



Service Development Plan

# Route Options Analysis

October 27, 2023



# CONTENTS

- 1. Introduction.....1**
  - 1.1. Planning Background.....1
  - 1.2. Project Location and Context .....3
    - 1.2.1. Complementary Multimodal Infrastructure .....5
  - 1.3. Preliminary Purpose and Need.....6
- 2. Route Options Analysis.....7**
  - 2.1. Purpose.....7
  - 2.2. Route Options.....7
- 3. Evaluation Factors and Criteria .....9**
- 4. Route Evaluation .....11**
  - 4.1. Communities and Markets Served.....11
    - 4.1.1. Communities and Markets Served Along the Routes.....11
    - 4.1.2. Prior Planning .....16
    - 4.1.3. Complements Multimodal Networks and Investments.....17
  - 4.2. Rail Corridors.....18
    - 4.2.1. Passenger Rail Compatibility .....18
    - 4.2.2. Route Length and Geometry .....20
- 5. Recommendations ..... 21**

## Exhibits

Exhibit 1: Planning Timeline for the FRPR System.....	2
Exhibit 2: FRPR Project Location.....	4
Exhibit 3: Colorado’s Freight and Intercity Passenger Rail Network.....	5
Exhibit 4: Route Options North of Denver .....	8
Exhibit 5: Factors and Criteria for Routes Evaluated North of Denver .....	9
Exhibit 6: Total 2045 Population and Employment Areas within 5 miles of Major and Secondary Market Areas by Route .....	12
Exhibit 7: Route 1 Market Areas.....	13
Exhibit 8: Route 2 Market Areas.....	14
Exhibit 9: Route 3 Market Areas.....	15
Exhibit 10: Representative Track, Route 1.....	19
Exhibit 11: Representative Track, Route 2 .....	19
Exhibit 12: Representative Track, Route 3 .....	20
Exhibit 13: Comparison of Route Options with Evaluation Criteria.....	22

# Acronyms and Abbreviations

Amtrak	National Railroad Passenger Corporation
AREMA	American Railway Engineering and Maintenance-of-Way Association
BNSF	BNSF Railway
BRT	Bus Rapid Transit
CDOT	Colorado Department of Transportation
COLT	City of Loveland Transit
CRISI	Consolidated Rail Infrastructure and Safety Improvements
EIS	Environmental Impact Statement
FRA	Federal Railroad Administration
FRPR	Front Range Passenger Rail
GWR	Great Western Railway of Colorado
I-25	Interstate 25
I-70	Interstate 70
ICS	Interregional Connectivity Study
mph	miles per hour
MPO	Metropolitan Planning Organization
NEPA	National Environmental Policy Act
Rail Commission	Southwest Chief and Front Range Passenger Rail Commission
RTD	Regional Transportation District
SB	Senate Bill
SDP	Service Development Plan
TPC	train performance calculator
UP	Union Pacific Railroad
US 34	United States Highway 34

# 1. Introduction

For decades, governmental coalitions and transportation advocacy groups have planned and promoted an intercity passenger rail system, Front Range Passenger Rail (FRPR), that would serve Colorado's Front Range urban corridor (Exhibit 1). To advance this planning, the FRPR project is developing a Service Development Plan (SDP) that is focused on the near-term opportunity to introduce intercity passenger rail service along Colorado's Front Range urban corridor by predominately using freight railroad infrastructure and interoperating with freight rail providers, BNSF Railway (BNSF) and Union Pacific Railroad (UP), along the Front Range between Pueblo and Fort Collins.

Near-term implementation of an FRPR service builds on recommendations of past planning efforts; collaboration among the Federal Railroad Administration (FRA), Class I railroads, National Railroad Passenger Corporation (Amtrak), Regional Transportation District (RTD), and state and local jurisdictions to advance FRPR service; stakeholder and political support for passenger rail in Colorado; and alignment with Federal policy objectives and funding for passenger rail infrastructure investments.

Implementation of an FRPR service will require completing a comprehensive National Environmental Policy Act (NEPA) analysis, which is required to be eligible for potential Federal funding. The NEPA analysis will be informed by the preliminary SDP.

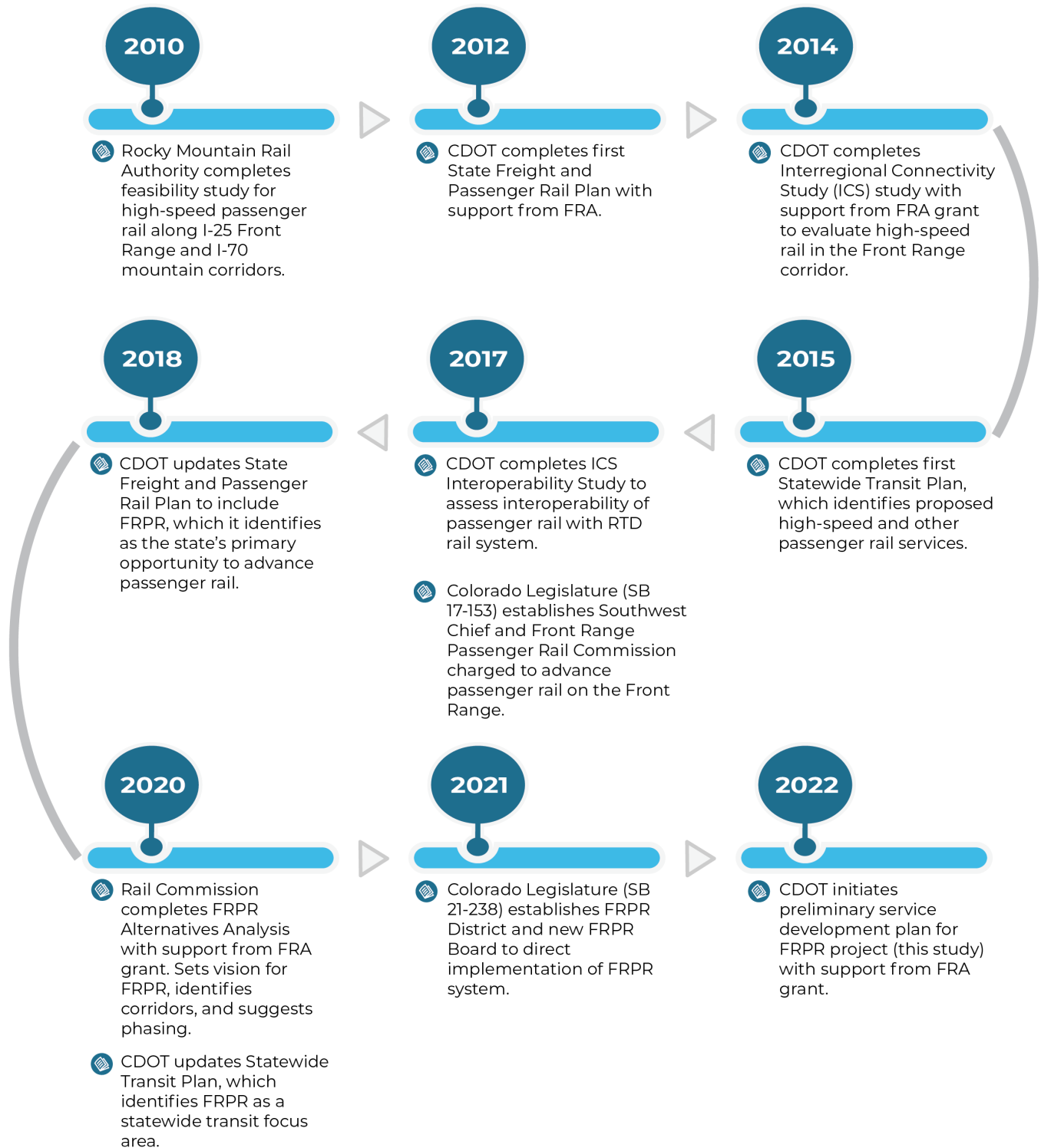
Early steps in the SDP process include developing a preliminary Purpose and Need, which was completed in May 2023, and analyzing early alternatives to recommend for detailed study and refinement in the SDP. This *Route Options Analysis*, which identifies and analyzes routes along freight rail corridors, is the first step of the alternatives analysis as part of the SDP. Subsequent steps will include evaluating service (service frequency and schedules), investment (capital and operating investments), and design (engineering designs) options.

