



Attention and Responsibility:



Front Range Passenger Rail

RTD Heavy Rail Upgrade Denver - Highlands Ranch

Engineer's Notes

Delivering a Front Range Passenger Rail (FRPR) service that is useful, reliable, and expandable requires a partnership with RTD to share and upgrade tracks within the Denver Metro Area.

Key Point 1: A reliable FRPR service requires a dedicated passenger rail right-of-way for FRPR trains.

Key Point 2: Track-sharing with RTD instead of the freight railroads will secure a far more reliable FRPR service between Downtown Denver and Highlands Ranch by:

- 1) **Upgrading 2 sections of RTD Light Rail (LRT) to heavy rail:** the Central Platte Valley (CPV) line and Southwest Corridor.
- 2) **Connecting upgraded sections with 2 new tracks provided in the Burnham Yards Redevelopment** (already planned), light rail is retained between I-25 / Broadway and the Downtown LRT Loop.
- 3) **Diverting the W Line** to Central Downtown (merge with L Line).
- 4) **Rebuild DUS' light rail platform as heavy rail and extend tail tracks northeast over the Platte River** to meet up with existing RTD B/G Line's heavy rail tracks.



FRPR Through Denver

A frequent and reliable FRPR service through Denver is needed to deliver sufficient mobility benefits for the Front Range as a whole.

- The FRPR 2020 Alternatives Evaluation Report identifies two BNSF Right-of-Way Alternatives (Green & Yellow) that serve Denver and Littleton for further study in the Service Development Plan (SDP).
- The Denver Moves Everyone 2050 Plan says “Establish Denver Union Station as a main hub along the planned FRPR route...”
 - The RTD Accountability Committee 2021 Final Report “supports the Northwest Rail alignment for the Front Range Passenger Rail (FRPR) corridor and recommends RTD pursue all reasonable partnership opportunities with the FRPR project.”
 - Union Station provides the densest concentration of people, jobs, attractions and connecting transit lines on the FRPR corridor.
 - Because of this, GDT believes that the Core FRPR alignment selected should serve Denver Union Station.



The FRPR District

The Front Range Passenger Rail (FRPR) District and CDOT are leading the development of an intercity rail service that spans the Front Range.

- FRPR District formed in 2022 by Colorado Act SB 21-238 to create an 'interconnected passenger rail system along the Front Range'.
- FRPR District is directed to collaborate with RTD & Amtrak (where appropriate).
- CDOT working with HNTB Corporation to produce the Service Development Plan.
- Ballot measure expected in 2026.





Denver Union Station Overview

DUS is the busiest transportation hub in Colorado, but really operates as 2 train stations connected via a bus concourse.

- 1. The Train Hall** with its iconic white canopy holds 8 stub-end (dead-end) tracks and accommodates 4 RTD commuter / heavy rail lines plus two Amtrak lines (long-distance, seasonal, and special event trains).
- 2. The Light Rail (LRT) Station** holds 3 LRT tracks (2 in service, 1 layover) that are also stub-end and accommodate 2 RTD lines (capacity for 3 lines).
 - a. 3 freight railroad tracks pass by immediately north as part of the BNSF / Union Pacific “Consolidated Main Line” (CML).
- 3. The Underground Bus Concourse** has 24 gates & accommodates multiple RTD bus routes including the Flatiron Flyer and intercity lines operated by other operators.

Transfers can require up to a 0.4 mile walk through the facility (eg. A line on Track 1 to light rail on track 12).





How DUS Became a ‘Stub’

Once a “through” station, DUS was disconnected south and west.

- **DUS’ heavy rail tracks were cut off** from lines to the southwest when Downtown’s freight lines were moved in 1986.
- **In 2001, RTD purchased DUS and opened the Central Platte Valley light rail (LRT) line** a year later on a separate alignment to the north (parallels existing freight tracks).
- **Short “tail tracks” stubs were left until 2010**, but were removed after discussions between RTD, Amtrak, and Denver ruled they would not be needed for future developments.
- **The right-of-way (RoW) was then sold off and redeveloped**, eliminating potential for any at-grade southwest extension of heavy rail from the DUS train hall.
- **Costly aerial (bridge) or underground (tunnel) alignments are now the only options** for extending southwest from the DUS train hall.





