

# PLT Meeting No. 4: Level 2 Evaluation Update: Costs, Impacts, Funding CDOT Interregional Connectivity Study



**CH2MHILL.**

February 2013

# Agenda

- ▶ Welcome and Introductions
- ▶ AGS Update
- ▶ PLT Input and Top Issues
- ▶ Level 2 Alignments Review
- ▶ Financial Options and Funding Strategies
- ▶ Break-out session – Funding Discussion
- ▶ Next Steps in Level 2 Evaluation
- ▶ Break



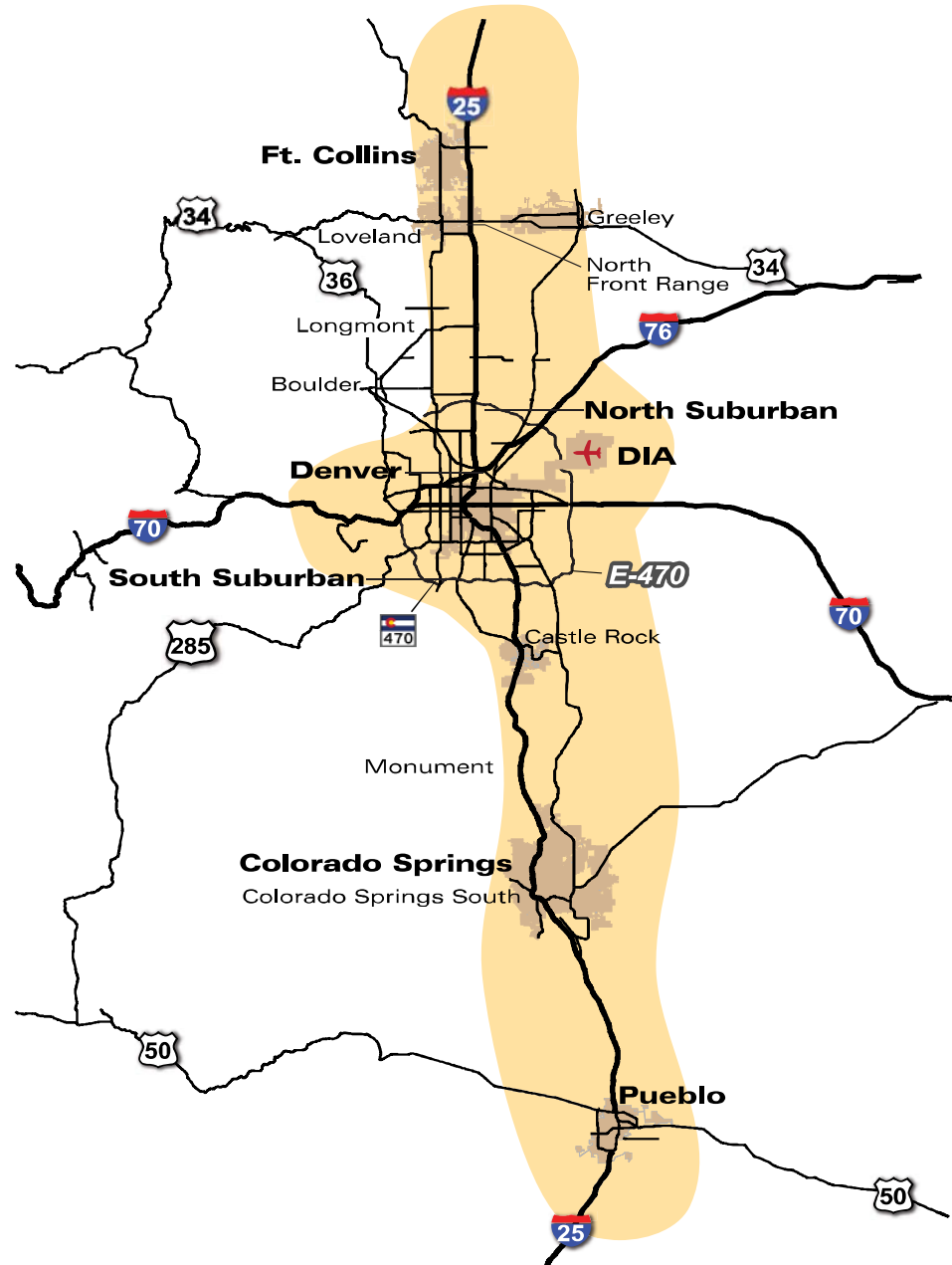
# ICS Study Sponsors and Purposes

- ▶ **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 HSIPR and RTD.**
  - Suggest method for integrating HSIPR into **the statewide multi-modal network.**
  - Develop the basis for **Next Steps.**



# ICS Study Area

- ▶ Fort Collins
- ▶ Denver
- ▶ Colorado Springs
- ▶ Pueblo
- ▶ Ridership statewide



# *Project Update*



# Where are We in the Process?



# Level 2 Goals

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



# Progress Since December 10, 2012 PLT

- Train performance calculations are completed
- CAPEX estimates for Level 2 are completed
- Environmental considerations are completed
- Sources of funding memorandum has been completed
- Ridership and revenue estimation is about 1 month delayed

## Level 2 Cost Estimates Completed

ICS: Denver Metro Capital Cost Estimate			From - To
Scenario A1			Host Carrier
Thursday, February 21, 2013			Mileposts
			Track Miles
FRA Standard Cost Category	Description	Unit	Final Costs (2013)
<b>10 TRACK STRUCTURES &amp; TRACK</b>			
<b>10.01</b>	<b>Track structure: Viaduct</b>		
10.01.01	Elevated Structure - 2 Track (30' Avg. Pier Ht)	Route Mile	54,814
10.01.02	Elevated Structure - 2 Track (60' Avg. Pier Ht)	Route Mile	73,320
10.01.03	Elevated Structure Straddle - 2 Track (30' Avg. Pier Ht)	Route Mile	83,824
<b>10.03</b>	<b>Track structure: Undergrade Bridges</b>		
10.03.01	Undergrade Bridge (Double Track)	EA	\$ 2,808
<b>10.07</b>	<b>Track structure: Tunnel</b>		
10.07.01	Cut & Cover Box - 2 Track / 1 Box (40' Avg. Exc. Depth)	Route Mile	147,226
10.07.02	RH Double Track Tunnel 50ft ID in soft rock (poor)	Route Mile	360,776
<b>10.08</b>	<b>Track structure: Retaining walls and systems</b>		
10.08.01	Retained Cut, Trench - 2 Track (10' Avg. Exc Depth)	Route Mile	39,002
10.08.02	Retained Cut, Trench - 2 Track (20' Avg. Exc Depth)	Route Mile	95,315
10.08.03	Retained Fill, Walls Both Sides - 2 Tracks (10' Avg. Wall Ht)	Route Mile	9,734
10.08.04	Retained Fill, Walls Both Sides - 2 Tracks (20' Avg. Wall Ht)	Route Mile	27,021
10.08.05	Retained Fill, Walls Both Sides - 2 Tracks (30' Avg. Wall Ht)	Route Mile	46,985
<b>10.09</b>	<b>Track new construction: Conventional ballasted</b>		
10.09.01	Double Track New Construction on Prepared Subgrade	Route Mile	3,223
10.09.02	Double Track New Construction on New Embankment	Route Mile	3,779
10.09.03	Double Track New Construction on Cut/Fill Roadbed (small ballast walls as needed)	Route Mile	5,000
<b>10.10</b>	<b>Track new construction: Non-ballasted</b>		
10.10.01	Double Track New Construction with Direct Fixation	Route Mile	3,779
<b>10.18</b>	<b>Other linear structures including fencing, sound walls</b>		
10.18.01	Highway Barrier Type 6	LF	\$ 1.43
10.18.02	Highway Barrier Type 5	LF	\$ 0.22
10.18.03	Fencing, 10 ft Chain Link (both sides)	MI	\$ 221.25
<b>Sub-total Track Structures &amp; Track (A)</b>			
<b>20 STATIONS, TERMINALS, INTERMODAL</b>			
20.01	Station buildings: Primary (incl 2000 parking spaces)	EA	\$ 50,000.00
20.02	Station buildings: Secondary	EA	\$ 25,000.00
<b>Sub-total Stations, Terminals, Intermodal (B)</b>			



# *AGS Study Update*



# AGS Feasibility Study Status

- ▶ **Technology Forum held December 14, 2012**
  - High Speed Rail, Maglev & other technologies attended and made presentations
  - About 45 stakeholders were part of Technical Review Team
  - 270 people attended
  - Good media coverage

# AGS Feasibility Study Status

- ▶ **Four Alignments Being Developed for Golden to Eagle County Regional Airport**
  - Wholly inside I-70 ROW – Low Speed Maglev
  - Greenfield Alignment – High Speed Rail (HSR)
  - Greenfield Alignment – High Speed Maglev
  - Hybrid Alignment – Various Technologies
- ▶ **Initial Travel Time Calculated for HSR**
  - 72 minutes with average speed of 84 mph

# AGS Feasibility Study Status

## AGS Team Continues To Coordinate With ICS Team

- Funding & Financial Task Force
- Technologies
- Cost Estimating
- Ridership

## AGS PLT

- Next meeting is March 14, 10:00 to 1:00 at Idaho Springs Elks Club

A group of approximately 15 people are seated around a large white table in a meeting room. They appear to be engaged in a collaborative discussion or meeting. Some are looking at documents on the table, while others are gesturing or talking. The room has a wooden floor and a whiteboard in the background. The image is slightly faded and overlaid with a semi-transparent white area containing the title text.

# *December PLT Input and Top Issues*

# PLT Workshop – December 10th

## North Metro Area Key Comments:

- ▶ Commerce City opposes 96th because of platted/developable land
- ▶ Thornton opposes use of I-25 between the RTD ROW crossing (north of Erie exit, south of Hwy 52) and E-470. Maintain this area for auto-oriented development.
- ▶ Station options: Pecos & I-76:  
(NW Rail/Gold line ICS) and 72<sup>nd</sup> & Colorado & I-76 (North Metro/ICS)



## East/West Through Denver Key Comments:

- ▶ I-70 Mountain Corridor representatives do not support an alignment that shares track with the Gold Line as it is not technology agnostic.
- ▶ Doesn't make sense to model Golden to DUS to DIA because it duplicates RTD service and doesn't leverage those investments.
- ▶ Avoid the tight turn at Hwy 58 and 93 in Golden

## North/South Through Denver Key Comments:

- ▶ Denver and RTD strongly support having the passenger rail service go through downtown Denver and into the Denver Union Station (DUS).
- ▶ C-470 expansion and available ROW changes possible

## Colorado Springs/Pueblo Key Comments:

- ▶ Castle Rock would prefer a station, not in downtown due to impacts, but further north between US 85 and I-25
- ▶ Pueblo generally agrees with the ICS proposal to enter downtown from the northwest and affirms that CDOT should not be coming in along the railroad alignment from the northeast.

## Northern/Fort Collins Key Comments:

- ▶ Longmont would prefer that the alignment serve downtown Longmont
- ▶ The North I-25 EIS identifies the 287 corridor as commuter rail with stations in each community. There is strong community support for alignment as commuter rail.



