

# PLT Meeting No. 6: Level 2 Evaluation Update and Decisions to be Made

CDOT Interregional Connectivity Study



# Agenda

- ▶ Welcome and Introductions
- ▶ Intent of the Meeting
- ▶ Additional Scenarios
- ▶ Review of Scenarios presented at last PLT
- ▶ Key Decisions to be Made before Level 3
  - E-W and N-S Alignments through Denver
- ▶ Additional indirect economic benefits
- ▶ Break Out Session
- ▶ Next Steps

# Intent of today's PLT meeting

## ▶ What's new since last PLT meeting

- Modeling and Other Review of Scenarios B-2 and B-3
- Refinement of B/C Results

## ▶ Input into scenarios/alignments carried into Level 3

- Acceptable speeds through developed communities
- East-west alignments through Denver (I-76 vs. US 6)
- North-south alignments through Denver (RR vs. beltway)
- Range of scenarios carried forward for Level 3 analysis
- Which scenario do you like?

# Key Considerations in Level 2 Evaluation

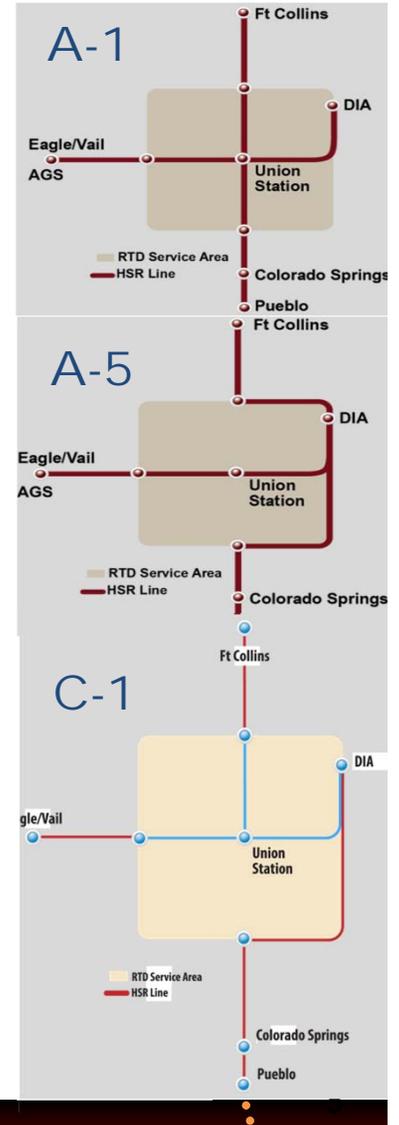
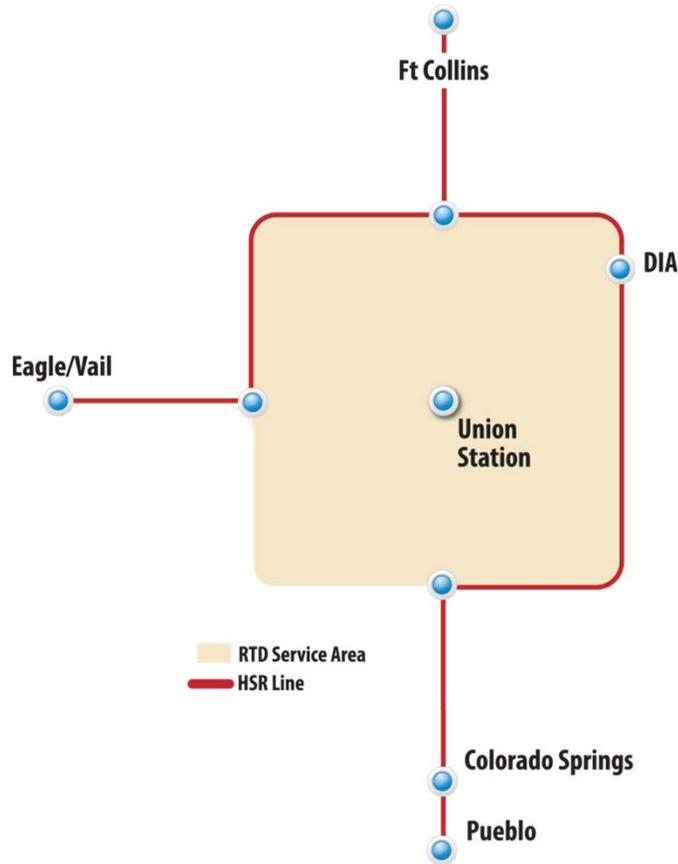
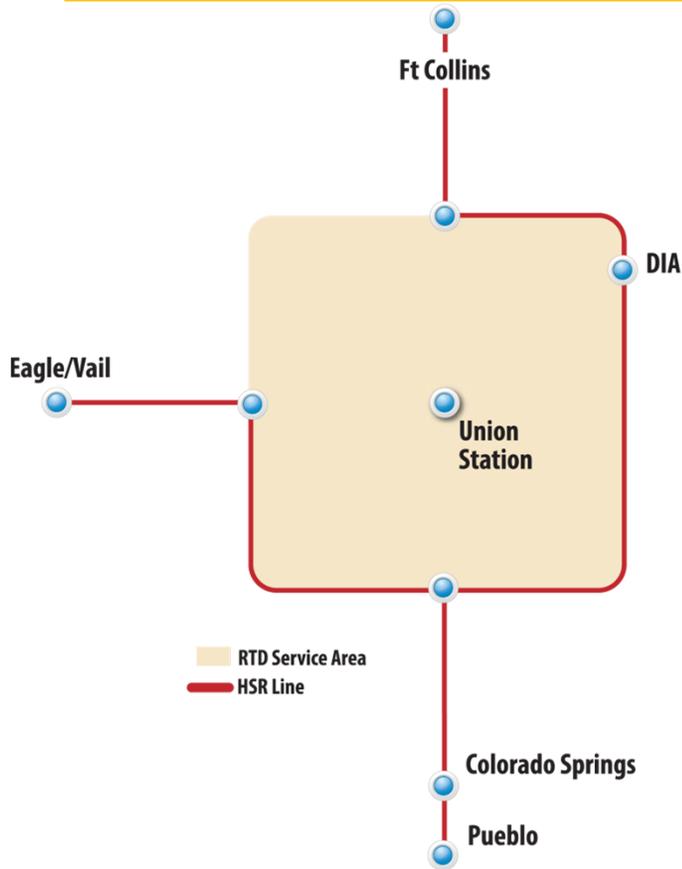
- ▶ E-W alignment through the Denver area communities
  - Use I-76 (Option a) or
  - Use US 6 (Option b)
- ▶ N-S alignment
  - Through (railroad alignment) or
  - Around the metro area (beltway alignments)
- ▶ North of Denver
  - Use I-25 or
  - Use Railroad (EIS commuter rail alignment)
- ▶ Decisions based on
  - Environmental/community impacts and benefits versus
  - Performance and costs