Separate from Freight Railroads

FRPR faces major risks by sharing freight rail infrastructure, especially near Denver's heavily-congested freight yards.

- 1. Low Reliability:** Amtrak passenger trains that share tracks with longer, less flexible freight traffic experience chronic delays.
- 2. Low Frequency:** Shared freight corridors tend to allow fewer than 6 passenger trains/day - this is insufficient capacity to expand beyond the initial segment and build out a network.
- 3. Low Support:** Failure to deliver a service that is both reliable and convenient will undermine public appetite for other transit projects.

A dedicated passenger-only rail corridor solves these problems:

- 1. High Reliability:** Avoids reliability risks from rail yard congestion.
- 2. High Frequency:** Removes capacity restrictions of shared freight.
- 3. High Support:** Public gets transit they ride and votes for more!





Our Proposed Solution

Existing light rail infrastructure between Union Station and Littleton should be upgraded to FRPR-compatible heavy rail standards.

Proposed FRPR & existing RTD Commuter Rail trains can run on the same tracks (same propulsion / signaling technology) if:

1. Central Platte Valley Light Rail Corridor upgraded to heavy rail.
2. Southwest Light Rail Corridor upgraded to heavy rail.
3. 2x new heavy passenger rail tracks provided by CDOT in Burnham Yards Redevelopment (already planned)

RTD Commuter Rail service is extended SW to Highlands Ranch.

Avoids delays from sharing tracks with freight railroads!





Light to Heavy Rail Upgrade

A rail upgrade project most affordably buys FRPR trains a reliable passenger-only right-of-way across the Denver Metro.

- Services operated using Commuter Rail rolling stock.
- Stations rebuilt with high-floor platforms.
- Track replaced.
- Overhead Catenary System (OCS) upgraded from 750V DC to 25kV AC.
- Signaling system replaced.

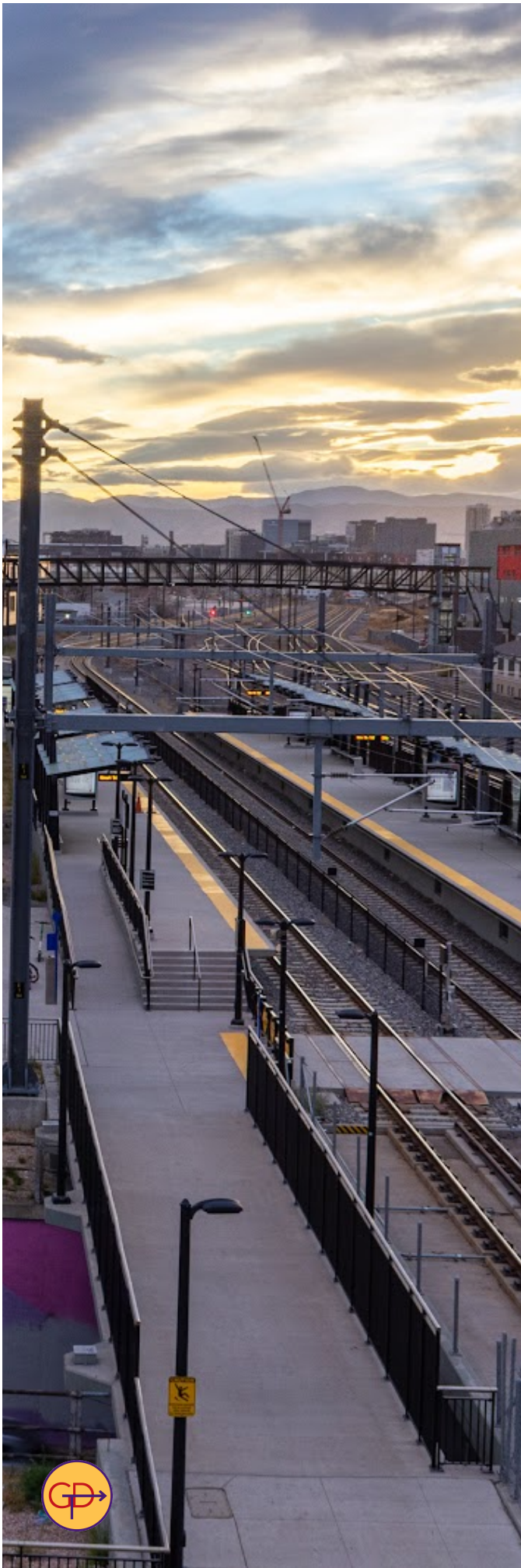
Denver Passenger-only FRPR

A rail upgrade project most affordably buys FRPR trains a reliable passenger-only right-of-way across the Denver Metro.

