

LEVEL 2 ALTERNATIVES EVALUATION MATRIX

Measure	BNSF Freight Rail Alternative	BNSF + I-25 Commuter Rail Alternative	I-25 + E-470 Highway Alternative

Operating Characteristics

Travel time between major travel markets (in minutes):				
Travel Times	Fort Collins–DEN Airport (southbound/northbound)	N/A	N/A	50 minutes
	Fort Collins–Downtown Denver	65 minutes	63 minutes	N/A
	Colorado Springs–DEN Airport	N/A	N/A	60 minutes
	Colorado Springs–Downtown Denver	61 minutes	61 minutes	N/A
	End to end travel time	168 minutes	169 minutes	149 minutes
Ridership	Projected annual ridership	2.2 million	1.5 million	2.2 million
	Projected weekday ridership	6,900	4,800	6,800
Operating speed	Average operating speed	66 mph	66 mph	77 mph
Reduction in annual vehicle miles traveled (VMT)	Regional reduction in VMT	63,000,000	43,000,000	63,000,000
Ability to interconnect with other modes (existing or planned transit)	Ease of transfers/availability and capacity of direct connections to local transit	All stations are generally situated to accommodate local transit integration and transfers as design progresses.	All stations are generally situated to accommodate local transit integration and transfers as design progresses.	All stations are generally situated to accommodate multimodal integration and transfers as design progresses; however, direct rail connections are less complimentary than with the freight rail alignments.
	Ease of first/last mile connectivity (applicable to station locations only)	NA (Not measurable with the current level of design and station planning)	NA (Not measurable with the current level of design and station planning)	NA (Not measurable with the current level of design and station planning)
	Percentage of riders connecting to/from other transit systems	37% of boardings transfer from other systems 49% of alightings transfer to other systems	30% of boardings transfer from other systems 39% of alightings transfer to other systems	21% of boardings transfer from other systems 25% of alightings transfer to other systems
	Connections with future mobility hubs	Co-located with potential location for Castle Rock mobility hub (although discussions with the town have	Co-located with potential location for Castle Rock mobility hub (although discussions with the town have	Co-located with potential location for Castle Rock mobility hub (although discussions with the town have

