Colorado Statewide Intercity and Regional Bus Network Study

Appendix A: Technical Memorandum for the I-70 Mountain Corridor (Denver to Grand Junction)

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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 is also 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. Itconnects 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

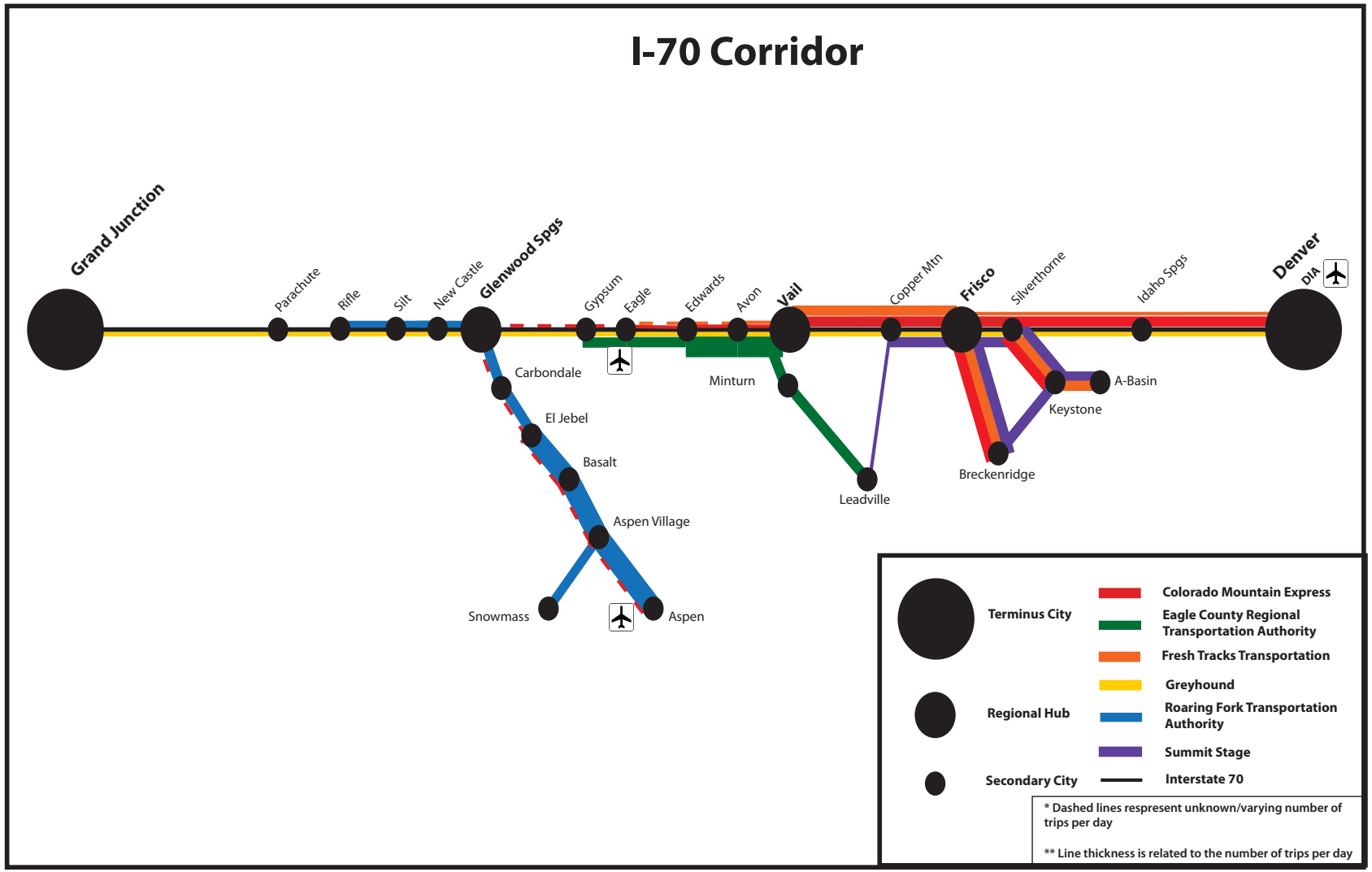
Existing services in the I-70 corridor are a mix of private and public services, illustrated in **Figure 1.** Privately operated services, each serving different markets, include:

- 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.

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



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 2001, 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				
Summit Stage	31	1,662,809	489,118	$8,097,539
Breckenridge Free Ride	13	533,660	211,713	$1,429,623
Eagle				
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				
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 Data;

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

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

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.

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.

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

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 Morrison 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
Morrison PNR: multiple lots	Multiple lots; served by private shuttle services. No restrooms. Security patrols.	Total of 1,375 spaces
West Line Federal Station	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:

- Morrison 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.

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

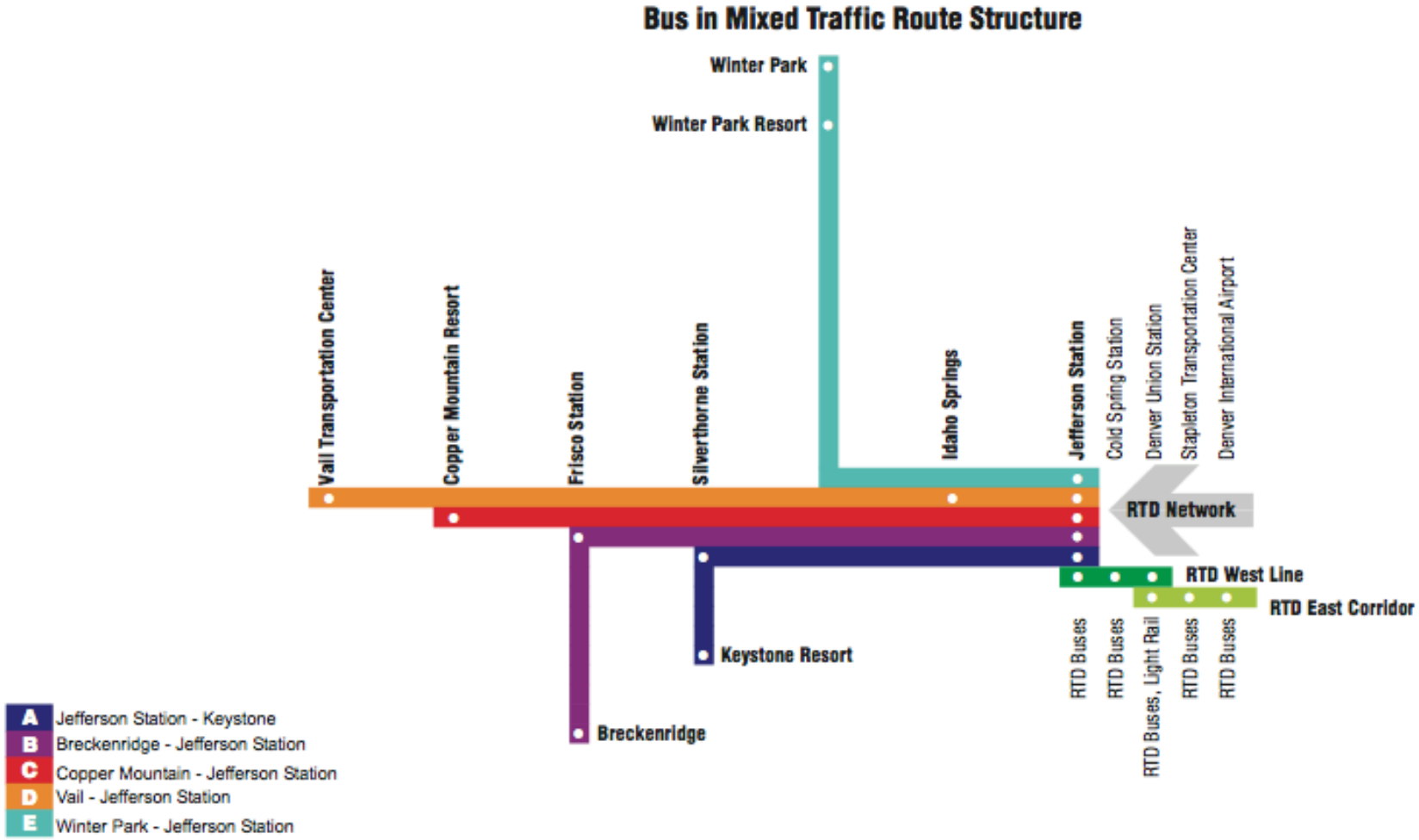
recreational demand and range from minimal transit to high speed, new technology fixed guideway service in the corridor between west metropolitan Denver and Vail. In general, the PEIS demonstrates that there is high future demand for transit in the corridor for any of several technologies.

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, 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 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.

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.

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



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 Figure 2. It includes five routes traveling between Denver and key resort activity centers. It generally consists of express services with, at most, one intermediate stop. The five routes include:

- 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. Error! Reference source not found. 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 auto occupancy rates are similar.

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.

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										

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.

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.

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.

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 Low	324,450 314,400	$1,622,250 $1,572,000		$584,010 $565,920
Denver - Winter Park	Extended Low	222,480 264,096	$1,112,400 $1,320,480		$333,720 $396,144
Frisco - Vail	Extended Low	86,520 110,040	$432,600 $550,200		$155,736 $198,072
Vail - Eagle	Extended Low	138,432 251,520	$692,160 $1,257,600	$692,160 $1,257,600	
Eagle - Gypsum	Extended Low	34,608 88,032	$173,040 $440,160	$173,040 $440,160	
Gypsum - Glenwood	Extended Low	103,824 94,320	$519,120 $471,600	$259,560 $235,800	$77,868 $70,740
Glenwood - Rifle	Extended Low	92,700 117,900	$463,500 $589,500	$231,750 $294,750	$111,240 $141,480
Rifle - Grand Junction	Extended Low	116,802 247,590	$584,010 $1,237,950		$140,162 $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 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.

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.

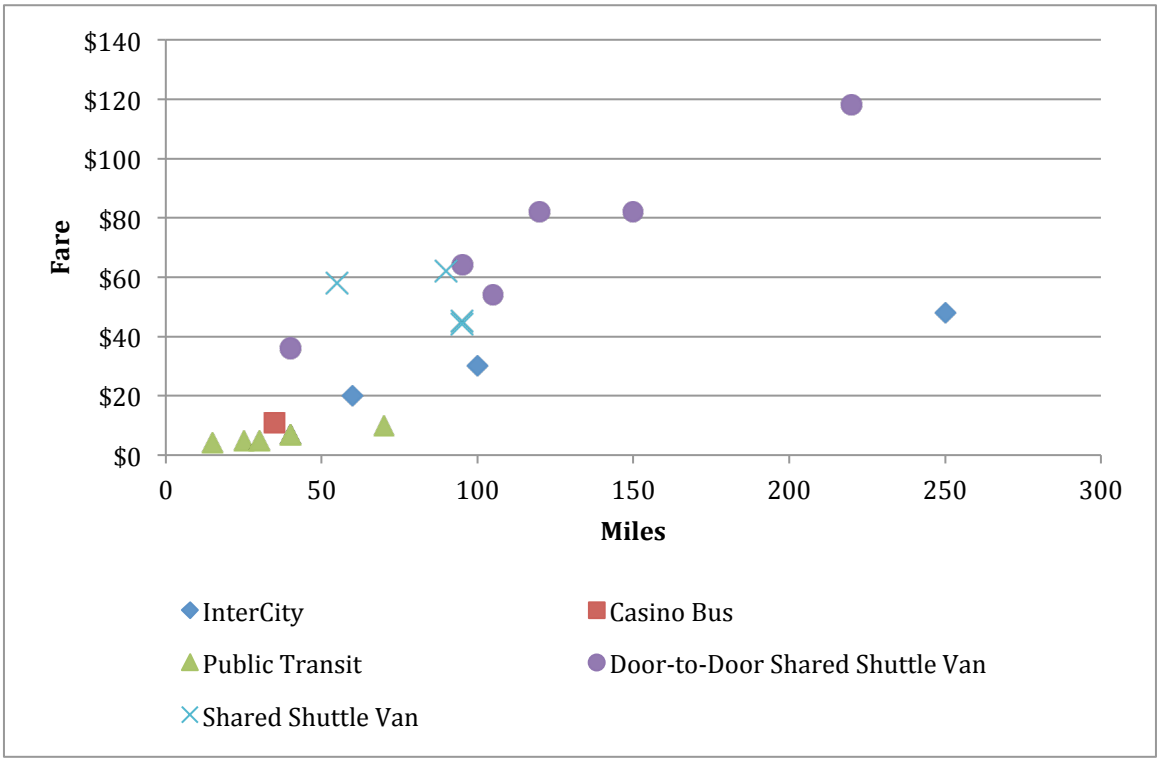
Table 7: I-70 Corridor Service: Fares and Distance

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

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.

Figure 3: Fares by Type of Provider and Distance



Park-and-Ride Lots

There are presently two examples of Park-and-Ride lots in the region, both using surface 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 Morrison 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 managed lanes 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.

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

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

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, Inc. 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.

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.

As noted earlier, infrastructure improvements that include managed lanes in a 12-mile stretch on eastbound I-70 in peak hours may be operational by 2015. This provides an opportunity to begin making transit options more competitive.

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: - Partnerships with local govt, transit providers, to address service development, facilities & equipment use, customer information, etc. - Supporting continued private sector investment - Basic operating, safety, ad customer service polices - Interline agreements and joint ticketing procedures ***Establish service standards and monitor provision of service*** - Monitor delivery of service, cost, and service effectiveness. ***Establish group to provide guidance and monitoring of CDOT regional transit program.*** ***Develop customer support resources linking systems in I-70 Mountain Corridor*** - Schedule and route information in various media	***Establish interregional services between Glenwood Springs and Denver*** - Expand as ridership warrants. ***Work to fill in gaps in service:*** - Glenwood Springs to Eagle - Frisco to Vail ***Establish "Last Mile" service in Denver*** - Develop a means for individuals who require assistance with travel needs to transfer seamlessly to a specialized transit provider.	***PNR improvements*** ***Support development of a new Glenwood Springs transfer ctr.*** ***Support development of managed lanes for all buses.*** ***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. ***Work towards developing stable & adequate financing for expanded I-70 Mountain Corridor transit services.*** ***Establish management framework to implement parking plan.***	***Expand services based on ridership and development of partnerships*** ***Establish service between Rifle and Grand Junction*** ***Establish service in Winter Park Corridor***	***Begin development of parking in Metro Denver.*** ***Continue development of transit stops and centers.*** ***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***

Colorado Statewide Intercity and Regional Bus Network Study

Appendix B: Interregional Express Bus

DRAFT

October 2013

KFH GROUP

Transit Plus
Moving People & Ideas

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OVERVIEW

Introduction and Purpose

As part of the *"Colorado Intercity and Regional Bus Network Plan - 2013 Update"* (Network Plan), specific emphasis was placed on developing express regional bus services. Initially referred to as regional commuter buses, they are now called "Interregional Express Buses" (IXB) to better reflect the type of service proposed. While most of the Network Plan provides mid-level planning appropriate for policy development and resource allocation, this Interregional Express bus work extended to service and implementation planning.

