



5.0 Evaluation of Alternatives

5.1 Introduction

This chapter presents a comparative evaluation of the final alternatives carried forward in the Gold Line FEIS for the provision of commuter rail service. The intent of this evaluation is to demonstrate the relative effectiveness of the recommended Preferred Alternative compared with the No Action and Baseline Alternatives in meeting the project's stated Purpose and Need statement and other evaluation measures. Most of the information in this chapter is derived from materials presented in previous chapters and provides the basis for decision-makers and the public to assess the relative benefits, costs, and environmental consequences of the Preferred Alternative against the stated goals and objectives of the project.

This analysis is focused on four areas:

- Performance in satisfying Purpose and Need
- Tradeoff analysis: Comparative benefits and environmental effects
- Irreversible and irretrievable commitments of resources
- Financial feasibility

In addition, the FTA has established the New Starts program to evaluate and rate candidate projects for federal funding. The New Starts program includes a comprehensive planning and project development process that agencies must follow when seeking federal funding. RTD currently intends to seek New Starts funding for the Gold Line project. This program is described in Section 5.4, New Starts Evaluation and Rating.

For the purposes of this Chapter, the CRMF impacts are additive to the Gold Line Preferred Alternative. This is because the CRMF is a support facility¹ to the Gold Line Preferred Alternative.

5.2 National Environmental Policy Act Evaluation

5.2.1 Performance in Satisfying Purpose and Need

The Purpose and Need was used to guide the development of alternatives and define the evaluation criteria for comparing and selecting alternatives during the alternatives evaluation phase of this project. The alternative that best met the Purpose and Need, as well as the supporting goals and objectives, was selected as the Preferred Alternative to meet 2030 travel demand in the Gold Line study area. The Preferred Alternative has been supported by the RTD Board of Directors, the public, and other stakeholders.

Table 5-1 summarizes the Preferred Alternative's fulfillment of the Purpose and Need Statement.

¹ The Gold Line, Northwest Rail, North Metro, and East Corridor share a proportion of the costs from the CRMF based on fleet size. Since the CRMF is in the Gold Line study area, the environmental impacts are attributed to this project.

TABLE 5-1
Preferred Alternative Fulfillment of Purpose and Need Statement

Criterion	Description
Purpose	
Implement fixed-guideway transit within the Gold Line study area between DUS and Ward Road in Wheat Ridge	The Preferred Alternative provides for EMU fixed-guideway transit service in the study corridor between DUS and Ward Road.
Need	
Mobility Improvements <ul style="list-style-type: none"> Improved travel times Provide mobility options Improve regional transit and connectivity 	<ul style="list-style-type: none"> Provides reliable travel time of 19 minutes, compared with 27 minutes for single-occupant automobiles under the No Action Alternative and 27 minutes for buses in the Baseline Alternative. Provides multimodal options for travelers in the study area. Provides access to other parts of the region through rail and bus connections at DUS and connections to the Northwest Rail line at 2 proposed stations (41st Avenue East Station and potentially the Pecos Station).
Serve both traditional and new transit users	<ul style="list-style-type: none"> Provides service to 2,577 traditional transit-riders and 5,547 minority persons and service to 9,400 new riders system-wide, compared with 6,600 for the Baseline Alternative.
Provide environmental benefits to the study area and region	<ul style="list-style-type: none"> Provides reductions in VMT. Encourages compact growth through the provision of infrastructure that is supportive of TOD.
Cost-effective and affordable under FasTracks	<ul style="list-style-type: none"> Meets the current revised FasTracks Plan budget adopted by the RTD Board in 2008. Provides sufficient cost-effectiveness for the project to be considered fundable under FTA's Penta-P. The Gold Line project received a "Medium" rating.
Meet the voter mandate of FasTracks	<ul style="list-style-type: none"> Provides a practical transit recommendation using a vehicle technology that is accepted in other parts of the United States, and uses an existing freight ROW. There are no known major impediments to the implementation of the project.

