AGS Feasibility Study

PLT Meeting 12
July 17, 2013

Agenda

- Introduction to the Meeting
- Public Comment
- Ridership Modeling
- Statement of Financial Information (SOFI) Update
- Cost Estimate Update
- AGS/ICS/Co-Development Project Coordination
- Conclusion, Final Remarks and Next Steps

Introduction to the Meeting

- Website Update
- Media Outreach

Public Comment

- The public is invited to make brief comments

Ridership Model

Ridership Modelling

1. Overview
2. Ridership and Ticket Revenue Forecasts
3. Demand Forecasting Methodology
4. Intercity Travel Market
   - New Data Collection: Auto Trip Table Development
   - New Data Collection: Stated Preference Survey
5. Other Travel Markets
6. Next Steps in Ridership Modelling

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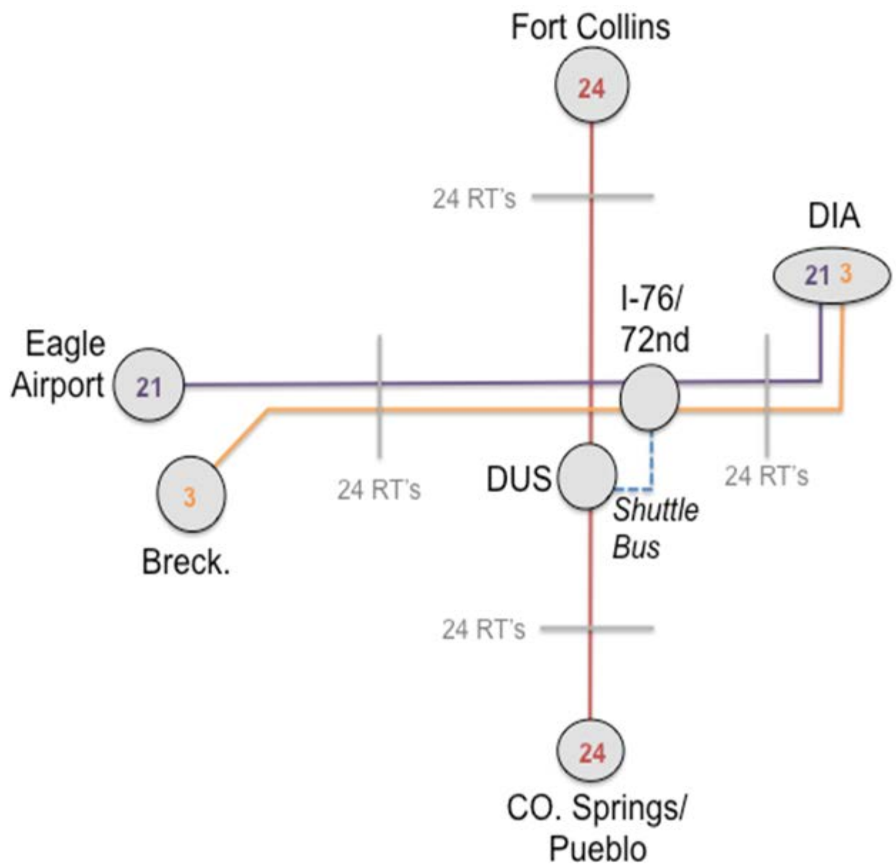
We Want the Ridership Forecasting Approach to be Transparent

- Open, non-proprietary forecasting models
- Network model-based forecasting tool
- 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 collection to
  - Address gaps in available data
  - Allow development of models that reflect the study area characteristics
- Information exchange and documentation
  - Interactions with stakeholders and modelers
  - Modeling Framework Report – circulated
  - Level 2 Analysis Report including Technical Appendix on modeling – circulated