The first part of this report provides planning information, including a peer analysis, demand analysis, and conceptual service plans. The report continues with more detailed implementation plans as part two. This includes service plans for the initial phase of services, information on park-and-ride development, fare revenues, and operating and capital budgets.

CDOT's Interregional Express Bus Purpose Statement is shown in the text box on the following page and has provided a framework for this planning activity. A subcommittee of the Transit and Rail Advisory Committee has been closely involved with the development of recommendations for Interregional Express Bus services. This subcommittee and stakeholders in the corridors have been instrumental in bringing to the table related policy issues, resulting in a broader vision of commuter bus and other regional services. The findings at various stages of the study have also resulted in refinement of the recommendations so they best meet the needs in Colorado.

Findings and Strategies

DTR recommends a focus on a core set of services for the initial phase of service development. Work to date has also shown that:

- Working in partnership with both public and private sector providers will result in the most effective deployment of resources.
- The services that seem to provide the most benefit do not all fit in the regional commuter bus category but do provide key connections between regions.
- In addition to operating services, it will be important for DTR to pursue other activities in developing a seamless statewide network of services. Such activities might include:

CDOT Interregional Express Bus Purpose Statement

To provide an integrated transportation system, improve mobility, and increase modal choice, CDOT will implement a basic system of express Interregional buses (IXB) service along the I-25 Front Range and I-70 Mountain corridors. This service will primarily address peak-hour commuter needs on two of the state's heavily congested corridors and will create an enhanced transit network by establishing interregional transit connections between major local transit providers. By providing express commuter bus service, major employment and population centers will be linked and CDOT will be able to maximize and enhance capacity of the existing transportation system without major infrastructure costs. This service helps to fulfill the CDOT Vision, and is consistent with the duties identified in the DTR enabling legislation to administer funding for the construction, maintenance, and operation of interregional transit services.

- **CDOT Vision and DTR Duties:** Providing IXB service will embrace the CDOT Vision Statement by creating a convenient and integrated transportation system that connects regional and local transit, and will further incorporate the DTR enabling legislation by utilizing funding to provide interregional transit services.

- **I-25 and I-70 Focus**: CDOT will initiate IXB service in the I-25 Front Range and I-70 Mountain corridors in order to connect major local transit systems together, serve the highest interregional bus needs in the state, and to respond to studies and demonstrated demand in the highest travelled corridors, as follows:

    - The North I-25 EIS calls for express bus service on I-25 between Fort Collins and Denver.
    - The I-70 PEIS identifies providing bus transit service as one way to address immediate issues on the corridor.
    - There is a demonstrated demand for RCB service between Colorado Springs and Denver as shown by the Colorado Springs-Denver FREX service.

- **Modal Connectivity**: By providing a basic, affordable service, the CDOT IXB service will connect seven of the largest local transit agencies in the state and provide significant modal choice to access job markets.

- **Growth Platform**: With connected RCB service on the I-25 and I-70 corridors, the CDOT system will provide a base level of service that connects much of the state's population. Additionally, the IXB service will provide a platform for connectivity with local transit and additional network expansion.

- Creating a framework for measuring performance of the States investments in regional and intercity bus services, collecting data and using it to improve performance over time.
- Developing ticket sharing agreements with partner agencies.
- Developing comprehensive customer information that will support passengers traveling regionally across more than one transit system.
- Working with urban area partners to include statewide vanpool options to address needs in corridors not suited to express regional bus services or as a precursor to developing more comprehensive transit services.

A broad approach that is firmly grounded in performance will meet the intention of DTR's establishing legislation, play to CDOT's strengths, and result in effective Interregional services.

Priority Service Recommendations

The first priority for funding is for the primary commuter corridors: Colorado Springs to Denver, Fort Collins-Loveland to Denver, and Glenwood Springs to Denver. However, there is also the need to develop transit services oriented to broader regional travel needs. Other key priorities for regional service development are:

- Increased connecting services between Glenwood Springs and Gypsum/Eagle will enable CDOT to leverage the investment in existing mountain transit services;
- Support of FLEX services will assist in stabilizing a regional service that has been productive. It is not an express service but has demonstrated that it is meeting traveler needs and connects Transfort, COLT, and RTD systems.

Funding for these services might be a priority as using FASTER funds for operations is considered.

Detailed recommendations for the first phase of services are located in Part 2 of this document.

PART 1: PLANNING FOR REGIONAL COMMUTER BUS SERVICES

This section begins with a presentation of findings from the peer analysis. Next, the demand analysis is summarized, describing the methodology and results. The full demand analysis is contained in Appendix C of the Network Plan. The section then presents overall recommendations for both the initial service implementation and ongoing development. Ongoing development will consider evaluation of the services once implemented, expansion of services or stops in the initial corridors, and development of services in additional corridors.

Peer Analysis

A peer analysis was conducted to gain perspective on how other state DOT supported / operated long-distance commuter bus operations are organized and operated. The team identified agencies operating service similar to that proposed by CDOT and contacted these systems to obtain information on:

- Organizational structure
- Infrastructure provision and ownership
- Contracting models
- Operating costs
- Ridership and farebox recovery

Selection of Peers

In selecting systems for consideration, the following criteria were used:

- State DOT directed regional commuter bus programs similar to that proposed by CDOT
- Operated by contractors
- Some variation in organizational structure
- Focus is long-distance, peak hour, peak direction service—not local transit service
- Not part of statewide transit operations providing all services—e.g., not New Jersey Transit, Delaware DART, Connecticut DOT
- Not commuter service into NYC

The following systems were selected for in-depth analysis:

- Maryland Transit Administration (MTA) - Commuter Bus
- Georgia Regional Transportation Authority (GRTA) - Xpress
- New Mexico DOT (NMDOT) Park and Ride
- New Hampshire Department of Transportation (NHDOT) - Boston Express
- Antelope Valley Transit Authority (AVTA) – Commuter Services

Summary statistics for these systems are listed in Table B-1.

Table B-1: Summary Characteristics of Peers

System	Number of Buses Operated in Commuter Service	Number of Commuter Routes	Number of Park and Ride Lots Served	Annual Ridership	Range of Route Lengths (One-Way)	Number of Contractors
MTA	220	24	33	4,290,486	22-52 miles	Five (23 separate contracts)
GRTA	134	39	33	2,371,773	9-42 miles	2 (plus two counties)
NM DOT P&R (145 days)	25	10	24	160,849	20-100 miles	One
NHDOT		2	6 (plus three terminals w/o parking	535,941	63-69 miles	One
AVTA	18-20	3	2	267,759	63-70 miles	One

Organizational Structure

A review of the organizational structure of these agencies showed no single model for organizational structure and state agency role. The role of policy boards is generally guided by overall DOT structure and roles. Only GRTA was designed to address a commuter bus program.

The organizational characteristics of each peer system are listed below, followed by the lessons they have learned as a result of their structure.

MTA Structure

The Commuter Bus program is part of state transit administration, which is both an operating and funding agency. The state transit administration operates Baltimore's transit system, statewide commuter rail, statewide commuter bus, funds and provides oversight for local transit programs.

There is not an MTA or DOT Board or Commission. Commuter bus policy recommendations come from staff, approved by MTA/MDOT executive level for inclusion in budgets. The Legislature functions as policy board through budget process

All service is contracted, with park-and-ride lots provided by MTA or leased by MTA.

There are no transfers with local systems except the Transit Link monthly pass allows use of Washington Metro, Montgomery Ride-On, and Baltimore MTA local services along with Commuter Bus.

Lessons Learned:

With no advisory or policy board to address potential issues, they may not be addressed until they become a political issue or problem. For example: a fare increase is needed for commuter bus—constant fares for ten years have led to crowding/service issues. However, fare increases are viewed as politically unpopular.

Given the level of service, there should be four or five additional field supervisors, Currently there are only two.

GRTA Structure

GRTA is a regional authority created by state legislation to improve mobility, air quality & land use in greater Atlanta region. The Board of Directors is the policy board with members appointed by the Governor. However, they are appointed from the 12 metro area counties in the region. It is worth noting that MARTA only serves three of these counties.

GRTA contracts for Xpress commuter services; there is no direct operation. Historically they have been funded by fares and CMAQ, but are now seeking funding from the

legislature. In two counties GRTA services are provided under contract by County systems.

GRTA provides or leases park and ride capacity for Xpress services. The agency also provides planning support for the statewide Human Service Transportation Coordinating Council.

There are no transfers with other providers, but will accept the MARTA "Breeze Card" as payment.

Lessons Learned:

GRTA is neither a statewide nor a local agency. There is no funding from locals; the Governor appoints the Board rather than local governments. Because it is not a statewide agency it is difficult to get special funding from the legislature.

GRTA does performs some functions that would normally be performed by a state DOT

As CMAQ funding for operations ends, GRTA is appealing to legislature for state operating funds.

New Mexico DOT

The Park and Ride program is managed by Rail and Transit Division of NMDOT. Rail and Transit Division staff oversees the contractor and makes policy recommendations. Policy approval rests with the Deputy Secretary/DOT Secretary, or the Governor's office if needed.

Service is operated by a single turnkey contractor. Park and ride lots are arranged by NMDOT through intergovernmental agreement or lease.

There are no transfers with local transit; the program provides their own "last-mile" shuttles.

Lessons Learned:

NMDOT reported no problems from lack of advisory/policy board, however the structure is untested by controversy.

With their turnkey contract the service can be operated with minimal staff - 1 ¾ FTE.

New Hampshire DOT

NHDOT Bureau of Rail and Transit (BRT) provides management and oversight of federal and state transit funding for local systems. BRT also oversees S. 5311(f) and CMAQ-funded commuter bus (Boston Express); both are managed as grant programs by one FTE who also has other duties.

There is no policy board or advisory board for commuter/intercity bus at either the Bureau level or the DOT.

BRT provides a statewide Park and Ride network, including lots serving commuter and intercity bus, and public intercity bus/commuter terminals (operated by contractors)

The Boston Express is operated under contract to NHDOT, providing commuter and mid-day service to/from Boston South Station and Logan Airport, so more than just work trips are served. This service is coordinated with non-funded ICB service by same carrier. CMAQ funded vehicles are used for the Boston Express

No transfers or agreements with local/regional transit agencies, except for carrier access to South Station and Logan Airport.

Lessons Learned:

The limited organizational structure appears to work well, but as in New Mexico it is untested by controversy.

Because there is a very high farebox recovery, the end of CMAQ operating funding may not be major issue.

There is a strong carrier role, allowing for limited state role in operations. Commuter services benefit from a historically strong state role in providing park and ride lots and public intermodal terminals.

Antelope Valley Transportation Authority (AVTA)

AVTA is a regional public entity created by a Joint Powers Agreement between two municipalities and the County of Los Angeles. The Board of Directors serves as the policy board; representatives are appointed by participating jurisdictions.

There is no dedicated "commuter bus" staff. The service (both local and commuter to Los Angeles) is operated by contractor under one hourly rate contract using AVTA vehicles.

AVTA uses two park and ride lots it provides. These are joint ventures with municipalities. AVTA maintains bus stop areas while the municipality is responsible for the parking areas.

There are no transfer arrangements with other service providers, or even between its own commuter and local services. AVTA does participate in regional "Tap Card" that has separate accounts for each transit service used.

Lessons Learned:

A local/regional provider can serve long-distance commute needs, providing both infrastructure and services, if it is a local priority.

Spreading management and operating costs over a single contract that includes local and commuter service may show reduced unit costs as there is a single hourly rate for all types of service, shared maintenance facility, etc.

Staffing

The staffing levels for each peer are listed in Table B-2. Generally the larger programs, MTA and GRTA, require more staff to monitor and evaluate operations, and inspect capital equipment procured by each. For AVTA, staff responsibilities are shared among the other services they are responsible for: local transit and demand response. NH and NM have minimal staff support and are satisfied with the performance of their contractor.

Peer Performance Data Review

A variety of data was compared for the peer systems to gain an understanding of their performance. This is summarized in Table B-3. The second column lists both the contracting strategy (Do they have a single contract for all services or multiple contracts?) and the ownership of the vehicles.

Before describing findings at each agency, some general findings are:

- MTA has the highest cost per mile, operates the most revenue miles, and has the highest ridership
- GRTA and AVTA own all of the vehicles in their service, and MTA owns a portion of the vehicles in its service
- GRTA and MTA have the highest boardings per mile
- GRTA and MTA cost per mile varied by route/contract—deadheading and possible alternative use of vehicles can have significant impacts
- NH DOT and GRTA have the lowest costs per mile. These are two systems with different levels of service
- NH DOT and AVTA have the highest farebox recovery ratios. Also, these two operate the fewest routes, and the destinations (Boston and Los Angeles) are known for high levels of congestion and high parking costs

Note that NM DOT Park & Ride performance data are for a 145-day period.

MTA Service and Performance

MTA staff monitor performance and ensure proper maintenance of vehicles procured by MTA. MTA maintains commuter services website.

MTA operates the most revenue vehicle miles of the group and provides the most boardings of the peer group. The farebox recovery is approximately 40%

Most riders are employed by the federal government, and will have access to Transit Benefits.

Lessons Learned:

- Staff includes a mechanic/engineer to inspect vehicles procured by MTA
- Customers have easy access to agency staff
- Demand for service has been increasing; the problem now is securing additional parking
- As previously mentioned, a fare change requires a legislative action and the fare has not changed for a long time—impacts farebox recovery and capacity problems

GRTA

GRTA staff monitors performance and, as with MTA, maintain commuter services website. GRTA operates the most routes of the group and carries 2,371,773 annual passenger trips. The farebox recovery approximately 42%.

Lessons Learned:

Staff includes a mechanic/engineer to ensure proper maintenance of vehicles procured by GRTA. He also examines upkeep of the GRTA facility used by one contractor.

Given monthly reporting requirements to the GRTA Board, staff and contractors are quick to address any service issues.

New Mexico DOT

NM DOT program staff monitor service performance and maintains the commuter services website. The data provided was for about six months - 145 service days, ending January 31, 2013. In this period 160,849 passenger trips were carried. The farebox recovery is approximately 15%.

Lessons Learned:

Agency is pleased with contractor and the Turnkey arrangement. They would like to continue this with the next contract. As there is no agency capital involved, there is no need for staff to track capital equipment. Remember that the structure is untested by controversy.

Customers have easy access to agency staff

New Hampshire DOT

NH program staff primarily is in a grants management role, monitoring operations and reporting. The State role in providing terminals/park and ride lots is done through other programs.

The operator manages and addresses rider feedback. The operator also maintains commuter services website. To the public, the service appears to be privately-provided.

Table B-2: Staffing Levels

System	MTA	GRTA	NM DOT P&R	NH DOT	AVTA
	• Superintendent • Assistant • Chief Maintenance Operator • 2 Field Supervisors	• Chief - Regional Transit Operations Officer • Director of Operations • Director of Maintenance • Director of Engineering • Director of Procurement • 2 Support Staff	• Transit Bureau Chief • Transit Planning & Coordination Manager	• Public Transportation Administrator • Transportation Specialist	• Senior Transit Planner • Director of Operations • Fleet Maintenance • 2 Field Supervisors
Total	5	7	1 ¾	1 ½	% of FTE for each.

