FRPR FRONT RANGE PASSENGER RAIL

Service Development Plan
Preliminary Alternatives Analysis Report

March 2025

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Acronyms and Abbreviations

BNSF	BNSF Railway
BRT	Bus Rapid Transit
CDOT	Colorado Department of Transportation
CRISI	Consolidated Rail Infrastructure and Safety Improvements
DOLA	Colorado Department of Local Affairs
FRA	Federal Railroad Administration
FRPR	Front Range Passenger Rail
GHG	Greenhouse Gas (emissions)
NEPA	National Environmental Policy Act
OTP	on-time performance
Rail Commission	Southwest Chief and Front Range Passenger Rail Commission
RTC	Rail Traffic Controller
RTD	Regional Transportation District
SB	Senate Bill
SDP	Service Development Plan
SOV	Single-Occupancy Vehicle
UPRR	Union Pacific Railroad

1. Introduction

The Front Range Passenger Rail (FRPR) project focuses on introducing intercity passenger rail service between Fort Collins and Pueblo along Colorado's Front Range. The project builds on decades of planning and aims to utilize existing railroad infrastructure, interoperating with BNSF Railway (BNSF) and Union Pacific Railroad (UPRR) freight operations. The initiative is coordinated with the Federal Railroad Administration (FRA), who is providing financial assistance toward planning activities; the Class I freight railroads (BNSF and UPRR), who own the rail infrastructure for which FRPR is proposed to operate over; and RTD, who owns and operates commuter and light rail transit infrastructure in the Denver metropolitan area. The project is part of Colorado's broader vision to enhance multimodal transportation options, reduce reliance on single-occupancy vehicles (SOVs), and improve connectivity, economic vitality, and environmental sustainability throughout the region. Colorado's multimodal transportation vision, particularly its focus on rail and transit infrastructure, took a significant step forward with the passage of Colorado Senate Bill 24-184 (SB 184) in May 2024. The legislation signals the state's strong commitment to advancing FRPR and completing RTD's unfinished Northwest Rail Corridor connecting Denver, Boulder, and Longmont. SB 184 secures dedicated funding for rail projects and requires the Colorado Transportation Investment Office (CTIO), a state business enterprise, to develop a multimodal strategic capital plan aligned with CDOT's 10-year transportation plan and statewide greenhouse gas reduction goals. Additionally, the bill directs CTIO to identify opportunities to leverage federal funding through 2030, reinforcing Colorado's commitment to advancing critical rail and transit infrastructure. The passage of SB 184 underscores the importance of advancing the Service Development Plan (SDP), a requirement of the Federal Railroad Administration (FRA) Corridor Identification Program, which includes the FRPR project.

The purpose of the Preliminary Alternatives Analysis is to evaluate a range of potential Front Range Passenger Rail (FRPR) alternatives, assess their operational, environmental, and financial performance, and identify one alternative to carry forward to develop in the SDP. The SDP is a comprehensive document that outlines the planning, development, and implementation of a passenger rail service.

Building on the selected alternative from the Preliminary Alternatives Analysis, the SDP will provide a detailed review of the implementation needs for FRPR, including the infrastructure and equipment requirements, capital and operating costs, train schedules, fare costs, amenities, implementation timeframes, and other important information for decision makers and the public to assess the project's value.

The SDP will serve as a key resource for decision-makers, including the FRPR District, CDOT, and CTIO, to develop an implementation plan aligned with SB 184 and prior legislative initiatives. It will also establish a foundation for advancing FRPR into the next phases of project development, including federal approvals through the National Environmental Policy Act (NEPA) process.

This report presents the initial alternatives for the FRPR project designed to address the project's Draft Purpose and Need Statement. These alternatives were developed based on evaluations of route, service, and investment options, which are detailed in the following memoranda included as appendices:

- Appendix A: Draft Purpose and Need Statement
- Appendix B: Route Options Memorandum
- Appendix C: Service Options Memorandum
- Appendix D: Investment Options Memorandum

1.1. Project Background

The FRPR project embodies a long-standing vision to implement an intercity passenger rail service along Colorado's Front Range. The Colorado Legislature established the Front Range Passenger Rail District in 2021, which succeeded the Southwest Chief and Front Range Passenger Rail Commission (Commission), created in 2017. As detailed in the Draft Purpose and Need Statement (Appendix A), the FRPR project has a long planning history. Prior to this SDP, the Rail Commission, in partnership with CDOT and with support from FRA, conducted an Alternatives Evaluation (Rail Commission, 2020) of FRPR corridors. The Rail Commission report concluded that while dedicated passenger only corridors provided excellent performance characteristics, they would be very expensive and disruptive to the Front Range cities they meant to serve. Instead, they recommended evaluating operating passenger rail service on the existing freight tracks, in a shared operations environment. This alternative provided the best opportunity to initiate FRPR service cost effectively and capitalize on the operational partnerships of the Rail Commission partners such as BNSF, UPRR, RTD, and Amtrak and provides the foundation for the SDP in evaluating viable options for FRPR service that could be operated predominately on existing freight rail tracks. This alternatives analysis is supported by CDOT and FRA and is propelled by growing public interest and federal funding opportunities from the federal Bipartisan Infrastructure Law (also known as the Infrastructure Investment and Jobs Act).

1.2. Purpose and Need

The purpose of the FRPR project is to introduce intercity passenger rail service along Colorado's Front Range urban corridor between Fort Collins and Pueblo that would predominately utilize shared track with the BNSF and UPRR railroads. An FRPR system would add a new intercity travel option for Front Range travelers that would enhance the state's transportation network and facilitate integrated multimodal travel options between major population centers. Adding a service that attracts people to choose passenger rail over SOV travel would enhance community connections and contribute to future economic vitality, equity, and environmental sustainability. Based on recommendations of the 2020 Alternatives Analysis, the FRPR project focuses on initial operation of the system within existing freight railroad corridors.

The FRPR project would address needs to:

- Increase mobility choices for safe, efficient, and reliable travel along the Front Range now and in the future.

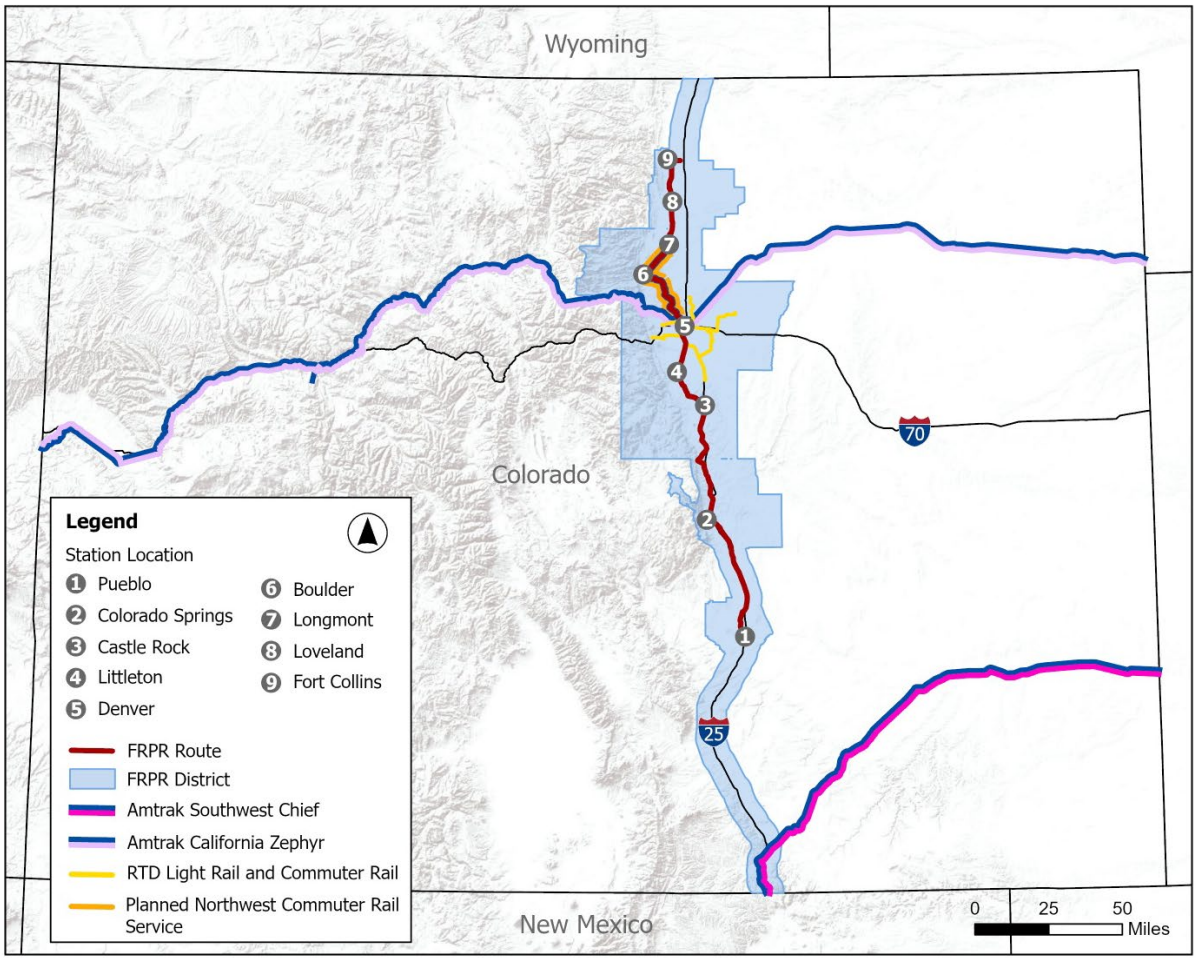
- Connect communities to jobs, retail centers, recreational opportunities, health care, leisure, education, entertainment, and other regional destinations.
- Foster economic vitality and improve transportation equity.
- Advance equity outcomes and Federal, state, and local economic and environmental goals

Appendix A contains the draft purpose and need statement for the project. The purpose and need defines the needs and goals of the project, reflects stakeholder input on these needs and goals, and guides the development and evaluation of alternatives.

1.3. Project Location

The FRPR corridor follows existing rail corridors built in the late 19th century that are currently operated by BNSF and UPRR to move freight across the state. The FRPR route extends between Fort Collins and Pueblo and includes planned stations in Fort Collins, Loveland, Longmont, Boulder, Denver, Littleton, Castle Rock, Colorado Springs, and Pueblo. Exhibit 1 illustrates the project area and route. The route was determined based on the findings and recommendation of the Route Options Analysis (Appendix B).

Exhibit 1: Project Location



Colorado's Front Range is home to the state's largest and most densely populated urban areas, where 85 percent of Colorado's population lives, and 86 percent of the state's jobs are located. Much of the area between urban centers is undeveloped rural or open space with natural resources and scenic vistas.

The approximately 180-mile FRPR corridor would be a backbone for multimodal travel options throughout the state's urban core, traversing populated communities with existing multimodal infrastructure. Multimodal infrastructure in the corridor that will complement FRPR service includes RTD bus, light and commuter rail in the Denver metro area, Amtrak's California Zephyr, CDOT's Bustang, and other local transit services. Regional bicycle facilities, such as the Platte River Trail in Denver, the US 36 Bikeway in Boulder and Longmont, the Pikes Peak Greenway in Colorado Springs, and the Loveland Recreation Trail in Loveland, intersect FRPR stations and, along with numerous local bicycle routes, provide complementary travel options for FRPR patrons.

1.4. Stakeholder & Public Outreach & Input

CDOT and the District are implementing a robust stakeholder engagement and public outreach program to educate stakeholders about FRPR, create a transparent process for collecting feedback, and align project understanding among CDOT, the District, and stakeholders. Many opportunities for public and stakeholder engagement were offered throughout 2023 and 2024, recognizing the long-standing public interest in the project. Outreach and opportunities for public feedback and suggestions will continue as the service is further developed through the SDP.

Specific feedback on operational characteristics helped inform the development and evaluation of alternatives. Operational priorities reflected in public comments include:

- Rail travel times should be reliable and comparable to driving. It should be complementary with and reduce stress on the state's transportation network, particularly the congested Interstate 25, the primary north-south travel route across Colorado.
- Shared freight operations should be carefully planned to maintain reliable passenger rail travel and minimize disruptions to service from maintenance, equipment failures, or operational conflicts.
- FRPR development should be informed by other successful passenger rail systems around the United States (US).
- Implementation of initial service should happen as soon as possible, and the systems should be expanded incrementally in response to ridership demand.
- Service should be all-day service, providing multiple options for travel throughout the day.
- FRPR should prioritize service that connects residential, high-employment areas, and transit systems.
- Future expansion should include broader coverage, more frequency, and expanded access for rural communities.