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		not resulted in agreement on a preferred location for the mobility hub)	not resulted in agreement on a preferred location for the mobility hub)	not resulted in agreement on a preferred location for the mobility hub) Co-located with north I-25 mobility hubs at SH 7 and Loveland	
2045 population served	Population within 5 miles of stations	984,000	975,000	599,000	
2045 employment served	Jobs within 5 miles of stations	1,459,000	1,353,000	898,000	
Environmental and Community Impacts					
Community Disruption	Availability of right of way	Majority of alignment on freight rail right of way and state highway right of way. Notable greenfield alignments south of Monument, east of Palmer Lake, between Broomfield and Louisville, around the east side of Longmont, and intermittently throughout the corridor to provide acceptable horizontal curves and optimize speed capabilities.	Freight rail and commuter rail right of way. Notable greenfield alignments south of Monument, east of Palmer Lake, between E-470 and Longmont, around the east side of Longmont, and intermittently throughout the corridor to provide acceptable horizontal curves and optimize speed capabilities.	Majority of alignment on highway right of way and freight rail right of way. Notable greenfield alignments north of Pueblo, adjacent to Fort Carson, between E-470 and I-25, and intermittently throughout the corridor to provide acceptable horizontal curves and optimize speed capabilities.	
	Number of road crossings				
		Highway	37	32	33
		Major roads	122	106	65
		Local roads	84	82	65
		Ability to use existing infrastructure (mobility hubs, etc.)	Potential to share right-of-way or other freight/RTD infrastructure (e.g., tracks) for 83 percent of alignment. Integration with one existing major rail station (DUS), potential to co-locate stations with four planned commuter rail stations (Highlands Ranch, Boulder, Longmont, Loveland), two transit centers (Pueblo and Fort Collins), and one mobility hub (Castle Rock)	Potential to share right-of-way or other freight infrastructure (e.g., tracks) for 75 percent of alignment. Integration with one existing major rail station (DUS), potential to co-locate stations with three planned commuter rail stations (Highlands Ranch, North Suburban, Loveland), two transit centers (Pueblo and Fort Collins), and one mobility hub (Castle Rock)	Potential to share right-of-way or other freight infrastructure (e.g., tracks) for 16 percent of alignment. Potential to share highway right-of-way in the 75 percent of the alignment that is adjacent to highway corridors. Integration with one existing major rail station (DEN), potential to co-locate stations with two RTD rail stations (RidgeGate and North Metro end of line), two transit centers (Pueblo and Fort Collins), and three I-25 mobility hubs (Castle Rock, SH 7, and Loveland/Centerra)
		Miles of residential, business, and commercial land uses adjacent to alignment	Corridor wide: 43 (res)/20 (bus/com) • North Segment:21/11 • Central Segment:8/3 • South Segment:14/6	Corridor wide: 57 (res)/20 (bus/com) • North Segment:35/11 • Central Segment:8/3 • South Segment:14/6	Corridor wide: 42 (res)/27 (bus/com) • North Segment:10/8 • Central Segment:13/9 • South Segment:19/10
		Number of minority/low income populations along alignment	Corridor wide: 24 block groups with high (greater than 50%) minority populations/30 block groups with high (greater than 50%) low-income populations • North Segment:0/7 • Central Segment:13/12 • South Segment:11/11	Corridor wide: 29 block groups with high (greater than 50%) minority populations/28 block groups with high (greater than 50%) low-income populations • North Segment:0/7 • Central Segment:18/10 • South Segment:11/11	Corridor wide: 16 block groups with high (greater than 50%) minority populations/15 block groups with high (greater than 50%) low-income populations • North Segment:0/1 • Central Segment:5/2 • South Segment:11/12
	Utilities and Energy	Annual energy consumption (from system)	(not calculated; not a differentiator among alternatives)	(not calculated; not a differentiator among alternatives)	(not calculated; not a differentiator among alternatives)
	Air Quality	Reduction in VMT	63,000,000	43,000,000	63,000,000
Natural Resources	Number of stream crossings	Corridor wide: 158 • North Segment: 78	Corridor wide: 149 • North Segment: 69	Corridor wide: 131 • North Segment:54	

