

Final Report

Project No. C SWOO-242

May 18, 2005



Table of Contents	Page
Addendum	i
Introduction and Approach	2
Introduction.....	2
Study Purpose.....	2
Study Background	2
Historical Perspective	2
Study Focus	3
Study Approach.....	4
Project Costs.....	4
Public Involvement	4
Section 1 - Project Scope and Costs	8
Introduction.....	8
Background.....	8
Previous Studies	8
Ongoing Studies	9
Data Collection	10
The Project Options and Limitations.....	12
Evaluation of Railroad Costs.....	13
Estimated Project Costs.....	14
Section 2 - Project Benefits	15
Introduction.....	15
Possible Benefits from Implementing the Project	15
The Two Project Scenarios	15
The Benefits	15
Summary.....	32
Section 3 - Funding and Financing Considerations	34
Introduction.....	34
Funding the Project	34
Financial Challenges.....	35
Funding Constraints.....	36
Project Delivery Innovations	38
Ownership of the Infrastructure	42
Paying for the Project.....	42
Debt Financing.....	46
Conclusions.....	46
Section 4 - Findings and Recommendations	48
Data Collection and Evaluation of the Railroad Project	48
Evaluation of Public Benefits.....	49
Additional Railroad Project Impacts	51
Public Benefits of Potential Future Passenger Rail	51
Funding and Financing Strategies	52
The Next Steps	53
Appendix A - Glossary of Terms and Acronym List	55
Glossary.....	55
Acronyms	63
Appendix B - Additional Railroad Project Impacts	66
Introduction.....	66



public **Benefits & Costs** study

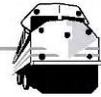
of the Proposed BNSF/UP Front Range Railroad Infrastructure Rationalization Project



Highlights of the Other Opportunities/Issues..... 66
Appendix C - Survey and Public Involvement Results 68
Introduction..... 68
Survey Results 68
Public Survey 69
Benefits 69
Concerns..... 70
Community-Specific Issues 71
Stakeholder List 71

All information and assessments contained herein are the sole responsibility of the Consultant. Although many other parties contributed substantially to the report, they shall not be held accountable for its accuracy.





ADDENDUM

The proposal submitted by the two railroads contained a wide variety of components that were proposed to be carried out as part of this relocation project. One of these components was a bypass at Utah Junction. This bypass grade separates UP and BN tracks and adds trackage that allows UP train movements to flow east/west through the junction without having to complete a time consuming maneuver within the UPRR's North Yard.

The UP has subsequently implemented these Utah Junction improvements with its own funding. Implementation of the Utah Junction improvements is recognized as a private investment toward this project that will be accounted for as appropriate as part of future negotiations as it relates to implementation of additional improvements defined in the Study. With the implementation of the Utah Junction improvements by the UPRR earlier than anticipated, the private/public benefits accrue to the project earlier without materially affecting the cost/benefit analysis of the overall project.

The data contained in this Study includes data related to the Utah Junction improvements and does not assume that the Utah Junction improvements have been completed.





Introduction and Approach

Introduction

This Final Report summarizes the key findings and recommendations of the *Public Benefits & Costs Study* (the Study) of the *Proposed Burlington Northern Santa Fe (BNSF)/Union Pacific (UP) Front Range Railroad Infrastructure Rationalization Project*, hereafter called "the Project." It summarizes the information contained in nine Technical Memoranda.

Study Purpose

To evaluate and validate the Project, a *Public Benefits & Costs Study* (the Study) was completed by DMJM+HARRIS and HDR (the Consultant team), in conjunction with CDOT. The purpose of this Study is to identify, and in some cases quantify, the potential public and private benefits and costs of relocating through-freight train infrastructure (bypass), and detail the advantages and disadvantages of a public-private partnership project between CDOT, other public entities, and the BNSF and UP railroads.

The ultimate goal of the Study, as detailed in this Report, is to determine whether there are sufficient benefits to the general public to warrant consideration of the investment of public dollars in the Project.

Study Background

The BNSF Railway Company and the UP Railroad Company, in conjunction with the Colorado Department of Transportation (CDOT), have discussed the possibility of relocating freight rail infrastructure, and the possibility of moving through-freight train service east, away from the Front Range urban corridor.

These relocation concepts are not new. Coal train traffic from Wyoming to Texas increasingly impacts the quality of life in Colorado Front Range communities from Fort Collins to Denver to Colorado Springs to Trinidad. Relocations were first considered by CDOT in 1979 during the *Colorado State Rail Plan—Rail Bypass Feasibility Study*. This earlier study evaluated the feasibility of rerouting freight railroad through-train routes farther east along the Colorado Front Range.

At the time of the 1979 study, seven Class One railroad companies were operating in Colorado. Mergers have reduced this number to only two: the BNSF and the UP. Fewer railroad companies mean fewer issues to be resolved when considering revisions to and relocations of the state's rail infrastructure.

Historical Perspective

Colorado's railroads were originally built in the late 1800s when cities and towns grew up around the railroads. Since railroads at that time were essential for the movement of people and goods, they needed to be close to where the people lived and worked. During the 1950s, and continuing to this day, improvements to existing highways and the creation of the Interstate Highway System changed the way people traveled in Colorado and across the U.S. Railroads in Colorado are now primarily freight haulers, not people movers. It is now realistic to consider the potential benefits and costs/cost savings to the public and the railroads if railroad through-freight infrastructure is moved. A number of beneficial outcomes would result from an eastward relocation, as well as other infrastructure improvements, including improved future-freight movement, and the maintenance of a competitive balance between the BNSF and UP railroads.





Study Focus

The BNSF and UP railroads have proposed a series of rail infrastructure improvements called the *BNSF/UP Front Range Railroad Infrastructure Rationalization Project* (the Project). The “Study team” completed a Study that evaluated the feasibility of implementing the Build Option of the proposed Project. This Study is broad in terms of detail, and preliminary in nature. The Study assumes that future phases of more detailed study will be needed to more completely examine participation in this Project.

Through-Freight Options

This Study focuses on two options for through-freight rail: Build and No-Build. Each cost and benefit identified in the Build Option is evaluated in terms of three Scenarios: Low cost-benefit, Mid-range cost-benefit, and High cost-benefit, and the No-Build Option evaluates keeping the existing freight rail system (year 2004). The consequences and costs associated with each option are explained in greater detail in Section 1—Project Scope and Costs, Section 2—Project Benefits, and Section 3—Funding and Financing. Section 4—Recommendations and Findings summarizes the study data and results. More detailed information is available in the nine Technical Memoranda and associated Appendices prepared for the Study.

The No-Build Option scenario includes an analysis of current and projected freight rail traffic through the Front Range corridor if the current rail lines and other infrastructure are kept intact with maintenance and some necessary improvements through the year 2030. Other issues studied for this option include:

- Ongoing operations and maintenance (O&M) costs for the current rail configurations,
- Environmental and neighborhood impacts,
- Noise and safety, and
- Other relevant issues and data that are detailed in Technical Memoranda 4, 5, 6, 8 and sections 1, 2, and 3 of this Report.

The Build Option scenario includes an analysis of the feasibility of and costs associated with the following:

- Constructing 95 miles of new track east of the Urban Front Range Corridor,
- Moving certain types of freight east of the urban Front Range corridor,
- Improving Utah Junction and rebuilding the Rock Island Line,
- Consolidating certain freight lines,
- Improving a number of grade crossings throughout the state,
- Environmental issues, funding, noise, and safety issues, and
- Other relevant issues and data that are detailed in Technical Memoranda 4, 5, 6, 8 and Sections 1, 2, and 3 of this Report.

This Study does not include in-depth information about:

- Environmental mitigation,
- Infrastructure costs,
- Appraisals related to possible right-of-way (ROW) acquisitions,
- Transit feasibility, or



- Final considerations required by future refinements in infrastructure location and alignment.

It is expected that additional levels of detail may be needed in the future based on the results and recommendations in this Study. In addition, detailed analysis of the economic impacts of proposed rail and grade crossing improvements and relocated facilities may be needed.

Study Approach

A planning horizon encompassing the years 2004 through 2030 (and in some cases beyond) was chosen for the Study’s timeframe. The Study team considered and compared two options during this timeframe, in addition to assessing the existing rail lines (2004 baseline) for the Study. These are a No-Build Option and a Build Option.

No-Build-Option. Even if the proposed freight railroad bypass system is not built, there will be ongoing and capital improvement costs associated with keeping the baseline (2004) system operating through the year 2030. Highlights of the No-Build Option are contrasted with the Build Option in Table I-1.

Build Option. This option is largely defined by capital and operating improvements, as well as a bypass system. Details are available in Appendix A of Technical Memorandum 2 (Study Approach Statement) and in Sections 1 through 4 of this Report. Highlights of the No-Build Option are contrasted with the Build Option in Table I-1.

Table I-1 Build versus No-Build Option Highlights

No-Build Option	Build Option
No new track construction , O&M and improvements to existing track	New track construction and improvements in addition to O&M
Freight terminals remain “as is”, with O&M	Two relocated freight terminals
Improvements to road/grade crossings	Improvements to road/grade crossings
Freight continues to pass directly through major Front Range cities	Most through freight bypasses major Front Range cities

Keeping the existing system unchanged was also considered. However, it is not economically feasible or realistic to leave the current infrastructure unchanged from 2004 through 2030 and beyond. A “do nothing” option is, therefore, not discussed in this report.

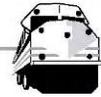
Project Costs

The cost data, estimates, and projections used in this report were provided primarily by the BNSF and UP railroads. Cost data include both capital and O&M figures for the Build and No-Build options. Where no cost data are available, the Study team prepared concept-level estimates.

Public Involvement

To maximize public involvement and input, the Study team and CDOT developed a Public Involvement Plan. Attracting and keeping members of the public involved in this Study was a key objective for a number of reasons:





- To help distribute information about the Study across and outside Colorado,
- To engage key public and private sector stakeholders to work with the Technical Advisory Committee (TAC) on issues leading to recommendations to CDOT,
- To solicit input from public and private groups and individuals,
- To determine public perceptions of livability associated with increased or decreased freight rail traffic,
- To determine the desirability of reduced conflicts with freight traffic and freight mobility,
- To determine the potential to attract new businesses, particularly on the Eastern Plains, and
- To determine other factors and variables that could relate to relocated rail freight traffic.

Public involvement ensured that the following challenges were addressed:

- Although any relocated freight rail infrastructure only directly affects people along the lines, it would ultimately affect people across the state in the form of public financial participation. In addition, some of the effects will be felt beyond the state's borders. To collect initial information a number of potentially affected groups and representatives of affected constituencies were surveyed. The survey form and results are contained in Appendix C.
- The timeframe, through the year 2030 and beyond, is too long to hold the interest of most affected citizens. To bridge this gap, interviews with policy and interest-based organizations involved in discussing and shaping long-term planning issues were solicited. Some of these include: state and local elected officials; chambers of commerce; the regional groups Action 22 and Progressive 15; and statewide organizations such as Colorado Counties, Inc., the Colorado Municipal League, and the Colorado Association of Commerce and Industry (CACI).
- The outreach strategy included telephone interviews with large numbers of identified stakeholders and interested parties representing different constituencies. A list of stakeholders contacted for this Study is contained in Appendix C. No public meetings were held.

The stated outcome of the Study is the determination of whether the Project concept can provide sufficient public and business benefits to continue its pursuit. An essential goal of the Public Involvement Program was to ensure sufficient participation and data for this purpose. To involve the public (citizens, businesses, interest groups, and other constituent groups) to the maximum extent possible, the following public involvement activities were undertaken:

Project Website

The Study team developed and is maintaining a website within the CDOT website. This website provides easily accessible information to a broad segment of the interested public. It also provides a cost-effective way for the public to send comments, concerns, or questions to the Project and Study teams.

The Project website address is: <http://www.dot.state.co.us/railroadstudy>.

The website is updated monthly, and all updates are approved by CDOT. Some of the information on the website includes Project schedules, Study goals, current Project/Study status, interim reports, Email links to project managers, contact lists for lead personnel at CDOT and the Study team, a frequently asked questions (FAQ) page, maps related to the Study area, and this final report.



The Technical Advisory Committee (TAC)

The TAC provided a forum for reviewing technical aspects of the Study work and made recommendations to CDOT and the Transportation Commission about review and approval of Study deliverables. The TAC members are listed in Table I-2. Others invited to TAC meetings are listed in Table I-3.

Table I-2 TAC Members

Member Name	Organization	City/State
Ed Gallagher	BNSF RR	Denver, CO
Dennis Royer	City of Denver	Denver, CO
Tamra McDowell	Colorado Dept. of Local Affairs	Denver, CO
Pam Hutton	CDOT Region 1	Denver, CO
Ron Dickey	CDOT Region 6	Denver, CO
Charles Stelmokas	Coors Brewing Company	Golden, CO
Jeff May	Denver Regional Council of Governments	Denver, CO
Steve Fender	Federal Railroad Administration	Lakewood, CO
Chris Dodge	OmniTRAX	Denver, CO
Rob MacDonald	Pikes Peak Area Council of Governments	Colorado Springs, CO
Jack Baier/ Ray Jantzen	Public Utilities Commission	Denver, CO
Bill Moore	Pueblo Area CO	Pueblo, CO
Betsy Monseu	RAG Energy Sales	Englewood, CO
Henry Stoppelcamp	Regional Transportation District	Denver, CO
Darrell Luther	TEALINC	Forsyth, MT
Bob Watts	Castle Rock Public Works	Castle Rock, CO
Joe Kiely	Town of Limon	Limon, CO
Bob Loew	TransPort	Greeley, CO
Earl Barton	UP RR Business Development	Omaha, NE
Wayne Fish	United Parcel Service	Denver, CO

Table I-3 Other TAC Meeting Attendees

Member Name	Organization	City/State
Randy Grauberger	CDOT	Parker, CO
Jay Chapa	BNSF RR	Denver, CO
Cathy Norris	BNSF RR	Denver, CO
Tom Norton	CDOT	Denver, CO
George Gerstle	CDOT	Denver, CO
Jennifer Finch	CDOT	Denver, CO
Tammy Goorman	CDOT	Denver, CO
Dick Hartman	UP RR	Cheyenne, WY
Mike Paras	UP RR	Omaha, NE



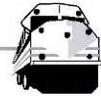


Table I-4 The Study Team

Member Name	Project Role	Organization
Tom Mauser	Overall Project Manager	CDOT
Ron Thorstad	Project Manager	DMJM + Harris
Jane Donovan	Deputy Project Manager	HDR
George Oamek	Economist	HDR
Dan Dornan	Financial Analyst	AECOM
Bill Burgel	Railroad Operations	HDR
John Morton	Competition Assessment	HDR
Steve Coffin	Political and Media Relations	GBSM
Terri Morrell	Environmental Analyst	DMJM + Harris

Other team members included: Marjorie Alexander of Two Hundred (Website Designer); Dan Pring of MERCO, Inc. (Noise and Vibration Analysis); Louise Smart of CDR, Inc. (Public Involvement); and Khalib Bekka of HLB Decision Economics, Inc. (Transportation Cost-Benefit Analysis)



Section 1 - Project Scope and Costs

Introduction

During the past 25 years, a number of options for relocating and improving through-freight rail service in Colorado have been considered. Recently, CDOT and the two Colorado Class One railroads [Burlington Northern Santa Fe (BNSF) and Union Pacific (UP)] have discussed options for relocating freight rail infrastructure, as well as through-freight train service, to the east, and away from the Front Range urban corridor.

Preliminary efforts between CDOT and BNSF/UP are known as the *Colorado Railroad Partnership Project* or *Colorado's Safety and Mobility Partnership Project*. In their current form, the joint CDOT-BNSF/UP efforts are called the *Proposed BNSF/UP Front Range Railroad Infrastructure Rationalization Project* (the Project). The Project has collected and developed data to support three scenarios for through-freight rail services in Colorado through the year 2030¹. These are Existing Conditions (2004), the No-Build Option (2030), and the Build Option (2030).

As described in the Introduction, the Build Option is the proposed Project. To evaluate the costs and benefits of the Build and the No-Build options and solicit input from the interested public, constituent groups, stakeholders, CDOT, DMJM+HARRIS and HDR (the Study team) conducted a *Public Benefits & Costs Study* (the Study) to:

- Identify and quantify the potential public benefits and costs of relocating, removing, and/or improving grade crossings, freight rail lines, and other rail infrastructure (the Build Option);
- Explore the advantages and disadvantages of a possible public-private partnership project between CDOT, other public entities, and the BNSF and UP railroads; and
- Analyze traditional and innovative funding sources and financing methods that could be applied to realize the Project.

The results of this study will enable the CDOT to better assess the type and extent of private-public financial participation in a possible partnership. The ultimate goal of this Study is to investigate whether there are likely to be sufficient benefits accruing to the citizens of Colorado to warrant consideration of the investment of public dollars in the Project.

Background

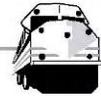
To accurately evaluate the Build and No-Build Options, the Study team conducted an extensive review of past and ongoing railroad-related studies around the country and existing documents and data. Documents reviewed by the Study team covered the areas of railroad operations, the environment, economic impact and property values, safety and security, other rail operations, passenger rail, archaeological and historic resources, special status plant and animal resources, major creeks and rivers, wetlands, other surface water resources, and hazardous and contaminated materials. The complete list of documents reviewed by the Study team can be found in Technical Memorandum 4.

Previous Studies

Many studies have been, and continue to be, done to define the costs, benefits, and impacts of relocating freight and/or passenger rail lines. Some relevant past studies are described below.

- *Dakota, Minnesota, and Eastern (DM&E) Railroad Corporation Powder River Basin Project Draft Environmental Impact Statement (EIS)* (2000). This study determined the environmental impacts associated with the construction of 300 miles of new rail line and the rehabilitation of another





600 miles. Potential impacts examined included air quality, noise, energy use, transportation impacts, environmental justice, and grade crossing safety.

- *Colorado State Rail Plan—Rail Bypass Feasibility Study.* This study, conducted in 1979, is a predecessor of this Study. It considered four alternatives:
 - Maintain the existing coal train routing but add or improve 40 grade separations in southern Colorado;
 - Bypass coal train traffic between Denver and Colorado Springs using new and existing tracks near Watkins, Elizabeth, and Elbert;
 - Construct a new alignment between Brush and Limon and use existing tracks from Limon to Colorado Springs; and
 - Provide all-new tracks between Brush and Las Animas.
- *East Corridor Major Investment Study Final Report.* This Major Investment Study (MIS) was prepared in 1997. It focused primarily on commuter and light rail transit improvements, such as extending a single-track commuter rail from Union Station to Denver International Airport (DIA).
- *Regional Transportation District (RTD) FasTracks Executive Summary.* This is a 12-year plan to provide high quality transit services and facilities in the Denver metro area.
- *Metro Vision 2020 Plan.* This is the Denver regional plan addressing future metro area growth. It integrates the core elements of development patterns, transportation systems, and water quality.
- *Metro Vision 2025 Interim Regional Transportation Plan (2002)—The Fiscally Constrained Element.* This plan presents regional transportation facilities that can be provided through 2025 based on reasonably expected revenues.
- *North Metro Transportation Study (2001).* This study covers the North I-25/Northeast Corridor, and considers the relationship of passenger rail service north of Denver and the relationship to existing freight railroad traffic.

Ongoing Studies

Three major ongoing studies provide valuable information about relocating and improving freight and other rail systems. A brief summary of each study follows.

Bridging the Valley Transportation Study

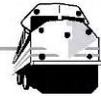
This ongoing study is being conducted for the Spokane Regional Transportation Council in Spokane, WA. The study covers the strategic Spokane to Sandpoint, ID rail corridor.

