Appendix H

Transit Analysis

US 93 Corridor Study
Transit Analysis

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FEHR & PEERS
TRANSPORTATION CONSULTANTS

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1.0 Technical Memorandum #1: Project Context

1.1 Introduction

Purpose of the Memorandum

This memorandum will describe the project context for the US 93 Corridor Study Transit Analysis. The following sections are included below:

- A primer on transit and transit supportive land uses
- Existing and future conditions including demographics, land use and travel patterns
- Existing transit service in Missoula and the Bitterroot Valley
- A summary of local initiatives and parallel studies
- A comparative analysis of two similar communities that have implemented high capacity transit systems

Subsequent memorandums will be built upon this information to provide an overall conceptual estimate of potential ridership, as well as an implementation strategy for transit in the US 93 Corridor.

Purpose of the Transit Study

The US 93 Corridor Study will address transportation issues on US 93 between Florence and Missoula. One method of minimizing future traffic congestion on US 93 is to implement Transportation Demand Management (TDM) strategies that encourage travelers to adjust their travel patterns and modes. One such strategy is to provide mass transit to reduce the number of single occupant vehicles on the road. A variety of implementation measures are possible, ranging from simple carpooling to commuter rail similar to systems around New York and in the Bay Area. This study will examine the potential for transit to manage traffic on US 93.

In addition to Demand Management, this study will also examine the relationship between transit and land use. It is well understood that more densely populated areas have more success with mass transit, so choosing transit solutions at the right scale will be key for this study. If a more robust system is desired than perhaps the land use can support, then this study will outline the steps that the communities would need to take in order to achieve their transit goals.

Study Area for Transit

The study area for the US 93 corridor study extends from the southern boundary of Missoula, to Florence, passing through Lolo. While this transit study will determine the feasibility of different transit modes within the study area, potential riders of any proposed system will likely come from both within the formal US 93 study area as well as outside of it. Because the analysis must count riders not just within, but passing through the study area, demographics, travel patterns and land use have been gathered for Missoula, Lolo, Florence, and Stevensville. For specific data collection by parcel, including population, households, and employment, data was gathered for the area within two miles of US 93 and the existing Bitterroot Rail corridor.

1.2 Transit Planning

Several types of data help describe the characteristics of communities in the study area, and help determine the potential for transit riders. The first step is to get an understanding of travel patterns. The primary input to determining travel patterns are answers to the basic questions:

- Where do people live?
- Where do they work?
- What other places do they need to go?
- What routes do they travel?
- Will this change in the future?

To determine the potential for transit two final questions must be answered:

- What mode of travel will people use?
- Will this change with the introduction of new modes?

Transit systems vary in size depending on the goal of the service. Table 1.1 shows transit types as well as an example of where the type of service exists.

Table 1.1
Transit Types

Type of Transit Service	Description	Example Community	Length of Service	Approximate Ridership (Daily)
Rideshare	Small vans serve specific subscription riders	MR TMA Ravalli and Missoula Counties		140 Subscribers
Bus Service	Fixed schedule and routes, buses can vary in size	Mountain Line, Missoula		2,750* (2007)
Bus Rapid Transit (BRT)	Buses designed to function similarly to Light Rail, fixed schedule and routes, often stations are constructed	Eugene/ Springfield, OR	4 mi.	4,500 (2007)
Streetcar	Smaller, more versatile rail vehicles that typically make frequent stops as frequently as every other block	Portland, OR	3 mi.	5,600 (2003)
Light Rail	Rail vehicles travel at higher speeds. Stops between 1/2 mile to mile apart.	TRAX Salt Lake City, UT	19 mi.	55,000 (2006)
Commuter Rail	Heavier vehicles travel at speeds above 50 mph. Stops are more than 1 mile apart.	San Francisco , CA (BART)	104 mi.	14,000** (2007)

*Average number of weekday trips.
**Monthly ridership of 300,000 divided by average of 21 days of service/month.

1.3 Existing and Projected Future Conditions

Regional Demographic Overview

For transit planning, it is important to understand both general population patterns as well as the employment distribution that surrounds potential stops or stations. This first category, general population patterns, helps describe the overall trends in growth and contributes to an understanding of the overall transportation needs in the Bitterroot Valley. The second category, employment distribution, helps determine the potential travel demand for commute trips and serves as a basis for determining regional travel patterns during the most congested travel periods. Table 1.2 below shows households, population and employment data on different scales in the Bitterroot Valley.

Table 1.2
Regional Demographic Profile

	Households 2005	Population 2005	Employment 2005
US 93 Corridor (within 2 miles of US 93)	30,280	70,031	40,521
Bitterroot Valley (within 5 miles of US 93)	36,558	86,011	51,390

Source: US Bureau of Census Block Group Data, Montana Department of Labor & Industry for year 2005, and Montana Department of Revenue for year 2005

Catchment Area Demographic Overview

Transit systems attract riders from the area around a stop or station commonly called a "catchment area". The catchment area represents the geographic distance from a station that passengers are willing to travel to access transit. Nationally, the catchment area for high capacity transit (bus or rail that serves regional destinations) is two miles. To understand potential ridership on a transit system in the Bitterroot Valley, Tables 1.3 and 1.4 show population and employment within a two mile catchment of the downtown centers of each town in the study area. The Missoula data represents the two mile area around the existing downtown area, centered on the train station.

Table 1.3
Catchment Area Population Profile

	Population 2005	Projected Population 2030	Households 2005	Projected Households 2030
Missoula*	32,871	51,000	15,069	23,500
Lolo	3,796	6,000	1,412	2,200
Florence	1,629	2,500	634	1,000
Stevensville	2,745	4,300	1,228	1,900

Notes: *Missoula Catchment area centered around Missoula downtown
2005 Source: US Bureau of Census Block Group Data
2030 Source: Center for Rocky Mountain Research,, Application of Average Annual Growth Rate of 1.8% for each community, rounded

Table 1.4 Catchment Area Employment Profile				
	Retail Employees 2005	Non Retail Employees 2005	Total Employment 2005	Projected Employment 2030
Missoula*	16,627	6,997	23,624	35,000
Lolo	492	363	855	1,300
Florence	346	207	553	800
Stevensville	925	238	1,163	1,700

Notes:
*Missoula Catchment area centered around Missoula downtown
2005 Source: US Bureau of Census Block Group Data and Montana Department of Revenue data for year 2005
2030 Source: Montana Dept. of Labor and Industry, Application of Average Annual Job Growth Rate of 1.6% for each community, rounded

Density Overview

It is common to analyze population in terms of housing density for transit planning. Nationally it has been shown that housing density, expressed as the number of housing units per acre, has one of the highest correlations to ridership on transit systems. For higher capacity transit systems such as BRT or light rail, it is commonplace to find minimum housing densities of at least two units per acre within two miles of a station. The figures for the study area are shown in Table 1.5.

Table 1.5 Density Profile	
	2005 Station Area Density (Dwelling Units/Acre)
Missoula*	1.87
Lolo	0.18
Florence	0.08
Stevensville	0.15

Notes: *Missoula Catchment area centered around existing train station
Source: US Bureau of Census Block Group Data

Density changes are difficult to project. With available land throughout the Bitterroot Valley and surrounding Missoula, density may not increase at the same rate as population. The Missoula Urban Area Land Use Plan shows planned residential densities of one and two dwelling units per acre in the southern boundary of the planning area, which extends through Lolo. The Lolo Regional Plan, which addresses the Bitterroot Valley, recommends maintaining rural residential densities, and the addition of small scale commercial development in at least one location in the study area. Because these plans show the perpetuation of typically rural land use patterns, densities are assumed to remain the same.

Zoning, Land Use, and General Growth Patterns

Zoning, land use, and general development patterns help predict how population and employment will be concentrated in the future. The primary purpose for understanding these patterns is to appropriately plan what areas transit should serve, and what locations are most appropriate for development of stops and stations. The following maps provide a geographic distribution of land uses within two miles of the US 93 corridor. Figures 1-1 and 1-2 illustrate the intensity of housing units, shown as dwelling units per acre, and land use types. The catchment area around each of the potential stations is shown for reference purposes.

Future guidance on land use and development within the study area is provided by the Missoula County Growth Policy Amendment and the 2002 Lolo Regional Plan. The Missoula County Growth Policy Amendment recommends:

- Encourage land development in areas adjacent to existing public service
- Encourage low density development further from public services
- Encourage low density in areas adjacent to the urban area in order to promote reuse and infill within urban areas

The 2002 Lolo Regional Land Use Plan recommends:

- Focus development in the North Bitterroot Valley Development Area
- Reduce densities further from existing town centers, including Florence and Lolo
- Encourage densities of one unit per acre to one unit per five acres around the US 93 Corridor
- Encourage residential and small scale commercial development at the crossroads of Highway 93 and Old Highway 93. A park and ride currently exists here.

Based on these guiding policies, future land uses may become more dense within Missoula, but will not be expected to add a significant amount of density overall in the study area. The policies established in these two documents encourage development to occur around existing town centers, while maintaining rural areas outside of towns.

Figure 1-1 Household Density within 2 Miles of US 93

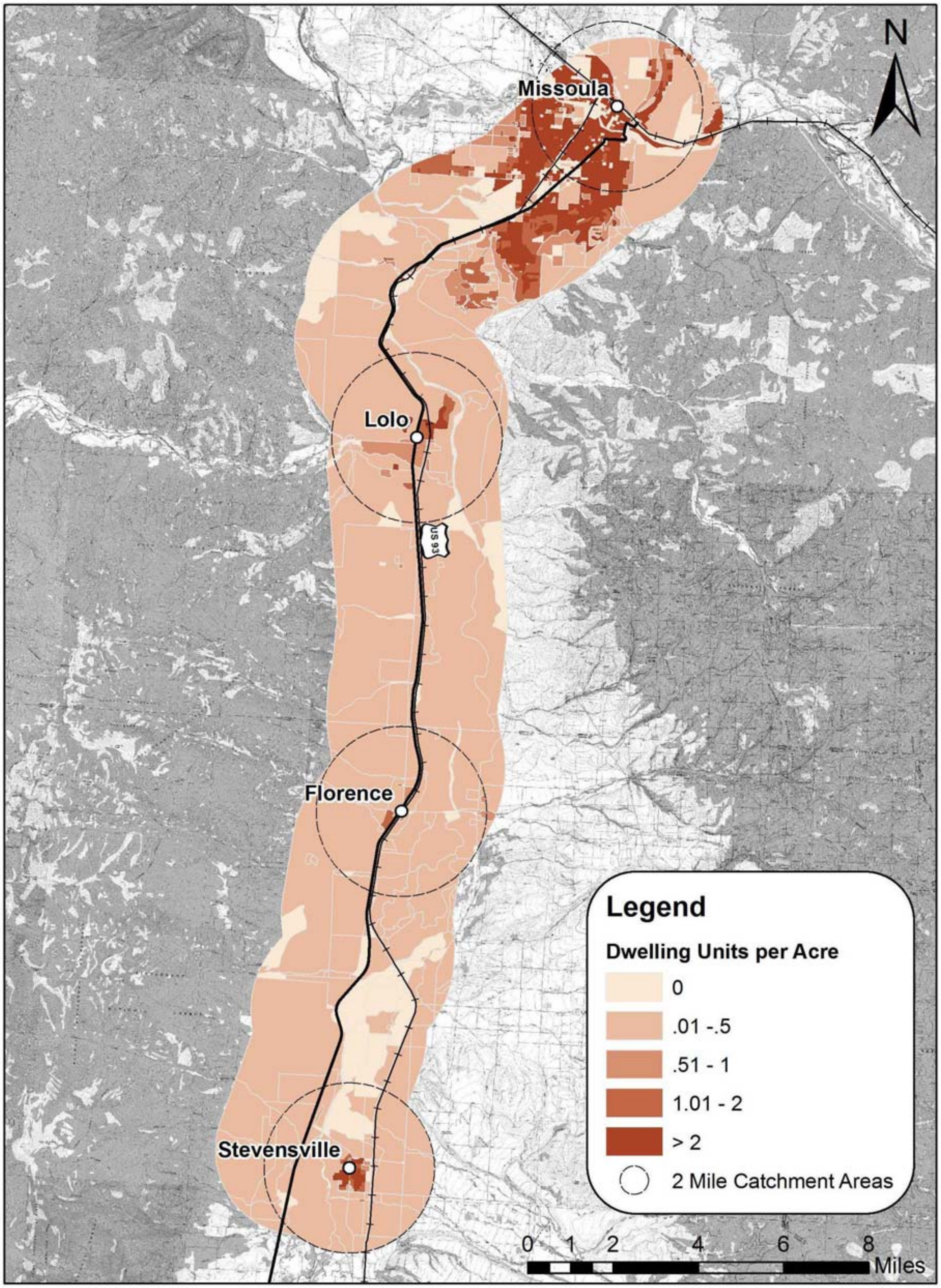
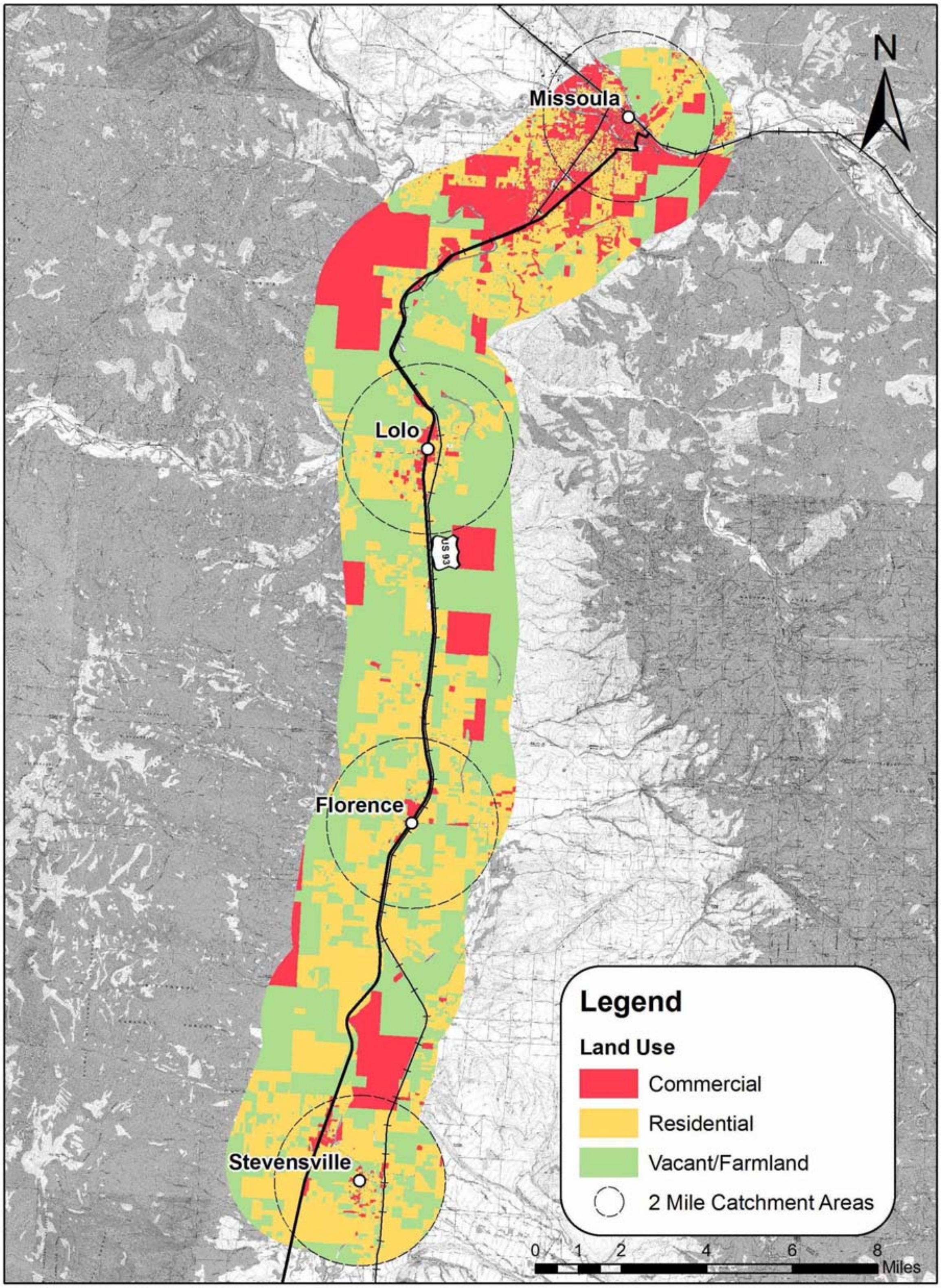


*Figure 1-2	Land Use within 2 Miles of US 93*



1.4 Existing Transit Service and Rail Infrastructure

Mountain Line (Missoula)

The Mountain Line bus system serves the community of Missoula and the University of Montana. In total, Mountain Line operates over a 36 square mile area. The system has twelve weekday routes. that run daily, except on Sundays. Saturday service is provided on ten routes, with an additional bus serving the downtown area on Saturday mornings during Farmers Market season. Buses generally operate between 6:00 a.m. and 8:00 p.m. on weekdays and 10:00 a.m. and 6:00 p.m. on Saturdays. Routes typically run every 30 minutes during peak a.m and p.m. hours and every 60 minutes during off-peak hours. Morning peak hours are from 6:45 to 9:45 a.m., and afternoon/evening peak is from 2:45 – 5:45 p.m. Transit lines are located throughout the city, but are highly concentrated in the downtown area and the area east of Russell Street, south of the river. Key destinations served by the system include the University of Montana, the airport, hospitals, shopping centers, museums, and parks. Mountain Line also operates paratransit service for the handicapped.