## 1.1. Planning Background

In 2017, the Colorado Legislature passed Senate Bill (SB) 17-153 to establish the Southwest Chief and Front Range Passenger Rail Commission (Rail Commission), an 11-member body that includes rail advocates, local officials and representatives of the metropolitan planning organizations (MPO) along the Front Range, BNSF, UP, RTD, Colorado Department of Transportation (CDOT), and Amtrak. SB 17-153 tasked the Rail Commission with facilitating "development and operation of a Front Range passenger rail system that provides passenger rail service" along the Front Range (Interstate 25 [I-25]) corridor between Pueblo and Fort Collins.

**Exhibit 1: Planning Timeline for the FRPR System**

**Front Range Passenger Rail Planning Timeline**



In 2020, the Rail Commission, in partnership with CDOT and with support from the FRA, continued planning for an FRPR system and documented its findings in the *FRPR Alternatives Evaluation Report* (Rail Commission, 2020). This effort incorporated past planning to develop a vision for an FRPR system, evaluate corridors for passenger rail service that could serve the major population centers along the Front Range, consider governance options for the FRPR program, and conduct extensive stakeholder outreach. The Rail Commission concluded, through its 2020 study, that interoperating passenger rail service along the existing freight alignment provided the best opportunity to initiate FRPR service and capitalize on the operational partnerships and complementary services of the Rail Commission partners, such as BNSF, UP, RTD, and Amtrak. In 2020, CDOT received a Consolidated Rail Infrastructure and Safety Improvements (CRISI) grant from the FRA to analyze the feasibility of introducing FRPR service through interoperation with freight railroads, which is the focus of the current preliminary SDP (FRA, 2021).

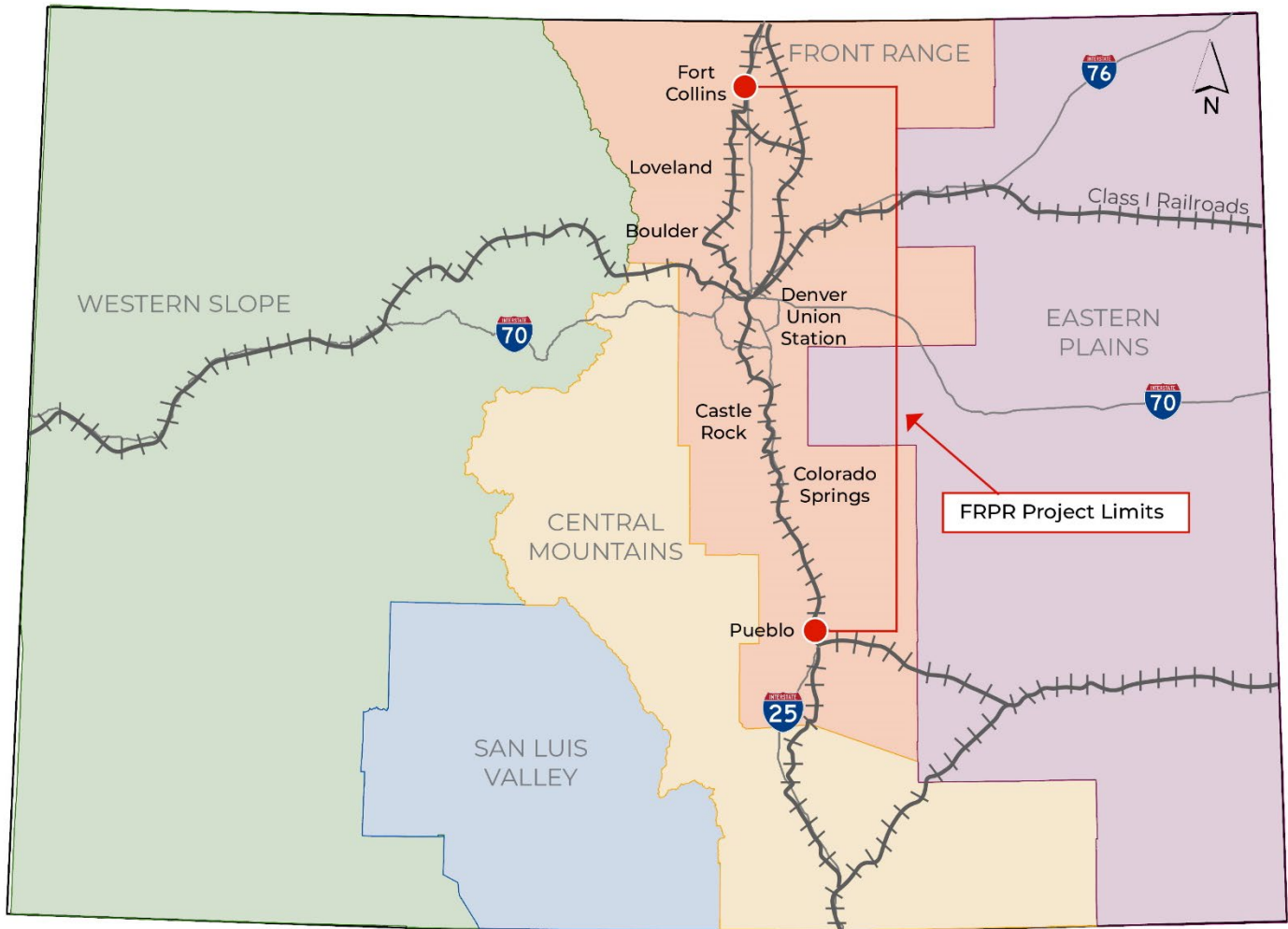
Shortly after the grant award in 2021, the Colorado State Legislature passed SB 21-238, which created the FRPR District “for the purpose of planning, designing, developing, financing, constructing, operating, and maintaining a passenger rail system.” Also in 2021, the U.S. Congress passed the Bipartisan Infrastructure Investment and Jobs Act, which provides significant Federal funding for intercity passenger rail service, such as the FRPR system. These legislative initiatives align with the SDP’s goals and timeline for near-term implementation of the FRPR project.

## 1.2. Project Location and Context

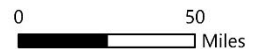
The FRPR project is located within the BNSF and UP freight rail corridors along Colorado’s Front Range urban corridor between Pueblo and Fort Collins. The project limits traverse the cities of Pueblo, Colorado Springs, Castle Rock, Denver, Boulder, Loveland, and Fort Collins (Exhibit 2).