# *Level 2 Alignment Review*



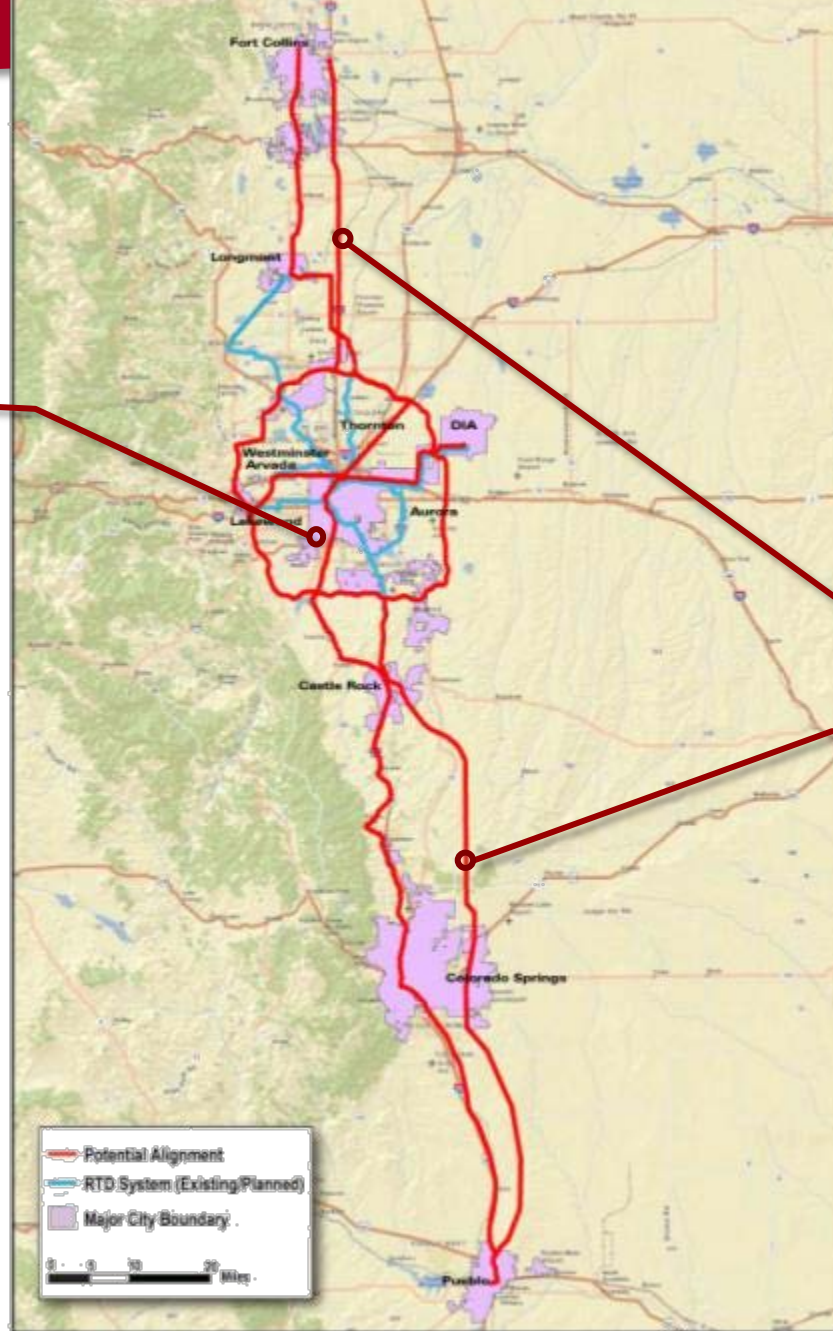
# What is covered in this section

- ▶ Level 2 Alignments Evaluated (445 miles reviewed)
- ▶ Travel Speeds by Segment
- ▶ CAPEX Estimating Methodology and Assumptions
- ▶ Environmental Consequences
- ▶ Results
  - By Segment Pair
  - By Scenario

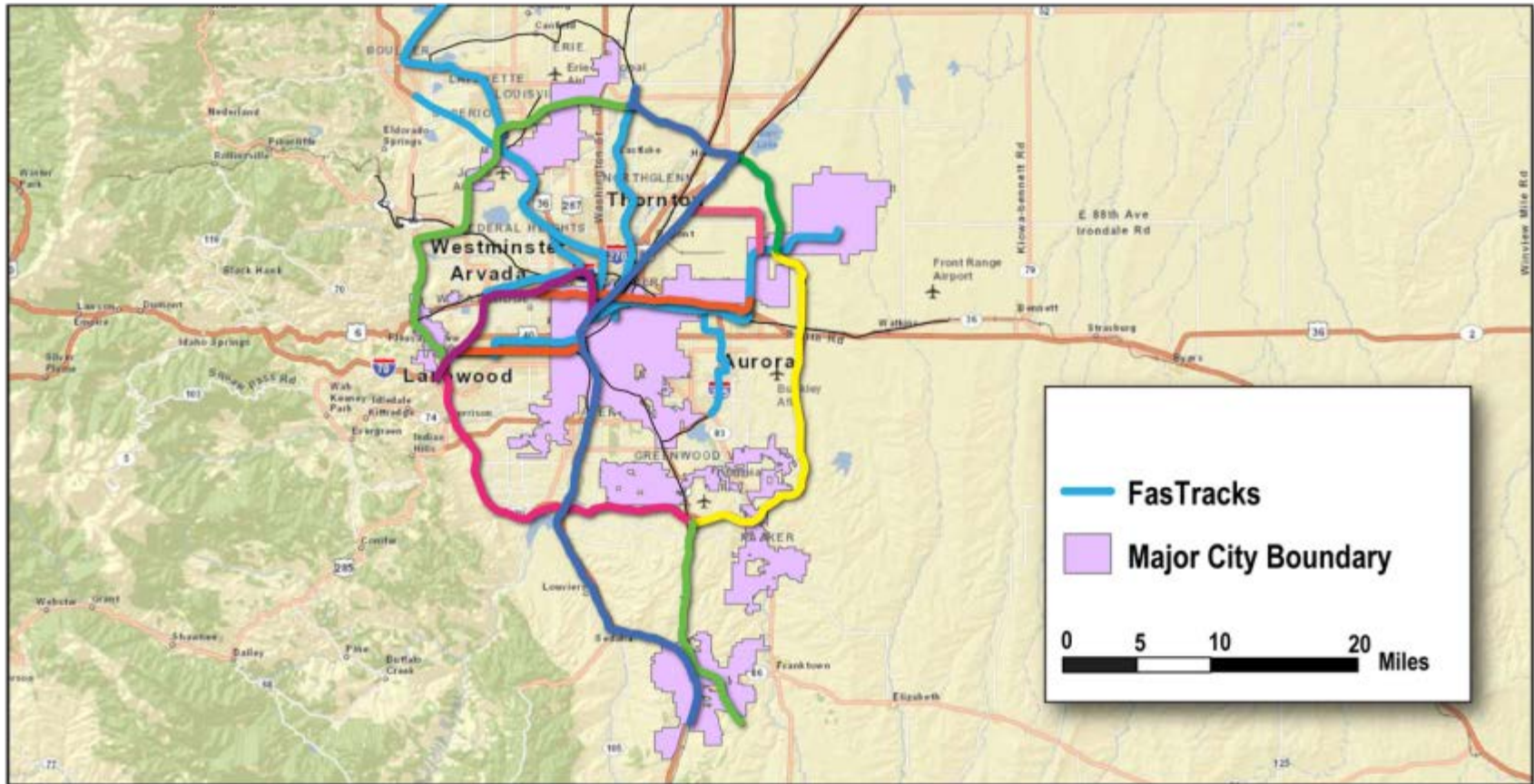
# Logic

Study Segments through and around Denver

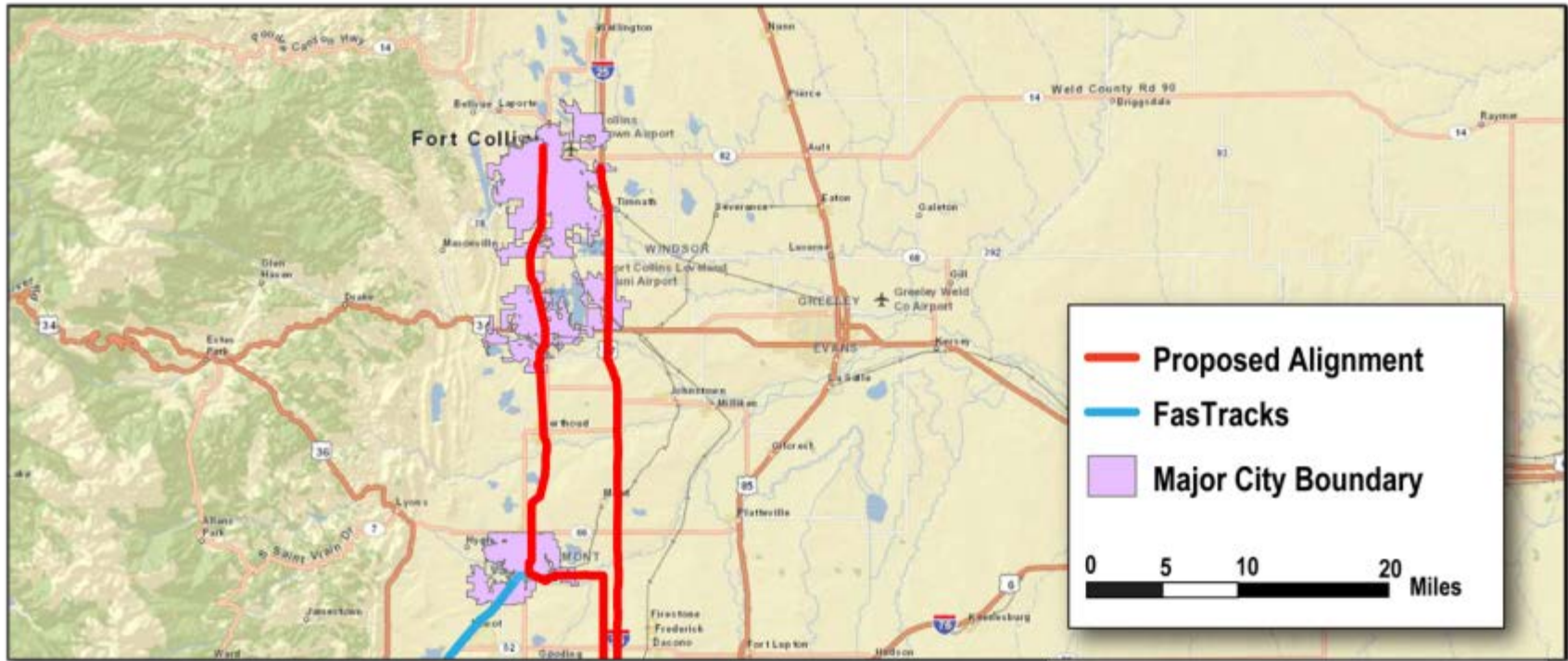
Determine the best Segments going North and South