Table B-3: Performance Data

System	Contract Strategy / Vehicle Ownership	Operating Expenses	Cost Per Trip	Cost Per Mile	Annual Ridership	Boardings Per Mile	Farebox Recovery
MTA	Multiple / Mix	$42,325,544	$9.86	$8.12	4,290,486	.82	38%
GRTA	Multiple / Agency	$16,884,121	$7.12	$4.85	2,371,773	.68	42%
NM DOT P&R (145 days)	Single / Vendor	$3,198,356	$19.88	$5.78	160,849	.26	15%
NHDOT	Single / Vendor	$6,006,921	$11.21	$4.10	535,941	.37	84%
AVTA	Single / Agency	$3,240,237	$12.10	-	267,759	-	72%

The farebox recovery is approximately 84%. The operator maintains CMAQ-funded vehicles.

Lessons Learned:

The operator operates additional trips along the same route, not funded by the program. The operator also receives S. 5311(f) for some rural intercity trips that are interwoven with commuter schedules as they enter commute zone.

Given operator experience and ability in managing customer feedback, staff requirements to monitor service are minimal.

Antelope Valley Transportation Authority

Program staff monitors operations of commuter and local services. AVTA maintains the commuter services website. The farebox recovery is approximately 72% for the commuter service.

There is some duplication of service in that there is MetroLink commuter rail service connecting downtown Lancaster to LA Union Station.

Lessons Learned:

In the short-term AVTA will conduct a review of fare levels. Even with public agency fares, farebox recovery is high for these long-distance services. In part this appear due to low costs resulting from including commuter routes in the same contract with local services.

Contracting Strategies

There are a mix of contracting strategies that have evolved in response to operating conditions and the availability of contractors.

- Three providers (MTA, NM DOT, and AVTA) use an RFP process to contract for services, with NM DOT using a single turnkey contractor. MTA contracts by route, resulting in many contracts with a few operators. AVTA has single contract for local and commuter routes.
- GRTA has intergovernmental agreements with two counties for the counties to provide services; for all other services GRTA contracts out using RFP process.
- NH DOT uses a grant process with a single operator.

Vehicle Ownership

The provision and ownership of vehicles varies. Some vehicles are state/agency owned and leased to contractor. NM DOT is a turnkey operation so the contractor provides the vehicles. MTA uses both vehicles they own and lease to the contractor and vehicles owned by the operators.

GRTA and AVTA provide all the vehicles for their operations, but the processes are different. The GRTA procurement process is assisted by GDOT, using the process developed to procure intercity buses for S. 5311(f). AVTA procured vehicles in a process similar to that used for procuring vehicles for their local services.

NHDOT provided grant funding to operator to procure vehicles for use in Boston Express service, so both the ownership of the vehicles and responsibility for procurement was with the operator.

MTA provides some vehicles to operators under lease. The contractors provide two rates, one if MTA buses are used and one if their own vehicles are used. In FY 2012 average per mile rate using MTA buses was 14.35 percent lower than for carrier buses

Vehicle Maintenance

The contractors maintain the vehicles in all five peer systems. They are maintained in the contractor facilities regardless of whether the contractor owns the vehicles or leases them from the state or transit agency.

The role of the state is to monitor results. If the contractors provide their own vehicles, the state/agency monitors service quality (missed trips, breakdowns, heat and a/c, lifts, general bus condition, etc.). If the contractor operates state vehicles, the state monitors the maintenance program, vehicle condition, and service quality. This requires state program staff time.

The state role in oversight for vehicles and service quality varies with scale of services and number of contractors. It appears minimal for limited service, single (reliable) contractor.

Passenger Facilities

At the origin end, all programs provide for park and ride capacity. They either build, own and maintain their own lots; utilize state/local lots built by other programs; and/or lease spaces. Some do a combination of all three. Providing for parking and access to stop locations is generally a state program role, rather than a contractor role.

At the destination end, only one of the five provides service into a bus terminal (Boston Express into South Station, Boston). All others pickup and drop off on the street looping through downtown destination areas.

Findings: A Review

- There is no single model for organizational structure and state agency role. Role of policy boards, etc. generally guided by overall DOT structure and roles—only GRTA designed to address commuter bus program

- Commuter bus riders are park and ride customers, do not use local transit to access the commute trip so limited need for joint fares, transfers, etc. at origin end—so limited or no partnership (unless the commuter operator is also the local operator like AVTA)
- Riders may use transit at the destination end to go the last mile, several systems make arrangements for joint fare payment at that end.
- All of the programs provide for park and ride facilities, either building/maintaining them, or leasing from private owners for use by riders,
- Provisions of vehicles varies—some are turnkey (contractor provides), some are state/agency owned leased to contractor, some do both
- State role in oversight varies with scale of services, number of contractors—appears minimal for limited service, single (reliable) contractor.
- State role in information and marketing varies. While NH places responsibility on the contractor, the other four peer states/agencies maintain this responsibility in-house.

Demand Analysis

The demand analysis for regional commuter services is documented in Appendix C of the Network Plan. It addresses both overall potential demand and the ridership that might be expected given a proposed level of service.

The demand estimation work relied on existing planning studies, the Census Journey-to-Work data, and ridership history for the FREX service that operated in the I-70 corridor as well as the ridership levels in the mountain I-70 services operated by Summit Stage, ECO Transit, and RFTA.

The overall findings were that:

(1) Colorado residents will use transit when services are available and viable for their travel needs. Workers have generally shown a propensity to use transit when it is available, with mode shares of 4-10% of work trips fairly common and higher numbers in some corridors. This reinforces the projections made in a variety of planning studies and the rule of thumb estimates that have developed for US services (e.g. 2% of total trips will use transit at a minimum). While mode shares provide an important guide to what might be expected, qualitative factors are also important, including:

   a. Quality of service as measured by travel time, frequency of service, span of service, and availability of parking

   b. Location of employment (central core vs. dispersed locations)

c. Availability of car and van pools

(2) There are a variety of corridors with high levels of employment travel that have the potential for regional commuter bus services. In addition to the North and South I-25 corridors, other corridors where there are significant work flows are between:

a. Pueblo and Colorado Springs
b. Larimer County and Boulder County
c. Larimer County and Weld County
d. Weld County and Boulder County

Many of these areas have higher total commuter flows than North and South I-25, but have more dispersed travel patterns. In the I-25 corridor, trips are funneled towards a common destination.

Serving these other corridors will require, for the northern counties, development of a comprehensive network of services. It is useful to begin with key corridors. In the NFR Regional Transit Plan, the I-25 and Hwy 287 corridors were identified as the most important. The Hwy 287 corridor is now being served by FLEX and the I-25 is the next logical corridor to develop. Development of services between Greeley and Denver and Greeley and Loveland will need to be addressed in service planning efforts. The Pueblo to Colorado Springs market also has complex travel patterns to serve. While work flows are high, the workers go to dispersed destinations (Fort Carson, downtown, Garden of the Gods, Research Parkway). Developing services will require addressing each of these markets. Future planning activities can be undertaken to develop viable services to serve workers in Larimer, Weld, and Pueblo counties.

(3) The issue of dispersed locations for employment sites is an important one for proposed services in the North and South I-25 corridors. On the south end, the Denver Tech Center is an important destination but one that is difficult to serve. On the north end, Boulder County is a destination that is on par with Downtown Denver and the Denver Tech Center in terms of the number of jobs available. In addition, many Weld County residents tend to work in the northeast portion of the Denver Metro Area, including the airport, Commerce City, and Aurora locations. The initial service is geared around Downtown Denver because the density of employment is high and it can be effectively served. However, over the long-term it will be important to address more dispersed sites.

(4) A similar issue is how to serve mid-range cities in the north and south I-25 corridors. The Carbon Valley communities (Firestone, Dacono, and Frederick) and Castle Rock are important contributors to the congestion on I-25 as many workers live in these communities. In neither case is there local transit service in the community, although each could join RTD and become part of the RTD network. Policy discussion regarding the role of these cities in funding services will be important prior to beginning service to these communities. Is a condition for a stop the provision of local services? In both situations, the ridership from these communities

could overwhelm the capacity of the proposed system, so additional vehicles and service would need to be programmed to serve workers from these communities.

The north and south I-25 corridors are substantially different from the I-70 mountain corridor, so different methodologies were used in each. Different types and levels of information were also available. High-level demand estimations have been prepared in a variety of studies such as the *"I-70 Mountain Corridor Programmatic Environmental Impact Statement"*, the *"North I-25 Environmental Impact Statement"*, and the *"Front Range Commuter Express Study"*. Each of these documents show the potential for high levels of ridership based on typical ridership patterns for similar services around the nation and specific travel patterns for the corridors in question.

For general project planning, such estimates have an appropriate level of detail. For service planning, more detail is desired to answer the question, "For the planned quality of service, what level of ridership would be expected?" This section summarizes the approach and findings for the corridors under consideration.

North and South I-25 Corridors

Approach

Data available in these corridors includes Census Journey-to-Work data describing the flow of employment trips to Denver from other counties; prior FREX ridership data for the South I-25 corridor, and planning studies illustrating overall demand in the North I-25 corridor.

A multi-step process was used to estimate demand for transit services in the north and south I-25 corridors. The general steps were:

1. Review historic ridership and service trends
2. Estimate mode share from journey-to-work data and consider qualitative and market factors in estimating mode share for proposed services.
3. Identify population and employment forecasts to determine how ridership might grow through 2040
4. Apply factors to estimate ridership for specific service plans

Findings

The ridership estimates are grounded in the reality of ridership experienced in the South I-25 corridor when FREX service was operated and consider the quality of proposed services. Because detailed origin and destination data was available from a survey of FREX riders that was carried out in 2008, 2008 was used as a base year. Ridership was then projected for a 2015 start.

In each corridor, two alternative levels of service were modeled and a range of ridership estimated. It was assumed fares remain at a level comparable to those charged by FREX.

Table B-4 identifies ridership for proposed north and south I-25 services using the low (elasticity of 1.25%) and high (elasticity of 1%) ridership levels for each alternative. Projections for this same service level, carried out to 2040, can be found in Appendix B. To the extent that service levels or fares change, the projections would also need to be adjusted.

The demand for regional services on the I-25 corridor is well documented, and the corridors are well suited to commuter services. Projected ridership levels are constrained by the proposed service quality and by the availability of park-and-ride spaces. The provision of more trips operating over a greater span of service would result in higher ridership.

Table B-4: Projected Ridership for Proposed Regional Services

	Daily One-way Rides			
South I-25 Service	**2008 Baseline**		**2015 Projection**	
	Low Riders	High Riders	Low Riders	High Riders
Alternative A: 5 round trips	335	418	371	463
Alternative B: 6 round trips	402	502	445	556
North I-25 Service	**2008 Baseline**		**2015 Projection**	
	Low Riders	High Riders	Low Riders	High Riders
Alternative A: 4 round trips	116	145	171	214
Alternative B: 5 round trips	140	175	206	257

I-70 Mountain Corridor

Demand in the I-70 Mountain Corridor is complex, serving varied markets and travel patterns. There are complex trip purpose and peaking characteristics that reflect the unique mix of recreational, employee, and general travel markets. In those parts of the corridor where there is strong travel demand for employees, comprehensive transit systems have developed.

The demand analysis in the I-70 Mountain Corridor resulted in understanding where the gaps and demand for service exist, and in strategies for building services in the corridor to meet the demand.

Approach and Findings

There are three basic types of information available for this corridor: Census Journey-to-Work data, the *"I-70 Mountain Corridor Programmatic Environmental Impact Statement" (PEIS)*, and ridership data from the systems in the corridor.

Together, this information presents a picture of the overall demand for service in the corridor and can be used to inform decisions on service development. The corridor is a long one, and most of this information only covers segments of the corridor. The focus of the available information is on the 160-mile stretch between Denver and Glenwood Springs. The available information is, however, fairly high level and best for conceptual planning. When the knowledge gained from this information is combined with detailed service plans, ridership can be estimated on specific segments.

The analysis began with an analysis of Journey-to-Work data. This validated the propensity to use transit, but also showed relatively low levels of employment trips in the gaps where transit service does not presently exist. The PEIS data, was also reviewed. In the PEIS a comprehensive travel demand modeling effort was undertaken, providing an important understanding of the markets for transit services and when the travel occurs by direction. It also provides an understanding of the magnitude of both service and park-and-ride infrastructure that will be required to address recreational travel even as an initial system is developed. The PEIS work was not, however, geared to evaluate trade-offs that need to be considered in various start-up bus operating scenarios.

The analysis showed that demands for transit services in the I-70 corridor are not primarily for employment trips as RFTA, ECO, and Summit Stage services cover that market well. The exception is between Frisco and Vail where employee-oriented services presently do not operate. Rather, the I-70 Corridor Analysis (conducted as part of the Network Plan) showed two primary areas of demand. One is for service is to connect the existing operators, filling the gaps in services between Glenwood Springs and Eagle and between Vail and Frisco and providing connections to a broader network for the high number of transit riders. The other primary transit demand is for service between Denver and Vail. The latter will require significant infrastructure and service levels to address adequately but initial service with low levels of service can begin to meet essential travel needs.

The initial service being considered under the Interregional Express Bus project is very limited, and is part of a start-up system. The reader is referred to the I-70 Corridor Analysis, in Appendix A of the Network Plan for an evaluation of service and ridership possibilities. In this analysis, a mid-term operating scenario was developed with moderate levels of service. Implementation is designed to occur over 10 to 20 years. Most importantly, it recommends beginning service in the mountain corridor by (a) filling the gaps between existing providers and (b) initiating limited service to Denver that would complement existing private services in the corridor, begin to provide a public

transit presence, and provide a framework for establishing the operating arrangements, customer information, and infrastructure necessary to build service in this corridor.

As with the I-25 corridors, a key constraint to developing service between Denver, Vail, and Glenwood Springs is the infrastructure necessary to support such services. This includes the ability for buses to travel faster than autos (addressed by managed lanes in key areas of congestion), park-and-ride capacity, and the ability to build awareness about the availability of such service and provide high quality customer information using the latest technologies.

Service level planning has been completed for transit service in the gap between Glenwood Springs and Gypsum/Eagle and shows demand adequate to support full-day service (approximately 15 round trips). Service level planning has not occurred for service between Frisco and Vail, but rather relies on anecdotal evidence and existing ridership between Frisco and Copper Mountain. In both of these segments, the ridership is important but the true value of such service is the ability to connect existing systems with high levels of service.

Service Development Recommendations

The planning work has led to a variety of service development recommendations. These address services and how they may be developed over time. The recommendations also address items such as organizational structure, delivery of services, fares, and a variety of managerial considerations such as the provision of customer information and provision of passenger facilities.

The recommendations reflect the diversity shown by peer agencies and the specific conditions in Colorado that suggest benefits from a specific course of action. A key lesson learned from the peers is that each has successfully developed services based on how organizations have developed over time and in response to local conditions.

The various recommendations are summarized in this section.

Service Recommendations

In the North and South I-25 corridors, begin with peak hour services and one mid-day trip, serving only Downtown Denver.