In 2007, Mountain Line provided an average of 2,750 weekday trips and an average of 865 Saturday trips on its fixed route service, totaling over 735,000 rides for the year. Mountain Line ridership has increased 60 percent in the last 15 years. Eight paratransit buses carry an average of 2,100 passengers per month. Additionally, the Missoula Downtown Association (MDA) EZ Pass program averaged 2,882 rides per month in 2007, up from an average of 2,371 in 2006.

In 1994, Mountain Line operated a trial fixed bus service to Lolo. The service was only implemented on a trial basis, and was not continued because the decision to extend the service area of Mountain Line could not be agreed upon. Staff at Mountain Line considered the experiment a success and would be interested in providing service to Lolo again.

MR TMA (Missoula and Ravalli Counties)

The Missoula Ravalli Transportation Management Association (MR TMA) is an organization that coordinates alternative transportation such as carpools and vanpools for Missoula and Ravalli counties. The goals of MR TRMA are to reduce air pollution and congestion and to improve the environment. They provide free services to employers to establish ride-sharing programs and offer guaranteed rides home in cases of emergency.

Groups of five to 15 people vanpool together through services offered by MR TMA. In 2003, 94 people from 36 different worksites used the vanpooling program. Currently, there are 12 vanpools with seven operating along the US 93 Corridor south of Missoula, with an estimated subscription of approximately 140 riders. Vanpools operate from Stevensville to Missoula, Hamilton to Missoula, and Missoula to Hamilton.

The carpool program coordinated by MR TMA serves to connect commuters interested in sharing transportation to work. Commuters can access the MR TMA web site to be matched with others interested in carpooling. Carpooling groups can use existing park and ride facilities throughout the corridor as a meeting place, or may make different arrangements. The program currently has over 20 carpool destinations in Missoula and Hamilton. The system currently has over 20 carpool destinations in Missoula and Hamilton.

MR TMA operates a number of park and ride lots in conjunction with the Montana Department of Transportation. In the Bitterroot Valley there are currently park and ride lots in Hamilton, Victor, Stevensville, Florence, and Lolo. There are also two park and ride lots in Missoula.

Rail Service and Infrastructure

Montana Rail Link is a private freight service provider operating limited service in the Bitterroot Valley. The current track condition allows an FRA Class 2 operating system, which can only accommodate speeds up to 25 mph. No signal systems are installed on this system. The track condition is “fair”, and would likely require upgrade for passenger service. In addition, operating speeds above 25 mph would require the installation of a signal system. There currently are no grade-separated crossings or stations along US 93, which would also be required for passenger service.

Missoula In Motion

Missoula In Motion is a community program designed to help local businesses, institutions, and individuals address transportation issues within the Missoula community. The program encourages alternative transportation and work options including carpooling, biking, walking, transit, vanpooling, telecommuting, and compressed work weeks in order to reduce traffic and improve air quality within the region.

Associated Students of the University of Montana (ASUM) Office of Transportation

ASUM is a representative body of University of Montana students. The ASUM Office of Transportation is intended to increase transportation options and awareness for The University of Montana (UM) campus. The office is supported by a student initiated fee of $22.50 per semester. ASUM transportation programs include a late night shuttle service (UDASH); a free temporary bike loan program (ASUM Cruiser Co-op); a covered, secured bike parking area (The Bike Hub); no interest bike loans; and a UM-sponsored facebook application that facilitates ridesharing among UM students (GoLoco).

1.5 Local Initiatives and Ongoing Studies

Bitterroot Rail

Bitterroot Rail is a community interest group that studies the feasibility of rail transit in the Bitterroot Valley. The goal of this group is to use the Montana Rail Link infrastructure to provide railbound public transport between Missoula and destinations south in the Bitterroot Valley. Ongoing study by this group has included input from transit experts.

Five Valleys Rural Transit Study

The Five Valleys Rural Transit Study is currently underway and includes a regional view of transit needs in the Five Valleys area including the rural portions of Missoula, Granite, Lake, Mineral, and Ravalli counties. The study began in January 2007, and has conducted and compiled a survey of travel patterns. The results of Phase 1 of this study, which includes community input and an estimation of transit needs in the Five Valleys area, shows that the demand for travel and transit is strongest in the Bitterroot Valley when compared with other areas. Some interesting conclusions from the community survey include:

- The primary purpose for trips to Missoula are for work (67% of all trips).
- Most travel to and from Missoula is in a single occupancy vehicle, though nearly 5% of respondents participate in vanpool.

- Twenty-four percent of trips to and from Missoula occur during peak hours (between 6:00 a.m. and 8:00 a.m., and between 4:00 p.m. and 6:00 p.m.), 22% of trips occur just after peak hours (between 8:00 a.m. and 10:00 a.m., and between 6:00 p.m. and 8:00 p.m.).
- Eighty-nine percent of respondents said they would use a bus service if it was available from their home to Missoula. 29% of these respondents said they would use this service daily.
- One of the most frequent comments recorded in the survey is that bus service on US 93 is needed.

Missoula in Motion
Missoula In Motion is a program designed to help local businesses, institutions and individuals address transportation issues within the Missoula community. The goal of the organization is to reduce traffic and improve air quality. Programs focus on encouraging carpooling, biking, walking transit, vanpooling, telecommuting, and flexible work schedules. Members of Missoula in Motion have access to a free ride service in emergencies.

1.6 Comparative Analysis

Purpose
The Bitterroot Valley will face transportation challenges as development occurs and roadway capacity remains static. Communities throughout the west have been resolving this issue with targeted roadway improvements and in some cases, high capacity transit systems. Given the proposed development in the Bitterroot Valley, a comparative analysis was prepared to highlight demographic details with similar communities who have recently implemented transit systems. This analysis shows the current population, employment, density, and ridership in two peer communities with high capacity transit systems.

Case #1: Roaring Fork Valley, Colorado
The Roaring Fork Valley is located in western Colorado on State Highway 82 just south of Interstate 70. This corridor has experienced significant growth in the last 40 years attributed to the popularity of Aspen, Colorado as a place to recreate and live. The impact of this popularity has increased housing values, traffic on SH 82, and transitioned work-force housing to outlying communities. This translated into high levels of congestion and the need for a high capacity transit system. The resulting bus system has been nationally recognized as a “Best Transit System,” by the American Public Transit Association and the Colorado Association of Transit Agencies. With over 4 million riders per year, this system has established the correlation between land use and bus transit integration. A system map is provided in Figure 1-3.

The Roaring Fork Transportation Authority (RFTA) operates the transit system in the valley and owns 34 miles of the Rio Grande Rail corridor between Glenwood Springs and Aspen. RFTA operates an extensive route system in nine communities in the Roaring Fork area. The spine of the system is a coach bus route between Glenwood Springs and Aspen for a total of 34 miles. Service is twice per hour between 5:00a.m. and midnight, and four time per hour during the evening peak (4:00 – 6:00) leaving from Aspen. This service averages approximately 8,500 daily passengers. The current one-way directional capacity during a peak hour is 200 passengers.

A rail corridor currently exists alongside the RFTA bus service. Because RFTA began bus operations with limited funds and was not a regional authority with the ability to collect taxes on a regional basis, the rail corridor was not an implementation option. At the time of implementation, bus service was the most economically feasible option. Now that a larger funding source is available and ridership in the valley is well established, rail service is an ongoing implementation concept for RFTA.

Case #2: Albuquerque South Valley, New Mexico

The Albuquerque South Valley is a high desert setting that has been rapidly developing over the last decade. The valley is located south of Albuquerque on both sides of Interstate 25. Historically, the valley consisted of small village centers with pockets of commercial uses. Today the communities are transforming into housing communities connected to employment centers via state highways and I-25.

Recognizing the impact that development in other parts of the region was having on traffic congestion, a large consortium of public officials agreed the South Valley was in need of a transportation alternative. Due in part to an effort by governor's office and the regional planning agency (MRCOG), the RailRunner commuter rail service was implemented in an existing rail corridor in the South Valley. This effort was monumental in that it was planned and implemented in two years (2003-2005) and was approved without a traditional methodology based on ridership. The RailRunner was constructed to meet future needs. This required acceptance by public officials and the community that initial ridership would be modest, but continually increase over a long period of time. The system cost of $363 million was approved with a $1.6 billion statewide transportation package. Approximately $75 million was used to purchase 75 miles of track and land. The system currently has an annual operating cost of $10 million and recovers approximately $1 million from passengers

The 47 mile corridor opened in 2005 and averaged 5,000 daily passengers for the first few months of service. After the initial period and the recent introduction of fares, ridership has consistently averaged 2,500 daily passengers system wide. The current one-way directional capacity during a peak hour is 400 passengers. A system map is provided in Figure 1-4.

Figure 1-3 RFTA SH 82 System Map

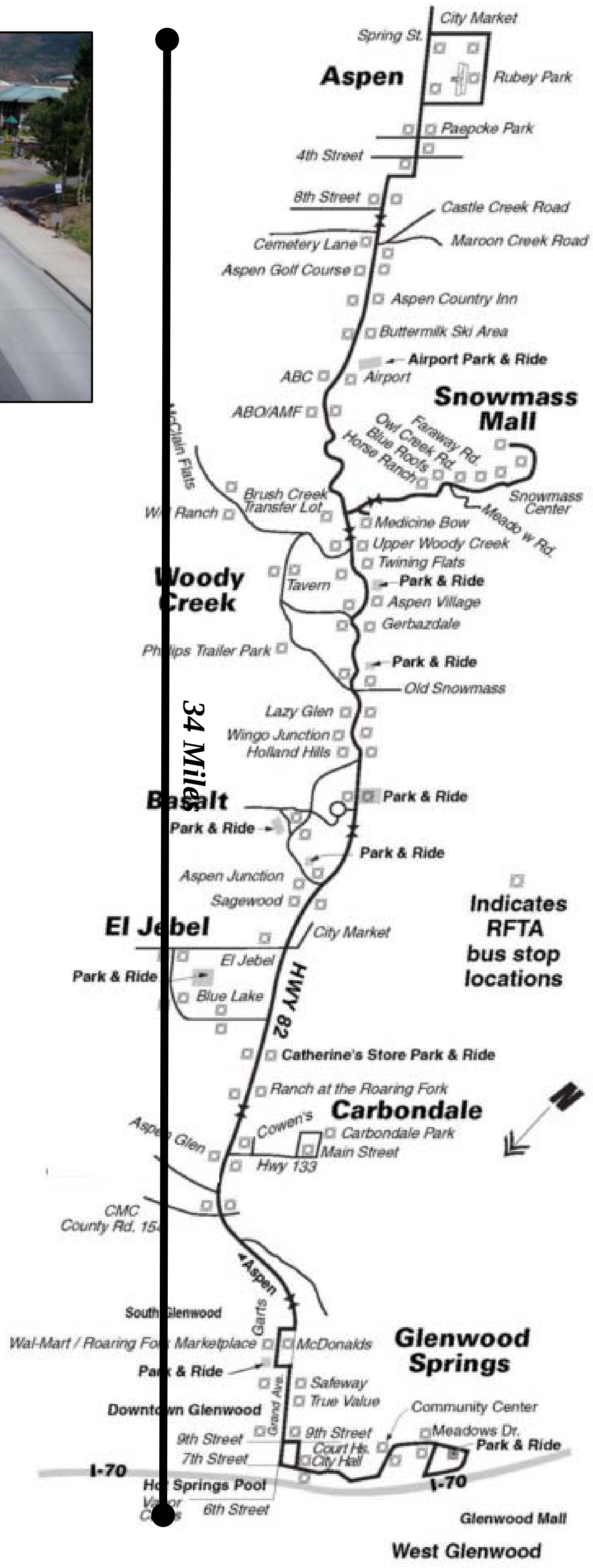
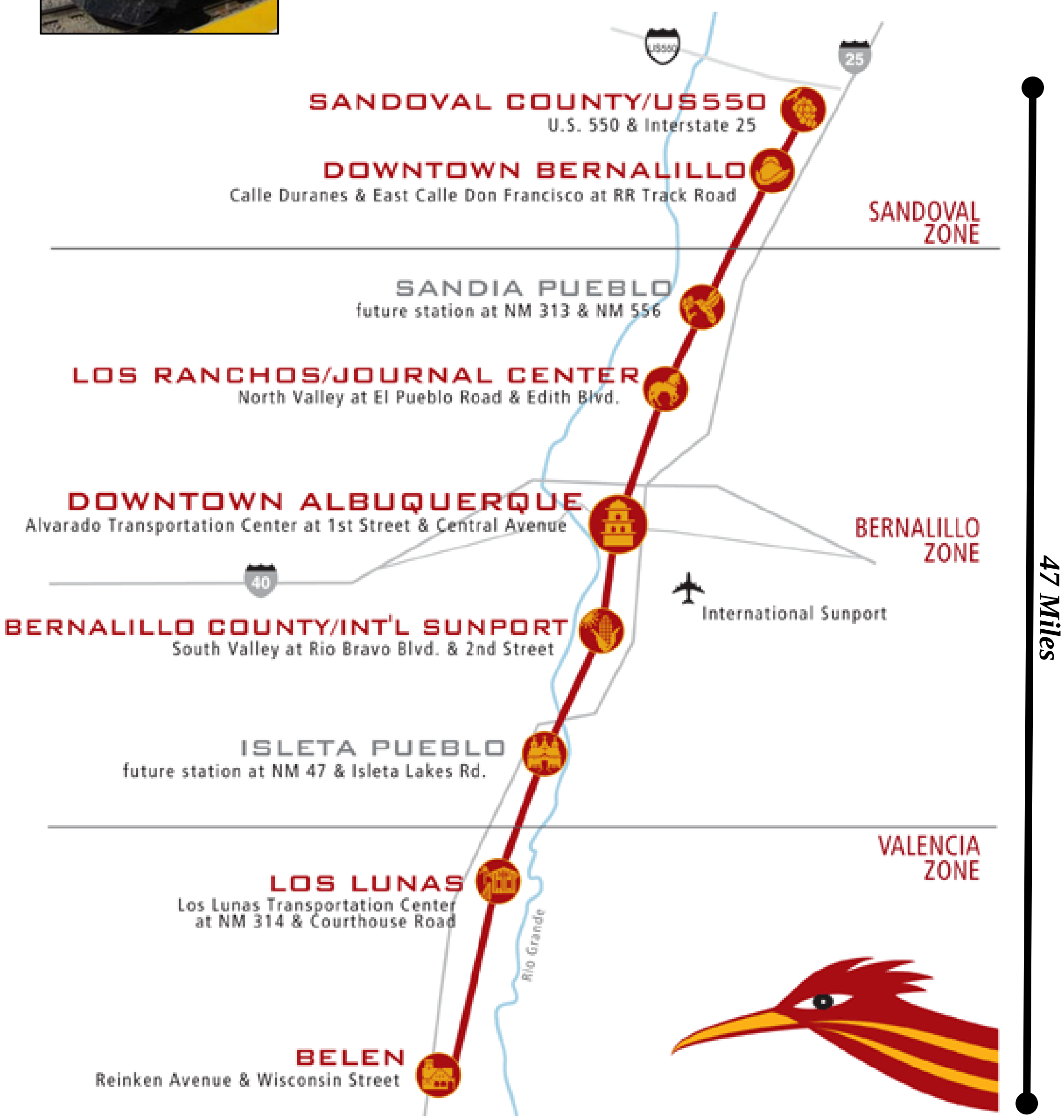