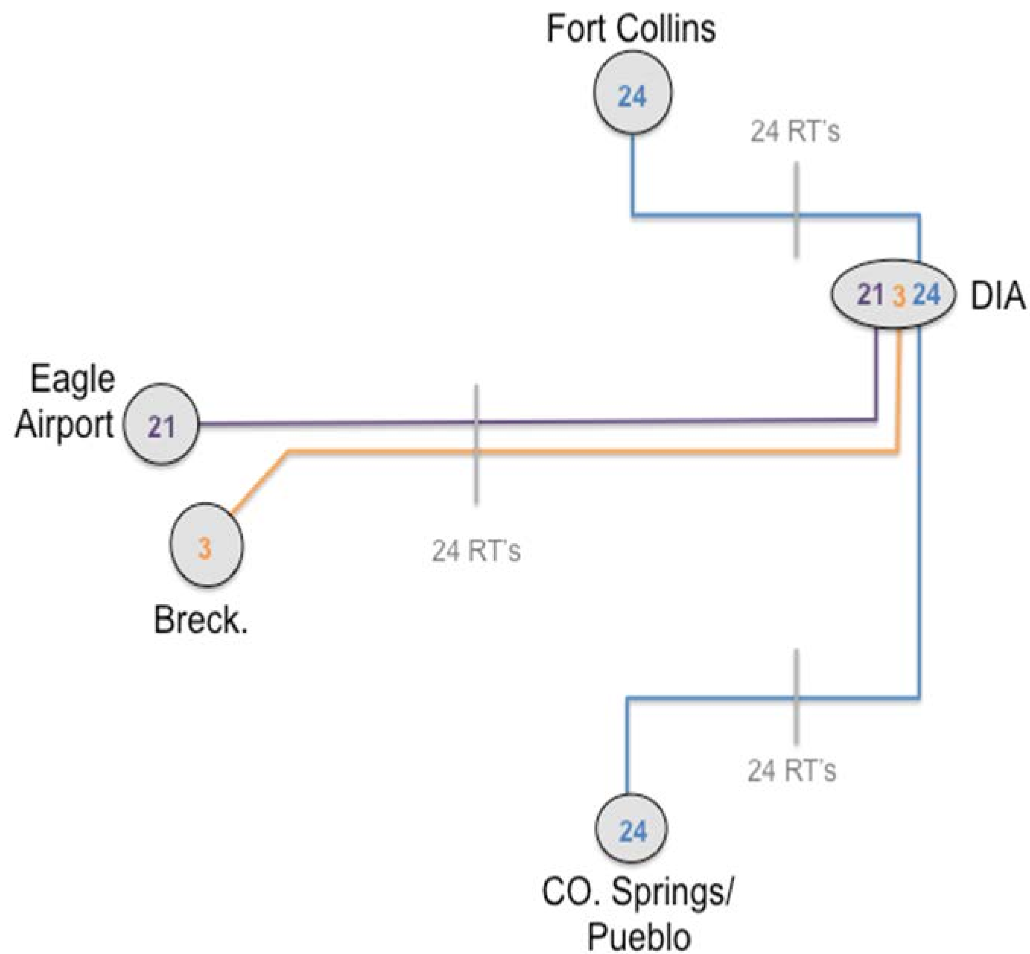
Scenario A-1 (US 6 or I-76): Direct Routing Through Denver (Steel Wheel on Steel Rail)

Station Pair	Travel Time: I-76	Travel Time: US 6
DIA-Eagle	94	96
Fort Collins-Eagle	174	143
Colorado Springs-Eagle	190	160
Fort Collins-Colorado Springs	93	93
Fort Collins-DIA	102	75
Co. Springs-DIA	119	92



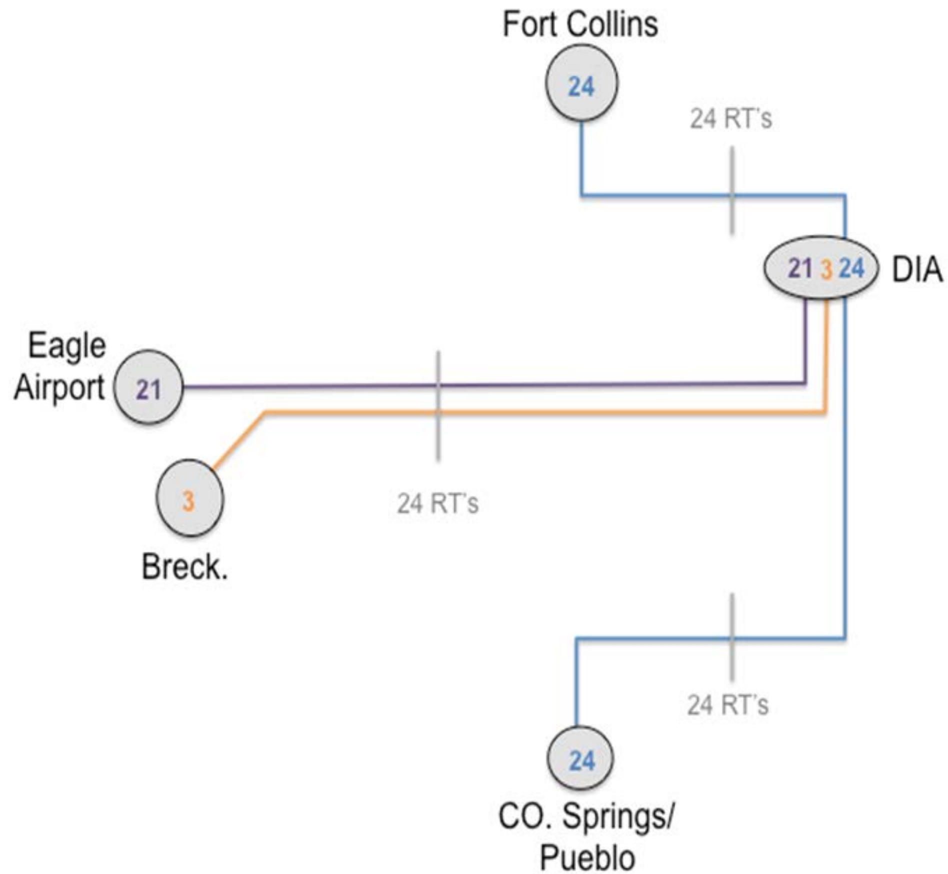
Scenario A-5 (US 6 or I-76): Eastern Beltway (Steel Wheel on Steel Rail)