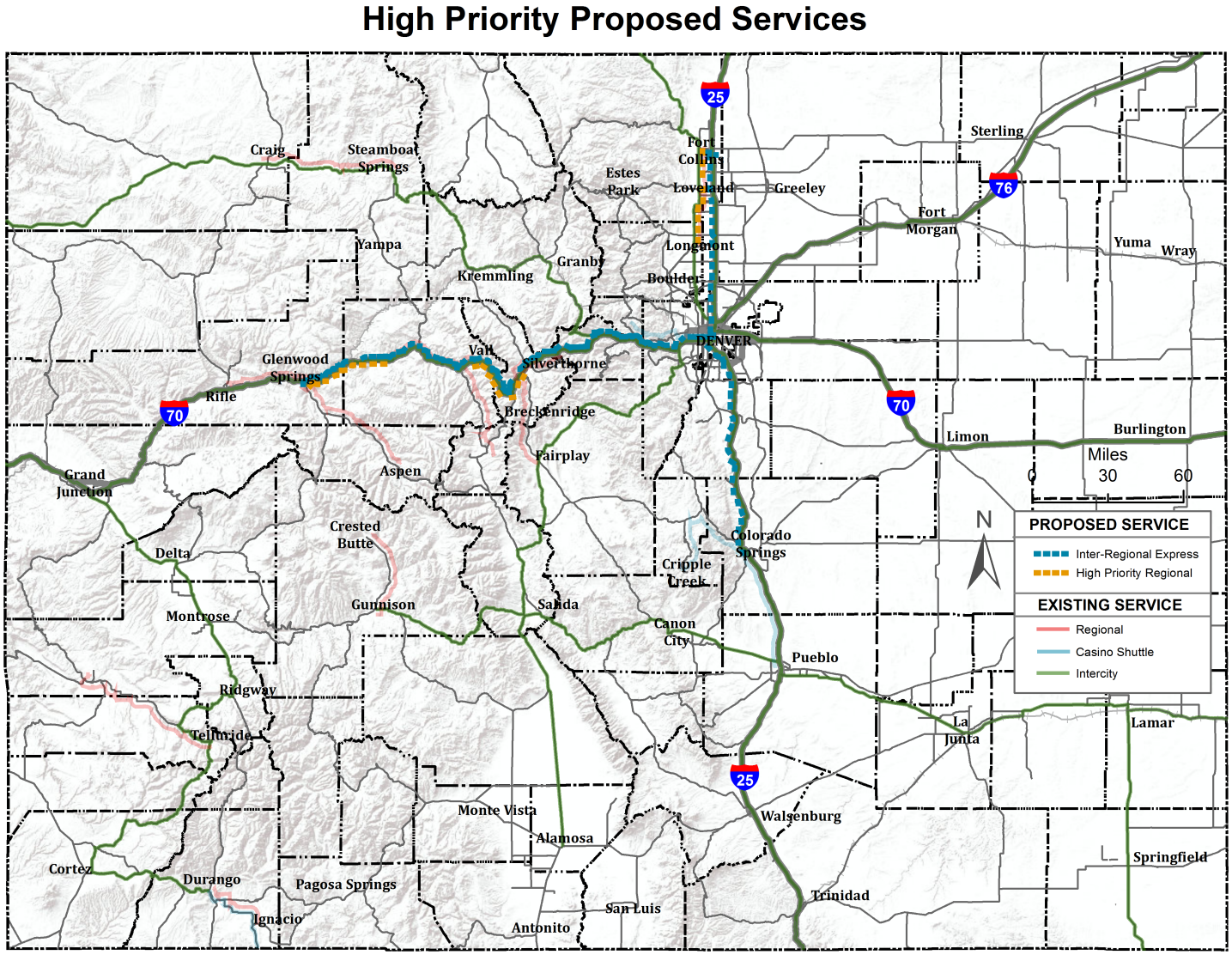
- As ridership develops, additional trips can be added. Funds for up to two additional round trips would be budgeted initially.
- After that point, the value of strengthening service in an existing corridor versus expanding to additional markets will need to be weighed.

Figure 1 illustrates the initial service corridors as well as those that may be developed some time in the future.

In the Mountain I-70 corridor, the recommended services are focused on (a) positioning CDOT to develop regional services between Vail and Denver, in line with the PEIS recommendations and (b) filling gaps between systems that are primarily responsible for commuter services. Only the Glenwood Springs - Denver service is proposed for Interregional Express service; the service that would fill gaps is categorized as regional service. The services are:

- Glenwood Springs - Denver: begin with one round-trip a day that complements the intercity service in the corridor. Expand to two round trips as demand warrants, with the second round trip operating between Vail and Denver.
- Eagle/Gypsum - Glenwood Springs: six or more round trips daily, connecting with services provided by ECO and RFTA. (Regional services operated by local agencies)
- Frisco – Vail: three round trips daily (Regional services operated by local agencies)

Figure B-1: Recommended Interregional Express Routes with Phasing



Service Development Recommendations

Monitor initial services including ridership, farebox recovery ratio, and reliability and adjust service levels as appropriate within the budget.

Work with partners to address both planning and policy issues related to developing additional services in the Pueblo to Colorado Springs corridor, for mid-range cities and dispersed work sites in the Denver Metro area, and for Larimer and Weld County workers.

Service Contracting

Colorado can benefit from the lessons learned from peer agencies. The availability of contractors varies between corridors so different providers may be able to provide the most cost-effective service in different corridors. It is recommended that RFPs for service contracts be structured to allow entities to bid on various segments of the service or all of the service.

Having more than one contractor reduces the ability to switch vehicles between corridors and to use the same back-up vehicle for all service. It also requires more oversight on the part of CDOT staff. In selecting contractors CDOT will need to balance between these program costs and the rates bid for service.

Fares

Comparing to the peer systems, a farebox recovery ratio of approximately 40% appears to be appropriate for the types of services provided. This will vary between corridors and types of service. Farebox recovery is anticipated to be higher than this for the South I-25 service (50% is a realistic goal) and somewhat lower for North I-25 as it is anticipated that ridership will take longer to develop in the north corridor.

The initial service plan for I-70 is not expected to generate this high of farebox recovery. Over the long term, as an effective network is developed in the corridor, a farebox recovery of around 40% is realistic for the Denver to Vail stretch. Initial levels of farebox recovery may be as low as 10% until the market develops. The farebox recovery for services filling the gaps between Glenwood Springs and Eagle/Gypsum is anticipated to match that of ECO Transit, or be closer to 20%. Many riders will have ECO Transit or RFTA passes. From the perspective of developing a seamless system for riders, this is one area where revenue sharing is worth investigating.

Overall, peer agencies reinforce the concept that revenue sharing is not an important issue as most riders arrive to the stop using their car. For the initial services, the free shuttles in downtown Denver, combined with looped routing between DUS and Broadway will enable passengers to easily reach a wide range of destinations.

CDOT Responsibilities

It is recommended that CDOT:

- Purchase vehicles and lease them to operator(s), providing oversight on both maintenance programs and service quality;
- Establish a customer information system and website and maintain responsibility for this. While the work may be contracted out (e.g. CDOT may contract with a university to update and maintain the transit service information or include website and telephone information in the IXB contract) the overall responsibility for this function should reside with CDOT to assure the system is effective and connects with other traveler information.
- Develop passenger facilities adequate to meet the needs of services in each corridor. The existing structure of having CDOT Regions own the park-and-ride facilities and entering into agreements with local entities for minor maintenance is a solid model for owned lots. However, it is anticipated that diverse arrangements will be needed, with CDOT owning some lots, leasing some lots, or leasing spaces in existing lots as services develop. It is recommended that CDOT plan for diverse arrangements in providing for park-and-ride lots.

Additional recommendations are included in Part 2, covering the implementation of services. Part 2 moves from a planning perspective to an implementation perspective and covers the details of how the first phase of services will be implemented.

PART 2: IMPLEMENTATION OF SERVICES

This part summarizes the service plan and characteristics, capital plan, and financial plan. Total system and individual corridor characteristics are covered.

Service Plan

Three routes are included in the system, serving Colorado Springs- Denver, Fort Collins - Denver, and Glenwood Springs – Denver. Service is designed as express, with limited stops at park-and-rides. It will operate weekdays, and not on major Holidays. Each route is described below.

Colorado Springs – Monument - Denver

This route serves Colorado Springs, Monument, and travels on South I-25 to downtown Denver. Stops are at:

- Tejon Park-and-Ride
- Woodman Road Park-and-Ride
- Broadway and I-25
- Denver Union Station

The last trip in the morning will serve the Colorado Springs Downtown Transit Center as connecting service will be available. Afternoon trips will serve the Downtown Transit Center on request after dropping passengers at the Tejon Park-and-Ride.

The recommended schedule includes five peak hour trips and one mid-day trip, as shown in the schedule below. The schedule is modeled on that run previously by FREX. Travel times are approximate and will need to be refined for final schedules and reviewed with local entities.

Table B-5: South I-25 Proposed Schedule

Trip	Departs Tejon	Arrives 18th & CA		Trip	Depart 19th & Stout	Arrives Tejon
1	5:15 AM	6:45 AM		7	1:35 PM	3:35 PM
2	5:30 AM	7:00 AM		8	3:35 PM	5:35 PM
3	5:45 AM	7:15 AM		9	3:50 PM	5:50 PM
4	6:00 AM	7:30 AM		10	4:05 PM	6:05 PM
5	6:15 AM	7:45 AM		11	4:20 PM	6:20 PM
6	11:30 AM	1:00 PM		12	4:35 PM	7:35 PM

Five buses are required for the peak schedule and these would be over-the-road coaches.

Fort Collins – Loveland – Denver

This route serves Fort Collins, Loveland, and travels on North I-25 to downtown Denver using the busway to speed its travel. Stops are at:

- Harmony Park-and-Ride at I-25,
- Loveland park-and-ride at US 34 at the Outlet Mall in Loveland, and
- Denver Union Station.

The first afternoon trip, departing Denver at 3:52 PM, can serve the South Transfer Center. However, by the time this service begins, Transfort plans to extend the route on Harmony Road to the park-and-ride. City of Loveland Transit (COLT) has also indicated they will be able to provide connecting transit services.

The recommended schedule is for 10 one-way trips, operating weekdays. The North I-25 subcommittee preferred a fifth peak hour trip rather than a mid-day trip. The most flexible approach would be to operate four peak hour trips and then based on ridership either add a fifth trip in the peak or a mid-day trip.

The following table shows four peak hour trips and one mid-day trip as the capital investment is significantly lower. Five peak hour trips require five vehicles while the schedule with four peak hour trips and one mid-day trip requires four vehicles.

Travel times are approximate and need to consider the final stops and expanded HOV lane. In addition, having two buses travel to Denver on Friday evening and return Sunday evening is recommended. Vehicles returning to Denver would be rotated for maintenance. This has been included in the budget.

Table B-6: North I-25 Proposed Schedule

Trip	Departs Harmony PNR	Arrives 17th & Stout		Trip	Depart 18th & Calif.	Arrives Harmony PNR
1	5:30 AM	6:35 AM		6	1:15 PM	2:35 PM
2	5:45 AM	6:50 AM		7	3:52 PM	5:15 PM
3	6:15 AM	7:20 AM		8	4:22 PM	5:45 PM
4	6:45 AM	7:50 AM		9	4:52 PM	6:15 PM
5	11:45 AM	12:50 PM		10	5:22 PM	6:45 PM

Five buses are required for the peak schedule and these would be over-the-road coaches.

Glenwood Springs - Vail – Frisco – Denver

This route serves Glenwood Springs, Eagle, Vail, Frisco, Silverthorne, Federal Center Station, and Denver stops. It is scheduled to operate one round trip daily, to complement Greyhound intercity service operating in the same corridor.

The route is proposed to depart Glenwood Springs at 7:20 AM weekdays, arriving in Denver at 10:40 AM. The route would depart Denver at 5:50 PM, arriving in Vail at 7:25 PM and Glenwood Springs at 11:20 PM. This limited schedule is proposed initially, with the ability to expand to two daily trips once ridership warrants doing so. The second expanded trip is planned to operate from Vail to Denver, and would be scheduled to arrive in Denver earlier in the morning (approximately 9 AM) and depart at approximately 3 PM.

Greyhound routes depart Denver at 12:15 PM (and 12:15 AM), traveling to Vail, and depart Vail at 5:40 AM and 3:55 PM, traveling to Denver. It is proposed that the services are jointly marketed and that an interline agreement be established. This agreement would provide for with each system honoring the tickets issued by the other and provides for marketing the service through Greyhound.

Primary stops are the South Glenwood Station to connect with RFTA's BRT, Eagle, Vail Transportation Center and the Frisco Transportation Center. Stops are also proposed for Denver Union Station and the Denver Bus Center.

One vehicle is required for initial service and an over-the-road coach is proposed.

System Characteristics

Table B-7 illustrates the overall system characteristics based on the service describe above. A low-end estimate was used and it is estimated that it will take three years for ridership to reach its potential. Initially 13 buses are required as the second Vail route is not programmed to begin operation at the same time as the other routes but rather will depend on demand.

Table B-7: System Characteristics

Characteristic	Colorado Springs	Fort Collins	Glenwood Springs	Vail	System Total
Trips					
Initial 1-way Trips	12	10	2	0	24
Additional Budgeted	2	2	0	2	6
Total Budgeted	14	12	2	2	30
Vehicles					
Peak	5	4	1	1	11
Back-up	1	1	1	0	3
TOTAL	6	5	2	1	14
Annual Revenue Miles	305,652	247,780	84,500	53,800	691,732
Daily Ridership					
First Year (50%)	223	103	18	15	344
Second year (60%)	267	124	21	18	412
Third year of operation (80%)	356	165	28	24	549

Fares

Fare Structure

The proposed fare structure is based on a zone system, as shown in Table B-8. The rates are based on those used by FREX, following the recommendations for the rates planned for 2014 with a cash fare averaging $0.17 per mile. It is comparable to RFTA and other similar services. A fare schedule by stop is included as an appendix to this report and provides an easy reference for fares between any two points.

The fare structure provides for cash fares and multiple-ride tickets, with discounts for purchasing larger quantities of tickets. A multiple-ride ticket is recommended rather than a monthly pass as it will allow for easier future conversion to smartcard technology.

Table B-8: Zone Fare System

	Approximate Distance	Towns	Cash Fare	10% Off 10-pack	20% Off 20-pack	25% Off 40-pack
Zone A	Up to 35 miles	Glenwood-Eagle, Eagle-Vail, Vail-Frisco	$5	$45	$80	$150
Zone B	From 35-60 miles	Monument, Loveland, Fort Collins	$9	$81	$144	$270
Zone C	From 60 - 85 miles	Colorado Springs, Frisco	$12	$108	$192	$360
Zone D	From 85 - 110 miles	Vail	$17	$153	$272	$510
Zone E	From 110- 140	Eagle	$22	$198	$352	$660
Zone F	From 140- 165	Glenwood Springs	$28	$252	$448	$840

In estimating fare revenues, consideration is given to the proportion of people who will choose each fare type and who will board in different zones. Table B-9 shows the average fare in each corridor based on these factors. These average fare estimates are reflected in the operating budget, where the average fare is multiplied by the annual ridership in calculating average fare revenue.