# New Scenarios Discussed Today

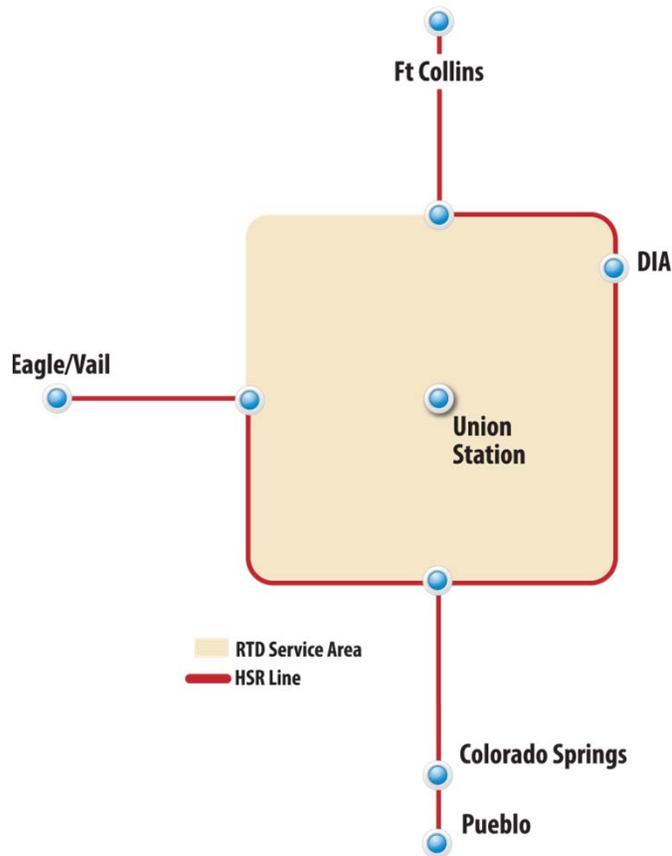
## Scenario

B-2

B-3



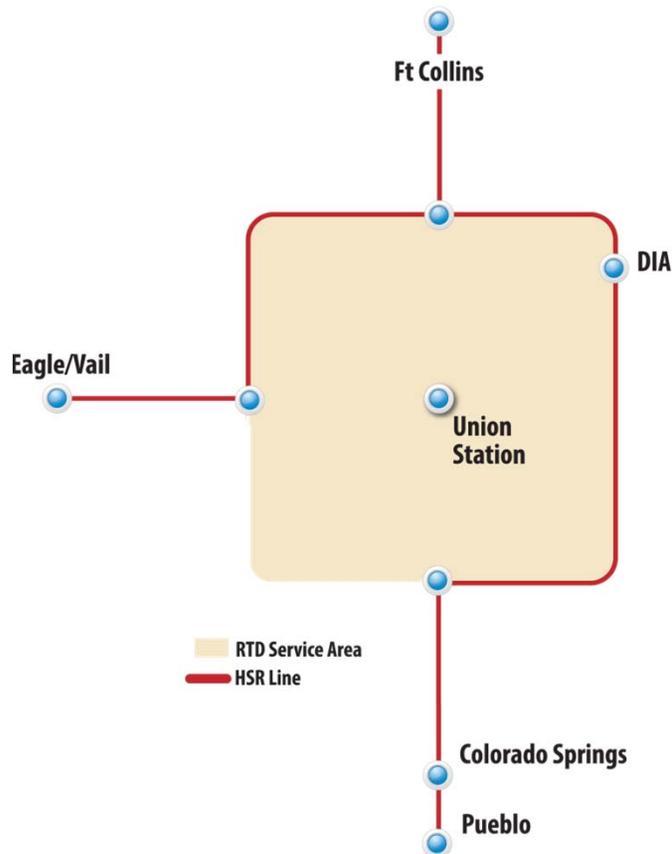
# Scenario B-2A



## Performance

- CAPEX - ~\$13.4 Billion
- OPEX - ~\$137.0 Million/yr
- Ridership – 13.8 million/yr
- Revenue - ~\$249.0 Million/yr
- Ops Ratio – 1.82
- Highest ridership and avoids the impacts of constructing through Denver urban areas
- Poor service to DIA from Mountain Communities; no service to DUS from any direction

## Scenario B-3

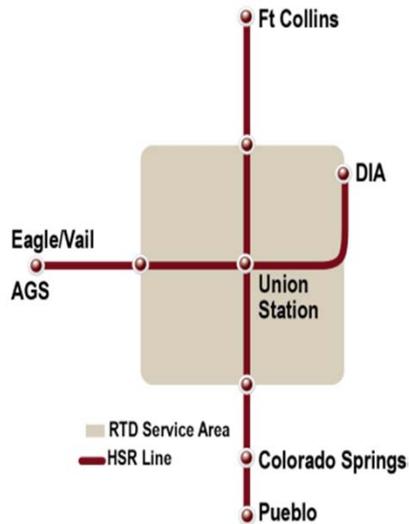


## Performance

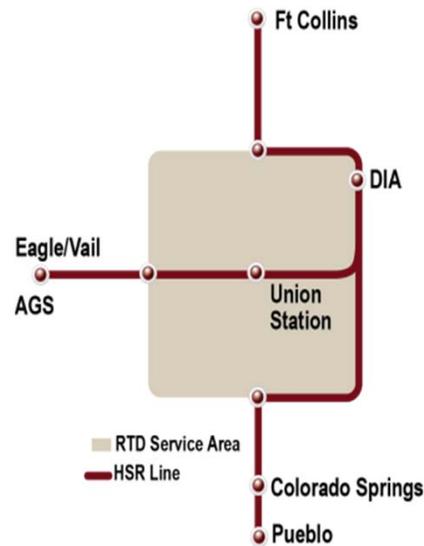
- CAPEX - ~\$13.9 Billion
- OPEX - TBD
- Ridership - 13.7 million/yr
- Revenue - ~\$248.0 Million/yr
- Ops Ratio - TBD
- **Second highest ridership and avoids impacts to Denver urban areas**
- **Limited access to DUS**

# Review of Scenarios Presented at Last PLT

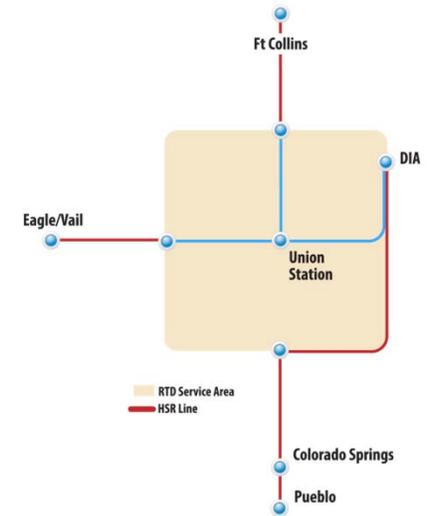
**A-1**



**A-5**



**C-1**



<b>CAPEX</b>	<b>\$14.9 Billion</b>
<b>OPEX</b>	<b>\$158 Million/yr</b>
<b>Ridership</b>	<b>12.1 to 13.1 million/yr</b>
<b>Revenue</b>	<b>\$250 Million/yr</b>
<b>Opex Ratio</b>	<b>1.58</b>
<b>B/C Ratio</b>	<b>2.0</b>

<b>\$14.3 Billion</b>
<b>\$161 Million/yr</b>
<b>12.9 to 13.1 million/yr</b>
<b>\$257 Million/yr</b>
<b>1.60</b>
<b>2.0</b>

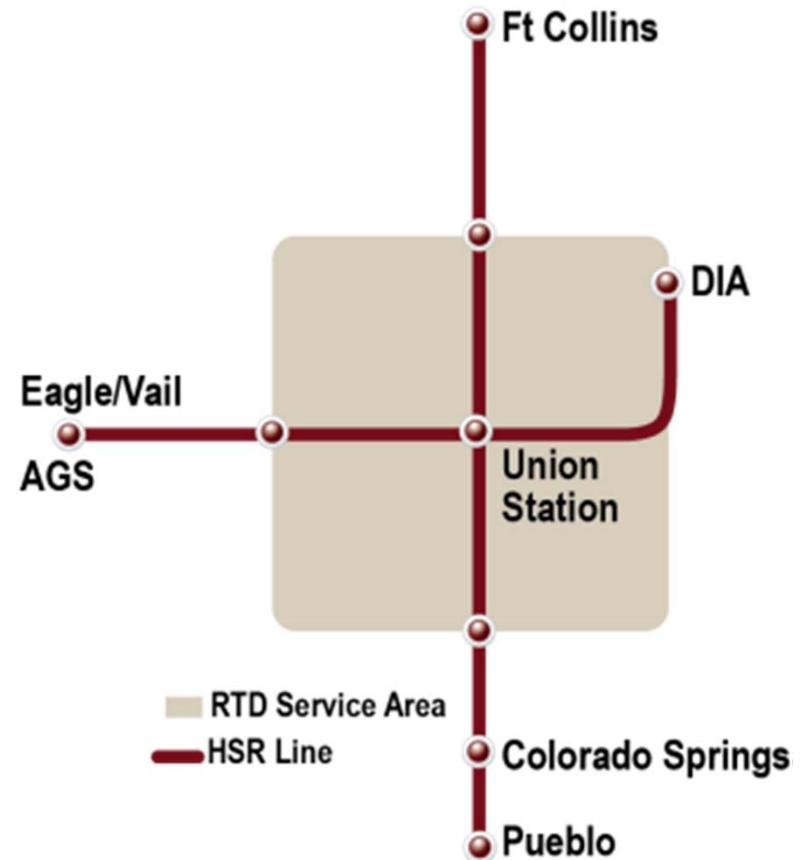
<b>\$11.5 Billion</b>
<b>\$165 Million/yr</b>
<b>10.8 million/yr</b>
<b>\$205 Million/yr</b>
<b>1.24</b>
<b>2.0</b>