Figure 1-4 RailRunner Summer 2007 System Map



Population Analysis

Using the available population data from various sources, a population analysis for communities along major transit stations in peer corridors was conducted. For the purposes of this analysis the total population within an incorporated boundary of the city is shown below. Table 1.6 illustrates the differences in the total number of people living in a city (population), the total number of dwelling units (households), and the area within an incorporated area (acres). The total numbers of households divided by the incorporated area suggests relative density per capita for each of the cities. This data only represents the peer cities and is not representative of valley-wide conditions. The purpose of using city data in this instance is to provide a comparison between peer cities.

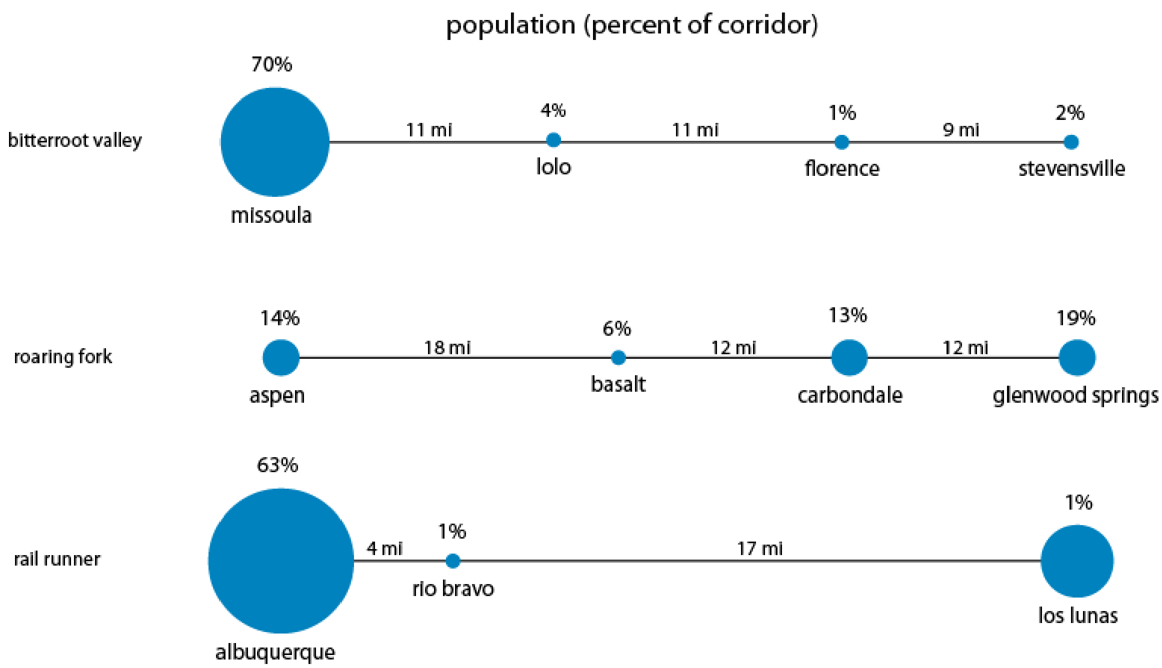
Table 1.6
Population for Highway 93 and Comparative Corridors

	City	Population (People)	Households (DU)	Size (Acres)	Density (DU/Acre)
Bitterroot Valley	Missoula	60,098	26,422	15,296	1.73
	Lolo	3,381	1,259	6,170	0.20
	Florence	901	336	3,021	0.11
	Stevensville	1,556	712	378	1.89
	Total (study cities)	65,936	28,729	24,864	1.15
Roaring Fork Valley	Aspen	5,914	2,903	2,240	1.3
	Basalt	2,681	1,052	1,216	0.87
	Carbondale	5,196	1,744	1,280	1.36
	Glenwood Springs	7,736	3,216	3,072	1.05
	Total (study cities)	21,527	8,915	7,808	1.14
New Mexico Rail Runner	Albuquerque	448,607	183,236	115,584	1.59
	Rio Bravo	4,282	1,333	6,534	0.20
	Los Lunas	10,034	3,601	6,464	0.56
	Total (study cities)	462,923	188,170	128,582	1.46

Notes: Population, Households, and Size provided for Incorporated City Boundaries. City Boundaries were used for comparative analysis to be consistent with the peer corridors. City Boundaries are different than transit station "catchment areas".
Bitterroot Population 2005 Census Block GIS data from MDT
RFTA Population: 2000 Census Block data
RailRunner Population: 2000 Census for Alb. and Los Lunas & 2005 Mountain View Comp Plan for Rio Bravo

Figure 1-5 provides a spatial distribution of the population in each of the corridors based on the data shown in Table 1.6. The spatial distribution highlights the variation in the different corridors.

Figure 1-5 Population distribution



<u>Employment Analysis</u>

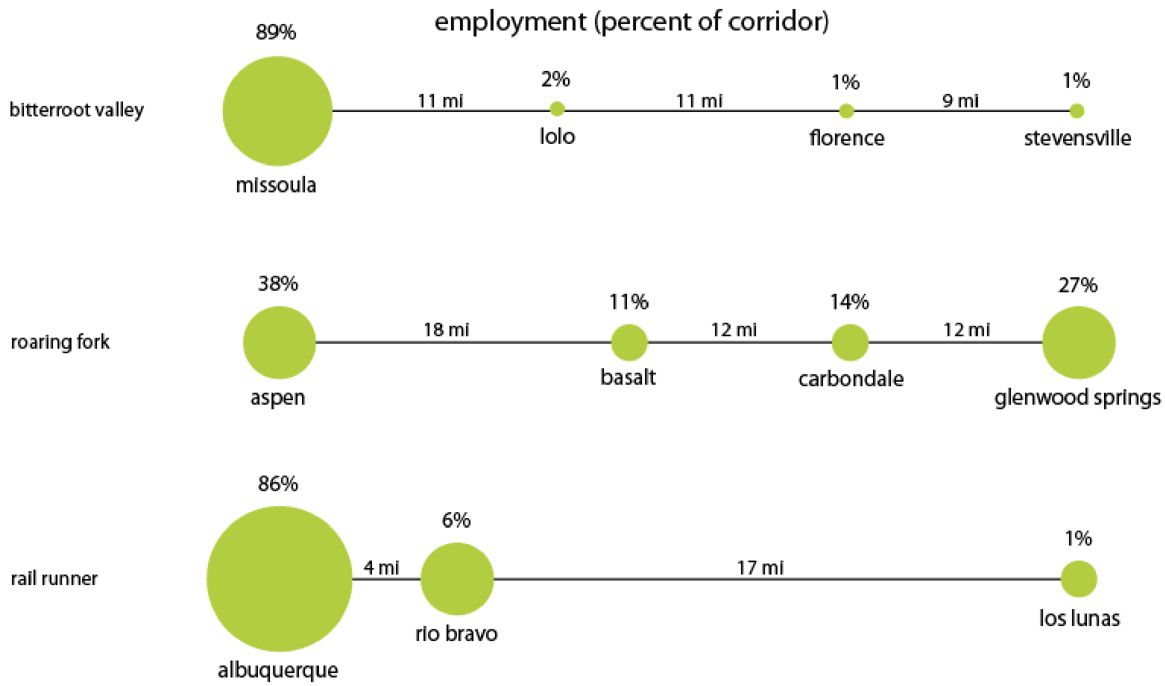
Employment data from various sources was analyzed to understand the distribution and concentration of employment. The data in Table 1.7 shows total employment within each of the incorporated city boundaries. A per capita calculation has also been provided to compare employment density in the peer communities. This data only represents the peer cities and is not representative of valley-wide conditions.

Table 1.7 Employment for Highway 93 and Comparative Corridors				
	City	Employment	Size (Acres)	Employment Density (Employees/Acre)
Bitterroot Valley	Missoula	45,802	15,296	2.99
	Lolo	852	6,170	0.14
	Florence	330	3,021	0.11
	Stevensville	723	378	1.91
	Total (study cities)	47,707	24,864	1.92
Roaring Fork Valley	Aspen	14,938	2,240	6.67
	Basalt	4,207	1,216	3.46
	Carbondale	5,439	1,280	4.25
	Glenwood Springs	10,843	3,072	3.53
	Total (study cities)	35,427	7,808	4.53
New Mexico Rail Runner	Albuquerque	298,325	115,584	2.58
	Rio Bravo	21,451	6,534	3.28
	Los Lunas	4,034	6,464	0.62
	Total (study cities)	323,810	128,582	2.52

Notes: Employment and Size provided for Incorporated City Boundaries. City Boundaries were used for comparative analysis to be consistent with the peer corridors. City Boundaries are different than transit station “catchment areas”.
Bitterroot Employment: 2005 ES 202 employment data aggregated by MDT to census blocks
RFTA Employment: Healthy Mountain Communities: Local & Regional Travel Patterns Survey
RailRunner Employment: MRCOG Rail Runner TOD Evaluation for Rio Bravo and Los Lunas Bernalillo Co. Employment subtracted from Rio Bravo employment to estimate Albuquerque.

Figure 1-6 provides a spatial distribution of employment in each of the corridors based on the data shown in Table 1.7. The spatial distribution highlights the variation in the different corridors.

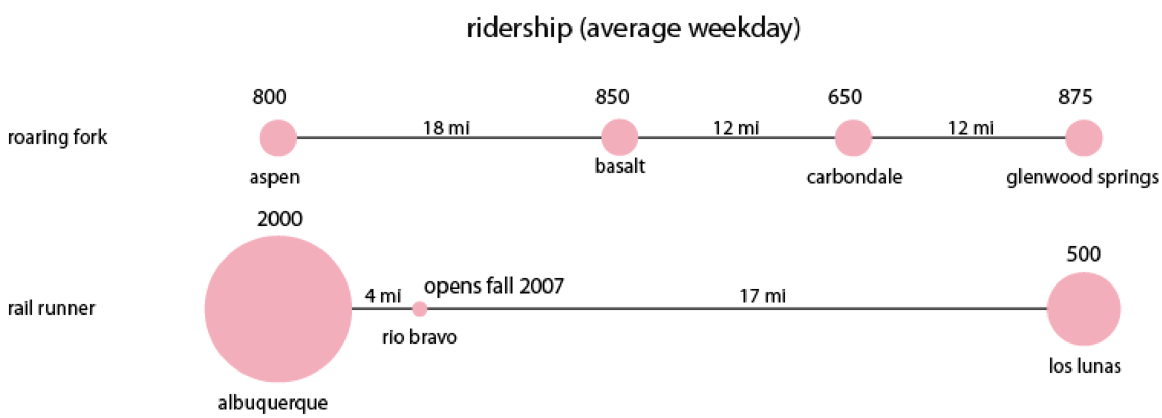
Figure 1-6 Employment Distribution



<u>Ridership Summary</u>

Ridership data was obtained from transit operators for each of the peer cities. The ridership data accounts for passengers boarding and alighting stations in each of the peer cities. Figure 1-7 illustrates the approximate boardings and alightings in each of the peer city based on 2006 data.

Figure 1-7 Ridership Comparison



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2.0 Technical Memorandum #2: Transit Framework, Methodology, and Alternatives

2.1 Introduction

The purpose of Technical Memorandum #2 is to describe the methodology for determining transit ridership potential, to identify future potential ridership, to identify a framework for transit service, and to begin to create alternatives for transit within the study area of the US 93 Corridor Study. In this memo, Fehr & Peers has applied transit ridership methodology to assess the overall potential for passengers in the study area. With the knowledge of the potential for transit, a framework for transit includes assumptions about where transit would begin and end, and where stations and stops would pick up passengers. This memorandum concludes with alternatives for transit to serve the region around US 93. These alternatives will be more fully developed in Technical Memorandum #3, which will focus on conceptual costs and operations, and the possible overall net change to US 93 traffic.

This technical memorandum includes four sections:

- Methodology for determining potential ridership
- Estimation of potential ridership
- Framework for transit service
- Transit alternatives

2.2 Methodology for Determining Ridership

Transit mode share objectives for the study area provide the basis for this regional transit ridership potential. Mode share was used to determine the potential transit ridership market in the absence of a regional travel model, travel survey information, or other means. For the purposes of this study, the following definitions are used:

- ***Transit mode share*** is the percentage of transit work trips, compared to work trips by all modes of transportation, which occur over the peak travel period. Work trips over the peak travel period were analyzed because most congestion in the valley occurs during the commute to and from work.

- ***Mode share objectives*** are the percent of work trips that must be captured to achieve a successful threshold for ridership.

- ***Ridership potential*** is the number of riders that are possible if the transit mode share objectives are met.

To determine the likely transit mode share, mode shares in the Albuquerque South Valley (RailRunner) and Roaring Fork Valley (RFTA) were analyzed. The valleys were chosen as peer comparisons based on the findings in *Technical Memorandum #1.* Mode share in each of the peer communities were determined using the Census 2000 Journey to Work data. This data provides a quantifiable mode share comparison given the varied populations, employment distributions, and density variation in the peer communities.

For the purposes of this study, the population of the study area is considered the catchment area, or the number of people living within two miles of Highway 93. The catchment area represents the geographic distance from a station that passengers are willing to travel to access transit. Nationally it is recognized that the catchment area for high capacity transit (bus or rail that serves regional destinations) is two miles.

Determining Transit Mode Share Objectives

To determine possible transit mode shares for the Bitterroot Valley, Census 2000 Journey to Work data was used with the following methodology:

- In 2000, the City of Missoula had the largest number of people in the study area using a transit service. The existing mode share for Missoula was calculated by dividing the number of workers who take transit by the number of people who live and work in Missoula. Missoula had a **2%** mode share for work trips. This metric provides a basis for the demand for transit service in the Bitterroot Valley.

- The mode shares for the peer corridors were also calculated to provide a basis for predicting ridership demand in the Bitterroot Valley. Since the RailRunner was not open in 2000, the mode share for the Albuquerque South Valley was calculated using the same methodology as Missoula. In 2000, the City of Albuquerque had a **2%** mode share for work trips.