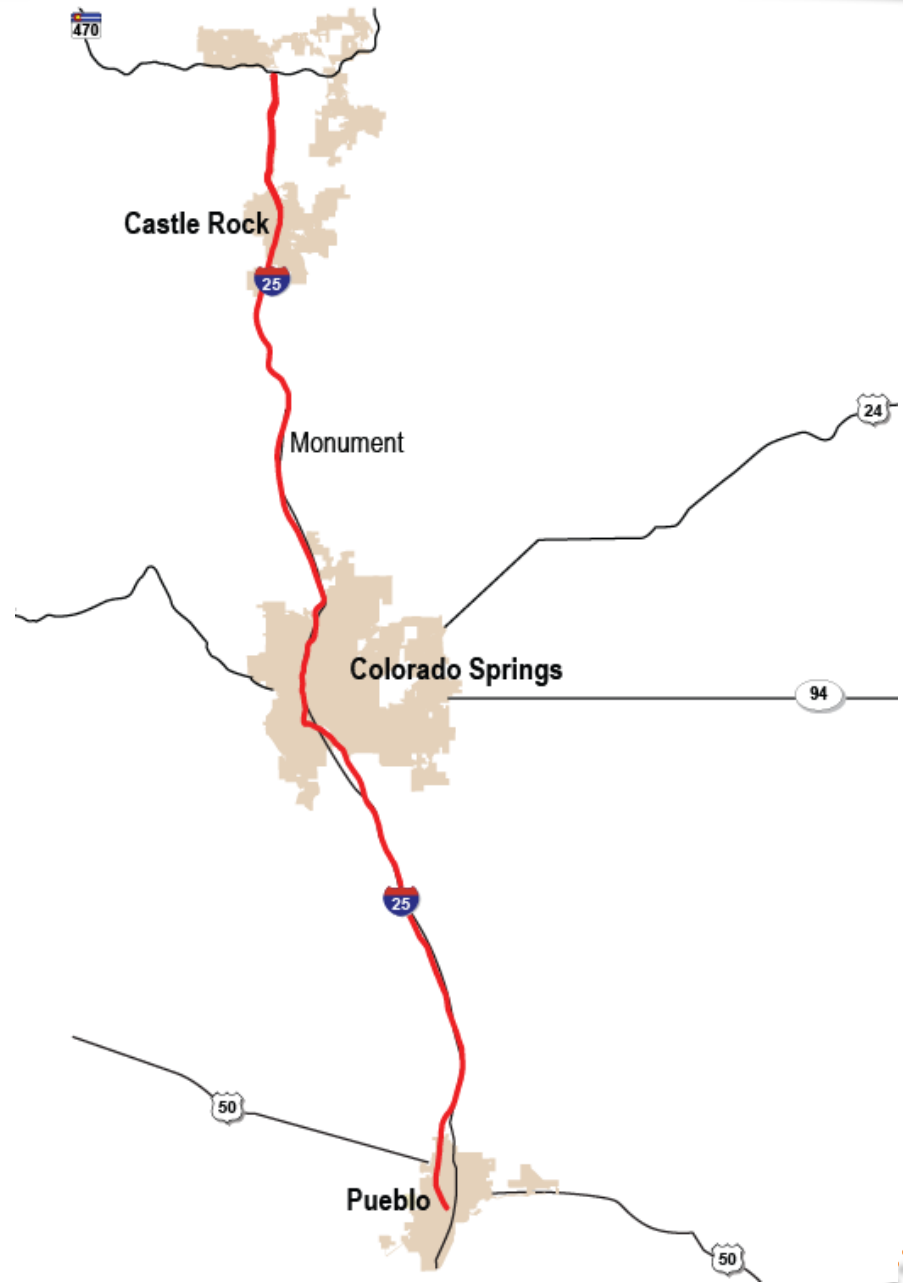
# Four Basic E-W Segments and One N-S Segment Remain in Level 2



# Two Segments Remain to Fort Collins



# One Segment Remains to Colorado Springs & Pueblo

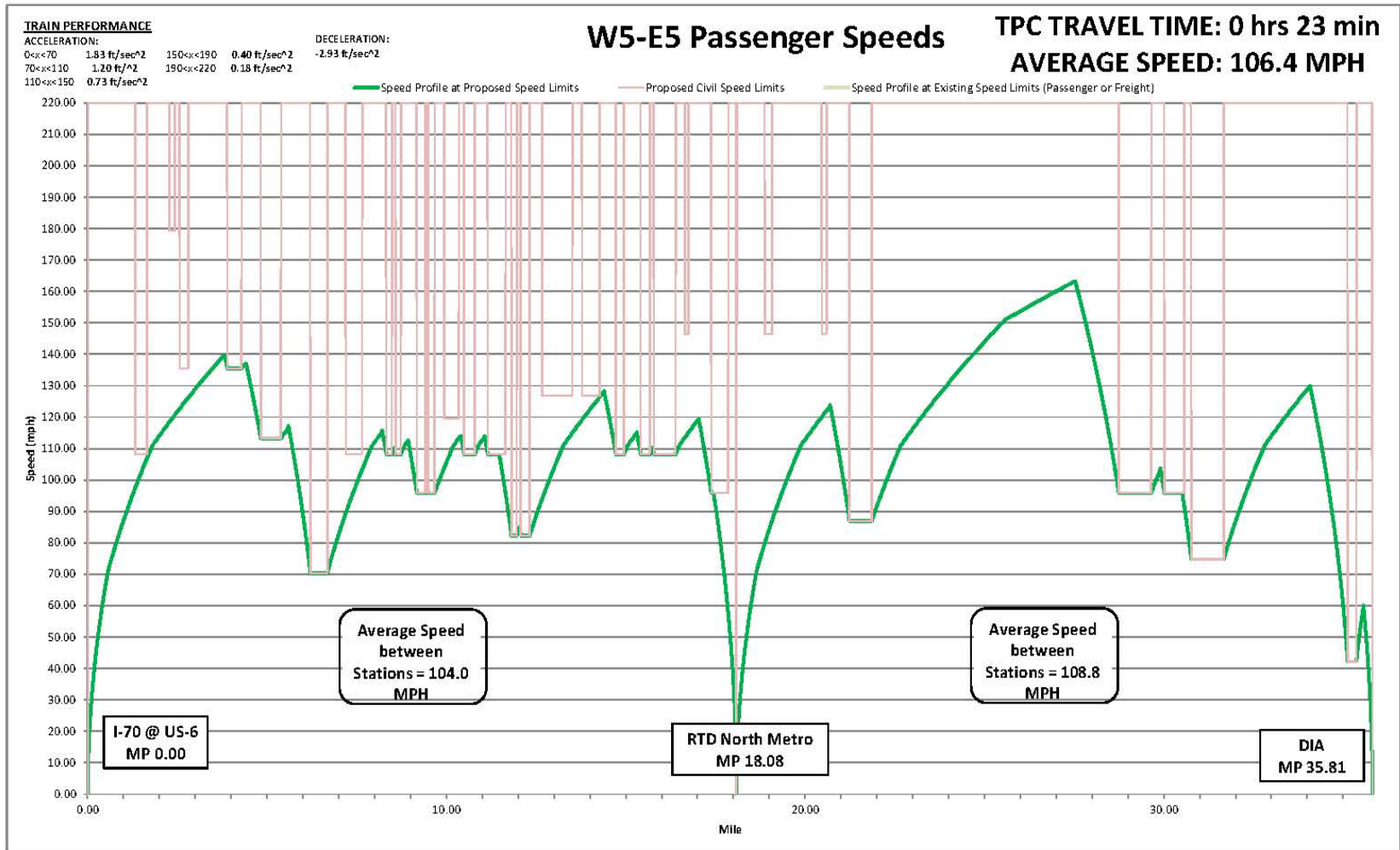


# Travel Speed Calculations

- Travel speed calculations between stations are needed for modeling
- Travel Speed is driven by:
  - Number of stations and station dwell time (120 and 60 seconds)
  - Vehicle performance – acceleration and deceleration
  - Track geometry
  - Passenger comfort
- Results are used to improve alignment performance