Many of the comments received during the initial planning phase focused on specific aspects of the service to be addressed in the SDP, including the need for convenient schedules, affordable fares, high-quality amenities, and connections between train stations and other transit systems. The public also expressed strong interest in the timeline and phasing of the service, as well as details and potential impacts of construction. The SDP will refine the service to provide answers to these questions.

1.5. Host Railroad Coordination

To operate FRPR on existing BNSF and UPRR infrastructure, agreements with the host railroads will be necessary. In addition to participating as non-voting members in the District, BNSF and UPRR play critical roles in any final decisions regarding passenger operations.

A key part of the host railroad coordination involves their input and review of rail operations modeling to ensure that current and future freight operations are accurately reflected to understand how passenger rail could operate within the existing Class I network. During the alternatives analysis process, sketch-level operation analysis was completed with input from BNSF and UPRR to inform the range of speeds and frequencies of the alternatives evaluated are viable.

The Service Options Memorandum (Appendix C) provides details of the initial operations analysis supporting the Preliminary Alternatives Analysis.

1.6. Resource Agency Coordination

FRA is the lead federal agency for the SDP and the likely lead federal agency for future environmental and project approvals. CDOT worked with FRA to coordinate with local, state and federal agencies that will have jurisdiction and/or expertise relevant to developing FRPR. This effort has included coordination with the Transportation Environmental Regional Council (TERC) over the many years of FRPR development. The TERC was formed in 2002 by CDOT, FHWA, and federal and state resource agencies to provide discuss state transportation decisions and plan for environmental stewardship. Most recently, CDOT and the District provided an update on the SDP and outlined expected environmental coordination and permitting for implementing FRPR, including strategies for streamlined NEPA processes. This meeting introduced the SDP, identified agency areas of concern or interest, and gauged resource agencies' interest in the SDP. TERC members expressed strong interest and engagement in the FRPR project. They recognized the importance of their participation and coordination as the large-scale project advances rapidly through implementation.

1.7. Colorado Senate Bill 24-184

In the spring of 2024, the Colorado General Assembly adopted SB 184, which has direct bearing on the FRPR project development. SB 184 contains a legislative mandate to CDOT, CTIO, RTD, and the FRPR District (the Parties) to work together to implement the Northwest Fixed Guideway

Corridor, including an extension of the corridor to Fort Collins, as the first phase of construction and operation of the FRPR project to connect communities from Fort Collins, through Denver and on to Trinidad.

One of the outcomes of SB-184 could be the addition of up to three stations between Denver and Boulder along the FRPR route that could be served by a joint operation of RTD commuter rail and/or FPRR intercity rail. Those additional stations are not assessed in this Preliminary Alternatives Analysis because they would be the same and could be incorporated into any of the five alternatives evaluated and therefore do not differentiate the alternatives selection in this document.

SB-184 also directs the Parties CDOT to conduct detailed operational modeling and other analysis for at least two scenarios for service for the Northwest Fixed Guideway Corridor between Denver Union Station and Fort Collins: three and five round trips per day. As with the additional stations, this Preliminary Alternatives Analysis does not assess these service scenarios because they can be included in any of the FRPR alternatives. However, it will be an important input to the SDP and will be included as part of the SDP analysis and document. Additionally, it is expected that an Intergovernmental Agreement between the Parties will be available to be reflected in the Funding, Governance, Phased Implementation Plan chapters of the SDP.

1.8. Comparative Intercity Passenger Rail Systems

The project team identified and reviewed intercity passenger rail systems around the United States to understand and benchmark how potential FRPR service might compare to other operating intercity passenger rail systems across the US, identify “peer” services, and validate the reasonableness of ridership forecasts. Criteria related to comparable geographic scope, service levels (frequency), and number of and distances between stations were used to identify peer systems that would be reasonable comparators for proposed FRPR service.

Based on the length of the FRPR corridor and the stations served, Amtrak state-supported services were determined to be the most akin to FRPR and were determined to be the most comparable. Twelve state-supported intercity passenger rail systems were included in the benchmarking exercise, as detailed in Table 2**.** The benchmarking is based on 2019 data because it is considered more reflective of passenger rail ridership pre-pandemic and how peer systems mature under normal ridership conditions (i.e. continuous years of service). Although intercity state-supported corridor ridership has partially recovered since the pandemic[1], service frequencies for those services changed to match the depressed ridership. Consequently, 2019 still represents the best “apples to apples” comparable between what FRPR is planned to operate in 2045 and what was operating in 2019.

[1] Based on available 2024 data, rail ridership across the twelve comparator services is approximately 14% down on 2019 levels. However, this is largely driven by significant reductions in two services (Pacific Surfliner and Capitol Corridor). Excluding these two services, 2024 rail ridership for the remaining ten comparator services is within 2% of 2019 levels.

Table 1: Peer Systems for Benchmarking

Peer system	Route Pairs	Weekday frequency (round trips per day)	Number of stations	Approximate corridor length (miles)	Ridership (2019M one way trips)	Operations and Maintenance ($2019M)
Wolverine	Pontiac, MI – Chicago, IL	3	16	301	0.5	33
Piedmont	Raleigh, NC – Charlotte, NC	4	11	180	0.2	9
Chicago-St Louis	Chicago, IL – St Louis, MO	5	11	282	0.6	33
Downeaster	Portland, ME – Boston, MA	5	11	145	0.6	18
Cascades	Vancouver, BC – Eugene, OR	6	17	470	0.8	70
Empire	New York, NY – Niagara Falls, NY	6	18	466	1.2	65
San Joaquin	Bakersfield, CA – San Francisco, CA	6	13	282	1.1	98
Hiawatha	Chicago, IL – Milwaukee, WI	7	5	86	0.9	23
NH – Springfield	New Haven, CT – Springfield, MA	8	8	62	0.4	24
Keystone	New York, NY – Harrisburg, PA	10	20	197	1.6	56
Capitol Corridor	San Jose, CA – Colfax, CA	12	18	170	1.8	73
Pacific Surfliner	San Luis Obispo, CA – San Diego, CA	12	27	349	2.8	138

Service levels among the peer systems range from 3 to 12 roundtrips per day, with most running less than 10 roundtrips per day, though some have increased or plan to increase service. For example, the Capitol Corridor System in northern California began operation in 1991 with three roundtrips, expanding to nine roundtrips by 2001. It currently operates 12 roundtrips per day across the system, down from a high of 16 roundtrips per day. The flexibility of the implementation makes this a good comparator for a range of FRPR service – providing insight to where FRPR could start and where it may mature. The Capitol Corridor has twice as many stations and approximately twice as many people and jobs within 15 miles of stations as the FRPR corridor, which makes it a compelling benchmark for both current and future service.

The benchmarking review showed a strong and expected correlation between ridership and operating expenses: the more trains, the more riders use the service and the more expensive the service is to operate. Exhibit 2 shows the relationship between ridership and frequency, and Exhibit 3 shows the relationship of operating costs and frequency. FRPR ridership, shown with star symbols, supports more than 6 roundtrips but ridership starts to flatten after 10 roundtrips. Operating expenses increase directly with the increase in frequency.

Exhibit 2: Comparison of Ridership and Frequency Between FRPR and Peer Services

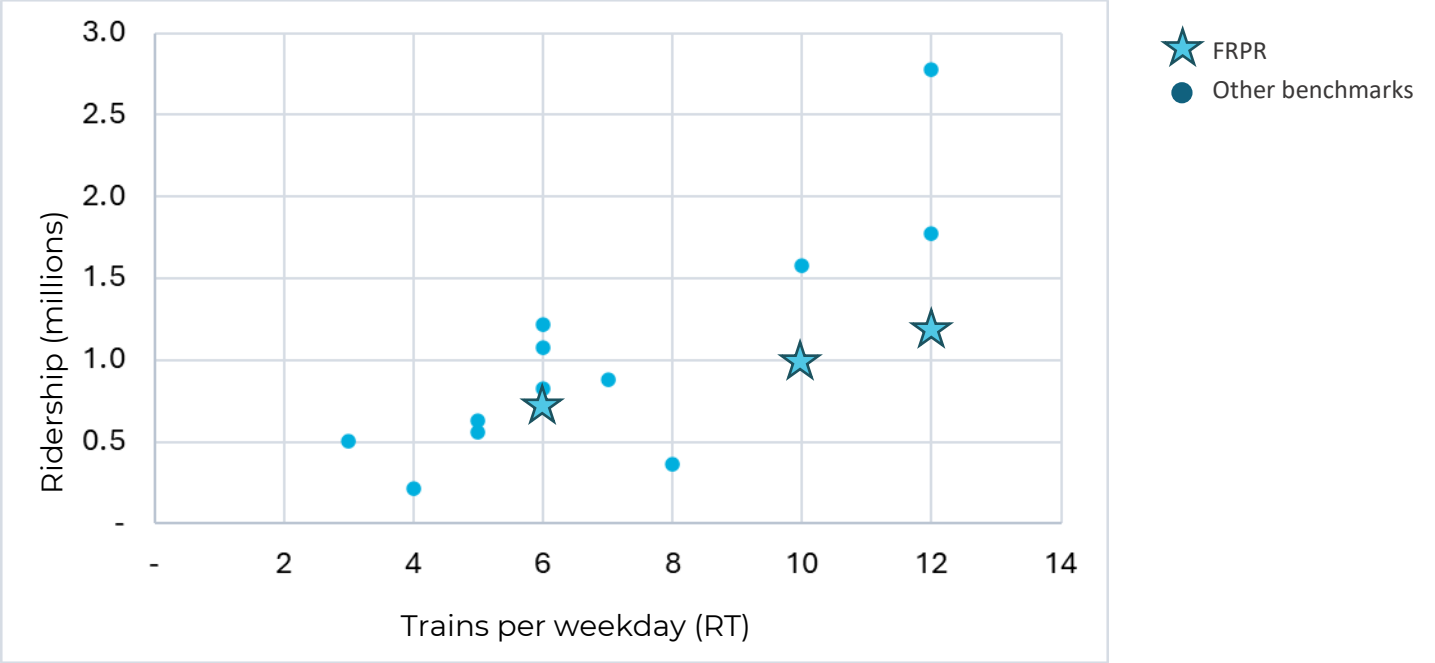
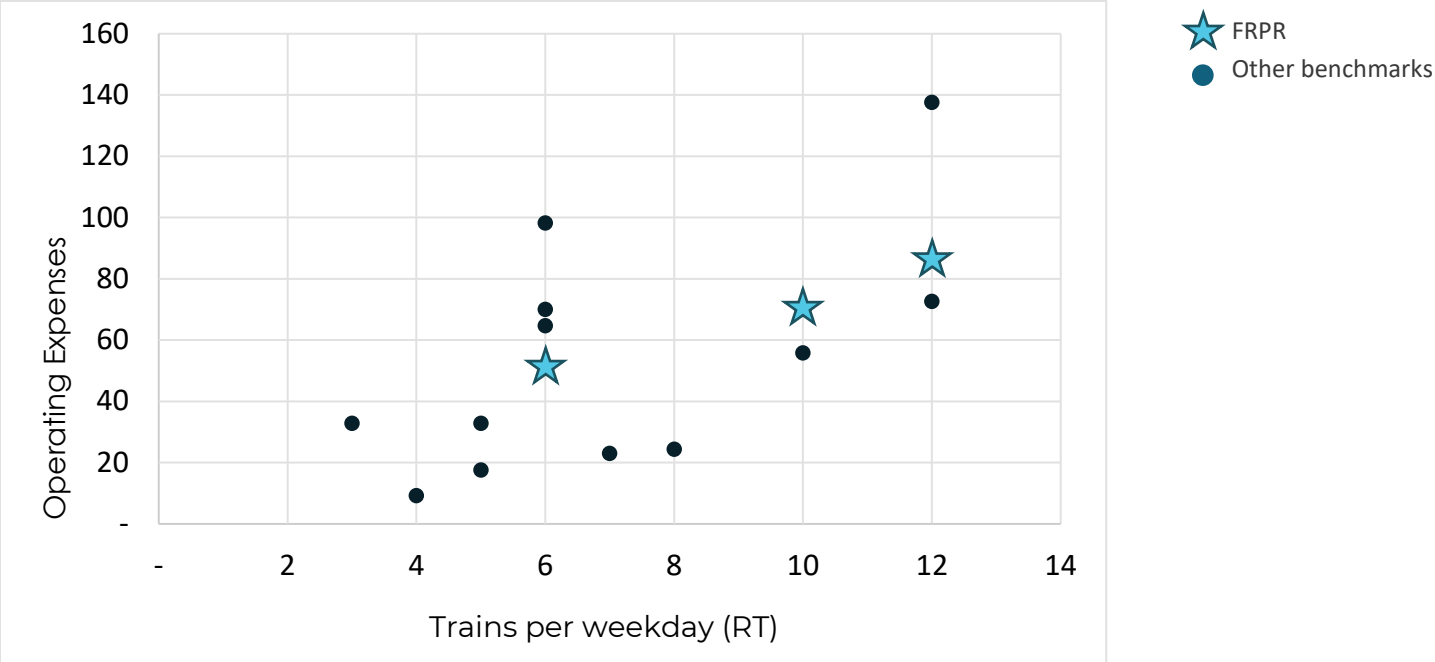


