Public Workshop No.2: Evaluation of Conceptual Alternatives

CDOT Interregional Connectivity Study

CH2MHILL®

May 2013

The Goals Of This Meeting Are To:

- Provide an update on the ICS project Level 2 Evaluation
- Hear your input on the final 5 scenarios – Endorse a final 2 to 3 scenarios
- Hear your input on revenue and financing options
- Better understand potential environmental and community impacts and where they serve as discriminators

Where Are We In The Process?

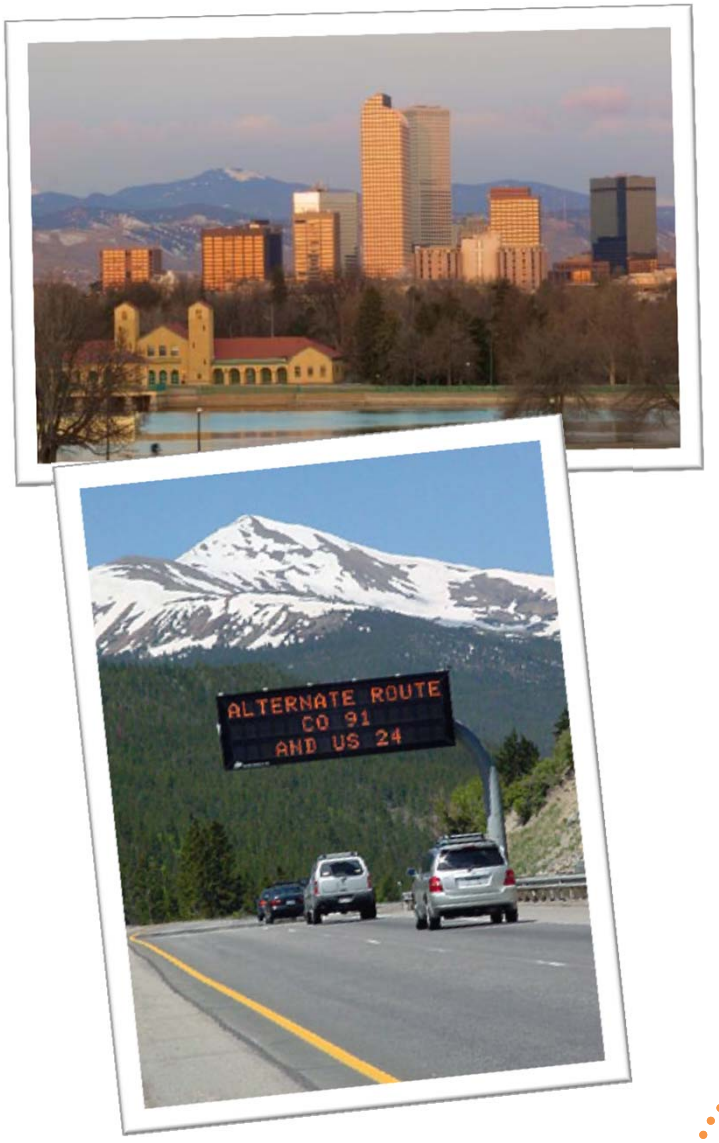
Next Steps

- Refine alternatives to improve performance
- Assess impacts in challenging areas
- Fine tune the service plan to reduce Operating Expenses
- Update cost estimates
- Develop a Phasing Plan
- Develop a Financial Plan

A Refresher from Level 1

ICS Study Sponsors & Purposes

- Sponsors:
  - CDOT with funding from the Federal Railroad Administration
- Purposes:
  - Provide cost-effective recommendations for alignments, technologies and station locations in the Denver Metro Area that maximize ridership between high speed rail & RTD.
  - Suggest method for integrating HSIPR into the statewide multi-modal network.
  - Develop the basis for next steps.