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		<ul style="list-style-type: none"> Central Segment:17 South Segment: 63 	<ul style="list-style-type: none"> Central Segment: 17 South Segment: 63 	<ul style="list-style-type: none"> Central Segment:23 South Segment:54
	Acres of wetlands	Corridor wide: 107 <ul style="list-style-type: none"> North Segment:34 Central Segment:20 South Segment: 53 	Corridor wide: 92 <ul style="list-style-type: none"> North Segment:19 Central Segment: 20 South Segment: 53 	Corridor wide: 16 <ul style="list-style-type: none"> North Segment:1 Central Segment: 0 South Segment:15
	Number of floodplain crossings	Corridor wide: 263 <ul style="list-style-type: none"> North Segment:124 Central Segment:52 South Segment:87" 	Corridor wide: 214 <ul style="list-style-type: none"> North Segment:75 Central Segment:52 South Segment:87 	Corridor wide: 162 <ul style="list-style-type: none"> North Segment:47 Central Segment:42 South Segment:73
	Acres of protected species habitat along alignment	Corridor wide: 77 <ul style="list-style-type: none"> North Segment: 0 Central Segment:77 South Segment: 0 	Corridor wide: 77 <ul style="list-style-type: none"> North Segment: 0 Central Segment:77 South Segment: 0 	Corridor wide: 11 <ul style="list-style-type: none"> North Segment: 0 Central Segment: 0 South Segment:11
Historic	Number of properties listed on the National Register of Historic Places potentially affected.	(Not measured. Data not readily available or considered meaningful to compare effects to historic properties since only a fraction of National Register eligible sites are formally listed.)	(Not measured. Data not readily available or considered meaningful to compare effects to historic properties since only a fraction of National Register eligible sites are formally listed.)	(Not measured. Data not readily available or considered meaningful to compare effects to historic properties since only a fraction of National Register eligible sites are formally listed.)
	Number of historic aged developments potentially impacted (clusters of historic aged properties from assessor records).	<p>In the Denver area, there are numerous historic sites and districts along the right-of-way constrained rail alignment that would potentially be affected by the BNSF Freight Rail Alternative. While a more comprehensive review and assessment would be needed to determine and quantify effects, it is extremely unlikely that all historic properties could be avoided. Section 106 of the National Historic Preservation Act and Section 4(f) of the US Department of Transportation Act and their corresponding federal regulations (36 CFR 800 and 23 CFR 774) will require detailed analysis of avoidance and minimization options.</p> <p>In the North Segment, the design was refined to include a bypass of Longmont's historic town center where significant effects to historic properties was also likely.</p>	Same as BNSF Freight Rail Alternative.	The I-25 + E-470 Highway traverses less developed and more recently developed lands, and in some cases, includes right-of-way preserved for or available for passenger rail. It is likely for these reasons that this alternative would have less effect on historic properties than the other alternatives. However, it is also unlikely that all historic effects could be avoided along the 190-mile route.
Hazardous Materials	Number of Superfund sites along alignment	Corridor wide: 1 NPL site (Denver radium - COD980716955) in 7 locations along I-25 in Metropolitan Denver <ul style="list-style-type: none"> North Segment: 0 Central Segment: 1 South Segment: 0 	Corridor wide: 1 NPL site (Denver radium - COD980716955) in 7 locations along I-25 in Metropolitan Denver <ul style="list-style-type: none"> North Segment: 0 Central Segment: 1 South Segment: 0 	Corridor wide: 1 NPL site (Lowry Landfill - COD980499248) <ul style="list-style-type: none"> North Segment: 0 Central Segment: 1 South Segment: 0
Recreational Resources	Number of parks and open space areas along alignment	Corridor wide: 50 <ul style="list-style-type: none"> North Segment:38 Central Segment:8 South Segment:4 	Corridor wide: 41 <ul style="list-style-type: none"> North Segment:29 Central Segment:8 South Segment:4 	Corridor wide: 3 <ul style="list-style-type: none"> North Segment: 0 Central Segment:3 South Segment: 0