- **Proposed FRPR trains can run on the same tracks** as RTD's Heavy (Commuter) Rail trains (same propulsion / signaling technology).
- **Significant financial savings** from utilizing an existing passenger-only right-of-way (RoW) instead of buying up and building from scratch.
- **Significant operational advantages** of sharing track with more flexible passenger service rather than freight trains around congested yards.
- **RTD will benefit from significant capital savings** as the Southwest Corridor's age would have obliged RTD to invest substantial capital in extensive infrastructure replacement; under this plan, they would be relieved of this responsibility.
- **Main capital costs are attributable to** rebuilding (a) stations, (b) signaling systems, and (c) overhead power infrastructure at heavy rail specifications (high-level platforms, 25kV AC at 60Hz respectively).



RTD Heavy Rail Upgrade



Neighborhood Breakdown Progression North to South

DUS and Northern Connections

Rebuild the light rail station at DUS as a heavy rail “thru” station with a 4 track, 2 island platform for RTD & FRPR trains.

- 1. Rebuild the light rail station at DUS as a heavy rail “thru” station with a 4 track, 2 island platform for RTD & FRPR trains.**
 - a. FRPR trains will save time by not having to reverse at DUS.
- 2. Build a grade-separated junction north of 20th Street for northbound trains continuing through Denver to Fort Collins.**
 - a. The junction addresses engineering challenges of navigating around existing BNSF freight and highway infrastructure on 20th Street and RTD’s I-25 Flyover Viaduct.
 - b. Bank space east of junction for a second pair of passenger tracks to tunnel 0.5 miles under the BNSF yard to meet up with the A Line: establishing a direct FRPR-DEN Airport connection.
- 3. Build a new passenger-only bridge / viaduct span over the Platte River to connect the new junction with the B and G Line.**



Ball Arena

Upgrade Ball Arena Station and RTD's Central Platte Valley Line from Light Rail to Heavy Rail Specifications.

4. Rebuild the Ball Arena Station to heavy rail specifications including longer high-level platforms (allows for level-boarding)

- a. Platforms will be lengthened for longer FRPR trains to serve the station when Ball Arena is hosting a game/event.
- b. Existing pedestrian bridge over 9th Street will be kept for future redevelopment with a new twin being constructed on 7th Street.
- c. Increase in station capacity will ensure transit infrastructure is ready to handle the greatly increased demand for public transportation from the River Mile and Ball Arena Redevelopment.



Empower Field & Auraria West

Provide a new heavy rail Empower Field Station and move the Auraria West light rail station south to Curtis Street.

5. Build a new Empower Field Station to heavy rail specs facing N/S over western parking of CU Denver's Lynx Crossing student dorm.

- a. Increase in capacity from lengthened platforms will ensure the station is ready to handle the greatly increased demand from a pending pedestrian bridge connection to Empower Field.

6. Walnut St. grade crossing to be rebuilt as an underpass to safely separate cars from passengers and pedestrians.

- a. The junction addresses engineering challenges of navigating around existing BNSF freight and highway infrastructure on 20th Street and RTD's I-25 Flyover Viaduct.

7. Relocate the Auraria West light rail station to face E/W along Curtis Street with light rail lines diverted to serve the Downtown Loop.