# *Comparison of Scenarios*

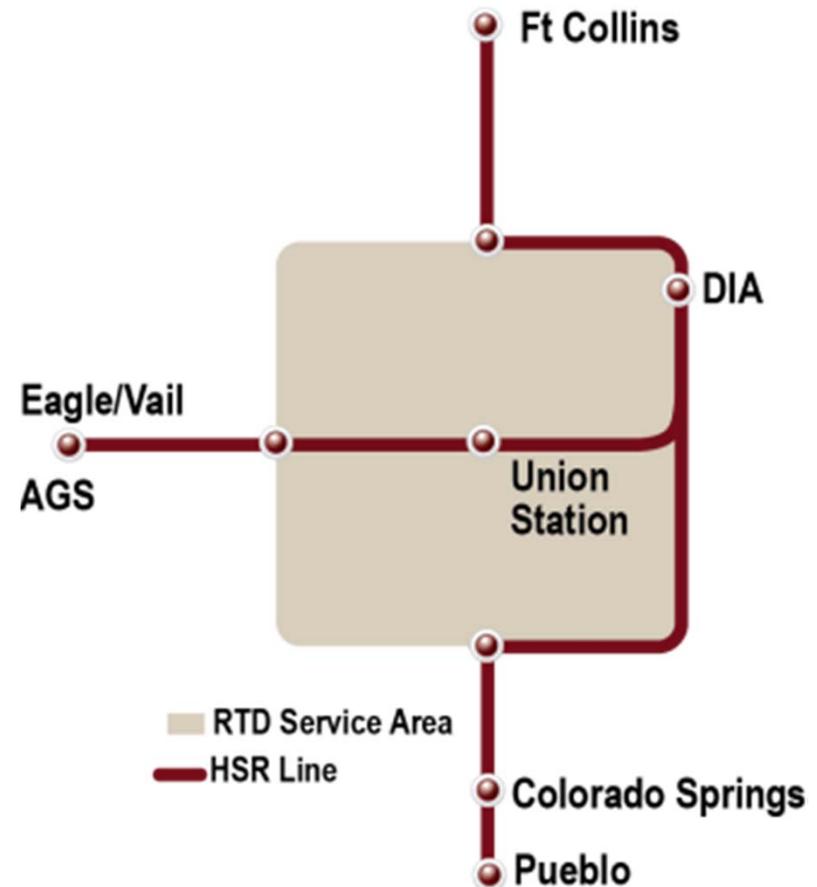
# Scenario A-1

- ▶ With US 6 option, highest overall ridership (marginally better than A-5) and better service to Denver (through DUS)
- ▶ Does not serve DIA from north or south well due to transfer at DUS and competition from RTD's lower fares and good travel times
- ▶ High community impacts and ROW costs, particularly for US 6 and railroad alignments through Denver

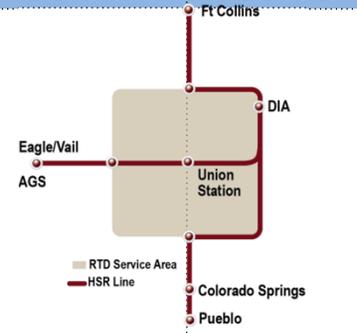
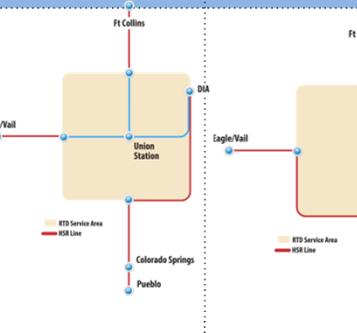
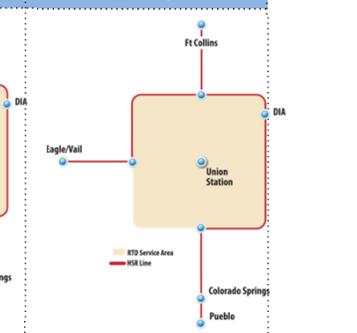
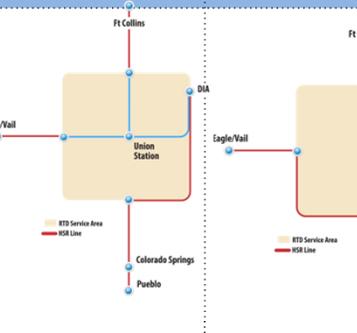
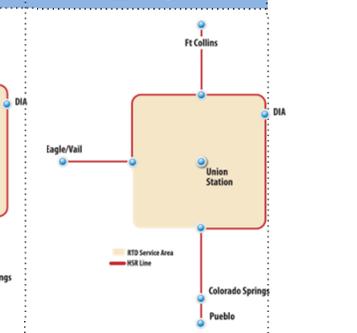
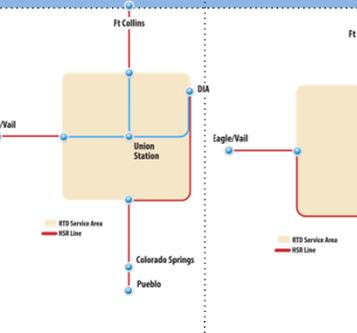


## Scenario A-5

- Serves DIA best with one-seat ride from all markets but requires more out-of-direction travel to mountains, north, and south
- Works well with either US 6 or I-76 option
- Lesser community impacts for north-south option

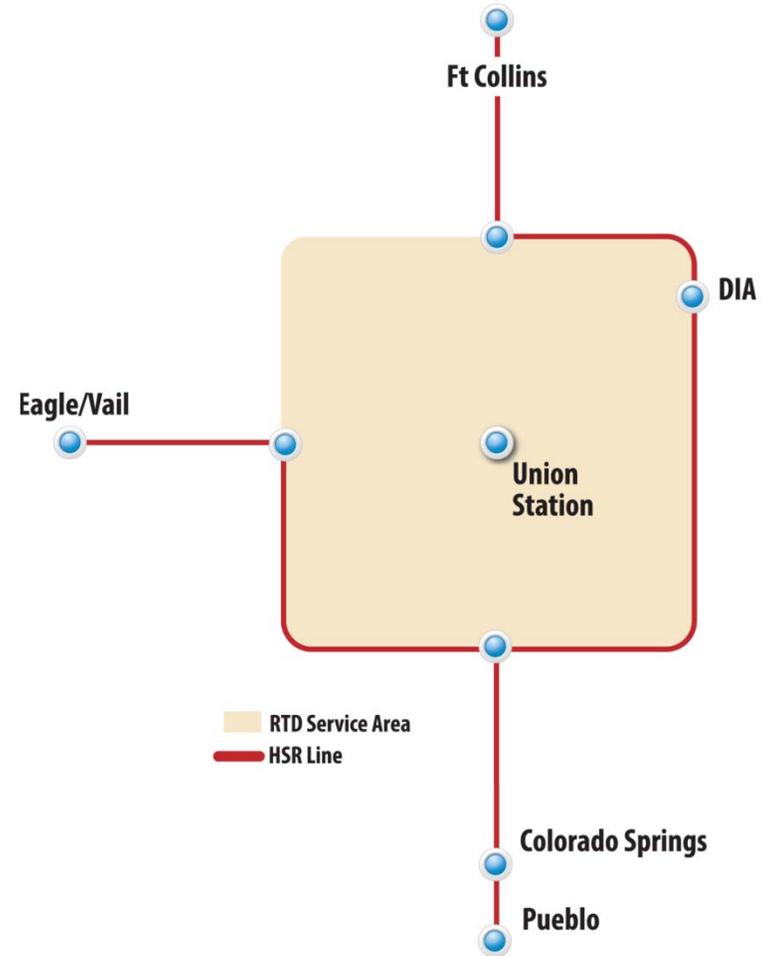


# Market Share by Scenario

	A-1a	A-1b	A-5a	A-5b	C-1	B-2	B-3
<b>Market</b>							
Mountain to Eagle	2,168,094	2,516,754	2,430,662	2,136,961	1,696,330	2,995,866	2,792,520
Percent of Total	<b>17.85%</b>	<b>19.12%</b>	<b>18.75%</b>	<b>16.27%</b>	<b>15.64%</b>	<b>21.63%</b>	<b>20.36%</b>
Mountain Daily	7,227	8,389	8,102	7,123	5,654	9,986	9,308
North to FC	2,069,642	2,472,297	2,326,763	2,620,094	1,909,081	2,498,178	3,107,216
Percent of Total	<b>17.04%</b>	<b>18.78%</b>	<b>17.95%</b>	<b>19.94%</b>	<b>17.60%</b>	<b>18.04%</b>	<b>22.66%</b>
North Daily	6,899	8,241	7,756	8,734	6,364	8,327	10,357
South to Pueblo	5,451,251	5,674,676	5,584,849	5,514,986	4,994,421	6,220,862	5,596,993
Percent of Total	<b>44.87%</b>	<b>43.11%</b>	<b>43.07%</b>	<b>41.98%</b>	<b>46.06%</b>	<b>44.92%</b>	<b>40.81%</b>
South Daily	18,171	18,916	18,616	18,383	16,648	20,736	18,657
Denver Interurban	2,460,154	2,499,106	2,623,452	2,865,417	2,244,474	2,133,840	2,218,226
Percent of Total	<b>20.25%</b>	<b>18.99%</b>	<b>20.23%</b>	<b>21.81%</b>	<b>20.70%</b>	<b>15.41%</b>	<b>16.17%</b>
Denver Daily	8,201	8,330	8,745	9,551	7,483	7,113	7,394
<b>ANNUAL TOTAL</b>	<b>12,149,141</b>	<b>13,162,833</b>	<b>12,965,726</b>	<b>13,137,458</b>	<b>10,844,306</b>	<b>13,848,747</b>	<b>13,714,955</b>