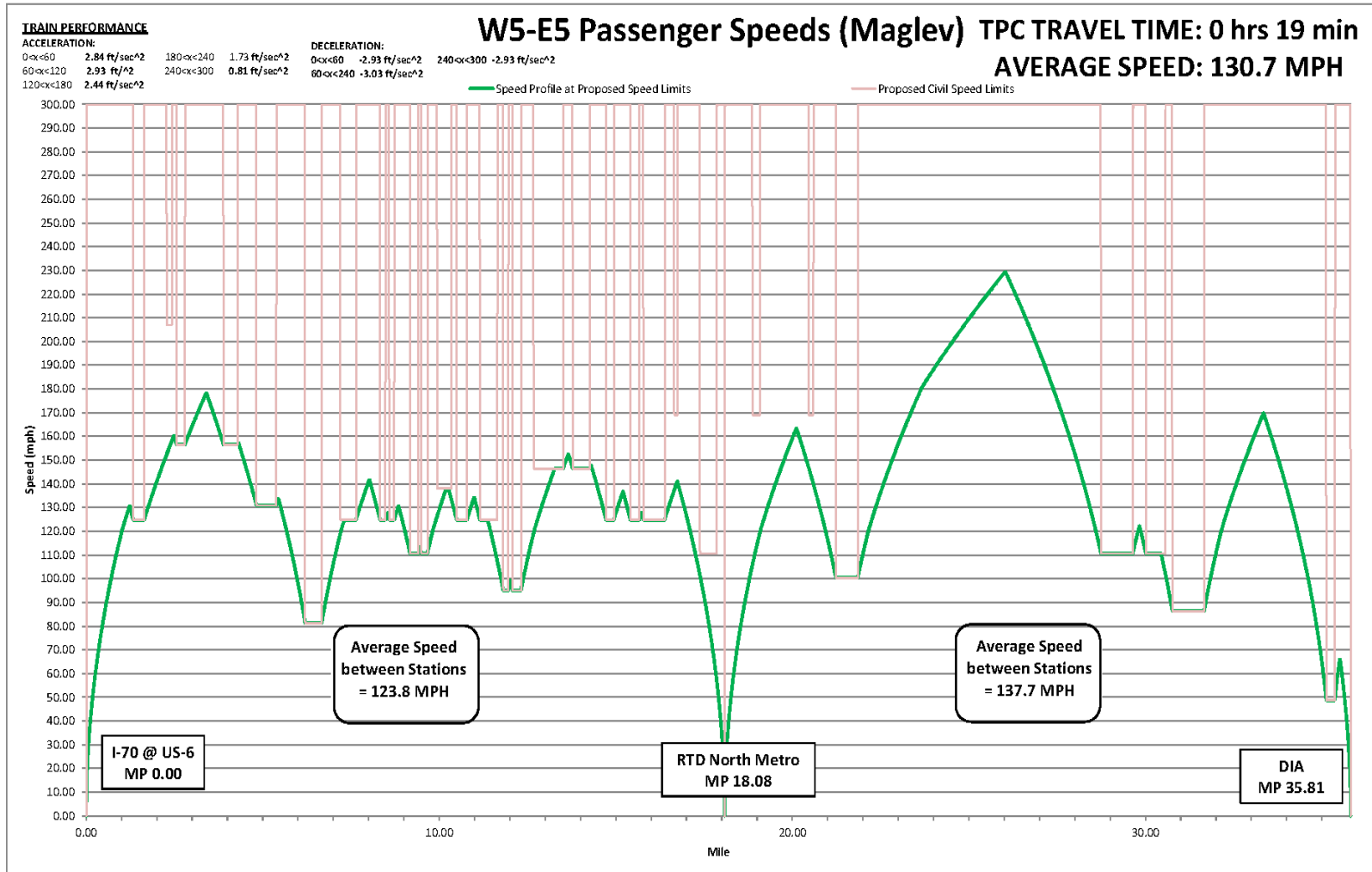


# Example Steel Wheel - Segment W-5/E-5

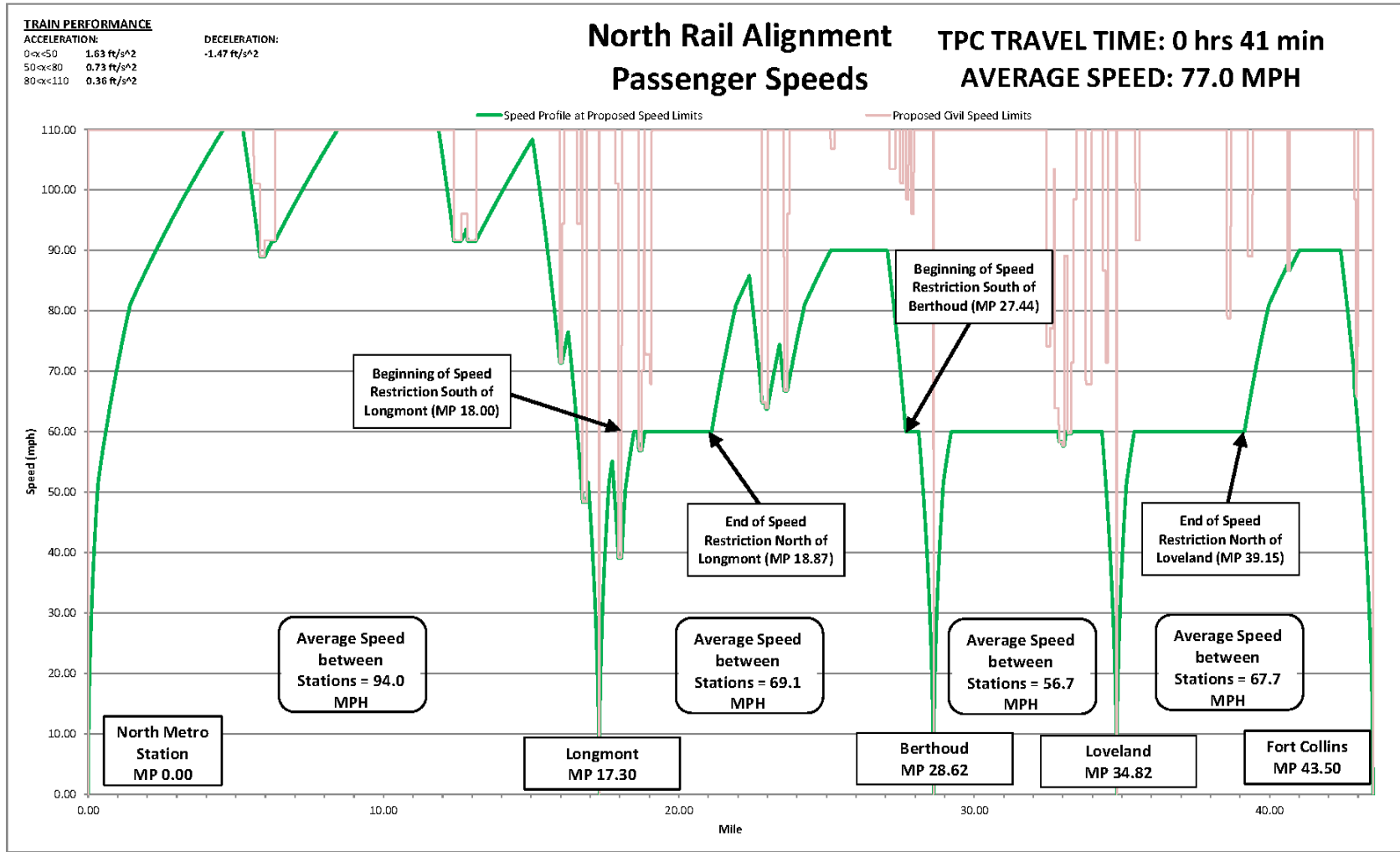




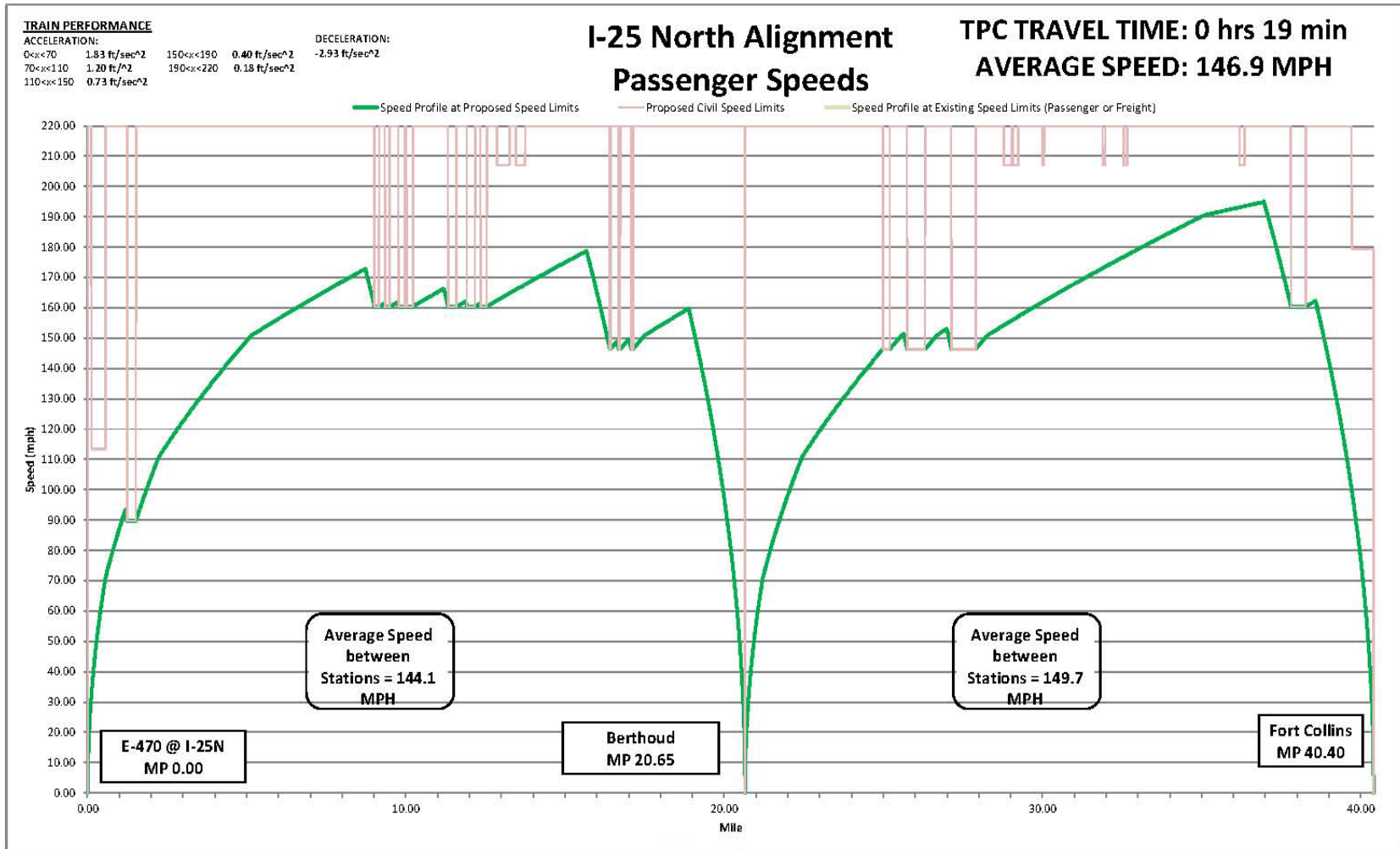
# Example: Maglev - Segment W-5/E-5



# Segment N-1 : (EIS Segment)



# Segment N-2 (I-25)

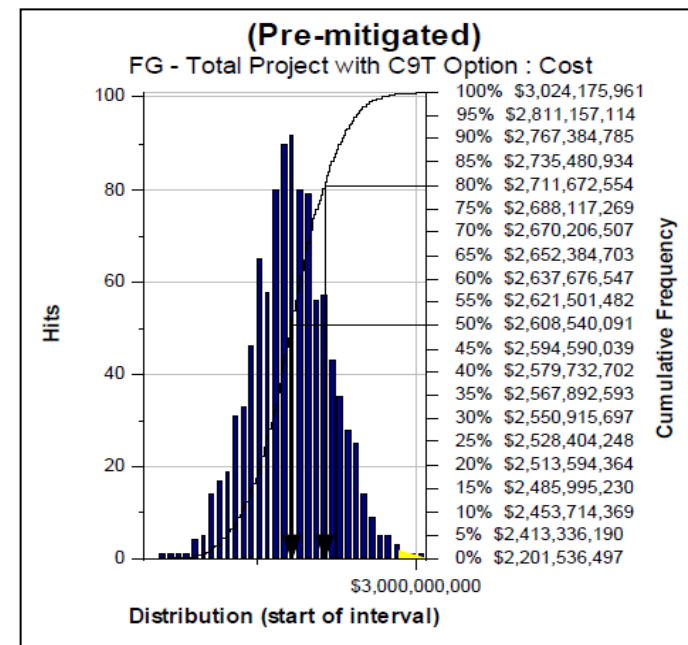
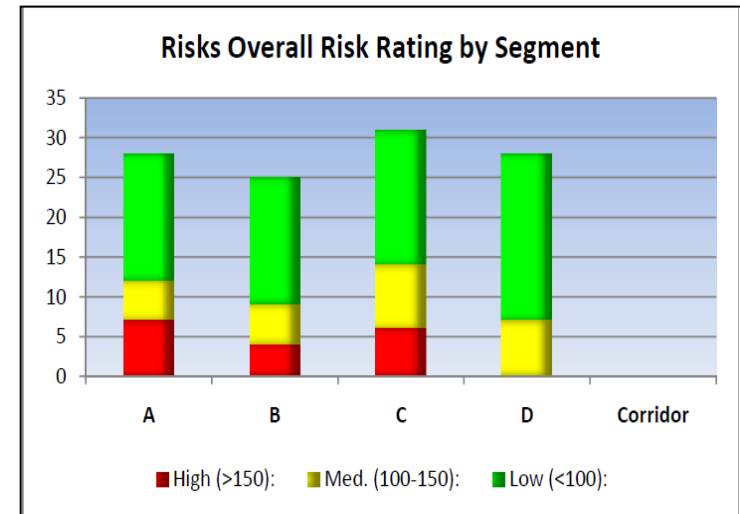


# *Cost Estimating Methodologies*



# 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



# Example of Quantity Measurement



# Key Assumptions – Physical Features

- ▶ All but one alignment is technology neutral
- ▶ All segments assume a double track configuration with ~60 – 100' ROW
- ▶ ROW cost is \$6 million/mile urban and \$3 million/mile rural
- ▶ 13 stations from \$25 to \$50 million
- ▶ 1 ICS Maintenance Facility at \$200 M
- ▶ 4 Layover Facilities at \$10 million each
- ▶ Transit vehicles costs are not included yet – service plan needed

# Configuration Assumptions

- ▶ For all East-West scenarios two design options are considered:
  - Option A – US 6 to DUS to DIA
  - Option B – I-76 to DIA
  