ICS Interregional Connectivity Study

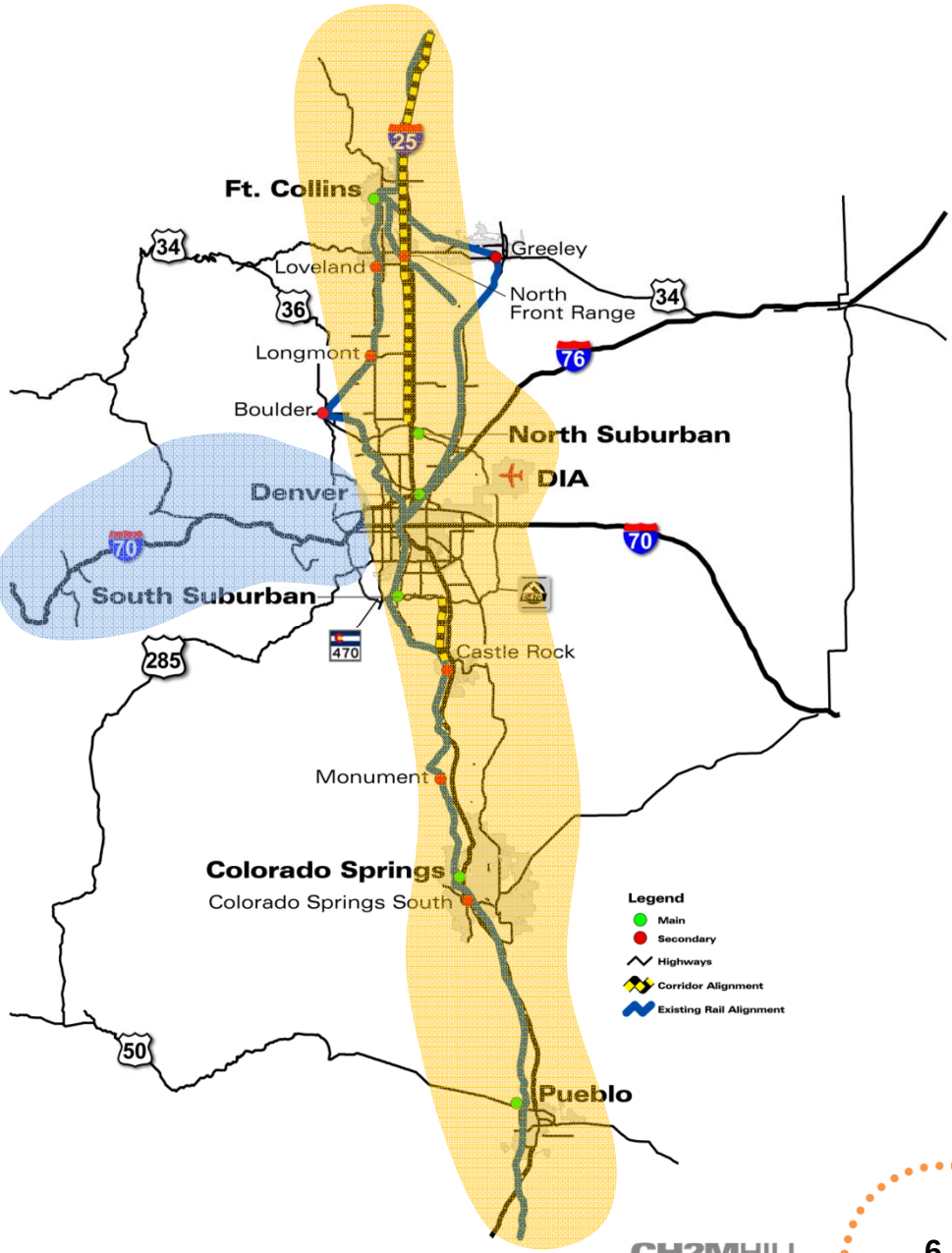
ICS Study Area

ICS – Front Range

- Fort Collins
- Denver
- Colorado Springs
- Pueblo

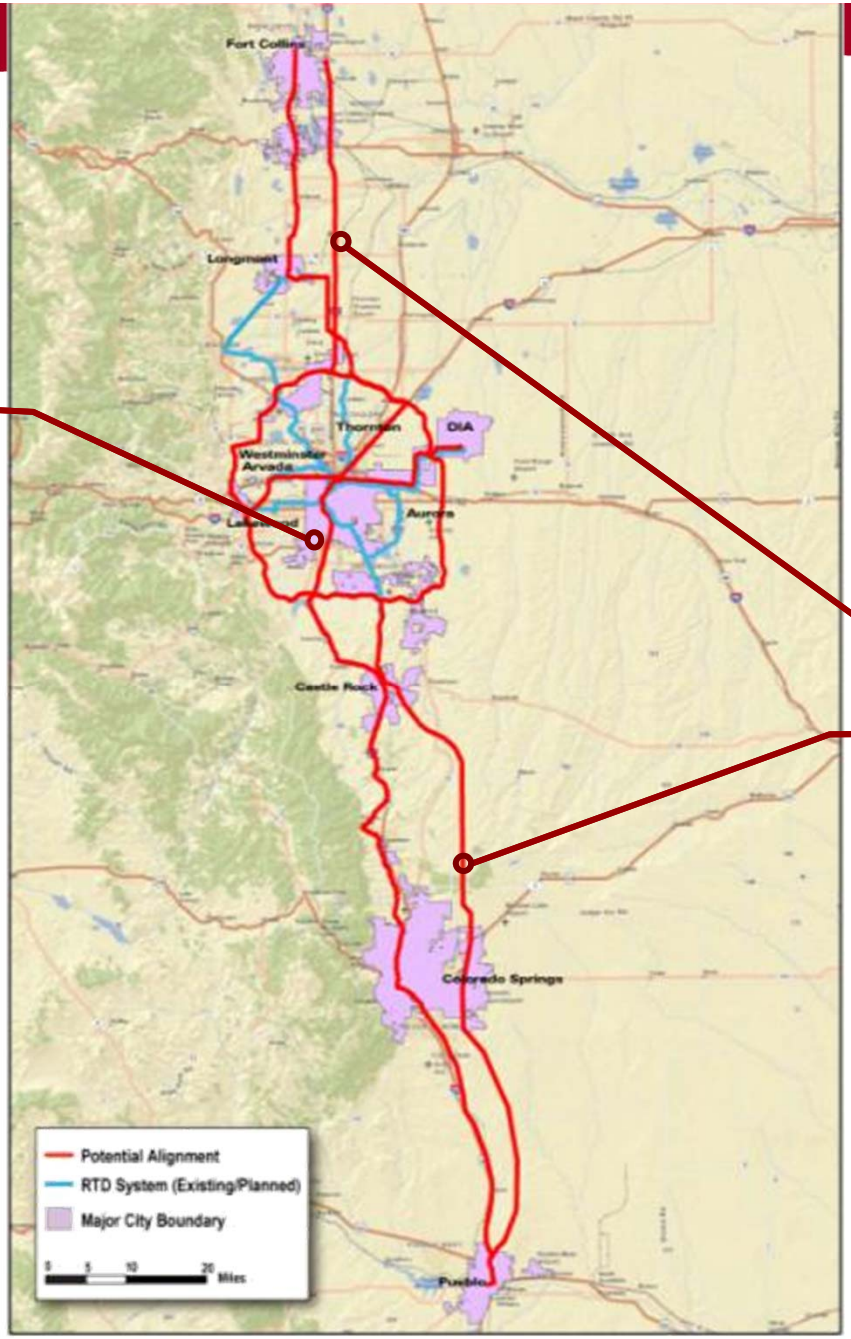
AGS – Mountains

- Eagle County Airport



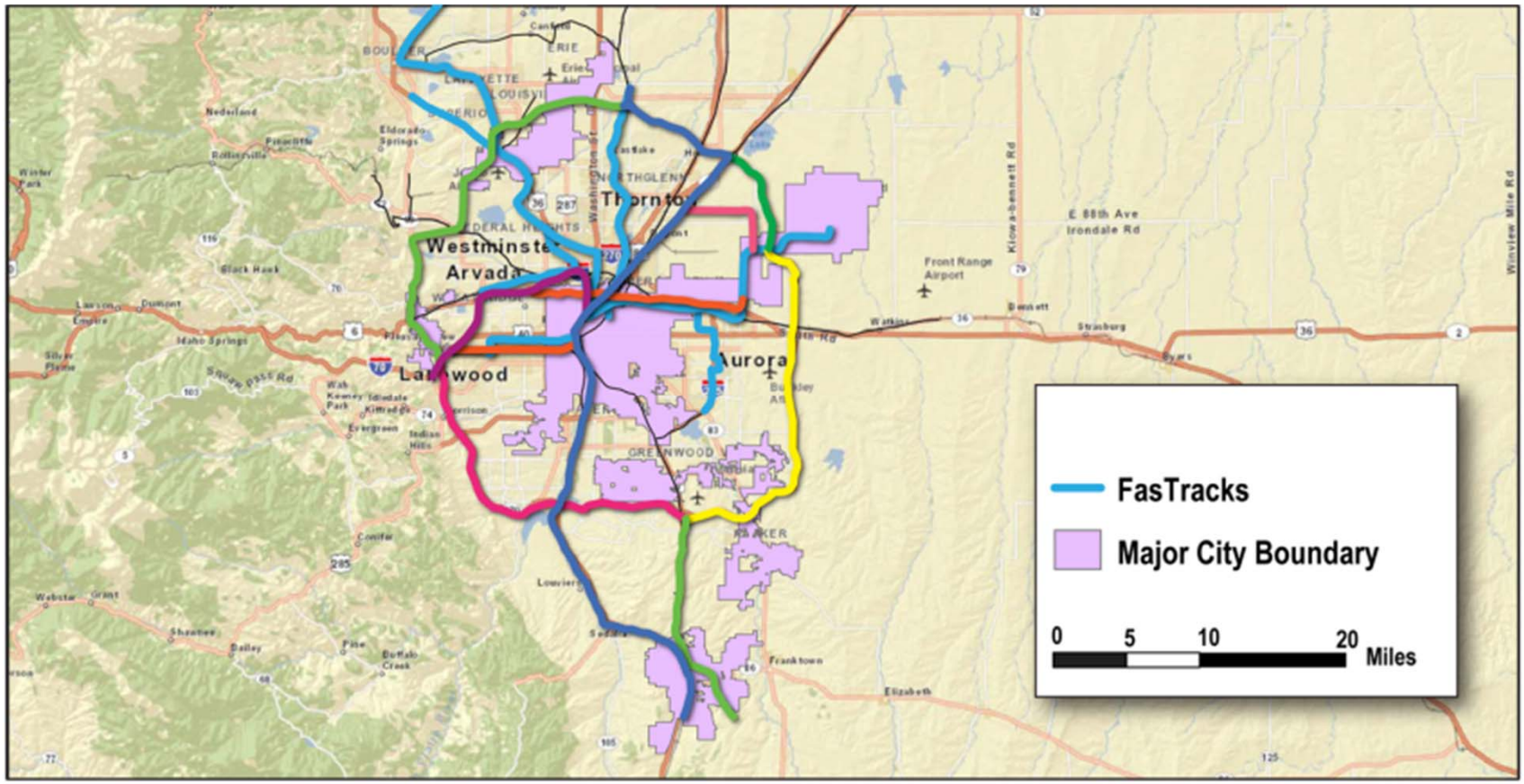
Logic

Study Segments through and around Denver

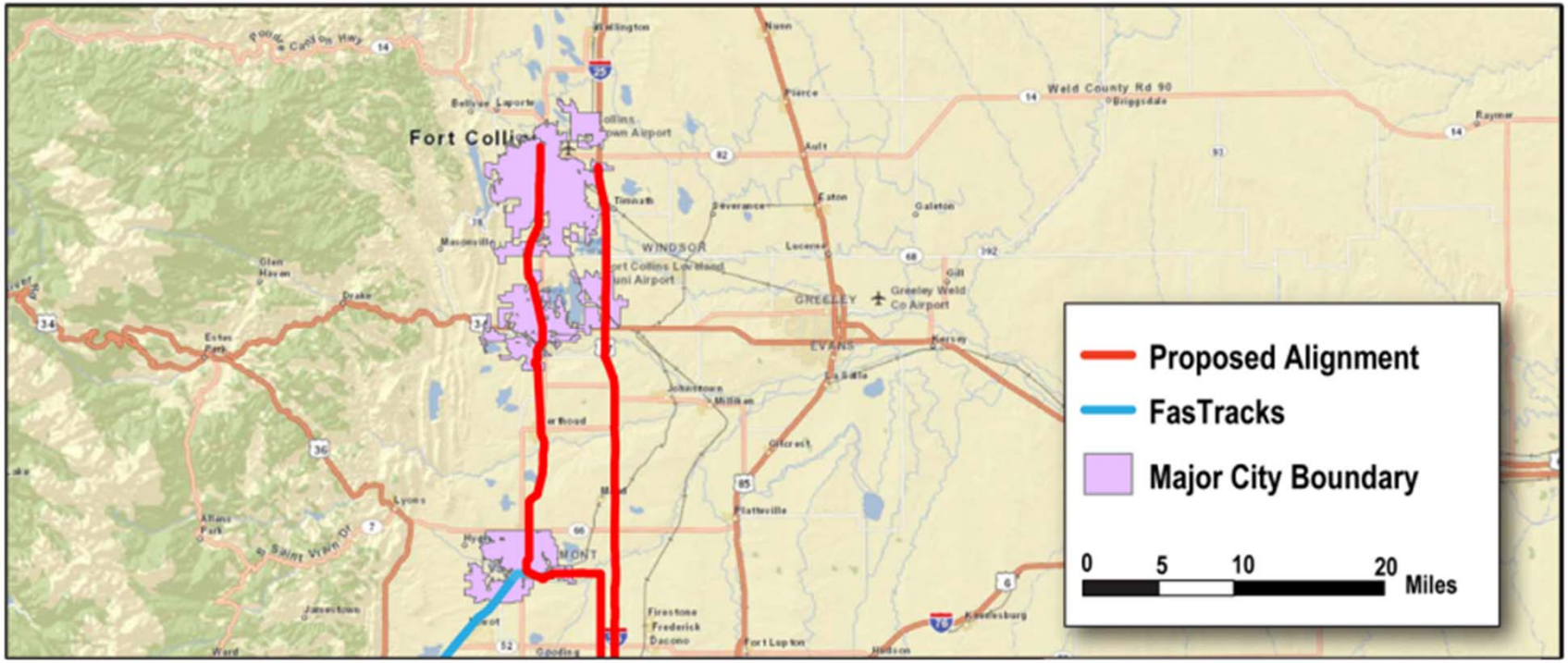


Determine the best Segments going North and South

Four Basic E-W Segments And One N-S Segment Remained Going Into Level 2

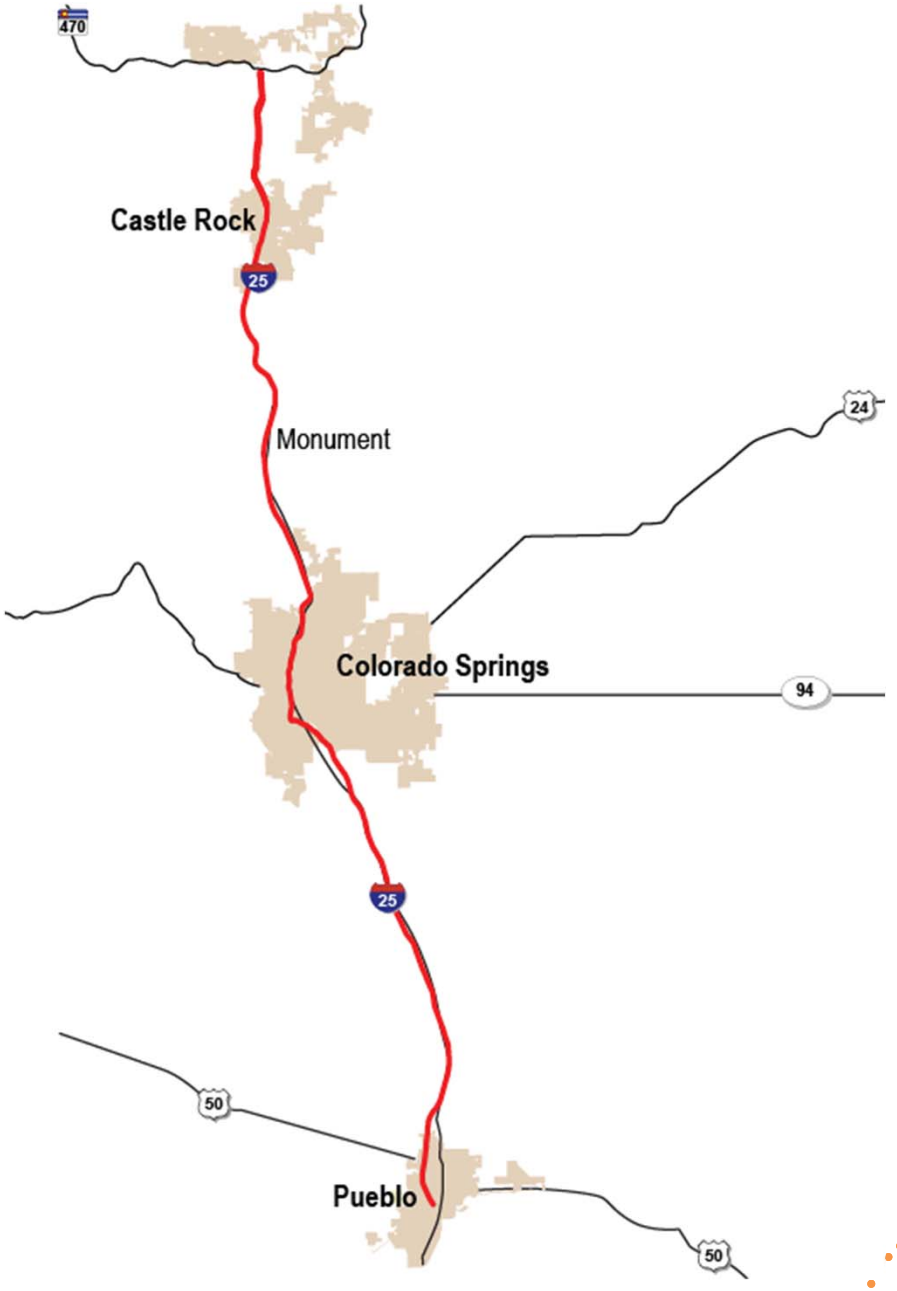


Two Segments To Fort Collins



One Segment Remained to Colorado Springs & Pueblo

The Black Forest segment (S1) east of COS was strongly opposed and eliminated in Level 1 Evaluation



What Was Promised At The Conclusion Of Level 1 Evaluation?