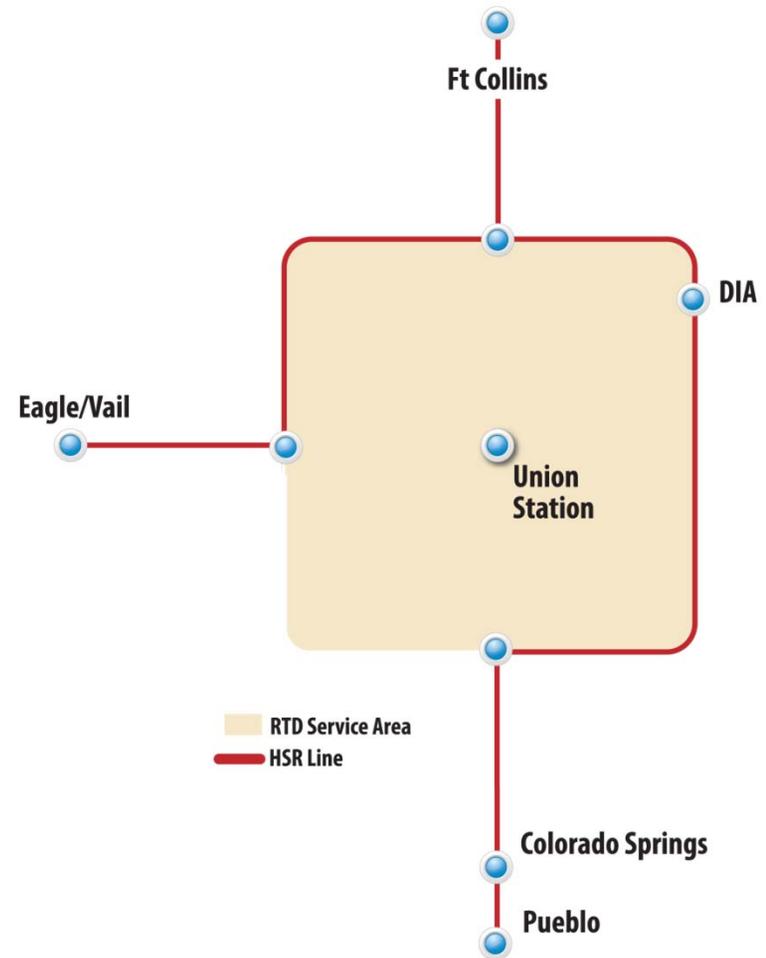
# Scenario B-2A

- Very strong ridership
- Poor access to DUS from all directions
- Poor access to DIA from the mountains
- High utilization of existing RTD infrastructure
- Avoids community impacts to neighborhoods through the Denver metro area



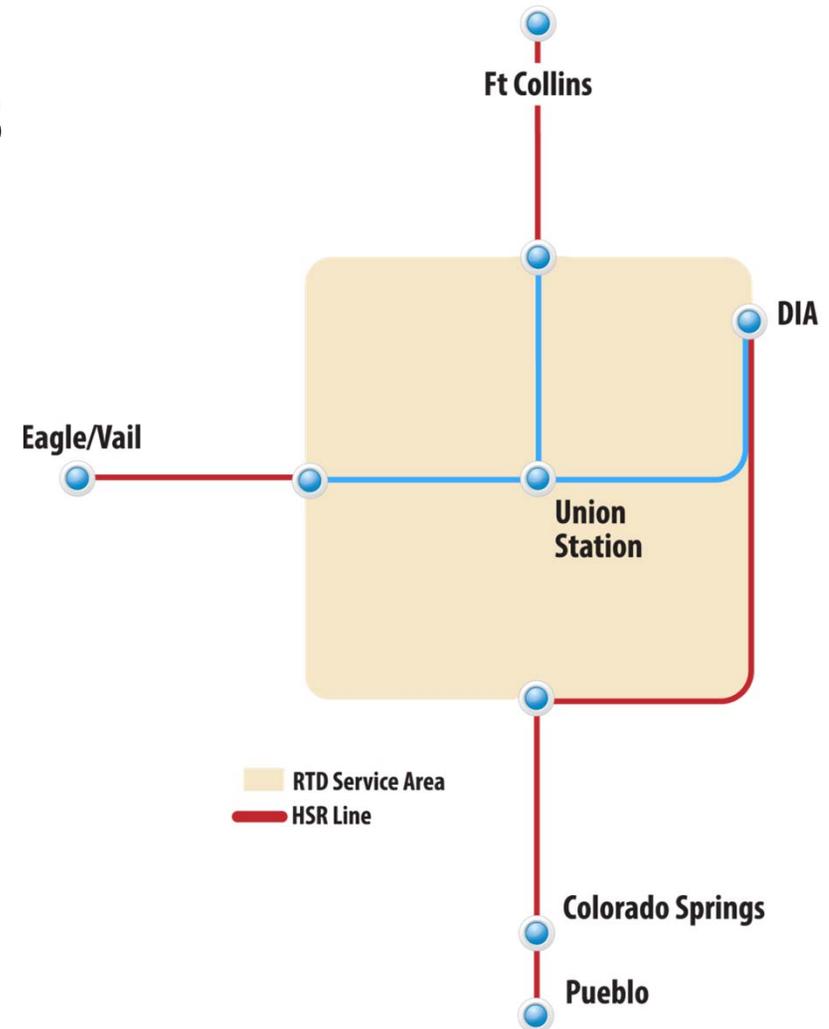
## Scenario B-3

- Very strong ridership
- Poor access to DUS from all directions
- Good access to DIA from all but the SW direction
- High utilization of existing RTD infrastructure
- Avoids community impacts to neighborhoods through the Denver metro area
- Involves the unknowns of constructing through the NW Quadrant.



## C-1 Scenario

- Lower cost by about \$3.3 B
- Fewer impacts
- Capitalizes on RTD FasTracks investment
- Could complicate RTD FasTracks operating plan but could also be revenue source for RTD
- 2.3 million fewer riders



# East to West – I-76 or US 6?

## I-76 (Option a)



1. Travel time: 23 min
2. Miles of Track: 71 mi
3. Ave./top speed: 106/165 mph
4. Cost: \$2.44 Billion
5. Less community impact
6. No direct connection to DUS; works poorly with A-1, better with A-5

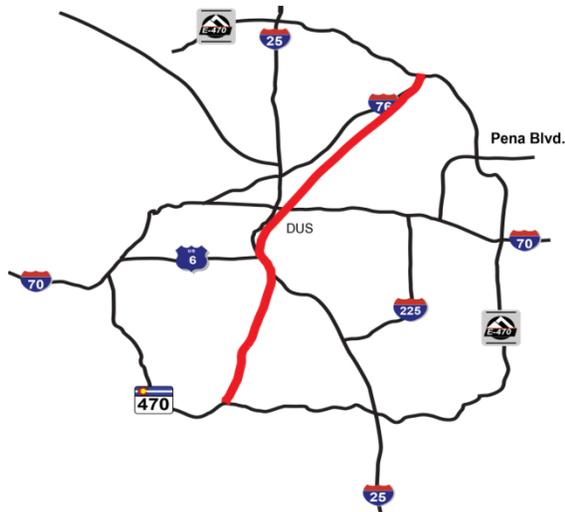
## US 6 (Option b)



1. Travel time: 24 min
2. Miles of Track: 73 mi
3. Ave/top speed: 115/170 mph
4. Cost: \$2.58 Billion
5. Higher community /ROW impact
6. Higher ridership for all markets

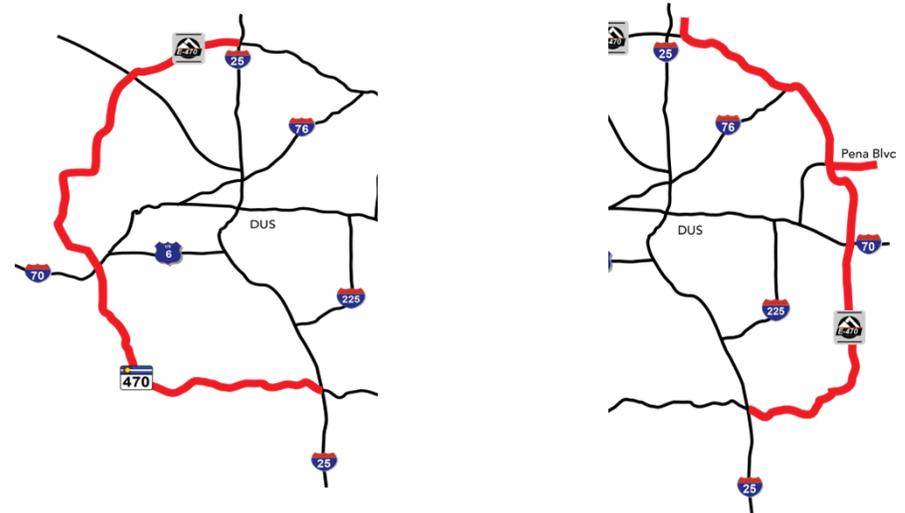
# North to South – RR or Beltway

## Railroad Segments



1. Travel time: 27 min
2. Miles of Track: 82 mi
3. Ave/top speed: 111/185 mph
4. Cost: \$3.36 Billion
5. Higher community/ROW impacts
6. Best DUS Ridership
7. Less DIA ridership (DUS transfer)