The study addresses a number of issues and impacts. Traffic congestion, traffic delays, safety, noise, air quality, emergency vehicle delays, at-grade crossing safety, train horn noise, and safety versus horn noise impact on the local community. Rail shippers are impacted by the relocation of lines, retention of branch lines, and/or discontinuance of rail service. Finally, rail carriers are afraid of increased operations and maintenance costs (O&M) and are reluctant to acknowledge benefits of new rail lines. They are very concerned about loss of operating capacity, and fear a loss of autonomy and control.

Many of the impacts and issues that were brought out in this study are directly applicable to the Proposed BNSF/UP Front Range Railroad Infrastructure Rationalization Project.

Chicago Regional Environmental and Transportation Efficiency (CREATE) Project





CREATE is a public-private partnership, much like the Proposed BNSF/UP Front Range Railroad Infrastructure Rationalization Project. Since Chicago is an important national hub for rail service, the quality of passenger and freight rail service across the country is affected by what is done there. Some of the planned or proposed improvements to help meet their goals include the following:

- Maximize the use of five rail corridors for a faster and more efficient rail network that will improve passenger rail service, and provide economic, environmental and energy benefits.
- Eliminate the wait for motorists at 25 at-grade crossings and ease traffic congestion by creating grade separations.
- Create six rail-to-rail “flyovers”—overpasses and underpasses that separate passenger trains from freight trains to increase safety.

The intent of the City of Chicago and its public-private partners is similar to that of the Proposed BNSF/UP Front Range Railroad Infrastructure Rationalization Project. The railroads (private) will pay for the benefits they receive through the project. City, state, and federal governments (public) will pay for the public benefits generated by the plan.

Alameda Corridor Study

This study was prepared for the Alameda (CA) Corridor Transportation Authority. Its purpose was to propose improvements for handling increasing volumes of cargo moving through San Pedro ports, which severely impacted several communities with noise, congestion, and safety issues. The recommended solution was a two-track mainline railway including grade separations. The main goals included:

- Improve Alameda Street port-related trucking.
- Consolidate mainline freight operations and “encourage the diversion of truck traffic to rail traffic.”
- Reduce traffic delays and improve operations and safety.

The partnerships and consensus building approach with affected communities is applicable to the proposed BNSF/UP Front Range Railroad Infrastructure Rationalization Project.

Data Collection

The Study focused on reviewing available data and collecting or projecting a wide variety of additional data on railroad movements. To perform a cost-benefit analysis it was necessary to gather all available data on existing railroad operations in Colorado. In addition, information about future operations was used to evaluate the Build Option and the No-Build Option.

The BNSF and UP provided master train counts, track data, and train data. This information was extrapolated to a Geographical Information System (GIS) database to show train volumes and other relevant data. Figures 1-1 and 1-2 illustrate the existing Train per Day (TPD) in 2004, estimated “No-Build” scenario TPD in 2030, and estimated “Build” scenario TPD in 2030.



Figure 1-1 Trains per Day - Denver

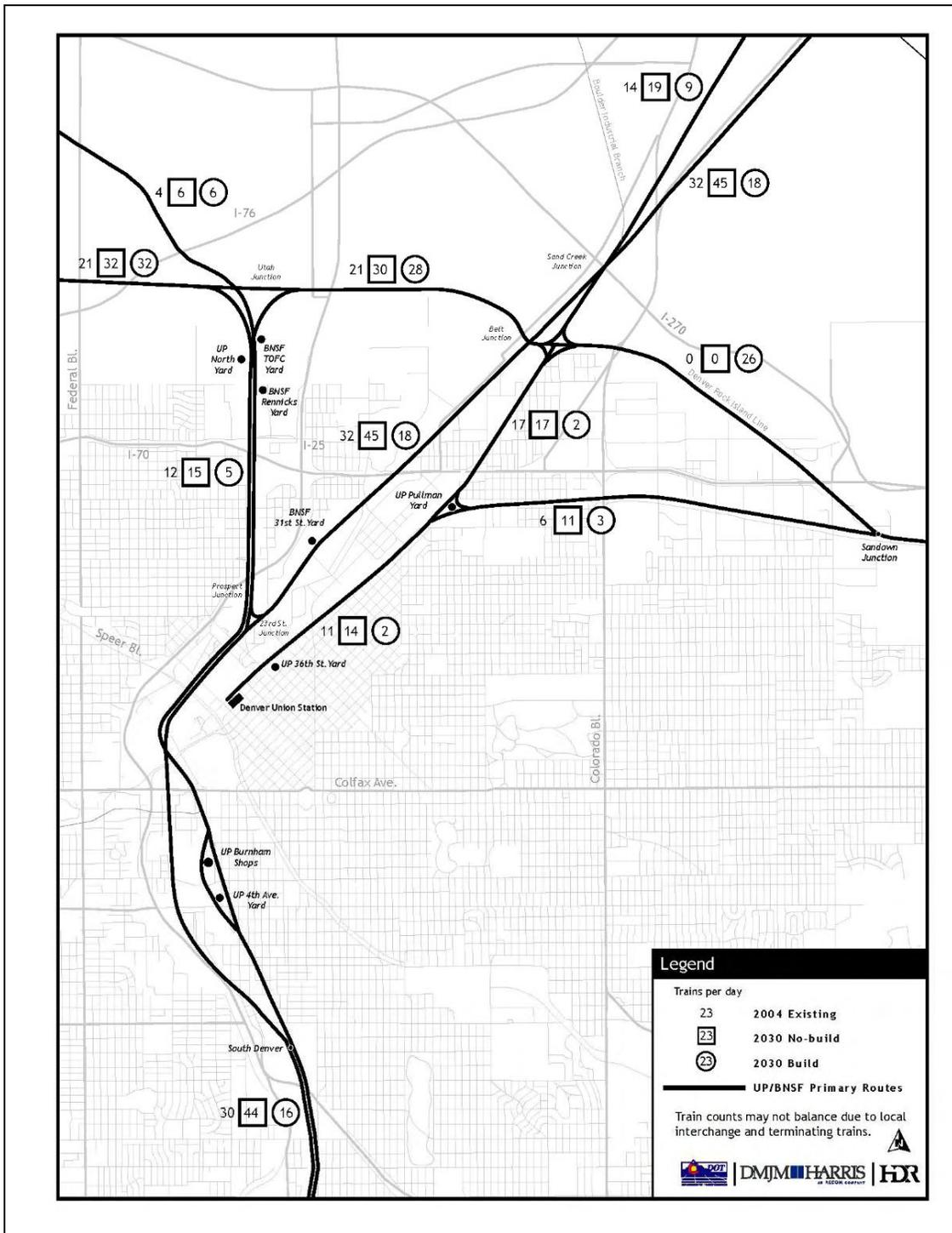
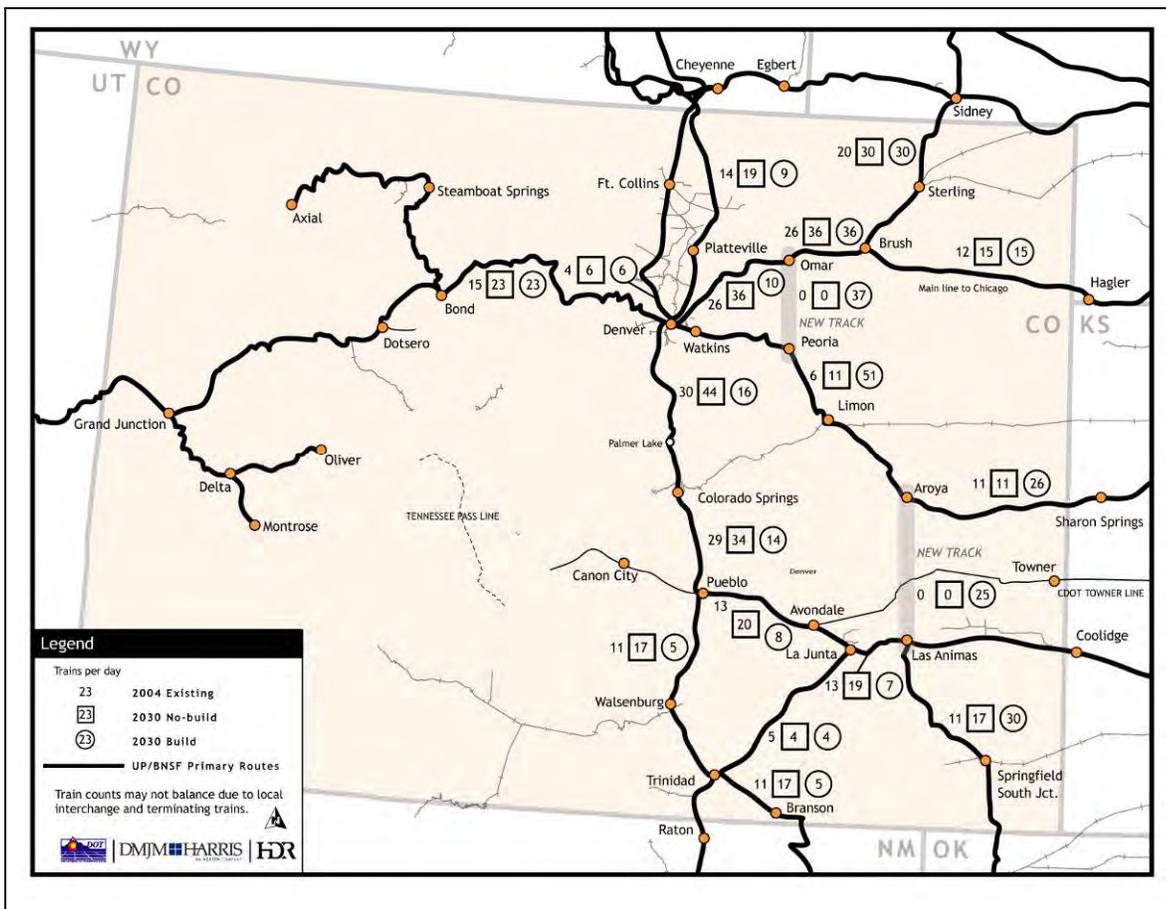




Figure 1-2 Trains per Day - Colorado



Since rail yard facilities and other infrastructure would be moved as part of a relocation of freight rail lines, additional data about the new rail yards were also mapped with the GIS data base.

The Study team collected data on the various types of grade crossings and related delay and safety issues presented by the freight rail system.

Rail yard relocations will affect many acres of land and change the use of some of that land. Therefore, current and potential land use along the existing and relocated rail lines was evaluated. Figures 4.2.1 through 4.2.18, found in Technical Memorandum 4, present detailed data collected and evaluated during this Study.

The Project Options and Limitations

The Study was limited in scope by several factors. First, the primary time horizon is through the year 2030. Second, the only Options actually evaluated were "Build" and "No-Build." Finally, the Project is a potential private-public partnership. As a result, fiscal constraints limit both the Build and No-Build Options (see the funding and financing information in Section 4 and in Technical Memoranda 5 and 8). Some additional considerations, such as passenger rail implementation, were also evaluated, but they were not the focus of the Study. Section 3, of this report, *Project Benefits*, provides details about projected Project benefits,



focusing on the Build Option. Additional information about the possible impacts of the Project is also contained in Appendix B, *Additional Railroad Project Impacts*. Detailed information is available in Technical Memoranda 5, 6, and 7.

The No-Build Option

The No-Build Option does not mean the current freight and passenger rail lines will be left as they are today. The two Class One railroads provided data to answer the question, *What would the freight railroad situation be like in the year 2030 if the proposed railroad Project were not built?* The railroads responded with train count projections, which are presented in Figures 4.3.1 through 4.3.6 in Technical Memorandum 4.

The Build Option

Capital and operating improvements, as well as a corresponding freight service plan, define the primary difference between the Build and No-Build Options. The train count projections incorporating existing, new, and rerouted track are shown in Figures 4.4.1 through 4.4.6 in Technical Memorandum 4.

Evaluation of Railroad Costs

The BNSF and UP railroads provided the Study team with a cost estimate to construct the proposed infrastructure, rail lines, grade crossings, and other improvements. As part of this Study, the Study team evaluated the cost estimates and adjusted them up or down, to account for the scope of the Project Build Option. Table 1-1 shows the Capital Cost Summary Comparison for the Build Option.

Table 1-1 Capital Cost Summary Comparison

Description	BNSF/UP Estimate	Study Team's Recommended Estimate
New Track (95 miles)	\$287,967,000	\$288,600,667
New UP Freight Terminal	\$208,024,000	\$208,024,000
New BNSF Freight Terminal	\$259,280,000	\$259,280,000
UP Limon Subdivision Track Improvements	\$144,223,000	\$150,568,000
Various Front Range Improvements		
Utah Junction	\$43,832,000	\$51,042,000
North Yard to Belt Junction	\$30,000,000	\$39,000,000
Utah Junction to Belt Junction	\$40,193,000	\$41,836,000
DRI Line	\$78,204,000	\$92,828,000
Sand Creek	\$15,546,360	\$15,882,000
Greeley Subdivision to DRI	\$7,983,000	\$8,036,000
Utah Junction to Prospect Junction	\$6,679,000	\$6,980,000
Omar to Union	\$5,293,000	\$5,293,000
Sidings, etc., South Denver to Palmer Lake	\$20,000,000	\$0 (removed as improvements are for commuter rail. Considered outside the scope of the Study.
Sidings, etc., Palmer Lake to Pueblo	\$79,526,000	\$0 (removed as improvements are for commuter rail. Considered outside the scope of the Study.
TOTAL	\$1,226,750,360	\$1,167,369,667



Estimated Project Costs

The Study considered three cost scenarios: Low, Mid-range, and High, and determined the Project costs for the Build Option. The Study team’s current cost estimate for the Project is \$1.2 billion in 2004 dollars, using the Mid-range Scenario. Table 1-2 summarizes the year-by-year Project cost estimates for the Low, Mid-range, and High Scenarios.

**Table 1-2 Project Capital Costs by Capital Cost Scenario and Year
(2004 dollars in millions)**

Year	Low Scenario	Mid-Range Scenario	High Scenario
2006	\$267	\$297	\$386
2007	\$267	\$297	\$386
2008	\$267	\$297	\$386
2009	\$267	\$297	\$386
Total	\$1,069	\$1,188	\$1,544

The Study assumes the Project will be developed over the four-year period from 2006 through 2009, with operations beginning in 2010. Details on Project funding and financing options are described in Section 4, Funding and Financing, as well as in Technical Memoranda 5 and 8.



Section 2 - Project Benefits

Introduction

This Study measures the potential benefits accruing to various public and private sector stakeholders (beneficiaries) including the railroads and public entities. It evaluates the benefits of the Build Option, contrasting these benefits with the No-Build Option where appropriate. In addition to the conventional benefits assessment approach, the Study also considers expanded, less tangible benefits that affect the quality of life.

The Study team used a variety of data, methods, and assumptions to estimate the economic costs and benefits associated with the development of the proposed Project. The benefits and costs have been estimated at a conceptual level to determine if further investigation of the proposed Project is warranted based on the potential benefits versus the potential costsⁱⁱ.

This Section summarizes the Build Option benefits in terms of the conventional direct benefits and in terms of Project-specific indirect benefits (expanded benefits allocated to actual beneficiaries of the Project).

Possible Benefits from Implementing the Project

Both direct and indirect benefits result from implementing either the Build Option or No-Build Option. The direct and indirect benefits and costs of the proposed Project were aggregated into six primary and two secondary benefit classifications. Primary Benefit Classifications are transportation benefits, economic development and land use benefits, safety and security benefits, environmental impact benefits, quality of life benefits, and passenger rail facilitation benefits. Secondary Benefit Classifications are statewide job creation or "expanded" benefits, and additional railroad project and freight carrier benefits.

Given the high level of uncertainty associated with many of these benefits, a range of potential benefits and costs were studied, and three benefit/cost Scenarios were developed. These are the Low Scenario, the Mid-range Scenario, and the High Scenario. These benefit/cost Scenarios were used in a probability analysis of the uncertainty associated with total Project benefits. The benefits assessment in Section 3 and the actual recommendations and findings in Section 4 of this report are based on the Mid-range Scenario.

The Two Project Scenarios

The benefit/cost analyses conducted by the Study team considered the Build and No-Build options as described in the Introduction and a Project benefit period lasting through the year 2030.

The Benefits

The analysis of potential benefits has been limited to the Build and No-Build Options as described in Section 1.

Many direct and indirect benefits result from improving and relocating portions of the BNSF/UP through-freight rail lines and related infrastructure east of the Front Range urban corridor. Each benefit is explained in some detail in the next sub-sections. Each benefit classification has various sub-categories; each of these sub-categories is examined with respect to its geographic location and when the potential benefits occur.

In most cases, the analysis of potential benefits focuses on the difference in the No-Build and Build Options. This difference, referred to in the Study's Technical Memoranda as the "delta," represents the Project's net impact for the resource being analyzed.

If benefits are supported by existing data or conceptual-level analyses, quantitative estimates of the net benefits have been developed for the highest-dollar benefit categories. Where this information does not



exist, more qualitative discussions are presented. As noted above, the Study considered three levels of benefits—low, mid-range, and highⁱⁱⁱ.

Several assumptions facilitate the benefits analyses^{iv}:

- Under the No-Build Option, the Project will not be developed. Current trends in maintenance and upgrades will continue into the future (2030 and beyond).
- Under the Build Option, the Project will be developed in its entirety. Construction will take place from 2006 through 2009, with completion in 2010.
- If the Build Option is developed, portions of the Project will be completed sooner than other portions.
- Environmental compliance requirements will impact the Build Option.
- Acquiring right-of-way (ROW) will impact the Build Option completion schedule.

Transportation Benefits

This classification or category of benefits includes the following benefits and costs:

- Increases in efficiency for the railroads moving goods through or around the Denver metro area, resulting in reduced operating costs.
- Potentially fewer at-grade crossings being upgraded to grade separated crossings along the entire Front Range.
- A reduction in maintenance costs associated with fewer at-grade railroad-road crossings.
- Reductions in crossing-related delays for vehicles.
- Fewer delays for emergency vehicles at railroad crossings.
- Various impacts to trucking operations.