Assumptions were made based on what was known about the FREX service for the North and South I-25 services. Interlining agreements with private intercity bus services are anticipated to result in significant ridership, particularly in the I-70 corridor. Ridership and revenue estimates will need to be closely monitored as service begins and adjusted as needed.

Table B-9: Average Fares

Percent of Riders	Percent of Full Fare	South I-25		North I-25		Glenwood		Vail (2nd Trip)	
		Fare	**Per 100**	Fare	**Per 100**	Fare	**Per 100**	Fare	**Per 100**
40%	75%	$8.33	**$333**	$6.75	**$270**	$12.53	**$501**	$10.31	**$413**
20%	80%	$8.88	**$178**	$7.20	**$144**	$13.72	**$274**	$11.00	**$220**
20%	90%	$9.99	**$200**	$8.10	**$162**	$16.25	**$325**	$12.38	**$248**
20%	100%	$11.10	**$222**	$9	**$180**	$16.25	**$325**	$13.75	**$275**
Total Fares for 100 Riders			**$932**		**$756**		**$1,425**		**$1,155**
Average Fare per Passenger			**$9.32**		**$7.56**		**$14.25**		**$11.55**

Operating Budget

The budget in Table B-10 shows three years of operating expenses and revenues. All are based on current dollars and the service characteristics shown in Table B-7. The operating and administrative expenses cover purchased transportation services, and the administrative costs associated with running the program.

It is proposed that the call center for customer information will be contracted out as part of the service package. It is recognized that telephone information will continue to be an important way in which people obtain information about the services so adequate staff time will need to be allocated to the function. Similarly, the contractor would be responsible for lost-and-found, a functional arrangement as the coach operators will turn in articles left on buses at the end of their shifts.

The fare revenues are calculated based on the ridership and average fare estimated above. This results in a 26% farebox recovery ratio in the first fiscal year of operation, growing to a 42% farebox recovery ratio in the third year.

The total annual operating expenses are budgeted at $3 million for a full year of operation. The net operating expense is projected at just over $1.7 million in the 2014-15 fiscal year (9 months of service), $2.0 million in 2015-16, and then dropping to $1.7 million as fare revenues increase.

Table B-10: Operating and Administrative Expenses

OPERATING EXPENSES FOR FY 2015 – FY 2017			
Purchased Transportation	Oct 1, 2014 - June 30, 2015	July 1, 2015 - June 30, 2016	July 1, 2016 - June 30, 2017
Over-the-Road Buses	$1,985,563	$2,647,418	$2,647,418
Administrative Expenses			
Staffing and Related Expenses	$187,500	$250,000	$250,000
Marketing	$150,000	$100,000	$100,000
Fare Media and Supplies	$1,000	$1,000	$1,000
Materials and Supplies	$1,000	$1,000	$1,000
SUBTOTAL	$339,500	$352,000	$352,000
Subtotal Administrative & Operating Expenses	$2,325,063	$2,999,418	$2,999,418
Fare Revenues	$597,981	$953,923	$1,271,252
Farebox Recovery Ratio	26%	32%	42%
Net Operating Costs	$1,727,082	$2,045,495	$1,728,166

Capital Expenses

The capital expenses include the costs of vehicles, upgrading park-and-ride lots, and costs associated with fare collection.

Vehicles

A fleet of thirteen vehicles is recommended, allowing for a spare in each corridor and the following peak vehicles:

South I-25:	5
North I-25:	4
I-70:	1
TOTAL	10

When a second I-70 trip is added an additional vehicle will be required in the peak period, as would the addition of any more peak period trips in north or south I-25. At that point there will be adequate experience with the routes to know if two spares, a 20% ratio, would be adequate.

Park-and-Ride Lot Improvements

While park-and-ride lots are available at most planned stops, capacity and other improvements are needed at various lots. A summary of park-and-ride lots and issues at each is listed below. A total of $1,000,000 is included in the capital budget for the various improvements to park-and-rides, including signage, shelters and access improvements.

South I-25 Stops

Projected ridership will fill existing lots, although no short-term issues are projected at either Tejon or Monument. With ridership split between Tejon (38%), Woodman (14%), and Monument (38%) the parking requirements would grow to approximately 170 spaces at Tejon, 60 spaces at Woodman, and 170 spaces at Monument park-and-ride.

Tejon Park-and-Ride: Capacity and turning capacity are adequate. Shelter and signage improvements needed.

Woodman Park-and-Ride: The existing lot is at capacity; turning radius is not adequate for over-the-road coaches; entrance is too close to intersection with Corporate Drive. The existing lot is used by employees and customers of the Tiffany Square shopping center, along with a variety of people riding the Mountain Metro bus or meeting for carpools. Tiffany Square was required to build a lot for their customers, and at present it is not used as people prefer to use the lot closer to their destination.

Two options are being explored. The first is to control access to the existing lot, restricting it to bus riders, minor improvements to the lot to provide an adequate radius for the larger over-the-road coaches to circulate (curb and gutter work along with re-striping) and to install a round-about at the intersection to improve vehicle circulation.

The second is a property swap with Tiffany Square, trading the existing public lot for the one constructed by the shopping center. This would allow customers of the shopping center to use the lot closest to their destination while the extra distance would matter little to people riding the bus as they drive to the lot and transfer to cars. It would allow safer access and egress for buses as the entrance is farther from the intersection. The improvements needed would include some re-design to allow room for a bus stop and circulation within the lot (turn-around for buses that would support the weight of the vehicle, curb, gutter, and passenger platform, and some re-striping) and installation of a shelter and signage. Prior to transferring the existing lot, it is anticipated that some environmental remediation would be needed. The location of the two lots is illustrated in Figure B-2.

Woodman Park-and-Ride: Adequate capacity and bus turn around exist. Shelter and signage improvements needed. Largest problem with this lot is the access and egress to I-25. Explore future northbound access to I-25 via a short connection from the frontage road to the weigh station.

Figure B-2: Site view of Woodmen Park-n-Ride

North I-25 Stops

Parking capacity is limited at the Fort Collins-Harmony PNR, which runs close to full on many days. There appears to be adequate capacity at the US 34 PNR at present. There is no prior experience to guide how ridership will be split between the Fort Collins-Harmony and the Loveland stops. Ridership estimates are at a low of 70 riders per day and a high of 103 riders per day, based on 2008 estimates and between 88 and 129 per day based on 2015 estimates.

Harmony Park-and-Ride: This lot, owned by the City of Fort Collins, needs expansion, and a 150-car extension has been proposed. The bus turn around and shelters exist, so only minor signage improvements would be necessary. Shelter and signage improvements needed. Largest problem with this lot is the access and egress to I-25. Explore future northbound access to I-25 via a short connection from the frontage road to the weigh station.

Figure B-3 illustrates the proposed improvements to the lot. The lot can be expanded as a gravel lot at a cost of approximately $172,000. Paving of the expanded area, with the island and lighting noted in Figure B-3 is estimated at $400,000.

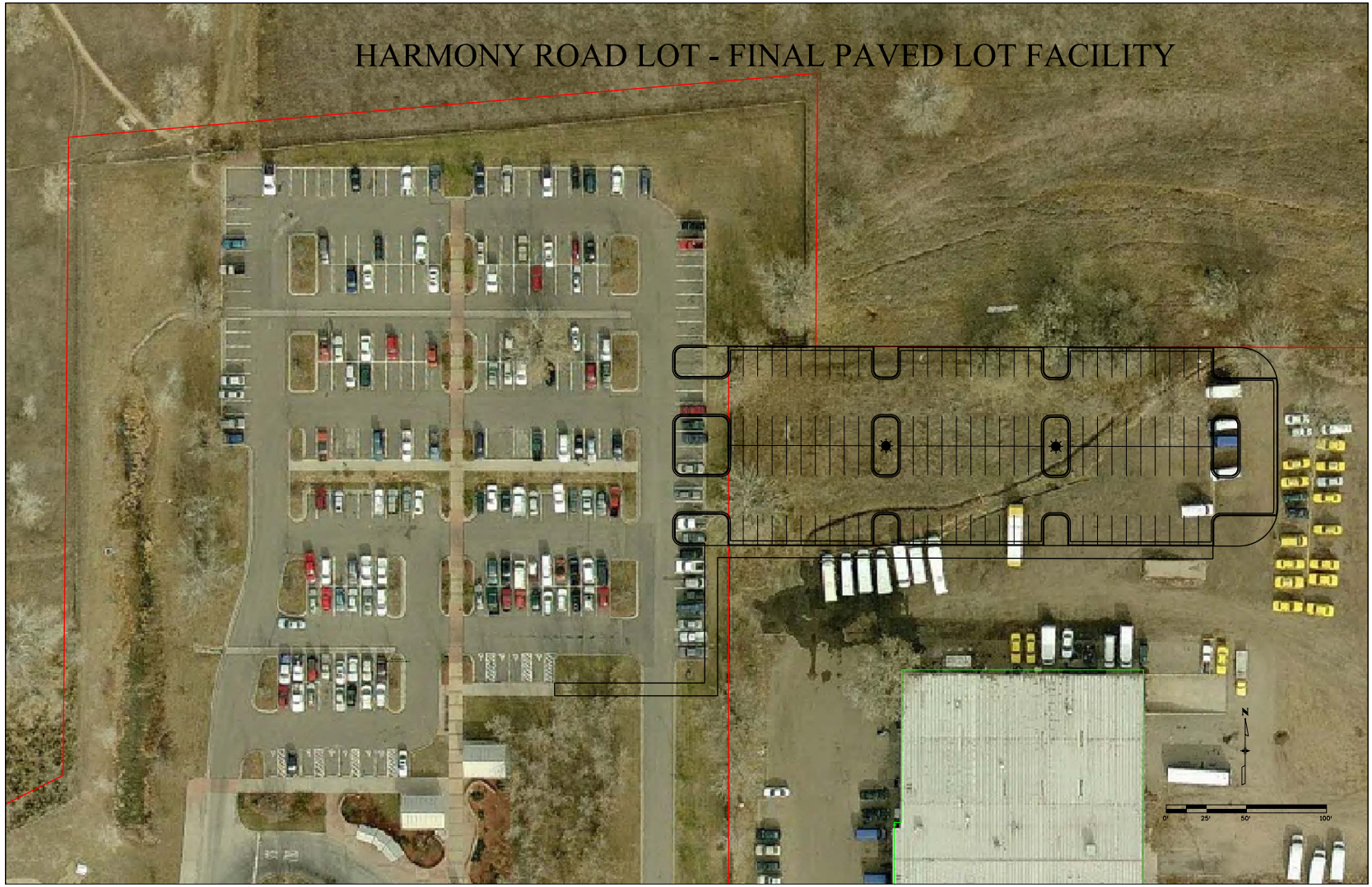
US 34 PNR: This location has adequate capacity but requires minor upgrades, including a shelter and minor concrete work for the platform and passenger waiting area. Circulation is adequate but requires significant time as the vehicle must circulate around the mall to return to US 34 and I-25, adding significant time to the route. It is recommended that alternative access and egress options be explored.

I-70 Stops

In general, the proposed stops in the I-70 corridor are in place, have adequate circulation and shelters or passenger waiting areas. Initially, parking requirements are not large as the service is limited. It is anticipated that for the I-70 corridor stops, the number of passengers transferring between bus systems will be significant. The specifics of each location are noted below.

Glenwood Springs: The VelociRFTA station at 27th Street and Highway 82. This location has only limited parking but connects with the BRT to the Roaring Fork Valley. A new station location in Glenwood has been identified that will serve all routes, but funding for construction has not been identified. In January of 2015 reconstruction will begin on the Highway 82 bridge, so at that time the service will need to detour and start in a West Glenwood location. The West Glenwood park-and-ride is recommended. It may be desirable to begin service at this location as the 27th Street South Glenwood station will not be accessible until mid-2018. It is recommended that CDOT work with RFTA and City of Glenwood Springs to determine if any improvements are needed at the temporary site and to assure that good connections are available to and from the South Glenwood station.

Figure B-3: Proposed Harmony PNR Expansion



Eagle: The existing Chambers PNR lot is at capacity and Eagle County is constructing a new lot that will be used by CDOT's IX service.

Vail: The Vail Transportation Center will be used as the stop for this service. There is a charge for parking in Vail, but there is a high level of bus access.

Frisco: The Frisco Transit Center will serve as the stop. This location has adequate parking, good bus circulation, and indoor waiting areas for passengers.

Other Capital Items

Fareboxes and related computer equipment are the other capital items that are needed. Mountain Metropolitan Transit has twelve electronic fareboxes from the FREX service they are willing to lease to CDOT at a nominal cost. Only one new electronic farebox will need to be purchased, along with the computer and related software for reading and reporting on fares. The fare equipment is included in the budget

Capital Budget

The capital budget (Table B-11) lists the items required for initiating IX service. Most expenses will occur in calendar year 2014 for service beginning in October of 2014.

Table B-11: Interregional Express Bus Capital Expenses - 2014

INTERREGIONAL EXPRESS BUS CAPITAL EXPENSES - 2014			
		Unit Cost	
Vehicles			
13	Over-the-road Coaches	$600,000	$7,800,000
1	Vaults & related, including PC		$17,500
Park-and-Ride Improvements			
	Woodman Road		
	Option1 - Land Swap with Tiffany Square w/improvements		
	Option 2 - Roundabout at Corporate Drive and Mark Dabley Bld	$300,000	
	Harmony Road		
	- Grading, gravel, for 150 new spaces	$172,000	
	- Paving and final finish	$399,000	
	Shelters, Benches, Infrared heating for Tejon, Woodman, Monument, Centerra, Ft Collins, and Eagle.		
	Total		$1,000,000
	Branding and Pre-Launch Communication		$200,000
	Contingency		$1,900,000
TOTAL CAPITAL			**$10,917,500**

APPENDIX 1: PROPOSED FARES BY STOP

I-25 South Fare Structure							
	Walk up	10 Ride		20 ride		40 Ride	
Between		Total	Fare/Ride	Total	Fare/Ride	Total	Fare/Ride
Colorado Sprngs Tejon/Woodmen and Denver	$12	$108	$10.80	$192.00	$9.60	$360.00	$9.00
Monument and Denver	$9	$81	$8.10	$144.00	$7.20	$270.00	$6.75

Note: No passengers will be carried whose entire trip is between Tejon PNR, Woodmen PNR, and Monument

I-25 North Fare Structure							
	Walk up	10 Ride		20 ride		40 Ride	
Between		Total	Fare/Ride	Total	Fare/Ride	Total	Fare/Ride
Fort Collins Harmony and Denver	$10.00	$90.00	$9.00	$160.00	$8.00	$300.00	$7.50
Loveland and Denver	$9.00	$81.00	$8.10	$144.00	$7.20	$270.00	$6.75

Note: No passengers will be carried whose entire trip is between Ft. Collins and Loveland