- The mode share in the Roaring Fork Valley was calculated by dividing the number of workers who take transit by the total number of workers in each community. The bus system in the Roaring Fork Valley has several stops within each community so it was unnecessary to subtract the commuting population. Communities in the Roaring Fork Valley had an average transit mode share of **9%** in 2000.

- The 2005 commuter population was determined by applying the percentages of the population who commute to the current population in each community. The percentage of the population that commutes is based on the Census 2000 Journey to Work data. Any person who works outside of their place of residence is considered a commuter. This methodology assumes that all commuters will be using the Highway 93 corridor.

- The number of commuters was grown in five-year increments at a rate of 1.8% per year.

It should be noted that the 2008 Missoula Long-Range Transportation Plan Survey Draft Final Report was prepared concurrent with this Corridor Study and was completed in April 2008. The telephone survey, conducted by the University of Montana Bureau of Business and Economic Research (BBER), found that 6.5 percent of Missoula-area workers age 18 or older use public transportation when commuting to work, representing over four percent greater transit mode share than reported by the US Census Bureau. The BBER survey disclosed a 95 percent confidence interval. When accounting for error, public transportation mode share reported by the BBER survey appears to be generally consistent with Census data. The US Census Bureau is cited for the purposes of this Transit Analysis because it is widely accepted as a reputable and objective source of data.

Understanding Peer Travel Markets

Communities throughout the Rocky Mountain West have been investing in high capacity transit systems to provide transportation alternatives to expanding congested roadways. As shown in *Technical Memorandum #1,* the RailRunner and RFTA systems have varying ridership markets.

The information below highlights key land use, population, and density differences found in the peer communities.

- Communities outside the major employment center (Aspen) in the Roaring Fork Valley have triple the population and twice the jobs compared to the communities located within the study area, outside the major employment center (Missoula) (this calculation excludes Aspen and Missoula).

- Approximately 50% of the population and 15% of the jobs currently found in the Roaring Fork Valley equates to population and jobs in the study area at 2020.

- Communities outside the major employment center in the Albuquerque South Valley have triple the population and ten times the jobs compared to the communities outside the major employment center in the study area (this calculation excludes Albuquerque and Missoula).

- Approximately 65% of the population and 10% of the jobs currently found in the Albuquerque South Valley will be present in the study area in 2020 (this calculation excludes Albuquerque and Missoula).

<u>Ridership in Peer Markets</u>

RFTA's regional bus service currently has five times the daily ridership of the RailRunner service. This is primarily due to the history of each system. The RailRunner system was constructed without a pre-existing transit market. The service is intended to meet the future demand because of the build-out in the Albuquerque region and beyond. Currently, the system has 2,500 daily riders. RFTA's bus system is quite different. The system has evolved by serving the needs of the transit ridership market as it has adjusted over time. The system has added capacity in response to congestion and development. The system currently has 8,500 daily riders, including those routes that connect to the valley-wide service to final destinations just outside of the corridor.

Table 2.1 highlights ridership thresholds based on national research, qualitative transit indicators, and quantitative transit indicators in each peer community. This information provides further insight into factors needed to achieve mode share objectives in the study area. Table 2.1 also includes the 2000 Census work mode share for each of the communities studied (shown in parenthesis next to the community name).

Table 2.1
Factors that Influence Transit Ridership

		Existing Systems							Hypothetical for Study Area		
		Aspen (12%)	Basalt (13%)	Carbondale (12%)	Glenwood Spirngs (4%)	Albuquerque (2%)	Rio Bravo (1%)	Los Lunas (4%)	Missoula	Lolo/Florence	Stevensville
Density Thresholds	Commuter Rail – 1 to 2 DU/Acre (2 mile catchment area*)+	✓		✓	✓	✓			✓	✓	✓
	Bus Service – 4 to 15 DU/Acre (1/2 mile catchment area*)++	✓	✓		✓	✓			✓		
	CBD with at least 100,000 jobs**					✓					
Quantitative Transit Indicators	Type of Sevice (local bus, express bus, commuter rail)	◖	◖	◖	◖	●	●	●	●	○	○
	Frequency of Service	●	◖	◖	●	○	○	○	●	○	○
	Accessibility to Destinations	○	●	◖	○	○	●	◖	◖	○	○
	Mix of Land Uses	●	◖	◖	●	●	○	○	●	○	○
Quantitative Transit Indicators	Property Values	●	●	●	●	◖	○	○	◖	○	○
	Traffic Congestion	●	●	●	●	◖	○	○	●	●	○
	Major Destination	●	○	○	◖	●	○	○	●	○	○
	Pedestrian Access	●	◖	◖	◖	◖	○	○	●	○	◖
	Bicycle Access	◖	◖	◖	◖	○	○	○	●	○	○
	Amenities & Safety	◖	○	○	○	◖	○	○	N/A		

Notes:
* Pushkarev and Zupan, *Public Transportation and Land Use Policy,* 1977
** CDOT, *Rail-Oriented Development: Strategies and Tools to Support Passenger Rail*, 2001
+ Threshold results based on data presented in Tech Memo #1
++ Threshold results based on conversations with city staff
- Calculated using 2007 ridership and 2000 working population

Legend

✓	**Threshold Met**
●	**High Ridership Influence**
◖	**Moderate Ridership Influence**
○	**Low Ridership Influence**

2.3 Potential for Future Ridership

Table 2.2 details transit mode share objectives and resulting potential ridership for the study area. The following comparisons to peer markets are helpful when considering ridership in the Bitterroot:

- Achieving a 2% transit commute mode share for the study area assumes that regional transit ridership will follow similar trends as the Mountain Line in the city of Missoula, or will be similar to the current RailRunner ridership in Albuquerque.

- A 5% transit commute mode share assumes that regional transit ridership in the study area would double the current ridership of Mountain Line in the city of Missoula.

- A 10% transit commute mode share assumes that the regional transit ridership would be similar to trends in the Roaring Fork Valley.

Table 2.2
Bitterroot Valley Peak Period Ridership Projections

	2005	2010	2015	2020	2025	2030
2% Mode Share	130	140	160	170	190	210
5% Mode Share	330	360	390	430	470	510
10% Mode Share	660	720	780	860	940	1030

2.4 Transit Framework

Origin and Destination

Origins and destinations are quite simply the starting and ending point for transportation trips, and define whom a transit system will serve, as well as where the system will go. The most likely transportation trips that would use transit are work trips, since they occur at roughly the same time of day each day, with the same general origin (home) and destination (work) and vice versa in the evening, for several days in a row.

For the purposes of studying the US 93 corridor, Missoula is the northern terminus for transit. Employment patterns in the study area are such that it is easy to assume that most work commuters are traveling to the large employment center of Missoula. Although no specific location has been determined for a transit station in Missoula within this study, some logical locations to consider are either the existing transit center in downtown, or integration with the proposed Intermodal Hub at the existing train station, also downtown.

The southern terminus of the transit system analysis is Stevensville. Fehr & Peers chose Stevensville based on its relative density combined with strong trip attraction to Missoula. Stevensville offers a dense downtown center, conducive to transit use, with a population that is likely to travel to Missoula on a regular basis whether for work or other purposes. Although

Hamilton was also considered, the concentration of both jobs and housing in the same location, coupled with a greater distance from Missoula, make transit travel on US 93 less likely.

<u>Stations/Stops</u>
Stations and/or stops are best located in areas of higher densities, or at junctions between major roadways. Although no specific locations are identified in this study, transit should serve the following areas with either a stop or station. In addition, Park and Rides should be offered in each of these locations, except for downtown Missoula.

- Downtown Stevensville
- Florence center
- Lolo center
- Highway 93 and Old Highway 93 (existing Park and Ride)
- Miller Creek area of Missoula
- Downtown Missoula

These stops or stations provide a starting point for fixed-route transit service. As demand for transit increases, stops may be added in other areas.

2.5 Description of Transit Alternatives

The following five alternatives are based on the concept that, as population and employment increases, so will the demand for transit trips. This increase in demand will ideally lead to an increase in transit mode share, which will be necessary to implement greater levels of transit service, as noted in the peer review analysis. The alternatives below are arranged by implementation timeframe. Alternative one could be immediately implemented, while Alternative 5 should be considered for implementation in 20 years or more. The alternatives are described briefly below, with additional details provided in Table 2.3 below.

<u>Alternative 1: Rideshare expansion</u>
The current ride-share service operated by MR TMA could be expanded to accommodate increased passenger service. This effort is ongoing, and is a reasonable immediate or near-term alternative that could provide commuter service and reduce single occupancy vehicles. ***This alternative could be implemented between one and five years from now.***

<u>Alternative 2: Peak hour fixed route bus service</u>
Fixed peak hour bus service would include bus service at regularly scheduled intervals, at fixed stops, during peak commute times. Peak commuting hours include from 6:00 a.m. to 9:00 a.m. in the morning and from 4:00 p.m. to 7:00 p.m. in the evening. This fixed route, peak hour bus service alternative assumes 30-minute intervals, which equates to two buses every hour. ***This alternative could be implemented between three and seven years from now.***

<u>Alternative 3: All day fixed route bus service</u>
As in Alternative 2, bus service would be offered at peak commute times, with the addition of one bus per hour on the off-peak hours. Off-peak hours would include from 9:00 a.m. to 4:00 p.m., and from 7:00p.m. to 9:00 p.m. ***This alternative could be implemented between 5 and 10 years from now.***

Alternative 4: Peak hour rail service

Peak hour rail service assumes use of the existing Montana Rail Link (MRL) infrastructure. Service would occur each hour, at peak hours. The implementation of this alternative would require upgrades to the MRL track, including the installation of a signal system, which can be costly. Conceptual costs for the upgrade of this system will be more fully explored in Technical Memorandum #3. ***This alternative could be implemented in 15+ years.***

Alternative 5: All day rail service

Providing all day rail service, once per hour, would require a combination of densification of population and employment, and a high mode share similar to what occurs in the RFTA service. ***This alternative could be implemented in 20+ years.***

Table 2.3
Transit Alternatives

	Alternative 1: Rideshare Expansion	Alternative 2: Peak Hour Fixed Route Service	Alternative 3: Peak and non-peak Fixed Route Bus Service	Alternative 4: Peak Hour Rail Service	Alternative 5: All Day Rail Service
Termini	N/A	Stevensville Downtown Missoula	Stevensville Downtown Missoula	Stevensville Downtown Missoula	Stevensville Downtown Missoula
Stations/Stops Park and Ride	N/A	Stevensville Florence Lolo Hwy 93/Old Hwy 93 Miller Creek Area Downtown Missoula	Stevensville Florence Lolo Hwy 93/Old Hwy 93 Miller Creek Area Downtown Missoula	Stevensville Florence Lolo Miller Creek Area Downtown Missoula	Stevensville Florence Lolo Miller Creek Area Downtown Missoula
Time Frame for Implementation	1 – 5 years	1 – 5 years	5 – 10 years	10 + years	20 + years
Hours of service	As needed	6:00 – 9:00 a.m. 4:00 – 7:00 p.m.	6:00 a.m. to 9:00 p.m. continuous	6:00 – 9:00 a.m. 4:00 – 7:00 p.m.	6:00 a.m. to 9:00 p.m. continuous
Frequency	As needed	Every 30 min. (2 buses/hr.)	Peak: Every 30 min. (2 buses /hr.) Off peak: Every hr.	1 hr.	1 hr.
Capacity		100 passengers/hr. Daily: 600 passengers	Peak: 100 passengers/hr. Off peak: 50 passengers/hr. Daily: 1,050	150 passengers/hr. Daily: 900 passengers	Peak and off peak 150 passengers/hr. Daily: 2,250
Target time frame	2008	2010	2015	2020+	2030+
Target mode share	3%	5%	7%	7% - 10%	More than 10%
Comparison with estimated potential ridership (Table 2.2)	2010 2% = 140 riders	2010 5% = 360 riders	2010 5% = 390 riders 10% = 790 riders	2020 5% = 430 riders 10% = 850 riders	2030 10% = 1,030

3.0 Technical Memorandum #3: Conceptual Cost

3.1 Introduction

The purpose of Technical Memorandum #3 is to summarize the operations and cost for each alternative presented in Technical Memorandum #2. A detailed approach to cost estimation is provided in an appendix. This memorandum is divided into two sections:

- Review of transit alternatives
- Conceptual costs

3.2 Review of Transit Alternatives

The following five alternatives are based on the concept that, as population and employment increases, so will the demand for transit trips. This increase in demand will ideally lead to an increase in transit mode share, which will be necessary to implement greater levels of transit service, as noted in the peer review analysis. The alternatives below are arranged by implementation timeframe. Alternative one could be immediately implemented, while Alternative 5 should be considered for implementation in 20 years or more. The alternatives are described briefly below, with additional details provided in Table 3.1 below.

<u>Alternative 1: Enhanced Rideshare / Vanpool Programs</u>
The current vanpool service operated by MR TMA could be expanded to accommodate increased passenger service. Additionally, education programs could be expanded to encourage ridesharing and greater use of existing park and ride facilities. These efforts are ongoing, and are a reasonable immediate or near-term alternative that could provide commuter service and reduce single occupancy vehicles. ***This alternative could be implemented between one and five years from now.***

<u>Alternative 2: Peak hour fixed route bus service</u>
Fixed peak hour bus service would include bus service at regularly scheduled intervals, at fixed stops, during peak commute times. Peak commuting hours include from 6:00 a.m. to 9:00 a.m. in the morning and from 4:00 p.m. to 7:00 p.m. in the evening. This fixed route, peak hour bus service alternative assumes 30-minute intervals, which equates to two buses every hour. ***This alternative could be implemented between three and seven years from now.***

<u>Alternative 3: All day fixed route bus service</u>
As in Alternative 2, bus service would be offered at peak commute times, with the addition of one bus per hour on the off-peak hours. Off-peak hours would include from 9:00 a.m. to 4:00 p.m., and from 7:00p.m. to 9:00 p.m. ***This alternative could be implemented between 5 and 10 years from now.***

<u>Alternative 4: Peak hour rail service</u>
Peak hour rail service assumes use of the existing Montana Rail Link (MRL) infrastructure. Service would occur each hour, at peak hours. The implementation of this alternative would require upgrades to the MRL track, including the installation of a signal system, which can be costly. Conceptual costs for the upgrade of this system will be more fully explored in Technical Memorandum #3. ***This alternative could be implemented in 15+ years.***

Alternative 5: All day rail service

Providing all day rail service, once per hour, would require a combination of densification of population and employment, and a high mode share similar to what occurs in the Roaring Fork Transportation Authority (RFTA) service. ***This alternative could be implemented in 20+ years.***

Table 3.1 Transit Alternatives					
	Alternative 1: Enhanced Rideshare / Vanpool Programs	**Alternative 2: Peak Hour Fixed Route Service**	**Alternative 3: Peak and non-peak Fixed Route Bus Service**	**Alternative 4: Peak Hour Rail Service**	**Alternative 5: All Day Rail Service**
Termini	N/A	Stevensville Downtown Missoula	Stevensville Downtown Missoula	Stevensville Downtown Missoula	Stevensville Downtown Missoula
Stations/Stops Park and Ride	N/A	Stevensville Florence Lolo Hwy 93/Old Hwy 93 Miller Creek Area Downtown Missoula	Stevensville Florence Lolo Hwy 93/Old Hwy 93 Miller Creek Area Downtown Missoula	Stevensville Florence Lolo Miller Creek Area Downtown Missoula	Stevensville Florence Lolo Miller Creek Area Downtown Missoula
Time Frame for Implementation	1 – 5 years	1 – 5 years	5 – 10 years	10 + years	20 + years
Hours of service	As needed	6:00 – 9:00 a.m. 4:00 – 7:00 p.m.	6:00 a.m. to 9:00 p.m. continuous	6:00 – 9:00 a.m. 4:00 – 7:00 p.m.	6:00 a.m. to 9:00 p.m. continuous
Frequency	As needed	Every 30 min. (2 buses/hr.)	Peak: Every 30 min. (2 buses /hr.) Off peak: Every hr.	1 hr.	1 hr.
Capacity		100 passengers/hr. Daily: 600 passengers	Peak: 100 passengers/hr. Off peak: 50 passengers/hr. Daily: 1,050	150 passengers/hr. Daily: 900 passengers	Peak and off peak 150 passengers/hr. Daily: 2,250
Target time frame	2008	2010	2015	2020+	2030+
Target mode share	3%	5%	7%	7% - 10%	More than 10%
Comparison with estimated potential ridership (Table 2.2)	2010 2% = 140 riders	2010 5% = 360 riders	2010 5% = 390 riders 10% = 790 riders	2020 5% = 430 riders 10% = 850 riders	2030 10% = 1,030

3.3 Conceptual Cost

Five alternatives were included in this Transit Alternatives Analysis. LTK Engineering Services (LTK), a national rail transportation consulting firm specializing in rail transit project development, prepared estimates for initial capital investments and for annual operating and maintenance costs for four public transit alternatives:

- Alternative 2: Peak Hour Fixed Route Bus Service
- Alternative 3: Peak and Non-Peak Fixed Route Bus Service
- Alternative 4: Peak Hour Rail Service
- Alternative 5: All-Day Rail Service

LTK did not prepare cost estimates for Alternative 1, the option to enhance existing ridshare / vanpool programs. For purposes of this study, cost estimates for this option will be drawn from the Five Valleys Regional Transit Study, 2008.