Efficiency increases for the Railroads

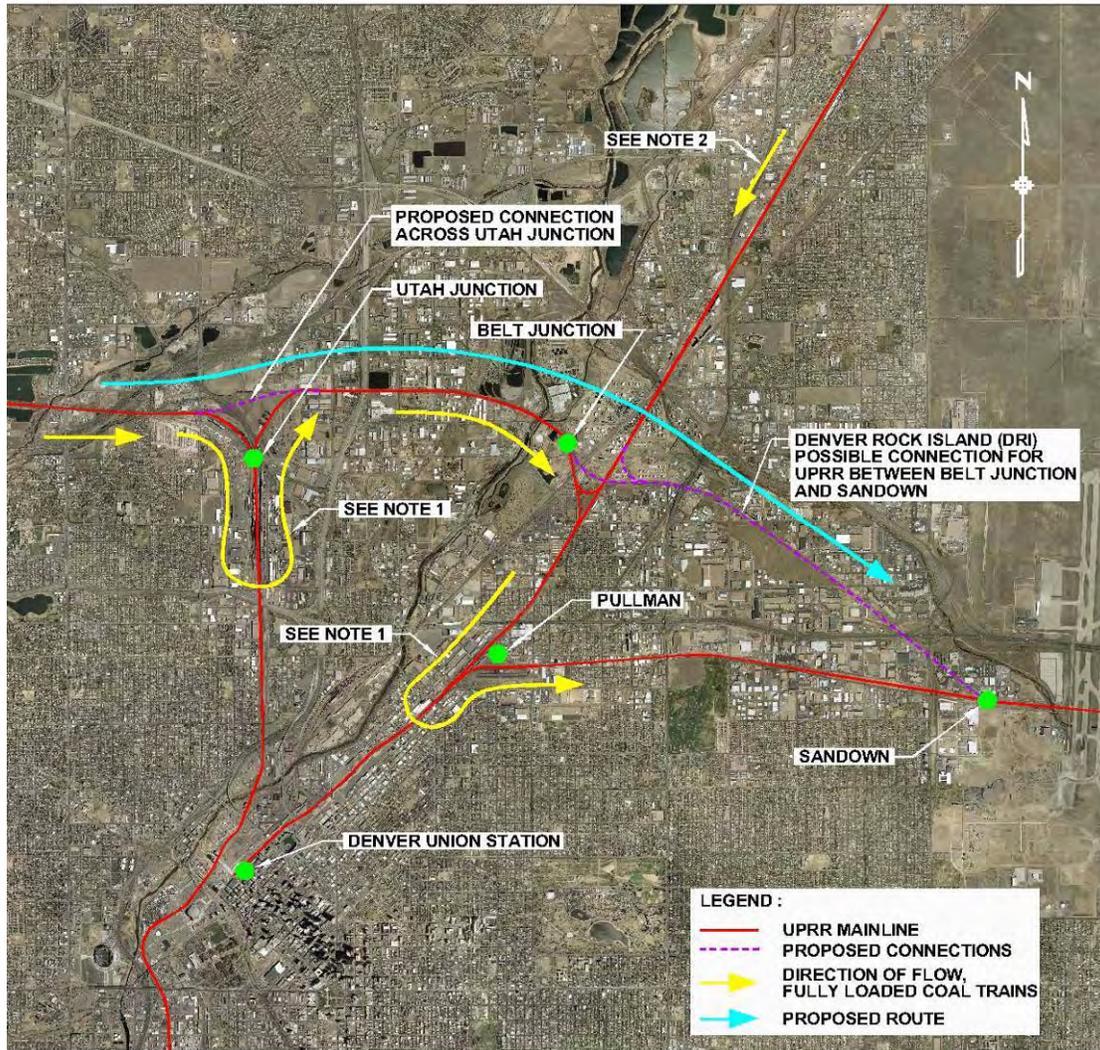
Efficiency gains for the railroads are expected for several reasons. The Project Build Option will result in 96 fewer miles of track traveled by coal trains from Wyoming going south and southeast. This reduced amount of track provides more direct routes between various locations. Track that is located outside of congested areas also allows for greater speeds. The reduced miles of track and greater speeds will save an estimated 2.8 hours for many of these coal trains. In addition, proposed improvements to Utah Junction, a bottleneck at the junction where the Moffat Tunnel Subdivision meets the Beltline Mainline, will save transit time due to increased efficiency of east-west traffic through Denver.

Utah Junction improvements will also reduce train delay times. Currently delay time through Utah Junction is estimated to range from as low as three hours to as high as eight hours. Actual dollar projections vary, but the Study estimates each hour of travel time saved is a benefit of approximately \$850 to the railroads. It should be noted that the UP railroad believes the hourly benefit to be closer to \$460. As a result, there are two major uncertainties in determining the east-west rail operation benefit associated with the Utah Junction improvements; the estimated amount of time saved, and the hourly value of the time savings. The Frequency Chart on page 5 of Technical Memorandum 5 shows the distribution of delay times.

Figure 2-1 shows the present and proposed train traffic patterns through Utah Junction.



Figure 2-1 Utah Junction Map



Notes

1. Existing Route. Traffic from the west heading east passes south through Utah Junction into North Yard, moves power to the back of the train, heads north turning east across the Belt Line to Belt Junction, south into Pullman, moves power to the back again and heads east toward Sandown.
2. Existing Route. Traffic from the north goes south into Pullman Junction, moves power to the back and heads east toward Sandown.



Table 2-2 shows the railroad operational benefits due to reduced mileage in the period 2004-2030.

Table 2-2 Railroad Operational Benefits Due to Reduced Mileage, 2004-2030

Gallons of Fuel				
Reduction in fuel usage associated with reducing coal train traffic on Front Range (gallons)	Associated increase in fuel usage by trains using new Eastern Colorado routes (gallons)	Net change in fuel usage (gallons)	Value per gallon of fuel	Net benefit associated with fuel usage reduction
23,203,932	19,515,892	(3,688,040)	\$0.885	\$3,263,915

The annualized cost savings, in addition to the time saved and reduced maintenance costs that result from trains traveling shorter distances, is estimated at \$13 million on an annualized basis (2004-2030).

Grade-Separated Crossings

If the number of trains per day in the Front Range urban corridor can be reduced, building grade separations in some areas may be avoided and provide a significant benefit to the public.

The Study team used the Federal Railroad Administration (FRA) Crossing Inventory database to create an “Exposure Factor” by multiplying the average annual daily road traffic (AADT) by the daily train volume (trains per day, or TPD). This Exposure Factor is a rough guide to how much exposure road traffic has to delay and accidents at an at-grade railroad crossing^v. Presently there are approximately 4,755 at-grade railroad-road crossings in the state.

The Exposure Factor was used to rank the rail crossings from most impacted to least impacted. The most impacted crossing is the Santa Fe Drive crossing at the BNSF tracks in South Denver.

During a series of analyses and reviews, 135 at-grade crossings were determined to rank high in Exposure Factors. Through meetings with the Colorado Public Utilities Commission (PUC) the 135 crossings were reduced to 39 candidates for possible grade separations. The details of these crossings and the selection process are provided in Technical Memorandum 5, specifically in Figures 5-1, 5-2 and 5-3 and Tables 5-3 and 5-4.

The at-grade crossings that are the most and least likely candidates for grade separation or reconstruction are shown in Table 2-3, Summary of Grade Separation Review. Eighteen are likely candidates for grade separation. Of these, eight are likely to be affected by the Build/No-Build decision. Historically, Colorado has built about one grade-separated railroad crossing per year. That trend is expected to continue throughout the Project period. Thus, 27 at-grade crossings will be impacted, leaving another nine (unspecified) at-grade crossings to be separated during the 2004 through 2030 timeframe. Of these, it is estimated that four will be affected by the Build/No-Build decision.

Of the 27 possible grade separation candidates, several are in highly-developed areas, and the reconstruction of two could be avoided under the Build scenario. Avoidance would save about \$20 million per crossing, or \$40 million. At the same time, the as-yet-unspecified grade separation candidates are expected to cost about \$10 million each because they are in less-congested areas. Three of these grade separations are unlikely to be built if the Build Option is selected, but would be built under the No-Build Option. One is likely to be built if the Build Option is chosen. This represents a net savings of two grade-separated crossings, for an additional cost savings of \$20 million with the Build Option.





Table 2-3 Summary of Grade Separation Review

Grade Separation/ Grade Reconstruction	Rail Crossings
Grade Separation <i>less likely</i> under the Build Option—less traffic	104 th Avenue east of US 85 1 st Avenue in Fort Lupton 13 th Avenue in Denver 47 th Avenue and York Street in Denver
Grade Separation <i>more likely</i> under the Build Option—increased traffic	Peoria Avenue north of Smith Road Washington Avenue at 62 nd Avenue
Reconstruction of existing Grade Crossing <i>less likely</i> under the Build Option	38 th Avenue Overpass
Reconstruction of existing Grade Crossing <i>possible</i> under the Build Option	Alameda Avenue Underpass

It should be noted that new grade separations would be required along the new track alignment on the Eastern Plains. This Study provides for five grade separations in the railroads' cost estimate.

If the Build Option is chosen, the total estimated savings from grade-separated crossings that will not be needed over the Project lifetime (2030) is estimated at \$60 million. The majority of the cost savings is expected to occur in the years 2006, 2009, and 2012^{vi}.

Emergency Vehicle Delays

The Build Option reduces the number of through-freight trains along the Front Range. Those trains block at-grade railroad-road crossings, interfering with the ability of emergency vehicles to respond to emergencies quickly. The extent to which the reduction of freight rail traffic will improve emergency response times was not quantified, but improvements are expected.

The Build Option will adversely impact emergency response times in Eastern Colorado along the proposed new rail line as well as along existing lines that will carry higher traffic volumes. These delays are likely near population centers including Limon, Aroya, Peoria, and Las Animas. The extent of the delays will depend on whether the more critical crossings are grade-separated.

Reductions in Traffic Delays

A major benefit of the Build Option is reduced delays at at-grade railroad crossings along the Front Range. Relocation of coal train rail lines to the east will greatly reduce the delays experienced by vehicular traffic, especially during the morning and afternoon commute times. The Study assumed the value of time for passenger vehicles delayed at rail crossings to be \$10.40 per hour. The value of time for trucks delayed at rail crossings was assumed to be \$18.06 per hour.

Table 2-4, Benefits of Reduced Delays, shows the benefit of travel time savings and induced demand, which is additional traffic on the road because there is less congestion. The total savings from reduced delays, under the Build Option, is estimated to be \$332 million between 2004 and 2030.





Table 2-4 Benefits of Reduced Delays^{vii}

Year	Discounted Travel Time Savings Benefit in Millions	Discounted Induced Demand Benefits in Millions
2004	0	0
2005	0	0
2006	0	0
2007	0	0
2008	0	0
2009	0	0
2010	\$14.90	\$0.80
2011	\$15.00	\$0.80
2012	\$15.00	\$0.80
2013	\$15.10	\$0.80
2014	\$15.10	\$0.80
2015	\$15.10	\$0.80
2016	\$15.20	\$0.80
2017	\$15.20	\$0.80
2018	\$15.20	\$0.80
2019	\$15.20	\$0.80
2020	\$15.10	\$0.80
2021	\$15.10	\$0.80
2022	\$15.10	\$0.80
2023	\$15.10	\$0.80
2024	\$15.00	\$0.80
2025	\$15.00	\$0.80
2026	\$15.00	\$0.80
2027	\$14.90	\$0.80
2028	\$14.80	\$0.80
2029	\$14.80	\$0.80
2030	\$14.70	\$0.80
Subtotal	\$315.60	\$16.80
Total Benefits		\$332.40

Impacts to Trucking Operations

Trucking services and freight rail services tend to operate in tandem. They come together at intermodal facilities. The Build Option is not expected to negatively impact the rail-trucking operations, but may change the way the trucking industry in Colorado operates.

The Build Option includes relocation of intermodal facilities, which will impact truck operations by moving the facilities out of the Denver metro area. Total travel distance for many truck hauls will be changed: some will increase and some will decrease.

The extent of the benefits and possible negative impacts to the trucking industry is not known at this time, but could include:

- Increased needs for trucking services from economic development associated with the Project.
- Longer travel distances and times to reach relocated intermodal facilities.





- Changed wear and tear patterns on roads as a result of the relocated intermodal facilities.
- A mode shift in grain transportation as more of this major Eastern Colorado commodity is moved by rail.
- Reduced delay times at grade-separated crossings.

Economic Development and Land Use Benefits

Benefits from the Build Option will accrue to both public and private stakeholders, so both are given equal weight in the Study analyses. Economic benefits are derived from the net increase in economic activity generated by the Build Option. Some of the expected economic development and land use benefits the Project will provide are:

- An increase in Colorado’s Gross Domestic Product (GDP),
- Creation of new jobs,
- Higher federal, state, and local tax revenues, and
- Redevelopment of urban rail yards in the Denver metro area.

Measuring Economic Development and Land Use Benefits

Economic development benefits from the Project will accrue to both private sector and public sector stakeholders. Measuring private sector benefits is straightforward, not specific to any single industry, and is defined in terms of increased profit. If profit is 10% of a firm’s gross revenue, the dollar value of economic benefit for the private sector is 0.1 times the total additional gross revenue. While simplistic, this benefit calculation yields reasonable “order of magnitude” estimates for the purposes of this Study.

Public sector benefits are measured in terms of increases in employment and increases in federal, state, and local tax revenues. The IMPLAN input-output model was used to estimate the annual employment, earnings, and fiscal (tax) impacts associated with an increased demand for Colorado’s goods and services. The Study used four input-output models: Western Colorado, Front Range, Eastern Colorado, and Statewide.

The four variations of the input-output model estimate the direct, indirect, and induced impacts to income and employment associated with a change in demand for a given product or service^{viii}. The economic and land use benefits for each model are summarized below.

1. *Western Colorado Economic Development.* The primary Western Colorado beneficiaries of rail improvements in the Front Range and Eastern Colorado are: the coal industry, the railroads hauling the coal, the communities that depend on the coal industry, and other Western Colorado industries that rely on freight rail service to the east.

Historically, the bottleneck at Utah Junction and other inefficiencies in east-west train movement through Denver have constrained the daily number of coal trains traveling from Western Colorado to east and south of Colorado. Demand for low-sulfur coal is increasing, and the Western Colorado mines are a source of this type of coal. Relief from the Utah Junction and Denver-area freight rail congestion may increase the market for Western Colorado coal and increase mining in the western part of the state.

The potential level of increased coal mining is uncertain. Since detailed information about the supply and demand relationships is not available, the Study team used the following scenarios and assumptions:

- Assumptions—Coal sells for \$20 per ton. The increase in coal production occurs as a near-term jump in production and grows at two percent per year thereafter.



- Low Scenario—An additional one million tons of Western Colorado coal can be marketed outside the state each year. This is a three percent increase in production, equivalent to an additional two coal trains per week through Utah Junction. This represents a \$20 million increase in revenues.
- Mid-range Scenario—An additional three million tons of Western Colorado coal can be marketed outside the state each year. This is close to a 10% increase in production, equivalent to an additional six coal trains per week through Utah Junction. This represents an additional \$60 million in revenues.
- High Scenario—An additional five million tons of Western Colorado coal can be marketed outside the state each year. This is about a 17% increase in production, equivalent to an additional 10 coal trains per week through Utah Junction. This represents an additional \$100 million in revenues.

The total benefits from increased coal mining in Western Colorado are spread across the entire state. Table 5-8 in Technical Memorandum 5 shows details of the estimated benefit in discounted dollars. The total estimated benefit is \$39.35 million for the Low Scenario, \$118.06 for the Mid-range Scenario, and \$196.77 for the High Scenario. The analyses in this Study use the Mid-range Scenario estimates.

Table 2-5 shows the projected additional revenue, jobs created, and additional tax revenues for the Low, Mid-range, and High Scenarios.

Table 2-5 Benefits of Additional Western Colorado Coal Production

	Additional Revenue from Coal Sales	Jobs Created—Western Colorado	Jobs Created—Rest of State	Additional Federal Taxes Paid	Additional State and Local Taxes Paid
Low Scenario	\$20 million	164	22	\$2.7 million	\$3.2 million
Mid-Range Scenario	\$60 million	492	66	\$8.2 million	\$9.7 million
High Scenario	\$100 million	820	110	\$13.7 million	\$16.2 million

2. *Front Range Economic Development.* The estimates of the benefits of Front Range economic development associated with the Project are uncertain but potentially large. Much of the projected increase in economic development stems from new intermodal facilities for the UP and BNSF.

These facilities have the potential to relieve a capacity-constrained intermodal system in the Denver metro area. Both existing intermodal facilities are space-constrained and located in highly developed urban settings. Both sites experience significant access and traffic problems. The existing intermodal facilities are distant from potential shippers located in the area’s newer industrial centers, and also distant from Denver International Airport (DIA) and other regional airports.

In addition to relieving capacity- and space-constraints of the existing intermodal system, the proposed locations of the new intermodal facilities have the potential to significantly increase regional commerce by acting as a convergence point for rail, highway, and air cargo for the Front Range. The new intermodal facilities will be patterned on the Alliance Texas^{ix} facility located between Dallas and Fort Worth, TX, and are expected to play a similar economic development role for the Front Range.

Substantial uncertainties are associated with the level of Project-driven economic development. The Study team used the following scenarios and assumptions:

- Low Scenario—It is assumed that 500 new jobs are created in the various industries along the Front Range. It is further assumed these jobs are phased-in over a 10-year timeframe.



- Mid-range Scenario—It is assumed that 2,000 new jobs are created in the various industries along the Front Range. It is further assumed these jobs are phased-in over a 10-year timeframe. This number of new jobs appears plausible in light of the Alliance experience in Texas.
- High Scenario—It is assumed 10,000 new jobs are created in various industries along the Front Range. It is further assumed these jobs are phased-in over a 10-year timeframe.

Table 2-6 summarizes the potential number of jobs created under each Scenario and lists the expected total annual earnings for these jobs. The private sector benefits begin in 2006 with the start of the Build Option and are phased in over a 10-year period. Benefits are discounted to 2004 dollars.

Table 2-6 Jobs and Earnings by Scenario

	Jobs Front Range	Jobs Rest of State	Total Jobs Created	Annual Earnings
Low Scenario	840	10	850	\$36 million
Mid-range Scenario	3,360	40	3,400	\$144 million
High Scenario	16,800	200	17,00	\$720 million

Urban Land Redevelopment. The new intermodal facilities will eliminate the need for several rail yards in the Front Range corridor. Most of the existing yards are near downtown Denver and are located on potentially valuable tracts of re-developable land^x. Redevelopment generates two categories of positive impacts: capital gains to the owners of the properties as they convert to a “higher” land use, and property tax increases to the local governments as a result of the higher use. If CDOT acquires title to the properties the first impact will be to the public sector. The second impact is also to the public sector—the local governments^{xi}.

The projected benefits for the Low Scenario amount to \$117.57 million; for the Mid-range Scenario the projected benefits are \$470.27 million; for the High Scenario the projection is \$2,351.37 million (all discounted to 2004 dollars). In all cases the benefits will not begin to be recognized until after construction begins in 2006, and benefits will continue to accrue through the year 2030.

3. *Eastern Colorado Economic Development.* Two types of economic benefits accrue to Eastern Colorado: Economic benefits similar to those for Western Colorado and the Front Range, and benefits to the agricultural industry resulting from greater transportation efficiency and lower grain shipping costs.

Better Rail Access. Estimates of new economic growth attributable to the Project for Eastern Colorado are speculative. While the Front Range has a diversified economy, the Eastern Plains do not. There is also no viable development model (such as the Alliance Texas model for the intermodal facilities) to follow. Instead, various stakeholders in Eastern Colorado were interviewed^{xii}.

The interviews indicate that the majority of economic development would be expansion and enhancement of industries already present in the region over a 5 to 10 year development period. All those interviewed saw the Project as a benefit to the Region, without appreciable downside risk.

Substantial uncertainties are associated with the level of Project-driven economic development. The Study team used the following Scenarios and assumptions for the study:

- Low Scenario—It is assumed the Project can generate about 15 jobs in various industries in Eastern Colorado.
- Mid-range Scenario—It is assumed the Project can generate about 75 jobs in various industries in Eastern Colorado.



- High Scenario—It is assumed the Project can generate about 250 jobs in various industries in Eastern Colorado.

Benefits to Grain Producers. Grain movement from northeastern Colorado counties to markets in southern Colorado, Texas, and Mexico is inhibited by at least two factors. First, only two options are available for moving grain across Eastern Colorado—rail or truck. It is more cost-effective to ship grain by rail than by truck. Second, several east-west railroads are in Eastern Colorado, but none run north-south. Trains must therefore go west to Denver and then south, or east to Kansas City and then south.