Station Pair	Travel Time: I-76	Travel Time: US 6
DIA-Eagle	94	96
Fort Collins-Eagle	155	156
Colorado Springs-Eagle	175	176
Fort Collins-Colorado Springs	94	94
Fort Collins-DIA	37	37
Co. Springs-DIA	57	57



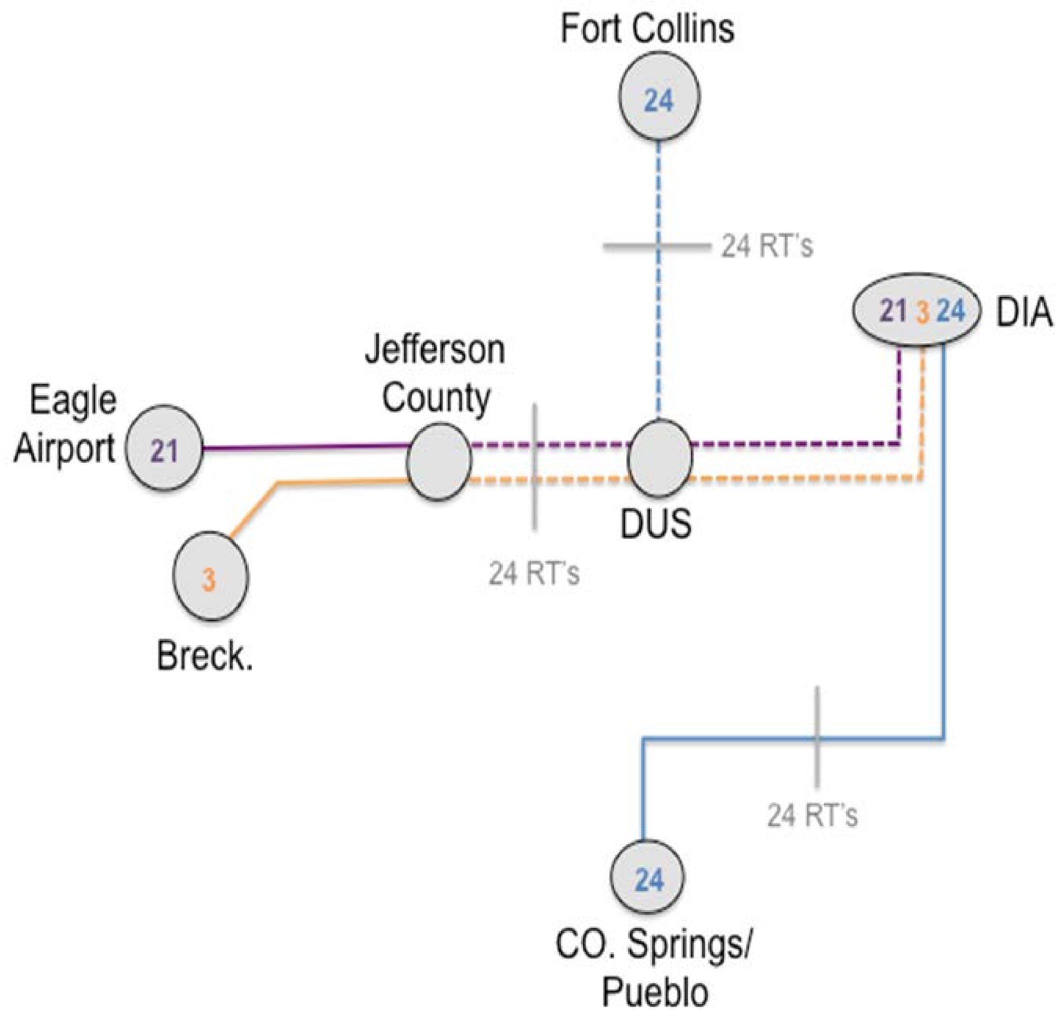
Scenario A-5 (US 6): Eastern Beltway (Steel Wheel on Steel Rail or Maglev)

Station Pair	Med-Speed Hybrid	High-Speed Base	High-Speed Hybrid
DIA-Eagle	125	99	93
Fort Collins-Eagle	185	159	153
Colorado Springs-Eagle	205	179	173
Fort Collins-Colorado Springs	94	94	94
Fort Collins-DIA	37	37	37
Co. Springs-DIA	57	57	57