Source: Gold Line Team, 2007

5.2.2 Trade-Off Analysis: Comparative Benefits and Environmental Effects

Tables 5-2 and 5-3 show the relative benefits and impacts of the Preferred Alternative compared with the No Action and Baseline Alternatives.

TABLE 5-2
Key Performance Discriminators

Criterion	No Action Alternative ²	Baseline Alternative	Preferred Alternative
Capital Cost (millions)	Highway -\$84.1	\$127.1 (2008) \$144.6 (2014)	\$590.5 ¹ (2014) ~\$43.3 (Gold Line share of the CRMF)
Operating Cost—2030 (millions)	\$13.6	\$17.8	\$10.9 (rail) \$14.9 (bus)
Travel time (2030)	27 minutes	27 minutes	19 minutes
Rail Ridership	NA	NA	16,800 to 20,100 (average weekday, 2030)
Regional daily VMT	103,302,956	103,297,703	103,275,346
Change in regional daily VMT over No Action Alternative	NA	-5,253	-27,610
Study Area daily VMT	6,320,851	6,314,068	6,302,630

Criterion	No Action Alternative ²	Baseline Alternative	Preferred Alternative
Change in study area daily VMT over No Action Alternative	NA	-6,783	-18,221
Regional daily linked transit trips	380,300	386,900	389,700
Change in regional daily linked transit trips over No Action Alternative	NA	+6,600	+9,400
Regional daily VHT	3,352,644	3,352,862	3,350,753
Change in regional daily VHT over No Action Alternative	NA	218	-1,891
Study Area VHT	204,575	204,166	203,430
Changes in study area VHT over No Action Alternative	NA	409	-1,145
Cost share with Northwest Rail	No	No	Yes
Employment 0.5 mile from stations (2030)	6,067	6,067	17,411
Population 0.5 mile from stations (2030)	7,017	7,017	18,638

Source: Gold Line Team, 2007

¹ This is for FTA New Starts funding where 2014 is assumed to be the mid-point of construction for this year-of-expenditure (YOE) estimate. The project cost for 2030 is \$814 million. The 2030 cost includes the 2015 cost plus the Gold Line pro rata share of the CRMF, 2030 parking additions of 1,880 new spaces included structured parking, the new ROW required for 2030 parking, and cost escalation. The shared trackway from DUS to Pecos Street is funded locally and is not part of the FTA New Starts project. It is estimated to cost \$235 million (YOE).

² The No Action Alternative assumes current pnRs at Olde Town and Ward Road with no new parking added, plus the costs of funded roadway improvements.

TABLE 5-3

Key Environmental Impact Discriminators: Gold Line plus the CRMF

Criterion	No Action Alternative	Baseline Alternative	Preferred Alternative
Construction Impacts	Some anticipated	Some anticipated	Approximately 95 acres (Gold Line) Approximately 30 acres (CRMF)
Property Acquisition	Unknown (transit) Unknown (roadway)	Some anticipated	16 Businesses (Gold Line)
Consistent with TOD plans	No	No	Yes
Traffic Impacts	Some anticipated	Some anticipated	Low
Regional pollutant emissions (annual tons) (2030)			
– CO	396,438	396,418	396,330
– NO _x	9,628	9,628	9,626
– VOC	14,908	14,908	14,904
– PM ₁₀	869	869	868
Parkland Impacts	Acquisition of approximately 1/4 acre of parkland	None anticipated	Acquisition of 0.11 acre of parkland at Jim Baker Reservoir Three temporary impacts during construction to trail crossings

Criterion	No Action Alternative	Baseline Alternative	Preferred Alternative
Historic/Archaeological Impacts	Potentially one historic site	No adverse effects	Three adverse effects: 1) Denver West Line, (5DV3512.3) 2) Allen-Rand Ditch, (5JF4454.1) 3) Impact to Denver Utah Pacific Railroad, Chicago Burlington Quincy Siding & Spur (5AM1888.5 and 5DV6243.7)
Public and Agency Support	Low	Low	High