Exhibit 3: Comparison of Operating Expenses and Frequency Between FRPR and Peer Services



2. Alternatives

Through discussions with host railroads, analysis of comparative services around the country, evaluation of population and employment centers, and opportunities for transit connectivity, five

service alternatives were developed. These alternatives are designed to meet the Draft Purpose and Need Statement and offer varying speeds and frequencies, with a consistent route and station locations across all alternatives:

- Alternative 1: 6 roundtrips at 79 mph
- Alternative 2: 6 roundtrips at 90 mph
- Alternative 3: 10 roundtrips at 79 mph
- Alternative 4: 12 roundtrips at 79 mph
- Alternative 5: 12 roundtrips at 90 mph

Initially, a broader range of speeds and frequencies was considered. For speeds, a maximum authorized speed range of 79 to 125 mph was considered. However, true high-speed rail (above 125 mph) was deemed infeasible due to existing infrastructure limitations, including vertical and horizontal geometry, incompatibility with freight traffic, and station spacing along the corridor. Even at a speed of 110 mph, 110 mph proved impractical, as it would rarely be attainable given the alignment's existing geometry, making the higher associated capital cost unjustifiable. Further, the host railroads did not support speeds above 90 mph on their infrastructure. At the other end of the spectrum, speeds below 79 mph did not meet the project goals because they were not competitive with auto travel times, as noted in Appendix C. For frequencies, the evaluation considered a range between 6 and 12 round trips per day for the ultimate buildout. This range is consistent with service for comparable intercity passenger rail peer systems described in Section 1.8 of this report. While service implementation could occur in smaller geographic or phased increments, the Preliminary Alternatives Analysis focuses on identifying an alternative for a fully developed service.

2.1. Base Investments

Regardless of frequency and speed, implementing and operating a new shared-use passenger service on existing freight tracks requires substantial investment in track improvements, signal and communications, stations and facilities, rolling stock and other investments such as bridges and at-grade crossings. For example, in the Denver Complex, grade separations are being proposed at Denver Union Station to allow passenger trains a direct route into the station from the north or south. A direct route into the station does not exist on current track geometrics, and this investment would be required regardless of the service frequency.

These "base" investments encompass most of the improvements needed to implement passenger service. Because the base investments are substantial and common to all the alternatives considered in this alternatives analysis, this alternatives analysis assumes the base investments is the starting point of capital costs and focuses on comparing the incremental additional improvements needed to expand service to distinguish among the alternatives. For more information on the base investments required for FRPR implementation, reference the Investment Options Memorandum (Appendix D).

2.2. Alternatives Evaluated

The five service alternatives evaluated in this report are described below. The alternatives combine the service options (outlined in Appendix C) with the necessary additional investments to develop the service, such as rail sidings and curve flattening or straightening (outlined in Appendix D). To provide a better comparison of costs and benefits of the alternatives, they were ordered by frequency and then speed to more accurately show the tradeoffs of both – i.e., the 6 roundtrips at 90 mph is presented with the 6 roundtrips at 79 mph rather than the 12 roundtrips at 90 mph. They include:

- Alternative 1: 6 roundtrips at 79 mph (Service Option 1 in Appendices B and C)
- Alternative 2: 6 roundtrips at 90 mph (Service Option 4 in Appendices B and C)
- Alternative 3: 10 roundtrips at 79 mph (Service Option 2 in Appendices B and C)
- Alternative 4: 12 roundtrips at 79 mph (Service Option 3 in Appendices B and C)
- Alternative 5: 12 roundtrips at 90 mph (Service Option 5 in Appendices B and C)

The evaluation in the sections below focuses on the differences among the alternatives to determine the reasonable upper limit for feasible service beyond the required base investment.

2.2.1. Alternative 1: 6 Roundtrips at 79 MPH

Alternative 1 would offer six daily round trips at 79 miles per hour with a travel time from end to end of 3 hours 19 minutes. Alternative 1 would serve nine stations, and annual ridership across the system is projected to be 702,000.

An initial timetable was developed for 6 roundtrips per day, generally providing all day service with three daily trips before 12:00 p.m. and three in the afternoon/evening in both directions (north and south). Table 2 and Table 3 illustrate the proposed timetable. Pueblo departures occur at 6:00 a.m., 7:30 a.m., 10:30 a.m., 3:00 p.m., 6:00 p.m. and 7:30 p.m. Fort Collins departures occur 35 minutes later at 6:35 a.m., 8:05 a.m., 11:05 a.m., 3:35 p.m., 6:35 p.m., and 8:05 pm.

These timetables are illustrative, based on existing corridor geometries, passenger- only operations and represent a “golden run,” or best-case-scenario simulated run where trains operate without delays, interference, or conflicts. Additional operations analysis and assessment will be required in the SDP to identify improvements to optimize train performance and identify conflicts so that a reliable schedule can be developed. The timetables assume no geometric improvements, such as curve flattening or straightening and recovery time (additional time included to account for unexpected delays and improve reliability of the train schedule) is not included. Dwell time (the time a train spends at a station waiting for passengers to alight and board) is assumed to be two minutes at each station, except Denver Union Station where 15-minute dwell time is assumed in the timetable. The operational assumptions at this stage in the analysis provide a reasonable basis for comparison of the service options.

Table 2: Alternative 1, Timetable from Fort Collins

	Fort Collins	Loveland	Longmont	Boulder	Denver Union Station (AR)	Denver Union Station (DP)	Littleton	Castle Rock	Colorado Springs	Pueblo
1	6:35 AM	6:44 AM	7:01 AM	7:14 AM	7:47 AM	8:02 AM	8:16 AM	8:34 AM	9:19 AM	9:54 AM
2	8:05 AM	8:14 AM	8:31 AM	8:44 AM	9:17 AM	9:32 AM	9:46 AM	10:04 AM	10:49 AM	11:24 AM
3	11:05 AM	11:14 AM	11:31 AM	11:44 AM	12:17 PM	12:32 PM	12:46 PM	1:04 PM	1:49 PM	2:24 PM
4	3:35 PM	3:44 PM	4:01 PM	4:14 PM	4:47 PM	5:02 PM	5:16 PM	5:34 PM	6:19 PM	6:54 PM
5	6:35 PM	6:44 PM	7:01 PM	7:14 PM	7:47 PM	8:02 PM	8:16 PM	8:34 PM	9:19 PM	9:54 PM
6	8:05 PM	8:14 PM	8:31 PM	8:44 PM	9:17 PM	9:32 PM	9:46 PM	10:04 PM	10:49 PM	11:24 PM

Table 3: Alternative 1, Timetable from Pueblo

	Pueblo	Colorado Springs	Castle Rock	Littleton	Denver Union Station (AR)	Denver Union Station (DP)	Boulder	Longmont	Loveland	Fort Collins
1	6:00 AM	6:37 AM	7:21 AM	7:39 AM	7:51 AM	8:06 AM	8:41 AM	8:54 AM	9:11 AM	9:19 AM
2	7:30 AM	8:07 AM	8:51 AM	9:09 AM	9:21 AM	9:36 AM	10:11 AM	10:24 AM	10:41 AM	10:49 AM
3	10:30 AM	11:07 AM	11:51 AM	12:09 PM	12:21 PM	12:36 PM	1:11 PM	1:24 PM	1:41 PM	1:49 PM
4	3:00 PM	3:37 PM	4:21 PM	4:39 PM	4:51 PM	5:06 PM	5:41 PM	5:54 PM	6:11 PM	6:19 PM
5	6:00 PM	6:37 PM	7:21 PM	7:39 PM	7:51 PM	8:06 PM	8:41 PM	8:54 PM	9:11 PM	9:19 PM
6	7:30 PM	8:07 PM	8:51 PM	9:09 PM	9:21 PM	9:36 PM	10:11 PM	10:24 PM	10:41 PM	10:49 PM

The sketch-level operations analysis, detailed in Appendix C, informed the engineering refinements needed for each service and identified areas for additional investment for shared-use operations. Based on this iterative operations analysis and engineering, investments needed to implement Alternative 1 were identified. Investments primarily include extending sidings and widening or reconstructing existing/new infrastructure. Locations and types of additional investments required for Alternative 1 are described in Table 4 and illustrated in Exhibit 4. Appendix D provides more details on the investment needs and costs.

Table 4: Additional Investments for Alternative 1

Segment	Track Investments	Other Investments
South	Extend Academy siding south to bridge MP68.3; Upgrade existing Academy siding track classification; Extend Academy siding North to MP63.1; and install Universal Cross Overs (UXO) at MP66.08	Widen or Reconstruct bridges at MP63.71 and MP64.32; and reconstruct at-grade crossings MP64.07 and MP65.7
South	Construct passenger passing siding between MP39.75 – MP41.75 along BNSF Main 1	Reconstruct private at-grade crossing MP41.5
North	Extend Broomfield siding south to MP10.10 Wadsworth Blvd; and single crossover at MP14.5; and Upgrade existing Broomfield Siding track and turnouts	Widen or Reconstruct bridges at MP11.34, MP11.44, and MP11.84; and reconstruct at-grade crossings MP12.95, MP14.0 and MP14.45
North	Construct siding track from MP33.25 Jay Road to MP 36.68 Mineral Road.	Evaluate closures at MP33.7 55th Street and MP35.29 63rd St; Widen bridges at MP33.64 and MP35.86; and extend multiple drainage culverts for additional track

Note that Denver Union Station is located at Milepost 0.

Exhibit 4: Locations of Additional Improvements for Alternative 1

2.2.2. Alternative 2, 6 Roundtrips at 90 MPH

Alternative 2 would offer six daily round trips at 90 miles per hour with a travel time from end to end of 3 hours 14 minutes, which is five minutes faster than Alternatives 1, 3, and 4. Alternative 2 would serve the same stations as the other alternatives, and annual ridership is projected to be 716,000 per year. Compared to Alternative 1, the increase in speed from 79 mph to 90 mph includes additional investment in track curve straightening, results in a 5-minute time savings across a full end-to-end trip, and attracts 14,000 (2 percent) more riders.

An initial timetable was developed for 6 roundtrips per day, generally providing all day service with three daily trips before 12pm and three in the afternoon/evening in both directions (north and south). Table 5 and Table 6 illustrate the proposed timetable for trains from Fort Collins and Pueblo, respectively. Pueblo departures occur at 6:00 a.m., 7:30 a.m., 10:30 a.m., 3:00 p.m., 6:00 p.m. and 7:30 p.m. Fort Collins departures occur 30 minutes later at 6:30 a.m., 8:00 a.m., 11:00 a.m., 3:30 p.m., 6:30 p.m., and 8:00 pm. These timetables are based on existing corridor geometries for passenger operations only and represent a golden run.