## Beltway Segments



### UPDATE

1. Put in new info

# Environmental/Community Considerations

- ▶ **Alignments through Denver all have potential for adverse community impacts**
  - High speeds – noise, vibration, safety
  - High ROW needs, particularly US 6, DUS, railroad alignments through central Denver (40<sup>th</sup> Ave to Evans)
  - Older residential neighborhoods (EJ, Historic, Cumulative)
- ▶ **Alignments around Denver**
  - Less dense residential development
  - ROW within transportation corridors
  - Ecological/park/open space, more NW and SW

# Comparison of Community/Environmental Impacts East - West Options through Denver



Community Disruption	8.3 linear miles	11.32 linear miles	7.02 linear miles
Parks	5 parks + RMA 0.56 linear miles	7 parks + RMA 1.07 linear miles	9 parks/open space 6.73 linear miles
Historic	Medium	High	Low
Environmental Justice	High	High	Low
Stream Crossings	13	12	13

# Comparison of Community/Environmental Impacts North-South Options through Denver

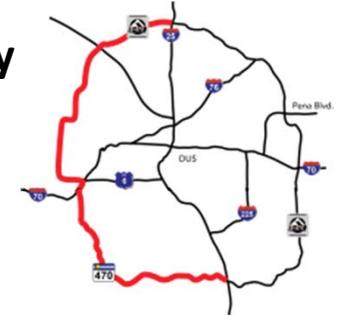
**Railroad/  
Santa Fe  
Corridor**



**Beltway  
east  
around  
Denver**



**Beltway  
west  
around  
Denver**



Community Disruption	18.31	5.05	9.98
Parks	1 0.15 linear miles	None	12 parks 11.28 linear miles
Historic	High	Low	Low
Environmental Justice	High	Low	Low
Stream Crossings	23	11	20

A group of approximately ten people are seated around a large white table in a meeting room. They are looking at documents and talking to each other. The room has a wooden floor and a whiteboard in the background. The image is overlaid with a semi-transparent white circle and a red curved line.

# *Level 2 B/C Refinements*

## Early B/C Conclusions

### ▶ Operating ratio and B/C is positive for the ICS system

- Does not include Mountain Corridor yet

### ▶ B/C is driven by:

- Impact of the **interest rate** assumed
- **Impact of TOD**
- Impact of construction and spin-off jobs
- Amount of Federal Funding and **multiplier effects**

# TOD and Multiplier Effects

## TOD

- Conservatively assume 15 acres of direct TOD around the station (125 acres within ¼-mile of station)
- Opportunities for TOD at suburban-type stations
- Floor to area ratios for similar suburban area (e.g., Belmar)

## Multiplier Effects

- Output multipliers range from 2 to 3 based on literature
- Federal is higher because money from outside the region

# Revisions to the B/C Calculations

B/C Element	Scenario A-1a	Scenario A-1b	Scenario A-5a	Scenario A-5b	Scenario C-1
<b>Costs (\$)</b>					
Interest payments	5,359,630,675	5,309,322,375	5,141,867,605	5,192,175,905	4,132,108,155
<b>Total Cost</b>	<b>22,999,517,385</b>	<b>22,809,209,085</b>	<b>22,229,733,695</b>	<b>22,420,041,995</b>	<b>18,355,994,865</b>
<b>Benefits (\$)</b>					
Increase in Real Estate Value	3,100,000,000	3,100,000,000	3,100,000,000	3,100,000,000	3,100,000,000
50% Federal funding	7,457,500,000	7,387,500,000	7,154,500,000	7,224,500,000	5,749,500,000
Multiplier effect	14,915,000,000	14,775,000,000	14,309,000,000	14,449,000,000	11,499,000,000
<b>Total Benefits</b>	<b>46,063,320,122</b>	<b>46,701,808,668</b>	<b>44,736,212,584</b>	<b>45,192,207,858</b>	<b>36,711,286,286</b>
<b>B/C Ratio</b>	<b>2.00</b>	<b>2.05</b>	<b>2.01</b>	<b>2.02</b>	<b>2.00</b>
<b>Operating Ratio</b>	<b>1.53</b>	<b>1.68</b>	<b>1.53</b>	<b>1.56</b>	<b>1.26</b>

# Break Out Sessions

- *How high is “high speed” through communities? Is 150 mph acceptable?*
- *On balance, which east-west alignment is preferable? I-76 or US 6? Need to consider DUS connectivity?*
- *On balance, which north-south alignment through Denver is preferable? Beltway option vs. freight railroad alignment?*
- *Based on information, is there another way to package scenarios to create another alternative we haven’t considered?*
- *Which scenario do you like best?*

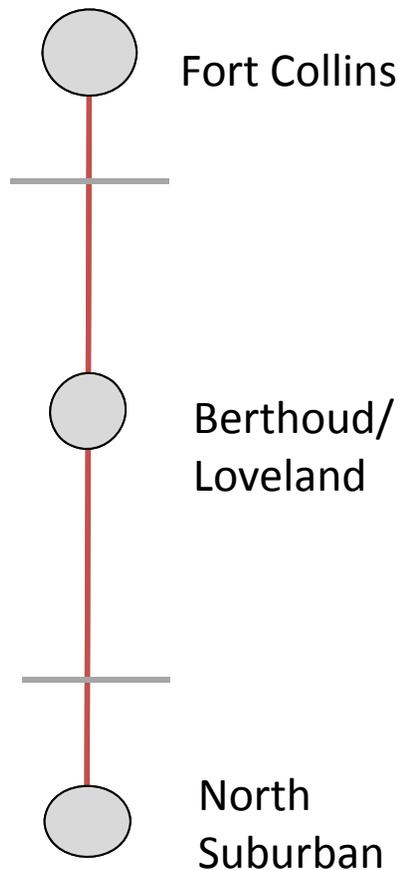
## Next Steps

- ▶ ICS Public Meetings – Weeks of May 20 and 27
  - Denver, Fort Collins, Colorado Springs, Pueblo
- ▶ AGS
  - Request for Financial Information – May 2013
  - PLT meeting June 12, 2013
  - Public meeting to follow
- ▶ Level 2 Evaluation Report
- ▶ Initiate Level 3 Evaluation
- ▶ Next ICS PLT Meeting – July 2013



# Impact of Scenarios on North Ridership

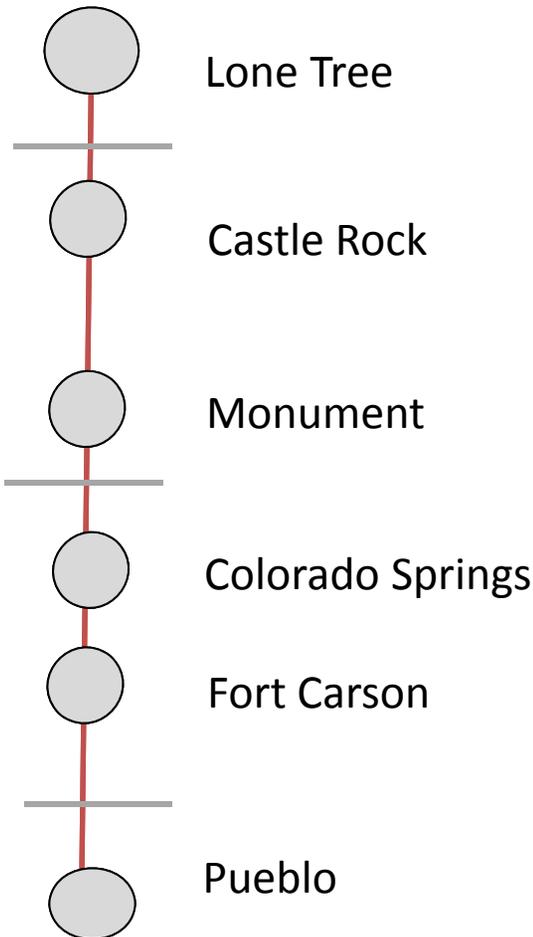
## UPDATE



- Denver alignments have direct effect on ridership north of Denver
- Highest ridership with the A1 (direct through Denver), US 6 option
- Lowest ridership on the C-1 shared track alignment
- 17 to 20 percent of ridership comes from northern market