Source: Gold Line Team, 2007

5.2.3 Irreversible and Irretrievable Commitment of Resources

The Preferred, No Action, and Baseline Alternatives may affect environmental resources that are both regulated and not regulated at the federal, state, or local level. Such impacts can include the consumption of natural resources such as fossil fuels and raw materials. In most cases, such impacts cannot be quantified, and cannot be avoided entirely. It is recognized that these impacts should be minimized to the extent practicable.

Sustainable practices incorporated into the project planning, construction, and maintenance can minimize impacts. RTD encourages that sustainable practices be implemented to reduce the impact of transit projects on environmental resources. This encouragement, identified in an adopted RTD Board policy, includes a commitment to allow innovative programs and flexibility in project planning, construction, and maintenance for the use of sustainable processes and materials. This may include such concepts as natural resource conservation, waste minimization, materials reuse, minimal use of native virgin materials, conservation and efficient use of water and energy, air pollution prevention, preference for “green” purchasing including recycled and minimally-processed items, and preference for locally-available resources. RTD also encourages the identification and incorporation of proven materials that are long lasting and require less maintenance when use of such materials is consistent with meeting its primary obligations for providing a safe and efficient transportation system. Alternative materials and practices can and must meet the performance goals of the construction specifications, demonstrate legitimate expenditure of public funds, and comply with all other applicable laws and regulations.

The use of nonrenewable resources during the construction and operational phases of the project may be irreversible since a large commitment of such resources makes removal or nonuse thereafter unlikely.

Table 5-4 displays the permanent and short-term commitment of resources and long-term productivity enhancements expected with implementation of the Preferred Alternative, including the CRMF.

TABLE 5-4
 Commitment of Resources and Productivity Associated with the Preferred Alternative and CRMF

Commitment of Resources	Short-Term Commitment of Resources	Long-Term Productivity Enhancements
Commitment of labor and energy (this includes the consumption of fossil fuels associated with the use of construction equipment)	Disruption of neighborhoods; increased noise and dust; and visual degradation during construction.	Improved mobility and safety for travelers in the corridor.
Use of materials (this includes aggregate, cement, petroleum products, and metals for the rails and catenary)	Relocation of 16 business properties.	Modest improvements in air quality.
Commitment of energy during the operation of any transit alternative	Loss of soil due to erosion during construction.	Improved economic conditions in the study area.
Commitment of additional land for ROW acquisition primarily at stations	Temporary degradation of air quality and water quality due to construction.	Access to public transit for 5,547 minority persons and 2,577 traditional transit users within 0.5 mile of stations.
	Loss of 0.95 acre of wetlands and waters of the U.S. of which 0.34 acre is jurisdictional. All wetlands will be mitigated.	Savings in travel time and increased worker productivity.
	Loss of trees and other natural cover during construction.	Improvements in land use planning and control of urban sprawl due to increases in densities around transit stations.

Source: Gold Line Team, 2007

5.3 Financial Feasibility

RTD's current 2009 estimate for the FasTracks Plan is \$6.99 billion, the FasTracks Plan is designed to improve mobility and travel options in the metropolitan Denver region within a 12-year period. The FasTracks Plan responds to the projected increase in regional population to 3.69 million in 2030 from 2.7 million in 2006.

The ability to implement the FasTracks plan depends on a variety of financial assumptions and projections that have been developed using the best available current estimates of costs, reasonably anticipated federal funding based on current federal law and regulations, and revenues from other sources including RTD sales tax and fare collections. Over the anticipated remaining build-out of 8 years, specific cost items, federal and other contributions, and RTD revenues may vary.