The BNSF and UP freight corridors generally encompass the core and connections to the Front Range urban corridor where intercity passenger rail is planned. They contain rail infrastructure that can support near-term implementation of the system; therefore, they have been the focus of the FRPR project. The FRPR District and its predecessors have developed relationships with the Class I railroads and are collaborating to develop the FRPR system. Additionally, the FRPR project is part of Amtrak’s Connect US Vision (Amtrak, 2021), and Amtrak has expressed interest in operating passenger service along the Front Range within the freight corridors. Amtrak has been an active participant in the FRPR District and former Rail Commission.

**Exhibit 2: FRPR Project Location**



\*Colorado Regions are shown as defined by the Department of Local Affairs (DOLA) and created through combination of county boundaries

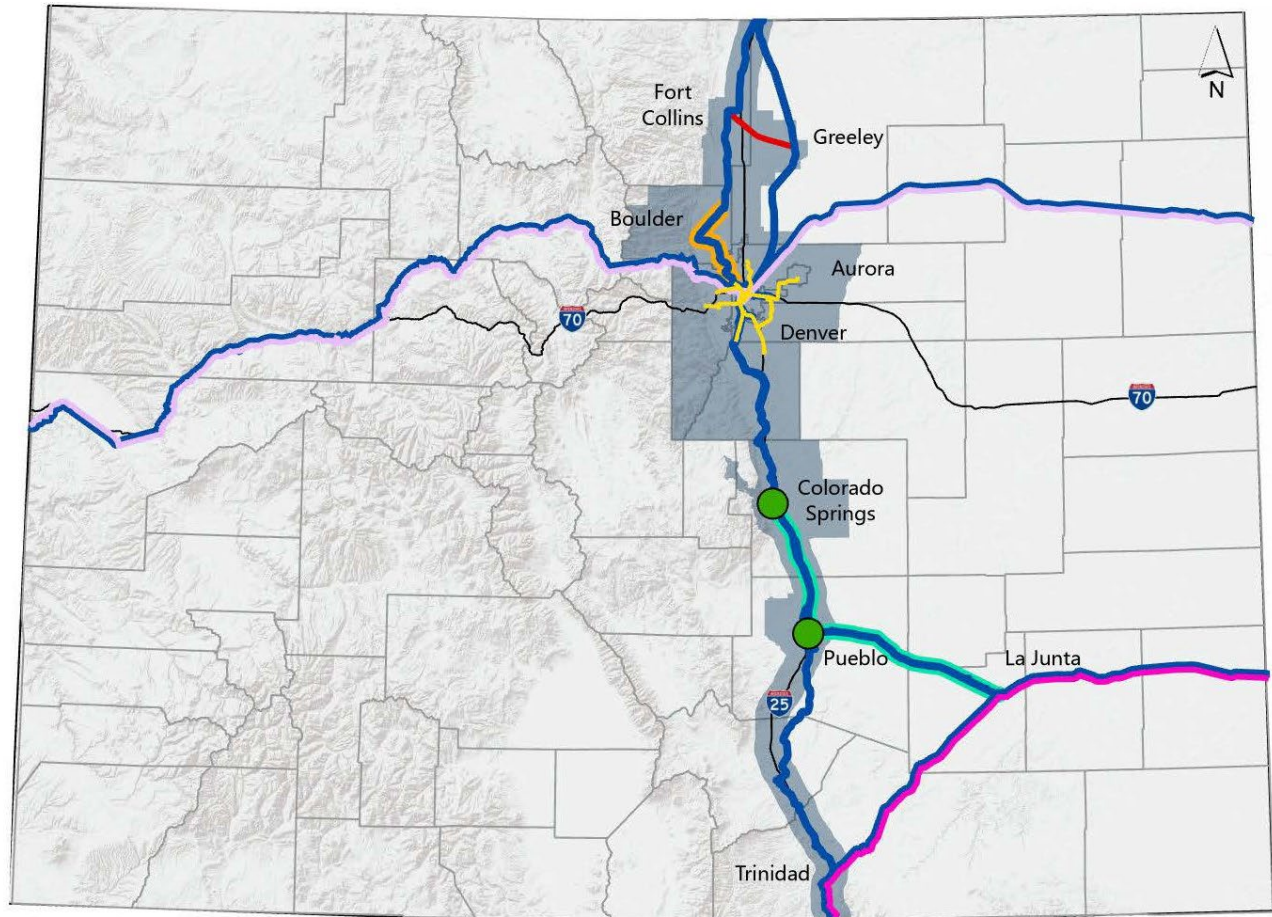


Colorado’s transportation system includes an extensive network of roads and transit services in the Front Range and beyond. However, intercity passenger rail in the state is limited to two Amtrak long-distance routes—the California Zephyr and the Southwest Chief, neither of which connect Front Range communities—and a seasonal winter service between Denver and the Winter Park Ski Resort; all operate on BNSF and UP tracks. The District’s vision is that the intercity FRPR system is the backbone of non-vehicular travel throughout the Front Range, which is enhanced by existing and additional transit investments by Front Range communities and responds to travel demand options by Front Range travelers.

Along with the FRPR service, complementary existing and planned multimodal connections (summarized in Section 1.2.1) will provide people with more choices on how to travel in the region, which will include travel beyond the new FRPR stations (Exhibit 3).



**Exhibit 3: Colorado's Freight and Intercity Passenger Rail Network**



**Legend**

- |   |  |  |
|---|--|--|
| FRPR District                                   | Great Western Rail Connection from Fort Collins to Greeley | Potential RTD Northwest Rail (Commuter Rail) Service |
| Class I Railroads Planned for Passenger Service | Amtrak California Zephyr                                   | Potential Southwest Chief Thru-Car Service           |
| RTD Light Rail and Commuter Rail                | Amtrak Southwest Chief                                     | Colorado Springs and Pueblo Station Area Planning    |

**1.2.1. Complementary Multimodal Infrastructure**

Denver Union Station, located in downtown Denver, is the multimodal hub of rail and transit services in the Denver metropolitan area, which is the state's capital and the largest urban area in the state. It is home to Amtrak, RTD bus and rail services, and intercity bus services, and it would be a key hub for the FRPR system.

RTD services at Denver Union Station include commuter rail, light rail, bus rapid transit (BRT), regional buses, and local bus routes, which offer connections to destinations throughout the Denver metro area, as well as the RTD MallRide, a free shuttle serving downtown destinations. Outside of services connected to Union Station, RTD also provides bus, light rail, and commuter

rail services throughout the Denver metro area with 143 fixed routes, 96 Park-n-Ride facilities, and other specialized bus services.

Additionally, CDOT funds and operates (under contract) an intercity bus service, branded Bustang, that provides daily service between urbanized areas along the Front Range, including Fort Collins-Denver and Colorado Springs-Denver. CDOT also operates Bustang Outrider, which connects rural areas across the state to Front Range communities, and it has several services focused on service between the I-70 mountain corridor and the Denver area. The Bustang family of routes that serve Denver operate out of Denver Union Station.