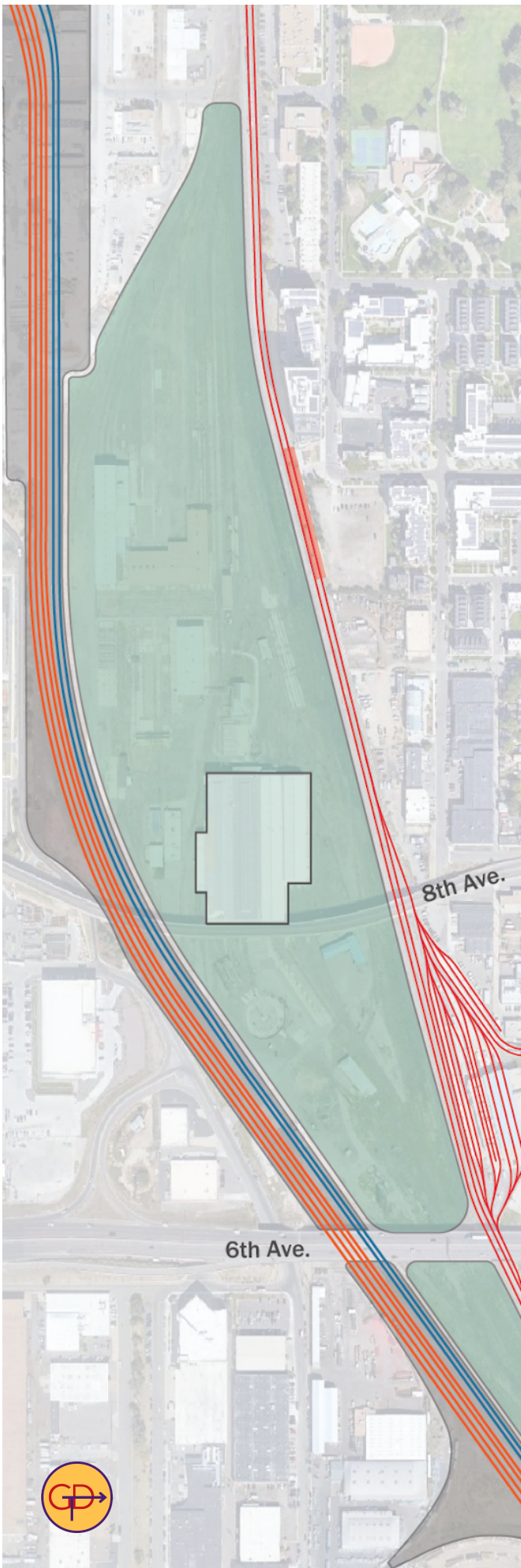
- a. E Line is effectively replaced with the F Line (former LRT line).
- b. W Line is diverted to Downtown Loop and merge with L Line.
- c. Former Auraria West Station land may be sold to CU/MSU.



Burnham Yards

Execute Alternate “E” of CDOT’s Burnham Yard and I-25 Central PEL which realigns the CML to Burnham Yard & adds extra tracks.

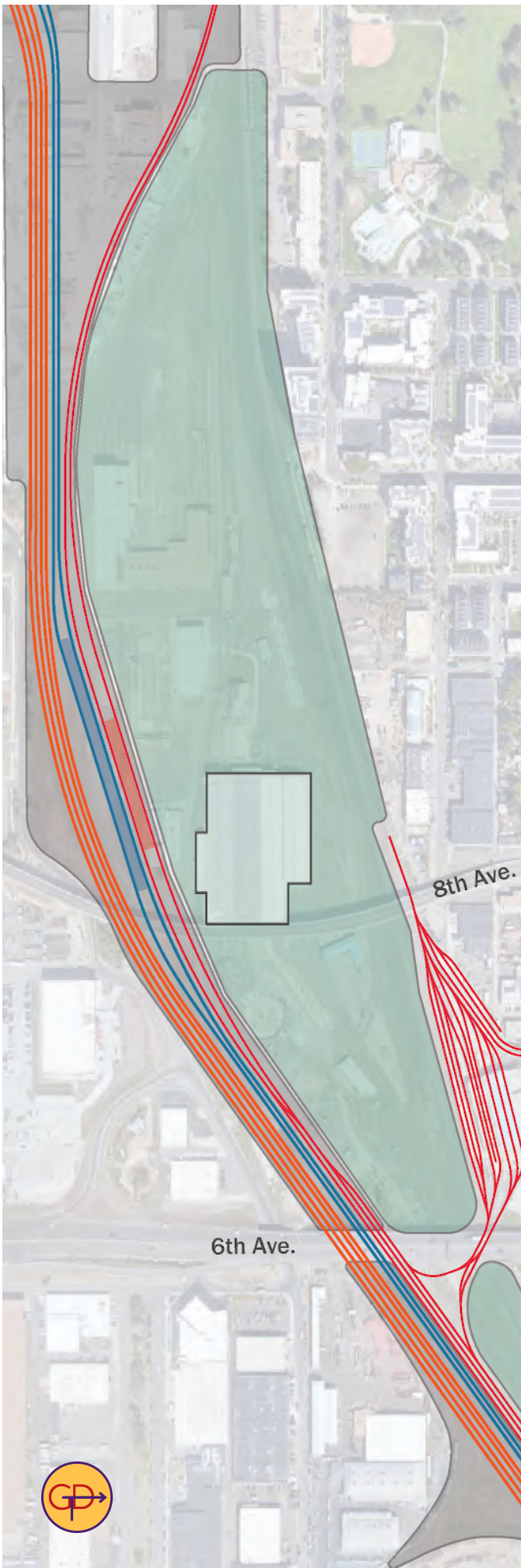
8. The “Consolidated Main Line” (CML) freight rail tracks will be relocated between I-25 & Broadway and Mile High to accommodate future highway safety projects on I-25.
 - a. In the base scenario, the Burnham Yards site will be bordered by two rail lines:
 - i. On the east boundary, RTD’s Light Rail spine will remain as-is (with the Mariposa maintenance facility unchanged).
 - ii. On the west boundary, the new CML alignment will include 4 freight tracks and 2 heavy passenger rail tracks (FRPR/RTD).
 - b. Separating rail on the site does risk some resale value and future community equity by squeezing redevelopment between rail on both sides.