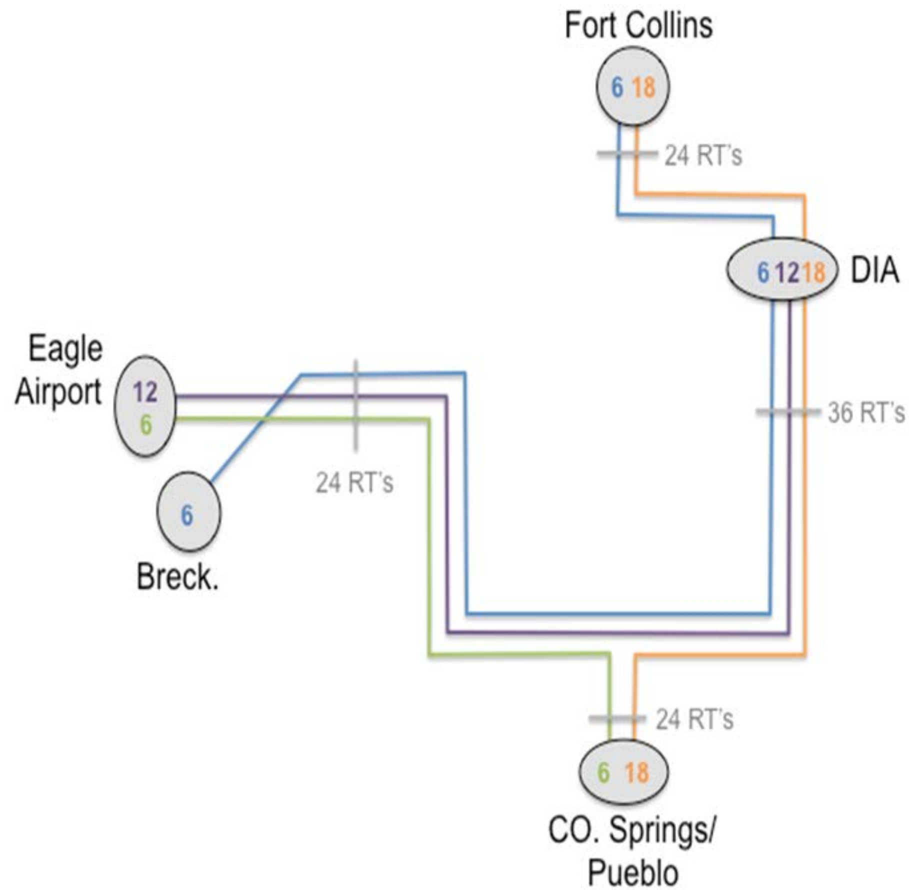
Scenario C-1: Shared Track (Steel Wheel on Steel Rail)

Station Pair	Travel Time
DIA-Eagle	128
Fort Collins-Eagle	171
Colorado Springs-Eagle	206
Fort Collins-Colorado Springs	186
Fort Collins-DIA	101
Co. Springs-DIA	55



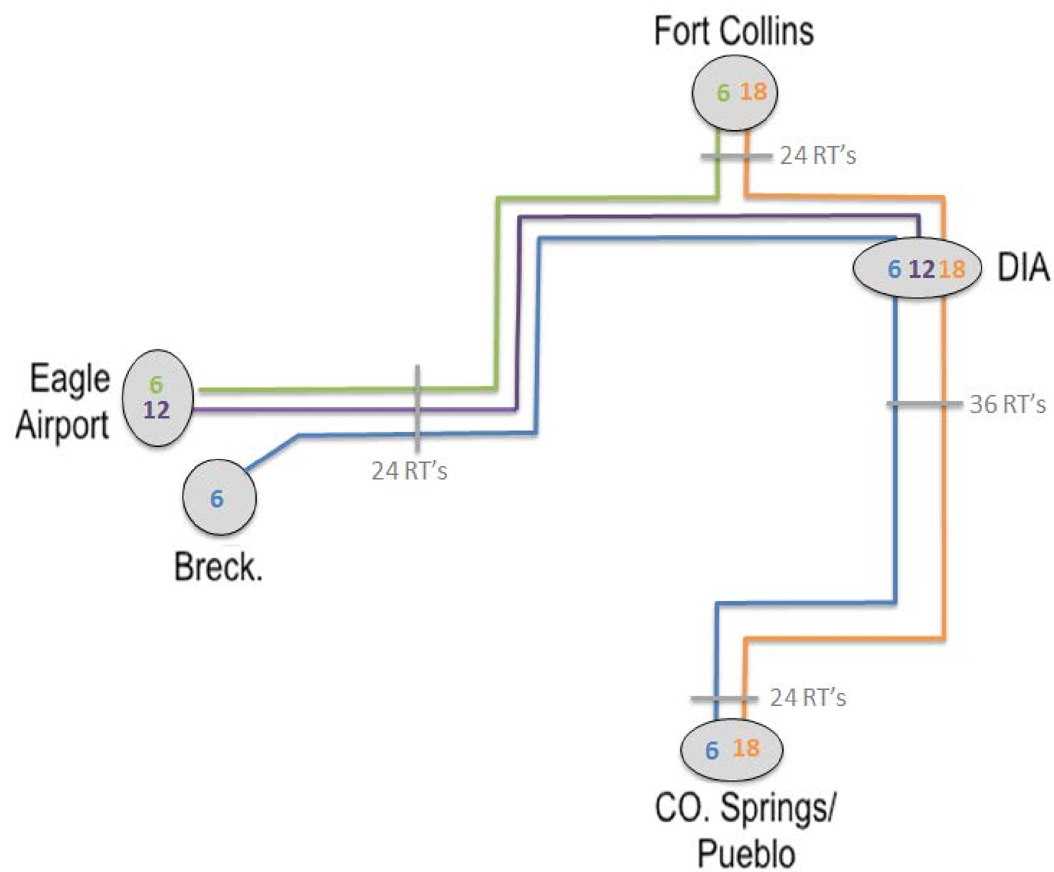
Scenario B-2A: Direct Routing Through South (Steel Wheel on Steel Rail)