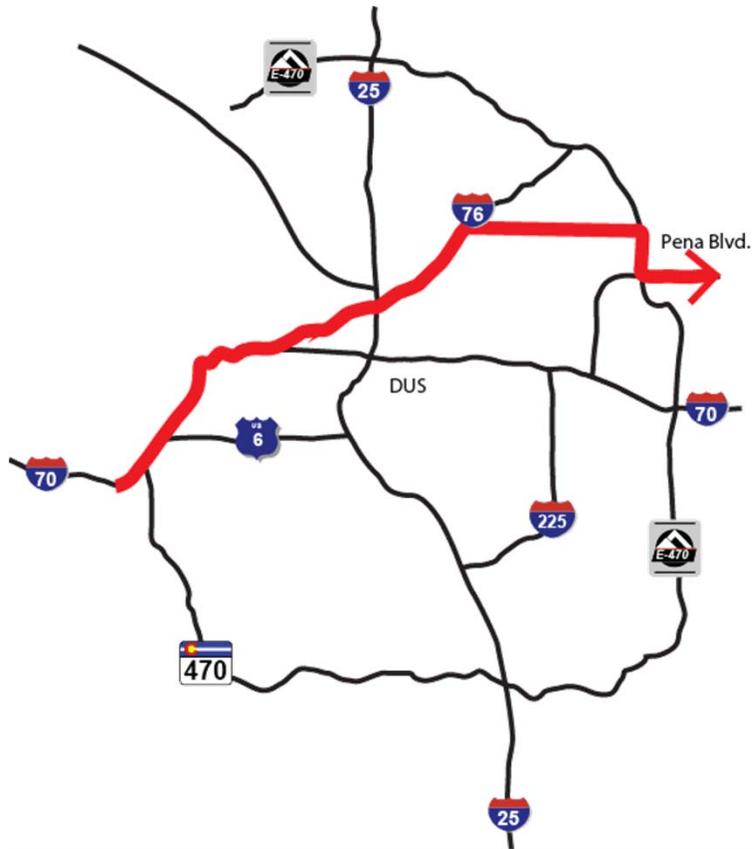
# Impact of Scenarios on South Ridership

## UPDATE

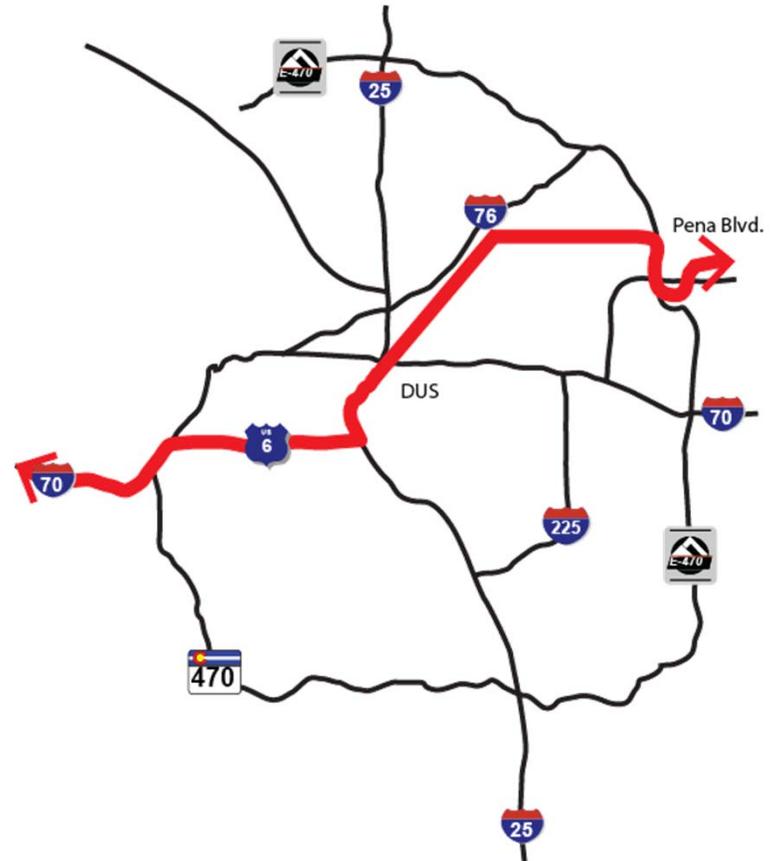


- Denver alignments have less effect on ridership south of Denver
- Ridership is comparable among A-1 and A-5 scenarios (either US 6 or I-76 options)
- Ridership is lower with the C-1 shared track alignment but less effect than for northern market
- Highest ridership within the system for all scenarios (40 to 46 percent)