Table 5: Alternative 2, Timetable from Fort Collins

	Fort Collins	Loveland	Longmont	Boulder	Denver Union Station (AR)	Denver Union Station (DP)	Littleton	Castle Rock	Colorado Springs	Pueblo
1	6:30 AM	6:39 AM	6:55 AM	7:08 AM	7:41 AM	7:56 AM	8:09 AM	8:27 AM	9:11 AM	9:44 AM
2	8:00 AM	8:09 AM	8:25 AM	8:38 AM	9:11 AM	9:26 AM	9:39 AM	9:57 AM	10:41 AM	11:14 AM
3	11:00 AM	11:09 AM	11:25 AM	11:38 AM	12:11 PM	12:26 PM	12:39 PM	12:57 PM	1:41 PM	2:14 PM
4	3:30 PM	3:39 PM	3:55 PM	4:08 PM	4:41 PM	4:56 PM	5:09 PM	5:27 PM	6:11 PM	6:44 PM
5	6:30 PM	6:39 PM	6:55 PM	7:08 PM	7:41 PM	7:56 PM	8:09 PM	8:27 PM	9:11 PM	9:44 PM
6	8:00 PM	8:09 PM	8:25 PM	8:38 PM	9:11 PM	9:26 PM	9:39 PM	9:57 PM	10:41 PM	11:14 PM

Table 6: Alternative 2, Timetable from Pueblo

	Pueblo	Colorado Springs	Castle Rock	Littleton	Denver Union Station (DP)	Denver Union Station (AR)	Boulder	Longmont	Loveland	Fort Collins
1	6:00 AM	6:35 AM	7:18 AM	7:36 AM	7:47 AM	8:02 AM	8:36 AM	8:49 AM	9:06 AM	9:14 AM
2	7:30 AM	8:05 AM	8:48 AM	9:06 AM	9:17 AM	9:32 AM	10:06 AM	10:19 AM	10:36 AM	10:44 AM
3	10:30 AM	11:05 AM	11:48 AM	12:06 PM	12:17 PM	12:32 PM	1:06 PM	1:19 PM	1:36 PM	1:44 PM
4	3:00 PM	3:35 PM	4:18 PM	4:36 PM	4:47 PM	5:02 PM	5:36 PM	5:49 PM	6:06 PM	6:14 PM
5	6:00 PM	6:35 PM	7:18 PM	7:36 PM	7:47 PM	8:02 PM	8:36 PM	8:49 PM	9:06 PM	9:14 PM
6	7:30 PM	8:05 PM	8:48 PM	9:06 PM	9:17 PM	9:32 PM	10:06 PM	10:19 PM	10:36 PM	10:44 PM

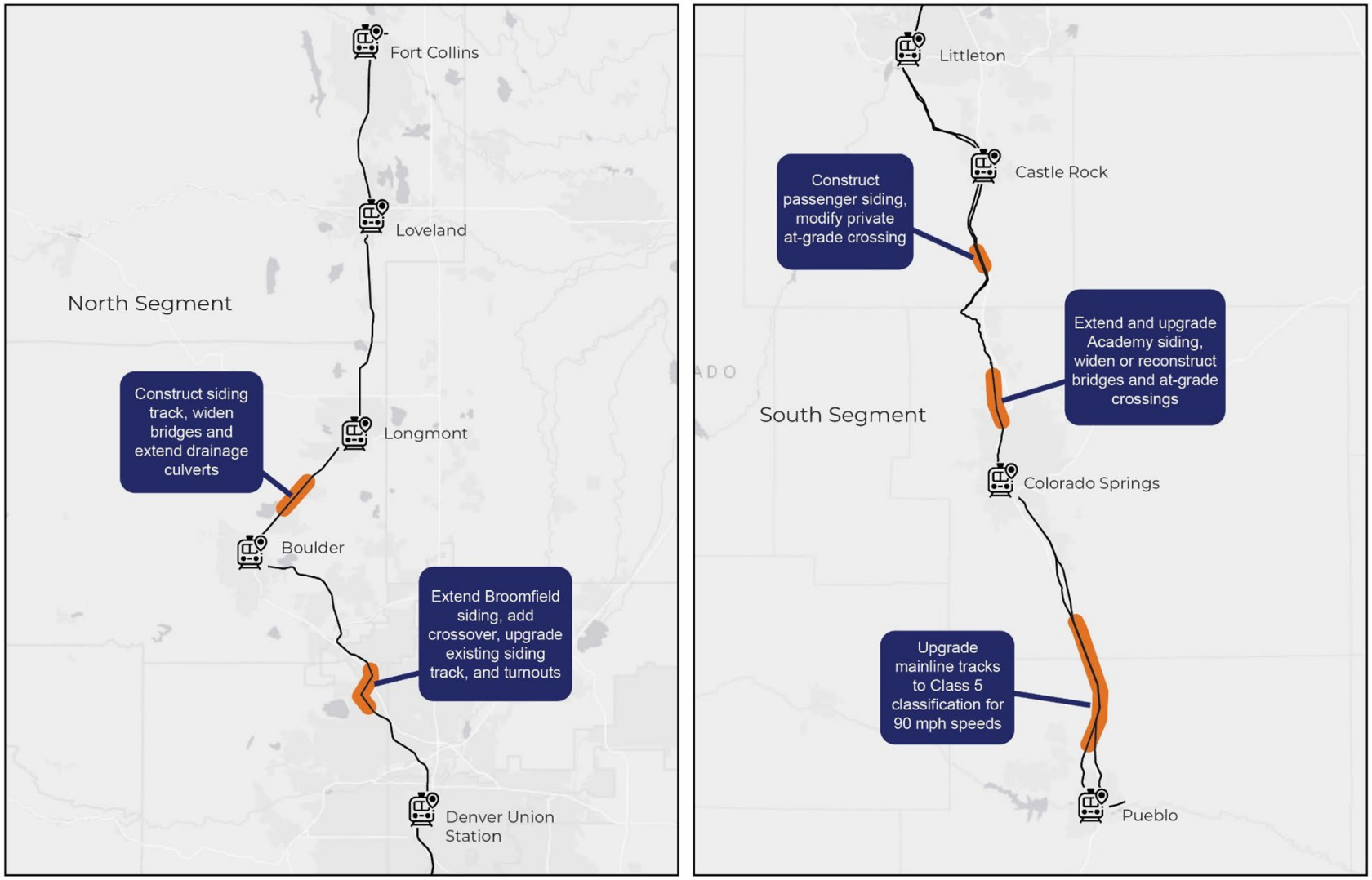
The sketch-level operations analysis informed the engineering refinements needed for each service and identified areas for additional investment for share-use operations. Based on this

iterative analysis between the operations analysis and engineering, identified investments to implement Alternative 2 were identified. Investments primarily include extending sidings and widening or reconstructing existing/new infrastructure. Locations and types of investments required for Alternative 2 are described in Table 7 and illustrated in Exhibit 5. Appendix D provides more details on the investment needs and costs. Note that Denver Union Station is located at Milepost 0 for reference to mileposts in Table 7.

Table 7: Alternative 2 Additional Investments

Segment	Track Investments	Other Investments
South	Extend Academy siding south to bridge MP68.3; Upgrade existing Academy siding track classification; Extend Academy siding North to MP63.1; and install UXO at MP66.08	Widen or Reconstruct bridges at MP63.71 and MP64.32; and reconstruct at-grade crossings MP64.07 and MP65.7
South	Construct passenger passing siding between MP43.2– MP45.2 along BNSF Main 1	Widen or Reconstruct bridges at MP44.60; and reconstruct private at-grade crossing MP44.63
South	Upgrade existing BNSF between MP95.5 to MP112.5 to Class 5 track classification for 90MPH operations	Upgrade existing structures and at-grade crossing for operating speeds above 79MPH
North	Extend Broomfield siding south to MP10.10 Wadsworth Blvd; and single crossover at MP14.5; and Upgrade existing Broomfield Siding track and turnouts	Widen or Reconstruct bridges at MP11.34, MP11.44, and MP11.84; and reconstruct at-grade crossings MP12.95, MP14.0 and MP14.45
North	Construct siding track from MP33.25 Jay Road to MP 36.68 Mineral Road.	Evaluate closures at MP33.7 55th Street and MP35.29 63rd St; Widen bridges at MP33.64 and MP35.86; and extend multiple drainage culverts for additional track

Exhibit 5: Locations of Additional Improvements for Alternative 2



2.2.3. Alternative 3, 10 Roundtrips at 79 MPH

Alternative 3 would offer ten daily round trips at 79 miles per hour with a travel time from end to end of 3 hours 19 minutes. Alternative 3 would also serve nine stations and the annual ridership is projected to be 990,000. Increasing frequency from 6 to 10 roundtrips attracts 288,000 (40 percent) more riders (compared to Alternative 1 at the same operating speed of 79 mph).

An initial timetable was developed for 10 roundtrips per day, generally providing all day service with five daily trips before 12pm and five in the afternoon/evening in both directions (north and south). Table 8 and Table 9 illustrate the proposed timetable. Pueblo departures occur at 4:30 a.m., 6:00 a.m., 7:30 a.m., 9:00 a.m., 10:30 a.m., 1:30 p.m., 3:00 p.m., 4:30 p.m., 6:00 p.m., and 7:30 p.m. Fort Collins departures occur 35 minutes later at 5:05 a.m., 6:35 a.m., 8:05 a.m., 9:35 a.m., 11:05 a.m., 2:05 p.m., 3:05 p.m., 5:05 p.m., 6:35 p.m., and 8:05 pm. Departure times occur every 90 minutes, except for between 10:30 a.m. and 1:30 p.m. in Pueblo and 11:00 a.m. and 2:00 p.m. in Fort Collins when there are no departures. Timetables are based on existing corridor geometries, passenger only operations, and represent a golden run.

Table 8: Alternative 3, Timetable from Fort Collins

	Fort Collins	Loveland	Longmont	Boulder	Denver Union Station (AR)	Denver Union Station (DP)	Littleton	Castle Rock	Colorado Springs	Pueblo
1	5:05 AM	5:14 AM	5:31 AM	5:44 AM	6:17 AM	6:32 AM	6:46 AM	7:04 AM	7:49 AM	8:24 AM
2	6:35 AM	6:44 AM	7:01 AM	7:14 AM	7:47 AM	8:02 AM	8:16 AM	8:34 AM	9:19 AM	9:54 AM
3	8:05 AM	8:14 AM	8:31 AM	8:44 AM	9:17 AM	9:32 AM	9:46 AM	10:04 AM	10:49 AM	11:24 AM
4	9:35 AM	9:44 AM	10:01 AM	10:14 AM	10:47 AM	11:02 AM	11:16 AM	11:34 AM	12:19 PM	12:54 PM
5	11:05 AM	11:14 AM	11:31 AM	11:44 AM	12:17 PM	12:32 PM	12:46 PM	1:04 PM	1:49 PM	2:24 PM
6	2:05 PM	2:14 PM	2:31 PM	2:44 PM	3:17 PM	3:32 PM	3:46 PM	4:04 PM	4:49 PM	5:24 PM
7	3:05 PM	3:14 PM	3:31 PM	3:44 PM	4:17 PM	4:32 PM	4:46 PM	5:04 PM	5:49 PM	6:24 PM
8	5:05 PM	5:14 PM	5:31 PM	5:44 PM	6:17 PM	6:32 PM	6:46 PM	7:04 PM	7:49 PM	8:24 PM
9	6:35 PM	6:44 PM	7:01 PM	7:14 PM	7:47 PM	8:02 PM	8:16 PM	8:34 PM	9:19 PM	9:54 PM
10	8:05 PM	8:14 PM	8:31 PM	8:44 PM	9:17 PM	9:32 PM	9:46 PM	10:04 PM	10:49 PM	11:24 PM

Table 9: Alternative 3, Timetable from Pueblo

	Pueblo	Colorado Springs	Castle Rock	Littleton	Denver Union Station (DP)	Denver Union Station (AR)	Boulder	Longmont	Loveland	Fort Collins
1	4:30 AM	5:07 AM	5:51 AM	6:09 AM	6:21 AM	6:36 AM	7:11 AM	7:24 AM	7:41 AM	7:49 AM
2	6:00 AM	6:37 AM	7:21 AM	7:39 AM	7:51 AM	8:06 AM	8:41 AM	8:54 AM	9:11 AM	9:19 AM
3	7:30 AM	8:07 AM	8:51 AM	9:09 AM	9:21 AM	9:36 AM	10:11 AM	10:24 AM	10:41 AM	10:49 AM
4	9:00 AM	9:37 AM	10:21 AM	10:39 AM	10:51 AM	11:06 AM	11:41 AM	11:54 AM	12:11 PM	12:19 PM