Other Front Range communities also have local transit services that could integrate with the FRPR system outside of the Denver metro area. These include:

- Fort Collins' Transfort transit service, which includes MAX BRT, a 5-mile-long system that serves Colorado State University and downtown Fort Collins, along with 22 other bus and shuttle routes in Fort Collins.
- City of Loveland Transit (COLT), which includes six fixed bus routes in Loveland.
- Mountain Metro Transit in Colorado Springs, which includes 40 routes in Colorado Springs, along with a free downtown shuttle.
- Pueblo Transit, which offers 11 bus routes in Pueblo.

### 1.3. Preliminary Purpose and Need

The preliminary Purpose and Need for the FRPR project is to introduce intercity passenger rail service along Colorado's Front Range urban corridor between Pueblo and Fort Collins that operates within freight railroad corridors and predominately uses shared track with the BNSF and UP railroads. The 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 single-occupant vehicle travel would enhance community connections and contribute to future economic vitality, equity, and environmental sustainability.

The FRPR project is proposed to advance implementation of the FRPR system, which 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, recreation, health care, leisure, education, entertainment, and other regional destinations.
- Foster economic vitality and improve transportation equity.

- Advance Federal, state, and local economic, environmental, and equity outcomes.

The preliminary Purpose and Need informs evaluation criteria and performance measures to assess how system alternatives meet project needs and whether the undertaking can achieve the intended results. It also provides a framework to engage stakeholders and the public about the scope, needs, benefits, impacts, timing, and structure of the FRPR system. The preliminary Purpose and Need is approved, and it is not expected to change substantially. However, it will evolve as data are collected and analyzed in the continuing planning effort to develop service and investment options.

## 2. Route Options Analysis

### 2.1. Purpose

The purpose of the route options analysis is to identify routes along freight rail corridors that meet the preliminary Purpose and Need for the FRPR project. Options that respond best and most comprehensively to the evaluation criteria will be carried forward.

### 2.2. Route Options

Three potential FRPR routes have been identified within the network of existing rail alignments along the Front Range.<sup>1</sup> All include a common route south of Denver, which follows the consolidated BNSF/UP mainline (currently operated as two separate directional tracks) that goes from Pueblo through Colorado Springs and Castle Rock to Denver Union Station, roughly paralleling I-25. There are no other routes that meet criteria for the FRPR project in that segment. As such, only route options north of Denver are being analyzed in this report.

Routes north of Denver to Fort Collins that are the focus of this route analysis include:

- **Route 1:** BNSF corridor (Front Range Subdivision) northwest from Denver Union Station to Boulder-Longmont-Loveland (downtown)-Fort Collins
- **Route 2:** BNSF corridor (Front Range Subdivision) northwest from Denver Union Station to Boulder-Longmont (same as Route 1) + Great Western Railway of Colorado (GWR) corridor to Kelim Junction (just south of United States Highway (US) 34) + UP corridor (Fort Collins subdivision)-Loveland (Centerra)-Fort Collins

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<sup>1</sup> The *FRPR Alternatives Evaluation Report* identified the same rail alternatives along with a highway alternative, which was not included in this route analysis because of the report's recommendation to focus on existing rail not just existing transportation corridors as a way to accelerate a more efficient delivery of an initial FRPR service.

- **Route 3:** UP corridor (Greeley Subdivision) northeast from Denver Union Station to Commerce City-Brighton-Fort Lupton-Greeley-Windsor-Timnath-Fort Collins

Exhibit 4 illustrates these routes. Note that all routes begin at Denver Union Station and end in Fort Collins. Routes 1 and 2 share the same route between Denver and Longmont.

**Exhibit 4: Route Options North of Denver**



### 3. Evaluation Factors and Criteria

Two primary factors were used to evaluate the route options. The primary factors represent the key requirements of the FRPR project described in the preliminary Purpose and Need: ability to serve the major markets—specifically population and employment centers—along the Front Range and location within an intact rail corridor. Evaluation criteria were organized around these two primary categories, as described in Exhibit 5.

As noted in Section 2.2, as only one route south of Denver met the evaluation criteria of following an existing rail corridor and serving the major markets of Pueblo, Colorado Springs, Castle Rock, and Denver, no additional routes were evaluated for this approximately 120-mile-long portion of the FRPR route.

**Exhibit 5: Factors and Criteria for Routes Evaluated North of Denver**

Factor 1: Communities and Markets Served		
Evaluation Criteria	Description/Definition	Evaluation
Connect Front Range communities and population/employment centers	Connect is defined as existing rail routes passing through or adjacent to a market center. Major markets include Fort Collins, Loveland, Longmont, Boulder, Denver, Castle Rock, Colorado Springs, and Pueblo.	Does the route connect major Front Range population and employment centers?  Does the route encompass potential station locations within the “heart” of major markets (e.g., downtown locations)?
Consistent with prior planning	Prior planning includes state, regional, and local efforts.	Is the corridor identified for passenger rail in an existing national, state, regional, and/or local level plan or study?
Benefit multimodal connectivity and network	Multimodal connectivity is how people get to and from public transportation, such as walking, bicycling, and driving.	Does the route benefit or improve connectivity with existing or planned multimodal transportation services and/or complement other modal investments?

<b>Factor 2: Rail Corridor</b>		
<b>Evaluation Criteria</b>	<b>Description/Definition</b>	<b>Evaluation</b>
Existing rail corridor	Existing rail corridor is defined as current or abandoned rail transportation corridor with intact rail right-of way.	Does the route follow an existing rail corridor?
Passenger rail compatibility	Infrastructure is defined as a standard rail roadbed, standard gauge steel rail generally following American Railway Engineering and Maintenance-of-Way Association (AREMA) guidelines, and FRA Track Safety Standards.	Does the corridor have infrastructure to accommodate passenger rail operations?
Potential for competitive travel times	Route length is correlated to travel time with longer distances equating to longer travel times. Travel time is a distinguishing characteristic of ridership, and longer travel times are likely to be less competitive with highway travel.  Curves (radii) of 1 degree 30 minutes or less are typically desired for operating at 79 miles per hour (mph). Curves above this threshold translate into slower travel times and/or increased infrastructure investments.	Are there travel time limitations, including total route length?  Are there speed limitations, including number of curves greater than 1 degree 30 minutes?

## 4. Route Evaluation

The route evaluation is based on quantitative and qualitative measures to support the screening criteria, as described in Exhibit 5. The evaluation compares the routes north of Denver Union Station, but it does not detail the common route south of Denver, as noted in Section 2.2.

### 4.1. Communities and Markets Served

Based on the preliminary Purpose and Need and supported by previous planning and legislative direction, routes must serve the major population and employment centers along the Front Range, which were defined in 2017 by Colorado SB 17-153 as Pueblo, Colorado Springs, Castle Rock, Denver, Boulder, Longmont, Loveland, and Fort Collins, all of which rank in the top 20 of Colorado's most populous cities. Projected population and employment data for 2045 are shown in Exhibit 6. The 2021 legislation, SB 21-238, did not specifically define major markets, but it was informed by the *FRPR Alternatives Evaluation Report*, which identified the same major markets as SB 17-153. Two additional major markets (Greeley/Evans and Commerce City) were identified for Route 3 in this analysis, which runs east of I-25 north of Denver. It does not traverse Boulder, Longmont, or Loveland, but it does include two other top 20 cities: Commerce City and Greeley-Evans.