Substantial uncertainties are associated with the level of Project-driven economic development. To calculate the benefits to grain shippers in Eastern Colorado, the Study team used the following Scenarios and assumptions:

- Low Scenario—An additional 0.5 trains per week (26 trains per year) carrying grain travel from Eastern Colorado. This is a 29% increase in grain shipments by rail, with 14% of total production being moved by rail.
- Mid-range Scenario—An additional train per week (52 trains per year) carrying grain travel from Eastern Colorado. This is a 57% increase in grain shipments by rail, with 17% of total production being moved by rail.
- High Scenario—An additional two trains per week (104 trains per year) carrying grain travel from Eastern Colorado. This is a 115% increase in grain shipments by rail, with 24% of total production being moved by rail.

Increasing grain shipments by rail saves about 2.5 cents per mile compared to costs for trucking grain. For the Low Scenario the savings amounts to \$550,000 per year, or \$7.3 million over 20 years (in 2004 dollars). For the Mid-Range the figures are \$1.1 million per year or \$14.4 million over 20 years. For the High Scenario the figures are \$2.2 million per year or \$28.9 million over 20 years.

Highway Maintenance. Transferring grain shipments from trucks to trains will reduce the number of grain trucks on the highways. This may result in lower road maintenance costs. At the same time, diesel fuel tax receipts will drop. The net benefit (reduced maintenance costs less reduced tax receipts) is about \$400,000 for the Low Scenario, \$750,000 for the Mid-range Scenario, and \$1.5 million for the High Scenario. Over a 20-year period this equates to about \$5.1 million, \$10 million, and \$20 million, respectively, in 2004 dollars.

Trucking Industry. It is not expected that many, if any, trucking industry jobs will be lost in the transfer of grain from trucks to trains.

Increased Tax Revenues. The cost savings from shipping grain by rail instead of by truck will increase the operating revenues of farm operations. This added income increases taxes paid to federal, state, and local governments. For the Low Scenario Colorado can expect to gain about \$25,500 per year; in the Mid-range Scenario the state can expect another \$50,000 per year; under the High Scenario this revenue rises to \$100,500 per year.

4. *Statewide Benefits.*

New Construction Jobs. The Project carries a total cost of \$1.2 billion (Mid-range Scenario) spent over the four-year period from 2006 through 2009. The Project will also require a large number of new long-term and temporary construction jobs to be filled. Those jobs will increase regional and statewide earnings and lead to spending on a wide range of goods and services. The jobs will also generate tax revenues (income, property, sales, and so forth).

The scope of these construction benefits is uncertain, but they will be closely related to the source of the Project construction funds. If a portion of the construction funding is federal or comes from the private sector, the earnings associated with the additional construction and related jobs would benefit the state and



the workers. To the extent the funds are reimbursed by Colorado taxpayers, either through the state General Fund or specific taxes, the beneficial impact will not be as great, but the other benefits associated with the Project will still occur. In addition, the Project will pull resources from other projects and programs within the state, all of which will have multiplier effects.

The Study team used the following assumptions:

- The assumed Project cost of \$1.2 billion is divided equally between the four years from 2006 and 2009.
- The Project cost is multiplied by 30%, representing an assumed level of outside funding.
- The construction expenditures comprising the 30% outside financing are used as input to the IMPLAN input-output model to determine the level of employment and earnings impacts, using economic multipliers.
- The analysis is done in 2004 dollars for all four years.

Using the assumed level of 30% of construction spending coming from outside the state and applying it to the Mid-Range Scenario, the following employment, earnings, and tax impacts are expected:

- Approximately 937 new construction jobs for the years 2006 through 2009.
- Approximately 789 supporting and ancillary jobs for the years 2006 through 2009.
- An estimated \$57.0 million in annual wages from the 1,726 projected jobs for the years 2006 through 2009.
- An annual increase of \$16.3 million in federal tax revenues for the four-year construction period.
- An annual increase in state tax revenues of about \$6.5 million for the four-year construction period.

Safety and Security Benefits

Some safety and security impacts are both quantitative and qualitative, but other impacts are only qualitative. The Study assessed vehicle-train accidents, pedestrian-train accidents, hazardous materials (HAZMAT) transport, and terrorism risks.

Vehicle-Train Accidents

Diverting freight train traffic outside the Front Range urban corridor will provide a number of safety benefits, especially reduced vehicle-train accidents. The study team assumes a two percent growth in AADT and an increase in freight train traffic to the east of the Front Range as rail lines are relocated. The Build Option, reduces the AADT counts in the rail line segments leading to the Front Range urban corridor, which generates substantial safety benefits.

Table 2-7 summarizes the safety benefits associated with the potential reduction in the number of vehicle-train accidents along the Front Range under the Build Option. This table uses the following costs: the median cost of a fatal accident is \$3.8 million. The median cost of an injury accident is \$1.0 million. The cost of an accident with property damage only is \$50,000.

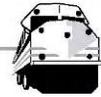


Table 2-7 Benefits from Reduced Vehicle-Train Accidents, 2004-2030

Year	Discounted Benefit in Millions (2004 dollars)
2004	0
2005	0
2006	0
2007	0
2008	0
2009	0
2010	\$0.58
2011	\$0.58
2012	\$0.58
2013	\$0.49
2014	\$0.49
2015	\$0.49
2016	\$0.49
2017	\$0.49
2018	\$0.49
2019	\$0.49
2020	\$0.49
2021	\$0.49
2022	\$0.39
2023	\$0.39
2024	\$0.39
2025	\$0.39
2026	\$0.39
2027	\$0.39
2028	\$0.39
2029	\$0.39
2030	\$0.39
Total	\$9.61

Pedestrian-Train Accidents

Incidents involving pedestrians and trains are not common, but they do occur. The last reported pedestrian-train accident in the Front Range involving a freight train occurred in 2000. The Build Option will allow the pedestrian-train accidents to decrease further since several fast-moving coal trains will be located to far less populated areas.

HAZMAT Transport

The movement of HAZMAT freight along and across the Front Range occurs on a regular, and possibly daily, basis. For the most part, the general public is unaware of the movement of HAZMAT trains. In the rare case of an accident involving a HAZMAT train, the results could be deadly, depending on the type of chemical or other HAZMAT being transported.

Approximately 75% to 90% of spent nuclear fuels and high-level radioactive wastes are expected to be transported by rail in the future^{xiii}. A route that is less populated than the current Front Range urban corridor could be an important benefit of the Build Option. The proposed route in Eastern Colorado has





fewer people, less traffic, and fewer grade crossings, which decreases the accident potential and exposure rate of trains carrying HAZMAT.

An additional benefit of the Build Option is redundancy. In the event a HAZMAT incident occurs, an alternate track exists on which to reroute train traffic. Instead of a HAZMAT incident shutting off commerce to other parts of the country, the flow of goods could continue on the other north-south track in the state.

Terrorism Risk

After the events of September 11, 2001, terrorism is a concern of major transportation carriers across the country. The concentration of business and industry in the Denver metro area and along the Front Range urban corridor makes the area a viable target for terrorists. By relocating coal trains, a potential terrorist target, out of the Front Range area, the risk of an attack is reduced. In addition, the Project creates a redundant route with which to move goods through the state.

Environmental Impact Benefits

The effect and extent of environmental impacts are essential considerations of the Project. The study team evaluated the benefits to and effects on the following areas:

- The natural and built environment, archaeological and historic resources, special status plant and animal resources, major creeks and rivers, wetlands, and other surface water resources, hazardous and contaminated materials sites, demographics, and other resources and potential constraints.
- Noise and vibration.
- Air quality benefits.
- Energy usage reductions.
- Visual benefits to the Front Range.

This Study is *not* an environmental study. Therefore, the results are preliminary in nature and broad in terms of detail. For more details on the scope and limitations of the environmental considerations, see Technical Memoranda 4 and 5.

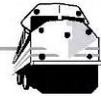
The Natural Environment

An inventory of the natural environment^{xiv} surrounding the potential Build areas was conducted as part of the Study. This inventory had two purposes: To determine if there are any fatal flaws and to determine if there would be extreme mitigation costs. A fatal flaw normally involves the presence of an endangered species of plant or animal life in the Build area.

Archaeological and Historic Resources. Numerous legal and regulatory requirements are related to historic and archaeological resources in the area proposed for the Build option. A definitive corridor for relocated rail lines was not established by the Study. The potentially affected area is a swath about 10 to 15 miles on either side of a "line" drawn between Omar and Peoria, and between Aroya and Las Animas.

A survey of relevant documents^{xv} provided the following information:

- Only Weld County has any prehistoric districts.
- Bent, Cheyenne, Elbert, Kiowa, and Lincoln counties have no *officially* eligible prehistoric sites.
- Historical resources have been recorded in all of Colorado's counties, and number in the thousands.



- No National Historic Landmarks or World Heritage Sites are located in the Study area.

Special Status Plant and Animal Resources. Numerous legal and regulatory requirements are related to special status plant and animal resources in the study area described above.

Major Creeks and Rivers, Wetlands, and Other Surface Water Resources. Numerous legal and regulatory requirements are related to water resources in the study area. No floodplain studies or soil studies were conducted. No wetlands have been specifically identified. All the creeks and rivers in the Study area have associated wetlands. In addition, other wetlands are scattered in the study area that are not associated with creeks or rivers.

Hazardous and Contaminated Materials Sites. Numerous legal and regulatory requirements are related to potentially hazardous materials in the study area. Known hazardous and/or contaminated materials sites were found in Bent, Cheyenne, Elbert, Kiowa, Lincoln, Morgan, and Weld counties.

Demographics. Numerous legal and regulatory requirements are related to Project demographics assessments. The Project has the potential for creating net social benefits that will accrue to all racial, ethnic, and income groups. Reducing the number of trains passing through low to moderate income neighborhoods in the Denver area will have positive safety, noise, air quality, property value, and mobility impacts.

Other Resources and Potential Constraints. Land use, socioeconomic factors, geology and soils, and groundwater resources are also important environmental impacts that may become issues as the Project progresses.

Noise and Vibration

Excessive noise has the potential to disrupt routine activities and can affect the overall quality of life. Train traffic produces both noise and vibration. Freight trains typically produce higher noise levels and vibration effects than passenger trains.

Relocating rail traffic away from developed urban areas has the potential to reduce noise and vibration levels in areas located close to existing rail lines.

It is expected that property values will increase in residential areas when freight rail traffic is relocated. The study team evaluated the effects of relocating 20 coal trains away from the Front Range area. Under the Low Scenario no property values increase is projected when the trains are relocated to the east. Under the Mid-range Scenario about a five percent increase in property values is projected. Under the High Scenario this property value increase is projected to be about 15%.

Using the Mid-range Scenario, relocating 20 coal trains out of the Denver metro area is expected to result in a one-time capital gain to about 14,600 property owners. The value of this capital gain is about \$87 million. The increase in property values results in additional property tax receipts for local governments, worth about \$1.5 million for years to come.

Air Quality Benefits

Relocating freight trains from the Front Range urban corridor to the east would help improve the air quality along the Front Range by reducing emissions from diesel locomotives. The reduction of pollutants would help improve the air quality status of a number of Front Range counties and cities.

Reducing or eliminating delays at freight rail crossings will help reduce emissions from vehicles. The projected impact of reducing these delays, by moving freight rail traffic to Eastern Colorado, is shown in Table 2-8 as Net Present Value (NPV) in Millions. Cost of VOC emissions is \$2,040/ton, cost of NOx emissions is \$2,765/ton, and cost of CO emissions is \$64.45/ton.



Table 2-8 Additional Air Quality Benefits

Year	Discounted Benefit in Millions (2004 dollars)
2004	0
2005	0
2006	0
2007	0
2008	0
2009	0
2010	10
2011	\$0.10
2012	\$0.10
2013	\$0.10
2014	\$0.10
2015	\$0.10
2016	\$0.10
2017	\$0.10
2018	\$0.10
2019	\$0.10
2020	\$0.10
2021	\$0.10
2022	\$0.10
2023	\$0.10
2024	\$0.10
2025	\$0.10
2026	\$0.10
2027	\$0.10
2028	\$0.10
2029	\$0.10
2030	\$0.10
Total	\$2.11

When the cost estimates in the preceding table are combined with the value of reduced freight train emissions, the benefit ranges from \$129 million to \$500 million through the year 2030.

Energy Usage Reduction

In addition to reduced fuel use by locomotives additional Project savings are expected from decreased idle times for vehicles at grade crossing and speed smoothing.

The study’s results estimate vehicle cost savings from speed smoothing and reduced idle times at grade crossings to be approximately \$21 million through the year 2030, in 2004 dollars.

Visual Benefits to the Front Range

The overall view for Front Range residents will improve since rail yards will be moved and some freight trains will no longer pass by neighborhoods. The Project does not eliminate any freight rail lines, but relocates the through freight trains. The proposed rail corridor goes through very sparsely populated areas. The proposed sites for the new intermodal facilities are relatively far from residential areas.





Quality of Life Benefits

Residents are naturally concerned about the impact the Project will have on their quality of life. The Project is expected to provide a net improvement to the quality of life of all involved.

Along the Front Range urban corridor coal train traffic will be reduced and intermodal facilities and rail yards will be relocated. This will reduce noise and vibration, improve views, improve air quality, reduce traffic delays, decrease accidents, and bring economic development to the area.

In Eastern Colorado, the location of the proposed rail line will have a net positive impact, despite some added noise, air quality issues, and impeded views. The negative impacts are expected to be far outweighed by the economic benefits to the area.

Passenger Rail Facilitation Benefits

Implementation of light rail and/or commuter rail are potentially influenced by the Project Build/No-Build decision. Three specific potential passenger rail projects have a definite, quantifiable difference between the Build versus No-Build Options. Other passenger rail projects may be facilitated by the Project but the benefits are not yet quantifiable. These are considered to be qualitative benefits.

The study team used five prior studies that evaluated possible opportunities related to passenger rail service in and through the Front Range. These studies are:

- The 1997 Colorado Passenger Rail Study (1997).
- The North Front Range Transportation Alternatives Feasibility Study (1999).
- The South I-25 Corridor Study (1999)
- The Rail-Oriented Development Study (2002).
- The Eastern Colorado Rail Mobility Study (2002).

Details for each study are available in Technical Memorandum 7. The five prior studies provide context, data, and background for this Study. In addition to these five studies, the Regional Transportation District (RTD) has continued to develop its own Denver metro area passenger rail plans.

With this Project, the major benefit to passenger rail is the potential ability to use existing and newly-acquired ROW, saving millions in ROW costs and roadbed development^{xvi}.

The expected reduction in passenger rail development costs is about \$203 million over the period 2004 through 2030. This is equivalent to about \$177.6 million in 2004 dollars.

Three corridors along the Front Range will be impacted by the Build/No-Build decision. Two are RTD corridors—East and North Metro; the other is commuter rail between Denver and Colorado Springs.

If the Project is built, RTD will probably be able to avoid the cost of a 3,400-foot long elevated structure required to avoid interfering with the UP's operations at the Pullman Yard, saving about \$44 million for RTD. The RTD North Metro Corridor would be able to avoid acquiring about 18 acres of ROW west of the UP tracks between Downing Street and I-25, saving another \$5.5 million. Finally, in the South Front Range Corridor, from Denver to Colorado Springs, there are significant cost savings with the development of the Build Option. Train track costs are reduced by \$1 million per mile and ROW acquisition costs are eliminated. This is a potential savings of about \$154 million.

Expanded Benefits

Additional indirect benefits are associated with the Build Option. These benefits are primarily in the creation of jobs state-wide. Technical Memorandum 8 (Funding and Financing Strategies) contains detailed



information about the distribution of project benefits to major public and private stakeholders. Private Sector Stakeholders include two Class One railroads, Western Colorado coal industry, economic development (jobs creation) and the Eastern Colorado grain industry. Public Sector Stakeholders includes the general public, local, state, and regional governments, and public transit entities.

These stakeholders are the groups most likely to support the Build Option of the Project.

Table 2-9 shows the distribution of Project total (direct and indirect) benefits by sector and scenario.

Table 2-9 Summary of Total Project Benefits by Sector and Scenario*

Sector	Low Scenario	Mid-Range Scenario	High Scenario
Private Sector	\$721	\$1,378	\$3,723
Public Sector	\$1,628	\$3,787	\$12,612
Total Benefits	\$2,349	\$5,165	\$16,335

* Net Present Value (NPV) in Millions

Table 2-10 shows the total benefits of the Mid-range Scenario.

Table 2-10 Project Benefit-Cost Ratios—Mid-Range Scenario*

Sector	NPV in Millions	Percent	Benefit-Cost Ratio
Private Sector	\$1,378	27%	1.2
Public Sector	\$3,787	73%	3.2
Total Benefits	\$5,165	100%	4.3

*Based on total Project Build Option costs estimated at \$1.2 billion.

The public sector receives 73% of the Project’s benefits when indirect benefits are included in total Project benefits. It should be noted that “public” benefits are associated with, in some cases, certain citizens, and in some cases with all citizens, as well as with the various levels of government that represent them; public benefits are not associated with a particular level of government.

The preceding information demonstrates that for both the private and public sector stakeholders, the level of Project benefits exceeds the estimated costs for the Project. Excluding indirect benefits, the direct benefits to the private and public sectors still would be about twice the cost of the Project. Table 8-13 in Technical Memorandum 8 summarizes the projected qualitative impacts of the Project. Significant public interest benefits at the state level are likely to reflect the public’s concern for maintaining or enhancing Colorado’s quality of life, image, and economic attractiveness.

Additional Railroad and Freight Carrier Benefits

Appendix B contains details from the Study about additional benefits that may result from developing the Build Option. Briefly summarized, these additional benefits may include:

- Colorado, Kansas and Pacific Railroad’s (CKP) Towner Line—Part of the proposed relocated freight rail line would cross the CKP Towner Line near Haswell. A wye connection along the Towner Line could help attract business that could be served by either Class One railroad or a shortline.
- Shortline impacts—The presently inactive Denver Rock Island (DRI) shortline would be used by the UP for its connection to Sandown, allowing trains to head straight east.
- Impacts to existing Class One infrastructure.
- Competitive balance between the two Class One railroads.





- Motor carrier industry—Benefits may accrue to the trucking industry from the relocation of intermodal facilities. In addition, truck delays may be significantly reduced.
- Impacts to Colorado coal—The infrastructure improvements will greatly improve traffic flow and decrease operating expenses in this low margin business.
- Impacts to neighboring states.

Summary

The Study team analyzed the potential benefits accruing to the public and private sectors under a set of assumptions called the Mid-range Scenario. The results of the analyses are a total benefit of about \$2.29 billion (in 2004 dollars) over the period 2004 through 2030. This is equivalent to about \$128 million per year.

For private sector stakeholders, benefits were projected based on the additional profit generated by the net increase in economic development afforded by the Build Option.

For the public sector stakeholders, benefits were projected based on reductions in travel time, increased safety, improved air quality, increases in property values, improved quality of life, increased job opportunities, increased tax revenues, and direct and indirect benefits.

Table 2-11 is a summary of direct and indirect benefits associated with the Build Option.