3.3.1 Alternatives 2 & 3: Bus Service

To prepare conceptual costs, LTK assumed the following:

- A one-way running time estimate of 65 minutes between downtown Missoula and Stevensville, based on Mountain Lines' Route 7 bus schedule for the in-town section, adjusted to account for making fewer stops than the existing local service, and an independent estimate for the remainder of the route on US 93 to Stevensville.

- Five buses in operation to offer 30-minute peak period headways customized for each alternative. Two spare buses to accommodate maintenance needs and ensure adequate fleet size.

- Assuming 40 seats in a bus and a total capacity of 75 seated and standing passengers, the service will have a one-way peak capacity of 80 seats/150 total passengers in the peak hour and 200 seats/375 total passengers in each three-hour peak period.

- A range of costs, shown in Table 3.2 below, include varying levels of infrastructure improvements for amenities. To plan a system that integrates the appealing system components of rail, costs include improved bus stops with shelters, boarding platforms, and additional rider amenities. Higher cost bus options also include some improvement to park and ride locations and conditions.

- The range of costs shown in Table 3.2 below show varying levels of vehicle investments. The highest cost vehicles are assumed to be clean hybrid drive vehicles, which average $500,000. Substituting regular diesel buses would drop the estimated unit cost per vehicle from $500,000 to $350,000. Using smaller or used buses at the outset of service could drop the cost per vehicle to $250,000.

Table 3.2 Range of Bus Capital Costs			
	Low Cost	**Mid Cost**	**Higher Cost**
Assumptions	Least expensive buses No stations or additional passenger amenities or branding No additional park and ride areas Reliance on Mountain Line maintenance and service facilities	Least expensive buses 3 Stations 3 additional park and ride areas Few passenger amenities, no ticketing Reliance on Mountain Line maintenance and service facilities	Premium buses with the opportunity for alternative fuel and higher capacity 6 Stations 6 park and ride areas Bus branding Reliance on Mountain Line maintenance and service facilities
Estimated Capital Cost	1.75 million	4 million	8 million

Bus capital costs are low compared to the rail alternatives because the bus service options would run on the existing road system, in which it is assumed there would be no further investment directly related to the transit service.

The estimated capital cost for alternatives 2 and 3 ranges from $1.75 million to $8 million.

The estimate of annual operating and maintenance (O&M) costs is $180,200 for Alternative 2 and $612,300 for Alternative 3.

3.3.2 Alternatives 4 & 5: Train Service

Provision of train service will be a more complex and costly project than the bus services outlined in the previous section for the following reasons:

- The rail line paralleling US 93 will have to be acquired, or a purchase of service contract and fees agreed with the current operator (Montana Rail Link). The latter condition is assumed for the estimates in this report.
- Track will need to be upgraded at least to Class 3 as defined by the Federal Railroad Administration (FRA) to support 60 mph passenger train operation.
- A signaling system specifically for rail will have to be installed to control the movements of trains on the line.
- Station platforms will need to be longer than required for buses.
- Trains, even self-propelled diesel multiple unit (DMU) vehicles, are much more expensive than buses.

LTK used the following assumptions when preparing costs for Alternatives 4 and 5:

- A one-way running time estimate of 47 minutes between downtown Missoula and Stevensville, based on the performance capabilities of the DMU vehicles, traffic-free operation on the improved track and having only five stations and three intermediate stops.

- Two trains, each comprised of a single DMU, customized for each alternative. One spare DMU to accommodate maintenance needs and ensure adequate fleet size.

- Assuming 90 seats in a DMU and a total capacity of 150 seated and standing passengers, the service will have a one-way peak capacity of 90 seats/150 total passengers in the peak hour and 270 seats/450 total passengers in each three-hour peak period.

- Two options for DMU vehicles. Heavy DMU, which means they would be fully compliant with FRA requirements, such as those being built by Colorado Railcar Manufacturing for the new commuter rail line in suburban Portland, Oregon. Light DMU requires a waiver from (some) FRA requirements and "time separation" of passenger and freight trains, as is the case on New Jersey's River Line between Camden and Trenton.

The capital investment for Alternatives 4 and 5 would include the DMU vehicles and a range of fixed facilities: track work, train control signals, grade crossing warning devices, stations (perhaps including some parking), ticket vending machines (assumed to be on the DMUs), and a small DMU storage and servicing facility at Stevensville.

The estimated capital cost for alternatives 4 and 5 is $123,700,000

The estimate of annual operating and maintenance (O&M) costs is $6.20 million for Alternative 4 and $6.66 million for Alternative 5.

3.3.3 Summary

The five alternatives exhibit a wide range of both capital investment and ongoing operating and maintenance costs, from a low of zero to substantial sums, as shown in Table 3.3.

Table 3.3
Summary of Alternatives; Capital Investments and Annual O&M Costs

Alternative	Capital	Annual O&M
1 – Rideshare Expansion	$40,000	$18,000
2 – Peak Hour Fixed Route Bus Service	$1.75-$8 mil	$0.18 mil
3 – Peak & Non-Peak Fixed Route Bus Service	$1.75-$8 mil	$0.61 mil
4 – Peak Hour Rail Service	$123.7 mil	$6.20 mil
5 – All Day Rail Service	$123.7 mil	$6.66 mil

All cost estimates associated with Alternative 1 have been drawn from the Five Valleys Regional Transit Study, 2008. For both bus and rail alternatives, the capital investment is the same because the same facilities and equipment must be put in place whether service is operated only in peak hours or all day. The rail investment is much higher because, unlike buses running on US 93 and city streets, the entire Missoula-Stevensville rail line must be renovated and improved to ensure safe operation and to offer competitive travel times. Finally, the spread between peaks only and all day O&M costs is greater for bus, for which all costs vary with the amount of service operated, as opposed to rail, for which there is a large sum of fixed costs that must be anticipated regardless of how much or how little train service actually is operated.

APPENDIX
TECHNICAL COST INFORMATION

Alternatives 2 & 3: Bus Service

Operations

- Alternative 2: Each bus makes a single Stevensville-Missoula-Stevensville round trip each operating day

- Alternative 3: Three buses provide hourly service all day; two additional buses making a single round trip, to Missoula in the AM and returning to Stevensville in the PM

Alt. 2: 5 Buses, 30-Minute Headway, Pk Pds Only					
	Northbound				
Station	1	3	5	7	9
Stevensville	5:45	6:15	6:45	7:15	7:45
Missoula	6:50	7:20	7:50	8:20	8:50
	Southbound				
Station	2	4	6	8	10
Missoula	16:00	16:30	17:00	17:30	18:00
Stevensville	17:05	17:35	18:05	18:35	19:05
Bus	A	B	C	D	E

Alt. 3: 5 Buses, 30-Minute Peak/60-Minute Base Headway, All Day Service																	
	Northbound																
Station	1	3	5	7	9	11	13	15	17	19	21	23	25	27	1	3	5
Stevensville	5:45	6:15	6:45	7:15	7:45	8:45	9:45	10:45	11:45	12:45	13:45	14:45	15:45	16:45	17:45	18:45	19:45
Missoula	6:50	7:20	7:50	8:20	8:50	9:50	10:50	11:50	12:50	13:50	14:50	15:50	16:50	17:50	18:50	19:50	20:50
Bus	A	B	C	D	E	A	C	E	A	C	E	A	C	E	B	D	E
	Southbound																
Station	2	4	6	8	10	12	14	16	18	20	22	24	26	28	2	4	6
Missoula	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	16:30	17:00	17:30	18:00	19:00	20:00	21:00
Stevensville	8:05	9:05	10:05	11:05	12:05	13:05	14:05	15:05	16:05	17:05	17:35	18:05	18:35	19:05	20:05	21:05	22:05
Bus	A	C	E	A	C	E	A	C	E	A	B	C	D	E	B	D	E
										Done		*Done*			*Done*	*Done*	*Done*

Assuming 40 seats in a bus and a total capacity of 75 seated and standing passengers, the service will have a one-way peak capacity of 80 seats/150 total passengers in the peak hour and 200 seats/375 total passengers in each three-hour peak period.

Maintenance

Buses would be stored overnight at Stevensville and bus operators would report and sign off there. The vehicles also would be serviced and maintained overnight at Stevensville; or alternatively, they might be serviced and maintained during the day at Mountain Lines' Missoula facility. Two "spare" buses should be provided to cover for vehicles undergoing maintenance and to ensure an adequate fleet size in case a vehicle is sidelined for repair of accident damage.

Aside from buses and a small overnight storage and servicing facility at Stevensville, Alternative 2 and 3 costs would be limited to stations (improved bus stops with boarding platforms, waiting shelters), and perhaps some parking. The buses are assumed to be clean hybrid drive vehicles. Substituting regular diesel buses would drop the estimated unit cost per vehicle from $500,000 to $350,000.

Capital Costs

Because the vehicles and facilities needed would be the same for both Alternatives 2 and 3, the estimated capital costs are the same for each option. Bus capital costs are low compared to the rail alternatives because the bus service options would run on the existing road system, in which it is assumed there would be no further investment directly related to the transit service.

Estimated Capital Costs						
Least expensive bus option.						
Item	**Basis**	**Units**	**No. Units**	**Unit $**	**Total $**	
				(2007)		
Route Miles		Miles	29.20			
Track/Lane Miles		Miles	30.00			
Buses	LTK Estimate	Each	7	$250,000	$1,750,000	
Total Project Estimate						$1,750,000
Mid-range bus option						
Item	**Basis**	**Units**	**No. Units**	**Unit $**	**Total $**	
				(2007)		
Route Miles		Miles	29.20			
Track/Lane Miles		Miles	30.00			
Land Acquisition	Cost Allowance	LS	0.50	$1,000,000	$500,000	
Demolition/Site Preparation	Cost Allowance	LS	0.50	$350,000	$175,000	
Stations	Cost Allowance	Each	3	$150,000	$450,000	
Subtotal-Construction						$1,125,000
Buses	LTK Estimate	Each	7	$250,000	$1,750,000	
Total-Construction & Vehicles						$2,875,000
Total Project Estimate						**$4,000,000**
Higher cost bus option						
Item	**Basis**	**Units**	**No. Units**	**Unit $**	**Total $**	
				(2007)		
Route Miles		Miles	29.20			
Track/Lane Miles		Miles	30.00			
Land Acquisition	Cost Allowance	LS	1.00	$1,000,000	$1,000,000	
Demolition/Site Preparation	Cost Allowance	LS	1.00	$350,000	$350,000	
Stations	Cost Allowance	Each	6	$150,000	$900,000	
Subtotal-Construction						$2,250,000
Buses	LTK Estimate	Each	7	$500,000	$3,500,000	
Total-Construction & Vehicles						$5,750,000
Total Project Estimate						**$8,000,000**

Operating and Maintenance Costs

The estimate of annual operating and maintenance (O&M) costs is $180,200 for Alternative 2: Peak Period Bus Service and $612,300 for Alternative 3: All-Day Bus Service. Based on the pro forma operating timetables above, an assumption of service being offered on 255 weekdays per year leads to estimates of 2,762.5 Revenue Vehicle Hours (RVH) per year for Alternative 2, and 9,392.5 annual RVH for Alternative 3. The annual O&M cost is based on estimated RVH times an estimated O&M cost per RVH of $65.23 (Mountain Lines' reported 2005 rate of $60.89 inflated by two years at a compound rate of 3.5%).

Alternatives 4 & 5: Train Service

Operations

- Alternative 4: Train A makes three Stevensville-Missoula-Stevensville round trips each operating day, and Train B makes a single weekday round trip.
- Alternative 5: Two trains, each comprised of a single DMU, provide hourly service all day, with each train completing seven complete round trips.

Alt. 4: Two Trains, 60-Minute Headway, Peak Periods Only							
	Northbound						
Station	1	3	5	--	--	--	7
Stevensville	5:51	6:51	7:51	--	--	--	16:51
Florence	6:05	7:05	8:05	--	--	--	17:05
Lolo	6:19	7:19	8:19	--	--	--	17:19
Post [b]	6:31	7:31	8:31	--	--	--	17:31
Missoula	6:38	7:38	8:38	--	--	--	17:38
	Southbound						
Station	2	--	--	--	4	6	8
Missoula	7:00	--	--	--	16:00	17:00	18:00
Post [b]	7:07	--	--	--	16:07	17:07	18:07
Lolo	7:19	--	--	--	16:19	17:19	18:19
Florence	7:33	--	--	--	16:33	17:33	18:33
Stevensville	7:47	--	--	--	16:47	17:47	18:47
Trainset	A	B	A	--	A	B	A

Alt. 5: Two Trains, 60-Minute Headway, All Day Service														
	Northbound													
Station	1	3	5	7	9	11	13	15	17	19	21	23	25	27
Stevensville	5:51	6:51	7:51	8:51	9:51	10:51	11:51	12:51	13:51	14:51	15:51	16:51	17:51	18:51
Florence	6:05	7:05	8:05	9:05	10:05	11:05	12:05	13:05	14:05	15:05	16:05	17:05	18:05	19:05
Lolo	6:19	7:19	8:19	9:19	10:19	11:19	12:19	13:19	14:19	15:19	16:19	17:19	18:19	19:19
Post [b]	6:31	7:31	8:31	9:31	10:31	11:31	12:31	13:31	14:31	15:31	16:31	17:31	18:31	19:31
Missoula	6:38	7:38	8:38	9:38	10:38	11:38	12:38	13:38	14:38	15:38	16:38	17:38	18:38	19:38
	Southbound													
Station	2	4	6	8	10	12	14	16	18	20	22	24	26	28
Missoula	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00
Post [b]	7:07	8:07	9:07	10:07	11:07	12:07	13:07	14:07	15:07	16:07	17:07	18:07	19:07	20:07
Lolo	7:19	8:19	9:19	10:19	11:19	12:19	13:19	14:19	15:19	16:19	17:19	18:19	19:19	20:19
Florence	7:33	8:33	9:33	10:33	11:33	12:33	13:33	14:33	15:33	16:33	17:33	18:33	19:33	20:33
Stevensville	7:47	8:47	9:47	10:47	11:47	12:47	13:47	14:47	15:47	16:47	17:47	18:47	19:47	20:47
Trainset	A	B	A	B	A	B	A	B	A	B	A	B	A	B

Assuming 90 seats in a DMU and a total capacity of 150 seated and standing passengers, the service will have a one-way peak capacity of 90 seats/150 total passengers in the peak hour and 270 seats/450 total passengers in each three-hour peak period.