Secondary markets are smaller communities located along each route that are not considered major markets or are too closely spaced to adjacent major markets to support intercity service patterns (generally within 10 miles of a major market area) and travel time/ridership expectations.

The major and secondary markets along each route are identified in Exhibit 4 and further detailed in Exhibits 7, 8, and 9. The CDOT statewide travel projections for the most current model year (2045) were used to estimate future population and employment, and they will be used to estimate ridership. This phase of FRPR development anticipates serving major intercity markets only to ensure competitive travel times and to maximize initial ridership. However, to understand the potential for expanding service in the future, secondary markets are referenced in the route comparison to differentiate each route's flexibility.

#### 4.1.1. Communities and Markets Served Along the Routes

The three routes identified in Section 2.2 were evaluated based on the ability to serve population and employment centers along each route, as detailed in Exhibits 7, 8, and 9. As all the routes include Denver Union Station and Fort Collins, these areas are served similarly by each route with the same catchment areas; therefore, they are excluded from the comparison to focus on the differences among the routes.

Exhibit 6 compares the 2045 5-mile population and employment catchment areas around major and secondary markets by route. Routes 1 and 2 have similar catchment area population and employment numbers, while Route 3 is dramatically lower.

**Exhibit 6: Total 2045 Population and Employment Areas within 5 miles of Major and Secondary Market Areas by Route**

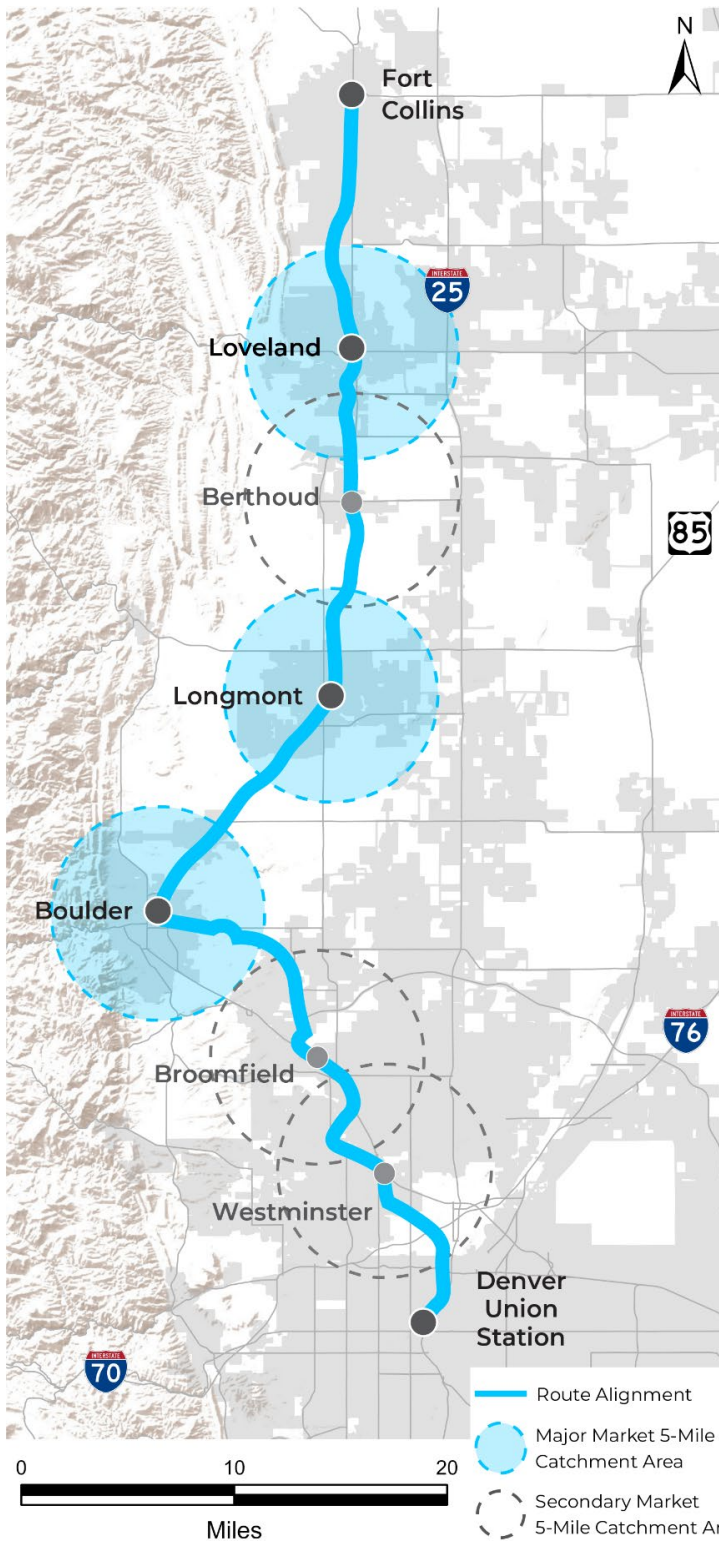
<b>Market Factors</b>	<b>Route 1</b>	<b>Route 2</b>	<b>Route 3</b>
Serves FRPR markets north of Denver as identified in previous planning and legislation (Boulder, Longmont, and Loveland)	YES	YES	NO
2045 Total Population Major Market Area	422,000	437,000	342,000
2045 Total Population Major and Secondary Market Areas	1,273,000	1,387,000	783,000
2045 Total Employment Major Market Area	306,000	311,000	265,000
2045 Total Employment Major and Secondary Market Areas	716,000	729,000	393,000

Source: CDOT's statewide model, StateFocus

Routes 1 and 2 directly serve Boulder, Longmont, and Loveland and meet FRPR's preliminary Purpose and Need. Route 1 better meets project goals and FRA planning guidance for intercity passenger rail with its ability to serve a downtown Loveland location, which is more central, less auto centric and provides more convenient last mile connections to travelers. Route 3 does not serve any of these markets, and while it does serve large population and employment centers in the Commerce City and Greeley/Evans areas, Route 3 bypasses key Front Range markets, serves substantially smaller population and employment areas now and in the future, and does not meet the preliminary Purpose and Need for FRPR service.