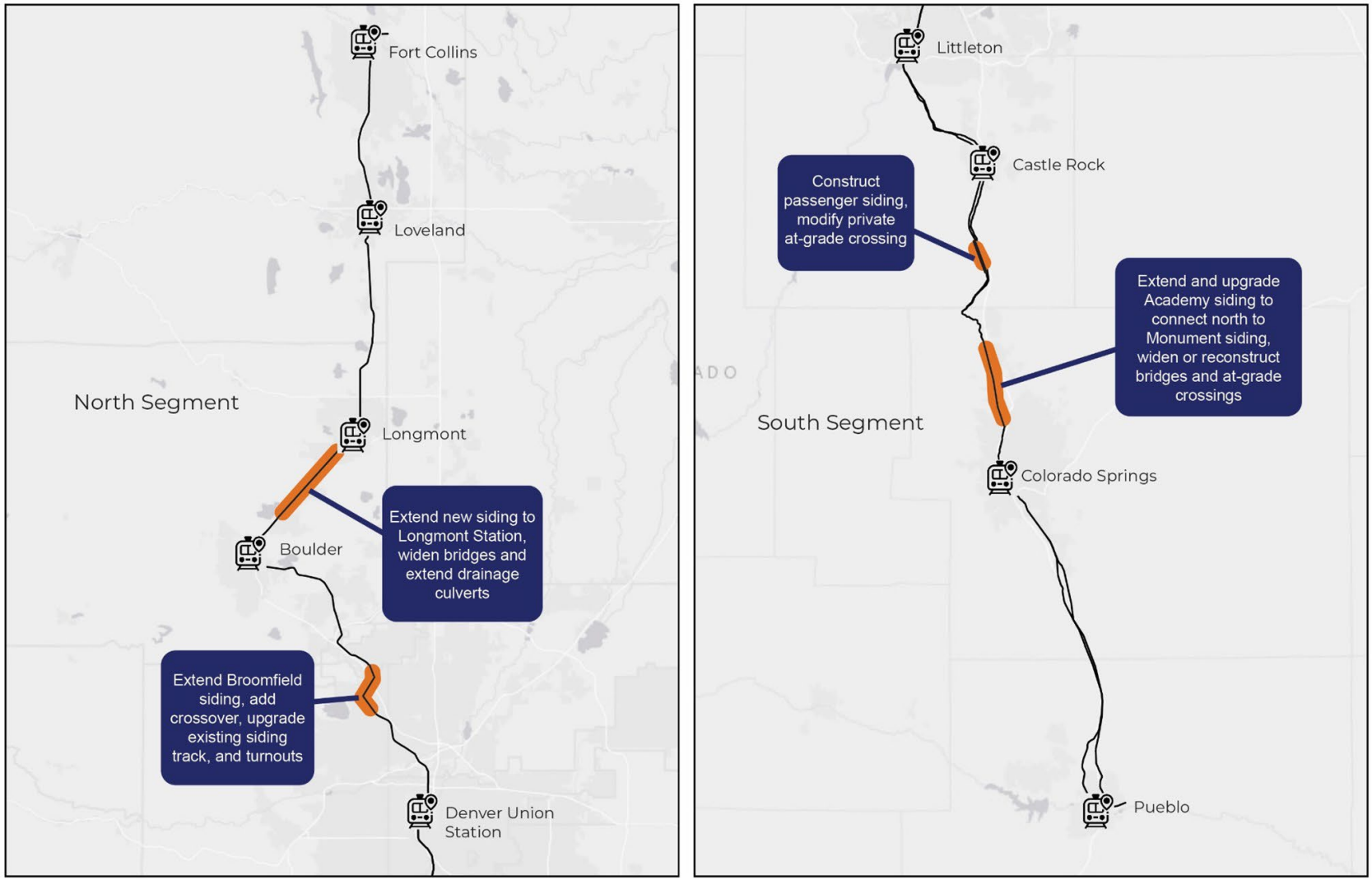
	Pueblo	Colorado Springs	Castle Rock	Littleton	Denver Union Station (DP)	Denver Union Station (AR)	Boulder	Longmont	Loveland	Fort Collins
5	10:30 AM	11:07 AM	11:51 AM	12:09 PM	12:21 PM	12:36 PM	1:11 PM	1:24 PM	1:41 PM	1:49 PM
6	1:30 PM	2:07 PM	2:51 PM	3:09 PM	3:21 PM	3:36 PM	4:11 PM	4:24 PM	4:41 PM	4:49 PM
7	3:00 PM	3:37 PM	4:21 PM	4:39 PM	4:51 PM	5:06 PM	5:41 PM	5:54 PM	6:11 PM	6:19 PM
8	4:30 PM	5:07 PM	5:51 PM	6:09 PM	6:21 PM	6:36 PM	7:11 PM	7:24 PM	7:41 PM	7:49 PM
9	6:00 PM	6:37 PM	7:21 PM	7:39 PM	7:51 PM	8:06 PM	8:41 PM	8:54 PM	9:11 PM	9:19 PM
10	7:30 PM	8:07 PM	8:51 PM	9:09 PM	9:21 PM	9:36 PM	10:11 PM	10:24 PM	10:41 PM	10:49 PM

The sketch-level operations analysis informed the engineering refinements needed for each service and identified areas for additional investment for shared-use operations. Based on this iterative operations analysis and engineering, investments to implement Alternative 3 were identified. Investments primarily include extending sidings and widening or reconstructing existing/new infrastructure. Locations and types of investments required for Alternative 3 are described in Table 10 and illustrated in Exhibit 6. Appendix D provides more details on the investment needs and costs. Note that Denver Union Station is located at Milepost 0 for reference to mileposts in Table 10.

Table 10: Alternative 3 Additional Investments

Segment	Track Investments	Other Investments
South	Connect Academy Siding south control point north to Monument Siding at MP57.9; construct UXO at MP57.9	Widen or Reconstruct bridges at MP61.57, MP60.42, MP59.94 and MP59.37; and reconstruct at-grade crossings MP61.87 and MP59.42.
North	Connect end of siding at MP36.68 to proposed Longmont station approach track at MP42.60; Construct UXO at MP36.80 and MP42.6	Reconstruction at-grade crossings at MP36.68, MP37.2, MP37.86, MP38.05, MP39.17, MP39.84, MP40.65, MP41.36, MP42.17, and MP42.53; New Bridge at MP40.3; and widen box culvert at MP42.56 for additional track

Exhibit 6: Locations of Additional Improvements for Alternative 3



2.2.4. Alternative 4, 12 Roundtrips at 79 mph

Alternative 4 would offer twelve daily round trips at 79 miles per hour with a travel time from end to end of 3 hours 19 minutes. Alternative 4 would also serve nine stations and the annual ridership is projected to be 1,131,000 or 141,000 (14 percent) more than 10 roundtrips.

An initial timetable was developed for 12 roundtrips per day, generally providing all day service with five daily trips before 12pm and five in the afternoon/evening in both directions (north and south). Table 11 and Table 12 illustrate the proposed timetable for Alternative 4. Pueblo departures occur at 4:30 a.m., 6:00 a.m., 7:30 a.m., 9:00 a.m., 10:30 a.m., 12:00 p.m., 1:30 p.m., 3:00 p.m., 4:30 p.m., 6:00 p.m., 7:30 p.m., and 9:00 p.m. Fort Collins departures occur 35 minutes later at 5:05 a.m., 6:35 a.m., 8:05 a.m., 9:35 a.m., 11:05 a.m., 12:35 p.m., 2:05 p.m., 3:35 p.m., 5:05 p.m., 6:35 p.m., 8:05 pm., and 9:35 p.m. Timetables are based on existing corridor geometries, passenger only operations, and represent a golden run.

Table 11: Alternative 4, Timetable from Fort Collins

	Fort Collins	Loveland	Longmont	Boulder	Denver Union Station (AR)	Denver Union Station (DP)	Littleton	Castle Rock	Colorado Springs	Pueblo
1	5:05 AM	5:14 AM	5:31 AM	5:44 AM	6:17 AM	6:32 AM	6:46 AM	7:04 AM	7:49 AM	8:24 AM
2	6:35 AM	6:44 AM	7:01 AM	7:14 AM	7:47 AM	8:02 AM	8:16 AM	8:34 AM	9:19 AM	9:54 AM
3	8:05 AM	8:14 AM	8:31 AM	8:44 AM	9:17 AM	9:32 AM	9:46 AM	10:04 AM	10:49 AM	11:24 AM
4	9:35 AM	9:44 AM	10:01 AM	10:14 AM	10:47 AM	11:02 AM	11:16 AM	11:34 AM	12:19 PM	12:54 PM
5	11:05 AM	11:14 AM	11:31 AM	11:44 AM	12:17 PM	12:32 PM	12:46 PM	1:04 PM	1:49 PM	2:24 PM
6	12:35 PM	12:44 PM	1:01 PM	1:14 PM	1:47 PM	2:02 PM	2:16 PM	2:34 PM	3:19 PM	3:54 PM
7	2:05 PM	2:14 PM	2:31 PM	2:44 PM	3:17 PM	3:32 PM	3:46 PM	4:04 PM	4:49 PM	5:24 PM
8	3:35 PM	3:44 PM	4:01 PM	4:14 PM	4:47 PM	5:02 PM	5:16 PM	5:34 PM	6:19 PM	6:54 PM
9	5:05 PM	5:14 PM	5:31 PM	5:44 PM	6:17 PM	6:32 PM	6:46 PM	7:04 PM	7:49 PM	8:24 PM
10	6:35 PM	6:44 PM	7:01 PM	7:14 PM	7:47 PM	8:02 PM	8:16 PM	8:34 PM	9:19 PM	9:54 PM
11	8:05 PM	8:14 PM	8:31 PM	8:44 PM	9:17 PM	9:32 PM	9:46 PM	10:04 PM	10:49 PM	11:24 PM
12	9:35 PM	9:44 PM	10:01 PM	10:14 PM	10:47 PM	11:02 PM	11:16 PM	11:34 PM	12:19 AM	12:54 AM

Table 12: Alternative 4, Timetable from Pueblo

	Pueblo	Colorado Springs	Castle Rock	Littleton	Denver Union Station (DP)	Denver Union Station (AR)	Boulder	Longmont	Loveland	Fort Collins
1	4:30 AM	5:07 AM	5:51 AM	6:09 AM	6:21 AM	6:36 AM	7:11 AM	7:24 AM	7:41 AM	7:49 AM
2	6:00 AM	6:37 AM	7:21 AM	7:39 AM	7:51 AM	8:06 AM	8:41 AM	8:54 AM	9:11 AM	9:19 AM
3	7:30 AM	8:07 AM	8:51 AM	9:09 AM	9:21 AM	9:36 AM	10:11 AM	10:24 AM	10:41 AM	10:49 AM