Vehicles

The DMU vehicles could be either "heavy" – fully compliant with Federal Railroad Administration requirements, such as those being built by Colorado Railcar Manufacturing for the new commuter rail line in suburban Portland, Oregon, or "light" – requiring a waiver from (some) FRA requirements and "time separation" of passenger and freight trains, as is the case on New Jersey's River Line between Camden and Trenton. At least one "spare" DMU should be provided to cover for a vehicle undergoing maintenance and to ensure an adequate fleet size in case a vehicle is sidelined for repair of accident damage.

Maintenance

DMUs would be stored overnight, fueled, serviced and maintained at Stevensville, and train operators would report and sign off there. A facility capable of accommodating these activities would have to be provided, including one or more environmental collection pans and an oil/water separator for spilled fuel, storage tracks(s) with auxiliary electric power, and an inspection shed with a pit and tools sufficient to support ordinary servicing and maintenance activities, parts stores, and offices. Heavy maintenance and repairs would be performed at an outside contractor's facility.

Capital Cost

The capital investment for Alternatives 4 and 5 would include the DMU vehicles and a range of fixed facilities: track work, train control signals, grade crossing warning devices, stations (perhaps including some parking), ticket vending machines (assumed to be on the DMUs), and a small DMU storage and servicing facility at Stevensville.

Route 93 Transit Alternatives Study						
Estimated Capital Costs						
Alts 4: DMU, Peaks-Only Service, and 5: DMU, All-Day Service						
Item	**Basis**	**Units**	**No. Units**	**Unit $**	**Total $**	
				(2007)		
Route Miles		Miles	29.20			
Track/Lane Miles		Miles	30.00			
Land Acquisition	Cost Allowance	LS	1.00	$1,000,000	$1,000,000	
Demolition/Site Preparation	Cost Allowance	LS	1.00	$350,000	$350,000	
Trackwork	LTK Estimate	Track Ft	158400	$150	$23,760,000	
Special Trackwork	LTK Estimate	Each	4	$140,000	$560,000	
Paving & Other Roadway	Portland Streetcar	Track Ft	1350	$200	$270,000	
Utility Work	Not Used This Project	Track Ft	0	$225	$0	
Signal System	Cost Allowance	Track Ft	158400	$150	$23,760,000	
System Electrical	Not Used This Project	Route Ft	0	$70	$0	
Traffic Signals (Pre-emption)	Not Used This Project	Each	0	$250,000	$0	
Grade Xing Warning Devices-Typical	Cost Allowance	Each	40	$250,000	$10,000,000	
Grade Xing Warning Devices-State/700E	Cost Allowance	Each	5	$350,000	$1,750,000	
Stations	Cost Allowance	Each	5	$250,000	$1,250,000	
Fare Collection (on DMU)	Cost Allowance	Each	3	$100,000	$300,000	
Service Facility	LTK Estimate	Each	1	$1,000,000	$1,000,000	
Storage Yard	LTK Estimate	LS	1	$355,000	$355,000	
Subtotal-Construction						$64,355,000
Buses	Not Used This Project	Each	0	$500,000	$0	
DMUs	LTK Estimate	Each	3	$4,500,000	$13,500,000	
Total-Construction & Vehicles						$77,855,000
Contingencies:						
Construction	Cost Allowance			35%	$22,524,250	
Vehicles	Cost Allowance			20%	$2,700,000	
Subtotal-Contingencies						$25,224,250
Overall Subtotal						$103,079,250
Design, CM, Admin Mgt	Cost Allowance			20%		$20,615,850
Total Project Estimate						$123,695,100

Because the vehicles and facilities needed would be the same for both Alternatives 4 and 5, the estimated capital costs are the same for each option. Considering the 29.2-mile length of the route, an investment of under $4.3 million per mile is quite modest for a rail project.

Operating and Maintenance Costs

Unlike the bus alternatives, for which all O&M costs are assumed to be related to and, thus, variable with RVH, the bulk of the rail alternatives' O&M costs are likely to be fixed charges for facility maintenance, insurance, and various management and administrative functions, with variable costs limited to fuel, train operations (crewing) and DMU maintenance. In essence, there is a fairly steep "entry fee" of Fixed Costs to pay before any trains are operated and, as a result, total O&M costs do not vary by a large amount between the "peaks only" and "all day" service alternatives. In the tables below, Track & Signal, Dispatch, Contractor's management and General & Administrative costs in sum may be taken as approximating payments to the host railroad for operating the service under contract, as has been assumed here.

In addition, these estimates assume use of a DMU vehicle suitable for operation by a single crew member, i.e., a "light" DMU with low floor level boarding, automatic doors controlled from the operating cab, and self-service proof-of-payment ticketing. If two-person train crews are required, estimated costs for Train & Engine (T&E) Crews would double. Note that the T&E jobs in Alternative 4 likely would be best arranged as part-time split shifts; and the people holding these assignments would have time for daytime second jobs during their midday layovers in Missoula (see *pro forma* timetable on an earlier page).

Missoula-Stevensville O&M Cost Estimate - DMU Rolling Stock									
Conceptual Operating Plan - Missoula-Stevensville; 1-Car Trains; Alt. 4 - Hourly Peaks-Only Service									
					Allocated to Functional Cost Categories				
Cost Item	**Units**	**Unit $ 2007**	**No. Units**	**Total $**	**Transp.**	**Equip. Maint.**	**Way Maint.**	**G&A**	**Total $**
		[a]							
Fixed Costs:									
- Track & Signal [b]	Track Mile	$50,000	29.5	$1,475,000			$1,475,000		$1,475,000
- Dispatch	No. Staff	$90,000	7	$630,000	$630,000				$630,000
- Insurance	Lump Sum	$1,000,000	1	$1,000,000				$1,000,000	$1,000,000
- Station & Revenue [c]	No. Stations	$60,000	5	$300,000	$300,000				$300,000
- Contractor's Management	Lump Sum	$600,000	1	$600,000				$600,000	$600,000
- General & Administrative	Lump Sum	$750,000	1	$750,000				$750,000	$750,000
Total Fixed Costs				$4,755,000					
Variable Costs:									
- Fuel [d,e]	Gallons	$3.05	29,784	$90,841	$90,841				$90,841
- Train & Engine Crews	Train Hours	$40.00	1,598	$63,920	$63,920				$63,920
- Equipment Maintenance	Units	$85,000	3	$255,000		$255,000			$255,000
Total Variable Costs				$409,761					
Estimated O&M Costs				$5,164,761	$1,084,761	$255,000	$1,475,000	$2,350,000	$5,164,761
Contingency	Percent	--	20%	$1,032,952	$216,952	$51,000	$295,000	$470,000	$1,032,952
Total Estimated O&M Costs				$6,197,713	$1,301,713	$306,000	$1,770,000	$2,820,000	$6,197,713
O&M per Train Hour				$3,878					
O&M per Train Mile				$104.04					
[a] Estimated values					21.0%	4.9%	28.6%	45.5%	
[b] Track Miles = 29.2 mile main line + 1 siding totaling 0.3 miles.									
[c] Missoula, Post (Miller Creek), Lolo, Florence, Stevensville									
[d] Basis: West coast diesel fuel price on 07/30/2007 per http://tonto.eia.doe.gov/oog/info/gdu/gasdiesel.asp									
[e] Weekday sets A-B single DMUs									

The estimate of annual operating and maintenance (O&M) costs is $6.20 million for Alternative 4: Peak Period Rail Service and $6.66 million for Alternative 5: All-Day Rail Service. Based on the pro forma operating timetables above, an assumption of service being offered on 255 weekdays per year leads to estimates of 1,598 Revenue Vehicle Hours (RVH) per year for Alternative 4, and 5,593 annual RVH for Alternative 5. Although total annual O&M costs are close for both alternatives, unit O&M costs per train hour and mile drop by large values as the level of service is increased and the fixed charges are spread over more units of service.

Missoula-Stevensville O&M Cost Estimate - DMU Rolling Stock									
Conceptual Operating Plan - Missoula-Stevensville; 1-Car Trains; Alt. 5 - Hourly All Day Service									
					Allocated to Functional Cost Categories				
Cost Item	**Units**	**Unit $ 2007**	**No. Units**	**Total $**	**Transp.**	**Equip. Maint.**	**Way Maint.**	**G&A**	**Total $**
		[a]							
Fixed Costs:									
- Track & Signal [b]	Track Mile	$50,000	29.5	$1,475,000			$1,475,000		$1,475,000
- Dispatch	No. Staff	$90,000	7	$630,000	$630,000				$630,000
- Insurance	Lump Sum	$1,000,000	1	$1,000,000				$1,000,000	$1,000,000
- Station & Revenue [c]	No. Stations	$60,000	5	$300,000	$300,000				$300,000
- Contractor's Management	Lump Sum	$600,000	1	$600,000				$600,000	$600,000
- General & Administrative	Lump Sum	$750,000	1	$750,000				$750,000	$750,000
Total Fixed Costs				$4,755,000					
Variable Costs:									
- Fuel [d,e]	Gallons	$3.05	104,244	$317,944	$317,944				$317,944
- Train & Engine Crews	Train Hours	$40.00	5,593	$223,720	$223,720				$223,720
- Equipment Maintenance	Units	$85,000	3	$255,000		$255,000			$255,000
Total Variable Costs				$796,664					
Estimated O&M Costs				$5,551,664	$1,471,664	$255,000	$1,475,000	$2,350,000	$5,551,664
Contingency	Percent	--	20%	$1,110,333	$294,333	$51,000	$295,000	$470,000	$1,110,333
Total Estimated O&M Costs				$6,661,997	$1,765,997	$306,000	$1,770,000	$2,820,000	$6,661,997
O&M per Train Hour				$1,191					
O&M per Train Mile				$31.95					
[a] Estimated values					26.5%	4.6%	26.6%	42.3%	
[b] Track Miles = 29.2 mile main line + 1 siding totaling 0.3 miles.									
[c] Missoula, Post (Miller Creek), Lolo, Florence, Stevensville									
[d] Basis: West coast diesel fuel price on 07/30/2007 per http://tonto.eia.doe.gov/oog/info/gdu/gasdiesel.asp									
[e] Weekday sets A-B single DMUs									

Appendix I

Detailed Costs and Cost Derivations

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Two New Travel Lanes on U.S. 93 from Lolo to Missoula

Item	Quantity	Units		Cost/Unit #	Cost
1. Embankment in place	140400	C.Y.	$	7.41	1,040,364
2. Pl. Mix Bit Surf.	25440	TON	$	26.28	668,563
3. Asphalt Cement	1524	TON	$	337.87	514,914
4. Cr. Agg. Crse	93864	C.Y.	$	17.32	1,625,724
5. Cover	93866	S.Y.	$	0.55	51,626
6. Seed/Fert.	12	Acres	$	400.00	4,800
7. Culvert Ext.	1	L.S.	$	180,000.00	180,000
8. Signing/Striping	1	L.S.	$	75,000.00	75,000
9. Topsoil salvage & place	5000	C.Y.	$	3.51	17,550
10. Fencing & Misc.*	1	L.S.	$	500,000.00	500,000
11. Retaining Wall (see separate itemized estimate for this item)	1	Ea.	$	20,931,559.00	20,931,559
12. Reconstruction of Existing Lanes	5 lanes over 6 mi	per lane per mile	$	1,000,000.00	30,000,000
Subtotal					55,610,101
Traffic Control (15%)					8,341,515
Subtotal					63,951,616
Mobilization (10%)					6,395,162
Subtotal					70,346,778
Contingency (15%)					10,552,017
Subtotal					80,898,794
Construction Engineering (10%)					8,089,879
Design Engineering (20%)					16,179,759
Right-of-Way (29 acres @ 5000/acre)					145,000
Total Estimated Cost					105,313,432

Unit costs based on MDT English Average Bid Prices - 2007

* Misc. items include survey, erosion control, mail boxes, cattle guards, etc.

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Two New HOV Lanes on U.S. 93 from Lolo to Missoula

Item	Quantity	Units		Cost/Unit #	Cost
1. Embankment in place	140400	C.Y.	$	7.41	1,040,364
2. Pl. Mix Bit Surf.	25440	TON	$	26.28	668,563
3. Asphalt Cement	1524	TON	$	337.87	514,914
4. Cr. Agg. Crse	93864	C.Y.	$	17.32	1,625,724
5. Cover	93866	S.Y.	$	0.55	51,626
6. Seed/Fert.	12	Acres	$	400.00	4,800
7. Culvert Ext.	1	L.S.	$	180,000.00	180,000
8. Signing/Striping	1	L.S.	$	125,000.00	125,000
9. Topsoil salvage & place	5000	C.Y.	$	3.51	17,550
10. Fencing and Misc.*	1	L.S.	$	500,000.00	500,000
11. Retaining Wall (see separate itemized estimate for this item)	1	Ea.	$	20,931,559.00	20,931,559
12. Reconstruction of Existing Lanes	5 lanes over 6 mi	per lane per mile	$	1,000,000.00	30,000,000
Subtotal					55,660,101
Traffic Control (15%)					8,349,015
Subtotal					64,009,116
Mobilization (10%)					6,400,912
Subtotal					70,410,028
Contingency (15%)					10,561,504
Subtotal					80,971,532
Construction Engineering (10%)					8,097,153
Design Engineering (20%)					16,194,306
Right-of-Way (29 acres @ 5000/acre)					145,000
Total Estimated Cost					105,407,991

Unit costs based on MDT English Average Bid Prices - 2007

* Misc. items include survey, erosion control, mail boxes, cattle guards, etc.

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Elevated Expressway with Two New Lanes from Lolo to Missoula

Item	Quantity	Units		Cost/Unit #	Cost
1. Elevated Roadway including ramps	909,440	FT^2	$	135.00	122,774,400
2. Signing/Striping	1	LS	$	90,000.00	90,000
3. Reconstruction of Existing Lanes	5 lanes over 6 mi	per lane per mile	$	1,000,000.00	30,000,000
Subtotal					152,864,400
Traffic Control (15%)					22,929,660
Subtotal					175,794,060
Mobilization (18%)					31,642,931
Subtotal					207,436,991
Contingency (15%)					31,115,549
Subtotal					238,552,539
Construction Engineering (15%)					35,782,881
Design Engineering (20%)					47,710,508
Right-of-Way (5 acres @ 5000/acre)					25,000
Total Estimated Cost					322,070,928

Unit costs based on Industry Standard in Montana & MDT English Avg. Bid Prices 2007
* Costs do not include lighting

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Two New Lanes and Center Reversible HOV Lane from Lolo to Missoula

Item	Quantity	Units		Cost/Unit #	Cost
1. Embankment in place	140400	C.Y.	$	7.41	1,040,364
2. Pl. Mix Bit Surf.	25440	TON	$	26.28	668,563
3. Asphalt Cement	1524	TON	$	337.87	514,914
4. Cr. Agg. Crse	93864	C.Y.	$	17.32	1,625,724
5. Cover	93866	S.Y.	$	0.55	51,626
6. Seed/Fert.	12	Acres	$	400.00	4,800
7. Culvert Ext.	1	L.S.	$	180,000.00	180,000
8. Signing/Striping	1	L.S.	$	150,000.00	150,000
9. Topsoil salvage & place	5000	C.Y.	$	3.51	17,550
10. Concrete Barrier Rail (10' section)	6340	Ea.	$	550.00	3,487,000
11. Grade Separated Interchange - Full (3 ea.) (see separate itemized estimate for this item)	1	Ea.	$	6,623,343.00	6,623,343
12. Fencing and Misc.*	1	L.S.	$	500,000.00	500,000
13. Retaining Wall (see separate itemized estimate for this item)	1	Ea.	$	20,931,559.00	20,931,559
14. Reconstruction of Existing Lanes	5 lanes over 6 mi	per lane per mile	$	1,000,000.00	30,000,000
Subtotal					65,795,444
Traffic Control (15%)					9,869,317
Subtotal					75,664,760
Mobilization (10%)					7,566,476
Subtotal					83,231,236
Contingency (15%)					12,484,685
Subtotal					95,715,922
Construction Engineering (10%)					9,571,592
Design Engineering (20%)					19,143,184
Right-of-Way (29 acres @ 5000/acre)					145,000
Total Estimated Cost					124,575,699

\# Unit costs based on MDT English Average Bid Prices - 2007, 2006, 2005
* Misc. items include survey, erosion control, mail boxes, cattle guards, etc.