- Assessment of an alternative to the Black Forest alignment
- Add an alignment along the I-76 through Denver to DIA
- Revise the C1 Shared Track with RTD scenario to allow travel to the south
- Prepare better information on costs, benefits and impacts of the final 5 scenarios
- Perform an initial Benefit/Cost Assessment

Level 2 Evaluation

-What is it

-Methodologies

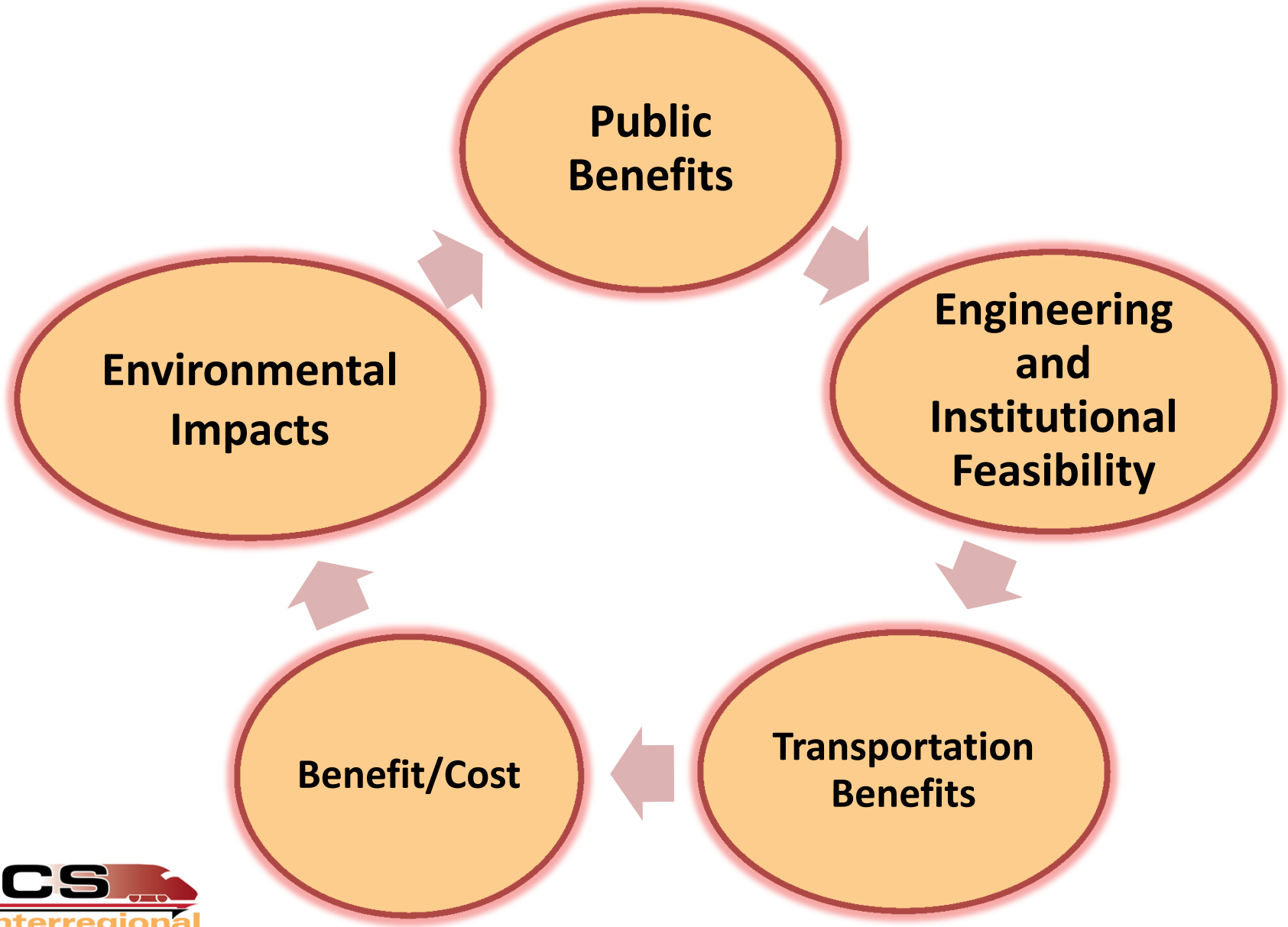
-Results

-Next Steps

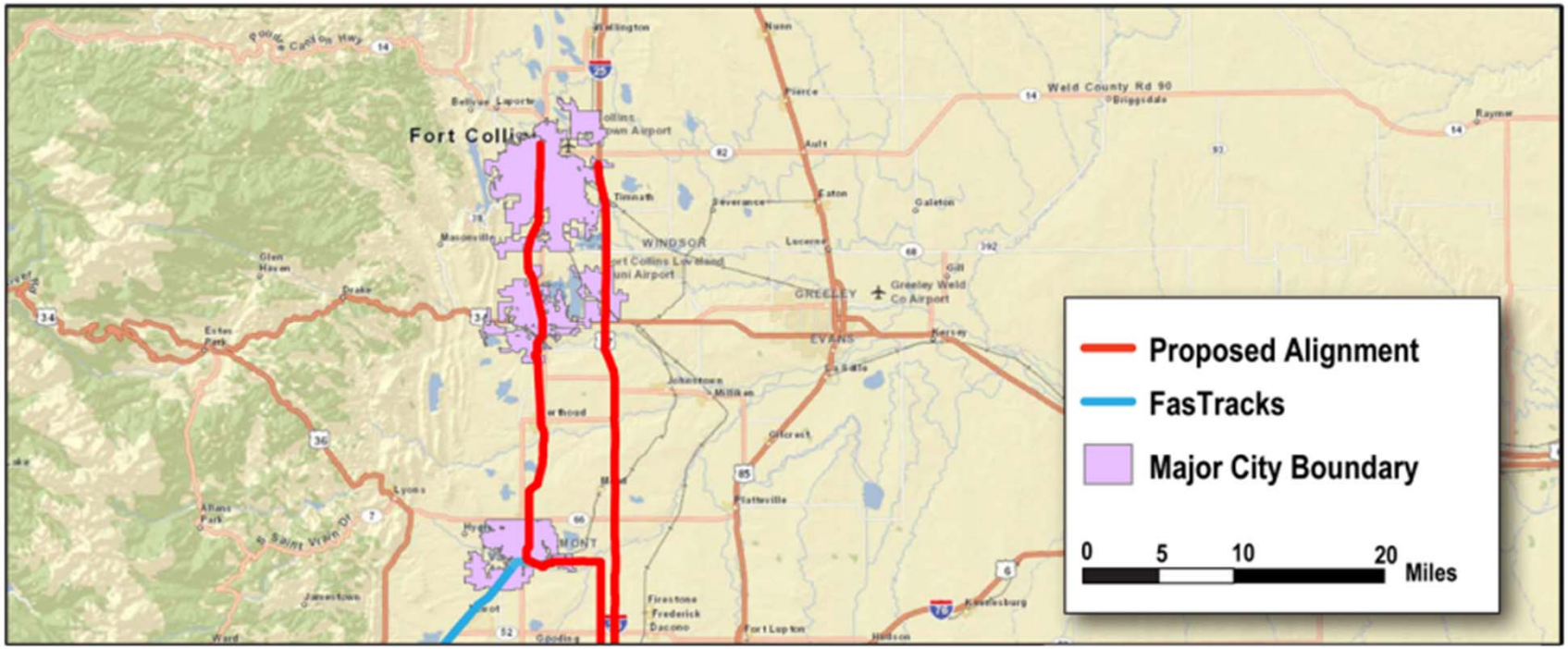
Level 2 Evaluation Goals

- Maintain public support
- Select alignments north and south outside the Denver metro
- Define the best E-W alignments through the Denver metro
- Define the best alignment around the Denver metro area
- Identify general station locations

Level 2 Evaluation Criteria



Level 2 Initial Evaluation of Northern Segments; Denver to Fort Collins



Stakeholder Input

- N-1 alignment follows 287 corridor and places HSR directly within the population centers or either retained fill or elevated structure
- Strongly support that corridor as a Commuter Rail transit corridor
- HSR along the N-2 alignment is conducive to achieving greater speeds and having fewer stops

North I-25 EIS

- The EIS Preferred Alternative includes commuter rail transit service from Fort Collins to the FasTracks North Metro end-of-line station in north Denver metro area. (first phase from Loveland to Longmont)
- 9 commuter rail stations in an alignment utilizing the BNSF track
- Commuter rail would be supplemented by Express Bus service along I-25.
- Communities desire this study to support the findings of the EIS

ICS Initial Evaluation of Northern Alignments

N1 (EIS)

- Cost = $ 2.9 B to $4.2 B
- Travel Time to North Suburban Station = 41 minutes
- Average Travel Speed = 75 mph
- Much higher community impacts

N2 (I-25)

- Cost = $1.1 B
- Travel Time to North Suburban Station = 20 minutes
- Average Travel Speed = 147 mph
- Minimal community impacts

Level 2 Initial Findings on Northern Alignments

- The N-1 alignment is not supported by Stakeholders, Agencies or the communities as an HSR corridor; it is identified and supported as a Commuter Rail corridor in the EIS;
- Estimated speeds are slow and costs are high for HSR along the N-1 alignment
- HSR along the N-1 alignment was dropped from further consideration at this initial evaluation in Level 2
- The N-2 alignment and performance characteristics support the goals of the statewide HSR system

Methodologies

-Ridership
-Capital Costs
-Operating Costs

Ridership Methodology

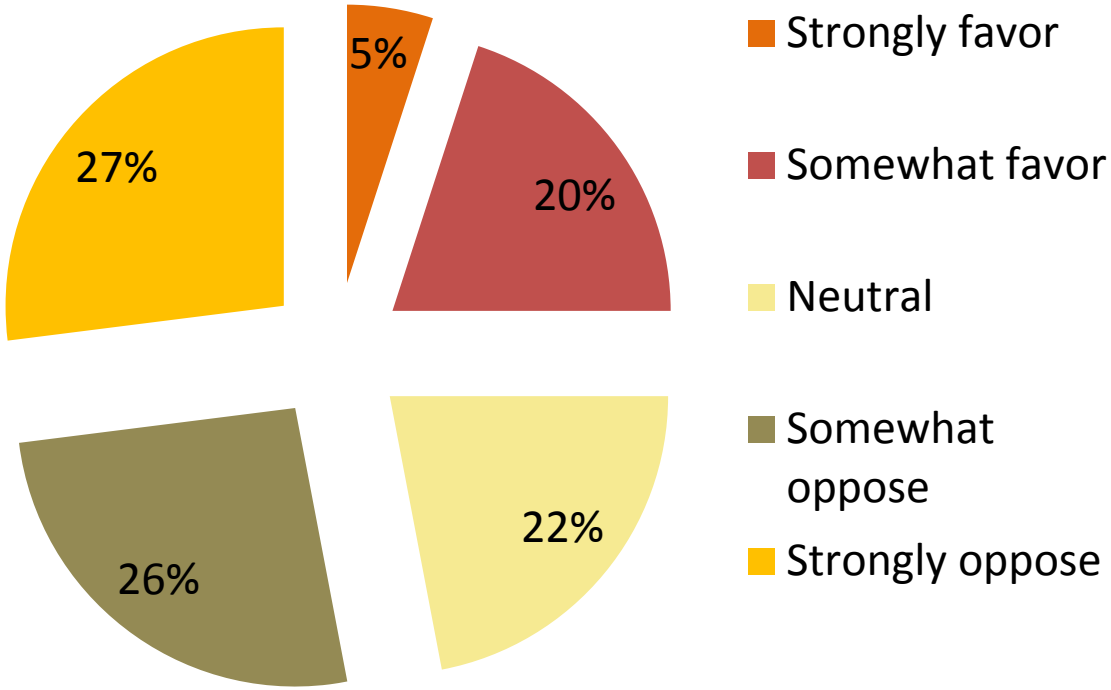
- Open, non-proprietary forecasting models
- Use of DRCOG and other MPO models and data to represent
  - Connectivity with RTD
  - Socio-economic and transportation characteristics of urban areas
- New local data collected to
  - Purchase of “cell phone” data
  - Conduct a “stated preference survey”
- Information exchange and documentation
  - Interactions with MPOs, stakeholders and modelers
  - Memos/reports on model development and application to come