Station Pair	Travel Time
DIA-Eagle	112
Fort Collins-Eagle	179
Colorado Springs-Eagle	124
Fort Collins-Colorado Springs	94
Fort Collins-DIA	37
Co. Springs-DIA	57



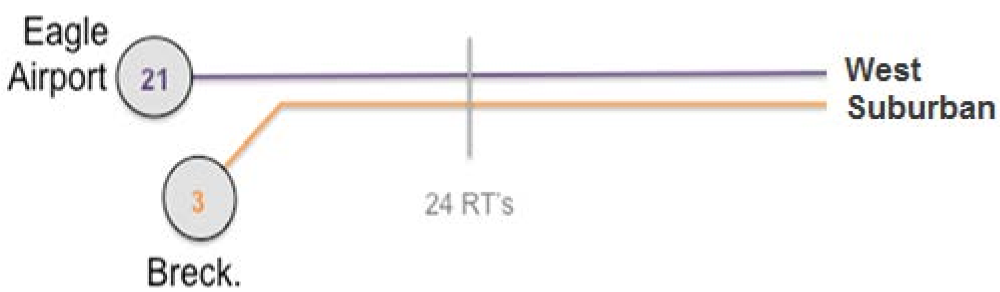
Scenario B-4: Direct Routing Through North (Steel Wheel on Steel Rail)

Station Pair	Travel Time
DIA-Eagle	109
Fort Collins-Eagle	119
Colorado Springs-Eagle	196
Fort Collins-Colorado Springs	94
Fort Collins-DIA	37
Co. Springs-DIA	57



Scenario: Stand-Alone AGS (Steel Wheel on Steel Rail)

Station Pair	Travel Time: I-70
West Suburban-Eagle	71
Breckenridge-Eagle	70
Georgetown-Eagle	55
Silverthorne-Eagle	39
Vail Station-Eagle	23



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Ridership and Revenue Summary