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Center Reversible HOV Lanes with new lane from Lolo to Missoula

Item	Quantity	Units		Cost/Unit #	Cost
1. Embankment in place	70200	C.Y.	$	7.41	520,182
2. Pl. Mix Bit Surf.	12720	TON	$	26.28	334,282
3. Asphalt Cement	762	TON	$	337.87	257,457
4. Cr. Agg. Crse	46932	C.Y.	$	17.32	812,862
5. Cover	46933	S.Y.	$	0.55	25,813
6. Seed/Fert.	6	Acres	$	400.00	2,400
7. Culvert Ext.	1	L.S.	$	100,000.00	100,000
8. Signing/Striping	1	L.S.	$	150,000.00	150,000
9. Topsoil salvage & place	2500	C.Y.	$	3.51	8,775
10. Concrete Barrier Rail	6340	Ea.	$	550.00	3,487,000
11. Grade Separated Interchange-Full (3 ea.) (see separate itemized estimate for this item)	1	Ea.	$	6,623,343.00	6,623,343
12. Fencing & Misc.**	1	L.S.	$	600,000.00	600,000
13. Retaining Wall (see separate itemized estimate for this item)	1	Ea.	$	20,931,559.00	20,931,559
14. Reconstruction of Existing Lanes	5 lanes over 6 mi	per lane per mile	$	1,000,000.00	30,000,000
Subtotal					63,853,673
Traffic Control (15%)					9,578,051
Subtotal					73,431,724
Mobilization (10%)					7,343,172
Subtotal					80,774,896
Contingency (15%)					12,116,234
Subtotal					92,891,131
Construction Engineering (10%)					9,289,113
Design Engineering (20%)					18,578,226
Right-of-Way (215 acres @ 5000/acre)					1,075,000
Total Estimated Cost					121,833,470

Unit costs based on MDT English Average Bid Prices - 2007
* Costs do not include lighting
** Misc. items include survey, erosion control, mail boxes, cattle guards, etc.

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Center Reversible Lanes with New Lane from Lolo to Missoula

Item	Quantity	Units		Cost/Unit #	Cost
1. Embankment in place	70200	C.Y.	$	7.41	520,182
2. Pl. Mix Bit Surf.	12720	TON	$	26.28	334,282
3. Asphalt Cement	762	TON	$	337.87	257,457
4. Cr. Agg. Crse	46932	C.Y.	$	17.32	812,862
5. Cover	46933	S.Y.	$	0.55	25,813
6. Seed/Fert.	6	Acres	$	400.00	2,400
7. Culvert Ext.	1	L.S.	$	100,000.00	100,000
8. Signing/Striping	1	L.S.	$	150,000.00	150,000
9. Topsoil salvage & place	2500	C.Y.	$	3.51	8,775
10. Concrete Barrier Rail (10' section)	6340	Ea.	$	550.00	3,487,000
11. Grade Separated Interchange - Full (3 ea.) (see separate itemized estimate for this item)	1	Ea.	$	6,623,343.00	6,623,343
12. Fencing & Misc.*	1	L.S.	$	600,000.00	600,000
13. Retaining Wall (see separate itemized estimate for this item)	1	Ea.	$	20,931,559.00	20,931,559
14. Reconstruction of Existing Lanes	5 lanes over 6 mi	per lane per mile	$	1,000,000.00	30,000,000
Subtotal					63,853,673
Traffic Control (15%)					9,578,051
Subtotal					73,431,724
Mobilization (10%)					7,343,172
Subtotal					80,774,896
Contingency (15%)					12,116,234
Subtotal					92,891,131
Construction Engineering (10%)					9,289,113
Design Engineering (20%)					18,578,226
Right-of-Way (215 acres @ 5000/acre)					1,075,000
Total Estimated Cost					121,833,470

Unit costs based on MDT English Average Bid Prices - 2007, 2006, 2005
* Costs do not include lighting
* Misc. items include survey, erosion control, mail boxes, cattle guards, etc.

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Eastside Bypass from Florence to Missoula - 2 Lanes

Item	Quantity	Units	Cost/Unit #	Cost
1. Unclassified Excavation	468000	C.Y.	$ 3.52	1,647,360
2. Pl. Mix Bit Surf.-Gr. S	84800	TON	$ 26.28	2,228,544
3. Asphalt Cement - PG 58-28	5080	TON	$ 337.87	1,716,380
4. Cr. Agg. Crse	312880	C.Y.	$ 17.32	5,419,082
5. Topsoil S&P	100000	C.Y.	$ 3.51	351,000
6. Cover	1200000	S.Y.	$ 0.55	660,000
7. Seed/Fert.	240	Acres	$ 400.00	96,000
8. Signing/Striping	1	L.S.	$ 250,000.00	250,000
9. Culverts/Drainage	1	L.S.	$ 1,275,000.00	1,275,000
10. Fencing & Misc.**	1	L.S.	$ 850,000.00	850,000
Subtotal				14,493,365
Traffic Control (15%)				2,174,005
Subtotal				16,667,370
Mobilization (10%)				1,666,737
Subtotal				18,334,107
Contingency (15%)				2,750,116
Subtotal				21,084,223
Construction Engineering (10%)				2,108,422
Design Engineering (20%)				4,216,845
Right-of-Way (236 acres @ 5000/acre)				1,180,000
Total Estimated Cost				28,589,490

Unit costs based on MDT English Average Bid Prices - 2007, 2006, 2005
* Costs do not include lighting
** Misc. items include survey, erosion control, mail boxes, cattle guards, etc.

U.S. 93 CORRIDOR STUDY

Planning Level Alternatives Costing

Improvement Option: Eastside Access Roadway from Lolo to Missoula - 2 Lanes

Item	Quantity	Units	Cost/Unit #		Cost
1. Unclassified Excavation	187200	C.Y.	$	3.52	658,944
2. Pl. Mix Bit Surf.-Gr. S	33920	TON	$	26.28	891,417.60
3. Asphalt Cement - PG 58-28	2032	TON	$	337.87	686,552
4. Cr. Agg. Crse	125152	C.Y.	$	17.32	2,167,633
5. Topsoil S&P	40000	C.Y.	$	3.51	140,400
6. Cover	480000	S.Y.	$	0.55	264,000
7. Seed/Fert.	96	Acres	$	400.00	38,400
8. Signing/Striping	1	L.S.	$	100,000.00	100,000
9. Culverts/Drainage	1	L.S.	$	510,000.00	510,000
10. Fencing & Misc.*	1	L.S.	$	500,000.00	500,000
Subtotal					5,957,346
Traffic Control (15%)					893,602
Subtotal					6,850,948
Mobilization (10%)					685,095
Subtotal					7,536,043
Contingency (15%)					1,130,406
Subtotal					8,666,449
Construction Engineering (10%)					866,645
Design Engineering (20%)					173,329
Right-of-Way (94.4 acres @ 5000/acre)					472,000
Total Estimated Cost					10,178,423

Unit costs based on MDT English Average Bid Prices - 2007, 2006, 2005
* Costs do not include lighting
** Misc. items include survey, erosion control, mail boxes, cattle guards, etc.

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Improved Park & Ride Facilities (Sheltered Waiting Area & Racks)

Item	Quantity	Units	Cost/Unit #	Cost
1. Covered Pedestrian Shelter	1	L.S.	$ 55,000	$ 55,000
2. Bicycle Racks	3	Ea.	$ 450	$ 1,350
3. Landscaping/Sprinklers	1	L.S.	$ 8,000	$ 8,000
4. Lighting/Signing	1	L.S.	$ 8,500	$ 8,500
5. Connection Path(s)	1	L.S.	$ 5,000	$ 5,000
6. Bike Lockers	15	Lockers	$ 1,000	$ 15,000
Subtotal				$ 92,850
Mobilization (15%)				$ 13,927
Subtotal				$ 106,777
Contingency (15%)				$ 16,016
Subtotal				$ 122,793
Construction Engineering (10%)				$ 12,279
Design Engineering (12%)				$ 14,735
Right-of-Way				$ -
Total Estimated Cost				$ 150,000

* includes excavation & removal, revegetation, fencing & sign removal, and traffic control

cost data from website www.bicycling info.org/bikecost sponsored by NCHRP and others.

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Bike Lanes on US 93 from Florence to Missoula

Item	Quantity	Units	Cost/Unit #	Cost
1. Embankment in place	166222	C.Y.	$ 7.41	1,231,705
2. Pl. Mix Bit Surf.	8789	TON	$ 26.28	230,975
3. Asphalt Cement	527	TON	$ 337.87	178,057
4. Cr. Agg. Crse	15504	C.Y.	$ 17.32	268,529
5. Drainage/Culvert Extension	1	L.S.	$ 50,000.00	50,000
Subtotal				1,959,267
Traffic Control (15%)				293,890
Subtotal				2,253,157
Mobilization (15%)				337,974
Subtotal				2,591,130
Contingency (15%)				388,670
Subtotal				2,979,800
Construction Engineering (10%)				297,980
Design Engineering (20%)				595,960
Right-of-Way (Permits Only)				10,000
Total Estimated Cost				3,883,740

Unit costs based on MDT English Average Bid Prices - 2007
* Assume 5' wide paths with 11/2" Pl. Mix + 4" CAC

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Separated Bike Path/Pedestrian Path on West Side from Lolo to Missoula and on East Side from Florence to Missoula*

Item	Quantity	Units	Cost/Unit #	Cost
1. Pl. Mix Bit. Surf.	11633	Tons	$ 26.28	$ 305,702
2. Asphalt Cement	698	Tons	$ 430.00	$ 299,925
3. Cr. Agg. Crse.	20520	C.Y.	$ 17.32	$ 355,406
4. Embankment in Place	56250	C.Y.	$ 7.41	$ 416,813
5. Drainage	1	L.S.	$ 23,000.00	$ 23,000
6. Signage & Misc.**	1	L.S.	$ 68,000.00	$ 68,000
Subtotal				$ 1,468,846
Mobilization (15%)				$ 220,327
Subtotal				$ 1,689,173
Contingency (10%)				$ 168,917
Subtotal				$ 1,858,090
Construction Engineering (10%)				$ 185,809
Design Engineering (10%)				$ 185,809
Right-of-Way				$ -
Total Estimated Cost				$ 2,229,708

* Assume 10' wide path - 1 1/2" pl. mix plus 4" gravel section

\# Unit costs derived from MDT English Average Bid Prices - 2007

** Misc. items include survey, erosion control, etc.

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Super Two Configuration with Roundabouts - 2 lanes**

Item	Quantity	Units	Cost/Unit #	Cost
1. Cover - Existing Road	650000	S.Y.	$ 0.55	357,500
2. Striping - Existing Road	1	L.S.	$ 70,000.00	70,000
3. Embankment in Pl.	2000	C.Y.	$ 7.41	14,820
4. Pl. Mix Bit Surf.	6575	Tons	$ 26.28	172,791
5. Asphalt	390	Tons	$ 337.87	131,769
6. Cr. Agg. Crse.	18625	C.Y.	$ 17.32	322,585
7. Curb & Gutter	3000	L.F.	$ 15.28	45,840
8. Drainage	1	L.S.	$ 20,000.00	20,000
9. Vegetation	1	L.S.	$ 15,000.00	15,000
10. Fencing & Misc.##	1	L.S.	$ 500,000.00	500,000
Subtotal				1,650,305
Traffic Control (15%)				247,546
Subtotal				1,897,851
Mobilization (10%)				189,785
Subtotal				2,087,636
Contingency (15%)				313,145
Subtotal				2,400,782
Construction Engineering (10%)				240,078
Design Engineering (20%)				480,156
Right-of-Way				-
Total Estimated Cost				3,121,016

Unit costs based on MDT English Average Bid Prices - 2007, 2006, 2005
* Costs do not include lighting
** 5 Roudabouts - assume roundabouts will require full reconstruction with 135' ∅ circle, 5" Pl. Mix, 24" CAC
Misc. items include survey, erosion control, mail boxes, cattle guards, etc.

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Two HOV Lanes within Existing Lane Structure from Lolo to Missoula

Item	Quantity	Units	Cost/Unit #	Cost
1. Signing/Striping	1	L.S.	$ 30,000.00	30,000
Subtotal				30,000
Traffic Control (15%)				4,500
Subtotal				34,500
Mobilization (10%)				3,450
Subtotal				37,950
Contingency (15%)				5,693
Subtotal				43,643
Construction Engineering (10%)				4,364
Design Engineering (20%)				8,729
Right-of-Way				-
Total Estimated Cost				56,735

Unit costs based on MDT English Average Bid Prices - 2007
* Costs do not include lighting

U.S. 93 CORRIDOR STUDY

Planning Level Alternatives Costing

Improvement Option: Center Reversible HOV Lane within Existing Lane Structure from Lolo to Missoula

Item	Quantity	Units		Cost/Unit #	Cost
1. Signing/Striping	1	L.S.	$	150,000.00	150,000
2. Concrete Barrier Rail	6340	Ea.	$	500.00	3,170,000
3. Full Interchange (3 ea.) (see separate itemized estimate for this item)	1	Ea.	$	6,623,343.00	6,623,343
Subtotal					9,943,343
Traffic Control (15%)					1,491,501
Subtotal					11,434,844
Mobilization (10%)					1,143,484
Subtotal					12,578,329
Contingency (15%)					1,886,749
Subtotal					14,465,078
Construction Engineering (10%)					1,446,508
Design Engineering (20%)					289,302
Right-of-Way (200 acres @ 5000/acre)					1,000,000
Total Estimated Cost					17,200,888

Unit costs based on MDT English Average Bid Prices - 2007

*Costs do not include lighting

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Center Reversible Travel Lane within Existing Lane Structure from Lolo to Missoula

Item	Quantity	Units	Cost/Unit #	Cost
1. Signing/Striping	1	L.S.	$ 150,000.00	150,000
2. Concrete Barrier Rail	6340	Ea.	$ 500.00	3,170,000
3. Full Interchange (3 ea.) (see separate itemized estimate for this item)	1	Ea.	$ 6,623,343.00	6,623,343
Subtotal				9,943,343
Traffic Control (15%)				1,491,501
Subtotal				11,434,844
Mobilization (10%)				1,143,484
Subtotal				12,578,329
Contingency (15%)				1,886,749
Subtotal				14,465,078
Construction Engineering (10%)				1,446,508
Design Engineering (20%)				289,302
Right-of-Way (200 acres @ 5000/acre)				1,000,000
Total Estimated Cost				17,200,888