# East-West Options

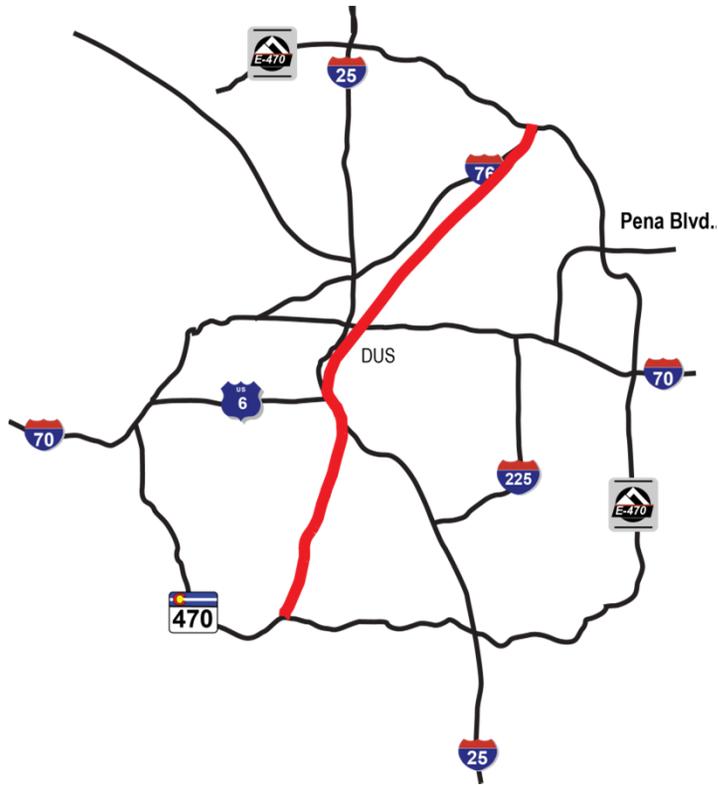


Option a: Use I-76

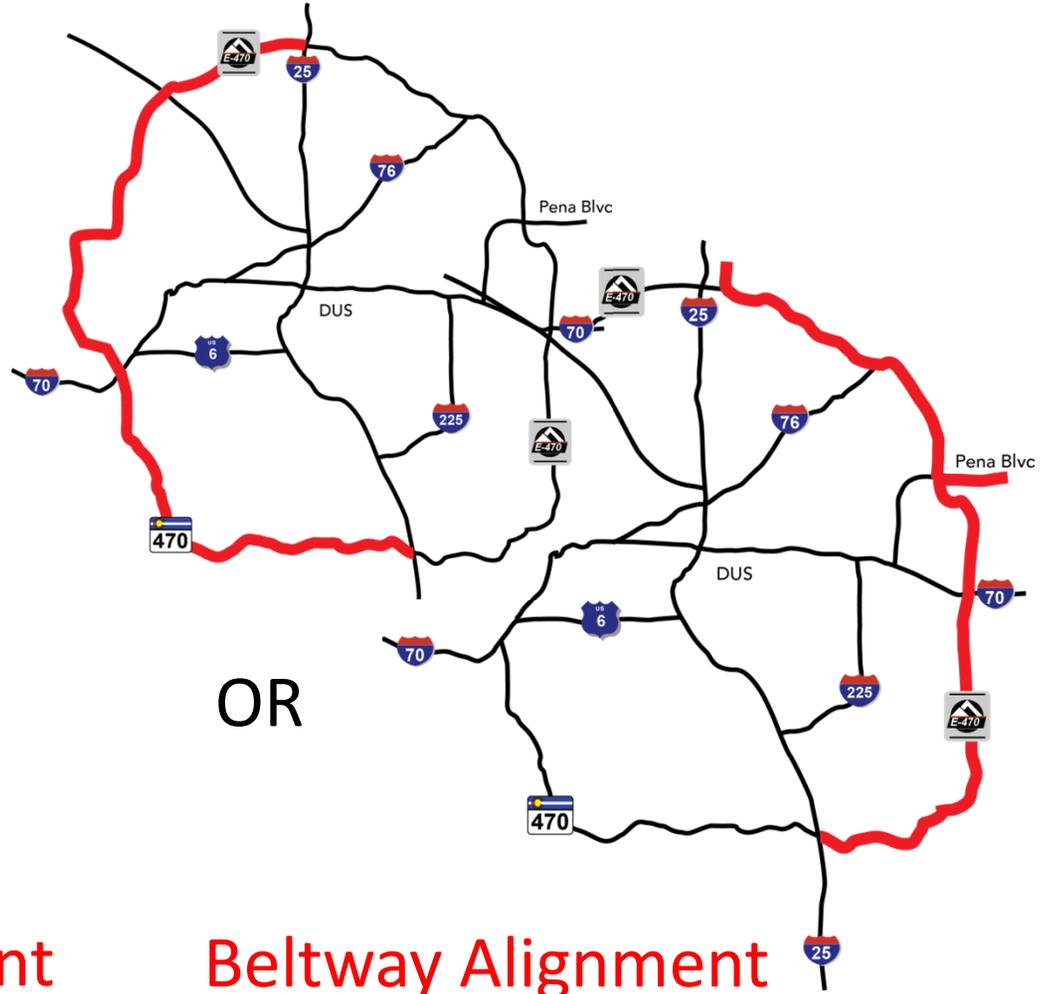


Option b: Use US 6

# North-South Options

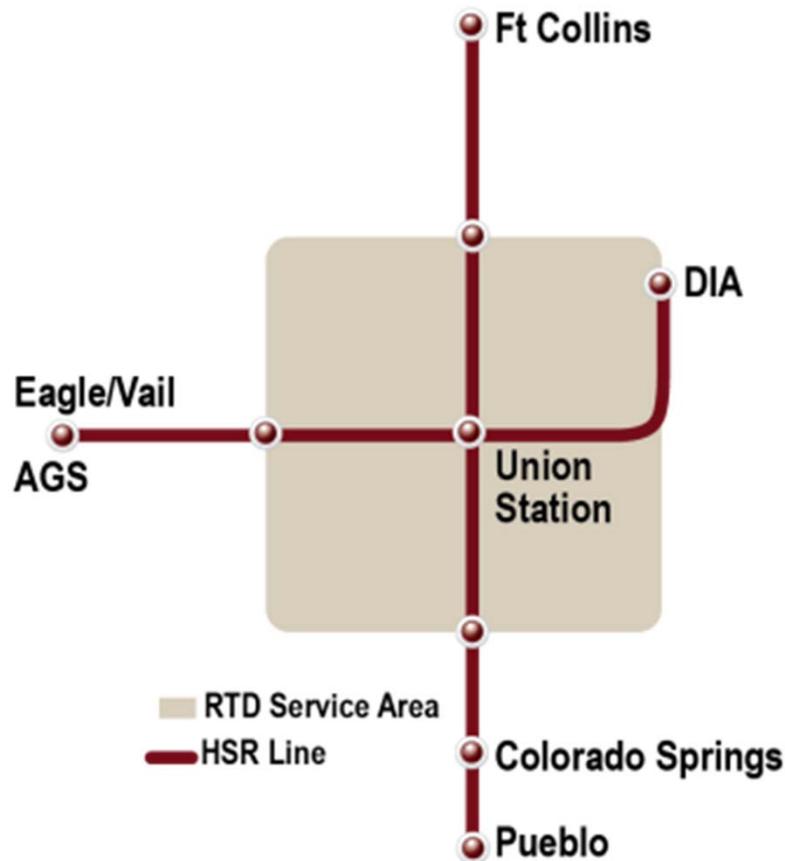


Freight Railroad Alignment



Beltway Alignment

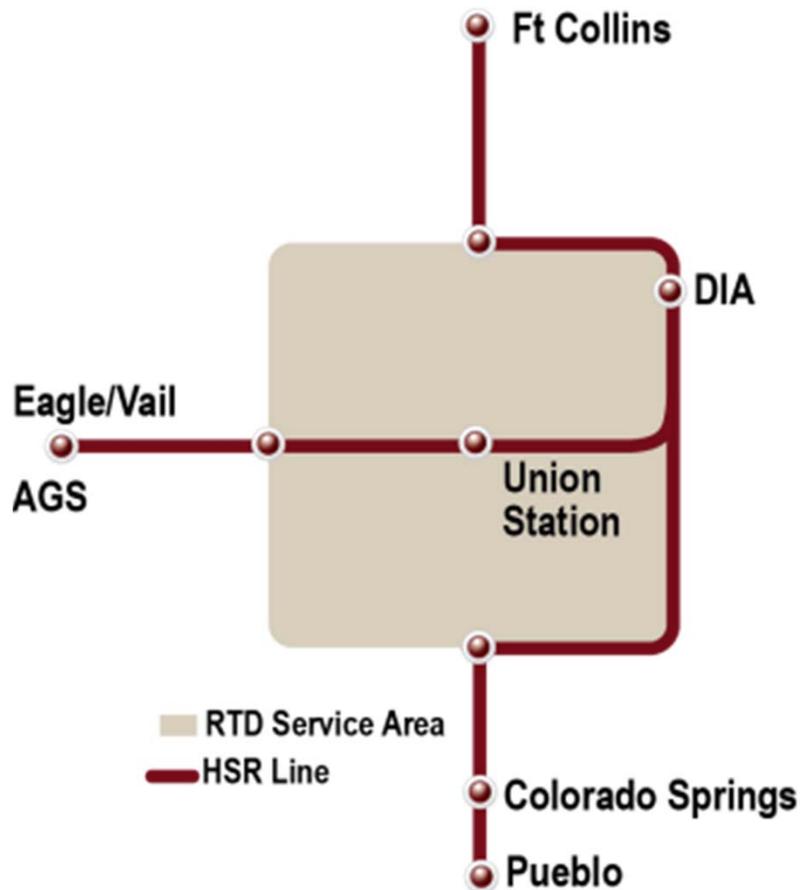
# Scenario A-1 Performs well Paired with US 6 Segment



## Performance

- CAPEX - ~\$14.5 Billion
- OPEX - ~\$158 Million/yr
- Ridership – 13.1 million/yr
- Revenue - ~\$250 Million/yr
- Ops Ratio – 1.58
- **Best ridership for most stations**
- **Not as strong for DIA**

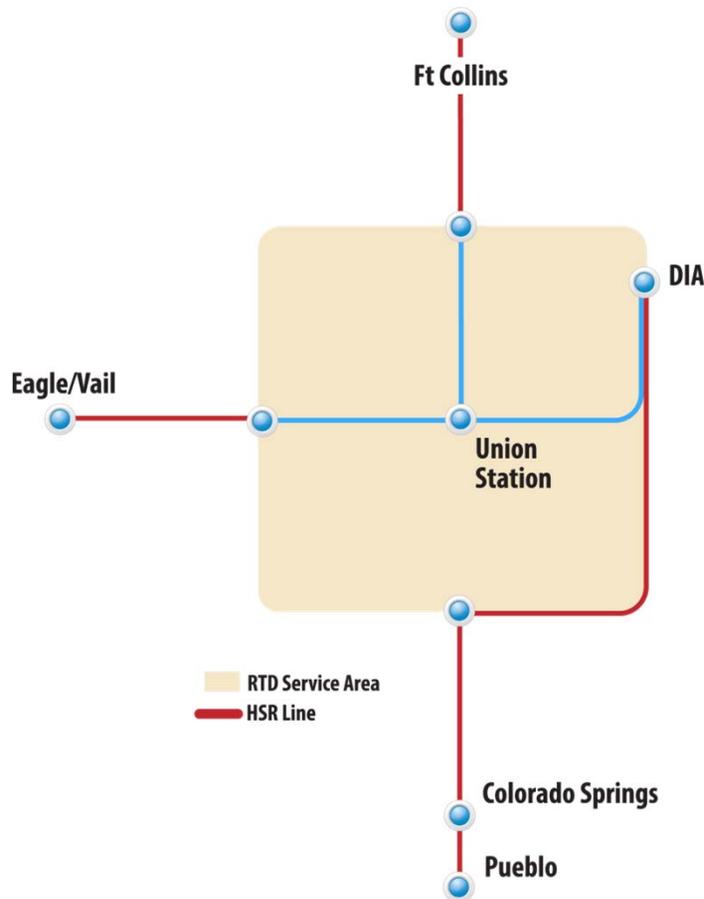
# Scenario A-5 Performs Well with both I-76 and US 6 Segments



## Performance

- CAPEX - ~\$13.9 Billion
- OPEX - ~\$161 Million/yr
- Ridership – 13.1 million/yr
- Revenue - ~\$257 Million/yr
- Ops Ratio – 1.60
- **Best ridership for DIA**
- **Not as strong for DUS**