Stated Preference (SP) Survey

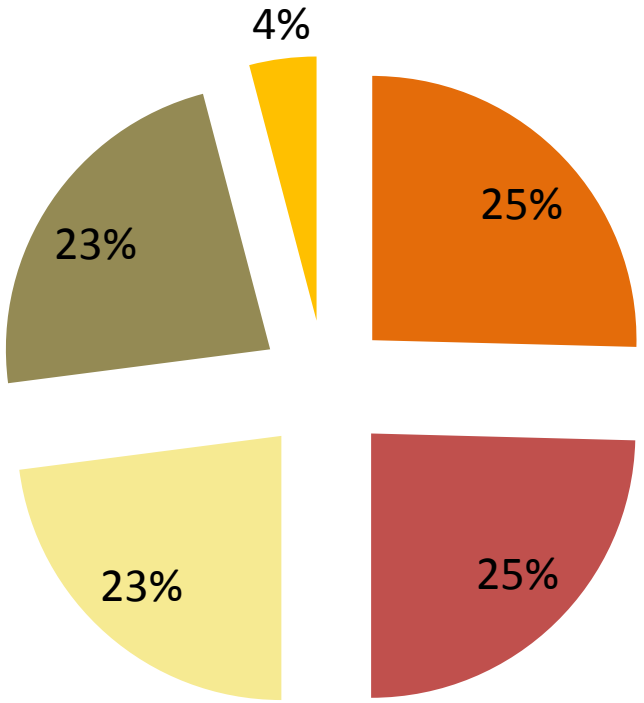
- Internet-based SP survey conducted in December 2012
  - Data from local residents
  - About 1000 completed surveys
- Survey respondents recruited using market research firm
- Stated preference alternatives
  - Current auto travel option
  - Auto travel with tolled facility
  - AGS/Train travel

SP Survey shows support for AGS/Train

Opinion: tolls on I-25 and I-70

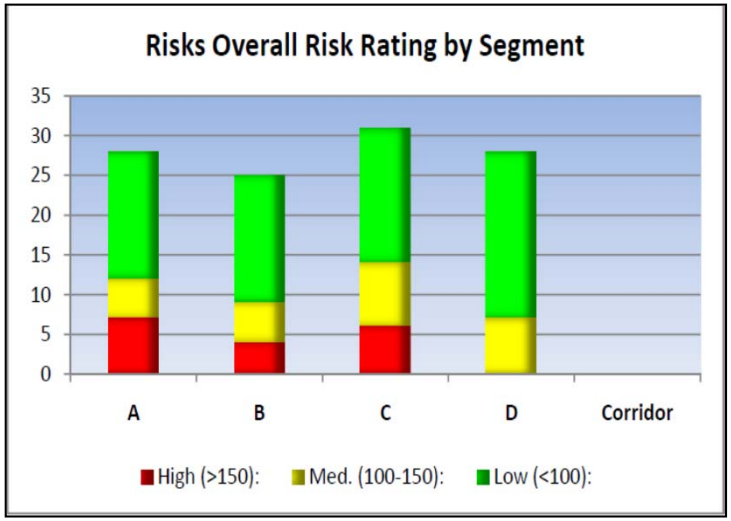


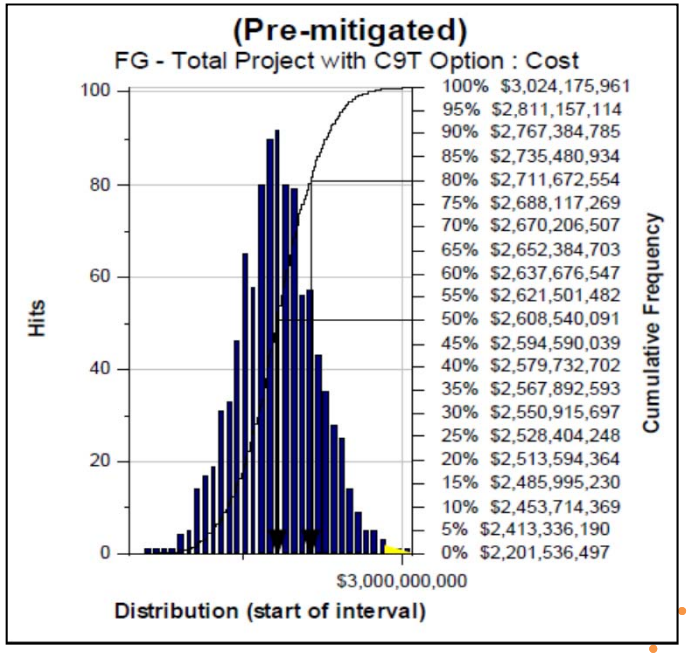
Opinion: new AGS/Train



CAPEX Methodology

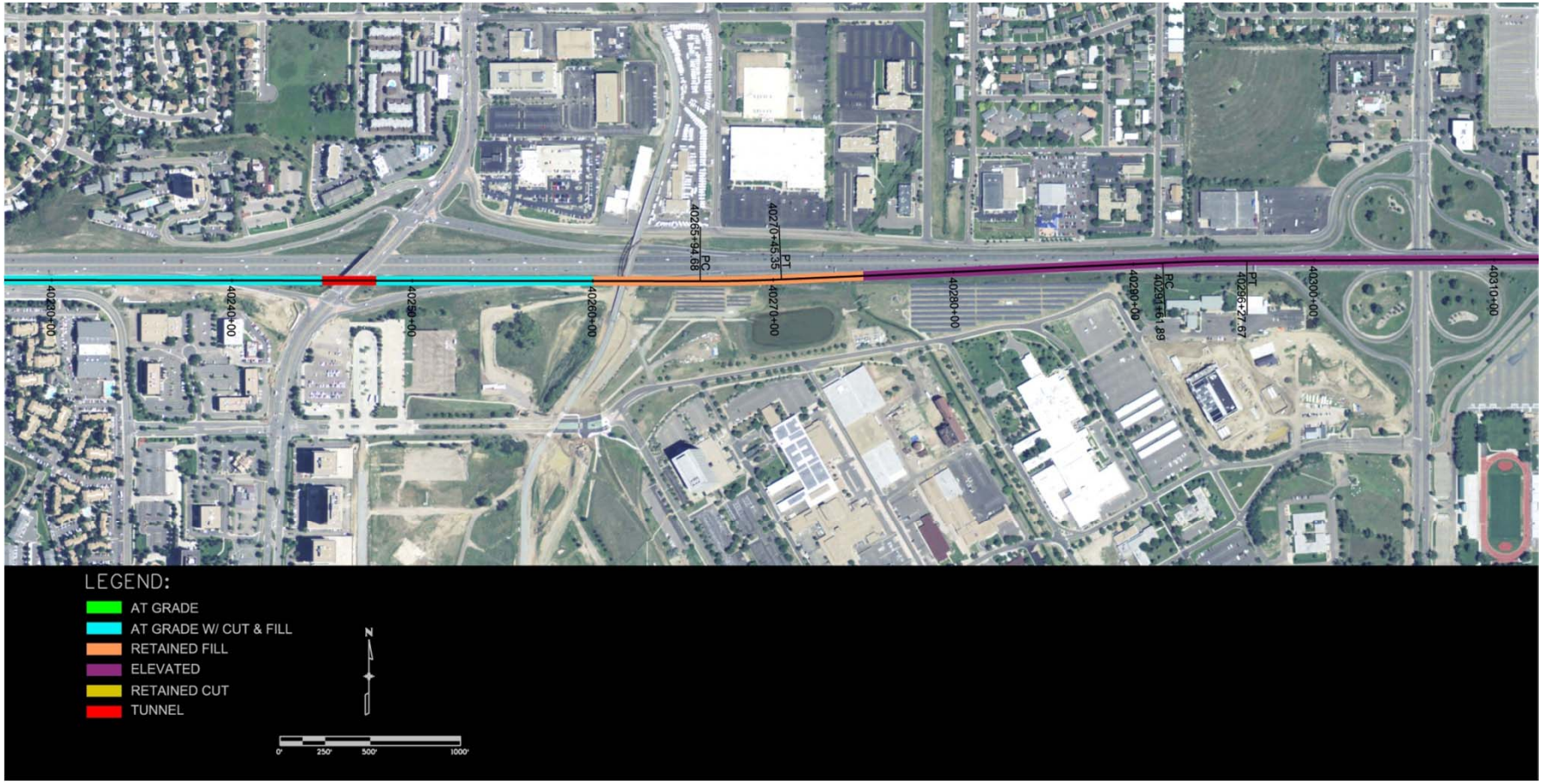
- CAPEX Methodology Manual was developed at Level 1
- Standard Cross Sections were developed for
  - Track at grade
  - Track on retained fill
  - Track on structure
  - Track in Tunnel
- Unit Prices were developed for each standard cross section
- Unit price is multiplied by the length of a standard cross section within a given segment





ICS Interregional Connectivity Study

Example of Quantity Measurement



OPEX Methodology

- Develop Service Plan Assumptions (# of trains/day)
- Calculate Train Miles for each Service Plan
- Multiply Train Miles by the Unit Cost for each technology
- Litmus test Basic and Capacity Scenarios

OPEX = (Train miles/ day) x (Days of operation) x ($/mile)

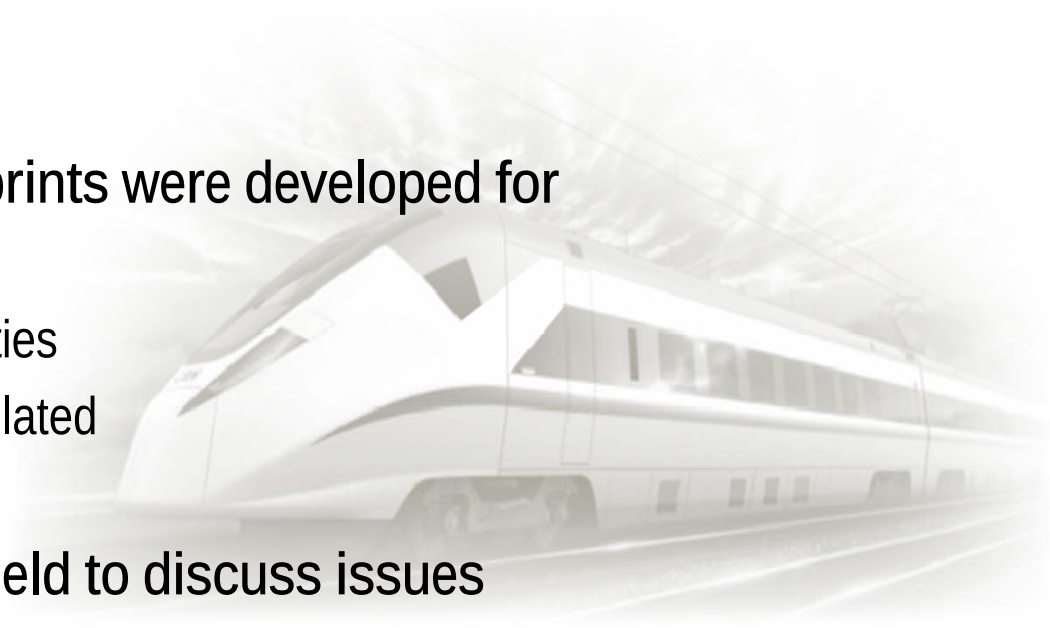
Two Operating Scenarios Were Considered

- 18 Hour Operation Per Day for each Scenario

- In Each Scenario, Two Options:
  - Basic Frequency Service Plan
    - 12 hours @ 1 hr frequency + 6 hrs @ 30 min frequency = **24 trains/day**
  - Capacity-Based Frequency Service Plan
    - 12 hours @ 1 hr frequency + 6 hrs @ 15 min frequency = **36 trains/day** (4,900 peak hour passengers)