Under the FasTracks Plan, 119 miles of rail transit and 18 miles of BRT improvements will be developed between 2005 and 2017. Rubber-tire service levels (bus and Americans with Disabilities Act services) will increase by a minimum of 1.0 percent per year from 2008 to 2020 and a minimum of 1.5 percent per year from 2021 to 2035. Overall, 2035 rubber-tire service hours will increase by 50 percent over 2007 service levels.

The FasTracks Plan is financed in part through a 0.4-percent increase in the regional sales and use tax approved by voters in November of 2004. This increase brought the total transit tax rate in the District to 1 percent (1 cent on the dollar), comparable to other areas in the western United States with urban rail systems.

The Gold Line has been accepted by FTA into the Penta-P along with the East Corridor and the CRMF (see Appendix H, Memorandum of Understanding). Potential benefits from a Penta-P include savings in construction, operations and maintenance costs, accelerated project delivery, and maximization of related project revenues. Evidence from other public-private partnerships nationally and internationally suggests that public-private partnerships can result in a 10 to 25 percent reduction in costs. The FasTracks Plan assumes that Penta-P project costs not covered by RTD, federal, or local contributions would be financed by the private partner, known as the Concessionaire, with taxable debt and equity. The FasTracks Plan assumes that the private partner will bridge the timing gap between expenditures and receipt of federal revenues from a Full Funding Grant Agreement during project construction.

The FasTracks Plan assumes that RTD would enter into a long-term Design-Build-Finance-Operate-Maintain lease agreement with the Penta-P concessionaire, over which time the RTD will make periodic availability payments. Availability payments are similar to lease payments in that both are subject to annual appropriation, but are different as availability payments include all costs to operate and maintain the line.

The Gold Line project is planned to be financed within the FasTracks Plan as described above. The capital cost of the Gold Line project as well as the other FasTracks projects is shown on Table 5-5. These values are estimated based on the most recent FasTracks Annual Program Review.

TABLE 5-5
Capital Costs by FasTracks Project (Millions \$)

Corridor	April 2004	Year of Expenditure ¹
West Corridor		
West Corridor – Federal Project ²	\$511.8	\$642.3
West Corridor – Third Party Funded ³	0.0	\$17.1
West Corridor – Additional RTD Costs – Committed ⁴	0.0	\$32.7
West Corridor – Additional RTD Costs – Pending ⁵	0.0	\$106.6
Northwest Rail Corridor	\$565.1	\$706.9
Gold Line	\$463.5	\$590.5
I-225 Corridor	\$442.3	\$694.9
East Corridor	\$702.1	\$1,343.7
North Metro Corridor	\$420.0	\$924.4
Central Corridor Extension	\$68.7	\$67.3
Southeast Corridor Extension	\$136.8	\$184.3
Southwest Corridor Extension	\$134.9	\$165.6
US 36 BRT – Phase 1	\$22.2	\$23.3
US 36 BRT – Phase 2 ⁶	\$204.1	\$208.5
US 36 BRT – Phase 2 ARRA Funding	0.0	\$7.6
Denver Union Station ⁷	\$268.4	\$279.3
Light Rail Maintenance Facility	\$100.4	\$26.6

Corridor	April 2004	Year of Expenditure ¹
Commuter Rail Maintenance Facility	\$80.4	\$189.1
Bus Maintenance Facility	\$71.7	\$0.0
Other FasTracks Project Costs	\$524.7	\$789.1
Total	\$4,717.1	\$6,999.8

¹ Current capital cost estimates are inflated to the mid-point of construction, which varies by project. For the Gold Line project YOE is 2014.

² Total cost identified for the West Corridor in the FFGA (\$709.8 million) includes financing charges and EIS/PE costs incurred prior to the FasTracks program.

³ Third-party-funding for the Federal Bridge replacement and bike bridges at Wadsworth and Kipling.

⁴ Includes costs for additional items in support of the West Corridor project which are not included in the FFGA, and which are locally funded.