Table 2-11 Project Benefits Summary Through 2030 (Mid-Range Scenario)

Project Benefits	Total Net Benefit, Net Present Value (in millions)	Net Increase in Jobs
Direct Benefits		
Transportation Net Benefits		
Railroad operating efficiency gains	\$693.9	
Avoided capital costs for new grade-separated crossings	\$51.9	
Reductions in travel delay at railroad crossings	\$332.4	
Reductions in the number of train-vehicle accidents	\$9.6	
Economic Development and Land Use Benefits		
Western Colorado		
--Coal Industry	\$118.1	
Front Range		
--New economic growth from better rail facilities	\$470.3	
--Redevelopment of urban rail yards	\$31.9	
Eastern Colorado		
--New economic growth from better rail access	\$34.6	
--Benefits to grain producers	\$29.4	
Safety and Security Net Benefit**	**	
Environmental Net Benefit		
Air quality benefits	\$244.8	
Property value benefits due to noise reduction	\$86.7	
Energy reductions for autos	\$21.0	
Quality of Life**	**	
Capital Cost Savings to Future Passenger Rail	\$178.3	
Total Direct Benefits	\$2,302.8	
Indirect Benefits		
Economic Development and Land Use Benefits		
Western Colorado--Job-related net income	\$560.8	558
Front Range--Job-related net income	\$1,923.8	3,400
Eastern Colorado--Job-related net income	130.6	282

public **Benefits & Costs** study

of the Proposed BNSF/UP Front Range Railroad Infrastructure Rationalization Project



Construction--Job-related net income	211.9	1,728
Coal Severance Tax Income to State of Colorado	\$35.4	
Total Indirect Benefits	\$2,862.5	5,966
Total Benefits	\$5,165.3	5,966
Totals, excluding temporary construction benefits	\$4,953.5	4,240

**These important benefits are not quantifiable.

Many of the estimated or projected benefits carry a high degree of uncertainty. For a more complete listing and explanation of the Monte Carlo analysis used to address these uncertainties, see Technical Memorandum 5.

Potential benefits associated with the Build Option are high, especially in the area of economic development for the entire state. With Project expenditures estimated at \$1.2 billion in the 2006 to 2009 timeframe, it is apparent that benefits should exceed costs with a relatively high degree of certainty. However, since these benefits accrue to a wide range of private and public interests, the nature of the cost allocation methods and the ultimate financial responsibilities for the Project are not identified by the Study.





Section 3 - Funding and Financing Considerations

Introduction

As part of the *Public Benefits & Costs Study* (the Study), the Study team evaluated alternative strategies to finance the *Proposed Burlington Northern Santa Fe (BNSF)/Union Pacific (UP) Front Range Infrastructure Rationalization Project* (the Project) at the lowest feasible cost. Cost and benefit scenarios were developed in terms of Low, Mid-range, and High Scenarios, and are detailed in Section 1, Project Scope and Costs, and Section 2, Project Benefits.

It is expected that if the Build Option is chosen the financing and funding for the Project will depend on a mix of private and public investments. This Section details the cost allocations to major stakeholders, outlines the funding and financing of similar projects across the country, and considers the funding and financing options that may work for implementation of the Build Option of the proposed Project.

Funding the Project

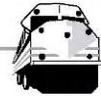
To assure equitable cost-sharing, Project development costs have been allocated among major public and private stakeholders based on the relative level of benefits that are expected to accrue to these stakeholders from 2004 through the year 2030.

As part of the assessment of cost allocation, a number of Study objectives were determined. These objectives are:

- Investigate and describe potential funding mechanisms at the federal, state, and local levels that may be available to implement the Project. These mechanisms may include public, private, and public-private funding sources. They may also include both traditional and innovative financing approaches.
- Present the advantages and disadvantages of various funding and financing strategies in terms of funding availability and timeliness, cost coverage, risk and uncertainty, project control, and value capture of stakeholder benefits.
- Provide a summary of the funding and financing strategies for at least five other “mega-projects” involving public-private partnerships between railroad, highway, and/or transit organizations.
- Validate the rationale for the Project by comparing the range of Project benefits and costs. These benefits and costs are based on Study assumptions for Low, Mid-range, and High Scenario Project cost estimates.
- Develop preliminary allocations of Project funding responsibilities among major public and private sector stakeholders based on the range of Project benefits estimated for these groups through 2030.
- Refine the allocation of Project funding responsibilities based on consideration of the major stakeholders’ competitive interests, willingness, and ability to fund the Project.

For the Project to go forward, it is essential to garner sufficient public and private sector stakeholder support. The Study considers both direct and indirect benefits to determine potential support for the Project from both public and private sector perspectives. By including indirect public benefits, the value of the mid-range benefits scenario (Build Option) for the Project is \$5.16 billion. Without considering the indirect benefits the value of the mid-range benefits scenario drops to \$2.4 billion. Details of the Project Benefits are presented in Section 2, Project Benefits, as well as in Technical Memoranda 5 and 8.

As a result of the Study, the Study team has developed a broad framework for pursuing Project sponsorship and assessing the level of public and private sector stakeholder interest in the Project. The Study and its



results are preliminary and not intended to be used to support any fund-raising efforts. A much more detailed assessment of Project costs, benefits, and revenues will be required to support an investment-grade analysis that could be used to secure private financing.

Financial Challenges

Many funding and financial challenges face the sponsors of this Project.

Funds are scarce. Funds for transportation infrastructure improvements are scarce. There are severe budget constraints among state and federal transportation agencies. Funding for capital improvements programs by private carriers is limited due to competitive pressures and competing demands for capital within those corporations. It is always difficult to find sponsorship for projects affecting both the public and private sector transportation modes.

Institutional barriers exist between the public and private sectors and between modal carriers.

Transportation infrastructure projects require the participation of multiple public agencies and private carriers have more difficulty moving forward due to institutional barriers. These barriers impede efforts to coordinate Project planning, programming, and delivery. The barriers also make it difficult to assign responsibilities for the funding and performance of Project planning, delivery, and programming.

Project benefits spread beyond the two railroads involved. While the costs for the proposed Project are mainly related to the relocation and development of private sector freight railroad assets, other entities also benefit (see Section 2, *Project Benefits*, for more information). The challenge is to find ways to convince non-railroad beneficiaries to share the in the costs of the Project.

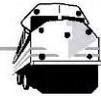
Using public funds for private projects. The public is traditionally skeptical of using public funds for private projects. The Project must demonstrate that it provides a “win-win” situation for all affected stakeholders.

Different regions of the state will experience different impacts and receive different benefits from the Project. The challenge is to find an equitable funding strategy that differentiates between stakeholders on both geographic and categorical bases.

Funding programs generally rely on a small number of sources. Whether funding is public, private, or from a public-private partnership, the number of contributing entities is typically small. The challenge for this project is to find the major funding sources among stakeholder groups with the most to gain from it. These stakeholders are the groups that usually have the greatest interest in the Project and the most resources available. The more stakeholders with an interest in the Project, the more likely adequate funding or financing can be secured.

Development costs occur in the first few years of a project while benefits build over the life of the project. The Project is expected to take four years to build, from 2006 though 2009, but benefits are projected to last until the year 2030, and likely far beyond. The challenge is to find a financing mechanism that will accommodate the imbalanced cash flow requirements while minimizing the costs of borrowed funds.

To determine and build support for the Project, a *Public Involvement Program* was developed. Details about the program are contained in Appendix C, *Public Survey Form and Results*. This program attempted to reach the major public and private sector stakeholders and constituent group representatives across the state. Section 2, *Project Benefits*, recaps the potential impact on public and private stakeholders both categorically and geographically. Details are available in Technical Memorandum 4. The results of public outreach efforts provide essential inputs for determining whether the Project can be justified from cost and benefits perspectives, and how an equitable and balanced funding plan can be developed.



Funding Constraints

A complex regulatory, competitive, funding and institutional environment govern the Project and affects the entire funding approach for the Project. It is the changing nature of the regulatory environment that is bringing the state of Colorado to the point of considering a public-private partnership to help fund what is often considered to be a private railroad investment. As changes occur in the freight transportation industry, all levels of the economy are affected. Therefore, decisions about surface transportation infrastructure investments are increasingly being made in the broader context of public *and* private sector stakeholder interests.

Some of the areas that are affected by, or affect, funding and financing constraints are discussed in the following sections.

Economic Deregulation

During the 1970s, surface transportation, including both the railroad and trucking industries, was deregulated. Shippers continue to press for lower rates and higher quality services. As a result, both railroad and trucking industries are feeling the effects, including:

- Significant reductions in freight revenues due to reduced shipping rates. This is especially true in highly competitive areas and corridors and it has eroded profit margins across the surface transportation industry.
- Rationalization of transportation infrastructure as redundant rail lines and truck terminals are closed or consolidated.
- Consolidation within trucking and railroad companies.
- Emergence of regional service providers for local and regional pick-up and delivery services.
- Greater emphasis on customer service and operational productivity.
- Greater recognition by surface transportation providers of the need to provide reliable, damage-free, prompt delivery.

As a result of the changes above, surface transportation carriers are recognizing the need for greater cooperation and coordination across the entire system. They are also improving efficiency and service by applying technologies such as Global Positioning System (GPS) tracking of containers and trailers, automatic train control and signaling, electronic billing and payment, and computer simulations of operational and facility alternatives to increase system capacity.

To manage the pressure for improved service and productivity that resulted from deregulation, surface transportation providers are entering into partnerships similar to this proposed partnership between the BNSF and UP railroads.

Changes in Funding

Economic deregulation is not the only change that has affected how public and private sector stakeholders perceive the roles and responsibilities for surface transportation infrastructure. Another major change was the completion of the Interstate Highway System in the late 1980s. The Interstate Highway System was funded primarily by fuel taxes, and it has been a major factor in the “suburbanization” of the population and the growth of the long-distance trucking industry. Further, the growth of long-distance trucking has often happened at the expense of the freight railroad industry.

The National Highway System (including the Interstate Highway System) has several sources of funding that the railroad system does not. Fuel tax revenues are used to pay for highway system construction. The



federal government accumulates the money from fuel taxes and distributes it on a “pay-as-you-go” basis to the states. As a result, most highway construction does not have to resort to debt financing (bond issuance) or alternative forms of funding or financing. State and local revenues are used to operate and maintain the highways and pay for local construction costs.

Traditional forms of funding and financing infrastructure projects are described in the next two sub-sections.

Traditional Funding Sources

- Federal motor fuel taxes are excise taxes that are imposed on the sale of motor fuels. These taxes fund the Federal Highway Trust Fund and generate approximately \$32 billion per year.
- Other federal taxes are those on trucks, trailers, and tires that also go into the Federal Highway Trust Fund.
- State revenue sources are taxes imposed on motor fuels, as well as sales taxes on motor vehicle sales, personal property taxes, vehicle registration fees, and license taxes.
- Local revenue sources are those that local governments collect such as property taxes, sales taxes, vehicle registration fees, and utility fees.

Traditional Financing Sources

- Pay-as-you-go financing is used by State and local transportation agencies when they accumulate funds to pay for road infrastructure projects as costs are incurred.

In recent years the costs of building, maintaining, and rehabilitating roads has outpaced the revenues from traditional funding sources. As a result, all levels of government have begun to look at alternative sources of funding to keep pace with increasing highway system needs and escalating highway project costs. Federal surface transportation authorization legislation (roads and railroads) has been granting state and local agencies increasing flexibility to use alternative financing and funding for infrastructure projects. This new flexibility is essential to support the Build Option of the Project. The following are some examples of the innovative funding sources and financing methods currently authorized by the federal government:

Innovative Funding Sources

- Toll revenues are fees charged to the users of a facility. Under the Transportation Equity Act for the Twenty-First Century (TEA-21) (1997), federal funds may now be used to convert Interstate highways to toll roads.
- Joint development involves coordinating activities among private developers, transit agencies, railroads, and local communities.
- Developer contributions may include the contribution of rights-of-way (ROW), technical support, and/or cash from developers to expedite infrastructure projects.
- Special assessment districts may be used by local authorities to assess special fees from businesses and/or residents in a defined area to pay for infrastructure improvements, such as highways, in those areas.
- Local impact fees are those collected from developers by local governments to help pay for public works projects required to support new development.
- Specialized funding sources would include revenues from sources such as advertising, naming rights, and utility access.



Innovative Financing Methods

- Revenue bonds are tax-exempt bonds issued to pay for capital projects such as new construction, highways, and so forth. Accrued interest and revenues from the project, such as tolls, cover principal payments. An example is bonds issued to build a toll road.
- Municipal/public bonds are tax-exempt bonds sold to investors and backed by the issuing governmental unit. The interest and principal on the bonds are paid from general or special tax revenues. An example are the bonds used for Denver International Airport.
- Anticipation notes are issued with the expectation they will be paid off with tax, bond, or revenue proceeds. For example, the T-REX highway/light rail project was built with this type of financing.
- Private bonds are issued by private or public corporations to pay the up front costs of capital projects. Corporate bonds issued by a company such as General Electric or United Airlines are an example of private bonds.
- Loan and credit support includes such methods as direct federal loans, loan guarantees, and credit enhancements provided by several special programs.
- State Infrastructure Banks (SIBs) are revolving funds that provide loans and credit assistance to either public or private sponsors of certain capital projects.

Additional details about traditional funding and financing and innovative funding and financing sources and methods the Study considered are contained in Technical Memorandum 8.

Project Delivery Innovations

The traditional project delivery process uses Design-Bid-Build (DBB) contracting. With DBB contracting, project design is done by the transportation agency or an engineering company (through a bid process). Construction is performed by the contractor that won the subsequent competitive (low-bid) process.

Surface transportation agencies (such as CDOT) and companies (such as the BNSF/UP railroads) have developed innovative project delivery mechanisms to further leverage available public funding. Innovative project delivery mechanisms are used to reduce the duration and/or cost of project development. Several of the innovative project delivery mechanisms and approaches considered by this Study are described briefly in the next paragraphs.

Innovative Project Delivery Mechanisms

- Design-Build (DB) Contracting: This approach combines project design and construction into a single contract. The results include reduced construction time, greater integration of design and construction responsibilities, and increased accountability for project quality, schedule adherence, and costs.
- Design-Build-Operate-Maintain (DBOM) Contracting: This approach extends the DB contracting approach by enabling a team to bid on both the development/delivery of a project and subsequent O&M functions. This type of contract is also known as a "turn-key" contract.
- Design-Build-Operate-Maintain-Finance (DBOM-F) Contracting: This is a variation of the preceding DB and DBOM contracting approaches. In addition to providing a "turn-key" project, the contractor also arranges for project financing. This approach is used for large-scale projects where available funding sources are not sufficient to fully fund initial start-up costs, but are adequate to provide necessary funding over the service life of the project.



Other Innovative Approaches

- **Public-Private Partnerships:** Public owners or sponsors of public-use transportation infrastructure are seeking partners to share the cost of improvements or additions. In public-private partnerships, several stakeholders take responsibility for project funding, development, and/or delivery in order to leverage limited public resources. Examples of public-private partnership sponsors include land developers, railroads, port authorities, and local communities.
- **Public-Public Partnerships:** These partnerships include several public entities as project co-sponsors. Some sponsors may include toll authorities, port authorities, community development agencies, and local communities. This sharing of financial responsibilities is the latest initiative for leveraging available public funds for transportation projects. Examples of this type of partnership include the establishment of toll entities within departments of transportation in states such as Colorado, Texas, Oklahoma, and Florida.

Technical Memorandum 8 reviewed a number of case studies of major transportation infrastructure projects sponsored by combinations of stakeholders that included transportation departments, railroads, transit agencies, toll authorities and/or the development community. Six of those projects are the Los Angeles Ports Alameda Corridor (CA), Chicago’s CREATE Rail Upgrade (IL), Denver’s Transportation Corridor Expansion (T-REX) (CO), Reno’s ReTRAC Rail Access Corridor (NV), Spokane’s “Bridging the Valley” Rail Upgrade (WA and ID), and Texas’s State Highway (SH) 130 Toll Highway (TX).

More detail regarding the funding and financing of these case studies is included below in Tables 3-1 through 3-6.

Table 3-1 Alameda Corridor Funding and Financing Program

Funding and Financing Source	Amount (Millions)	Percent of Project Cost
GRANTS		
Ports of L.A. and Long Beach	\$394	16%
Metropolitan Transportation Authority	\$347	14%
Interest Income and Other State and Federal Sources	\$130	5%
BORROWING		
Senior Taxable Revenue Bonds	\$500	21%
Senior Tax Exempt Revenue Bonds	\$494	20%
TIFIA Loan	\$400	16%
Subordinate Revenue Bonded Debt	\$167	7%
TOTAL	\$2,432	



Table 3-2 CREATE Benefits and Proposed Funding Program

Funding and Financing Source	Amount (Millions)	Percent of Project Cost
BENEFITS		
Public benefits	\$3.9	95%
Private benefits	\$212	5%
SOURCES OF FUNDS		
Private railroads	\$212	14%
METRA (regional rail operator)	\$20	1%
Federal surface transportation reauthorization	TBD	
City and State contribution from programs like "Illinois First"	Remainder	
TOTAL	\$1,500	

Table 3-3 Denver T-REX Funding and Financing Program

Funding and Financing Source	Amount (Millions)	Percent of Project Cost
FTA Full Funding Grant Agreement	\$525	31%
FHWA Grant anticipation Revenue Vehicles (GARVEE)	\$600	36%
Transit Sales Tax Grant Anticipation Notes (GAN)	\$324	19%
Sales and Use Tax Revenues	\$195	12%
Local Funds	\$30	2%
TOTAL	\$1,674	

Table 3-4 Reno ReTRAC Funding and Financing Program

Funding and Financing Source	Amount (Millions)	Percent of Project Cost
Sales Tax	\$120	45%
Railroad ROW and Lease	\$87	33%
Special Assessment District Fees	\$21	8%
Federal and State Transportation Funds	\$21	8%
1% Room Tax	\$13	5%
Interest Income	\$2	1%
TOTAL	\$264	



Table 3-5 Spokane “Bridging the Valley” Funding and Financing Program

Funding and Financing Source	Amount (Millions)	Percent of Project Cost
Washington State Freight Mobility Strategic Investment Board	\$42	16%
Federal Rail Relocation Assistance Program (Proposed)	TBD	
Private Railroads	TBD	
TOTAL	\$270	

Table 3-6 Texas SH 130 Highway Funding and Financing Program

Funding and Financing Source	Amount (Millions)	Percent of Project Cost
Bond Proceeds	\$1,217	34%
Bond Anticipation Notes Proceeds	\$911	25%
TxDOT Equity contribution	\$700	20%
3 rd Party Right of Way Contribution	\$526	15%
Interest Earnings	\$199	6%
TIFIA Loan Proceeds	\$17	<1%
Developer Note	\$10	<1%
Accrued Interest	\$6	<1%
TOTAL	\$3,586	

These projects, like the *Proposed BNSF/UP Front Range Railroad Infrastructure Rationalization Project*, share a number of characteristics that positioned them for innovative financing and project delivery approaches:

- Large scale and scope that require more money than can be accumulated through traditional “pay-as-you-go” funding.
- High priority in terms of relieving congestion and/or mitigating environmental situations.
- Clearly defined stakeholders with complementary interests in the project.
- Willingness of sponsoring agencies and partners to share costs, risks, and returns.
- Sufficient funding sources to pay for the project over time.
- Financing mechanisms to allow project development to proceed in an expeditious manner.
- Use of innovative project delivery approaches (e.g. DB, DBOM, DBOM-F contracting) to manage project development costs and schedules.

The six case studies are summarized in Table 8-8 of Technical Memorandum 8.



Ownership of the Infrastructure

Funding and financing options for a project such as the *Proposed BNSF/UP Front Range Railroad Infrastructure Rationalization Project* depend on a number of factors. An issue that can greatly impact the type and level of funding by public and private sector stakeholder groups is who will actually own the infrastructure when it is completed. For the Project, there are four possible ownership options:

- The infrastructure and facilities may be owned by the BNSF and UP railroads on an individual basis.
- The infrastructure and facilities may be jointly-owned by the BNSF and UP railroads, particularly the new shared-access rail lines.
- The infrastructure and facilities may be jointly-owned by the principal public funding agency(s) and the BNSF and UP railroads.
- The infrastructure and facilities may be owned outright by the principal public funding agency(s).