Environmental Impact Methodology

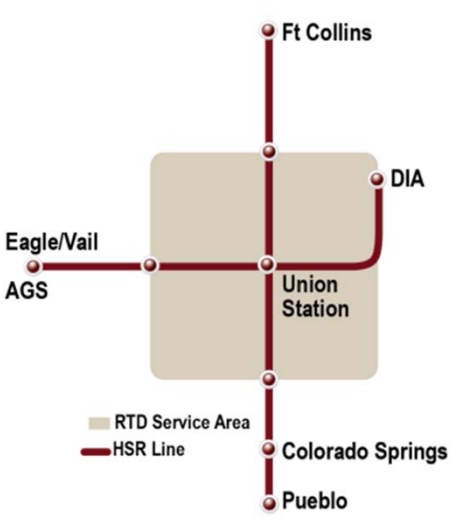
- Important environmental resources were identified from available mapping
- Engineering alignments were developed and compared to mapped resources – high level
- Typical construction footprints were developed for
  - Track
  - Stations and support facilities
  - Acres of disturbance calculated
- Four PLT meetings were held to discuss issues

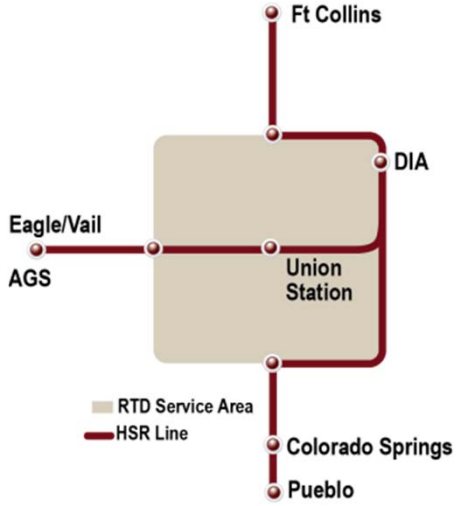


Level 2 Results

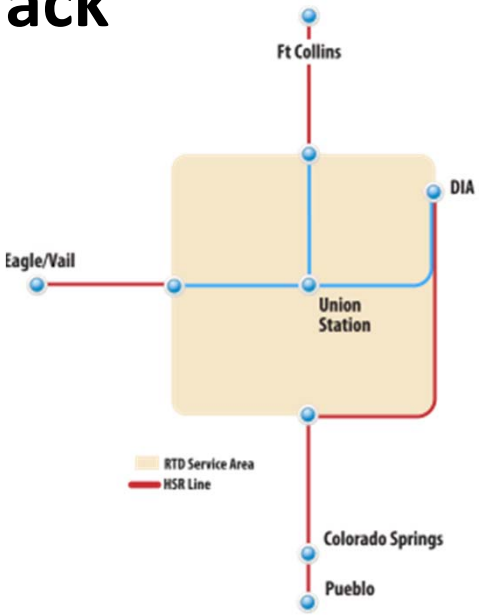
Five Scenarios Remained in Level 2

A-1 and A-5: Through Denver Options A (I-76) or B (US 6)

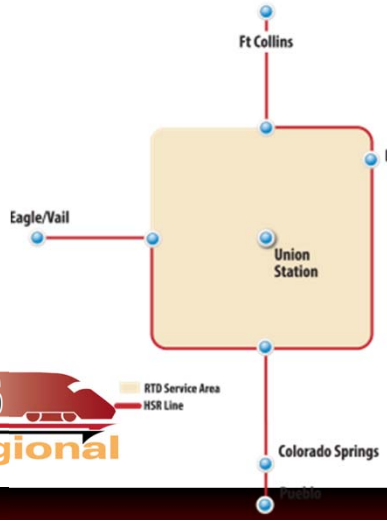


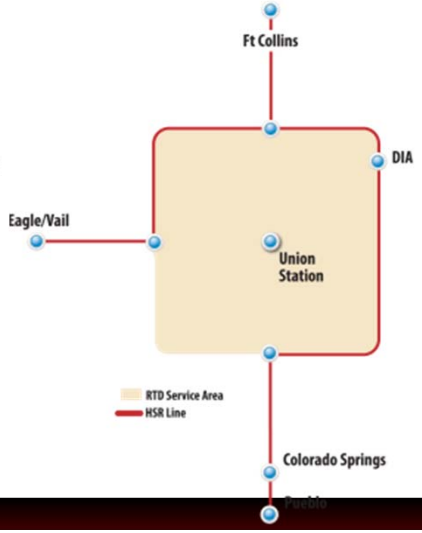


C-1: Shared RTD Track

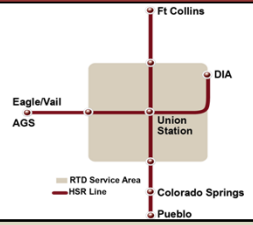
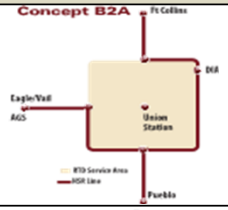


B-2A and B-5: Around Denver

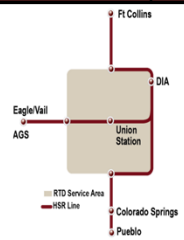
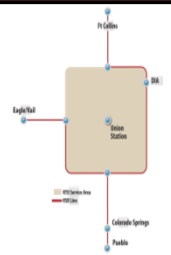
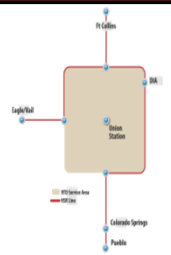
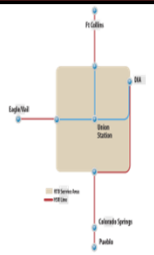




Performance by Scenario

Scenario		Ridership	Revenue
A1a		12,149,142	$ 293,776,963
A1b		13,162,834	$ 323,101,495
A5a		12,965,726	$305,025,470
A5b		13,137,458	$306,777,970
B2b		13,848,747	$318,978,788
B5		13,714,955	$310,293,016

Distribution of Ridership by Scenario

Scenario	A1a	A1b	A5a	A5b	B2a	B5	C-1
Ridership							
Mountains	2,168,094	2,516,754	2,430,662	2,136,961	2,995,866	2,792,520	1,696,330
Percent of Total	17.85%	19.12%	18.75%	16.27%	21.63%	20.36%	15.64%
Mountain Daily	7,227	8,389	8,102	7,123	9,986	9,308	5,654
North of Denver	2,069,642	2,472,297	2,326,763	2,620,094	2,498,178	3,107,216	1,909,081
Percent of Total	17.04%	18.78%	17.95%	19.94%	18.04%	22.66%	17.60%
North Daily	6,899	8,241	7,756	8,734	8,327	10,357	6,364
South of Denver	5,451,251	5,674,676	5,584,849	5,514,986	6,220,862	5,596,993	4,994,421
Percent of Total	44.87%	43.11%	43.07%	41.98%	44.92%	40.81%	46.06%
South Daily	18,171	18,916	18,616	18,383	20,736	18,657	16,648
Denver Metro	2,460,154	2,499,106	2,623,452	2,865,417	2,133,840	2,218,226	2,244,474
Percent of Total	20.25%	18.99%	20.23%	21.81%	15.41%	16.17%	20.70%
Denver Daily	8,201	8,330	8,745	9,551	7,113	7,394	7,482
Total	12,149,141	13,162,833	12,965,726	13,137,458	13,848,747	13,714,955	10,844,306

Scenario Capital and Operating Costs

Scenario	CAPEX	OPEX
A-1: Direct through Denver	$14.9 to $15.6 B	$183.0 M
A-5: Eastern Beltway	$14.1 to $14.3 B	$186.0 M
B2A: Denver Periphery Excluding the NW Quadrant	$13.4 B	$205.0
B-5: Denver Periphery Excluding the Southwest Quadrant	$13.9 B	$207.0 M
C-1: Shared Track with RTD	$11.5 B	$189.2 M

How Environmental Impacts Affect Results

- North to Fort Collins
  - Impacts of N1 (EIS) are too great on Longmont, Loveland and Fort Collins
  - The impacts of N2 (I-25) are minimal due to its location in the I-25 median
- Through the Denver Area
  - Segments through Denver have high impacts and are likely not implementable
  - Beltway segments around Denver have fewer issues and could be implemented
- South to Colorado Springs/Pueblo
  - Since there is only one basic alignment the emphasis will be to mitigate anticipated impacts
  - Impact challenges are anticipated through Castle Rock and Colorado Springs, as well as streams and floodplains between Castle Rock and Monument

	N:1: Railroad Alignment (I-25 North EIS Commuter Rail) 	N2: I-25 Alignment 
Community Disruption	10.80 linear miles directly adjacent to residential/mixed use	No residential/mixed use within 1,000 feet of alignment
Parks	• 8 potentially affected properties • 4.62 linear miles adjacent to parks	• 3 potentially affected properties • 0.88 linear miles adjacent to parks
Historic	• Two National Register listed properties potentially affected • Developed areas than 50 years old	No historic properties within CDOT right-of-way.
Environmental Justice	Low income/minority populations adjacent to the US 287 corridor in corridor communities	Some populations exist north of Timnath but far from alignment
Stream Crossings	• 12 stream crossings • 2.77 linear miles of streams adjacent to alignment	• 12 stream crossings • 0.15 linear miles of streams adjacent to alignment

Benefit Cost Ratio

What Are the Components of the BCA?