B. Yards - Developer's Option

An alternative plan for Burnham Yards would be to relocate the light rail beside western CML & FRPR / RTD passenger rail tracks.


- In line with CDOT's Burnham Yard and I-25 Central PEL, freight rail still moves to the western edge of the Burnham Yards site here.
- However, all three modes of rail could be aligned on the west edge by moving the light rail west as well with the following benefits:
 - Avoids building two disconnected sets of barriers (tracks) that cut off the redeveloped section of the parcel from each side.
 - Still keeps freight traffic noise on the furthest edge of the site, away from existing neighborhoods.
 - City can expand existing street grid west to facilitate more organic and cost-efficient neighborhood growth.
- Replacement 10th & Osage Station would be renamed "Lincoln Park" - could be just a light rail station or could also build heavy rail.



Alameda

Rebuild Alameda Station over Alameda Ave and construct.

9. Rebuild the Alameda Station with 4 tracks (2 heavy rail, 2 light rail) over Alameda Ave to improve E/W bus connections.
 - a. Existing Alameda Station will be closed.
10. Existing Alameda underpass to be rebuilt as planned by CDOT / DOTI for safety, but needs a wider profile to fit planned BRT platforms also.



Alameda Ave.

I-25 & Broadway

Construct four new tracks at the I-25 & Broadway Station at heavy rail specifications

11. **Build new I-25 & Broadway platforms (4 new tracks) to allow FRPR trains (2 tracks) to overtake RTD commuter trains (2 tracks).**
 - a. 2/3 existing light rail tracks to be disconnected from the Southwest line which will be upgraded to heavy rail.
 - b. One SW track will be maintained in LRT standard for 2.5 miles in order to maintain access to the Elati Maintenance Facility.
 - c. Expanded station to be served by FRPR trains, the restored C Line operating as heavy rail, and the F and H LRT lines.



Evans and Oxford

Upgrade Evans, Englewood, and Oxford Stations to heavy rail specifications, preserve LRT access to Elati Maintenance Facility.

12. Existing stations to be rebuilt with heavy rail specifications including longer high-level platforms (allows for level-boarding)
13. One track to the Elati Maintenance Facility will be maintained in LRT standard for 2.5 miles in order to maintain LRT access.
14. Signaling and overhead power infrastructure of two main tracks will be rebuilt at heavy rail specifications: 25kV AC at 60Hz.