Unit costs based on MDT English Average Bid Prices - 2007
*Costs do not include lighting

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: HOV Lane Reversal within Existing Lane Structure

Item	Quantity	Units	Cost/Unit #	Cost
1. 10' - Concrete Barrier Rail	6336	Ea.	$ 500.00	$ 3,168,000
2. Epoxy	870	Gal.	$ 51.70	$ 44,979
3. Signage	6	L.S.	$ 10,000.00	$ 60,000
4. Gates	12	Ea.	$ 5,000.00	$ 60,000
Subtotal				$ 3,332,979
Traffic Control (L.S.)				$ 11,000
Mobilization (L.S.)				$ 3,000
Contingency (L.S.)				$ 2,000
Construction Engineering (L.S.)				$ 2,000
Design Engineering (L.S.)				$ 2,000
Right-of-Way				$ -
Total Estimated Cost				$ 3,352,979

Unit costs based on MDT English Average Bid Prices for 2005 & 2006 adjusted for inflation and Average Bid Prices for 2007

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Grade Separated Intersections - Full Interchange **

Item	Quantity	Units	Cost/Unit *	Cost
1. Pl. Mix Bit. Surf.	2655	Tons	$ 26.28	$ 69,773
2. Asphalt Cement	159	Tons	$ 337.87	$ 53,721
3. Cr. Agg. Crse.	5166	C.Y.	$ 17.32	$ 89,475
4. Embankment in Place	555300	C.Y.	$ 7.41	$ 4,114,773
5. Drainage	1	L.S.	$ 300,000.00	$ 300,000
6. Bridge Structure	9600	S.F.	$ 136.00	$ 1,305,600
7. Misc. #	1	L.S.	$ 690,000.00	$ 690,000
Subtotal				$ 6,623,343
Traffic Control (15%)				$ 993,501
Subtotal				$ 7,616,844
Mobilization (18%)				$ 1,371,032
Subtotal				$ 8,987,876
Contingency (15%)				$ 1,348,181
Subtotal				$ 10,336,058
Construction Engineering (15%)				$ 1,550,409
Design Engineering (20%)				$ 2,067,212
Right-of-Way (150 acres @ $5,000/acre)				$ 750,000
Total Estimated Cost				$ 14,703,678

- includes survey, signing, striping, fencing, revegetation, seal & cover

* - bridge structure cost from Industry Standard Estimates
- other unit costs from MDT Average Bid Prices - 2007

** - assumes simple diamond interchange with single lane ramps & side road overpass

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Frontage Road/Connecting Roadway System on both sides of Roadway over Entire Corridor except Old US 93

Item	Quantity	Units		Cost/Unit #	Cost
1. Unclassified Excavation	904800	C.Y.	$	3.52	3,184,896
2. Pl. Mix Bit Surf.-Gr. S	163947	TON	$	26.28	4,308,518
3. Asphalt Cement - PG 58-28	9821	TON	$	337.87	3,318,334
4. Cr. Agg. Crse	604901	C.Y.	$	17.32	10,476,891
5. Topsoil S&P	193333	C.Y.	$	3.51	678,600
6. Cover	2320000	S.Y.	$	0.55	1,276,000
7. Seed/Fert.	464	Acres	$	400.00	185,600
8. Signing/Striping	1	L.S.	$	483,333.33	483,333
9. Culverts/Drainage	1	L.S.	$	2,465,000.00	2,465,000
10. Fencing & Misc.**	1	L.S.	$	1,643,333.33	1,643,333
Subtotal					28,020,506
Traffic Control (15%)					4,203,076
Subtotal					32,223,582
Mobilization (10%)					3,222,358
Subtotal					35,445,940
Contingency (15%)					5,316,891
Subtotal					40,762,831
Construction Engineering (10%)					4,076,283
Design Engineering (20%)					815,257
Right-of-Way (450 acres @ 5000/acre)					2,250,000
Total Estimated Cost					47,904,371

Unit costs based on MDT English Average Bid Prices - 2007, 2006, 2005
* Costs do not include lighting
** Misc. items include survey, erosion control, mail boxes, cattle guards, etc.

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Intersection Improvements - Right Turn Lane*

Item	Quantity	Units	Cost/Unit #	Cost
1. Topsoil Stockpile & Place	450	C.Y.	$ 3.51	$ 1,580
2. Embankment in Place	4700	C.Y.	$ 7.41	$ 34,827
3. Cr. Agg. Crse	2300	C.Y.	$ 17.32	$ 39,836
4. Pl. Mix Bit Surf. - Gr. D	1550	Ton	$ 67.71	$ 104,951
5. Revegetation	5	Acre	$ 400.00	$ 2,000
6. Asphalt Cement	93	Ton	$ 432.09	$ 40,184
7. Signage/Striping	1	L.S.	$ 5,800.00	$ 5,800
8. Drainage	1	L.S.	$ 7,000.00	$ 7,000
Subtotal				$ 236,177
Traffic Control (15%)				$ 35,427
Subtotal				$ 271,604
Mobilization (10%)				$ 27,160
Subtotal				$ 298,764
Contingency (15%)				$ 44,815
Subtotal				$ 343,579
Construction Engineering (10%)				$ 34,358
Design Engineering (20%)				$ 68,716
Right-of-Way				$ -
Total Estimated Cost/Unit				$ 446,653 per turn lane

Unit costs based on MDT English Average Bid Prices - 2007

* Costs do not include lighting

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Pedestrian Signal Actuation

Item	Quantity	Units	Cost/Unit #		Cost	
1. Pedestrian Push Button	1	Each	$	400.00	$	400
2. LED Pedestrian Signal Head	1	Each	$	1,000.00	$	1,000
Subtotal					$	1,400
Traffic Control (15%)					$	210
Subtotal					$	1,610
Mobilization (15%)					$	242
Subtotal					$	1,852
Contingency (10%)					$	185
Subtotal					$	2,037
Construction Engineering (10%)					$	204
Design Engineering (8%)					$	163
Right-of-Way					$	-
Total Estimated Cost/Unit					$	2,403 per crossing*

Unit costs based on MDT English Average Bid Prices - 2006/2007
*Estimate does not include cost for amount of wire at each intersection.

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Improved Ped. Crossings at Bus Stops & Park & Ride Locations

Item	Quantity	Units	Cost/Unit *	Cost
1. Bridge Deck - Pedestrian	7200	FT^2	$ 100.00	$ 720,000
2. Abutments	2	Ea.	$ 18,000.00	$ 36,000
3. ADA Approach Path #	1	L.S.	$ 40,000.00	$ 40,000
4. Landscaping	1	L.S.	$ 4,000.00	$ 4,000
5. Signing/Lighting	1	L.S.	$ 20,000.00	$ 20,000
6. Bridge Railing/Fence	200	L.F.	$ 85.00	$ 17,000
Subtotal				$ 837,000
Mobilization (15%)				$ 126,000
Subtotal				$ 963,000
Contingency (25%)				$ 241,000
Subtotal				$ 1,204,000
Construction Engineering (15%)				$ 181,000
Design Engineering (10%)				$ 120,000
Right-of-Way				$ -
Total Estimated Cost				$ 1,505,000

includes embankment, CBC, Pl.Mix Path

* cost data from website www.bicyclinginfo.org/bikecost sponsored by NCHRP and others

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Animal Crossing Treatments - 4'x8' RCB, 3 each

Item	Quantity	Units	Cost/Unit #		Cost	
1. 4'x8' RCB	258	L.F.	$	700.00	$	180,600
Subtotal					$	180,600
Traffic Control (10%)					$	18,060
Subtotal					$	198,660
Mobilization (15%)					$	29,799
Subtotal					$	228,459
Contingency (10%)					$	22,846
Subtotal					$	251,305
Construction Engineering (10%)					$	25,130
Design Engineering (8%)					$	20,104
Right-of-Way					$	-
Total Estimated Cost					$	296,540

Unit costs based on MDT English Average Bid Prices - 2006

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Animal Crossing Treatments - 12'x22' RCB, 3 each

Item	Quantity	Units	Cost/Unit #	Cost
1. 12'x22' RCB	252	L.F.	$ 1,700.00	$ 428,400
Subtotal				$ 428,400
Traffic Control (10%)				$ 42,840
Subtotal				$ 471,240
Mobilization (15%)				$ 70,686
Subtotal				$ 541,926
Contingency (10%)				$ 54,193
Subtotal				$ 596,119
Construction Engineering (10%)				$ 59,612
Design Engineering (8%)				$ 47,689
Right-of-Way				$ -
Total Estimated Cost				$ 703,420

Unit costs based on MDT English Average Bid Prices - 2006/2007

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Transportation Communication System

Item	Quantity	Units	Cost/Unit #	Cost
1. Message Sign	1	E.A.	$ 98,000.00	$ 98,000
2. Structure	1	E.A.	$ 98,000.00	$ 98,000
Subtotal				$ 196,000
Traffic Control (10%)				$ 19,600
Subtotal				$ 215,600
Mobilization (15%)				$ 32,340
Subtotal				$ 247,940
Contingency (10%)				$ 24,794
Subtotal				$ 272,734
Construction Engineering (10%)				$ 27,273
Design Engineering (8%)				$ 21,819
Right-of-Way				$ -
Total Estimated Cost/Unit				$ 321,826 per sign

Unit costs based discussions with Dektronics Variable Message Signs (206)-898-5381

U.S. 93 CORRIDOR STUDY
Planning Level Alternatives Costing

Improvement Option: Improved Pullout Locations - 2 Each

Item	Quantity	Units	Cost/Unit #	Cost
1. Embankment in Place	8000	C.Y.	$ 7.41	$ 59,280
2. Cr. Agg. Course	3150	C.Y.	$ 17.32	$ 54,558
3. Pl. Mix Bit. Surf. - Gr. D	248	Ton	$ 75.00	$ 18,600
4. Asphalt Cement	15.2	Ton	$ 430.00	$ 6,536
5. Drainage	1	L.S.	$ 16,000.00	$ 16,000
6. Signing/Markings	1	L.S.	$ 6,000.00	$ 6,000
7. Fencing	1	L.S.	$ 4,000.00	$ 4,000
Subtotal				$ 164,974
Traffic Control (15%)				$ 24,746
Subtotal				$ 189,720
Mobilization (15%)				$ 28,458
Subtotal				$ 218,178
Contingency (15%)				$ 32,727
Subtotal				$ 250,905
Construction Engineering (10%)				$ 25,090
Design Engineering (10%)				$ 25,090
Right-of-Way				$ -
Total Estimated Cost				$ 301,086

Unit costs based on MDT English Average Bid Prices - 2007

US 93 Corridor Study
Cost Summary

	Enhanced Vanpool / Carpool Programs		Improved Park & Ride Locations	Separated Bicycle / Pedestrian Path		Fixed Route Bus Service		Intersection Improvements: Additional Right Turn Lane	Improved Pedestrian Crossings		Improved Animal Crossings		Transportation Communication System	Improved Pullout Locations
2007 Estimated Const. Cost	**$ 5,000**	**$ 40,000**	**$ 150,000**	**$ 1,400,000**	**$ 2,200,000**	**$ 400,000**	**$ 8,000,000**	**$ 450,000**	**$ 2,500**	**$ 1,505,000**	**$ 300,000**	**$ 2,000,000**	**$ 350,000**	**$ 300,000**
Indirect Costs (@12%)	$ 600	$ 4,800	$ 18,000	$ 168,000	$ 264,000	$ 48,000	$ 960,000	$ 54,000	$ 300	$ 180,600	$ 36,000	$ 240,000	$ 42,000	$ 36,000
Year 2007 Estimate	**$ 5,600**	**$ 44,800**	**$ 168,000**	**$ 1,568,000**	**$ 2,464,000**	**$ 448,000**	**$ 8,960,000**	**$ 504,000**	**$ 2,800**	**$ 1,685,600**	**$ 336,000**	**$ 2,240,000**	**$ 392,000**	**$ 336,000**
Inflation at 3% Annually to Year 2012	$ 5,796	$ 46,371	$ 173,891	$ 1,622,984	$ 2,550,403	$ 463,710	$ 9,274,193	$ 521,673	$ 2,898	$ 1,744,707	$ 347,782	$ 2,318,548	$ 405,746	$ 347,782
Indirect Costs (@12%)	$ 696	$ 5,565	$ 20,867	$ 194,758	$ 306,048	$ 55,645	$ 1,112,903	$ 62,601	$ 348	$ 209,365	$ 41,734	$ 278,226	$ 48,690	$ 41,734
Year 2012 Estimate	**$ 6,492**	**$ 51,936**	**$ 194,758**	**$ 1,817,742**	**$ 2,856,451**	**$ 519,355**	**$ 10,387,096**	**$ 584,274**	**$ 3,246**	**$ 1,954,072**	**$ 389,516**	**$ 2,596,774**	**$ 454,436**	**$ 389,516**
Inflation at 3% Annually to Year 2018	$ 6,921	$ 55,369	$ 207,635	$ 1,937,927	$ 3,045,315	$ 553,694	$ 11,073,871	$ 622,905	$ 3,461	$ 2,083,272	$ 415,270	$ 2,768,468	$ 484,482	$ 415,270
Indirect Costs (@12%)	$ 831	$ 6,644	$ 24,916	$ 232,551	$ 365,438	$ 66,443	$ 1,328,865	$ 74,749	$ 415	$ 249,993	$ 49,832	$ 332,216	$ 58,138	$ 49,832
Year 2018 Estimate	**$ 7,752**	**$ 62,013**	**$ 232,551**	**$ 2,170,478**	**$ 3,410,753**	**$ 620,137**	**$ 12,402,736**	**$ 697,654**	**$ 3,876**	**$ 2,333,265**	**$ 465,102**	**$ 3,100,684**	**$ 542,620**	**$ 465,102**
Inflation at 3% Annually to Year 2024	$ 8,264	$ 66,114	$ 247,927	$ 2,313,987	$ 3,636,265	$ 661,139	$ 13,222,781	$ 743,781	$ 4,132	$ 2,487,536	$ 495,854	$ 3,305,695	$ 578,497	$ 495,854
Indirect Costs (@12%)	$ 992	$ 7,934	$ 29,751	$ 277,678	$ 436,352	$ 79,337	$ 1,586,734	$ 89,254	$ 496	$ 298,504	$ 59,503	$ 396,683	$ 69,420	$ 59,503
Year 2024 Estimate	**$ 9,256**	**$ 74,048**	**$ 277,678**	**$ 2,591,665**	**$ 4,072,617**	**$ 740,476**	**$ 14,809,515**	**$ 833,035**	**$ 4,628**	**$ 2,786,040**	**$ 555,357**	**$ 3,702,378**	**$ 647,917**	**$ 555,357**
Inflation at 3% Annually to Year 2030	$ 9,868	$ 78,943	$ 296,038	$ 2,763,021	$ 4,341,890	$ 789,435	$ 15,788,692	$ 888,114	$ 4,934	$ 2,970,248	$ 592,076	$ 3,947,173	$ 690,755	$ 592,076
Indirect Costs (@12%)	$ 1,184	$ 9,473	$ 35,525	$ 331,563	$ 521,027	$ 94,732	$ 1,894,643	$ 106,574	$ 592	$ 356,430	$ 71,049	$ 473,661	$ 82,891	$ 71,049
Year 2030 Estimate	**$ 11,052**	**$ 88,416**	**$ 331,563**	**$ 3,094,584**	**$ 4,862,917**	**$ 884,167**	**$ 17,683,335**	**$ 994,688**	**$ 5,526**	**$ 3,326,678**	**$ 663,125**	**$ 4,420,834**	**$ 773,646**	**$ 663,125**