Benefits

1. Ticket Revenue
2. Reductions in VMT
3. Reductions in travel delay
4. Fatalities avoided
5. Air Quality
6. Temporary and permanent employment
7. Influx of federal grant money
8. Multiplier effects

Costs

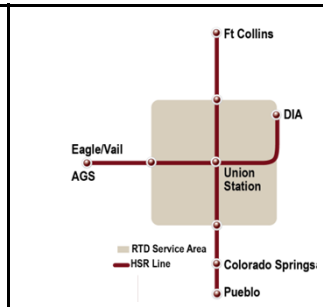
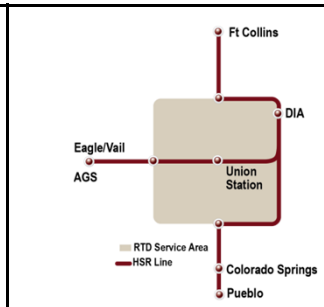
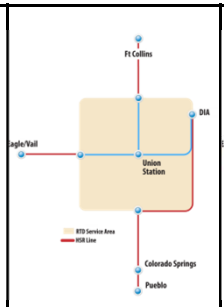
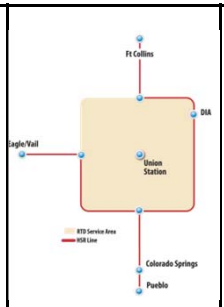
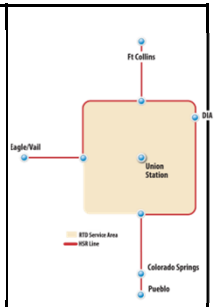
1. Capital Cost
2. Interest on bonds
3. Operation and Maintenance Costs

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
  - Fare box revenue
  - Construction employment
  - Operations employment
  - Effects of and influx of federal funding

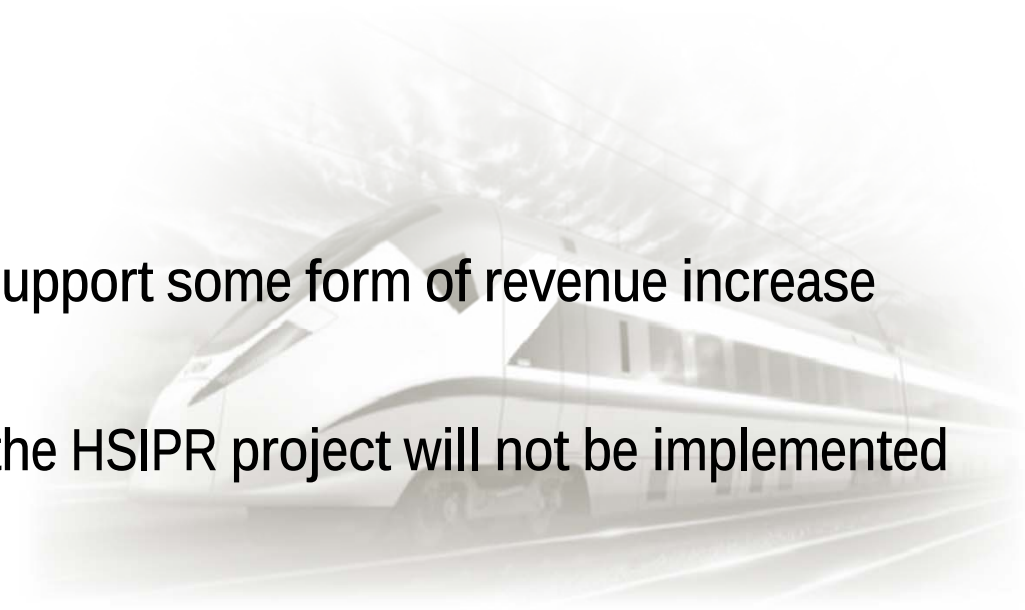
Preliminary B/C Calculations

					
B/C Element	**A-1a**	**A1b**	**A-5a**	**A-5b**	**C-1**	**B-2A**	**B-5**
Total Benefits	$48.2 B	$47.7 B	$44.8 B	$45.4 B	$37.3 B	$43.8 B	$44.8 B
Total Costs	$24.5 B	$23.5 B	$22.4 B	$22.7 B	$18.9 B	$22.5 B	$22.5 B
B/C Ratio	1.97	2.03	2.00	2.00	1.97	2.01	1.99
Operating Ratio	1.32	1.45	1.32	1.35	1.05	1.21	1.19

Revenues and Financing Options

Why Is This Important?

- All scenarios will require a significant local funding contribution
  - Perhaps $80-$100 million/year for an initial phase (MOS)
- The higher level of local funding the better the chance to:
  - Receive a federal grant
  - Attract private funding
- The public will need to support some form of revenue increase
- Without public support the HSIPR project will not be implemented



How Much Money Would a First Phase Require?

- HSIPR would need to be phased over many years due to the cost
- Once a first phase was proven feasible future phases would be easier to fund
- Assume a Phase 1 from DIA to Fort Collins
  - Capital cost = ~$2.37 Billion
  - Interest at 4%
  - Payment = ~$137.1 Million/year
  - Federal share = ~$68.6 Million/year
  - State and other share = ~ $68.6 Million/year

Where Does the Money Come From For HSIPR Projects?

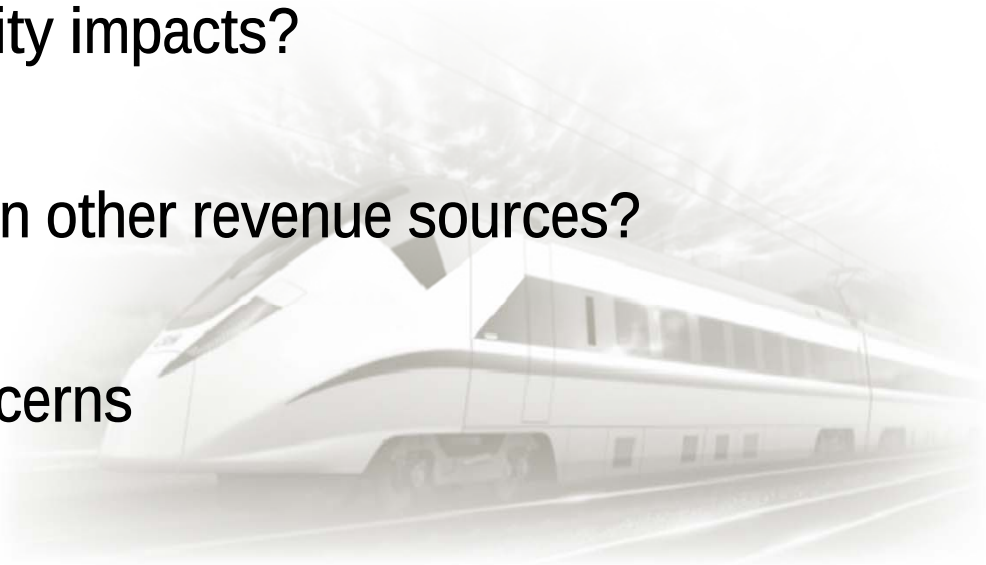
- Conventional Sources
  - Motor Fuel Taxes
  - Vehicle Registration Fees
- Other General Government
  - Sales Taxes
  - Income Taxes
  - Property Taxes
  - Profits from Lottery Sales
- Other sources
  - Farebox Revenues
  - Value Capture Mechanisms (Fees)
  - Vehicle Miles Travelled (VMT) Fees
  - Utility Fees
  - Lodging (or other Visitor Fees)
  - Private/Public Private Partnerships

What Are Some Possible Way To Fund The $69 M Required?

Sources	*Increase / Change*	*Revenues Generated (M $/year)*
User Fees		
Farebox Revenues	$0.35/mile	$320.0
Motor Fuel Purchase Tax Increase	$.25 per gallon	$446.9
VMT Fees	$.01 per mile	$392.9
Increase in Vehicle Registration Fees	$100 per vehicle	$391.3
Utility Fees	$15 per month/hh	$293.6
General Revenues		
Increased State Sales Tax	1%	$571.9
Increased State Property Tax	4 mills	$200.1
Increased State Income Tax	1%	$1,044.1
Lodging Tax	1% statewide lodging spending	$26.5
Change in Lottery Tax Allocation	10% of lottery profits	$11.3
Value Capture Mechanisms		
Development Fee	$10,000/residential 1% fee/ commercial	$169.4

Tonight: What are your thoughts.....

- What is your opinion on the 5 scenarios?
- What weighs heaviest – higher ridership or fewer environmental/community impacts?
- Do you have thoughts on other revenue sources?
- Other comments or concerns

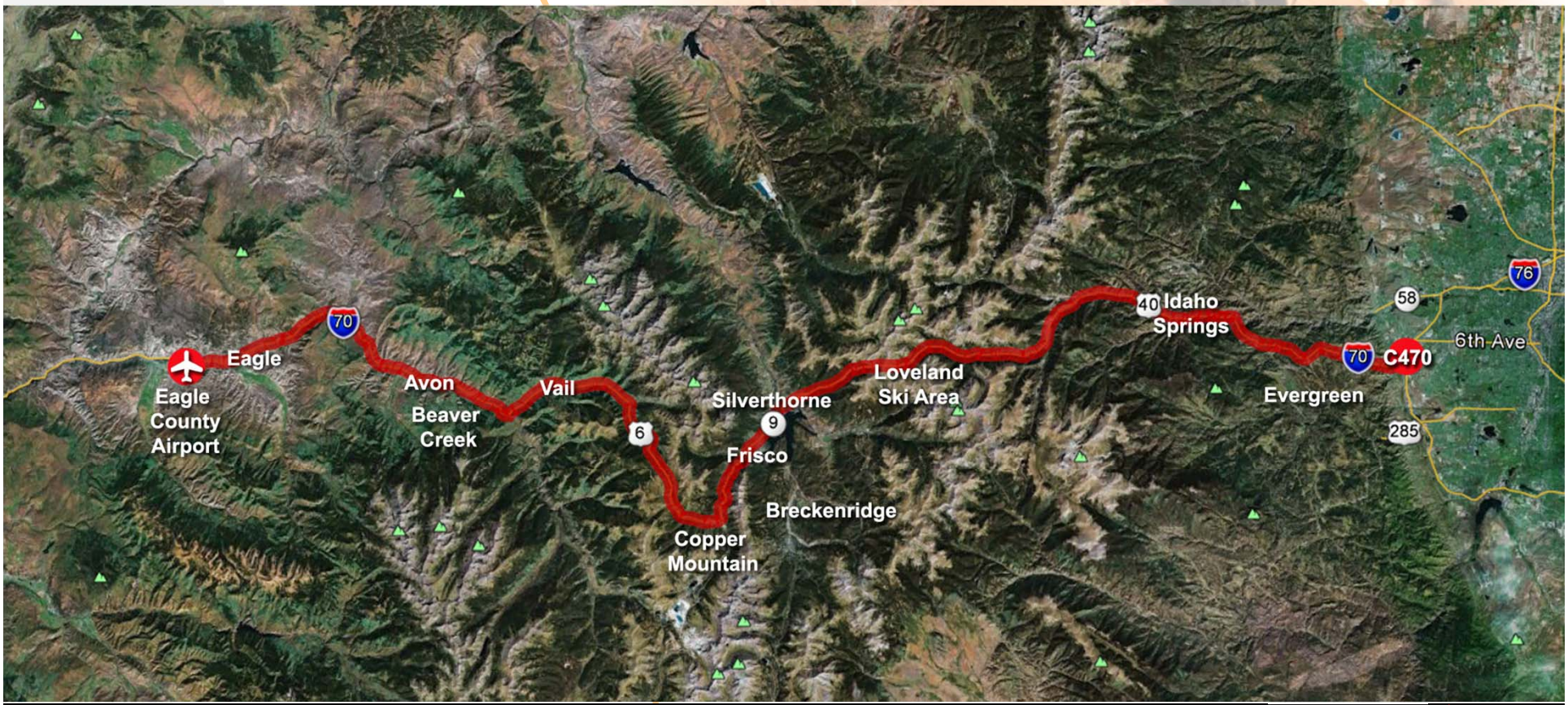


Next Steps For Level 3 Evaluation

- Planning Studies
  - Better define and mitigate high impacts
  - Refine the service plan to optimize service and improve cost-effectiveness
  - Refine the OPEX estimate with specific technology based unit costs.
- Engineering Studies
  - Make recommendations for a preferred technology
  - Value engineer the remaining scenarios to improve cost-effectiveness
  - Better define ROW requirements
  - Revise CAPEX to account for engineering refinements
  - Prepare a phasing strategy
- Third Round of Public Open Houses – early Fall