I-70 Fare Structure

	Denver/Denver Federal Center						
	Walk up	10 Ride		20 Ride		40 ride	
		Total	Fare/Ride	Total	Fare/Ride	Total	Fare/Ride
Glenwood Springs	$28.00	$252.00	$25.20	$448.00	$22.40	$840.00	$21.00
Eagle	$22.00	$198.00	$19.80	$352.00	$17.60	$660.00	$16.50
Vail	$17.00	$153.00	$15.30	$272.00	$13.60	$510.00	$12.75
Frisco/Silverthorne	$12.00	$108.00	$10.80	$192.00	$9.60	$360.00	$9.00
	Frisco/Silverthorne						
	Walk up	10 Ride		20 Ride		40 ride	
		Total	Fare/Ride	Total	Fare/Ride	Total	Fare/Ride
Glenwood Springs	$17.00	$153.00	$15.30	$272.00	$13.60	$510.00	$12.75
Eagle	$12.00	$108.00	$10.80	$192.00	$9.60	$360.00	$9.00
Vail	$5.00	$45.00	$4.50	$80.00	$4.00	$150.00	$3.75
Denver Federal Center/Denver	$12.00	$108.00	$10.80	$192.00	$9.60	$360.00	$9.00
	Vail						
	Walk up	10 Ride		20 Ride		40 ride	
		Total	Fare/Ride	Total	Fare/Ride	Total	Fare/Ride
Glenwood Springs	$12.00	$108.00	$10.80	$192.00	$9.60	$360.00	$9.00
Eagle	$5.00	$45.00	$4.50	$80.00	$4.00	$150.00	$3.75
Frisco/Silverthorne	$5.00	$45.00	$4.50	$80.00	$4.00	$150.00	$3.75
Denver Federal Center/Denver	$17.00	$153.00	$15.30	$272.00	$13.60	$510.00	$12.75
	Eagle						
	Walk up	10 Ride		20 Ride		40 ride	
		Total	Fare/Ride	Total	Fare/Ride	Total	Fare/Ride
Glenwood Springs	$5.00	$45.00	$4.50	$80.00	$4.00	$150.00	$3.75
Vail	$5.00	$45.00	$4.50	$80.00	$4.00	$150.00	$3.75
Frisco/Silverthorne	$12.00	$108.00	$10.80	$192.00	$9.60	$360.00	$9.00
Denver Federal Center/Denver	$22.00	$198.00	$19.80	$352.00	$17.60	$660.00	$16.50
	Glenwood Springs						
	Walk up	10 Ride		20 Ride		40 ride	
		Total	Fare/Ride	Total	Fare/Ride	Total	Fare/Ride
Eagle	$5.00	$45.00	$4.50	$80.00	$4.00	$150.00	$3.75
Vail	$12.00	$108.00	$10.80	$192.00	$9.60	$360.00	$9.00
Frisco/Silverthorne	$17.00	$153.00	$15.30	$272.00	$13.60	$510.00	$12.75
Denver Federal Center/Denver	$28.00	$252.00	$25.20	$448.00	$22.40	$840.00	$21.00

Note: No passengers will be carried whose entire trip is between Downtown Denver and Denver Federal Center.

Colorado Statewide Intercity and Regional Bus Network Study

Appendix C: Demand Estimation

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October 2013

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OVERVIEW

This appendix examines regional demand in three corridors where CDOT has proposed establishing regional commuter bus services: the North I-25, South I-25, and I-70 corridors. Different methods were used in the I-70 corridor from the north and south I-25 corridors because of different conditions and different availability of data.

This appendix addresses both demand and ridership estimates. Often, the two terms are used interchangeably. As much of the information comes from different sources, note that the context in which the terms are used is important. The term "demand" is used in a general sense to identify the overall level of demand that would be expected to occur if transit services are operated with a high enough level of service so that riders find the service to be convenient for the trips they make. The term "Ridership" is used to reflect the anticipated use of a service based on the quality of service that is provided.

The quality of service is commonly measured by frequency of service, the days and hours when service is available, travel time, directness of travel, and fares. The more complete the service network, with direct service or easy transfers, the more viable it is for travelers. The service that is being considered for these corridors is essentially new service, so in the development of the service will need to balance the quality of service and development of ridership. While a base level of service is needed to garner ridership, the development of transit service in a corridor is then generally incremental with service increases provided as warranted by ridership. It can take up to two years for ridership to develop on a route as people learn about the option, test it, and then a portion become regular riders.

Several studies have identified overall demand for transit service in these corridors including major environmental analyses in the Mountain I-70 Corridor and the North I-25 corridor. In this appendix information will be presented on overall demand from models, and where data is available the estimates will be grounded in experience within the corridors. The appendix begins with information on the Mountain I-70 corridor and then describes demand and potential ridership in the I-25 corridors.

MOUNTAIN I-70 CORRIDOR

Demand in the I-70- corridor is complex, serving varied markets and travel patterns. There are complex trip purpose and peaking characteristics that reflect the unique mix of recreational, employee, and general travel markets. In those parts of the corridor where there is strong travel demand for employees, comprehensive transit systems have developed.

INFORMATION AVAILABLE

There are three basic types of information available: Census Journey-to-Work data, the *"I-70 Mountain Corridor Programmatic Environmental Impact Statement"* (PEIS), and ridership data from the systems in the corridor.

- The Census information is high level and specific to one market, employment trips. It helps provide an understanding of the use of transit for employment trips.
- The PEIS provides a high level analysis of travel markets in the mountain corridor, with detailed information on how the markets vary by time of day, day of the week, and season of the year. This information is helpful in understanding the magnitude of the various markets and when service will be needed to serve these markets.
- Ridership data, schedule information, and planning studies from Summit Stage, ECO Transit, and Roaring Fork Transportation Authority (RFTA) provide actual information on the level of use of these transit systems and the role they serve in transporting employees. In addition, their historical development will be useful in understanding the growth and development of transit services in the I-70 mountain corridor.

Together, this information presents a picture of the overall demand for service in the corridor and can be used to inform decisions on service development. The corridor is a long one, and most of this information only covers segments of the corridor. The focus of the available information is on the 160-mile stretch between Denver and Glenwood Springs. The available information is, however, fairly high level and best for conceptual planning. As noted above, when the knowledge gained from this information is combined with detailed service plans, then ridership can be estimated on specific segments.

Mode of Transportation to Work

The mode of transportation to work for the counties in the I-70 corridor, as reported in the American Community Survey, is presented in Table 1. Rows illustrate the mode of transportation for residents living in the county and for employees working in the county. In counties where a significant number of workers live elsewhere, this is an important distinction.

This data illustrates the completeness of the transit networks in various counties. Those counties where either 5% or more of riders use transit are highlighted. This occurs in in Gilpin, Summit, Eagle, and Pitkin counties in the I-70 corridor.

- In Gilpin County over 26% of workers arrive by transit, riding the many casino shuttles that serve Black Hawk and Central City. Four percent of residents in the County use transit for their work trip. Most of these are workers coming from the Metro area counties.

- The strength of the transit networks in Summit, Eagle, and Pitkin counties are reflected in the high use of transit for commute trips. Parking costs in the Vail and Aspen area also is an important factor.
    - Summit County has a 7.5% transit mode share for both residents and workers;
    - Eagle County has a 6.9% transit mode share among residents and 4.8% among workers;
    - Pitkin County has a 10.9% transit mode share among residents and 13.6% transit mode share among workers.
- Note that in Pitkin and Garfield counties the carpool mode share is extraordinarily high as well.

The journey-to-work data also illustrates the propensity of residents to use transit. First, it shows that where there are good transit connections, people do use transit services. A 5% transit mode share shows the transit network is strong, providing effective connections between home and work, but many of these regions far exceed that level.

It is worth noting that ridership in ECO Transit and RFTA both declined significantly in the recession years, reflecting how closely system ridership is tied to commuter transportation. With job reductions, ridership declined and then service was cut. Ridership and service is only now starting to build up again. For example, ECO Transit carried 3,300 riders daily in 2008 and 1,900 riders daily in 2011, over a 40% reduction in ridership.

Table 1: Mode of Transportation to Work

			Total Workers	Drove alone	2-person Carpool	3-or-more-person Carpool	Public Transportation	Bike	Walked	Taxi, Motorcycle and Other	Worked at Home
Gilpin	Residents	Number	3,053	2,194.0	352	6.0	125	11.0	40	17.0	308
		Percent	100	71.9	12	0.2	4	0.4	1	0.6	10
	Workers	Number	5,373	2,888	452	130	1,416	0	33	146	308
		Percent	100.0	53.8	8.4	2.4	26.4	0.0	0.6	2.7	5.7
Clear Creek	Residents	Number	5,217	3,897	426	41	69	78	223	97	386
		Percent	100.0	74.7	8.2	0.8	1.3	1.5	4.3	1.9	7.4
	Workers	Number	3,392	2,111	482	98	22	39	193	61	386
		Percent	100.0	62.2	14.2	2.9	0.6	1.1	5.7	1.8	11.4
Summit	Residents	Number	17,430	10,904	1,579	357	1,311	275	1,128	223	1,653
		Percent	100.0	62.6	9.1	2.0	7.5	1.6	6.5	1.3	9.5
	Workers	Number	19,172	12,283	1,747	535	1,433	255	1,148	118	1,653
		Percent	100.0	64.1	9.1	2.8	7.5	1.3	6.0	0.6	8.6
Eagle	Residents	Number	30,238	21,815	2,024	435	2,084	248	1,341	65	2,226
		Percent	100.0	72.1	6.7	1.4	6.9	0.8	4.4	0.2	7.4
	Workers	Number	30,271	21,739	2,368	801	1,454	228	1,376	79	2,226
		Percent	100.0	71.8	7.8	2.6	4.8	0.8	4.5	0.3	7.4
Garfield	Residents	Number	29,204	18,706	3,375	1,954	1,354	483	1,332	158	1,842
		Percent	100.0	64.1	11.6	6.7	4.6	1.7	4.6	0.5	6.3
	Workers	Number	27,945	18,902	2,889	1,570	756	477	1,332	177	1,842
		Percent	100.0	67.6	10.3	5.6	2.7	1.7	4.8	0.6	6.6
Pitkin	Residents	Number	10,238	5,290	622	269	1,114	288	1,330	195	1,130
		Percent	100.0	51.7	6.1	2.6	10.9	2.8	13.0	1.9	11.0
	Workers	Number	17,917	9,144	1,878	1,394	2,437	320	1,395	219	1,130
		Percent	100.0	51.0	10.5	7.8	13.6	1.8	7.8	1.2	6.3
Source/Note	US Census Bureau, ACS 2006-2008 3yr est., Special Tabs for CTPP										

PEIS Data

For the PEIS a comprehensive travel demand modeling effort was undertaken. The effort was focused on solving congestion problems, so the days modeled were related to the days on which congestion occurs and it was structured to build an understanding of the components congestion.

This provides a great deal of useful information and is an important component of the analysis. However, it is important to keep the information in context. The modeling effort was geared to the magnitude of the congestion issues and used a bus alternative with the capacity to handle peak volumes. This is illustrated in the I-70 Corridor Analysis, Appendix A. In the model, buses traveling in mixed traffic were not considered effective because of poor travel times in peak periods and limited capacity. However, they were retained in the Record of Decision as an initial start-up system or to augment a rail or Advanced Guideway system. Buses operating in a guideway performed well, but there were concerns about icing and snow build-up in the guideway.

This study is considering development of an initial start-up system, and considering the conditions that exist in 2013. The PEIS information provides an important understanding of the markets for transit services and when the travel occurs by direction. It also provides an understanding of the magnitude of both service and park-and-ride infrastructure that will be required to address recreational travel even as an initial system is developed. The PEIS work is not geared to evaluate trade-offs that need to be considered in various start-up bus operating scenarios.

On the following pages charts and data are presented that illustrate key information from the PEIS. The first two graphs illustrate the daily person trips, by purpose, that the model estimated would be carried in 2025 by a bus in mixed traffic. This is illustrated for a Winter Saturday and a Summer Thursday to show peak and base travel days. Following this is a table illustrating the projected mode share of person trips carried by buses operating in mixed traffic with notes on the trip purposes by segment.

Definitions:

CDR – Colorado day recreation (not from Front Range)
CNW – Colorado non-work trips
Stay Over – Stay-over recreation trips
FRDR – Front Range day recreation trips
LNW – Local non-work

A key finding is that even in mixed traffic the model estimates around 5% of trips would be made by bus.

Figure 1: 2025 Bus-in-Mixed-Traffic Person Trips (Summer)

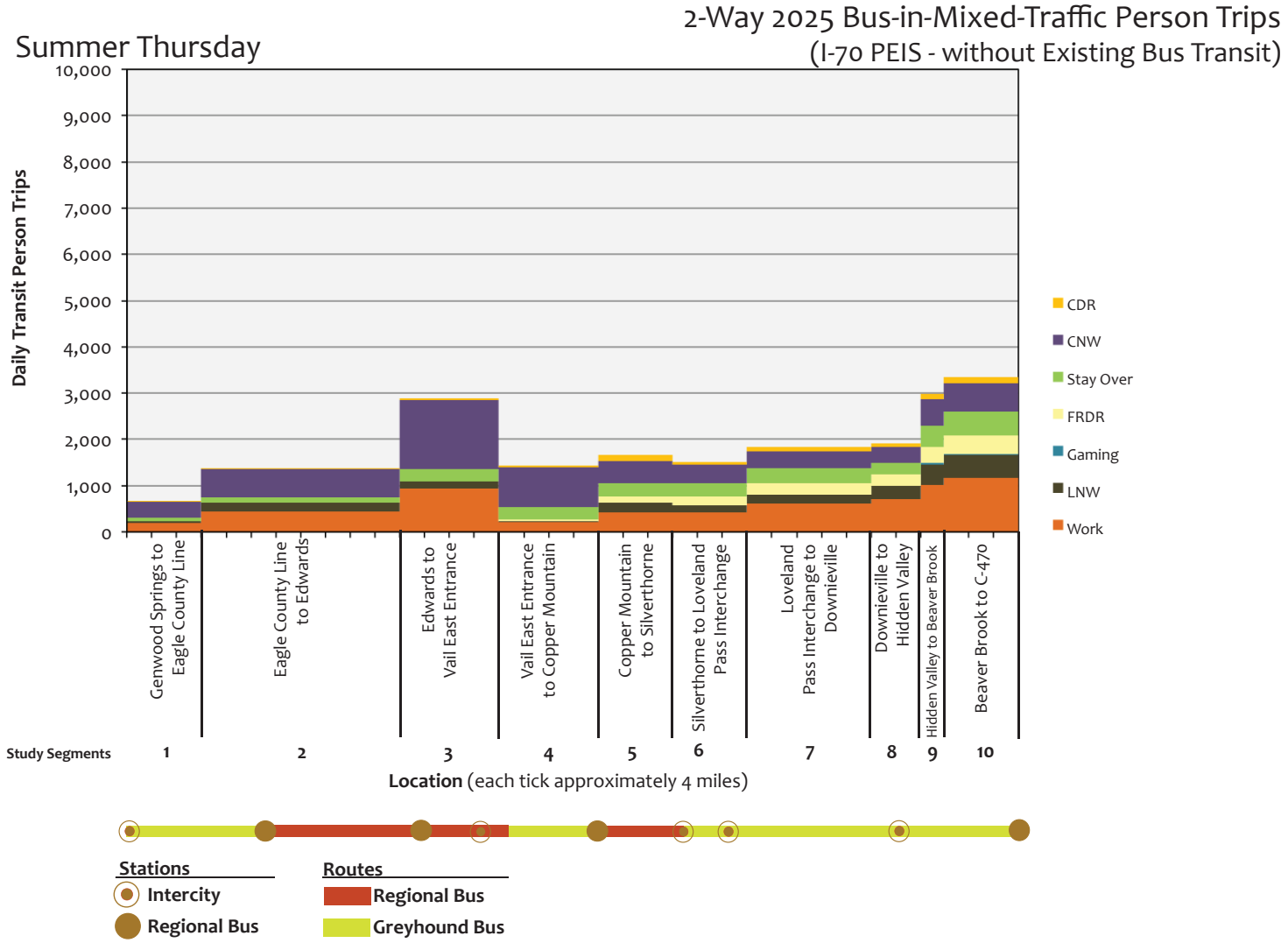

Figure 2: 2025 Bus-in-Mixed-Traffic Person Trips (Winter)