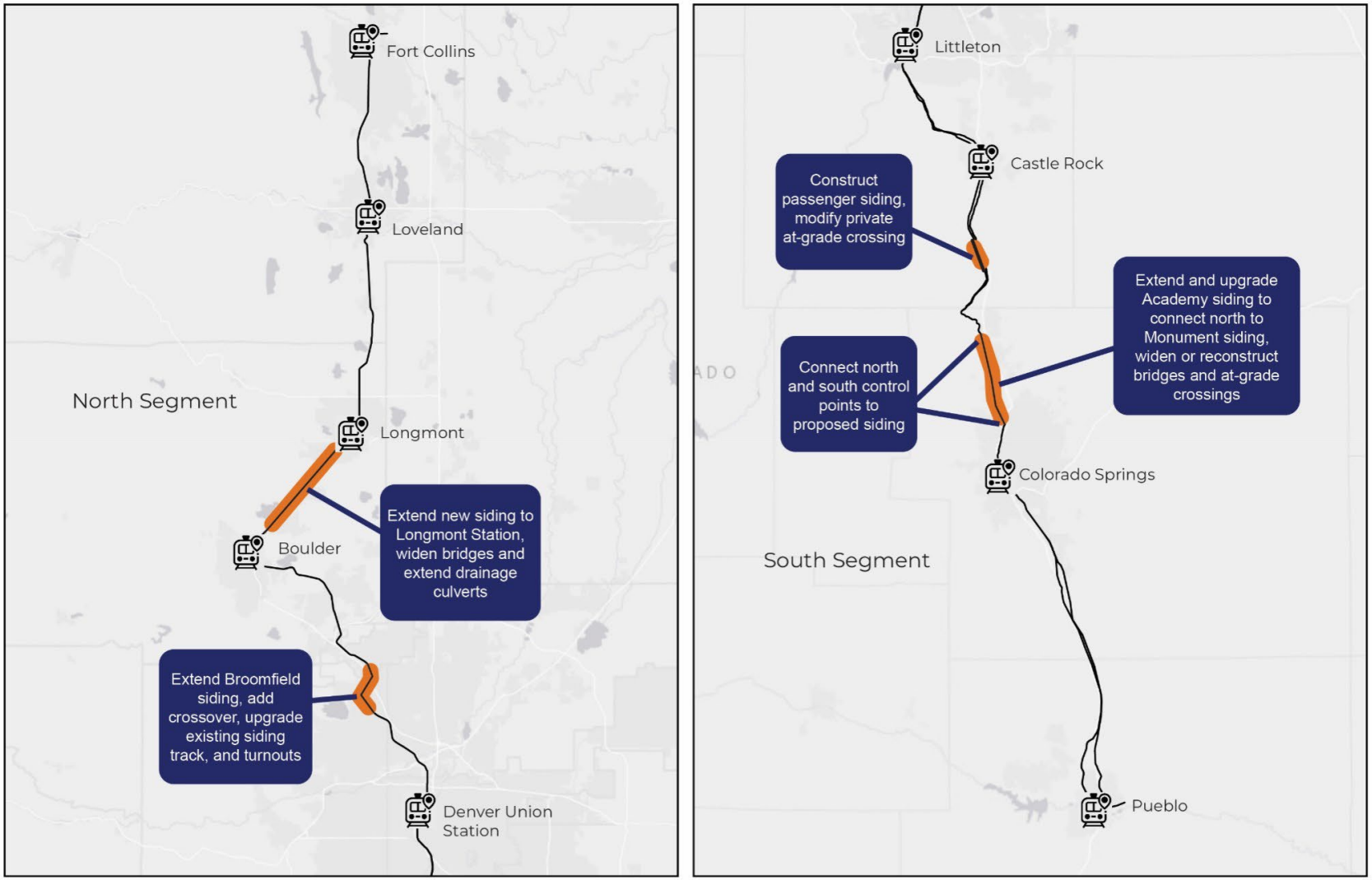
	Pueblo	Colorado Springs	Castle Rock	Littleton	Denver Union Station (DP)	Denver Union Station (AR)	Boulder	Longmont	Loveland	Fort Collins
4	9:00 AM	9:37 AM	10:21 AM	10:39 AM	10:51 AM	11:06 AM	11:41 AM	11:54 AM	12:11 PM	12:19 PM
5	10:30 AM	11:07 AM	11:51 AM	12:09 PM	12:21 PM	12:36 PM	1:11 PM	1:24 PM	1:41 PM	1:49 PM
6	12:00 PM	12:37 PM	1:21 PM	1:39 PM	1:51 PM	2:06 PM	2:41 PM	2:54 PM	3:11 PM	3:19 PM
7	1:30 PM	2:07 PM	2:51 PM	3:09 PM	3:21 PM	3:36 PM	4:11 PM	4:24 PM	4:41 PM	4:49 PM
8	3:00 PM	3:37 PM	4:21 PM	4:39 PM	4:51 PM	5:06 PM	5:41 PM	5:54 PM	6:11 PM	6:19 PM
9	4:30 PM	5:07 PM	5:51 PM	6:09 PM	6:21 PM	6:36 PM	7:11 PM	7:24 PM	7:41 PM	7:49 PM
10	6:00 PM	6:37 PM	7:21 PM	7:39 PM	7:51 PM	8:06 PM	8:41 PM	8:54 PM	9:11 PM	9:19 PM
11	7:30 PM	8:07 PM	8:51 PM	9:09 PM	9:21 PM	9:36 PM	10:11 PM	10:24 PM	10:41 PM	10:49 PM
12	9:00 PM	9:37 PM	10:21 PM	10:39 PM	10:51 PM	11:06 PM	11:41 PM	11:54 PM	12:11 AM	12:19 AM

The sketch-level operations analysis informed the engineering refinements needed for each service and identified areas for additional investment for shared-use operations. Based on this iterative operations analysis and engineering, investments to implement Alternative 4 were identified. Investments primarily include extending sidings and widening or reconstructing existing/new infrastructure. Locations and types of investments required for Alternative 4 are described in Table 13 and illustrated in Exhibit 7. Appendix D provides more details on the investment needs and costs. Note that Denver Union Station is located at Milepost 0 for reference to mileposts in Table 13.

Table 13: Alternative 4 Additional Investments

Segment	Description	Other investments
South	Connect North Colorado Springs north control point to proposed South Academy siding south control point at MP68.3; construct UXO at MP72.3	Widen or reconstruct bridges at MP71.48, MP70.48, MP70.45, MP69.26, MP68.87, and MP68.31; and modify pier protection at existing overpasses.
North	Connect end of proposed extended Boulder Siding at MP31.6 to proposed end of siding at MP33.25; install UXO at MP31.60	Widen or reconstruct bridges at MP31.85, MP32.74, and MP33.14; Reconstruction at-grade crossings at MP32.04, MP32.33, and MP33.25

Exhibit 7: Locations of Additional Improvements for Alternative 4



2.2.5. Alternative 5, 12 Roundtrips at 90 mph

Alternative 5 would offer twelve daily round trips at 90 miles per hour with a travel time from end to end of 3 hours 14 minutes. Alternative 5 would also serve nine stations, includes additional investment in track curve straightening, and is projected to have the highest annual ridership at 1,153,000, which is 22,000 (2 percent) more than Alternative 4 at 79 mph.

An initial timetable was developed for 12 roundtrips per day, generally providing all-day service. Table 14 and Table 15 illustrate the proposed timetable. Pueblo departures occur at 4:30 a.m., 6:00 a.m., 7:30 a.m., 9:00 a.m., 10:30 a.m., 12:00 p.m., 1:30 p.m., 3:00 p.m., 4:30 p.m., 6:00 p.m., 7:30 p.m., and 9:00 p.m. Fort Collins departures occur 30 minutes later at 5:00 a.m., 6:30 a.m., 8:00 a.m., 9:30 a.m., 11:00 a.m., 12:30 p.m., 2:00 p.m., 3:00 p.m., 5:00 p.m., 6:30 p.m., and 9:30 p.m. Departure times occur every 90 minutes. Timetables are based on existing corridor geometries, passenger only operations, and represent a golden run.

Table 14: Alternative 5, Timetable from Fort Collins

	Fort Collins	Loveland	Longmont	Boulder	Denver Union Station (AR)	Denver Union Station (DP)	Littleton	Castle Rock	Colorado Springs	Pueblo
1	5:00 AM	5:09 AM	5:25 AM	5:38 AM	6:11 AM	6:26 AM	6:39 AM	6:57 AM	7:41 AM	8:14 AM
2	6:30 AM	6:39 AM	6:55 AM	7:08 AM	7:41 AM	7:56 AM	8:09 AM	8:27 AM	9:11 AM	9:44 AM
3	8:00 AM	8:09 AM	8:25 AM	8:38 AM	9:11 AM	9:26 AM	9:39 AM	9:57 AM	10:41 AM	11:14 AM
4	9:30 AM	9:39 AM	9:55 AM	10:08 AM	10:41 AM	10:56 AM	11:09 AM	11:27 AM	12:11 PM	12:44 PM
5	11:00 AM	11:09 AM	11:25 AM	11:38 AM	12:11 PM	12:26 PM	12:39 PM	12:57 PM	1:41 PM	2:14 PM
6	12:30 PM	12:39 PM	12:55 PM	1:08 PM	1:41 PM	1:56 PM	2:09 PM	2:27 PM	3:11 PM	3:44 PM
7	2:00 PM	2:09 PM	2:25 PM	2:38 PM	3:11 PM	3:26 PM	3:39 PM	3:57 PM	4:41 PM	5:14 PM
8	3:30 PM	3:39 PM	3:55 PM	4:08 PM	4:41 PM	4:56 PM	5:09 PM	5:27 PM	6:11 PM	6:44 PM
9	5:00 PM	5:09 PM	5:25 PM	5:38 PM	6:11 PM	6:26 PM	6:39 PM	6:57 PM	7:41 PM	8:14 PM
10	6:30 PM	6:39 PM	6:55 PM	7:08 PM	7:41 PM	7:56 PM	8:09 PM	8:27 PM	9:11 PM	9:44 PM
11	8:00 PM	8:09 PM	8:25 PM	8:38 PM	9:11 PM	9:26 PM	9:39 PM	9:57 PM	10:41 PM	11:14 PM
12	9:30 PM	9:39 PM	9:55 PM	10:08 PM	10:41 PM	10:56 PM	11:09 PM	11:27 PM	12:11 AM	12:44 AM

Table 15: Alternative 5, Timetable from Pueblo

	Pueblo	Colorado Springs	Castle Rock	Littleton	Denver Union Station (DP)	Denver Union Station (AR)	Boulder	Longmont	Loveland	Fort Collins
1	4:30 AM	5:05 AM	5:48 AM	6:06 AM	6:17 AM	6:32 AM	7:06 AM	7:19 AM	7:36 AM	7:44 AM
2	6:00 AM	6:35 AM	7:18 AM	7:36 AM	7:47 AM	8:02 AM	8:36 AM	8:49 AM	9:06 AM	9:14 AM
3	7:30 AM	8:05 AM	8:48 AM	9:06 AM	9:17 AM	9:32 AM	10:06 AM	10:19 AM	10:36 AM	10:44 AM
4	9:00 AM	9:35 AM	10:18 AM	10:36 AM	10:47 AM	11:02 AM	11:36 AM	11:49 AM	12:06 PM	12:14 PM
5	10:30 AM	11:05 AM	11:48 AM	12:06 PM	12:17 PM	12:32 PM	1:06 PM	1:19 PM	1:36 PM	1:44 PM
6	12:00 PM	12:35 PM	1:18 PM	1:36 PM	1:47 PM	2:02 PM	2:36 PM	2:49 PM	3:06 PM	3:14 PM
7	1:30 PM	2:05 PM	2:48 PM	3:06 PM	3:17 PM	3:32 PM	4:06 PM	4:19 PM	4:36 PM	4:44 PM
8	3:00 PM	3:35 PM	4:18 PM	4:36 PM	4:47 PM	5:02 PM	5:36 PM	5:49 PM	6:06 PM	6:14 PM
9	4:30 PM	5:05 PM	5:48 PM	6:06 PM	6:17 PM	6:32 PM	7:06 PM	7:19 PM	7:36 PM	7:44 PM
10	6:00 PM	6:35 PM	7:18 PM	7:36 PM	7:47 PM	8:02 PM	8:36 PM	8:49 PM	9:06 PM	9:14 PM
11	7:30 PM	8:05 PM	8:48 PM	9:06 PM	9:17 PM	9:32 PM	10:06 PM	10:19 PM	10:36 PM	10:44 PM
12	9:00 PM	9:35 PM	10:18 PM	10:36 PM	10:47 PM	11:02 PM	11:36 PM	11:49 PM	12:06 AM	12:14 AM

The sketch-level operations analysis informed the engineering refinements needed for each service and identified areas for additional investment for shared-use operations. Based on this iterative operations analysis and engineering, investments to implement Alternative 5 were identified. Investments primarily include extending sidings and widening or reconstructing existing/new infrastructure. Locations and types of investments required for Alternative 5 are described in Table 16 and illustrated in Exhibit 8. Appendix D provides more details on the investment needs and costs. Note that Denver Union Station is located at Milepost 0 for reference to mileposts in Table 16.

Table 16: Alternative 5 Additional Investments

Segment	Description	Other investments
South	Connect Academy Siding south control point north to Monument Siding at MP57.9; construct UXO at MP57.9	Widen or reconstruct bridges at MP61.57, MP60.42, MP59.94 and MP59.37; and reconstruct at-grade crossings MP61.87 and MP59.42.
South	Connect North Colorado Springs north control point to proposed South Academy siding south control point at MP68.3; construct UXO at MP72.3	Widen or reconstruct bridges at MP71.48, MP70.48, MP70.45, MP69.26, MP68.87, and MP68.31; and modify pier protection at existing overpasses.
North	Connect end of siding at MP36.68 to proposed Longmont station approach track at MP42.60; Construct UXO at MP36.80 and MP42.6	Reconstruction at-grade crossings at MP36.68, MP37.2, MP37.86, MP38.05, MP39.17, MP39.84, MP40.65, MP41.36, MP42.17, and MP42.53; new bridge at MP40.3; and widen box culvert at MP42.56 for additional track
North	Connect end of proposed extended Boulder Siding at MP31.6 to proposed end of siding at MP33.25; install UXO at MP31.60	Widen or reconstruct bridges at MP31.85, MP32.74, and MP33.14; reconstruct at-grade crossings at MP32.04, MP32.33, and MP33.25

Exhibit 8: Locations of Additional Improvements for Alternative 5

3. Evaluation

Alternatives were evaluated and compared based on operational, environmental, and financial criteria stemming from the Purpose and Need Statement for the corridor. The key evaluation metrics were selected based on key performance indicators as shown in Table 17.

