operating, safety, ad customer service polices<br>- Interline agreements and joint ticketing procedures<br>***Establish service standards and monitor provision of service***<br>- Monitor delivery of service, cost, and service effectiveness.<br>***Establish group to provide guidance and monitoring of CDOT regional transit program.***<br>***Develop customer support resources linking systems in I-70 Mountain Corridor***<br>- Schedule and route information in various media | ***Establish interregional services between Glenwood Springs and Denver***<br>- Expand as ridership warrants.<br>***Work to fill in gaps in service:***<br>- Glenwood Springs to Eagle<br>- Frisco to Vail<br>***Establish "Last Mile" service in Denver***<br>- Develop a means for individuals who require assistance with travel needs to transfer seamlessly to a specialized transit provider. | ***PNR improvements***<br>***Support development of a new Glenwood Springs transfer ctr.***<br>***Support development of managed lanes for all buses.***<br>***Conduct a parking study to identify how parking can be provided in the Denver Metro area for expanded services.*** |
| **MID-TERM – 2021 – 2030** | | |
| ***Adjust policy framework as needed.***<br>***Work towards developing stable & adequate financing for expanded I-70 Mountain Corridor transit services.***<br>***Establish management framework to implement parking plan.*** | ***Expand services based on ridership and development of partnerships***<br>***Establish service between Rifle and Grand Junction***<br>***Establish service in Winter Park Corridor*** | ***Begin development of parking in Metro Denver.***<br>***Continue development of transit stops and centers.***<br>***Continue development of infra-structure as identified in PEIS*** |
| **LONG-TERM – 2031 - 2040** | | |
| ***Develop partnerships necessary to expand transit services.*** | ***Expand services to full schedule by 2040*** | ***Continue development of infrastructure and parking*** |