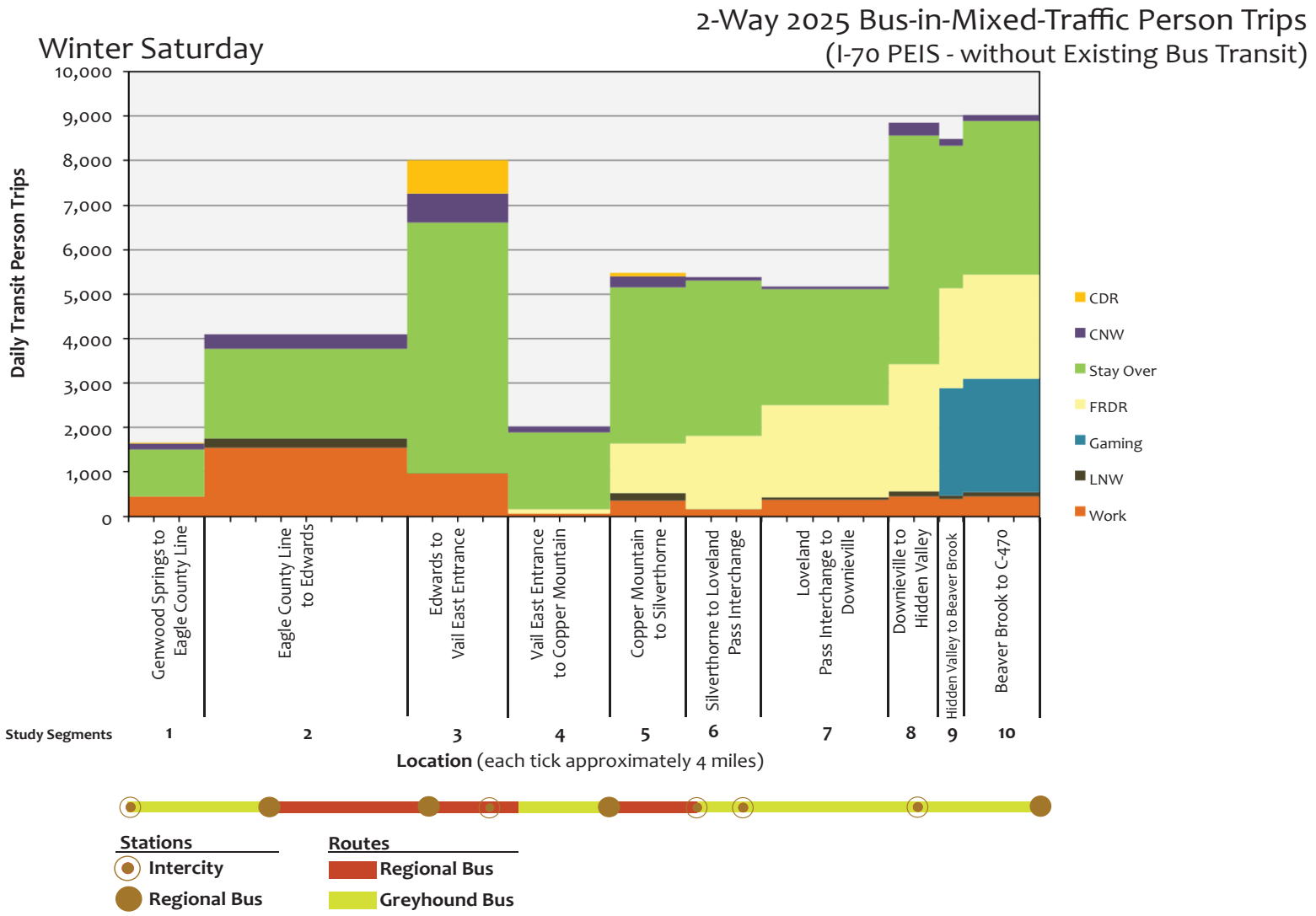

Table 2: I-70 Travel Demand Bus-in-Mixed Traffic (Winter)

Bus-in Mixed Traffic Projected Mode Share				Notes on Trip Purposes
Winter Saturday	**2025 Highway PTs**	**2025 Transit (all BIMT) PTs**	**PEIS Transit as % of Total PTs**	**2025 Winter Saturday Corridor Trip Purpose Patterns (% of Total 2025 PTs)**
Winter Saturday e/o Genesee				**Overview** On Winter weekends, Day Recreation, Stay Over and Colorado Non-work trips dominate trip purposes **Work Trips** • 24% of PTs from Eagle Co line to Edwards • 7 – 11% for the rest of the Corridor **Local non-work trips** • 15 – 20 % of PTs in Eagle Co • 9% in Summit Co • 2% in Clear Ck Co **Day Recreation** • 30% of all PTs from Edwards to Vail • 31% in Summit Co • 46 – 48% in Clear Creek Co • 25% in Jefferson Co **Stay over and Colorado non-work PTs** • 38% from Edwards to Vail • 60% at Vail Pass • 38% in Clear Ck Co • 22% in Jefferson Co.
	258,400	11,500	4%	
Winter Saturday at Floyd Hill				
Minimal Action	242,500	10,900	4%	
Winter Saturday at Twin Tunnels				
Minimal Action	153,600	7,600	5%	
Winter Saturday e/o Empire Jct				
Minimal Action	69,700	7,500	5%	
Winter Saturday at EJMT				
Minimal Action	111,000	6,200	5%	
Winter Saturday between Frisco and Silverthorne				
Minimal Action	109,300	6,100	5%	
Winter Saturday at Vail Pass				
Minimal Action	70,500	2,200	3%	
Winter Saturday at Dowd Canyon				
Minimal Action	111,300	9,000	7%	
Winter Saturday e/o Eagle				
Minimal Action	84,700	4,400	5%	
Winter Saturday w/o No Name				
Minimal Action	50,900	1,800	4%	

Table 3: I-70 Travel Demand Bus-in-Mixed Traffic (Thursday - Summer)

Summer Thursday	2025 Highway PTs	2025 Transit (all BIMT) PTs	PEIS Transit as % of Total PTs	2025 Summer Thursday Corridor Trip Purpose Patterns (% of Total 2025 PTs)
Summer Thursday e/o Genesee				**Overview** Eagle Co is expected to be the most urbanized. In 2025, Work and Local non-work trips dominant east of Eagle (over 100% increase); and Stay Over and Colorado Non-Work trips are more dominate west of Eagle. The growth in Local Non-Work trips and Stay Over and Colorado Non-Work trips reflect the urbanization patterns projected in Eagle Co west of Vail. **Work Trips** • Work Trip % increase from west to east: • 28% at Glenwood Canyon • 27 – 30 % from Eagle Co line to Vail • 33 -37% from Vail to Copper Mountain • 36% to 48% in Summit Co • 46% in Clear Creek Co • 34% from Beaver Brook to C-470 **Local Non-Work Trips** • 40% from Eagle County Line to Edwards • 36% from Edwards to Vail • 13% in Vail pass • 24% in Summit Co • 12% in Clear Ck Co **Day Recreation Trips** • Less than 10% in Corridor west of Copper Mountain • 5 - 6% east of Copper Mountain **Stay Over and Colorado Non-Work** • 28% in Glenwood Springs area • 25% in the Eagle Co line to Edwards area • 41% at Vail Pass • 25% in Summit C
Minimal Action	195,700	4,000	2%	
Summer Thursday at Floyd Hill				
Minimal Action	170,400	3,500	2%	
Summer Thursday at Twin Tunnels				
Baseline	115,000	300	0%	
Minimal Action	113,000	2,300	2%	
Summer Thursday e/o Empire Jct				
Minimal Action	103,400	2,200	2%	
Summer Thursday at EJMT				
Minimal Action	94,700	1,900	2%	
Summer Thursday between Frisco and Silverthorne				
Minimal Action	108,300	2,000	2%	
Summer Thursday at Vail Pass				
Minimal Action	72,100	1,500	2%	
Summer Thursday at Dowd Canyon				
Minimal Action	121,100	3,200	3%	
Summer Thursday e/o Eagle				
Minimal Action	98,200	1,400	1%	
Summer Thursday w/o No Name				
Minimal Action	48,700	700	1%	

Table 4: I-70 Travel Demand Bus-in-Mixed Traffic (Sunday - Summer)

Summer Sunday	2025 Highway PTs	2025 Transit (all BIMT) PTs	PEIS Transit as % of Total PTs	2025 Summer Sunday Corridor Trip Purpose Patterns (% of Total 2025 PTs)
Summer Sunday at Genesee				**Overview** The total eastbound (peak direction) demand is constant between the Eagle County Line and Copper Mountain. Summer Sunday volumes are projected to exceed Winter Saturday across the Corridor, however peak hourly winter Saturday volumes may exceed those of summer weekends. In contrast, summer weekends tend to have several consecutive hours of similarly heavy travel demand. Local Non-Work and Work trips make up a greater percentage of Eagle Co (especially Eagle Co line to Edwards), triggered by projected population and employment growth. Recreational travel dominates throughout the Corridor. **Work Trips** • 5% Eagle Co line to Edwards • 3 – 5 % for remainder of Corridor **Local Non Work Trips** • 5% Eagle Co Line to Edwards • 3 – 5% for remainder of Corridor **Day Recreation** • Drops off west of Copper Mountain •5 - 7% Eagle Co Line to Edwards •10% at Dowd Canyon • 4-5% at Vail Pass • 15% Summit Co **Stay Over and Colorado Non-Work Trips** • 75 – 90% in Eagle, Summit and Clear Ck Counties • 40% in Jefferson Co
Minimal Action	358,400	9,800	3%	
Summer Sunday at Floyd Hill				
Minimal Action	301,500	8,700	3%	
Summer Sunday at Twin Tunnels				
Minimal Action	196,800	6,700	3%	
Summer Sunday e/o Empire Jct				
Minimal Action	193,900	6,600	3%	
Summer Sunday at EJMT				
Minimal Action	151,700	5,000	3%	
Summer Sunday between Frisco and Silverthorne				
Minimal Action	151,600	5,000	3%	
Summer Sunday at Vail Pass				
Minimal Action	117,200	2,500	2%	
Summer Sunday at Dowd Canyon				
Minimal Action	132,200	3,300	2%	
Summer Sunday e/o Eagle				
Minimal Action	117,600	1,900	2%	
Summer Sunday w/o No Name				
Minimal Action	86,500	1,800	2%	

System Development Among I-70 Corridor Public Providers

Several public transit systems operate in the mountain I-70 corridor, each operating some combination of local feeder services or regional employee transportation. The municipal systems (Black Hawk/Central City, Vail Transit, Avon-Beaver Creek, Glenwood Ride!) primarily offer local circulating transit services. The countywide systems have a stronger focus on employee transportation, although they also provide circulation within the communities in each county. While the municipal systems provide important feeder services, the countywide systems (Summit Stage, ECO Transit, and Roaring Fork Transportation Authority) and the service on the I-70 corridor are the focus here. RFTA service on Highway 82 is identified as well, as it has a high level of transit service and it serves as an extension of the I-70 corridor.

Table 5: I-70 Corridor LOS

Operator	Segment/Route	Service Level*	Annual Riders	Daily Riders
Summit Stage	Frisco-Copper Mtn.	15-30 minute peak; 60-minute base frequency	185,000	260 - summer and 860 - winter
ECO Transit	Gypsum-Vail (I-70)	Express w/ 15-30 min in peak; up to 120 in base	144,000	400
	Edwards-Vail (6 & 70)	30 min	533,000	1,461 overall, with 780 in summer & 2,300 in winter
RFTA	Glenwood-Rifle	Peak only, with 60 min. frequency most often.	164,000	450
	Hwy 82	30 min; will increase to 15 peak with opening of BRT	2,204,000	4,160

** Service levels vary considerably, both by season and by time of day, as the systems match service with demand. These approximations are what commonly occur.*
*** ECO's highest ridership months are December through March with an average of 3,200 trips provided per day (total ridership was 391,373). In the summer, the ridership was about 335,000 with an average daily ridership of 1,400 trips.*

The ridership numbers in Table * generally reflect annual ridership and are for either 2011 or 2012, depending on availability of data. Winter and summer differentials are provided where available. The ridership does not relate directly to potential I-70 service as routes serve multiple purposes and different purposes than the proposed services. These routes operate on a mix of local roadways, State Highways, and I-70. For example, the ECO Highway 6 route operates on both Highway 6 and I-70, carrying local passengers and workers traveling from Edwards to Vail. The existing ridership does, however, provide a reality check and shows that the projections from the PEIS are in a realistic range.

RFTA Highway 82 service will transition to Bus Rapid Transit in September of 2013. ECO Transit is in the initial stages of restructuring their service to operate an I-70 spine augmented by continued local services operating on Highway 6. This will allow them to provide the highest capacity service with the quickest travel times and lowest costs.

NORTH AND SOUTH I-25 CORRIDORS

These corridors are different in character than the Mountain I-70 Corridor in that the focus of service development is primarily peak hour regional employment trips.

One can consider a simple mode share estimate (e.g. 2% of trips generally will use the transit mode when adequate services are provided) and consideration of the mode share of only the work trips that travel in the market. In Colorado, workers have generally shown a propensity to use transit when it is available, with mode shares of 4-10% of work trips fairly common and higher numbers in some corridors. While mode shares provide an important guide to what might be expected, qualitative factors are also important, including:

- Quality of service as measured by travel time, frequency of service, span of service, and availability of parking
- Location of employment (central core vs. dispersed locations)
- Availability of car and van pools

INFORMATION AVAILABLE

There are three basic types of information available for these corridors: Census Journey-to-Work data, historical ridership data from FREX, and planning studies for north I-25, including the North I-25 EIS and North Front Range Regional Transit Element.

- The Census information provides an understanding of the flow of employment trips between Denver and the other counties along the I-25 corridor.
- Prior FREX ridership data provides a wealth of information about ridership levels by trip.
- The planning studies provide a conceptual understanding of the level of demand in the northern corridor. Both the EIS and Regional Transit Element considered total trips rather than only employment trips, but this information is useful in understanding the potential growth of services and overall demand in the North I-25 corridor.

Again, the demand estimation only provides a conceptual understanding of ridership. Service levels, and particularly in the North I-25 corridor, the availability of park-and-ride lots, are major determinants in developing successful services.