Given the private-sector nature of the BNSF and UP railroads, it is unlikely the public sector will own the new or improved infrastructure or facilities, unless a new portion of track was established as a toll enterprise similar to the Alameda Corridor project. This leaves the issue of joint ownership between the railroads to be negotiated. It is expected the railroads would receive the appropriate "credit" for any portion of the Project they fund.

Paying for the Project

When paying for a project of the magnitude of the proposed Project, both funding and financing are major considerations and areas of risk and uncertainty.

Project Funding

For projects such as this one, sponsors need to consider a range of funding sources to spread risk over the broadest group of Project beneficiaries. This leverages the resources available. The funding program needs to be tailored to the financial capabilities and constraints of each participant, as well as the timing for making funding resources available to the Project. Potential funding strategies to do this are covered in this section.

Table 3-7 shows many of the *funding strategies* used to make large-scale infrastructure projects affordable.

Table 3-7 Possible Funding Strategies

Funding Source Options	Potential Sources	Advantages	Disadvantages
Federal Railroad Program Funds <ul style="list-style-type: none"> • Proposed Rail Relocation Grant (RRG) • Rail Rehabilitation and Improvement Fund (RRIF) 	Federal Government - Federal Railroad Administration	RRG is a proposed grant program that would be dedicated to railroad relocation projects like this.	<ul style="list-style-type: none"> • Proposed RRG program not yet authorized by Congress - may be dropped by sponsors in current budget debate. • This Project not eligible for RRIF Program funds.
Federal Highway Trust Funds <ul style="list-style-type: none"> • Earmarks • Grants • Pilot projects • Capital program • Renewal program • Congestion/emission 	Federal Government - Federal Highway Administration	Large highway-focused program with some discretion for intermodal projects and projects that reduce congestion and emissions in non-attainment areas.	<ul style="list-style-type: none"> • Major competition for available funds with needs far exceeding available funding. • Focused on highway uses - not railroad relocations except where highway



Funding Source Options	Potential Sources	Advantages	Disadvantages
reduction (CMAQ) program • State Infrastructure Bank (SIB) program			facilities are directly impacted (grade separations/ crossings). • SIBs have not received additional federal funding since 1997.
State Transportation Program Funds • Program funds • Project funds	State Government - Colorado Department of Transportation (CDOT)	• Potentially large pool of transportation-related funds. • CDOT has wide latitude in using excess sales tax revenues for various transportation-related purposes, when available, as provided by Senate Bill 1.	• High competition for available funds. • State highway funds are limited to use on State Highway System by policy and legislation. • Economic conditions since 2002 have reduced Senate Bill 1 proceeds to zero.
Regional Transportation Program Funds • New Starts Program funds for commuter rail initiatives • FasTracks Program funds	Regional Transit Agency - Regional Transit District (RTD)	• Local pool of transportation-related funds. • Might be eligible for FasTracks funds if program approved by voters this November.	High competition for available funds.
Local Transportation Funds • State transportation funds allocation • General funds • Regional Transportation District funds	Local government including cities and counties	Local pool of transportation related funds	• High competition for available funds. • May be limited to use on State and local highways and roads. • Legislation to permit formation of regional transportation districts still being debated by the State Legislature.
State Taxes • Sales tax revenues • Incremental sales tax revenues above 6% growth rate	State government	• Large statewide pool of general funds that apply to residents and visitors. • Significant revenue potential when State's economic conditions are favorable. • High discretion for using incremental sales tax revenues for transportation purposes when available.	• High competition for State sales tax receipts. • Funds generally committed to other uses. • Revenues subject to economic conditions which can vary significantly.
Local Taxes • Sales tax • Property tax increment • Special assessment district	Local government	Wide variety of funding instruments possible (e.g., E-470 funding program)	• Limited State and local budgets create high competition for limited funds. • Current political environment nationwide makes tax increases highly unlikely.
Private Company Contributions • Money • Rights of way • In-kind services	• Railroads • Coal companies • Development community	• Access to capital markets and internal funds for projects that offer high competitive returns • Private sector players need to realize benefits commensurate with their contributions.	• High competition for available funds. • Project must produce a higher rate of return than typical for the public sector.



Funding Source Options	Potential Sources	Advantages	Disadvantages
Joint Development - Public-private partnership	<ul style="list-style-type: none"> Development Community Railroads State and Local Government 	Significant opportunity to leverage scarce resources by combining public and private resources and interests. Major emphasis by leadership of US DOT and FHWA.	Requires careful balancing of project risks, returns, and responsibilities among project partners. Potential loss of control over public assets by the public sector.
User Fees <ul style="list-style-type: none"> Tolls Shadow tolls Access fees 	<ul style="list-style-type: none"> Railroads Development Community State Government 	<ul style="list-style-type: none"> Provides direct linkage between the users of the facility and its funding. Provides a long-term cash flow stream to support bond financing methods. Colorado has favorable legislation for development of tolled highways. Private sector pays for the construction cost and is reimbursed by the public sector through use-based shadow tolls. This encourages greater use of the relocated facilities by the private sector, increasing the level of benefits over time. 	Uncertainty over user willingness to pay the fees and the level of utilization of the facility when user fees are applied or adjusted over time.
Other Sources <ul style="list-style-type: none"> Utility easements Right-of-way sale Land development Trackage rights 	<ul style="list-style-type: none"> Utility companies (power, pipeline, cable/phone) Developers Region or Shortline Railroads 	Additional sources of funding to augment primary funding sources.	<ul style="list-style-type: none"> Revenue levels may be limited by scope of project. Right-of-way likely to be owned by private railroads, who would likely determine its concurrent use.

Financing Strategies

The Study team identified a number of possible Project financing strategies. The major costs for infrastructure projects such as the *Proposed BNSF/UP Front Range Railroad Infrastructure Rationalization Project* occur in the initial years of the facility and infrastructure lifecycle. These costs include Project development, ROW acquisition, utility clearance, environmental mitigation, construction, and inspection. All of these costs occur before the facility or infrastructure can be used. These costs represent the largest component of the lifecycle costs for large infrastructure projects. Project sponsors are therefore faced with the challenge of accumulating enough funding before beginning the project, or employing financing strategies to borrow funds.

Accumulating money before beginning a project is the traditional way to fund large infrastructure projects, however, this approach is not feasible for this Project.

To mitigate this funding issue, Congress authorized the Federal Highway Administration (FHWA) to allow state transportation agencies to issue "Grant Anticipation Revenue Vehicles," or GARVEEs. These GARVEEs allow state transportation agencies to borrow against future federal highway funding to pay the interest and principal on bonds that fund large infrastructure projects such as this Project. This also reduces project lifecycle costs. In Colorado, GARVEEs were used to help finance the T-REX project.

Table 3-8 shows possible *financing strategies* for large-scale infrastructure projects.





Table 3-8 Menu of Possible Financing Strategies

Financing Options	Sources	Advantages	Disadvantages
Direct Project Grants or Contributions - includes funds, rights of way, and in-kind services	Public Sector - US DOT including FHWA, FTA, FRA; CDOT, State Infrastructure Bank (SIB), RTD, and State and local governments Private Sector - including railroads, coal companies and developers	<ul style="list-style-type: none"> Avoids costs of Debt and need to pursue voter approval due to Colorado Taxpayer Bill of Rights (TABOR) Law requirements Provides funds up front when project capital costs are highest. 	<ul style="list-style-type: none"> None - except for scarcity of these kinds of funds particularly in times of economic distress. SIBs have not received additional federal funding since 1997.
Revenue Bonds	Public Infrastructure Finance Markets	Allows funds to be made available up front to pay for capital costs of project and then paid off over time.	<ul style="list-style-type: none"> Needs defined user-fee or other direct revenue source, which is unlikely for this project. Costs of debt service over term of bond.
State Bonds	State Government - CDOT	High credit rating of State due to lower risk of default	TABOR law represents significant roadblock to State support of debt for this project.
Municipal Bonds	Local government - cities and counties	Ability to issue tax-exempt bonds at relatively low rates	Reluctance or inability of local jurisdictions to incur debt for railroad infrastructure.
Private Bonds	Companies	Uses credit-worthiness of corporate entity to gain access to private bond markets for financing up-front project costs.	Typically taxable debt which significantly raises the cost of borrowing for the project.
Private Activity Bonds (PABs)	Financial Markets (railroads, developers, other private companies)	<ul style="list-style-type: none"> Tax exempt bonds for private investment in public use transportation infrastructure with favorable rates to sponsor entity. Currently available for intercity passenger rail infrastructure 	<ul style="list-style-type: none"> Federal permission for transportation-related PABs contingent on Reauthorization legislation now being developed by Congress. PAB limitation to public use infrastructure may limit use for private railroad facilities.
Anticipation Notes	FHWA including GARVEEs and State Infrastructure Bank (SIB)	Expedites the availability of Federal and State funds for needed projects.	<ul style="list-style-type: none"> Commits State to pledge future Federal highway program funds until GARVEE is paid off, including debt service. Not a direct source of funding SIBs have not received additional federal funding since 1997.
Loan and Credit Support	FHWA through TIFIA program, Railroad Rehabilitation Improvement Financing Program, and State Infrastructure Bank (SIB)	<ul style="list-style-type: none"> Leverages available Federal resources by lowering the cost of borrowing up to a third of the cost of large projects. RRIF Program lowers cost of debt by providing credit enhancement for railroad capital improvement projects that involve intermodal or rail equipment or facilities 	<ul style="list-style-type: none"> No down side, except where the sponsors cannot incur debt for the project Not a direct source of funding SIBs have not received additional funding since 1997.



Debt Financing

The Study team carefully considered debt financing as an innovative way to finance the Project Build Option. In the case of a project of this magnitude, debt financing is generally the most feasible approach.

Debt financing is used to match project expenditures with the availability of sponsor funds. Bonds are frequently used as a financing method in both the private and public sectors. An advantage of bond financing for public sector entities is the tax-exempt status of public-issue bonds at the federal, state, and local levels. Since municipal bond holders are not usually taxed on their earnings, lower interest rates can be used resulting in a lower cost of debt repayment over the life of the bond. Several possible options for Project financing when both public and private sector sponsors are involved are listed below:

- **No Financing:** The total project cost is funded on a pay-as-you-go basis using cash reserves from both private and public sector sponsors.
- **Private Financing of the Public Share Financing:** The public sector portion of the project cost is financed by private-issue, taxable debt (bonds), which is repaid by the public sector sponsors over the term of the financing. The private sector also finances its portion of the project cost using taxable debt.
- **Public Financing of the Private Share Financing:** The private sector portion of the project cost is financed by public-issue, tax-exempt debt, which is repaid by the private sector sponsors over the term of the financing. The public sector also finances its portion of the project cost using tax-exempt debt.
- **Public and Private Financing:** The project cost is financed by both public-issue, tax-exempt debt and private-issue, taxable debt, in proportion to the allocation of funding responsibilities among public and private sector sponsors of the project. The debt issues are repaid by the public and private sector sponsors over the term of the financing.

While bonds are an expedient way to fund projects in a timely manner, they are expensive to issue. The cost can be as high as one and one-half times the cost of the project. At the same time, the use of debt financing for transportation infrastructure projects has several benefits. First, debt financing expedites the flow of facility benefits. At the same time it allows the project sponsors to hedge against future price increases in project development costs.

Additional details about possible Project funding strategies are included in Technical Memorandums 8 and 9.

Conclusions

The Project offers significant benefits to both public and private sector stakeholders. These benefits are more than sufficient to warrant moving forward with the development process. Specific benefits are further detailed in Technical Memorandum 4 and Section 2 of this Report. The challenge will be to translate these benefits into support and ultimately sponsorship so the Project can be funded. This will require accommodating the interests and concerns of all parties to develop a Project funding and financing solution. The success of the solution will be measured by the willingness of the primary public and private stakeholder groups to commit the necessary resources to complete the Project.

The Study teams' analysis of Project stakeholder benefits, interests, and capabilities suggests that the major stakeholder groups for the Project are:

- *Private Sector Stakeholders*, including the railroad industry, the coal industry, the economic development community, and the grain industry.
- *Public Sector Stakeholders* would include the general public, local, state, and regional governments, and regional transit agencies.



The Study results and stakeholder determinations are further supported by the qualitative benefits projected as a result of the Project. The distribution of Project benefits for these stakeholders produces a wide foundation of support levels by group (see Appendix C, Survey Results). This backing provides significant flexibility to establish Project support levels in the future, as the Project development process evolves.

The six case studies of similar mega-projects demonstrate that a wide variety of traditional and innovative funding and financing arrangements is available to expeditiously move major rail infrastructure projects from concept to construction. These mega-projects represent the kinds of innovative approaches being used across the country to leverage resources and expedite important transportation projects. Innovative approaches being used include:

- Using public-private partnerships to balance the risks and funding responsibilities of private and public sector sponsors.
- Applying the DB approach to project delivery to assure project completion within budget and schedule requirements
- Using innovative financing strategies that combine grant, bond, and in-kind funding resources.

While debt financing raises the total costs of major infrastructure projects over their expected life-cycle, project sponsors are able to realize the benefits of their endeavors much sooner and at potentially lower life-cycle costs than when using traditional project development, funding, and financing approaches.

At this stage of the *Proposed BNSF/UP Front Range Railroad Infrastructure Rationalization Project*, it is too early to develop actual funding/financing combinations for the Project. This should be done when Project sponsors have indicated their level of interest and the underlying estimates of Project costs and benefits have been analyzed in more detail. At that point, Project sponsors might consider one or more of the funding sources and financing strategies noted earlier for crafting an adequate financial plan for the Project. Should the Project development process proceed, the Project funding and financing plan should be tailored to take into consideration the capabilities, constraints, and interests of each potential Project sponsor and stakeholder.

As this Project evolves, changes in the economic outlook for the nation, the region, and Colorado will play key roles in determining whether the Project can attain the needed support to move forward. The projected long-term benefits suggest that when evaluating whether to proceed with further development of the Project, careful consideration should be given to the potential role the Project could play in the following areas:

- Promoting Colorado's economic vitality.
- Providing greater mobility and accessibility for both freight and passenger travel in Colorado.
- Improving air quality along the Front Range.
- Preserving Colorado's quality of life.
- Enhancing Colorado's competitive position within the region.



Section 4 - Findings and Recommendations

The key findings are summarized below for the relevant Technical Memoranda from the *Public Benefits & Costs Study* (the Study) of the *Proposed BNSF/UP Front Range Railroad Infrastructure Rationalization Project* (the Project).

Data Collection and Evaluation of the Railroad Project

The proposed Project is very large in scope, with a Mid-range Scenario cost estimate of about \$1.2 billion to be expended during the four-year period between 2006 and 2009. There have been many studies and infrastructure projects that provide cost, benefit, feasibility, and other inputs for the Project. The 10 most relevant ongoing or completed studies, as determined by the Study team are listed in Table 4-1.

Table 4-1 Studies Used for Project Input

Completed studies:
The DM&E Railroad Powder River basin Draft EIS.
The Colorado State Rail Plan—Rail Bypass Feasibility Study.
The East Corridor Major Investment Study.
The RTD FasTracks Executive Summary.
The Metro Vision 2020 Plan.
The Metro Vision 2025 Interim Regional Transportation Plan.
The North Metro Transportation Study.
Ongoing studies:
Spokane’s Bridging the Valley Transportation Study.
The Chicago Regional Environmental and Transportation Efficiency (CREATE) Project.
The Los Angeles Ports Alameda Corridor Study.

Both the Burlington Northern Santa Fe (BNSF) and Union Pacific (UP) provided a large amount of data about their facilities, equipment, and operations. When data was unavailable or insufficient for Study needs, the Study team extrapolated from the existing data. A Geographical Information System (GIS) was used to create, manipulate, and enhance the Study’s maps.

The data collected and/or extrapolated shows the following major daily train volume changes between the Build and No-Build Options for selected areas as shown in Table 4-2.

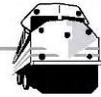


Table 4-2 Trains per Day in 2030

Location	No-Build Option	Build Option
South out of Denver to Colorado Springs	44	16
New north-south lines (Omar to Peoria)	0	37
New north-south lines (Aroya to Las Animas)	0	25
East of Denver (Peoria to Limon)	11	51
North of Denver (toward Greeley)	19	9
North of Denver (toward Omar)	45	18
West out of Denver	32	32
Northwest out of Denver	6	6

The Study team reviewed the Project cost estimate developed by the BNSF and UP railroads, and made recommendations and changes that reduced the original Project Mid-range Scenario cost estimate by less than five percent, to \$1.17 billion. In many areas of the Study this number has been rounded to \$1.2 billion.

As part of the Study’s data collection and analysis effort, 600 Survey forms (see Appendix C) were sent to statewide opinion shapers, stakeholders, and other community leaders. The 70 Survey forms returned indicated an overwhelming majority (89%) felt the overall impact of developing the Build Option would be positive. The most frequently cited benefits of the Project were economic development, reduced traffic congestion, and passenger rail facilitation. Very few respondents (4%) felt the Project impact would be negative, and the most frequently cited concern was grade crossing safety on the Eastern Plains.

Evaluation of Public Benefits

The Study found a wide range of quantifiable benefits that result from developing the Build Option. Those benefits are the conventional or direct ones forming the basis for determining the ratio of Project Costs to Project Benefits.

A major benefit of developing the Build Option is expected to come from the north-south operating efficiency gains that will accrue to the BNSF and UP railroads. Trains will travel about 96 fewer miles through the state and save about 2.8 hours in travel time along the north-south route. This is estimated to save the railroads about \$235 million through 2030. East-west operating efficiency gains from improvements in metro Denver (Utah Junction, and so forth) will generate an additional benefit estimated at \$458 million through 2030.

The Build Option will also avoid four expensive grade separation projects in the Denver area and across the state. The estimated cost savings for these avoided grade separations totals another \$60 million, when it occurs in the first few years of the Project.





A large volume of rail traffic, particularly the freight train traffic occurring in the Front Range urban corridor, will benefit from the Build Option because at-grade crossing delays will be reduced with a cost savings estimated at \$332 million through 2030. Areas that will experience increased freight train traffic, and a corresponding increase in railroad crossings, are largely rural, so at-grade crossing delays will affect fewer people.

Another major benefit resulting from developing the Build Option is expected to be increased economic development statewide. These benefits, based on the Mid-range cost/benefit scenario would include:

- Increased economic development on the Western Slope in the coal mining industry, estimated at \$118 million.
- Increased economic development along the Front Range, estimated at \$470 million.
- Urban land redevelopment, generating a one-time capital gain estimated at \$32 million, plus an additional \$0.6 million in property taxes.
- Increased economic development in Eastern Colorado, estimated at \$34 million.
- Reduced shipping costs for Eastern Colorado grain producers and reduced highway maintenance, estimated to save \$29 million.

The construction period is expected to last from 2006 through 2009. Estimated net job creation is projected to be 937 construction-related jobs and 789 supporting and ancillary jobs each year. These jobs are expected to produce federal tax revenues of about \$16.3 million each year and state and local tax revenues of about \$6.5 million each year. (Note these increases in jobs and tax revenue only cover the four-year Project construction period.)

The Build Option also yields a number of safety benefits across the state. These include reduced vehicle-train accidents resulting in an estimated \$9.6 million in savings through 2030, providing an alternate route for hazardous materials, and providing rail line alternate routes in case of a terrorist incident.

The very preliminary environmental impact assessment done by the Study team found no fatal flaws for the Build Option. The Project results in noise and vibration reductions that produce a one-time property value increase estimated at \$87 million, with an accompanying \$1.5 million annual increase in property taxes. The Build Option also results in reduced train and vehicle emissions, with an estimated savings of about \$245 million. Reduction of idle times for vehicles at crossings is estimated to save an additional \$21 million in energy use.