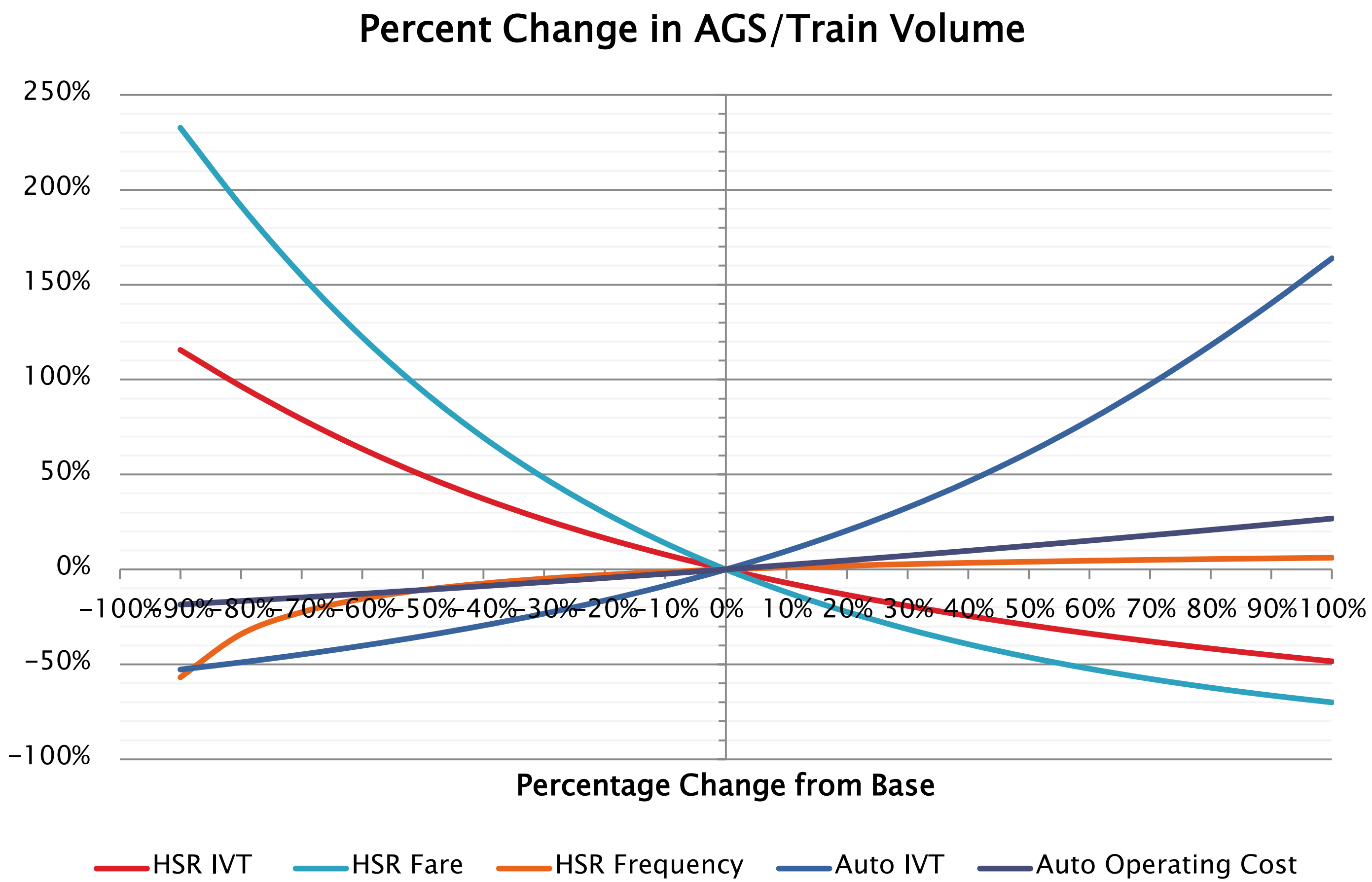
Scenario	I-70 Ridership (millions)	I-70 Revenue (millions)	Total Ridership (millions)	Total Revenue (millions)
A-1 (I-76)	3.2	$103.8	12.2	$293.8
A-1 (US 6)	3.9	$126.8	13.2	$323.1
A-5 (I-76)	3.4	$114.4	13.0	$305.0
A-5 (US 6)	3.1	$103.6	13.1	$306.8
C-1	2.2	$75.5	10.8	$242.7
B-2a	4.3	$137.4	13.8	$319.0
B-4	3.9	$124.8	13.7	$310.3
Stand-alone AGS	3.0	$72.9	3.0	$72.9
A-5 (I-76) High Speed Maglev Base	3.3	$114.7	12.9	$306.0
A-5 (I-76) Medium Speed Maglev Hybrid	2.9	$93.4	12.5	$284.7
A-5 (I-76) High Speed Maglev Hybrid	3.6	$123.7	13.2	$315.0

All revenues in 2012 $

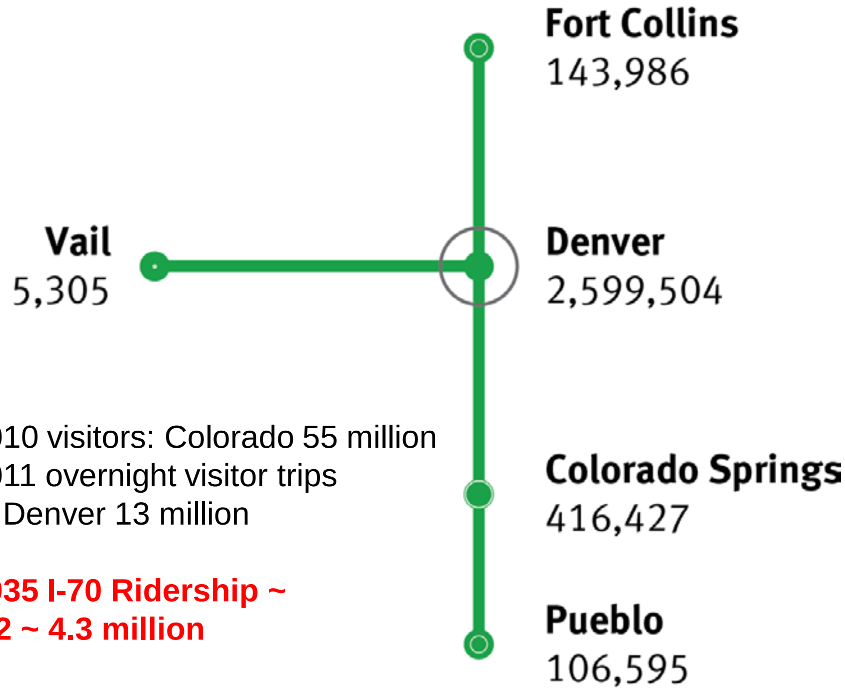
Auto Diversion is High on the East West I-70 Corridor

- Auto diversions in the study region are from 5.9% to 7.6%
  - These are quite high intercity auto diversion percentages based on established standards
  - We typically observe percentages in the range of ~3% to 5% on other studies
- These percentages are even higher when both origin and destination are located on the East West corridor: 8% to 11.4%
- However, the diversion percentages are lower for travel between I-70 & I-25 North and I-70 & I-25 South
  - Between I-70 and I-25 North: 1.5% to 6.4%
  - Between I-70 and I-25 South: 1.0% to 6.8%