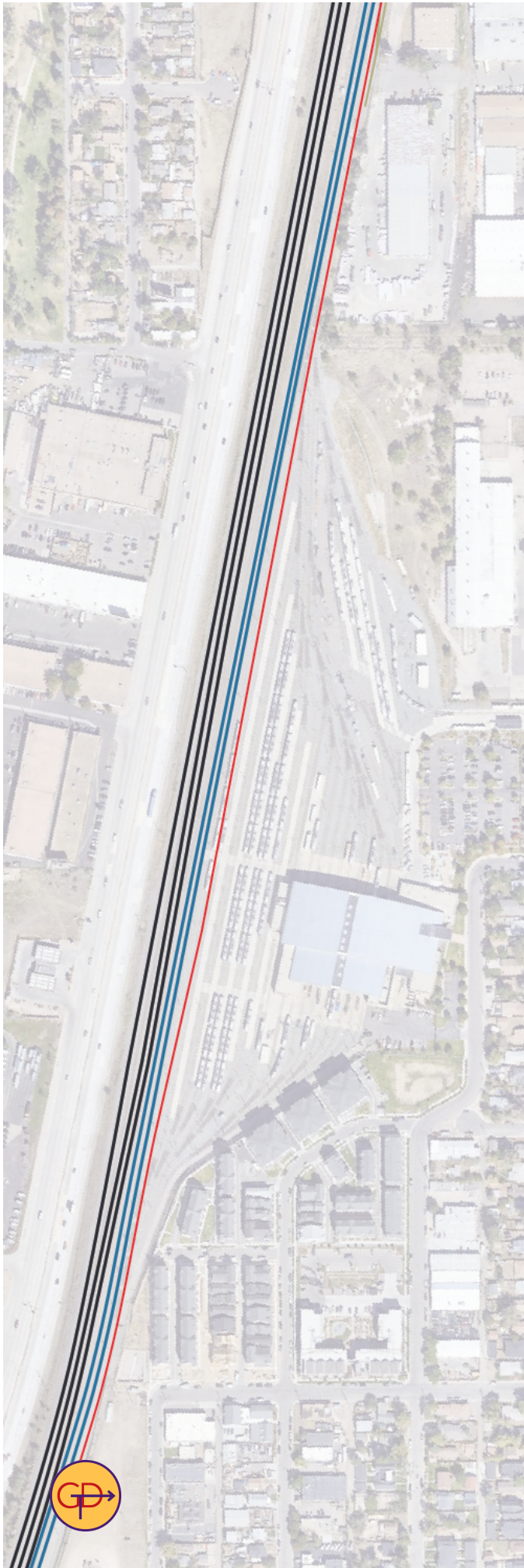


Elati

Upgrade Evans, Englewood, and Oxford Stations to heavy rail specifications, preserve LRT access to Elati Maintenance Facility.

15. Three outer tracks at the Elati Maintenance Facility will be converted to heavy rail for overnight FRPR storage

- a. With CPV and Southwest conversion to heavy rail, the size of the light rail fleet will shrink (freeing up capacity at the yard).



Littleton

Convert Littleton / Downtown and Littleton / Mineral Stations to heavy rail specifications.

16. Existing stations to be rebuilt with heavy rail specifications including longer high-level platforms (allows for level-boarding).
 - a. FRPR trains will serve Littleton / Downtown Station which offers far more destinations compared to the Mineral Park & Ride.
 - b. RTD fares and passes should be accepted on FRPR trains for journeys within the District.
17. Signaling and overhead power infrastructure of two main tracks will be rebuilt at heavy rail specifications: 25kV AC at 60Hz.



Highlands Ranch

Extend RTD's Southwest Line south to a new Park-n-Ride Station located on the junction of US85 and Highlands Ranch Parkway.

- 18. FRPR trains will enter/exit the shared railroad here, but will not regularly serve the station (access from Littleton / Downtown).**
 - a. Extension will be built to heavy rail specifications (25kV AC at 60Hz) and fully compatible with FRPR.
- 19. RTD Southwest Light Rail Corridor Extension scheme is replaced.**
 - a. Confluence of Highlands Ranch and Wildcat Reserve parkways enjoys better access to the community's main E/W roads:
- 20. New Station will serve as the beginning of a guaranteed "no-freight disruption zone" extending to at least Westminster.**