- ▶ North to Fort Collins two segment options:
  - Option A – N-1 (EIS alignment )
  - Option B – N-2 (I-25)
  
- ▶ South to Pueblo one segment option



# Key Assumptions Soft and Other Costs

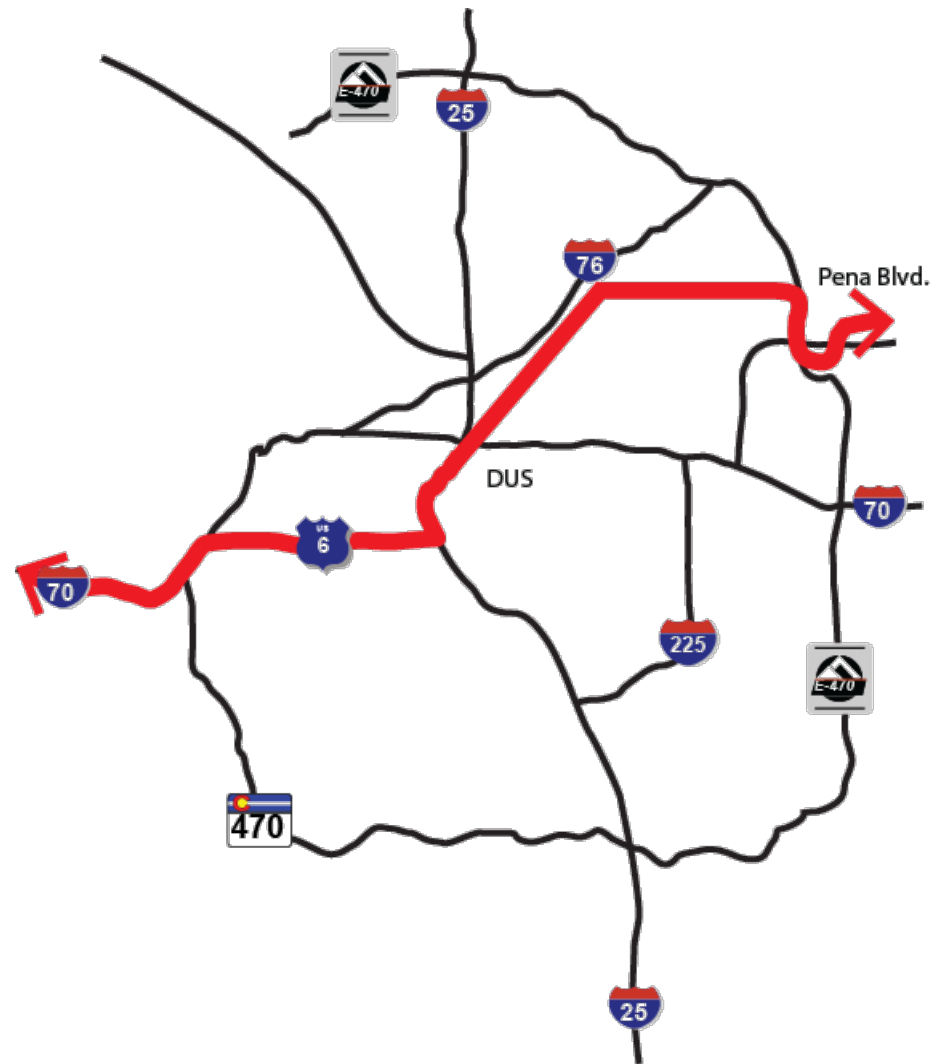
- ▶ Soft costs such as engineering and program management at 26%
- ▶ Utilities at 6% for urban areas and 3% rural areas
- ▶ Environmental Mitigation at 2.5 %
- ▶ Contingency at 30%



# *Level 2 Results – Segment Pairs*

# E/W Through Denver: US 6/CML/96<sup>th</sup> Ave

1. Travel time: 24 min
2. Ave. speed: 115 mph
3. Top Speed: 170 mph
4. Cost: \$2.58 Billion
5. ROW requirements will result in many community impacts
6. Noise, EJ issues & community impacts



East/West: I-70 ► US 6 ► CML/BrushLine ► 96th Ave ► DIA

# E/W Through Denver: I-70

1. Travel time: 26 min
2. Ave. speed: 99 mph
3. Top Speed: 160 mph
4. Cost: \$2.82 Billion
5. Not supported by CDOT – inconsistent with EIS
6. EJ issues & community impacts



East/West: I-70 ▶ New Stockyards Station ▶ I-70 ▶ DIA

# E/W Through Denver: I-76 (new for L-2)

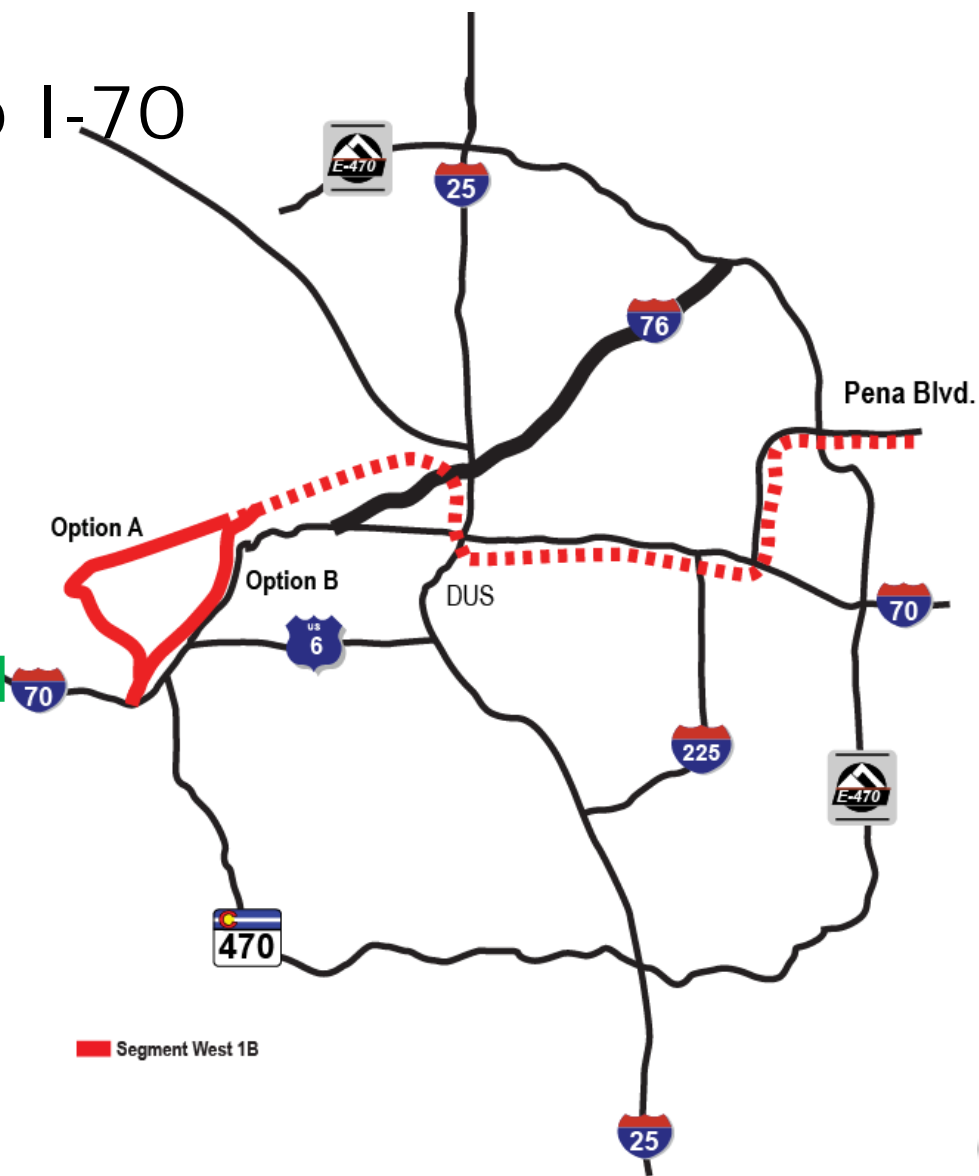
1. Travel time: 23 min
2. Ave. speed: 106 mph
3. Top Speed: 165 mph
4. Cost: \$2.44 Billion
5. Fewer environmental/  
community issues than  
other E-W segments
6. Opposition to 96<sup>th</sup> Avenue  
alignment



East/West: I-70 ► I-76 ► New North Metro Station ► 96th Ave ► DIA

# Shared Track: Extend Gold Line to I-70

1. Travel time: 56 min
2. Ave. speed: 45 mph
3. Top Speed: 130 mph
4. Cost: \$0.56 Billion
5. Increased train movements will increase local noise and community disruption
6. May not work operationally with single-track
7. Arvada recorded concerns



# E/W Around Denver: Beltways South

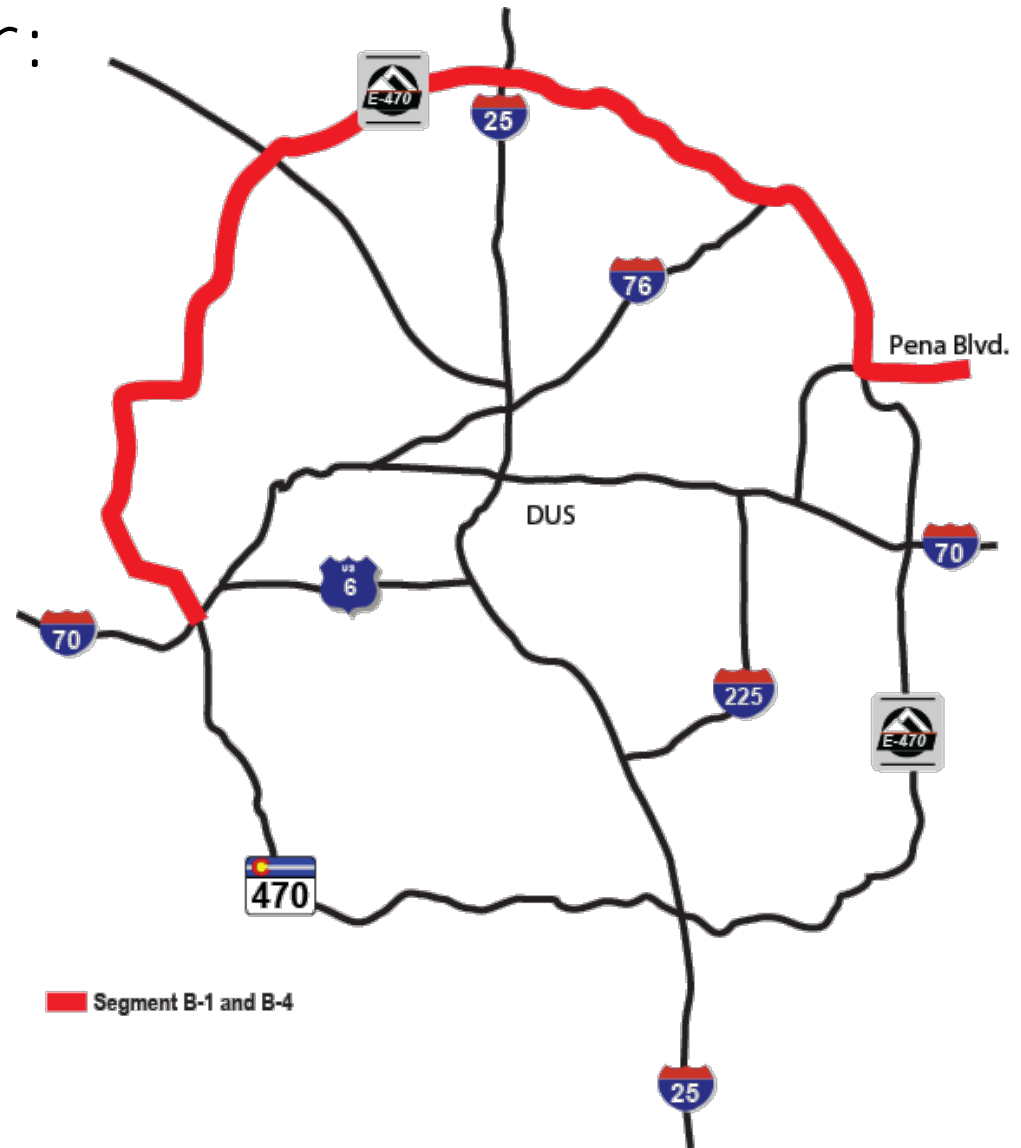
1. Travel time: 35 min
2. Ave. speed: 106 mph
3. Top Speed: 157 mph
4. Cost: \$3.50 Billion
5. Follows corridors with available/dedicated ROW
6. Potential impacts to Chatfield State Park