Table 17: Evaluation Criteria

Criteria Category	Evaluation Metric
Operational Considerations	• Ridership • Travel time • Frequency • Equipment Utilization
Environmental Considerations	• Area of Potential Disturbance • Proximity to Sensitive Resource(s)
Financial Considerations	• Total Annual Operations & Maintenance (O&M) Costs • Operating Ratio • Total Annual Operating Revenue • Total Capital Cost

3.1. Operational Considerations

Ridership is the primary measure of the operational success of FRPR alternatives in meeting the Draft Purpose and Need Statement. Travel time and service frequency are the operational characteristics that most affect ridership.

3.1.1. Ridership

Initial FRPR ridership forecasts were developed using CDOT's existing statewide activity-based travel demand model, which relies on travel data and traffic counts specific to Colorado and covers the entire Front Range region. The CDOT model is a highly sophisticated activity-based travel demand model that relies on millions of data points to project travel across the state. It was used to project ridership for a "base" condition of 6 roundtrips per day. A less sophisticated but more nimble strategic tool was created to validate ridership against the benchmark systems and test ridership for higher frequency service. Analysis of the effects of frequency on ridership is included in Section 3.1.3. As noted below, despite the improvements to track geometry needed to achieve 90 mph speeds, travel time was virtually the same under the 79 mph and 90 mph alternatives and was not a factor in distinguishing ridership.

3.1.2. Travel Times

Travel times are related to the speed of the train, including acceleration and deceleration times, the number and distances between stations (how long trains can maintain highest speeds), and

rail infrastructure and geometry – curvature and grade, and other external factors, such as speed restrictions and network scheduling and congestion. For this analysis, travel times were calculated from "golden runs" that optimized speed based on geometry. As noted previously, increasing from 79 mph to 90 mph only resulted in a 5-minute (2 percent) time savings and a less than 2 percent increase in ridership for an end-to-end run. Speed, therefore, was not a distinguishing factor in alternatives performance.

As the project development progresses, travel times will be refined to reflect actual run time considerations. This will include adjustments related to limitations of rail infrastructure and geometry as well as operational considerations, such as the potential trade-off between headline travel times and on-time performance (OTP). Longer travel times would be expected to reduce ridership forecasts. The sensitivity of ridership to travel time – among other sensitivity tests – will be further explored within the Project Development Report.

3.1.3. Frequency

Ridership was estimated for a range of service frequencies, including 24, 16, 12, 10 and 6 roundtrips, using the strategic tool, as documented in the Draft Ridership Modeling Analysis Memo (2024). Projections show that ridership is highly correlated to frequency – generally, the more trains, the more riders. Although the 24- and 16-roundtrip frequencies generated high ridership, they were not evaluated in detail because they would require dedicated track and could not be interoperated with freight rail so did not meet the purpose and need for FRPR.

The five alternatives considered in this analysis tested three frequencies: 6 roundtrips, 10 roundtrips, and 12 roundtrips. At 6 roundtrips, FRPR is expected to attract just over 700,000 riders at either 79 mph or 90 mph. However, as frequency increases, ridership increases substantially. Alternative 1 has the lowest ridership projection and is shown as the baseline (0 percent), increasing by 25 percent from 6 to 10 roundtrips and another 14 percent from 10 to 12 roundtrips. Speed amounts to less than 2 percent addition to ridership projections and is therefore not considered a driver in the comparison.

These results provide an indication of the demand across the system and indicate for 6 roundtrips, ridership demand is greatest to and from the Denver Metro area and fairly evenly distributed between Denver and the North (Boulder to Fort Collins) markets and Denver and South (Castle Rock to Pueblo) markets.

As frequency increases, overall ridership increases; however, the modeling found that the increases were not consistently distributed, and much of the increased ridership associated with increased frequency was in the northern section. While the ridership in the southern section and between the south and north increases, it generally flattens, and most of the increases with ridership occur in Denver and North, suggesting that higher frequency of 10 or 12 roundtrips could better meet demand in the Denver Metro-North and that 6 roundtrips may be more appropriate to meet demand for markets in the Denver Metro-South.

3.2. Environmental Considerations

Impacts to environmental resources were analyzed by comparing the areas of potential disturbance to proximity of important environmental and community resources along and within the FRPR corridor. Generally, the alternatives with higher speeds and frequencies require more investment and more disturbance because more construction work is anticipated. That is, Alternative 5 would have the most impact, and Alternative 1 would have the least, though none of the additional investments considered in this analysis account for the base investments, which constitute the majority of the area of disturbance and most impact.

All investments (both base and additional) are expected to occur within or predominately within the railway right-of-way. Because all investments would occur predominately within previously disturbed railroad right-of-way, environmental impacts are not a differentiating factor among alternatives. For instance:

- The number of stream and trail crossings would be the same under all the alternatives.
- The proximity of operations to communities, including those with environmental justice concerns, would likewise be the same under all alternatives.
- The noise and other operational effects would not be distinguishable by the change in frequency or speed that differentiates the alternatives.

To the extent possible, given the current level of design detail and understanding of direct property impacts, the team identified sensitive resources requiring additional environmental compliance. These include threatened and endangered species, historic and archaeological properties, wetlands and waters of the U.S., and historic and recreational properties subject to Section 4(f) of the U.S. Department of Transportation Act. While no major concerns were identified in this initial review, further evaluation and potential avoidance strategies will be considered as the project advances.

Environmental Context Memos provide additional information about environmental resources along the corridor and conclude that while important resources may be traversed by the route, most of the area within the rail right-of-way where most of the construction would occur is already disturbed. Environmental considerations do not influence the alternatives' ability to meet the project's Draft Purpose and Need Statement and are not a distinguishing factor in this Preliminary Alternatives Analysis.

3.3. Financial Considerations

This section summarizes the financial components of the FRPR project across the different alternatives. Relative costs among the alternatives are linear: the more service is provided, the more capital (infrastructure) is required, the more expensive it is to operate and maintain, and the more revenue it generates. Information related to operating costs is detailed in the Service Options Memorandum (Appendix C). Information related to capital costs is detailed in the Investment Options Memorandum (Appendix D).

3.3.1. Operational Financial Considerations

The comparative operating costs and revenues of the alternatives are described below and summarized in Table 19.

Table 18: Financial Characteristics or Operations

	O&M ($ million)	Revenue ($ million)	Operating Ratio (Revenue/O&M)
Alternative 1	52.4	10.1	0.193
Alternative 2	52.4	10.3	0.197
Alternative 3	76.3	13.0	0.170
Alternative 4	87.6	14.3	0.163
Alternative 5	87.6	14.6	0.167

Operations and maintenance (O&M) costs represent the annual costs of operating and maintaining the system. It includes labor costs, energy costs, vehicle and station maintenance, and other administrative costs. Train hours and train miles are key inputs to calculating O&M costs and are highly correlated to frequency.

Revenue represents the potential revenues of the service based on fare recovery. It should be noted that a formal fare policy structure has not been determined but for the purpose of evaluating the service alternative, ticket prices are based on $0.37/mile. Ridership modeling also considered a lower fare for comparison. Lowering the fare to $0.19/mile would have a considerable benefit of a possible 71% increase in ridership for the six round trips, as shown in Table 20, but it would also reduce revenue by 13%. The fare structure is not a differentiator in the analysis because the same fare is modeled across all alternatives. In both the Project Development Report and SDP, the fare structure will be further refined to strike the necessary balance between revenue and ridership. Revenue is dependent on fare policies, which have not been developed for FRPR. The operating ratios reported are subject to change but provide a relative measure to compare operational efficiency of the alternatives.

Table 19: Indicative ridership by Average Fare Per Mile

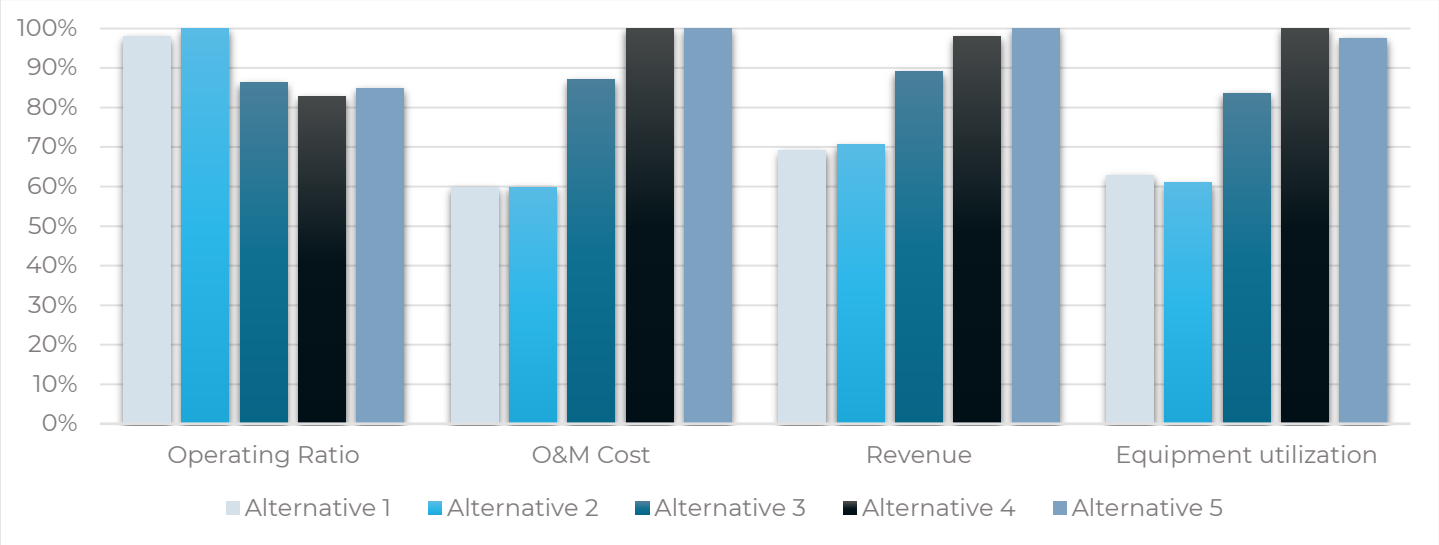
	Frequency(roundtrips)	$0.19/Mile	$0.37/Mile
Alternative 1	6	1,200,000	702,000
Alternative 2	6	1,220,000	716,000
Alternative 3	10	1,690,000	990,000
Alternative 4	12	1,930,000	1,131,000
Alternative 5	12	1,970,000	1,153,000

The operating ratio is the operating revenue divided by operating expenses and is a measure of the financial efficiency of the system. An operating ratio of 1 means that revenues cover costs.

In addition to operating ratio, O&M cost, and revenue, another indicator of financial efficiency is equipment utilization. Equipment utilization is measured in average daily revenue hours per train consist—the higher the utilization, the more revenue is being generated for the least capital (equipment) cost.

Exhibit 11 compares the alternatives based on the key operational metrics: operating ratio, O&M cost, revenue, and equipment utilization. The metrics are presented on a percentage basis, with the alternative with the highest number for a metric set to 100 percent, and the other alternatives measured as relative percentages of the highest. Except for O&M costs, the higher percentage shown in Exhibit 11 represents better performance in each category. Alternative 2 has the best operating ratio, and Alternatives 4 and 5 have the highest O&M costs. The highest revenue is Alternative 5, and the highest equipment utilization is Alternative 4.