Sensitivity of the Intercity Model AGS/Train Ridership Forecasts



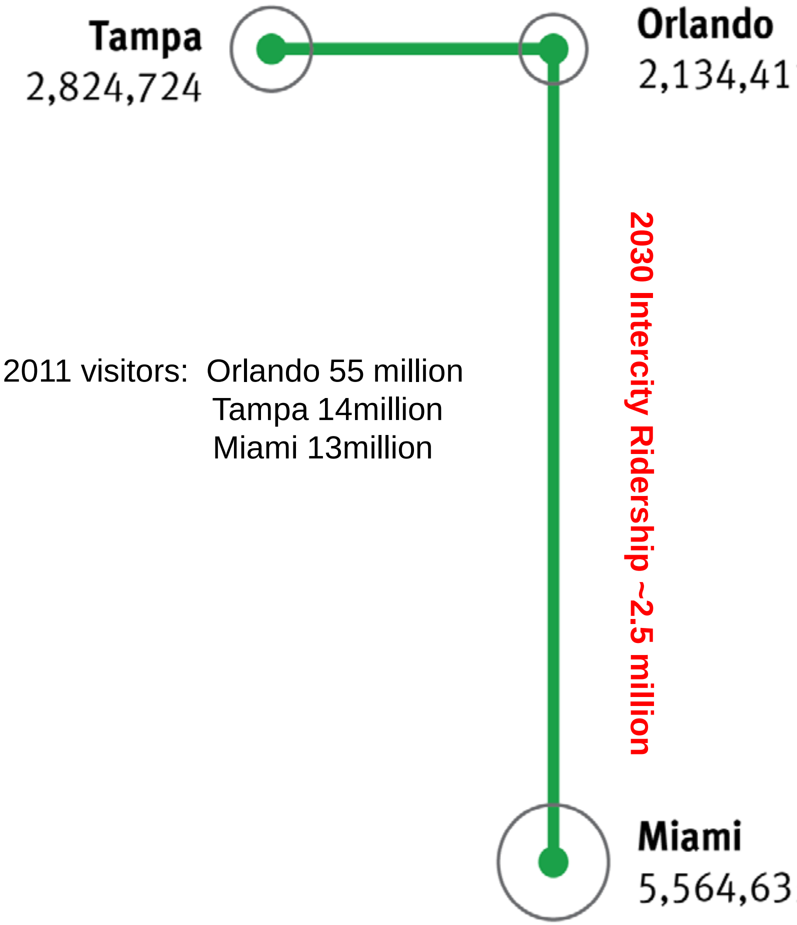
Ridership Benchmark Against Other HSR Corridors



2010 visitors: Colorado 55 million
2011 overnight visitor trips
to Denver 13 million

2035 I-70 Ridership ~ 2.2 ~ 4.3 million

2026 Intercity Ridership ~3.5 million



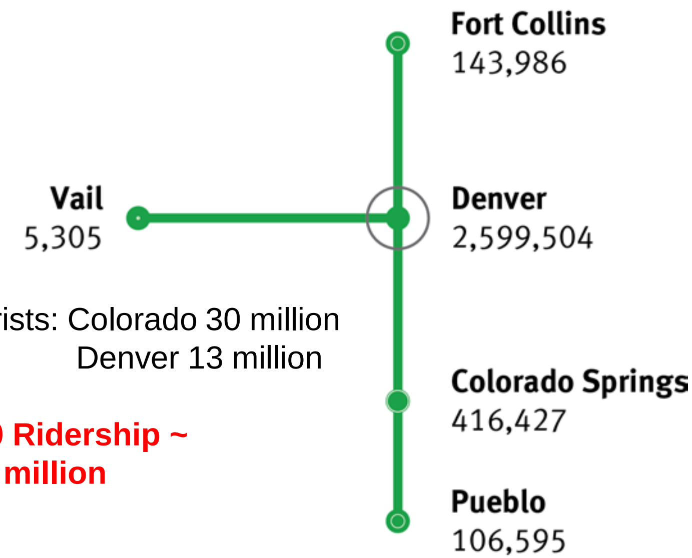
2011 visitors: Orlando 55 million
Tampa 14million
Miami 13million