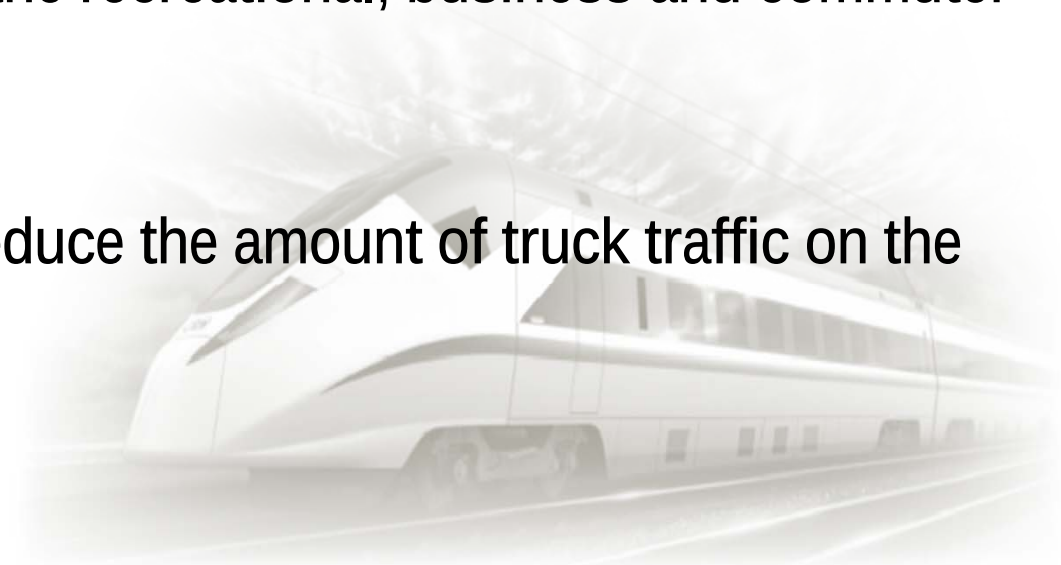
CDOT Advanced Guideway System (AGS) Feasibility Study Update

Location of AGS
I-70 Mountain Corridor (six stations)



AGS Project Goal

- To find a feasible and implementable high speed transit system to ultimately link Denver International Airport and Eagle County Regional Airport, following the I-70 alignment
- This system will serve the recreational, business and commuter needs of the corridor
- This system will also reduce the amount of truck traffic on the corridor



Study Progress to Date:

- Feasible Technologies Identified
- Alignment Alternatives Developed
- Preliminary Ridership Estimates Completed
- On-Going Cost Estimating (Capital & O&M)
- Assessing Financial Feasibility
- Planned Completion in Early Fall 2013

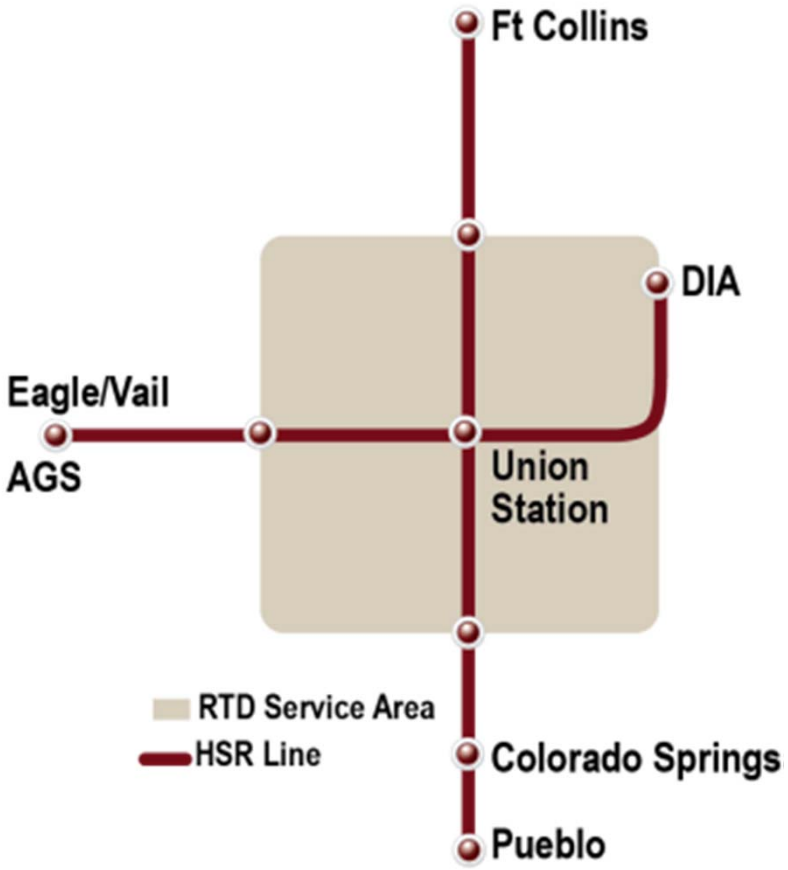
Extra Slides

What is the Level 2 Evaluation

- The Level 2 Evaluation builds from the technical analysis and public input received during the Level 1 Evaluation
- More quantitative assessment of the ridership, cost and environmental consequences of each of the five surviving scenarios
- Benefits are compared to the full cost of each scenario
- The intent will be to reduce the number of scenarios to two or three for more detailed study at Level 3.

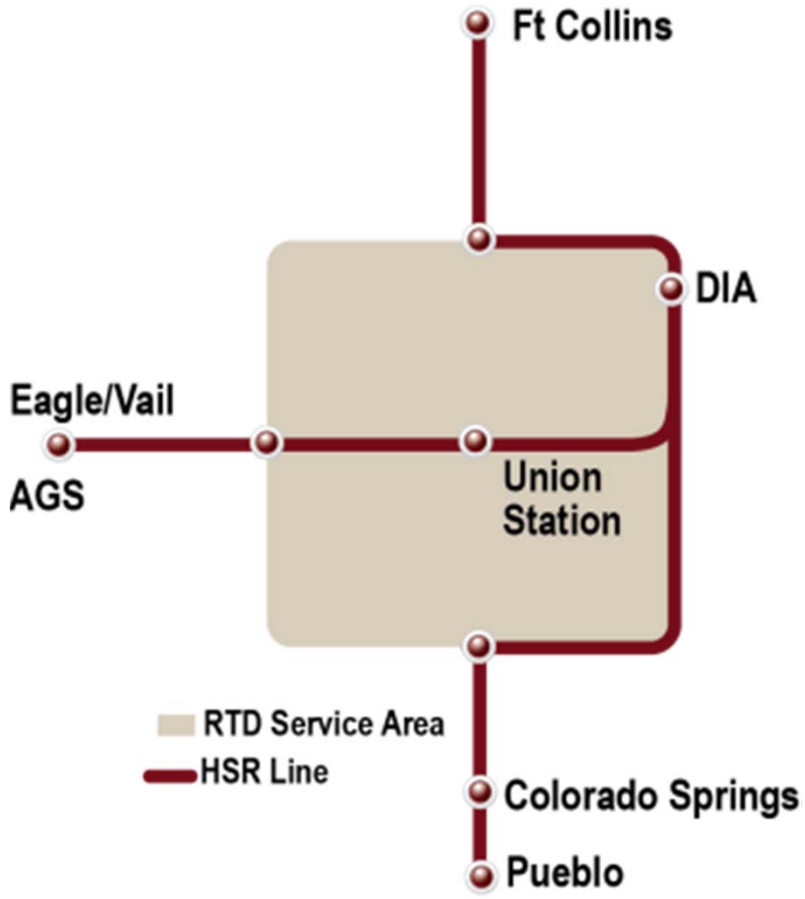
Scenario A-1

- Direct service to Denver from north and south of metro area
- Does not serve DIA directly from north or south; requires transfer at DUS
- Competes with RTD's lower fares from DUS to DIA
- High community impacts and ROW costs, particularly for US 6 and railroad alignments through Denver