East/West Around Denver: I-70 ▶ C-470 ▶ E-470 ▶ DIA

# E/W Around Denver: Beltways North

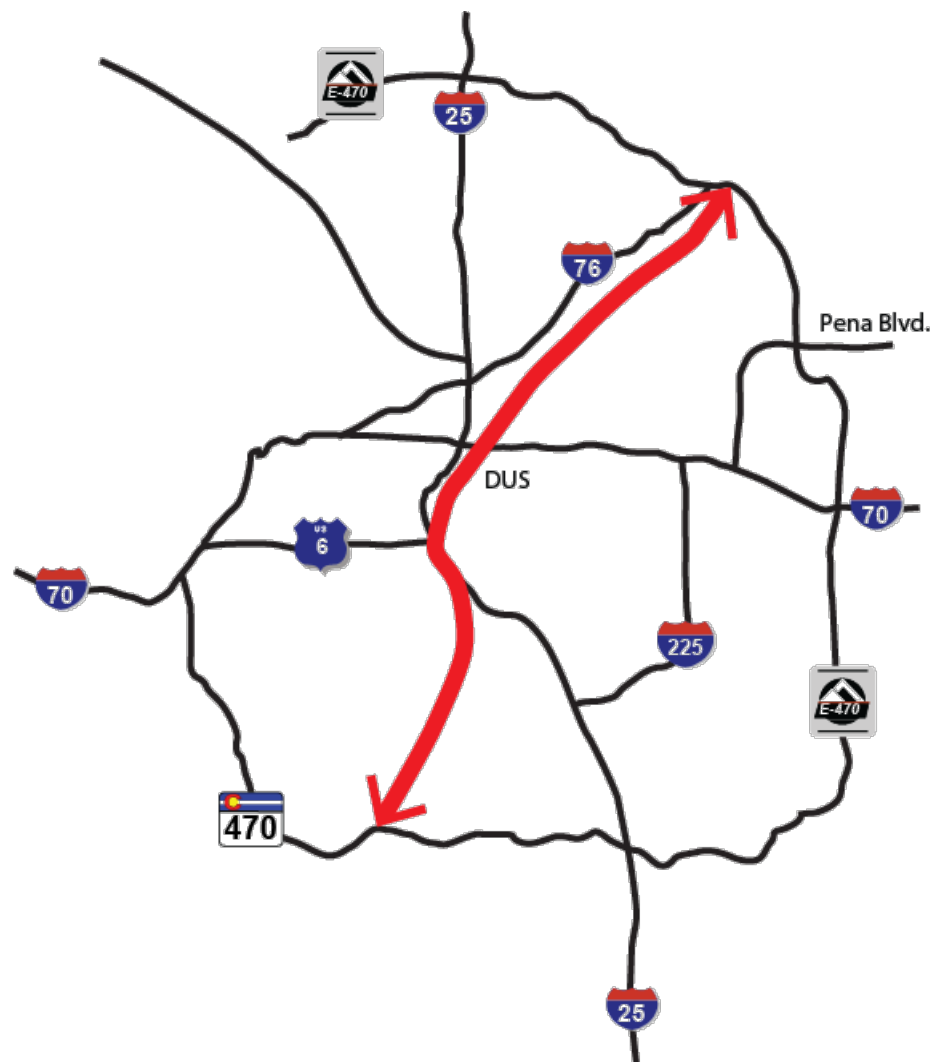
1. Travel time: 37 min
2. Ave. speed: 96 mph
3. Top Speed: 133 mph
4. Cost: \$3.08 Billion
5. Potential impacts to Rocky Flats and open space/wildlife/recreation
6. No ROW and history of public concerns in NW quadrant





# N/S Through Denver: Railroads

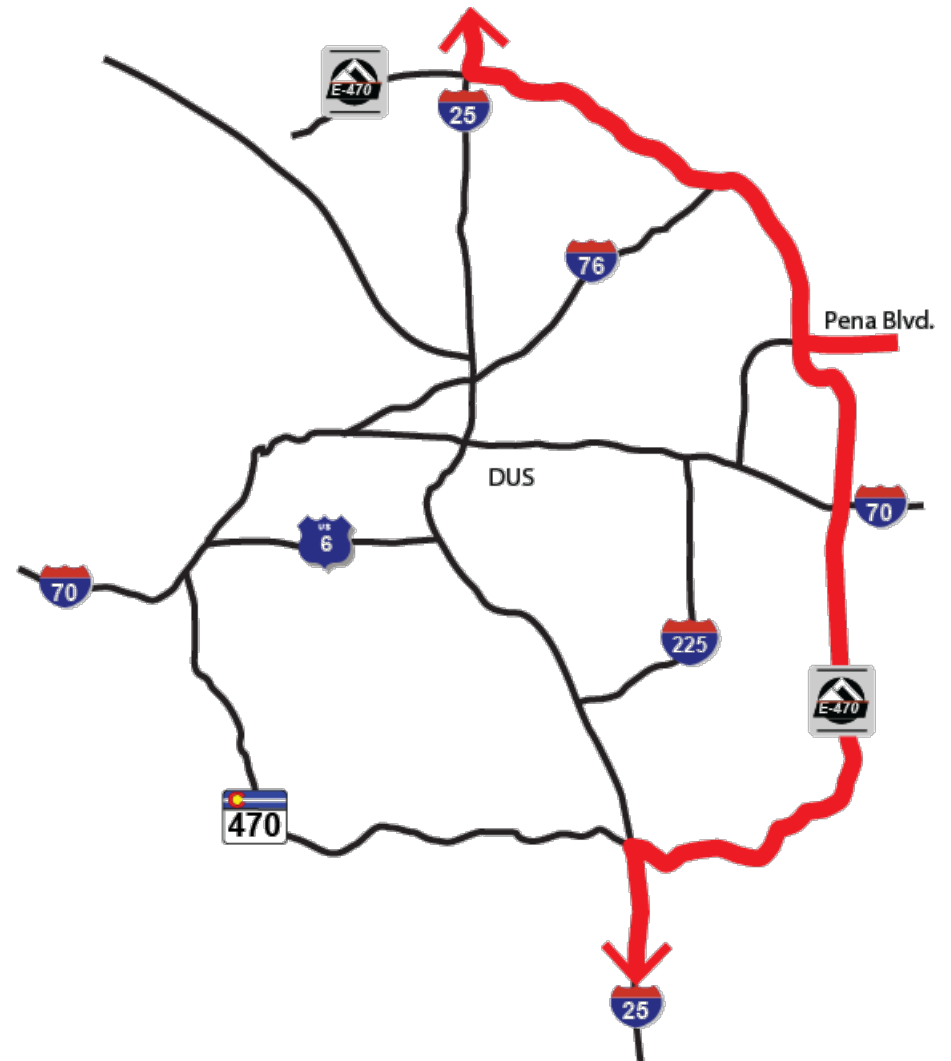
1. Travel time: 27 min
2. Ave. speed: 111 mph
3. Top Speed: 185 mph
4. Cost: \$3.36 Billion
5. Limited availability of right-of-way along freight railroads
6. ROW requirements will result in heavy community impacts



North/South Through Denver: Brush Line ▶ CML ▶ Joint Line ▶ C-470

# N/S Around Denver: Beltways

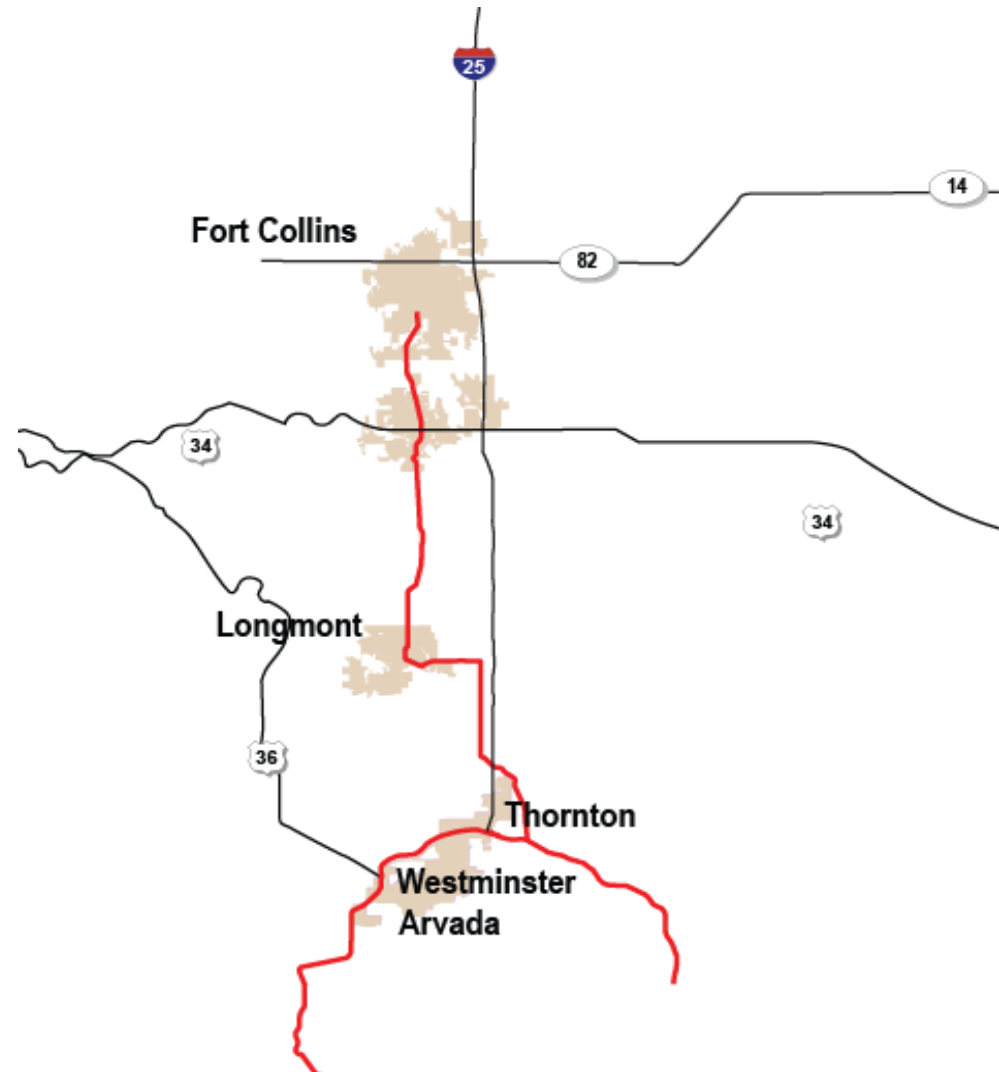
1. Travel time: 31 min
2. Ave. speed: 110 mph
3. Top Speed: 160 mph
4. Cost: \$2.88 Billion
5. E-470 ROW reduces impacts and costs