The preceding benefits are quantifiable. The Study found that the Build option also results in qualitative benefits. The Front Range will have improved views from fewer trains and less land devoted to heavy industry, where the Eastern Plains will see quality of life improvements from economic development and jobs growth.

The total direct Project benefits under the Build Option Mid-range Scenario are projected to be \$2.29 billion, annualized to \$128 million, allocated to private and public sector stakeholders.

The Build Option is expected to increase demand for Colorado goods and services estimated \$438 million to \$738 million during the construction period (2006 through 2009). At the same time, federal, state, and local tax revenues are projected to rise to between \$74 million and \$97 million.

A probability model showed the most frequently estimated benefit total was \$2.4 billion, with a 90% probability that benefits will exceed \$4.4 billion. The ratio of Mid-range Scenario Project costs to benefits is therefore approximately 1:2 (\$1.2 billion to \$2.4 billion). The ratio is even stronger if the Expanded Project (indirect) benefits, discussed in Technical Memorandum 8, are included.



Additional Railroad Project Impacts

Additional Project benefits may result from developing the Build Option of the Project. These include:

- The Towner Line could be tied to train movements along the new line from Aroya to Las Animas through a wye connection. This rail access could serve to attract new businesses to that corridor in Eastern Colorado.
- The Denver Rock Island shortline railroad could be reconnected as a component to reduce the east-west travel time.
- The two mainlines through Castle Rock could be consolidated, leaving the UP line through the city open for commuter rail.
- The two Class One railroads (BNSF and UP) are likely to be able to maintain a competitive balance.
- The motor carrier industry is likely to benefit from improved access to the new intermodal facilities included as part of the Build Option.
- Grain shipment to Kansas and Texas could benefit as new rail service opportunities are offered. Colorado and neighboring states' regional shippers will also benefit from new and/or improved rail transportation service.

Public Benefits of Potential Future Passenger Rail

The Project will impact future passenger rail proposals for either light rail or commuter rail lines or other intercity passenger rail lines planned outside the Denver metro area. Findings of the Study include three specific potential passenger rail projects that would be affected by the Build Option. These benefits are both positive and quantifiable. In addition, the Study finds that the Build Option would likely facilitate the implementation of other passenger rail projects.

The three passenger rail projects with quantifiable benefits are RTD's East Metro Corridor Project, RTD's North Metro Corridor Project, and a south Front Range corridor rail project (as yet not designed or formally proposed) from Colorado Springs or Pueblo to Denver.

Under the No-Build Option, RTD's East Corridor may require a 3,400-foot long structure to avoid impacting the UP's operations at the Pullman Yard. This structure is estimated to cost \$44 million, including right-of-way acquisitions. The Build Option avoids this cost by reducing the number of trains in this area from eleven per day to three, allowing passenger rail to operate within the UP's ROW.

Under the No-Build Option, RTD's North Metro Corridor requires an estimated 18 acres of right-of way west of the UP's mainline, at an estimated cost of \$5.6 million. This right-of-way is needed to avoid interference with UP's north fork of the Pullman yard. The Build Option avoids this cost by relocating the UP's Pullman yard to the east.

Under the No-Build Option, a south Front Range corridor rail project would require \$21.5 million right-of-way purchase adjacent to I-25 as far south as Castle Rock, and an additional \$58.5 million purchase from Castle Rock to Colorado Springs. The track cost difference between the two Options results in estimated additional savings of \$74 million. The total estimated savings with the Build Option is projected at \$154 million.

Under the Build Option, the total estimated savings for the three quantifiable passenger rail projects is about \$204 million.

RTD's US 36, West Line, and Gold Line Corridors are not likely to be affected by the Build Option. A north Front Range corridor rail project is also not likely to be affected.



Funding and Financing Strategies

A number of relevant completed and ongoing projects have been studied and summarized. In each instance, the Study team reviewed projects that are similar to the proposed Project to assess its funding and financing strategies:

- *The Alameda Corridor Project*—a \$2.4 billion project—used public sector grants and revenue bonds supported by freight railroad tolls applied to containers moving through the Corridor.
- *The Chicago CREATE Project*—a proposed rail upgrade project—is still being developed. The railroads have committed to a funding ceiling equal to the estimated private sector benefits of \$212 million.
- *The Denver T-REX Transportation Corridor Expansion* is a Design-Build project that combines highway and transit improvements within a bonding package.
- *The Reno ReTRAC Rail Access Corridor*—proposes using both railroad and local dedicated revenues for major funding. Dedicated revenues include lease income, special assessment district taxes, hotel room taxes, and local sales taxes.
- *The Texas SH Toll Highway*—plans to rely largely on toll-supported revenue bonds.

The Project Benefit/Cost Scenarios are based on the Mid-range Scenario. The Low Scenario capital costs were estimated by decreasing the Mid-range Scenario capital cost figures by 10%; the High Scenario capital costs were estimated by increasing the Mid-range Scenario figures by 30%. This resulted in a range of \$1.1 billion to \$1.5 billion in Project costs over the four-year period from 2006 through 2009. For planning and estimation purposes, operations for this Project are expected to begin in 2010.

Expanded Project Benefits

In order to determine total (direct and indirect) Project Benefit/Cost ratios and allocate funding responsibilities, the Study team considered the following:

- Projected total direct benefits from the Project (see Study Technical Memorandum 8 and Section 2 of this Final Report).
- Projected income from wages and salaries from the net increase in jobs created directly or indirectly by the Project.
- The projected annual increase in severance from added Western Colorado coal produced as a result of the Project.

For the Mid-range Scenario, the expanded Project benefits have an estimated net present value of \$5.2 billion, against a net present value of total Project costs estimated at \$1.2 billion.

- The Mid-range Scenario produces a benefit-to-cost ratio of 4.3 for the Project when direct and indirect benefits are included.
- Private sector benefits of \$1.4 billion account for 27% of total direct and indirect Project benefits.
- Public sector benefits of \$3.8 billion account for 73% of total direct and indirect Project benefits.

Potential support for the Project depends on several factors, including the level of public and private sector stakeholder support, quantitative benefits, competitive interest, stakeholder willingness and the ability to provide Project funding, and perceived or qualitative benefits.

Funding Strategies





There are many possible ways to fund and finance major infrastructure and facilities projects such as the *Proposed BNSF/UP Front Range Railroad Infrastructure Rationalization Project*. Traditional financing includes pay-as-you-go, the normal way to fund highway projects since there are revenues sources to do so, and Grant Anticipation Revenue Vehicles (GARVEEs), authorized by Congress. Innovative financing includes direct project grants, revenue bonds, state-issued bonds, municipal bonds, private bonds, anticipation notes, and loans and credit support.

Most innovative financing methods rely on debt financing (bonds). This form of financing adds significant costs (up to 50%) to projects, but expedites their completion. The Study team identified a number of methods as possible options for Project financing, including the No-Financing Option, the Public Share Financing Option, the Private Share Financing Option or the Public and Private Financing Option. However, more in-depth analysis will be needed to choose the ultimate funding and financing strategies.

Study Conclusions

The Study's data support the Project's assertion that sufficient benefits are likely to accrue to the citizens of Colorado to warrant consideration of the investment of public funds in the Project. The Study shows that costs for the Project are far less than the value of the benefits to the public and private sector stakeholders^{xvii}. Important points are highlighted below.

- Under the Low, Mid-range, or High Scenarios more than sufficient direct and indirect benefits accrue to warrant consideration of the investment of public funds for further study of the Build Option of the proposed Project.
- The major stakeholders in the Project include private sector (railroads, grain industry, coal industry, economic development community) and public sector (federal, state, and local governments and transit providers).
- The Project will require adequate funding from both public and private sectors. Resources are scarce and other projects are competing for funds.
- A high degree of uncertainty exists about Project benefits. Stakeholders may be unwilling to accept funding responsibilities commensurate with their potential benefits.
- A wide variety of traditional and innovative funding and financing options are available to move the Project from concept to construction in an expeditious manner.
- Debt financing raises the total Project cost, but sponsors and stakeholders will receive Project benefits sooner and at potentially lower lifecycle costs than by using traditional funding approaches.
- The ultimate Project funding and financing strategy should be tailored to the capabilities, constraints, and interests of each Project sponsor and stakeholder.
- The projected Mid-range Scenario long-term benefits suggest that careful consideration should be given to the potential role this Project could play in promoting Colorado's economic vitality, providing greater mobility and accessibility for both freight and passenger rail travel in the state, improving air quality along the Front Range, preserving Colorado's quality of life, and enhancing Colorado's national and international competitive position.

The Next Steps

Consensus of all the Project beneficiaries, both public and private, will be needed for the Project to move forward. The findings and recommendations in this Final Report are largely the opinion of the Study team. The following tasks are likely to be the most important next steps in the short-term:



- *Public Involvement.* If the general public is going to be expected to pay for a portion of the project costs, a more comprehensive public involvement program must be developed, in accordance with federal requirements and local practices.
- *Environmental Studies.* If federal funding is expected to be used for any portion of the project costs, the National Environmental Policy Act (NEPA) process must be started soon and followed to conclusion. This will be a significant effort, thus, time is of the essence.
- *Funding and Financing Negotiations.* All the Project beneficiaries must reach a funding and financing agreement, at least in principle, very soon. More in-depth study is likely to be needed to improve stakeholder confidence in the direct and indirect (qualitative and quantitative) benefit calculations in the Study.
- *Project Development.* Finally, the *Proposed BNSF/UP Front Range Railroad Infrastructure Rationalization Project* is really a "program" with several component projects, each in a different stage of engineering development. Some components have been developed from a conceptual perspective with little or no design to support them. Other components are well-developed, with significant design and some construction already underway. All the projects will need to be advanced to a minimum level of preliminary design in order to increase stakeholder confidence in the overall Project capital cost estimate.



Appendix A - Glossary of Terms and Acronym List

Glossary

At-grade roadway crossing:	The location where a local street or highway crosses the railroad tracks at the same level or elevation.
Attainment area:	An area that meets National Ambient Air Quality Standards (NAAQS) specified under the Clean Air Act.
A-weighted sound level (dBA):	The most commonly used measure of noise, expressed in "A-weighted" decibels (dBA), it is a single-number measure of sound severity that accounts for the various frequency components in a way that corresponds to human hearing.
Ballast:	Top surface of rail bed, usually composed of aggregate (e.g. small rocks and gravel).
Branch line:	A secondary line of railroad usually handling light volumes of traffic.
Build Option:	Implementation of the Project.
Bulk Train:	Also known as a unit train. A complete train consisting of a single non-breakable commodity such as coal, grain, semi-finished steel, sulfur, potash, or orange juice with a single point of origin and destination.
Class One/Class 1 Railroad:	Railroads that exceed annual gross revenues of \$250 million, in 1991 dollars. The amount is indexed annually to reflect inflation. For 1996, the annual gross revenue was \$255 million.
Commuter Rail:	Rail lines that move people.
Consist:	The make-up of a train, usually referring to the number of cars.
Construction Footprint:	The area of a construction site subject to both permanent and temporary disturbances by equipment and personnel.
Cultural Resource:	Any prehistoric or historic district, site, building, structure, or object that warrants consideration for inclusion in the National Register of Historic Places (NRHP). For the purposes of this report, the term applies to any resource more than 50 years of age for which SEA gathered information to evaluate its significance.
Day-Night Sound:	One of the most widely accepted measures of cumulative noise exposure in residential areas. The Day-Night Sound Level is the A-weighted sound level, averaged over a 24-hour period, but with levels observed during the night-time hours between 10 p.m. and 7 a.m., increased by 10 dBA to account for increased sensitivity at night.
dBA:	Adjusted decibel level. A sound measurement that adjusts noise by filtering out certain frequencies to make it analogous to that perceived by the human ear. It applies to what is known as an "A-weighting" scale to acoustical measurements.



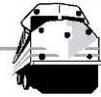
Decibel (dB):	A logarithmic scale that compresses the range of sound pressures audible to the human ear over a range from one (1) to 140, where 0 dB represents the sound pressure corresponding to the threshold of human hearing and 140 dB corresponds to a sound pressure at which pain occurs. Sound pressure levels that people hear are measured in dBs, much as distances are measured in feet or yards.
Deciduous:	Any plant whose leaves fall off during certain seasons; usually in reference to tree types.
Design-Bid-Build:	The traditional project delivery process, project design is performed by the transportation agency or an engineering firm secured through a qualifications-based negotiated-bid process, while construction is performed by a construction contractor secured through a subsequent competitive low-bid process.
Design-Build:	This approach combines project design and construction into a single contract, whereby the contract team is responsible for both developing and executing the project plans. This approach reduces project contracting time, promotes greater integration of design and construction responsibilities, and increases contract team accountability for project quality, schedule, and cost.
Design-Bid-Operate-Maintain:	This approach extends the design-build contracting approach by enabling the contract team to bid on both the development/delivery of the project and its subsequent operation/maintenance functions. This approach holds the contract team accountable for project compliance with performance-based specifications over the term of the contract. These are also known as "turn key" contracts, in the sense that a single contract team develops, delivers, and operates the project on behalf of the project owner/sponsor.
Design-Bid-Operate-Maintain-Finance:	The contractor not only develops and delivers the project, but also arranges for project financing either directly or through a third party. This approach is used for large-scale projects where available funding sources are not sufficient to fully fund initial start-up costs, but are sufficient to provide the necessary funding over the service life of the project.
Diesel Multiple Unit (DMU):	A new generation of the Rail Diesel Car.
Double Stacks:	See intermodal train.
Emergent species:	An aquatic plant with vegetative growth mostly above the water.
Endangered species:	A species of plant or animal that is in danger of extinction throughout all or a significant portion of its range and is protected by state and/or federal laws.
Federal Railroad Administration:	The governing body whose mission is to provide support, analysis, and recommendations on broad subjects relating to the railroad industry, such as: mergers and restructuring; economic regulation; rail economics; financial health; traffic patterns and network analysis;



	labor-management issues; freight data and operations; intermodalism; environmental issues; and international programs.
Fixed Guideway Transit:	Non-bus transit such as light rail, airport subway and similar systems.
Flat yard:	A system of relatively level tracks within defined limits for making up trains, storing cars, and other purposes, which requires a locomotive to move cars (switch cars) from one track to another.
Flood plain:	The lowlands adjoining inland and coastal waters and relatively flat areas ad flood-prone areas of offshore islands, including, at a minimum, that area inundated by a one percent (also known as 100-year or Zone A floodplain) or greater chance of flood in any given year.
Freight rail:	Rail lines that move freight.
Frog:	A track structure used where two running rails intersect that permits wheels and wheel flanges on either rail to cross the other rail.
GARVEE bonds:	Grant anticipation notes or revenue bonds
Grade crossing:	An intersection between a railroad track and a roadway where the cross at the same grade or elevation.
Grade separation:	An intersection between a railroad track and roadway where they are separated by height or elevation, the railroad crosses over the roadway on a structure, or vice versa.
Grade-separated crossings:	See grade separation.
Habitat:	The place(s) where plant or animal species generally occur(s) including specific vegetation types, geologic features, and hydrologic features. The continued survival of that species depends on the intrinsic resources of the habitat. Wildlife habitats are often further defined as places where species derive sustenance (foraging habitat) and reproduce (breeding habitat).
Haulage right:	The limited right of one railroad to operate trains over the designated lines of another railroad.
Hazardous materials (HAZMAT):	Any material that poses a threat to human health and/or the environment. Typical HAZMAT substances are toxic, corrosive, ignitable, explosive, or chemically reactive.
Heavy Rail:	Refers to the weight of the rails.
Historic property:	Any prehistoric or historic district, site, building, structure, or object that warrants consideration for inclusion in the National Register of Historic Places (NRHP). The term "eligible for inclusion in the NRHP" includes both properties formally determined as such by the Secretary of the Interior and all other properties that meet NRHP listing criteria.
Hump yard:	A railroad classification yard in which the classification of cars is accomplished by pushing them over a summit, known as a "hump," beyond which they run by gravity.



IMPLAN	IMPLAN is an economic model for determining regional economic impacts of project expenditures. It uses economic multipliers to estimate the indirect and induced impacts of project spending on jobs and earnings -- aka the "spin-off" effects. The IMPLAN model itself is simple and widely used.
Induced Demand:	In this context, induced demand from reduced congestion refers to additional traffic that is now on the road because there is less congestion. The reduced congestion improves traffic flow, and subsequently becomes more attractive to commuters.
Interlocking:	An arrangement of switch, lock, and signal appliances interconnected so that their movements succeed one another in a predetermined order, enabling a moving train to switch onto adjacent rails. The process may operate manually or automatically.
Intermodal facility:	A site or hub consisting of tracks, lifting equipment, paved areas, and a control point for the transfer (receiving, loading, unloading, and dispatching) of intermodal trailers and containers between rail and highway or rail and marine modes of transportation.
Intermodal train:	A train consisting or partially consisting of highway trailers and containers or marine containers being transported for the rail portion of a multimodal movement on a time-sensitive schedule; also referred to as a piggyback, TOFC (trailer on flatcar), and double stacks (for containers only).
Key routes:	As defined by the American Association of Railroads (AAR), a key route is a track that carries an annual column of 10,000 car loads or intermodal tank loads of HAZMAT. The AAR developed voluntary industry key route maintenance and equipment guidelines designed to address safety concerns in the rail transport of HAZMAT. For analysis purposes, SEA has used the term "major key route" to identify routes where the volume of HAZMAT carried on a route would double and exceed a column of 20,000 car loads as a result of the proposed Conrail Acquisition.
Key Stakeholders:	<i>Private Sector Stakeholders</i> include the railroad industry, the coal industry, the grain industry and the economic development community. <i>Public Sector Stakeholders</i> include the general public, local, state, and regional governments, and regional transit agencies.
Level of Service (LOS):	Level of service rating (A through F). A measure of the functionality of a highway or intersection that factors in vehicle delay, intersection capacity, and effects on the street/highway network.
Lift:	A lift is an intermodal trailer or container lifted onto or off a rail car. Lifts are used to determine the number of trucks using intermodal facilities.
Light Rail:	Refers to the weight of the rails.
Locomotive, road:	One or more locomotives (or engines) designed to move trains between yards or other designated points.



Locomotive, switching:	A locomotive (or engine) used to switch cars in a yard, between industries, or in other areas where cars are sorted, spotted (placed in a shipper's facility), pulled (removed from a shipper's facility), and moved within a local area.
Mainline:	The principal or main lines of a railway.
Merchandise train:	A train consisting of single and/or multiple car shipments of various commodities.
Mitigation:	Actions to prevent or lessen negative effects.
Multi-modal:	Integrated transit systems such as bus-rail-bicycle-auto.
National Highway System:	The U.S. road system that includes the federal Interstate Highway System, certain other limited access highways, and primary intercity roadways.
National Register:	A listing of historic places maintained by the Secretary of the Interior.
National Wetlands:	An inventory of wetland types in the United States compiled by the USFWS.
No-Build Option:	Maintaining the present system with some improvements.
Noise:	Any undesired or unwanted sound.
Palustrine wetland:	Non-tidal wetland dominated by trees, shrubs, or persistent emergent vegetation. Includes wetlands traditionally classified as marshes, swamps, or bogs.
Passby:	The passing of a train past a specific reference point.
Pick up:	To add one or more cars to a train from an intermediate (non-yard) track designated for the storage of cars.
Piggyback:	See intermodal train.
Prime farmland:	Land defined by the National Resource Conservation Service (NRCS) as having the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops.
Public Involvement Plan:	A plan to provide information about The (Railroad) Project/Study state-wide and beyond. A means to engage key stakeholders in working through issues related to the Study. A means to solicit input from potentially affected citizens, businesses, and interest groups.
Public-Private Partnership:	Increasingly, public owners and/or sponsors of public-use transportation infrastructure are seeking private partners to share the costs and benefits of needed improvements or additions to transportation infrastructure. This can take the form of public-private partnerships, whereby several stakeholders take responsibility for project funding, development, and/or delivery in order to leverage limited public resources. This approach is particularly useful when project sponsors proactively indicate their interest in having the project built expeditiously and are willing to bear some of the



financial responsibility. Examples of partnership sponsors include land developers, retail centers, amusement parks, railroads, port authorities, toll authorities, engineering firms, and local communities.