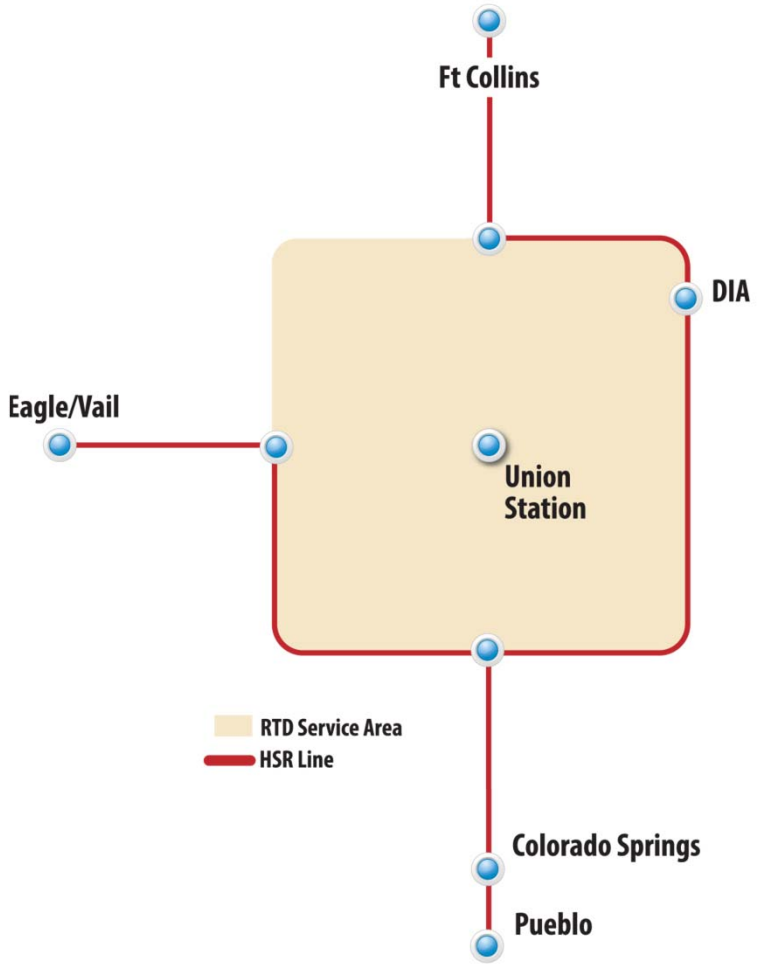
Scenario A-5

- 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



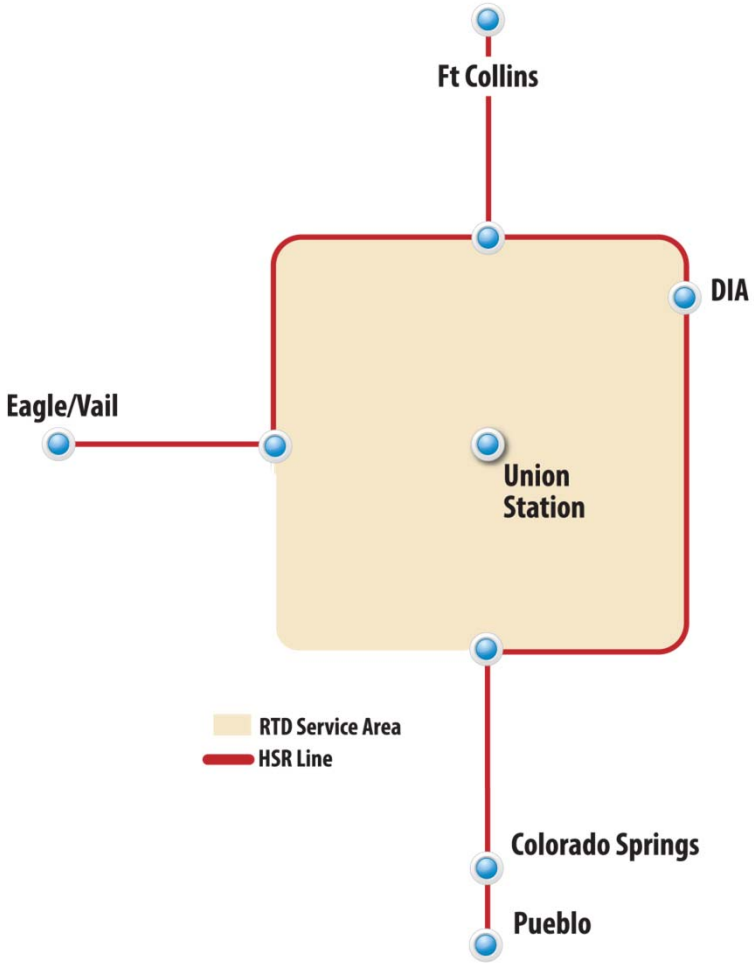
Scenario B-2A

- Very strong ridership
- No direct access to DUS; relies on utilization of existing RTD system infrastructure
- Poor access to DIA from the mountains
- Good access from south to mountains and DIA
- Avoids community impacts through the Denver metro area



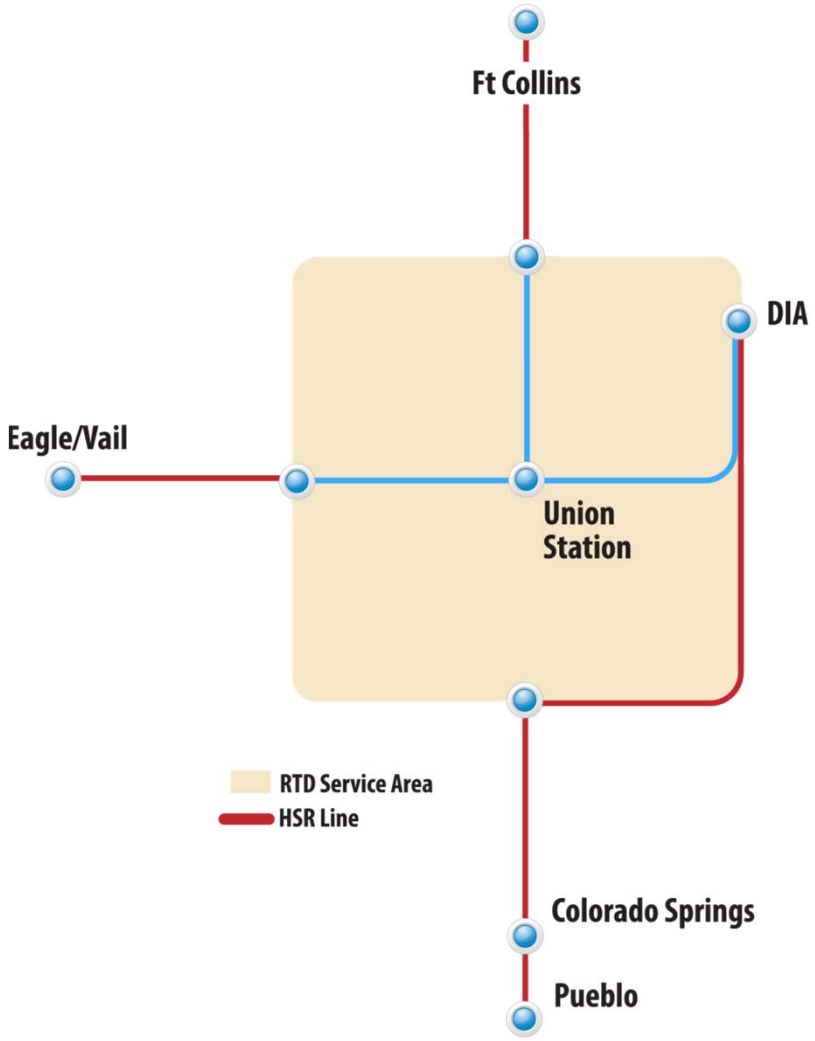
Scenario B-5

- Very strong ridership
- No direct access to DUS; relies on utilization of existing RTD system infrastructure
- Good access to DIA from all but the SW metro area
- Avoids community impacts through the Denver metro area
- Involves the unknowns of constructing through the NW Quadrant; possible conflicts with CDOT/Golden agreements for



C-1 Scenario

- Shared track with RTD lowers cost by about $3.3 B
- Avoids community impacts through the Denver Metro area
- Capitalizes on RTD FasTracks investment
- Could complicate RTD FasTracks operating plan but could also be revenue source for RTD
- Slower speeds through metro area result in 2.3 million fewer riders



Trip Type Breakdown by Scenario

Scenario	Intercity	Intra-Urban	Connect Air
A-1a (I-76)	84%	12%	4%
A-1b (US 6)	84%	12%	4%
A-5a (I-76)	75%	20%	5%
A-5b (US 6)	76%	19%	5%
B2a	77%	19%	4%
B5	75%	21%	4%
C-1	78%	16%	6%

Comparison of Community/Environmental Impacts East – West Options through Denver

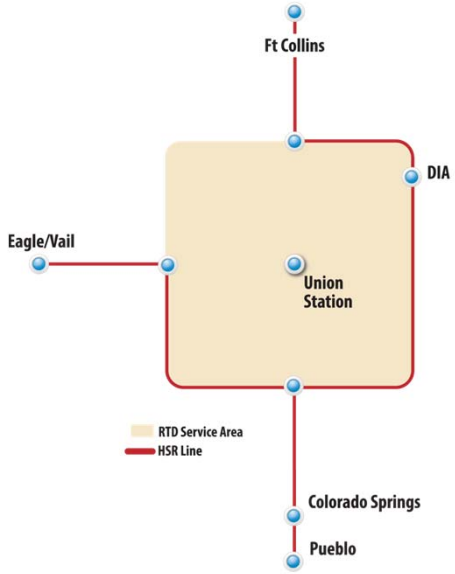
	I-76 through Denver 	US 6 through Denver 	Beltway north around Denver 
Community Disruption	8.3 linear miles	11.32 linear miles	7.02 linear miles
Parks	5 parks + RMA 0.56 linear miles	7 parks + RMA 1.07 linear miles	9 parks/open space 6.73 linear miles
Historic	Medium	High	Low
Environmental Justice	High	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	12.79	5.05	9.98
Parks	1 park 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

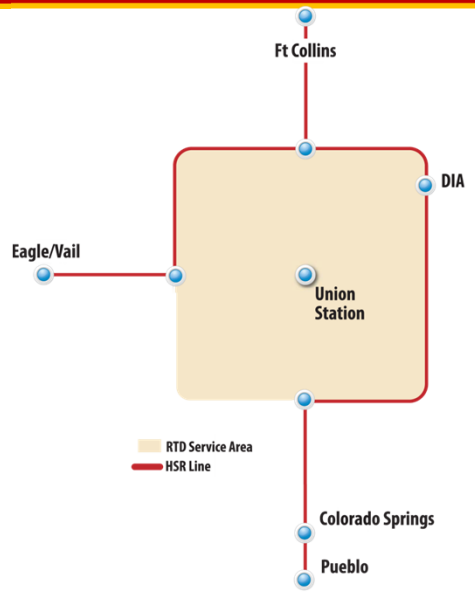
Summary Comparison (cont)

B-2



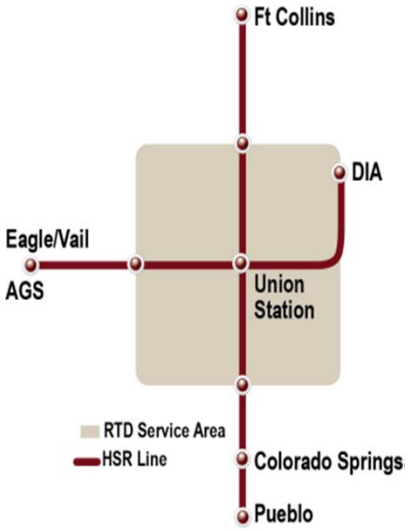
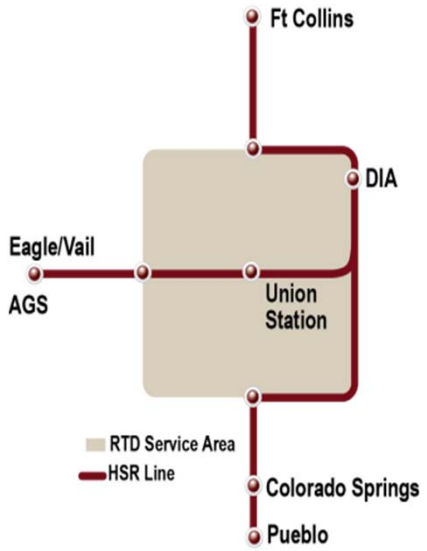
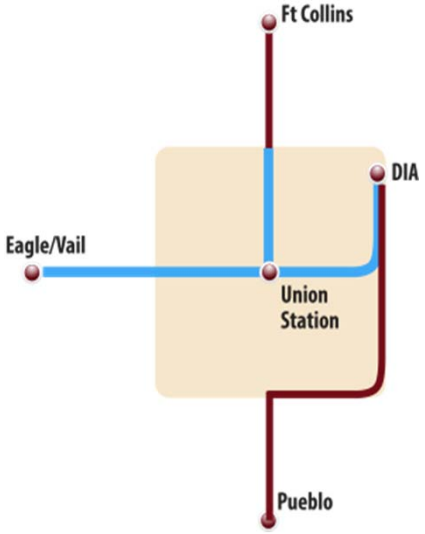
CAPEX	**$13.4 Billion**
OPEX	**$206 Million/yr**
Ridership	**13.8 million/yr**
Revenue	**$250 Million/yr**
Opex Ratio	**1.21**

B-5



CAPEX	**$13.9 Billion**
OPEX	**$207 Million/yr**
Ridership	**13.7 million/yr**
Revenue	**$247 Million/yr**
Opex Ratio	**1.19**

Summary Comparison of Scenarios

	A-1	A-5	C-1
			
CAPEX	$15.2 Billion	$14.2 Billion	$11.5 Billion
OPEX	$183 Million/yr	$186 Million/yr	$189 Million/yr
Ridership	12.1 to 13.1 million/yr	12.9 to 13.1 million/yr	10.8 million/yr
Revenue	$252 Million/yr	$248 Million/yr	$198 Million/yr
Opex Ratio	1.38	1.33	1.05
$/Rider (Capex)	$57.86	$57.84	$61.54

Transportation Is A Small Part Of The State Budget (Fiscal Year 2010-2011)

- $25 billion budget
- 22 departments
- Largest departments: Health Care & Education
- Transportation is about 5% of overall state budget at $1.3 billion