North/South Around Denver: North I-25 ► E-470 ► DIA ► E-470 ► I-25 ► Castle Rock

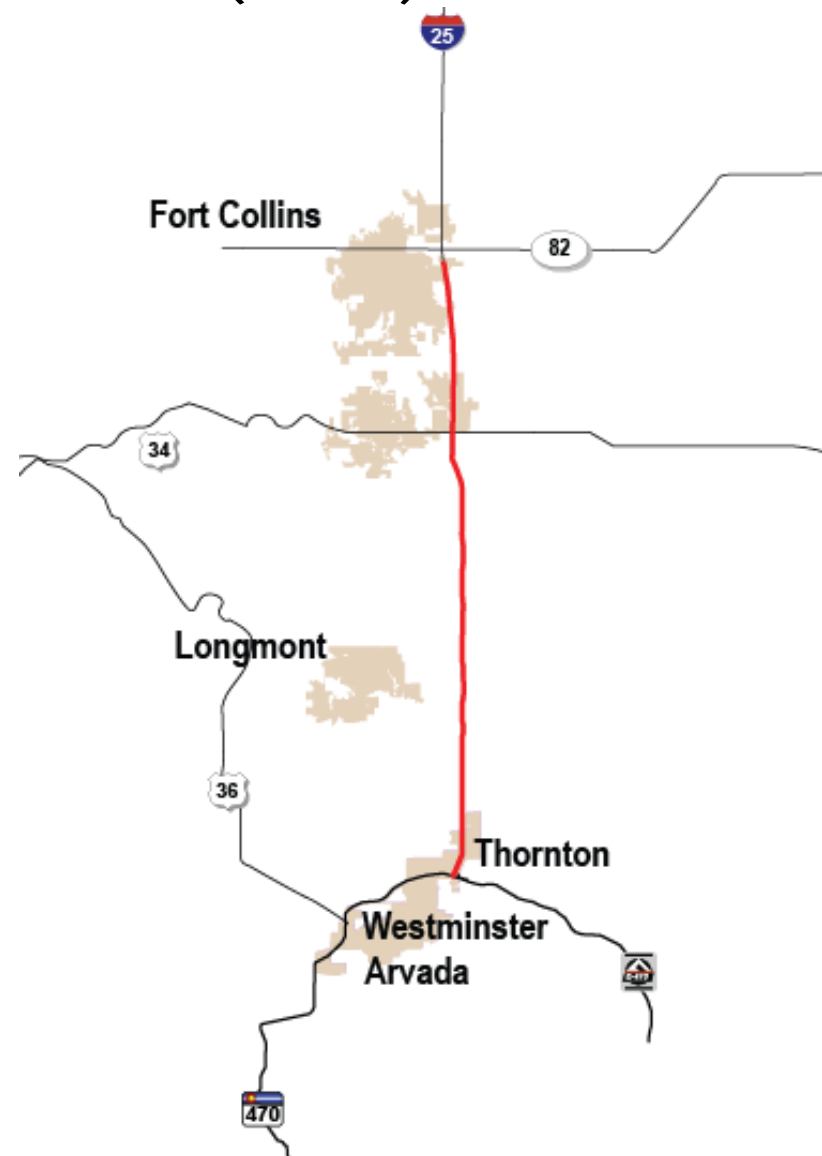
# North to Fort Collins: N-1 (EIS)

1. Travel time: 33 to 41 min
2. Ave. speed: 77 to 99 mph
3. Top Speed: 110 to 160 mph
4. Cost: \$2.90 B to \$4.2 B
5. Supported as commuter rail alignment in EIS/ROD
6. May not be compatible with community development (high speeds/elevated)



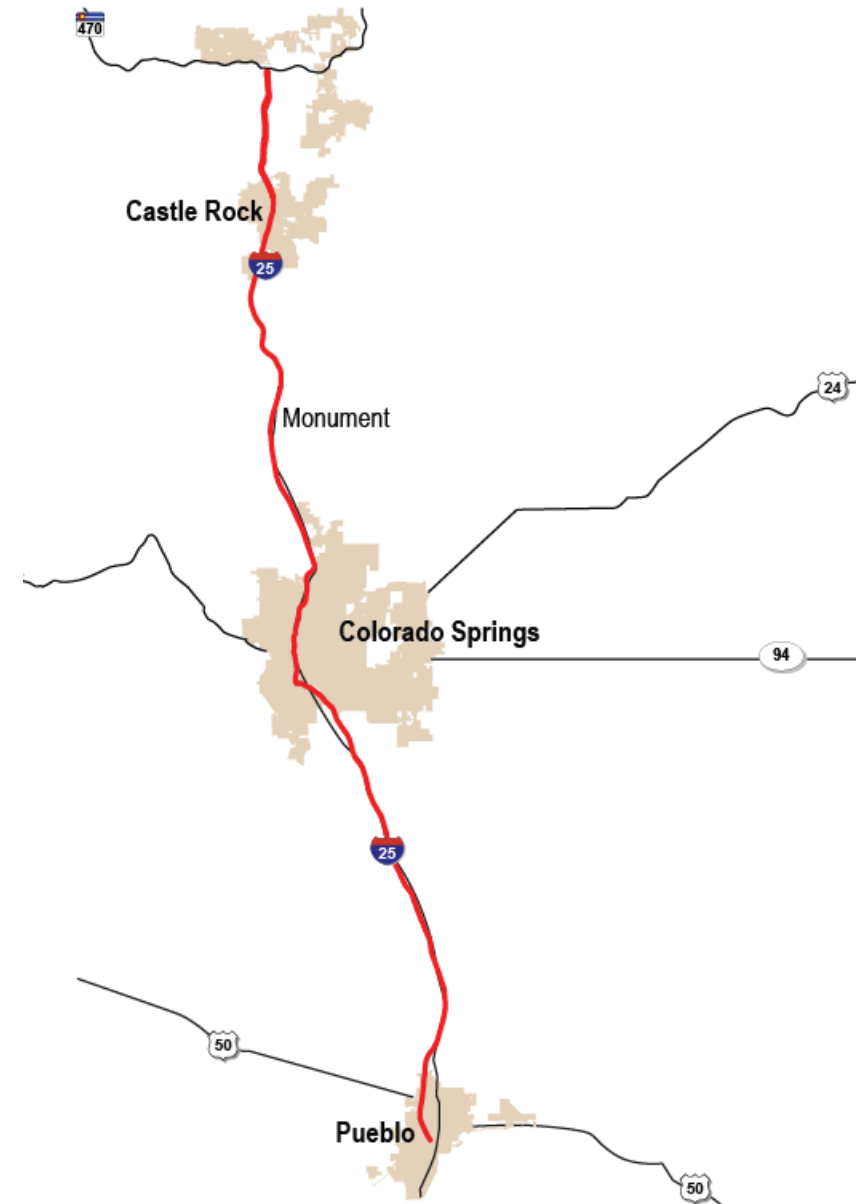
# North to Fort Collins: N-2 (I-25)

1. Travel time: 19 min
2. Ave. speed: 147 mph
3. Top Speed: 195 mph
4. Cost: \$1.68 Billion
5. Uses CDOT ROW and away from developed communities (few impacts)
6. Alignment is located away from community centers and is not widely supported by the communities



# South to Pueblo: (New for L-2)

1. Travel time to COS: 27 min
2. Travel time to Pueblo: 61 min
3. Ave. speed: 128 mph
4. Top Speed: 180 mph
5. Cost: \$6.88 Billion
6. Community impacts through Castle Rock and Colorado Springs
7. Wetland, stream, floodplain impacts



# Conclusions: Speed versus Cost for Segment Pairs

## ▶ Through Denver Metro

- The I-76 Alignment (W-5/E5) and the US 6 Alignment (W4/E4) are comparable

## ▶ Around Metro Denver (E-W)

- The southern segment is 2 minutes faster than the northern segment
- However the northern segment costs \$0.4 Billion less

## ▶ Metro Denver Segments N-S are comparable

## ▶ North to Fort Collins

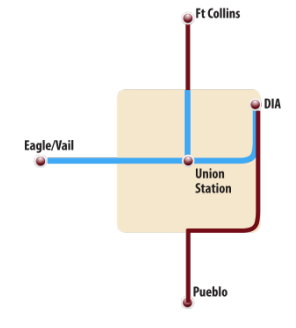
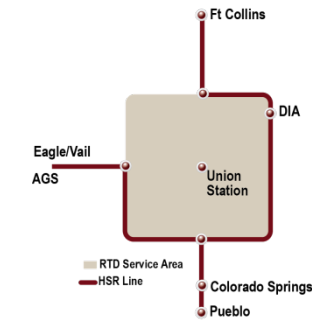
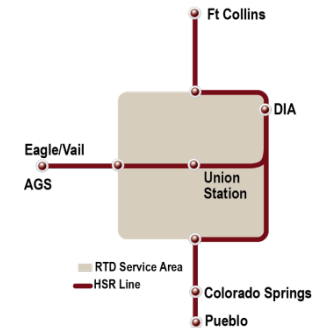
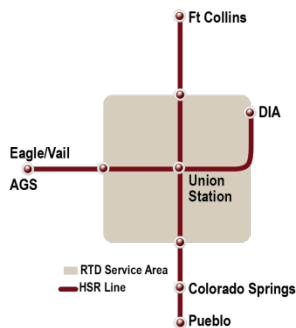
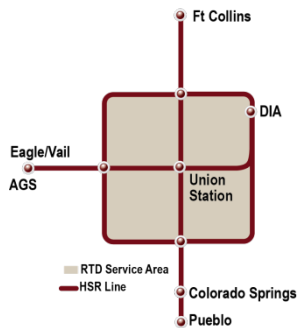
- The I-25 (N-2) alignment is faster at 19 minutes versus 33 to 41 minutes and costs much less than the EIS (N-1) alignment

# *Rollup Scenario Costs*



# Scenarios to be Modeled in L-2

## Scenario



North	\$1.7 Billion	\$1.7 Billion	\$1.7 Billion	\$1.7 Billion	\$1.7 Billion
Denver Metro	\$12.0 Billion	\$6.5 Billion	\$5.9 Billion	\$5.0 Billion	\$3.1 Billion
South	\$6.9 Billion	\$6.9 Billion	\$6.9 Billion	\$6.9 Billion	\$6.9 Billion
<b>TOTAL</b>	<b>\$20.6 Billion</b>	<b>\$15.1 Billion</b>	<b>\$14.5 Billion</b>	<b>\$13.6 Billion</b>	<b>\$11.7 Billion</b>