Public-Public Partnership:	Partnerships that include several public entities as project co-sponsors, such as toll authorities, port authorities, community development agencies, and local communities. The sharing of financial responsibilities among multiple public entities is the latest initiative for leveraging available public funds for transportation projects. This arrangement breaks down traditional barriers between institutional competitors, such as transportation departments and their toll authority counterparts, due to the potential for expediting needed projects. In some cases, the advantages of public-public partnerships has resulted in the consolidation of the functions of the public partners. Examples include the establishment of toll entities within state departments of transportation, such as in Colorado, Texas, Oklahoma, and Florida.
Public Utilities Commission:	The PUC. The governing body for changes to rail crossings. This includes adding or removing at-grade vehicle crossings.
Railbanking:	A set-aside of abandoned rail corridor for recreational and/or transportation uses, including reuse for rail.
Railroad Rehabilitation and Improvement Financing Program:	A Federal Railroad Administration (FRA) program provides credit enhancement for railroad capital improvement projects that involve intermodal or rail equipment and/or facilities.
Rail spur:	A track that diverges from a main line, also known as a spur track or rail siding, which typically serve one or more industries.
Rail yard:	A location where rail cars are switched and stored.
Receptor/receiver:	A land use or facility where sensitivity to noise or vibration is considered.
Right-of-way (ROW):	The strip of land for which an entity (e.g. a railroad) has a property right to build, operate, and maintain a linear structure, such as a road, railroad, or pipeline.
Riparian:	Relating to, living, or located on, or having access to, the bank of a natural watercourse. May include a lake or tidewater.
Riprap:	A loose pile or layer of broken stones erected in water or on soft ground to guard against erosion.
Riverine wetland:	All wetlands and deepwater habitats contained within a channel, either naturally or artificially created.
Route miles:	Distance calculated along a railroad's main and branch lines.
Scrub-shrub:	Areas dominated by woody vegetation less than six meters (20 feet) tall, including shrubs and young trees.



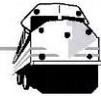
Section 129 of Title 23 U.S.C.:	A federal loan and credit support program aimed at lowering the borrowing costs associated with loans to toll projects.
Set onto:	To remove on or more cars from a train at an intermediate (non-yard) location such as a siding, interchange track, spur track, or other track designated for the storage of rail cars.
Take or taking:	Refers to the removal of property, an acquisition of ROW, or loss and/or degradation of a species' habitat.
The Project:	The Proposed BNSF/UP Front Range Infrastructure Rationalization Project. See Appendix A of Technical Memo 2.
The Railroad Study:	The Proposed BNSF/UP Front Range Infrastructure Rationalization Project
Towner Line:	A railroad line from east of Pueblo to Towner. Owned by CDOT.
Threatened:	A species that is likely to become an endangered species within the foreseeable future throughout all or part of its range, and is protected by state and/or federal law.
Trackage rights:	The right or combination of rights of one railroad to operate over the designated trackage of another railroad including, in some cases, their right to operate trains over the designated trackage; the right to interchange with all carriers at all junctions; and the right to build connections or additional tracks in order to access other shippers or carriers.
Turnout:	A track arrangement consisting of a switch and frog with connecting and operating parts, extending from the point of the switch to the frog, which enables engines and cars to pass from one track to another.
Unit train:	A train consisting of cars carrying a single commodity, e.g. a coal train (see bulk train).
US DOT's Transportation Infrastructure Finance and Innovation Act:	This program leverages available federal resources by lowering the cost of borrowing up to a third of the cost of large projects (over \$100 million total project cost).
Water resources:	An all-inclusive term that refers to many types of permanent and seasonally wet/dry surfaces or water features such as springs, creeks, streams, rivers, ponds, lakes, wetlands, canals, harbors, bays, sloughs, mudflats, and sewage-treatment and industrial waste ponds.
Western ASHTO	Western Transportation Trade Network Association
Wetlands:	As defined by 40 CFR part 230.3, wetlands are "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Wetlands generally include swamps, marshes, bogs, and similar areas.

public **Benefits & Costs** study

of the Proposed BNSF/UP Front Range Railroad Infrastructure Rationalization Project



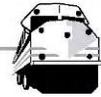
- Wye track: A principal track and two connecting tracks arranged like the letter "Y."
- Yard truck: Any truck that delivers into a rail yard.



Acronyms

2MT	Double mainline track
AADT	Average Annual Daily Traffic
AAR	American Association of Railroads
ADT	Average daily traffic
APE	Area of Potential Effect
ATSF	Atchison Topeka Sante Fe Railroad
BACT	Best Available Control Technology
BNSF	Burlington Northern and Santa Fe Railway Company
CACI	Colorado Association of Commerce and Industry
cap	Capital
CBD	Commerce Business Daily
CEO	Chief Executive Officer
CDOT	Colorado Department of Transportation
CDPH	Colorado Department of Public Health
CERCLIS	Comprehensive Environmental Response, Contamination, and Liability Information System
CERCLA	Comprehensive Environmental Response Compensation and Liability Act (1980)
CKP	Colorado, Kansas and Pacific Railroad
CMAQ	Congestion-Emission Reduction
CREATE	Chicago Regional Environmental and Transportation Efficiency Project
CTC	Centralized Traffic Control
dBA	"A-weighted" decibels
DB	Design-Build
DBB	Design-Bid-Build
DBOM	Design-Bid-Operate-Maintain
DBOM-F	Design-Bid-Operate-Maintain-Finance
DIA	Denver International Airport
DM&E	Dakota, Minnesota, and Eastern
DMT	Double mainline track
DMU	Diesel Multiple Units/Diesel Multi Unit
DOT	Department of Transportation
DRCOG	Denver Regional Council of Governments
D&RG	Denver and Rio Grande





DRI	Denver Rock Island Line
DUT	Denver Union Terminal, usually referred to as DUS or Denver Union Station
EIS	Environmental Impact Statement
EL	Elevation
EPA	Environmental Protection Agency
ERNS	Emergency Response Notification System
FAQ	Frequently Asked Question
FEIS	Final Environmental Impact Study
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GAN	Grant Anticipation Note
GARVEE	Grant Anticipation Revenue Vehicle
GDP	Gross Domestic Product
GIRAS	Geographic Information Retrieval Analysis System
GIS	Geographical Information System
GPS	Global Positioning System
G.S.	Grade Separation
GWRGWRR	Great Western Railroad
HAZMAT	Hazardous Materials
HOV	High Occupancy Vehicle
LOS	Level of Service
LRT	Light Rail Transit
METRA	Metropolitan Transit Authority (Chicago)
MIS	Major Investment Study
NAAQS	National Ambient Air Quality Standards
NRCS	National Resource Conservation Service
NEPA	National Environmental Policy Act
NPV	Net Present Value
NRHP	National Register of Historic Places
O&M	Operations/Operating and Maintenance
PAB	Private Activity Bond
Ph	Phase





PNW	Pacific Northwest
PUC	Public Utilities Commission
RCRA	Resource Conservation and Recovery Act
ROW	Right-of-Way
RR	Railroad
RRG	Rail Relocation Grant (program)
RRIF	Railroad Rehabilitation and Improvement Financing Program
RTD	Regional Transportation District (Denver)
RTP	Regional Transportation Plan
SH	State Highway
SIB	State Infrastructure Bank
SMT	Single mainline track
TAC	Technical Advisory Committee
TBD	To Be Determined
TEA-21	Transportation Equity Act for the Twenty-First Century
TESS	Threatened and Endangered Species System
TEU	Twenty-foot Equivalent Container Unit
TIFIA	Transportation Infrastructure Finance and Innovation Act Program
T-REX	Transportation Corridor Expansion
TTI	Texas Transportation Institute
TM	Technical Memorandum
TOFC	Trailer on Flatcar
TPD	Trains per Day
UP	Union Pacific
UPRR	Union Pacific Railroad Company
USFWS	US Fish and Wildlife Service
URL	Uniform Record Locator
UTA	Utah Transit Authority
VP	Vice President



Appendix B - Additional Railroad Project Impacts

Introduction

If the Build Option of the *Proposed Burlington Northern Santa Fe (BNSF)/Union Pacific (UP) Front Range Railroad Infrastructure Project* (the Project) proceeds, there are a number of opportunities and issues that are related to the Project. These opportunities are not, however, dependent upon the Project being implemented. The additional railroad Project impacts assessed during the Study are:

- The Colorado, Kansas and Pacific (CKP) Towner Line.
- Shortline impacts.
- Impacts to the existing Class One infrastructure within the state.
- Maintaining competitive balance between the BNSF and UP railroads.
- Impacts on the motor carrier industry and the railroads.
- Impacts on Colorado coal.
- Changes in truck movements in the Denver area.
- Impacts to neighboring states.

Highlights of the Other Opportunities/Issues

The CKP Towner Line.

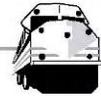
The Towner Line is owned by CDOT and is currently leased to the CKP railroad. The 121-mile long Towner Line will be intersected by a 60-mile long segment of the new Aroya-Las Animas rail line proposed under the Project. The addition of a wye connector at or near the intersection point (Haswell, CO) could help to attract businesses to the area.

Discussions have also been held with the UP Railroad about the feasibility of reopening Tennessee Pass. Although reopening the Tennessee Pass rail line, in conjunction with the Towner Line, could expand the use of the Central Corridor for transcontinental traffic, this is unlikely to happen.

Shortline Impacts.

There are several shortline railroads in the state that may be affected by the Build Option of the Project. These shortlines include:

- The CKP Railroad.
- The presently out-of-service Denver Rock Island (DRI) Line.
- Omni TRAX, the operator of the shortlines in the region north of Denver, if trains are rerouted.
- Possible new shortline subsidiaries of the BNSF and UP railroads.



Impacts to Existing Class One Infrastructure.

It is unlikely the Moffat Tunnel will be improved to provide clearance for hi-cube double-stacked equipment. The other alternative, Tennessee Pass, is also unlikely to be reopened.

It is likely that the land adjacent to the new rail corridors, where both Class One railroads operate jointly, will be opened to new industry. The joint use of this rail line may encourage rail shippers seeking competitive rates from the two railroads to consider moving operations to this land.

Consolidating the two mainlines through Castle Rock has been studied in the past. The Build Option may realize the benefits identified in these earlier studies.

Maintaining Competitive Balance Between Class One Railroads.

It is too early to speculate on the impacts the Build Option might have on the competitive balance between the BNSF and UP railroads, but the railroads intend to maintain a competitive balance as a result of the Project.

Impacts on the Motor Carrier Industry.

The motor carrier industry is likely to balk at the use of public funds for a private enterprise such as the proposed Project. In other parts of the country, such as with the *Chicago Regional Environmental and Transportation Efficiency (CREATE)* project, the motor carriers are expected to benefit greatly from the results of the project.

Relocating intermodal facilities away from highly congested metro areas to locations adjacent to Interstate highways should be viewed as a benefit by the motor carrier industry.

Impacts on Colorado Coal.

Coal transport is a very low-profit business. Currently coal that originates in Western Colorado must be handled several times. The infrastructure improvements proposed under the Build Option will greatly improve the fluidity of east-west coal movements and thereby decrease operating costs, improving revenues.

Changes to Truck Movements in the Denver Area.

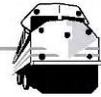
Relocating the UP Railroad's Pullman Yard and Rolla Auto Ramp and the BNSF Railroad's Globeville, Renick, and Denver Intermodal to locations outside Denver's city center will greatly affect the flow of truck traffic in the Denver area.

Truck delay has been estimated to cost \$50 per hour. If the development of the Project can save 500 hours of delay per day, the net savings is about \$9 million per year.

Impacts to Neighboring States.

Kansas could benefit from the Project due to increased overhead traffic on the CKP Railroad. Grain from Kansas may particularly benefit since Kansas-based shippers would have more direct access to the Pacific Northwest rail routes.

The entire area stands to benefit from the Project since improved rail transportation would shift the economic "watershed" in favor of regional shippers.



Appendix C - Survey and Public Involvement Results

Introduction

A major element of the *Public Benefits & Cost Study* (the Study) is the Public Involvement Plan (the Plan). Details of this Plan can be found in Technical Memo Number 3. This Plan was designed to accomplish a number of things:

- Provide information across the state and beyond the state about the Study.
- Engage key public and private sector stakeholders to work together to think through the issues related to the Study.
- Involve the key stakeholders in making recommendations to Colorado Department of Transportation (CDOT) decision-makers.
- Solicit input from potentially affected citizens, businesses, and interest groups regarding possible positive and negative impacts to their communities and gain their perceptions of the value of those benefits and cost of any impacts.

A database of about 375 people from the Front Range, Eastern Plains, and northwest Colorado was surveyed using the survey form in this Appendix. The individuals chosen for the survey were selected because they:

- Are involved in planning and development efforts that shape the physical characteristics and quality of life in their communities.
- Interact with, or represent, a broad cross-section of people in their community.
- Represent the perspective of numerous organizations and interests.

Some of the organizations surveyed also distributed the survey to some of their members. Altogether about 600 surveys were distributed and 70 were completed and returned.

Survey Results

The overwhelming majority of survey respondents indicated the overall impact of the *Proposed BNSF/UP Front Range Railroad Infrastructure Rationalization Project* (the Project) would be more positive than negative for their community. After considering the potential positive and negative impacts, 89% of those choosing to reply said this project would be a net benefit to their community. Only 4% replied the overall impact would be more negative.

The survey form is contained in Figure C-1. The Survey Results—Perceived Benefits are presented in Table C-2. The Survey Results—Concerns are presented in Table C-3.



Figure C-1 Public Survey

Public Survey

We would greatly appreciate your response to the survey no later than February 20, 2004, if possible. To respond, simply hit REPLY TO ALL and respond to the following questions.

1. Do you see this proposed project as having an impact on your community? To what extent (slight to significant)?
2. Who in your community do you think could potentially feel the greatest impact? How might they be affected?
3. What do you think the potential impact might be in terms of:
 - a. Economic impacts
 - i. Potential job creation or job loss?
 - ii. Potential additions or loss to the tax base?
 - iii. Attracting businesses to locate to, or move from, your community?
 - iv. Other economic impacts?
 - b. Environmental impacts
 - i. Potential improvements or deterioration in air quality?
 - ii. Potentially positive or negative impacts on land use?
 - iii. Impacts on water quality, either positive or negative?
 - iv. Other environmental impacts?
 - c. Traffic movement, in terms of increased or decreased congestion, or increased or decreased safety risks?
4. What other potential impacts not mentioned do you see?
5. Of these potential impacts, which have the potential to be the greatest benefit to your community? Which cause you the greatest concern?
6. When considering all the potential positive and negative impacts, do you think the overall impact could be more positive or negative for your community?
7. How do you think your community in general will react to this proposed project?
8. Do you see this possible realignment as conflicting with any development, land use, or other plans for your community? As being consistent with redevelopment opportunities in your community?
9. Do you have any other comments or information you consider important for evaluating the impacts on your community that we have not mentioned?
10. In which part of the state you reside? (City or region)
11. You are responding as:
 - a. An elected official _____
 - b. A government official _____
 - c. A chamber of commerce or economic development official _____
 - d. A private sector business _____
 - e. Other _____

Please feel free to provide any additional comments.

Benefits

Almost 25% of the respondents cited the potential for this Project to spur economic growth as the most significant benefit. In the Eastern Plains, respondents felt they might attract freight-related businesses as long as the relocated rail lines included stops and transfer points. There is also the possibility of





construction-related jobs. Along the Front Range, respondents felt there was the potential for redevelopment along the corridor, particularly in the Central Platte Valley.

Congestion and traffic delay reductions were cited as a benefit by 23% of the respondents. Another 21% felt the new rail lines might offer the potential for commuter rail transportation in the Denver metro area and from Pueblo to Fort Collins.

Table C-2 Geographic Area of Respondent/Perceived Benefits

Greatest Benefit	Denver Metro	Eastern Plains	North Central	South Central	Western Slope	TOTAL
Commuter Rail Transport	9		3	3		15
Congestion/Delays	10	1	4	1		16
Economy/ Redevelopment	7	6	2	2		17
Safety	4		2	1	1	8
Job Creation/ Maintenance	1	5			1	7
Reduced Noise/ Pollution	5		3			8
Increased Tax Base		3	1	1		5
Other (continued coal production, land use, access to Gulf Markets)	1	1			2	4

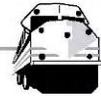
Concerns

The majority of respondents had no concerns about the Project. When they did express concerns there was less consistency in the type or frequency. Some of concerns included:

- Safety in Eastern Plains communities due to the increased number of grade crossings (13%).
- Increased congestion, primarily in Eastern Plains communities (9%).
- Negative effects on Colorado’s coal industry.
- Cost.

Table C-3 Geographic Area of Respondent/Concerns

Greatest Concern	Denver Metro	Eastern Plains	North Central	South Central	Western Slope	TOTAL
Safety	2	7				9
Cost/Funding	1		1		1	3
Loss of Shipping Mode	3			1		4
Coal Transport (WY. Coal)				2	2	4
Increased Congestion	2	1	1	1	1	6
Project Won't Happen	2		1			3
No Concerns	2	4	2	2		10
Other (Increased pollution, loss of farm land, detract from highway funding)	5	2	2	2		11



Community-Specific Issues

A number of issues specific to various communities (Colorado Springs, Fort Carson, Pueblo) were also raised. Specific issues can be viewed in Technical Memorandum 4.

Stakeholder List

See Technical Memo Number 2.

ⁱ See TM 4 for details about data collection and evaluation.

ⁱⁱ Section 1, Scope and Costs, explains the data collection process and covers the estimated Project Costs. Section 4, Funding and Financing, evaluates means to fund and finance the Build Option.

ⁱⁱⁱ See TM 5 for more details about the benefits, data, analyses, and other criteria.

^{iv} See TM 4 for more detailed data collection and analysis.

^v See the FRA website (www.fra.gov) for detailed information for all 4,755 rail crossings.

^{vi} See Table 5-5, Total Benefits from Reduced Number of Grade Separated Crossings, in TM 5.

^{vii} Note that the benefits do not begin until operations begin (in 2010) under the Build Option.

^{viii} Additional details and explanations of the models are explained in Appendix A of Study TM 5.

^{ix} Hunt, Harold D. "Alliance" *Tierra Grande*, Texas A&M Real Estate Center Journal. No. 1525. October, 2001.

^x Assuming there are no environmental issues or restrictions.

^{xi} See Table 5-10 of TM 5 for specific details.

^{xii} See appendix B of TM 5.

^{xiii} FRA, *Safety Compliance Oversight Plan for Rail Transportation of High-Level Radioactive Waste and Spent Nuclear Fuel*, June 1998.

^{xiv} Significant additional detail about the natural environment can be found in TM 5.

^{xv} *A Profile of the Cultural Resources of Colorado 2003*, National Register of Historic Places (NRHP).

^{xvi} See TM 7 for more details.

^{xvii} See Section 3, Project Benefits.