Exhibit 9: Comparison of Relative Operating Costs and Revenues among Alternatives



3.3.2. Capital Costs

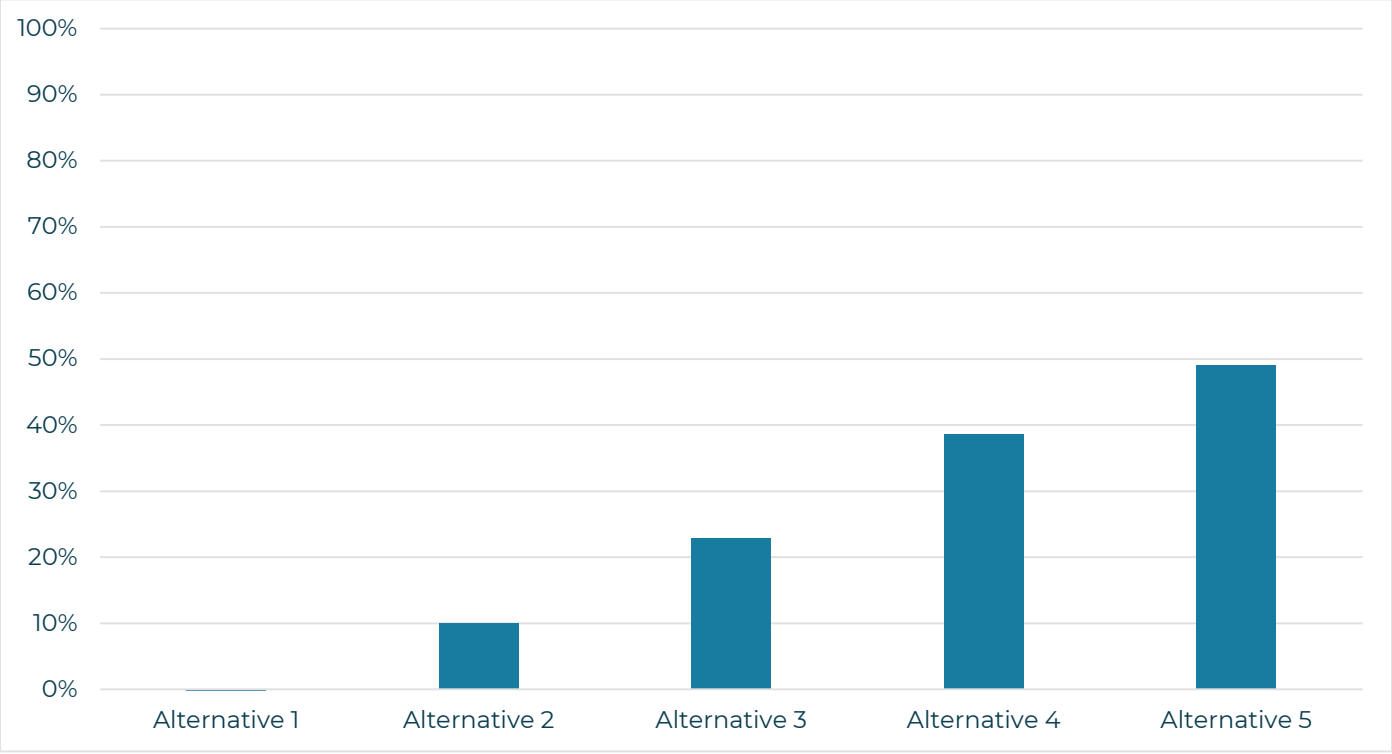
Capital costs represent the cost to construct the passenger rail civil and structural elements; build new tracks, stations, and support facilities; purchase and install system control components; acquire vehicles; perform professional services, such as design and construction management; and construct other supporting sitework infrastructure, such as drainage and utilities. Most of the capital costs are associated with the base infrastructure to implement passenger service—to run one train, as described in Section 2.1 of this report. The comparison of capital costs in this analysis focuses only on the estimated cost for implementing the additional improvements, beyond the base investments needed for each alternative. Isolating the cost of the additional investments provides a more refined comparison of the relative additional costs and revenues of each alternative. As detailed in Appendix D, capital investments and costs are lowest for Alternative 1, which requires the least additional infrastructure and has the lowest frequency and speed, and

highest for Alternative 5, which has the greatest infrastructure needs and highest frequency and speed.

Exhibit 12 presents a relative comparison of the relationship between capital costs and increasing service frequency and speeds. Alternative 1, as the lowest cost alternative, is shown as 0 percent, and additional costs are shown as percentage increases compared to Alternative 1. For instance, increasing speed to 90 mph between Alternative 1 and Alternative 2 and Alternative 4 and Alternative 5, results in an approximate 10 percent increase in capital costs compared to the same frequency service at 79 mph due to needed upgrades over the base investments on the mainline tracks. Increasing frequency from 6 to 10 roundtrips between Alternative 1 and Alternative 3 results in 23 percent higher capital costs, and increasing to 12 roundtrips in Alternative 4 increases costs 39 percent compared to the Alternative 1 6 roundtrip alternative.

While there are measurable differences among the alternatives evaluated, it should be noted that the comparison is exaggerated because of the high base investment costs that are common to all alternatives.

Exhibit 10: Comparison of Relative Capital Cost among Alternatives



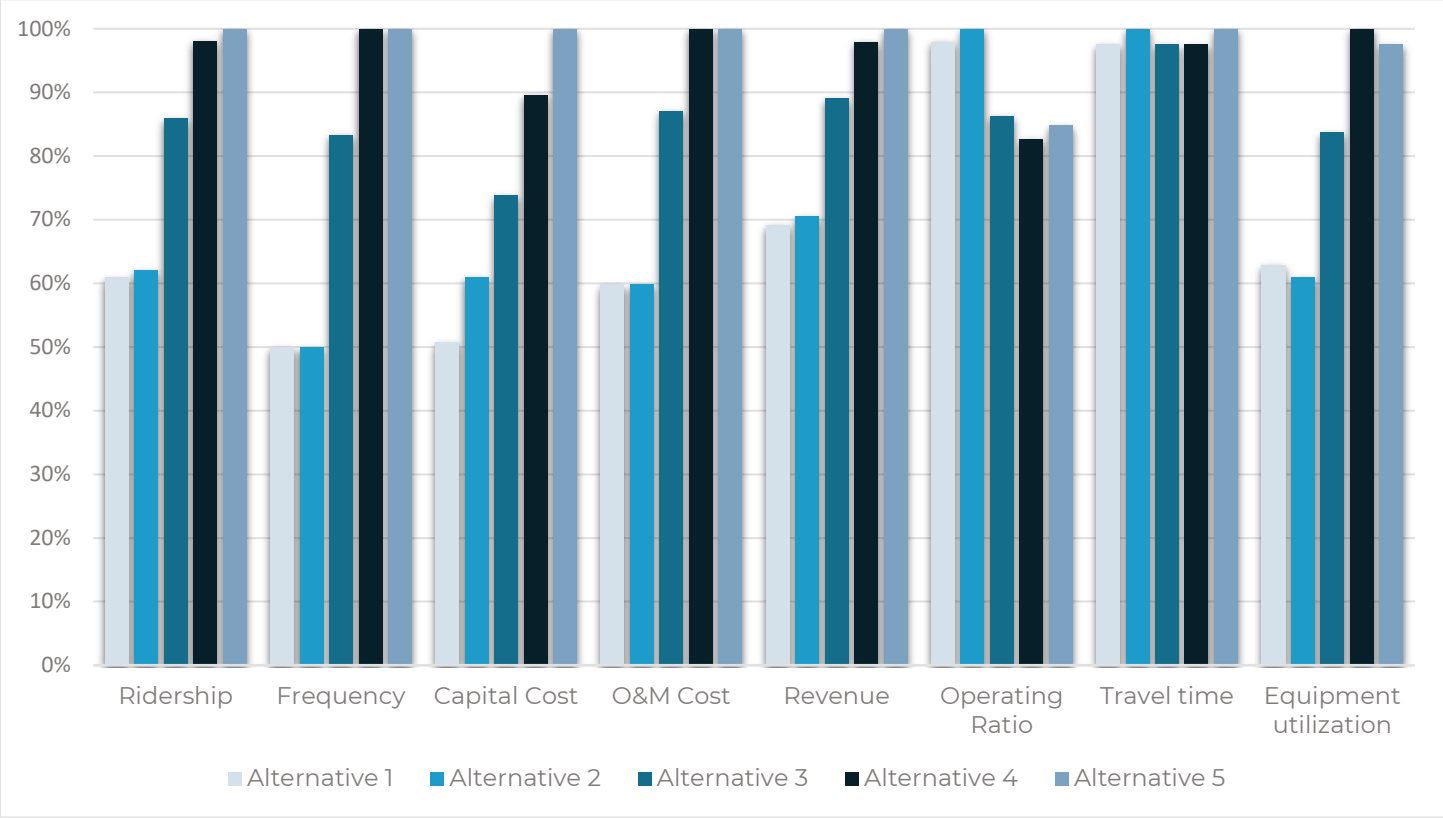
4. Conclusion

Alternative 3, 10 Round Trips at 79 mph, is identified as the alternative to be refined in the SDP. It presents an ambitious yet flexible vision, with the potential to start with a service with fewer roundtrips and scale up as demand and resources increase, either across the system or in distinct segments. This option offers a practical starting point with a reasonable ceiling for service expansion. It also provides the best test case for the SDP, which will address critical operational and cost questions through robust operational modeling and public input. Additionally, it allows for informed adjustments as the project progresses, including prioritizing key elements like phasing and timelines.

4.1. Comparison

Exhibit 13 summarizes the performance of the alternatives based on key operational and financial metrics. The performance is presented as percentages, with the highest-rated alternative in each category (ridership, capital cost, O&M costs, revenue, operating ratio, travel time, and frequency) shown at 100 percent. Metrics for the other alternatives are shown as relative percentages compared to this 100 percent benchmark. For example, Alternative 5 has the highest ridership, while Alternatives 1 and 2 serve approximately 60 percent of the riders served by Alternative 5.

Exhibit 11: Alternatives Comparison



Alternatives 2 and 5, operating at 90 mph, provide approximately 2 percent higher ridership due to a 5-minute travel time savings. However, they incur more than 20 percent additional implementation costs. Given the minimal ridership increase and the relatively high costs, Alternatives 2 and 5 are not recommended to move forward in the SDP.

Among the 79 mph alternatives, each shows varied performance across the metrics. Alternative 1, with 6 roundtrips per day, consistently ranks lower, while Alternative 4, with 12 roundtrips, ranks notably higher across all key metrics. Alternative 3, offering 10 roundtrips per day, strikes a balance between the two extremes. This is expected, as service frequency is the most important driver of ridership, which in turn is the key metric for meeting the project's purpose and need.

- Alternative 1 has the lowest projected ridership but also fails to meet ridership demand effectively, missing out on 300,000 to 400,000 additional riders annually, especially in the North, where ridership is highly sensitive to increased service frequency. In addition, limiting service to six roundtrips falls short of the project's purpose and need, as well as public expectations for a more robust and transformative system that could serve as a true alternative to SOV travel across the Front Range
- Alternative 4, with the highest projected ridership of the 79 mph options, is an attractive option and positions FRPR as a system that riders can "build their lives around." However, offering 12 roundtrips per day may be excessive, as it approaches the upper limit of comparable benchmark services, particularly given the region's lower population and employment densities compared to high-frequency corridors like the Capitol Corridor. Additionally, this alternative poses significant challenges and risks for implementation, especially with shared freight operations. While the initial base investment analysis shows a linear relationship between capital costs and benefits, further operational modeling is likely to reveal the need for additional investments to reduce conflicts and mitigate risks with freight operations.
- Alternative 3, with 10 roundtrips, falls in the middle of Alternatives 1 and 4, providing a balanced approach between ambition and practicality. It offers a vision that is both aspirational and achievable, aligning ridership, revenue, and costs, and provides a strong foundation to meet the project’s purpose, need, and the District’s goals.

4.2. Next Steps

The Preliminary Alternatives Analysis is a critical step in advancing the SDP for the FRPR project. It demonstrates significant progress in defining the FRPR service in collaboration with host railroads, ensuring alignment with operational and infrastructure constraints. By establishing a foundation for focused financial, operational, and implementation analyses, the Preliminary Alternatives Analysis allows the SDP to proceed with a clear understanding of the best option for FRPR service—both for current needs and future scalability

The Preliminary Alternatives analysis sets the boundaries for FRPR service vision, and it provides a basis for discussing specific operational and infrastructure improvements with the host railroads to develop passenger rail service on predominantly existing freight infrastructure. From this basis,

discussions with host railroads will evolve, engineering will progress, and more information will be developed regarding specific investments and costs for the selected alternative. This refined information will provide useful data for implementation planning, including phasing and financial needs. The refined operational cost and timelines developed through the SDP will likely differ from the costs, travel time, ridership, etc. reported in this Preliminary Alternatives Analysis. For example, the travel times and timetables in this analysis are based on golden runs that do not account for freight traffic or other conflicts that will be clarified through additional operational modeling. Regardless, the recommendation for the FRPR service vision for 10 roundtrip per day at 79 mph along the entire route would not change. The same revisions to travel time would apply to any service options evaluated in this Preliminary Alternatives Analysis.

To simulate real-world conditions and validate the service, the SDP will move forward with operational testing for the recommended service option in coordination with host railroads. Rail operations modeling will analyze and optimize rail network operations, including simulated train movements along the FRPR corridor and test various operational strategies, such as dispatching rules, train priorities, and service frequencies. The modeling helps evaluate train performance and network capacity to identify and address potential bottlenecks and other operational issues with freight and passenger operations sharing existing infrastructure. This process ensures alignment with state and federal implementation goals and requirements, including advancing governance structures and conducting cost-benefit evaluations. The SDP, which is expected to be completed before the end of 2025, will also include analysis related to station planning, preliminary engineering, travel demand modeling and other project development elements, as well as documentation of public and stakeholder involvement.