# Conclusions on Scenarios

- ▶ Concept A-6 would not likely be implemented due to high costs, impacts and redundancy
- ▶ Concept A-1 (through Denver) at \$15.1 B may be competitive with B-2A (beltway) at \$13.6 B depending on ridership
- ▶ Concept A-5 at \$14.5 may be a better option to A-1 if N-S (railroad) construction is not implementable
- ▶ Scenario A-5 also will have fewer community impacts than A-1
- ▶ Concept C-1 saves about \$3.4 B, has fewer impacts, but will likely have lower ridership than A-1



# *Revenues and Financing Options*

# Purpose

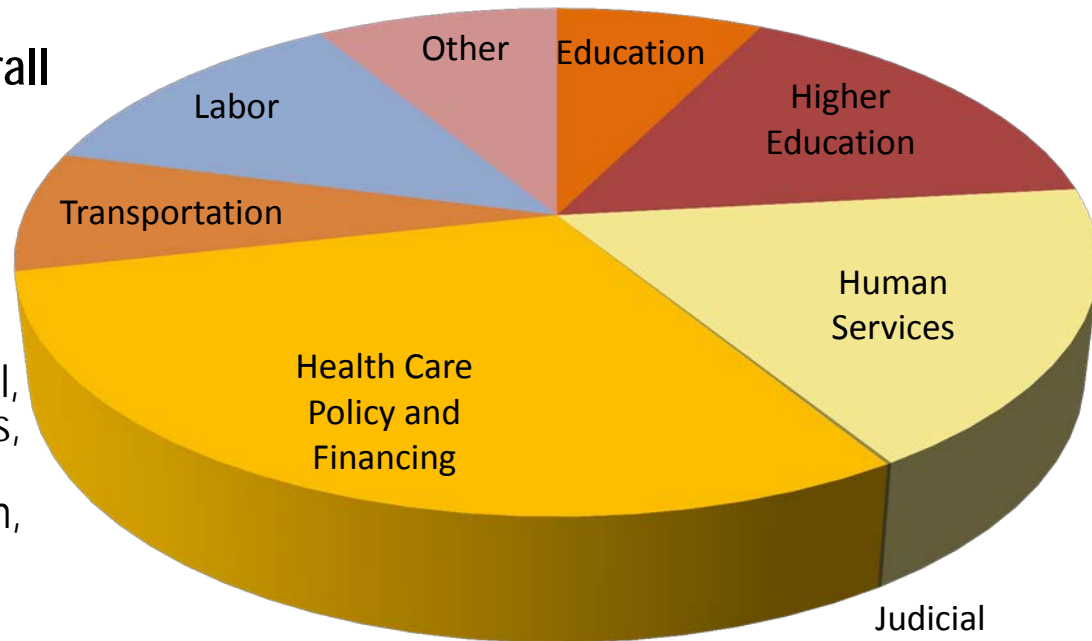
- ▶ ICS costs range from \$11 to \$14.5 B (\$2013)
- ▶ Assuming phasing and 50% federal grants, a first phase project of \$2 B would require ~\$65 M per year in revenue.
- ▶ Identify types of funding sources, including new fees and taxes
- ▶ Determine general level of revenue potential
- ▶ Determine the level of political will for new revenue sources
- ▶ Does not assume that all will be implemented

# Approach

- ▶ Literature research of other funding approaches
- ▶ Colorado State Budget
- ▶ Colorado Department of Transportation
- ▶ Identify transportation funding sources and general government sources and current funding levels
- ▶ Assume levels of revenues generated through stated assumptions about increases

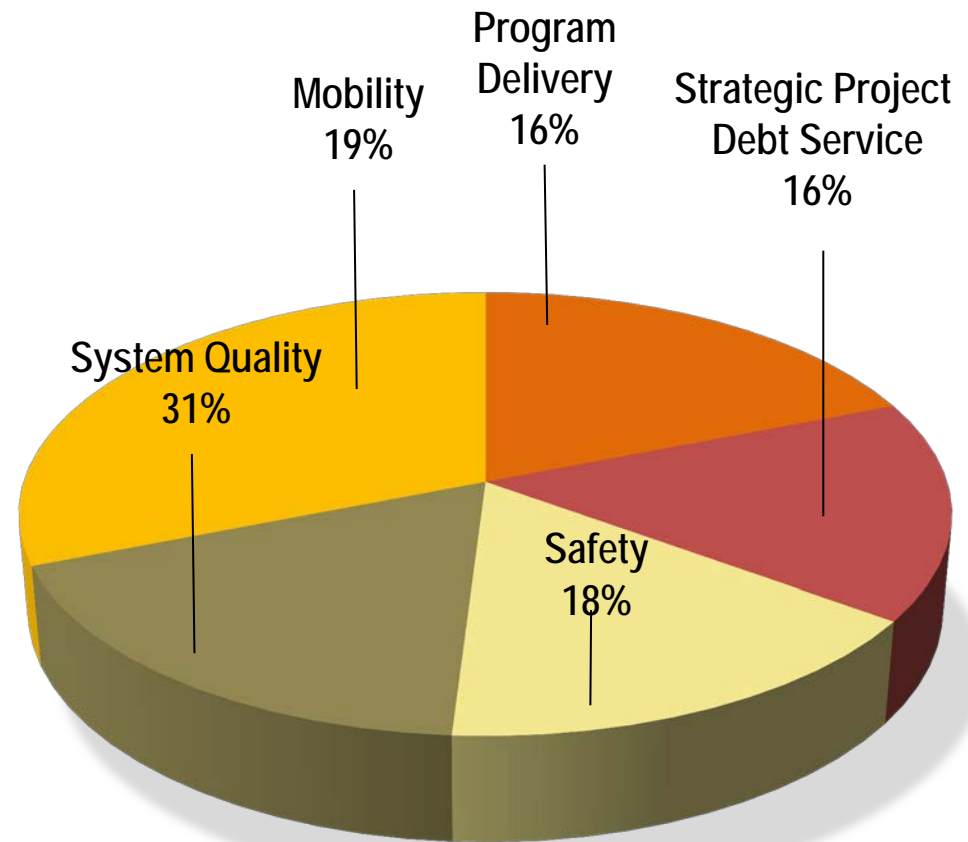
# Colorado State Government

- ▶ \$25 billion budget (FY 2010-2011)
- ▶ Transportation is about 5% of overall state budget at \$1.3 billion
- ▶ 22 departments
  - Agricultural, Corrections, Education, Governor, Health Care, Higher Education, Human Services, Judicial, Labor, Law, Legislature, Local Affairs, Military & Veteran Affairs, Natural Resources, Personnel, Public Health, Public Safety, Regulatory Agencies, Revenue, State, Treasury
- ▶ Largest departments: Health Care & Education



# CDOT Revenue & Expenditures, FY 2010-2011 (\$1.3 B)

- ▶ **Highway Users Tax Fund**
  - Fuels Tax & Registration fees
- ▶ **Federal Funds – MAP 21**
  - Federal fuels tax
- ▶ **ARRA / Tiger – ARRA mostly complete**
- ▶ **FASTER - \$292 M per year to 2035**
  - \$15 M for transit
  - Bridge reconstruction, highway safety, transit
  - Vehicle registration fees



# Identifying Sources

## ◉ Currently used for transportation

- Motor Fuel Taxes
- Vehicle Registration Fees

## ◉ Other General Government

- Sales Taxes
- Income Taxes
- Property Taxes
- Profits from Lottery Sales

## ◉ Others

- Farebox Revenues
- Value Capture Mechanisms (Fees)
- Vehicle Miles Travelled (VMT) Fees
- Utility Fees
- Lodging (or other Visitor Fees)

# One Percent Increase in Sales Tax

County	State Sales Tax FY 2010-2011	Total Revenues*	With 1% increase
Adams	\$160,759,000	\$5,543,413,793	\$55,434,138
Arapahoe	\$230,854,000	\$7,960,482,759	\$79,604,828
Boulder	\$114,262,000	\$3,940,068,966	\$39,400,690
Broomfield	\$29,947,000	\$1,032,655,172	\$10,326,552
Clear Creek	\$2,068,000	\$71,310,345	\$713,103
Denver	\$326,757,000	\$11,267,482,759	\$112,674,828
Douglas	\$107,968,000	\$3,723,034,483	\$37,230,345
Eagle	\$35,047,000	\$1,208,517,241	\$12,085,172
El Paso	\$199,283,000	\$6,871,827,586	\$68,718,276
Gilpin	\$2,288,000	\$78,896,552	\$788,966
Jefferson	\$184,036,000	\$6,346,068,966	\$63,460,690
Larimer	\$108,058,000	\$3,726,137,931	\$37,261,379
Pueblo	\$50,008,000	\$1,724,413,793	\$17,244,138
Summit	\$24,245,000	\$836,034,483	\$8,360,345
Teller	\$5,289,000	\$182,379,310	\$1,823,793
Weld	\$77,775,000	\$2,681,896,552	\$26,818,966
<b>County Totals</b>	<b>\$1,658,644,000</b>	<b>\$57,194,620,690</b>	<b>\$571,946,207</b>



# Revenue Summary 2011 and 2035 Population

Sources	Increase / Change	Revenues Generated (2011\$M)	Revenues Generated (2035 Pop in M\$)
<i>User Fees</i>			
Farebox Revenues	TBD	TBD	
Motor Fuel Purchase Tax Increase	\$.25 per gallon	\$447	\$715
VMT Fees	\$.01 per mile	\$393	\$629
Increase in Vehicle Registration Fees	\$100 per vehicle	\$391	\$626
Utility Fees	\$15 per month per household	\$294	\$470
<i>General Revenues</i>			
Increased State Sales Tax	1%	\$572	\$915
Increased State Property Tax	4 mills	\$200	\$320
Increased State Income Tax	1%	\$1,044	\$1,670
Lodging Tax	1% of current statewide lodging spending	\$27	\$43
Change in Lottery Tax Allocation	Reallocation of 10% of lottery program profits	\$11	\$18
<i>Value Capture Mechanisms</i>			
Development Fee	\$10,000 per residential unit and 1% fee on the value of commercial development	\$169	\$270
<b>Total</b>		<b>\$3,548</b>	<b>\$5,676</b>

# Selection Criteria

- ▶ Does not assume that all will be implemented
- ▶ Does not assume the levels suggested
  - Financial Effectiveness
  - Transportation Efficiency
  - Fiscally Efficient
  - Equity
  - Political Acceptability
  - Impact on Competitiveness

# *Break-out Groups*



# Breakout Groups –

- ▶ Break into 5 groups
- ▶ Exercise: If you were charged with coming up with a strategy to fund an initial operating segment of HST/HSIPR, what funding sources would you consider?
- ▶ Would they be equitable, politically acceptable and competitive?
- ▶ Rank and report back to the larger group

# Next Steps: March – Early April

- ▶ Ridership and Revenue Estimation

- ▶ OPEX Estimation

- ▶ Cost-Benefit Analyses

- Operational Surplus Calculations
- B/C Calculations

- ▶ Next PLT Early April

A group of approximately 15 people are seated around a large, light-colored rectangular table in a meeting room. They are looking at documents and papers spread across the table. Some are pointing at the documents, and others are looking towards the center of the table. 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 on the left side.

*Thank you for  
Attending!*