Front Range Passenger Rail



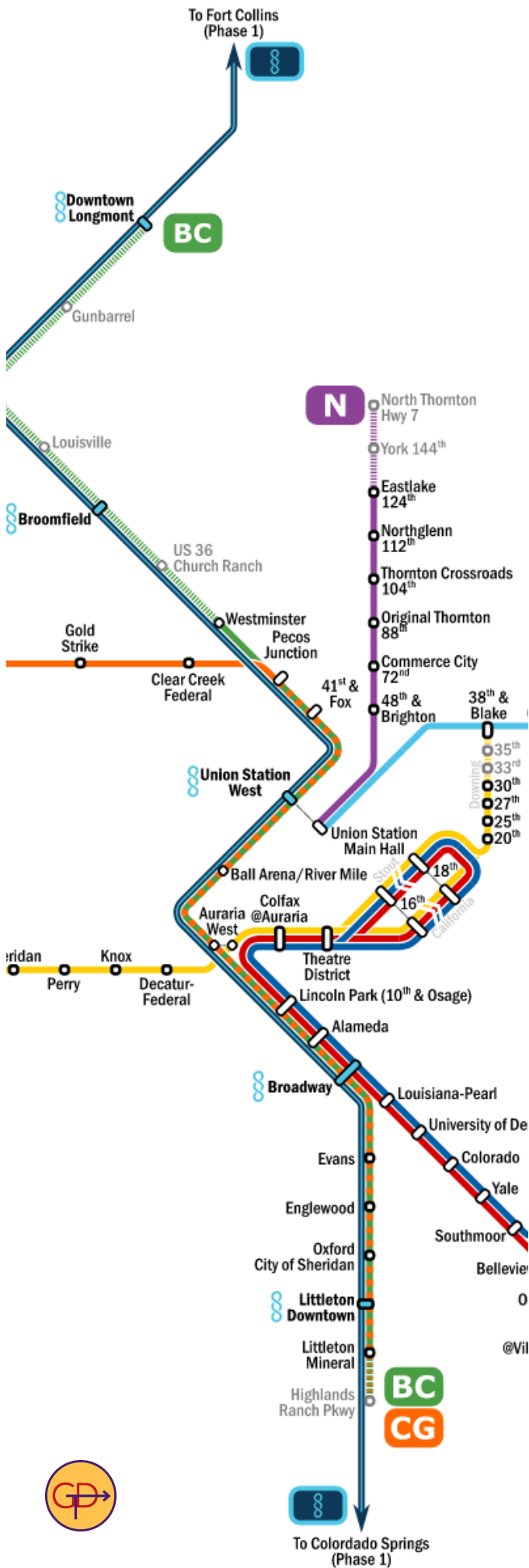
Getting There and Outcomes



RTD Operational Possibilities

RTD B and G Line commuter rail trains may run through to Highlands Ranch to provide north-south “cross city” service.

- More “through” journey opportunities are created.
 - Journeys are simpler and easier due to reduced need to transfer.
- RTD’s E and W Lines would be diverted to the Downtown Light Rail Loop after the upgrade.
 - F Line reinstated to replace the E Line.
 - No change to H or R Line operations.
 - L and W Lines could be combined for E/W through service running from Jefferson County Government Center Station to 38th & Blake Station, as planned per the FasTracks program.



Asks for the FRPR District

We ask that the FRPR District direct their consultants to study this FRPR - RTD Heavy Rail Upgrade from Highlands Ranch to Denver.

- If cost/benefit analysis comes back favorable, a second round of due-diligence would help establish:
 - How to raise sufficient capital via a ballot-measure to fully cover the costs of the initial scope and potential expansion.
 - Construct an offer for RTD to upgrade and share the passenger- only RoW between Highlands Ranch, Denver, and the north.
 - Construct an offer for freight railroads that is attractive and viable to ensure their cooperation in removing freight traffic from most essential track needed for passenger service.
 - Establish cost and steps to railbank all desired alignments for a fully built-out FRPR Network.