Exhibit 7: Route 1 Market Areas



# Route 1

## MAJOR MARKETS

### Population

2015	<b>306,000</b>
2045	<b>422,000</b>

### Employment

2015	<b>222,000</b>
2045	<b>306,000</b>

## MAJOR & SECONDARY MARKETS

### Population

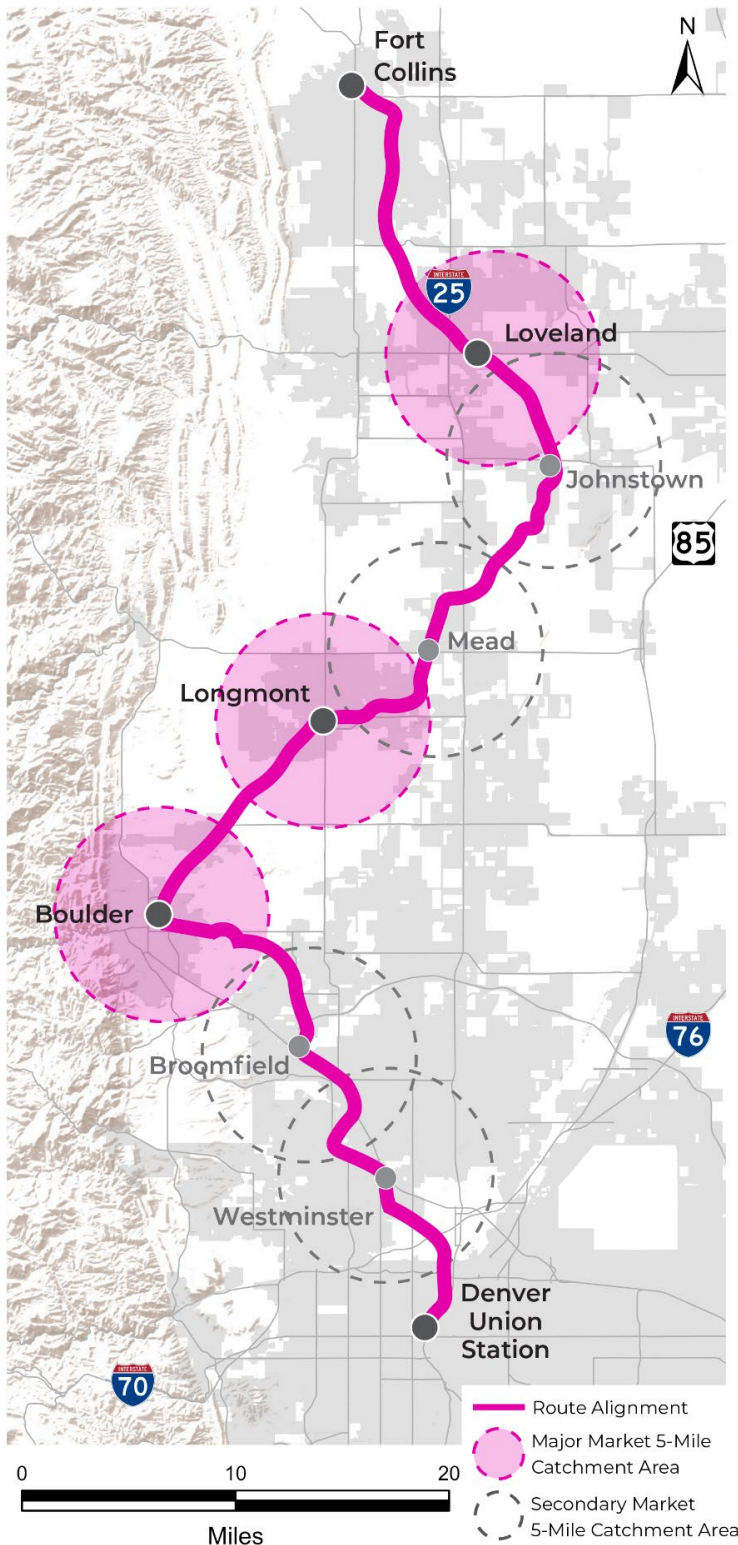
2015	<b>916,000</b>
2045	<b>1,273,000</b>

### Employment

2015	<b>536,000</b>
2045	<b>716,000</b>

Source: CDOT's statewide model, StateFocus

Exhibit 8: Route 2 Market Areas



# Route 2

## MAJOR MARKETS

### Population

2015	<b>265,000</b>
2045	<b>437,000</b>

### Employment

2015	<b>213,000</b>
2045	<b>311,000</b>

## MAJOR & SECONDARY MARKETS

### Population

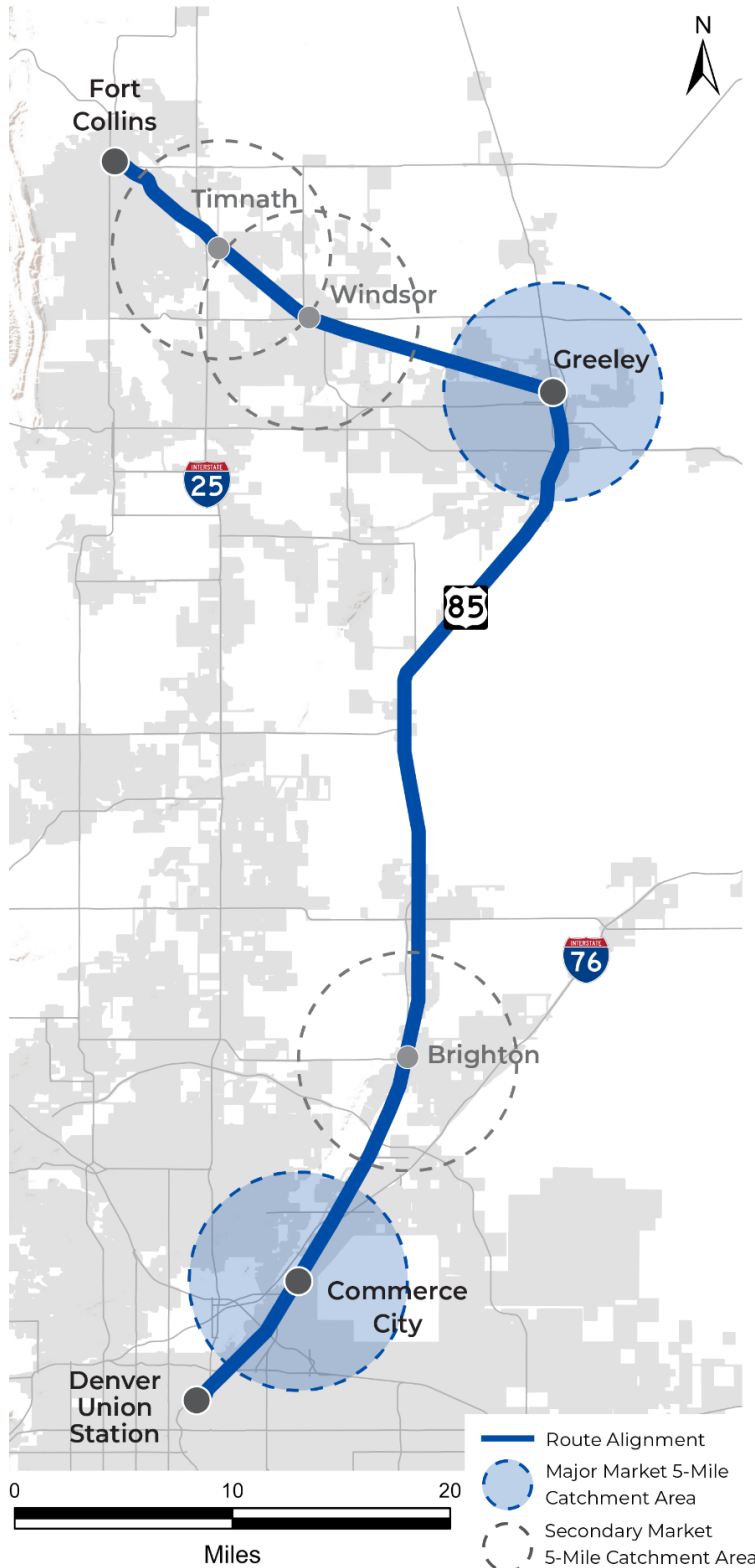
2015	<b>887,000</b>
2045	<b>1,387,000</b>

### Employment

2015	<b>534,000</b>
2045	<b>729,000</b>

Source: CDOT's statewide model, StateFocus

Exhibit 9: Route 3 Market Areas



# Route 3

## MAJOR MARKETS

Population	
2015	<b>262,000</b>
2045	<b>342,000</b>
Employment	
2015	<b>197,000</b>
2045	<b>265,000</b>

## MAJOR & SECONDARY MARKETS

Population	
2015	<b>423,000</b>
2045	<b>783,000</b>
Employment	
2015	<b>293,000</b>
2045	<b>393,000</b>

Source: CDOT's statewide model, StateFocus

## 4.1.2. Prior Planning

### 4.1.2.1. Route 1

Route 1 was one of three recommended alignments evaluated in the *FRPR Alternatives Evaluation Report*. It was the only recommended alignment located entirely within freight rail corridors.