⁵ Includes costs for the Red Rocks pedestrian bridge and double track to the Jefferson County building, which only will be completed if the ballot initiative passes.

⁶ Includes \$3.5 million in SB1 funds for the Table Mesa pedestrian overpass that were not included in the original FasTracks plan.

⁷ Denver Union Station costs in the 2009 plan include only RTD locally-funded contributions to the joint project and grant funds and other reimbursements to be received by RTD. CDOT, other federal sources, TIF, metro district revenues, development rights revenues, and other sources are expected to contribute an additional \$220.7 million to the project, for a total project cost of \$500 million.

5.4 New Starts Evaluation and Rating

5.4.1 Background

RTD is planning to pursue New Starts (Section 5309) funding for the Preferred Alternative. The Section 5309 New Starts program is the federal government's primary program for providing financial support to locally planned, implemented and operated fixed-guideway transit capital investments. This section briefly describes the New Starts process and associated methods that FTA uses to evaluate and rate fixed-guideway transit projects seeking federal funding.

Each year, FTA submits its *Annual Report on New Starts* to Congress as a companion document to the annual budget submitted by the President. The report provides recommendations for the allocation of New Starts funds under Section 5309 of Title 49 of the USC.

FTA uses two major categories of rating a project, which are captured in the overall Summary Rating used to determine whether or not a project is funded. The two major categories include Project Justification and a Financial Rating. The Project Justification criteria are as follows:

- Mobility improvements
- Environmental benefits
- Cost effectiveness including operating efficiencies
- Transit-supportive existing land use, policies, and future patterns
- Other factors including economic development

The Financial Rating includes the local financial commitment and an assessment of the capital and operating financial plan for the project.

The FTA reviews the Project Justification and Financial Rating for each candidate project and assigns a rating for each criterion. For some of the project justification criteria, the proposed project is rated against a "Baseline Alternative." The Baseline Alternative, for purposes of the New Starts program, consists of improvements to the transit system that are

relatively low in cost and the “best that can be done” to improve transit without a major capital investment in infrastructure.

A candidate project is given an overall rating of “High, Medium-High, Medium, Medium-Low or Low” as directed by SAFETEA-LU. The overall rating is based on separate ratings assigned by FTA to each of the Project Justification and Financial Rating criteria described above.

Project evaluation is an ongoing process. FTA evaluation and rating occurs annually in support of budget recommendations presented in the *Annual Report on New Starts* and when projects request FTA approval to enter into preliminary engineering or final design. Consequently, as proposed New Starts projects proceed through the project development process, information concerning costs, benefits, and impacts is refined and the ratings updated to reflect new information.

5.4.2 Current Ratings for Gold Line Preferred Alternative

FTA has granted RTD permission to enter Preliminary Engineering with a “Medium” rating, which represents an average of many ratings as shown in Table 5-6 below.

TABLE 5-6
Gold Line Project FTA New Starts Ratings

FTA Category	Rating
Overall Project Rating	Medium
Project Justification Rating	Medium
a. Cost-effectiveness Rating	Medium
b. Transit Supportive Land Use	Medium
Existing Land Use	Medium-Low
Transit Supportive Plans and Policies	Medium-High
Performance and Impacts of Policies	Medium-High
c. Mobility Improvements Rating	Medium-Low
d. Environmental Benefits Rating	High
Local Financial Commitment	Medium
a. Section 5309 New Starts Share of Total Project: 28% Rating	High
b. Capital Financing Plan Rating	Medium
Agency Capital Condition	Medium-High
Commitment of Capital Funds	Medium
Capital Cost Estimate, Planning Assumptions, and financial Capacity	Medium-Low
c. Operating Finance Plan Rating	Medium-High
Operating Agency Financial Condition	Medium
Commitment of Operating and Maintenance Funds	High
Operating Cost estimates, Planning Assumptions and Financial Capacity	Low