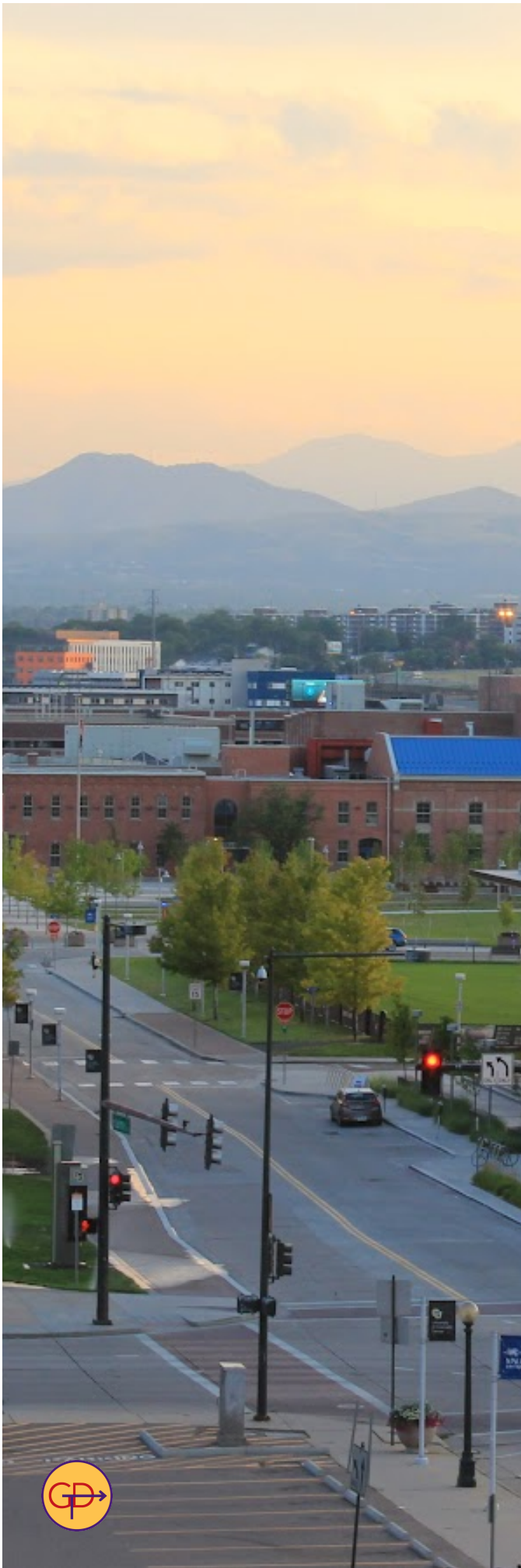




Asks for RTD

To realize essential transit service upgrades without new debt, RTD should strive to partner with the FRPR district by:

- Fact-finding on what it would take for RTD to operate (not build):
 - Wheat Ridge/Ward Rd. to Highlands Ranch (GC) as heavy rail.
 - Westminster to Highlands Ranch (BC) as heavy rail.
 - Combined L and W line thru service running from Jefferson County Government Center Station to 38th & Blake Station.
- Explore considerations for additional heavy rail vehicle procurement.
- Begin FRPR construction mitigation planning for:
 - 12 month outage of the Central Platte Valley Corridor.
 - 18 month outage of the Southwest Rail Corridor.
 - W Line diversion from CPV Corridor to Downtown Loop.



Asks for CDOT and DOTI

CDOT and DOTI can support the FRPR District and RTD by having:

- CDOT to adopt Alternate E of the Burnham Yard and I-25 Central PEL which funds two new tracks for RTD (to be shared by FRPR).
 - In addition to the current plan for two sets of rail, we urge them to study pushing all rail to the west of the parcel.
- CDOT, in partnership with DOTI, should rebuild the Alameda underpass in anticipation of future BRT on Alameda.
 - Ensure selected design widens the underpass to include sufficient space for BRT platforms on either edge with stairs and elevator access to the rail above to be fully ADA-accessible.



Result

By utilizing existing RTD transit infrastructure, FRPR can expand into a network that spans the Front Range with wide benefits.

- Right-of-way negotiation is far easier: minimal holdup from private developers as route only deals with existing rail property.
- Train service through Denver will be reliable: no holdup from mile-long freight trains entering and exiting adjacent freight yards.
- Capacity can expand: Denver-section of FRPR will be capable of hosting at least hourly FRPR service from Day 1.
- Front Range riders will have direct access not just to Denver, but through Denver onto all other Front Range cities without an extra 1-2 transfers in Denver.
- All future transit projects across the Front Range will benefit from expanded public support from FRPR riders who will evangelize the value proposition from high-performing transit first-hand.