# Scenario C-1 Performs Best as a Phasing Option



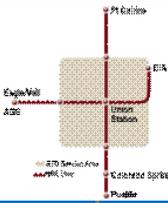
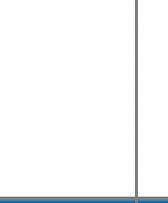
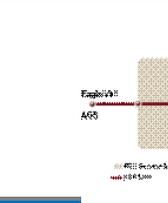
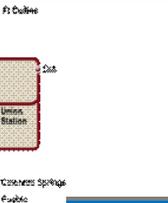
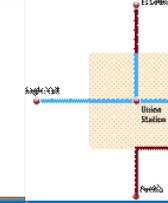
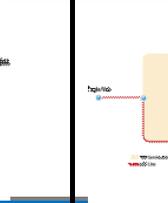
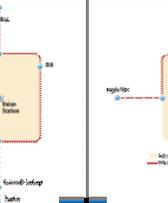
## Performance

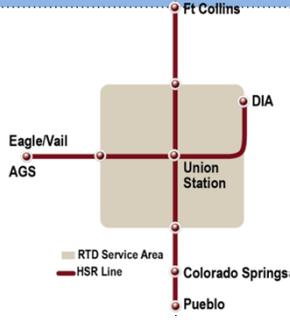
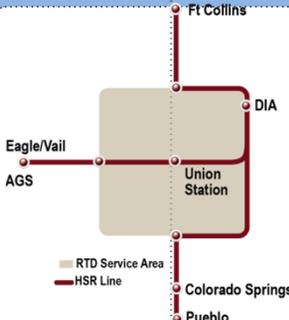
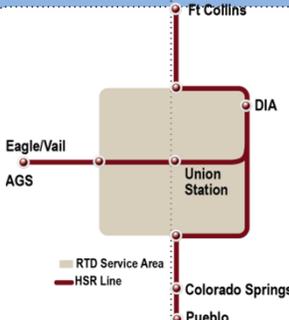
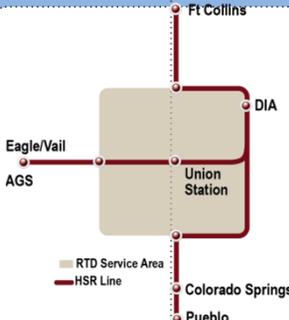
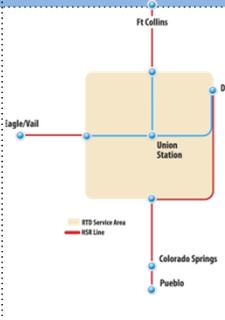
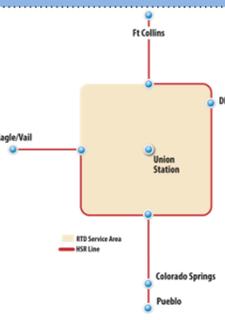
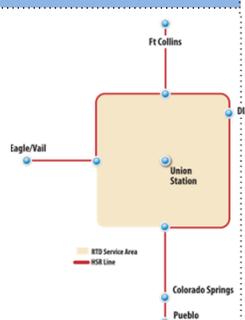
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- Revenue - ~\$205 Million/yr
- Ops Ratio – 1.24
- General market split is same for north and south markets
- Poorer for mountain markets

# Revisions to the B/C Calculations

B/C Element	Scenario A-1a	Scenario A-1b	Scenario A-5a	Scenario A-5b	Scenario C-1
	Basic	Basic	Basic	Basic	Basic
<b>Costs</b>					
Interest payments	\$ 5,359,630,675	\$ 5,309,322,375	\$ 5,141,867,605	\$ 5,192,175,905	\$ 4,132,108,155
<b>Total Cost</b>	<b>\$ 22,999,517,385</b>	<b>\$ 22,809,209,085</b>	<b>\$ 22,229,733,695</b>	<b>\$ 22,420,041,995</b>	<b>\$ 18,355,994,865</b>
<b>Benefits</b>					
Increase in Real Estate Value	\$ 3,100,000,000	\$ 3,100,000,000	\$ 3,100,000,000	\$ 3,100,000,000	\$ 3,100,000,000
50% Federal funding	\$ 7,457,500,000	\$ 7,387,500,000	\$ 7,154,500,000	\$ 7,224,500,000	\$ 5,749,500,000
Multiplier effect of Federal funding (3.0 multiplier)	\$ 14,915,000,000	\$ 14,775,000,000	\$ 14,309,000,000	\$ 14,449,000,000	\$ 11,499,000,000
<b>Total Benefits</b>	46,063,320,122	\$ 46,701,808,668	\$ 44,736,212,584	\$ 45,192,207,858	\$ 36,711,286,286
<b>Sum of Benefits (PW Cost Basis)</b>	<b>\$ 46,063,320,122</b>	<b>\$ 46,701,808,668</b>	<b>\$ 44,736,212,584</b>	<b>\$ 45,192,207,858</b>	<b>\$ 36,711,286,286</b>
<b>Sum of Costs (PW Cost Basis)</b>	<b>\$ 22,999,517,385</b>	<b>\$ 22,809,209,085</b>	<b>\$ 22,229,733,695</b>	<b>\$ 22,420,041,995</b>	<b>\$ 18,355,994,865</b>
<b>B/C Ratio</b>	<b>2.00</b>	<b>2.05</b>	<b>2.01</b>	<b>2.02</b>	<b>2.00</b>
<b>Operating Ratio</b>	<b>1.53</b>	<b>1.68</b>	<b>1.53</b>	<b>1.56</b>	<b>1.26</b>

# Market Share by Scenario

	A-1 (I-76)	A-1 (US 6)	A-5 (I-76)	A-5 (US 6)	C-1	B-2A	B3
Market							
Mountain	2,168,094	2,516,754	2,430,662	2,136,961	1,696,330	2,995,866	2,792,520
%	17.85%	19.12%	18.75%	16.27%	15.64%	21.63%	20.36%
Mountain Daily	7,227	8,389	8,102	7,123	5,654	9,986	9,308
North	2,069,642	2,472,297	2,326,763	2,620,094	1,909,081	2,498,178	3,107,216
%	17.04%	18.78%	17.95%	19.94%	17.60%	18.04%	22.66%
North Daily	6,899	8,241	7,756	8,734	6,364	8,327	10,357
South	5,451,251	5,674,676	5,584,849	5,514,986	4,994,421	6,220,862	5,596,993
%	44.87%	43.11%	43.07%	41.98%	46.06%	44.92%	40.81%
South Daily	18,171	18,916	18,616	18,383	16,648	20,736	18,657
Denver	2,460,154	2,499,106	2,623,452	2,865,417	2,244,474	2,133,840	2,218,226
%	20.25%	18.99%	20.23%	21.81%	20.70%	15.41%	16.17%
Denver Daily	8,201	8,330	8,745	9,551	7,482	7,113	7,394
	12,149,141	13,162,833	12,965,726	13,137,458	10,844,306	13,848,747	13,714,955

	A-1a	A-1b	A-5a	A-5b	C-1	B-2	B-3
Market							
Mountain to Eagle	2,168,094	2,516,754	2,430,662	2,136,961	1,696,330	2,995,866	2,792,520
Percent of Total	<b>17.85%</b>	<b>19.12%</b>	<b>18.75%</b>	<b>16.27%</b>	<b>15.64%</b>	<b>21.63%</b>	<b>20.36%</b>
Mountain Daily	7,227	8,389	8,102	7,123	5,654	9,986	9,308
North to FC	2,069,642	2,472,297	2,326,763	2,620,094	1,909,081	2,498,178	3,107,216
Percent of Total	<b>17.04%</b>	<b>18.78%</b>	<b>17.95%</b>	<b>19.94%</b>	<b>17.60%</b>	<b>18.04%</b>	<b>22.66%</b>
North Daily	6,899	8,241	7,756	8,734	6,364	8,327	10,357
South to Pueblo	5,451,251	5,674,676	5,584,849	5,514,986	4,994,421	6,220,862	5,596,993
Percent of Total	<b>44.87%</b>	<b>43.11%</b>	<b>43.07%</b>	<b>41.98%</b>	<b>46.06%</b>	<b>44.92%</b>	<b>40.81%</b>
South Daily	18,171	18,916	18,616	18,383	16,648	20,736	18,657
Denver Interurban	2,460,154	2,499,106	2,623,452	2,865,417	2,244,474	2,133,840	2,218,226
Percent of Total	<b>20.25%</b>	<b>18.99%</b>	<b>20.23%</b>	<b>21.81%</b>	<b>20.70%</b>	<b>15.41%</b>	<b>16.17%</b>
Denver Daily	8,201	8,330	8,745	9,551	7,483	7,113	7,394
<b>ANNUAL TOTAL</b>	<b>12,149,141</b>	<b>13,162,833</b>	<b>12,965,726</b>	<b>13,137,458</b>	<b>10,844,306</b>	<b>13,848,747</b>	<b>13,714,955</b>