METHODOLOGY

As employment transportation is a key reason for the development of regional services, it is useful to examine the proportion of workers who use transit for the commute trip. This provides a context for understanding the likelihood of residents to use transit for their commute trip and the degree to which existing services are meeting this need.

A several-step methodology was used to determine the demand for regional transit services in the north and south I-25 corridors. These general steps were:

A. Review historic ridership and service trends

B. Estimate mode share from journey-to-work data and consider qualitative and market factors in estimating mode share for proposed services.

C. Identify population and employment forecasts to determine how ridership might grow through 2040

D. Apply factors to estimate ridership for specific service plans

MODE OF TRANSPORTATION TO WORK

The mode of transportation to work, as reported in the American Community Survey, is presented in Table 6. The destination counties of the Denver Metropolitan Area are listed first, followed by counties that would be served by the proposed I-25 regional commuter bus services, and then the counties in the I-70 corridor. Rows illustrate the mode of transportation for residents living in the county and for employees working in the county. In counties where a significant number of workers live elsewhere, this is an important distinction.

This data illustrates the completeness of the transit networks in various counties. Those counties where either 5% or more of riders use transit are highlighted. This occurs in Denver and Boulder counties in the metropolitan area. In the Denver Metro Area, note that 4.4% of residents of Arapahoe County use transit for work trips, many of whom likely travel into Denver. However, only 2.5% of employees use transit, a reflection that it is more difficult to use transit to access jobs in Arapahoe County.

The journey-to-work data also illustrates the propensity of residents to use transit. First, it shows that where there are good transit connections, people do use transit services. More than a 5% transit mode share shows the transit network is strong, providing effective connections between home and work. Second, it points out those counties where the propensity to use transit for the work trip is low. El Paso County had 1.3% of people reporting that they use transit for the work trip. While a low number, it was more than twice the 0.6% rate for Weld County. Larimer County showed 0.8% of residents using transit for their work trip. While not reflective of what people who travel long distances may choose to do, it still provides information on the relative propensity to use transit in various counties.

Table 6: Mode of Transportation to Work

			Total Workers	Drove alone	2-person Carpool	3-or-more person Carpool	Public Transportation	Bike	Walked	Taxi, Motorcycle. and Other	Worked at Home
Denver	Residents	Number	295,432	204,843	23,645	6,122	22,968	5,472	12,365	4,015	16,002
		Percent	100.0	69.3	8.0	2.1	7.8	1.9	4.2	1.4	5.4
	Workers	Number	451,562	325,369	36,869	8,655	41,003	5,616	12,359	5,689	16,002
		Percent	100.0	72.1	8.2	1.9	9.1	1.2	2.7	1.3	3.5
Adams	Residents	Number	204,553	155,965	21,099	5,614	8,735	736	3,065	2,453	6,886
		Percent	100.0	76.2	10.3	2.7	4.3	0.4	1.5	1.2	3.4
	Workers	Number	157,037	123,315	14,083	3,543	3,471	793	3,070	1,876	6,886
		Percent	100.0	78.5	9.0	2.3	2.2	0.5	2.0	1.2	4.4
Arapahoe	Residents	Number	281,253	219,450	20,739	4,935	12,336	1,255	4,897	2,999	14,642
		Percent	100.0	78.0	7.4	1.8	4.4	0.4	1.7	1.1	5.2
	Workers	Number	269,772	217,198	19,596	3,743	6,729	1,193	4,567	2,104	14,642
		Percent	100.0	80.5	7.3	1.4	2.5	0.4	1.7	0.8	5.4
Boulder	Residents	Number	150,237	99,407	10,557	2,647	8,022	6,183	6,703	1,862	14,856
		Percent	100.0	66.2	7.0	1.8	5.3	4.1	4.5	1.2	9.9
	Workers	Number	176,783	123,463	13,449	3,047	7,336	6,197	6,622	1,813	14,856
		Percent	100.0	69.8	7.6	1.7	4.1	3.5	3.7	1.0	8.4
El Paso	Residents	Number	293,332	226,775	22,225	6,019	3,766	1,146	13,572	3,344	16,485
		Percent	100.0	77.3	7.6	2.1	1.3	0.4	4.6	1.1	5.6
	Workers	Number	292,588	227,392	22,330	5,704	3,592	1,134	13,237	2,714	16,485
		Percent	100.0	77.7	7.6	1.9	1.2	0.4	4.5	0.9	5.6
Larimer	Residents	Number	148,674	112,454	11,267	3,011	1,157	5,583	3,639	1,892	9,671
		Percent	100.0	75.6	7.6	2.0	0.8	3.8	2.4	1.3	6.5
	Workers	Number	141,534	107,298	10,088	2,636	1,047	5,550	3,757	1,487	9,671
		Percent	100.0	75.8	7.1	1.9	0.7	3.9	2.7	1.1	6.8
Weld	Residents	Number	115,789	91,550	10,056	2,930	717	625	2,483	1,401	6,027
		Percent	100.0	79.1	8.7	2.5	0.6	0.5	2.1	1.2	5.2
	Workers	Number	91,856	70,473	8,171	2,529	529	620	2,439	1,068	6,027
		Percent	100.0	76.7	8.9	2.8	0.6	0.7	2.7	1.2	6.6
Source/Note	**US Census Bureau, ACS 2006-2008 3yr est., Special Tabs for CTPP**										

HISTORIC RIDERSHIP AND SERVICE LEVELS

Table 3-2 illustrates FREX service characteristics between 2005 and 2012. In 2010 there was a one-third cut in service, and the Castle Rock stop was eliminated. Fares were steadily increased in 2007, 2008, and 2009.

This table shows that the FREX service carried between 300 and nearly 700 one-way passenger trips per day, showing the level of demand that exists. The highest ridership was when gas first went over $4.00 per gallon in 2008. The lowest ridership was in 2010 after service was reduced and after the future of the service was threatened; it appears many riders found other means of traveling. Ridership did climb again to nearly 400 a day in 2011 and 2012.

The ridership appears to be directly related to the level of services operated. When service was reduced to 26 trips per day, riders did not condense onto the remaining available trips. Rather, boardings per trip remained in the same range as previously. This indicates the importance of having a broad schedule so people have flexible travel time.

Table 7: Historical FREX Service Characteristics

	2005	2006	2007	2008	2009	2010	2011	2012
								8 months
Revenue Hrs.	23,607	24,614	23,056	24,920	24,819	16,280	16,100	10,773
One-way trips per day	42	42	42	42	42	26	32	32
Boardings	118,387	154,861	136,765	175,935	141,316	79,444	101,282	66,685
Boardings/ Hour	5.0	6.3	5.9	7.1	5.7	4.9	6.3	6.2
Boardings / Trip	10.9	14.2	12.6	16.2	13.0	11.8	15.0	10.7
1-way daily passenger trips	457	598	528	679	546	307	391	397

Source: 2011 FREX Business Plan, detailed ridership records

Transit planners use the concept of "elasticity" to describe how ridership changes when there are service changes or fare changes. This tool provides a way to quantify the percentage change in ridership for every percentage change in service. In an ideal situation, one would be able to see a clear relationship between a change in service or fares and the change in ridership. This occurs when there is a fare increase but no changes in service or if headways are changed (such as from 60 to 30 minutes) with no other changes.

In the real world, many things happen together so the challenge becomes how to measure the impact of changes and tease out meaningful data. Often, gross measures are used. An example is comparing total revenue miles or overall

frequency changes to ridership changes. In the case of FREX there were many influences each year between 2008 and 2011. Ridership peaked in 2008 when gas prices were high and before the recession hit. By 2010, there were substantial service cuts. At the same time, ridership grew with the perception that service was stable or dropped with the perception that it was not stable.

The historical data was examined to see if patterns would emerge that had both internal consistency and consistency with national patterns. The analysis showed that it is important to look at a finer level – for example not just the difference in total trips operated but the difference in peak hour peak direction trips. It also showed that it is important to look at longer periods than one year, to allow changes to settle in.

The proposed I-25 regional commuter bus service is substantially less than that operated by FREX, even on the reduced schedule of 16 round trips (32 one-way trips). There are three important differences:

1. The buses are proposed to remain in Denver, so the peak hour trips will operate in the peak direction. FREX return trips served some reverse commute travel but in the peak hours did not carry many riders.
2. The proposed service is scheduled to operate on the most heavily used peak-hour trips.
3. Each bus will have 20% more capacity.

To understand how this will impact ridership, a detailed look was taken at ridership by trip, by direction and on the number of trips in the peak direction and peak hour, during mid-day, and early and late trips. Table 3-3 shows how the overall level of service changed by time of day.

Table 8: Changes in FREX Service Levels

Time of Day	2008-2009	2010	2011 - 2012	Proposed
Peak hour, peak direction trips	8 NB; 8 SB	6 NB; 6 SB	6 NB; 6 SB	5 NB; 5 SB
Mid-day trips	5+ NB; 4 SB	3 NB; 4 SB	4 NB; 4 SB	1 NB; 1 SB
Early & late trips	2 NB AM; 3 SB PM	1 NB AM; 0 SB PM	2 NB AM; 0 SB PM	0
TOTAL	**30**	**20**	**22**	**12**
% Change by Period	---	-33%	+10%	-45%
% Change 2009-2011	---	---	-27%	---

Comparing the information on the level of service reductions from Table 3-3 to the change in ridership in Table 3-2, one sees that the reduction in ridership from 2009 (141,316) to 2011 (101,282) was 28%. 2009 was chosen because the impact of the gas prices was not as apparent and the employment market is closer to that in 2011. 2011 was chosen because the ridership had a chance to settle in after the reductions that occurred in 2010 and it was a full year of

service. A one percent reduction in ridership for each one percent reduction in service is in the expected range. The same exercise for the period from 2008 to 2011 results in an elasticity of 1.25%, which is high for the transit industry. The demand estimation tables use a range from 1% to 1.25% to estimate high and low ridership levels.

The proposed services are reduced from services provided in 2011 with a shorter span of service, fewer trips in the peak periods, and significantly less service in the mid-day. These reductions in service quality will affect ridership; the assumption is that the impact will be similar to previous service reductions. Partially offsetting this is that fact that the buses will have more capacity, with 50 seats rather than 40, a 20% increase. Capacity was a constant issue for FREX. Although the average trip load, over the course of the month, shows there is available capacity, the reality is that ridership varied significantly throughout the week. On a Wednesday there might be people who could not get a seat while on a Friday there would be empty seats. When people could not regularly obtain a seat they looked for other options for travel.

Demand Model

At the end of this section you will find demand worksheets that go through each of the following steps:

Step 1: Existing and Historic Ridership and Service Trends
Step 2: Journey-to-Work Data
Step 3: Qualitative Observations
Step 4: Mode Share: Relation to Ridership
Step 5: Population and Employment Forecasts
Step 6: Application – Potential Markets and Service Levels

Separate worksheets are provided for South and North I-25 corridors. The model projects ridership between 2015 and 2040; two service levels are identified in each corridor. It is based on 2008 data as that is the year in which an on-board survey was conducted of FREX riders and this data allowed the modeler to link origins and destinations in order to more accurately assess ridership.

The first three steps have been covered above and is augmented by the corridor-specific information in the tables. Some additional explanation of the mode share and application of the model to alternative scenarios may be useful.

Mode Share for Regional Service in the I-25 Corridor

Journey-to Work data was used to identify the overall market for regional trips in Step 2. The data is limited to county-level analysis, but provides a sense of the overall market share between the major markets.

Comparing the ridership between markets to the size of the employment markets, the mode share can be identified. The FREX experience indicates that 2% to 8% of commuters from El Paso County to Metro Denver counties used the FREX service at its service peak in 2008. In the opposite direction, 1% of commuters used the service. For the North I-25 corridor, a lower mode share was used because (a) previous analysis in the NFR Regional Transit Element showed the diversity and distance from I-25 of origin trips and the diversity of destinations in Denver County and (b) with county-level data it was necessary to use data from all of Larimer and Weld County, including those trips that would use other travel sheds such as Highway 287 or Highway 85.

Based on the service levels provided by FREX, the riders served, and the other factors as listed above, the mode shares for various county markets in the south I-25 corridors are estimated in Step 4 of the demand worksheets found in Attachment 1 at the end of this appendix. Attachment 1 provides numbers for South Front Range and Attachment 2 covers North Front Range. Note that the mode shares for North Front Range are found only in Step 6 of Attachment 2 as no previous service existed for the comparison used in Step 4.

One surprising finding from the Census data on Mode of Transportation to Work is that despite the strong van pool program in the North Front Range, the percentage of people who carpool is similar for Larimer and El Paso counties; Weld County is slightly higher than the other two. Currently the Van Go program has 18 vanpools that operate in the North I-25 corridor and have a destination of downtown Denver. At an average occupancy of 6 per van, this represents 108 individuals[1]. If service was in place, a portion of these may have chosen fixed route transit instead of a vanpool. It is important to note that once people are in a vanpool, few leave to use fixed route transit.

Application of Factors to Proposed I-25 Corridor Services

Step 6 applies the various factors to population levels from 2008 to 2040. In each corridor, two alternative levels of service are modeled. For this exercise, it is assumed fares remain at a level comparable to those charged by FREX.

Table 9 identifies ridership for proposed north and south I-25 services using the low (elasticity of 1.25%) and high (elasticity of 1%) ridership levels for each alternative. Projections for this same service level, carried out to 2040, can be

[1] Looking at Larimer County to Denver workflows, a 5% capture rate would be 98 employees; for Weld County to Denver work flows, a 5% capture rate would be 324 employees. Only a portion of them are in the path of travel served by van pools, but this suggests that this corridor is one with more people in 3-person carpools than the Journey-to-Work average data suggests.

found in Appendix B. To the extent that service levels or fares change, the projections would also need to be adjusted.

Table 9: Projected Ridership for Proposed Regional

	Daily One-way Rides			
South I-25 Service	**2008 Baseline**		**2015 Projection**	
	Low Riders	High Riders	Low Riders	High Riders
Alternative A: 5 round trips	335	418	371	463
Alternative B: 6 round trips	402	502	445	556
North I-25 Service	**2008 Baseline**		**2015 Projection**	
	Low Riders	High Riders	Low Riders	High Riders
Alternative A: 4 round trips	116	145	171	214
Alternative B: 5 round trips	140	175	206	257

SUMMARY OF REGIONAL DEMAND

The demand for regional services on the I-25 corridor is well documented, and the corridors are well suited to commuter services. Projected ridership levels are constrained by the proposed service quality. The provision of more trips operating over a greater span of service would result in higher ridership. It is important to give consideration to the balance between expenses, fare revenues, and ridership. It will also be important to develop plans to address demands that are greater than the service can carry.

Demands for transit services in the I-70 corridor are not primarily for employment trips as RFTA, ECO, and Summit Stage services cover that market well. The exception is between Frisco and Vail where employee-oriented services presently do not operate. Rather, there are two primary areas of demand. One is for service is to connect the existing operators, filling the gaps in services between Glenwood Springs and Eagle and between Vail and Frisco. The other primary transit demand is for recreational trips between Denver and Eagle. It will require significant infrastructure and service levels to address adequately.