Route 1 from Denver to Boulder and Longmont is coincident with the long-planned Northwest Rail corridor, which is a commuter rail service that is planned as part of RTD's FasTracks program for light rail and commuter rail transit in the Denver metro area. It is one of three unfinished corridors in the FasTracks system. RTD is currently evaluating the potential to operate a limited peak-period commuter service while it continues to pursue funding for the full service outlined in the FasTracks plan. Northwest Rail's completion is a high priority for area residents and taxpayers, many of whom see an opportunity for joint development of RTD's commuter rail network and FRPR's intercity service. SB 21-238 recognized this previous planning and directed the FRPR District to consider how BNSF's rail infrastructure between Denver, Boulder, and Longmont could be shared between services. Though beyond the scope of the SDP to plan or coordinate these services, co-alignment offers a proximity advantage in meeting these legislative and taxpayer goals for coordinated rail development over routes that do not follow this alignment (i.e., Route 3).

Between Longmont and Fort Collins, Route 1 also follows a planned commuter rail corridor, the I-25 North Commuter Rail, which was identified and approved in the *2011 North I-25 Environmental Impact Statement (EIS) Record of Decision* (CDOT, 2011). While funding has not been identified to deliver this system and its development is uncertain, a follow-up study was conducted in 2015 to confirm alignment and planned stations and to provide additional right-of-way and cost information that could inform its future implementation (CDOT, 2015). Like Northwest Rail, the potential to jointly develop the rail corridor for intercity and commuter service may offer advantages. Route 1 also connects to premium transit service recommendations from the North Front Range MPO *LinkNoCo Premium Transit Study* that examined regional transit bus and rail connections in the North Front Range region (North Front Range MPO, 2022). Particularly, the Loveland downtown station would be included in the US 34 regional bus route.

### 4.1.2.2. Route 2

Route 2 between Denver and Boulder shares the Northwest Rail alignment described in Section 4.1.2.1.

The Route 2 alignment between Longmont and Fort Collins was developed for this route analysis. It follows an intact rail corridor and provides a "middle" alignment between Routes 1 and 3, providing a potential to better serve growing markets east of the I-25 corridor (see Exhibit 4). It connects from Longmont to suburban Loveland via the small communities of Mead to an existing

“mobility hub” and retail activity center (Centerra) near I-25. Although Route 2 is supportive of the North Front Range regional bus (Greeley to Loveland) and rail routes (Greeley to Fort Collins), because it bypasses the heart of Loveland’s downtown it is less consistent with FRA station location guidance.

#### **4.1.2.3. Route 3**

Route 3 has been considered in past planning efforts but not recommended for passenger rail service, largely because it is a rural corridor with dispersed development patterns that are generally not favorable for passenger rail service. Route 3 was reviewed but not recommended in the *FRPR Alternatives Evaluation Report* due to its inability to serve major population centers and its limited public support. It also was evaluated for commuter rail service in the North I-25 EIS but not recommended as it did not serve population centers west of I-25 where commuter rail was most favored by the public and ridership projections were higher.

Although the majority of the Route 3 alignment is outside of major population centers and is not appropriate for rail service, the portion between Greeley and Fort Collins has potential for passenger rail service. This segment was recommended for commuter rail service by the North Front Range MPO’s *LinkNoCo Premium Transit Study*, which was completed after the *FRPR Alternatives Evaluation Report*. While not recommended as part of the foundational FRPR service, the LinkNoCo route, when developed, would increase mobility choices, and it could drive increased ridership to the FRPR system.

### **4.1.3. Complements Multimodal Networks and Investments**

Route 1 has long been considered for commuter rail service. Local communities have planned and implemented multimodal projects, and they have instituted land use policies that are supportive of multimodal connections. For instance, local investments in supportive land use and transit projects in the Boulder region, such as existing and planned BRT and station area planning and zoning for higher density development around planned commuter rail stations, suggests Route 1 would likely attract the most riders of the evaluated routes, particularly in the near term.

Route 2 shares many of the advantages of Route 1, but it is less attractive as it bypasses city centers between Longmont and Fort Collins. City center station locations generally have more attractive and convenient last mile connection options from stations to activity centers; therefore, FRA considers them more favorable station locations.

Route 3 is generally located outside of major population centers. However, the area between Greeley and Fort Collins has received additional attention recently as one of three priority transit corridors for the North Front Range region that could connect to the FRPR system. Also, Route 3 would, in part, deliver rail service along the GWR line between Greeley and Fort Collins, a

commuter rail priority identified in the *2022 LinkNoCo Premium Transit Study*, and it could be an attractive additional expansion service for the area.

Other transit investments recommended from the study were bus routes from Loveland to Greeley and from Windsor to Loveland along US 34 and Weld County Road 17.

## 4.2. Rail Corridors

When planning shared-use passenger operations on freight railroad corridors, assessing the existing freight track classification and route geometrics is important to understanding expected passenger operating speeds. Track classification defines the condition and tolerances of the track infrastructure regarding track gauge, tie conditions, and running rail alignment. These conditions then correspond to a track classification and allowable freight and passenger operating speeds. A higher track classification has a higher allowable speed.

Both track class and geometrics directly correlate with the allowable speed passenger operations can operate at, and thus, the achievable travel times for passenger service. For 79 mph passenger operations, the ideal existing freight corridor should be maintained to minimum FRA Class IV classification standards and have maximum curvature less than 1 degree 30 minutes. When evaluating higher passenger operating speeds, track classification and curves are even more important. Generally, routes that can achieve higher operating speeds have lower overall travel times and higher ridership. Therefore, routes with longer segments of higher track classification and fewer curves that exceed the desired threshold are more suitable.

### 4.2.1. Passenger Rail Compatibility

#### 4.2.1.1. Route 1

Route 1 follows an active Class I freight rail corridor. The freight railroads continue to maintain the tracks to the appropriate FRA standard class associated with rail operations. Although some capital investment would be expected for any route introducing passenger rail service, the foundational track infrastructure could support shared-use operations with passenger rail. Exhibit 10 shows representative infrastructure conditions for Route 1, which is maintained to FRA Class III and IV operating speed limits.

Between Longmont and Fort Collins, the track class is supportive of passenger rail operations. However, it presents some challenges with development abutting the tracks and numerous at-grade crossings, which are less compatible with higher speeds and associated travel time benefits favorable to successful intercity service.