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Noise and Vibration	Miles of potentially sensitive receptors along alignment	Corridor wide: 43 • North Segment:21 • Central Segment:8 • South Segment:14	• Corridor wide: 57 • North Segment:35 • Central Segment:8 • South Segment:14	Corridor wide: 42 • North Segment:10 • Central Segment:13 South Segment:19
	Number of sensitive open space or recreational receptors	Corridor wide: 50 • North Segment:38 • Central Segment:8 • South Segment:4	Corridor wide: 41 • North Segment:29 • Central Segment:8 • South Segment:4	Corridor wide:3 • North Segment: 0 • Central Segment:3 • South Segment: 0
	Number of trail crossings	Corridor wide:153 • North Segment:105 • Central Segment:17 • South Segment:31	Corridor wide:157 • North Segment:109 • Central Segment:17 • South Segment:31	Corridor wide: 62 • North Segment:19 • Central Segment:12 • South Segment:31
Financial and Economic Factors				
Capital Cost	Capital cost (right of way, construction, stations, rolling stock)	\$8 billion to \$13.4 billion	\$8.5 billion to \$14.2 billion	\$7.8 billion to \$13.1 billion
Operating Cost	Operating cost	\$125 million to \$187 million	\$120 million to \$180 million	\$125 million to \$188 million
Feasibility and Implementation				
Interaction with Freight Railroad Operations/Customer Access	Freight conflicts/ability to maintain current and projected freight operations (long term) and customer access	(Additional rail simulation modeling required to assess.)	(Additional rail simulation modeling required to assess.)	(Less interaction with freight corridors but would still require rail simulation modeling to assess South Segment operations.)
Constructability	Level of engineering and construction complexity	All alternatives will be major undertakings and complex to design and construct. Some distinguishing features of the BNSF Freight Rail Alternative include: • 1.3-mile tunnel at Monument Hill • Substantial work within freight rail right-of-way to be coordinated with Class I railroads • Complex access through Colorado Springs (more station planning needed) • Complex access into and out of DUS	Similar to BNSF Freight Rail Alternative with the following differences: • Slightly shorter (7 miles) route • Long viaduct out of DUS parallel to RTD N Line • High percentage of acres of urban double track right-of-way (40 percent) (more constrained) • Most interaction with RTD corridors (30 miles adjacent to RTD)	All alternatives will be major undertakings and complex to design and construct. Some distinguishing features of the I-25 + E-470 Highway Alternative include: • 0.6 miles of tunnel (half of freight alternatives) • Fewer road and stream crossings • Less construction and coordination with Class I railroads • Complex access through Colorado Springs (more station planning needed) • Complex access into and out of DEN
System Flexibility	Ability to phase starter system and accommodate future capacity expansion	Maximizes potential for shared use of existing freight rail infrastructure in starter system and ability to add service and infrastructure (sidings, stations) as demand warrants. Additional rail simulation modeling needed to assess capacity on existing freight corridor.	Same as BNSF Freight Alternative with Maximizes potential for shared use of existing freight rail infrastructure in starter system and ability to add service and infrastructure (sidings, stations) as system evolves. Additional analysis of freight and RTD capacity needed to determine level of service for starter system.	More difficult to phase because does not use freight corridors or have the ability to use shared tracks. Also, distances between stations is greater
	Ability to accommodate secondary and/or commuter rail stations	Strong potential for layered service with commuter rail and FRPR express service. Follows three existing or planned commuter rail lines, including RTD's C/D light rail line between Mineral and DUS, B Line between DUS and Boulder and Longmont, and North I-25 EIS	Strong potential for layered service with commuter rail and FRPR express service. Follows three existing or planned commuter rail lines, including RTD's C/D light rail line between Mineral and DUS, N Line between DUS and Thornton, and North I-25 EIS planned	Less ability to jointly serve commuter rail because alignments generally are not adjacent. Central Segment stations at South Suburban (RidgeGate), DEN, and North Suburban (N Line end of line) provide strong interactions with RTD existing service.

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		planned commuter rail line between Longmont and Fort Collins.	commuter rail line between Longmont and Fort Collins.	
Public and Political Support	Qualitative feedback through stakeholder meetings, public meetings, etc.	Strong support for alignment and station locations along the BNSF Freight Rail Alternative. Strong support for DUS as a Denver hub for FRPR and for service to/from Boulder.	Good support for alignment and station locations along the BNSF + I-25 North Commuter Rail Alternative. North Denver metro communities support integration of this alternative with the RTD N Line. Less support with Boulder area stakeholders compared to the BNSF Freight Rail Alternative.	Less support for the E-470 alignment in Denver compared to the other alternatives that serve DUS directly; nearly twice as many public survey respondents indicated support for DUS as primary Denver destination. Mixed support for DUS vs DEN service provided in Central and North Segment Coalition meetings, and strong preference for DUS (and opposition to DEN) service expressed by South Segment Coalition stakeholders.
RECOMMENDATIONS		Carry Forward for refinement and consideration in NEPA.	Carry Forward for refinement and consideration in NEPA.	Carry Forward for refinement and consideration in NEPA.