**Exhibit 10: Representative Track, Route 1**

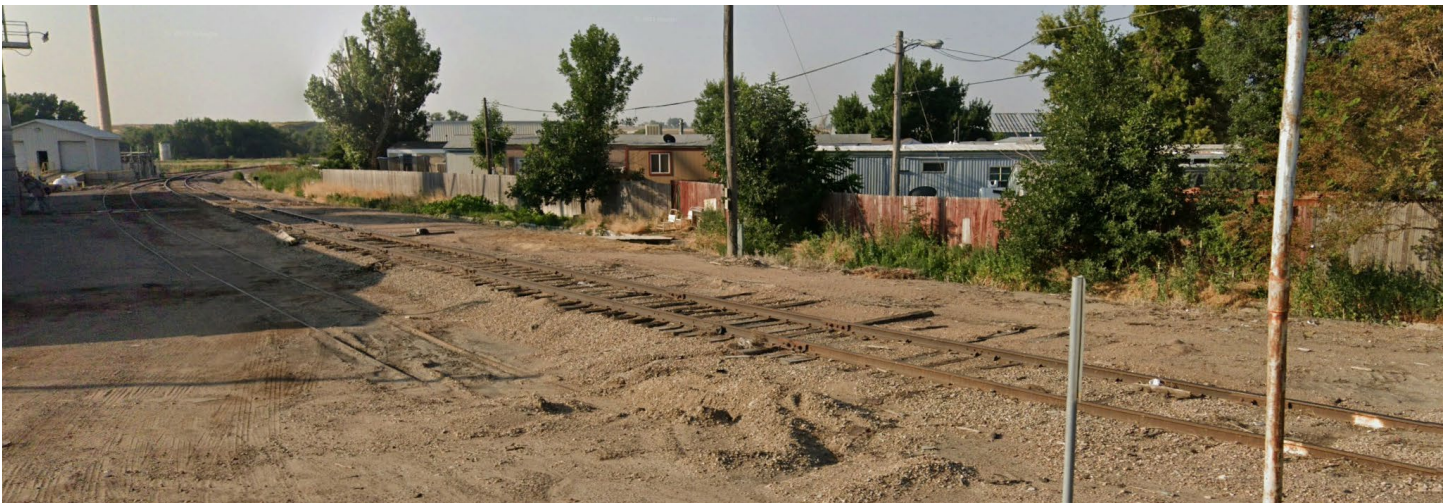
View from Niwot Road **of an at-grade crossing** adjacent to State Highway 119 in Niwot, Colorado

**4.2.1.2. Route 2**

Route 2 shares the same infrastructure and track conditions as Route 1 between Denver and Longmont. Between Longmont and Fort Collins, Route 2 is a mostly intact rail corridor with freight operations, but it would require reestablishing several wye connections and has a sizable section of track that does not currently meet passenger rail requirements. Route 2 would require substantially more infrastructure improvements than Route 1, such as upgrades to track, switches, turnouts, and positive train control, to be suitable for passenger rail operations. Exhibit 11 illustrates the relatively poor representative conditions along sections of the corridor, which is maintained to FRA Class I and II operating speeds.

**Exhibit 11: Representative Track, Route 2**

View from 1st Street in Johnstown, Colorado



### 4.2.1.3. Route 3

Route 3, like Route 1, generally follows a Class I freight railroad alignment, and it is maintained to FRA Class IV operating speed limits. The segment between Greeley and Fort Collins along the GWR is FRA Class I and II operating speeds. Exhibit 12 shows representative infrastructure conditions for Route 3.

#### **Exhibit 12: Representative Track, Route 3**

View from 88th Ave in Brighton, Colorado



### 4.2.2. Route Length and Geometry

Route length and geometry (or curvature) are important factors to the proposed service's travel time. Longer routes naturally tend to have longer travel times, which may be less attractive to travelers. Straighter routes are more likely to support higher travel speeds, which may generate shorter travel times. The choice to travel by train becomes less viable for travelers if the travel time between destinations is not competitive with other travel modes. Therefore, the shortest, straightest route option is more likely to meet the FRPR project's goal to provide competitive travel times with interstate travel.

Route 1 is 71 miles long between Denver and Fort Collins. It is relatively straight with 28 curves greater than 1 degree 30 minutes. Based on geometry and route length, the base travel time on Route 1 is approximately 25 minutes between Longmont and Fort Collins.<sup>2</sup>

Route 2 is 78 miles, which is 7 miles longer than Route 1. It has 45 horizontal curves greater than 1 degree 30 minutes, 40 percent more than Route 1. Based on the TPC calculations, travel time on

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<sup>2</sup> A train performance calculator (TPC) model was used to estimate travel times.



Route 2 between Longmont and Fort Collins is estimated at 31 minutes or 6 minutes longer than Route 1.

Route 3 is 76 miles, which is shorter than Route 2 and longer than Route 1. However, because the route bypasses several major markets, it is not expected to support high ridership or competitive travel times among Front Range markets. Therefore, its length or curvature is not relevant to its evaluation.



















## 5. Recommendations

Route 1 is recommended for further evaluation, and Routes 2 and 3 are recommended to be set aside. Exhibit 13 summarizes the comparison of route options based on how they meet the evaluation factors identified in Exhibit 5.

Based on the analysis presented in this *Route Options Analysis* and to maintain consistency with prior planning efforts, Route 1 is recommended for further analysis as it:

- Provides the shortest, most direct route to major population and employment centers between Denver and Fort Collins.
- Has infrastructure, geometry, and track class designations that are compatible with passenger rail, which results in an expected travel time savings of six minutes over Route 2.
- Is consistent with previous passenger rail recommendations and has demonstrated public support through prior planning efforts.
- Has potential to leverage investments and share infrastructure and operational synergy with RTD's Northwest Rail service.
- Has the most supportive land use and transportation connections to attract FRPR riders.

**Exhibit 13: Comparison of Route Options with Evaluation Criteria**

<b>Evaluation Criteria</b>	<b>Route 1</b>	<b>Route 2</b>	<b>Route 3</b>
Connect Front Range communities and markets	 GOOD	 FAIR	 POOR
Consistent with prior planning	 GOOD	 FAIR	 POOR
Benefit multimodal connectivity and network	 GOOD	 GOOD	 POOR
Existing rail corridor	 GOOD	 FAIR	 GOOD
Passenger rail compatibility	 GOOD	 FAIR	 FAIR
Potential for competitive travel times	 GOOD	 FAIR	 POOR
<b>RECOMMENDATION</b>	Carry Forward	Set Aside	Set Aside

Route 2 serves major population and employment centers, particularly in growing areas along and east of I-25. However, Route 2 is not recommended because it has longer travel times and less suitable land use and rail infrastructure conditions for passenger rail operations compared to Route 1. Additionally, it does not serve downtown Loveland, and it does not support the North I-25 EIS recommendations and community preferences for passenger rail service in the North Front Range.

Route 3 is not recommended because it does not serve the major markets of Boulder, Longmont, and Loveland. It has substantially less population and employment centers compared to Routes 1 and 2., Route 3 is not expected to attract ridership sufficient to serve the FRPR project’s goals or to meet the preliminary Purpose and Need based on the projected demographics for the route.

The SDP will evaluate Route 1 in the service options and investment options analyses. The route recommendation for the preliminary SDP provides a baseline for ridership and travel time benchmarks. The single route recommendation focuses service planning and engineering in the preliminary SDP on the feasible and viable phasing of FRPR service in the near term.

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