2030 Intercity Ridership ~2.5 million

Ridership Benchmark Against Other HSR Corridors

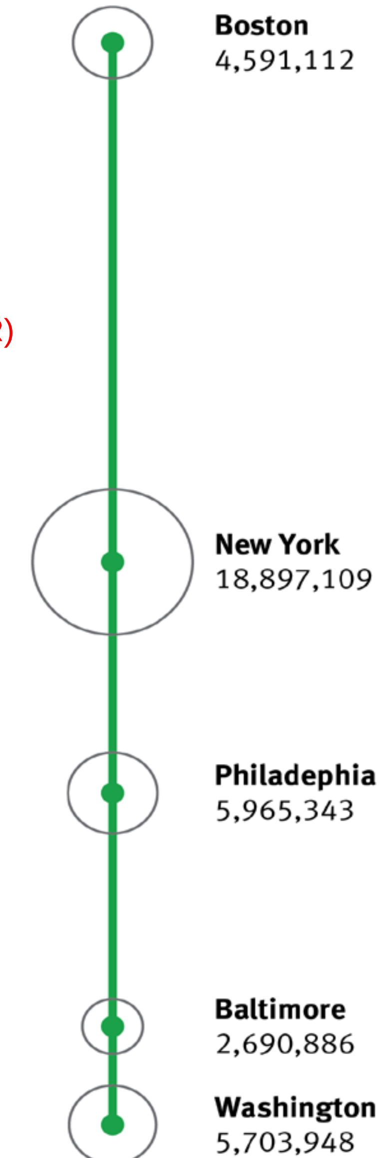
2012 Actual Ridership (Acela + NER)
~11.5 million

2040 B/F Plan Ridership Forecast
~43.5 million



2011 tourists: Colorado 30 million
Denver 13 million

2035 I-70 Ridership ~ 2.2 ~ 4.3 million



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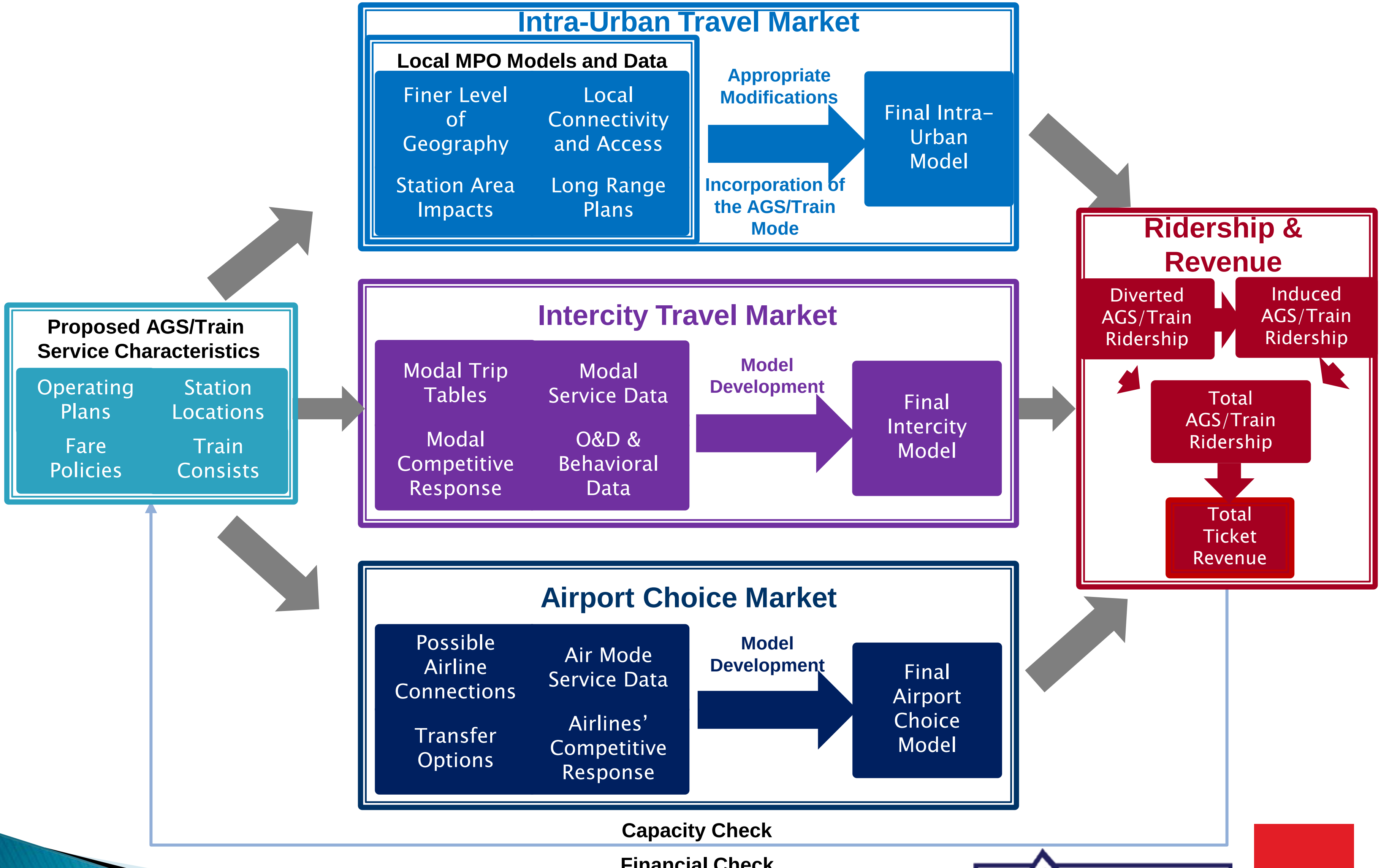
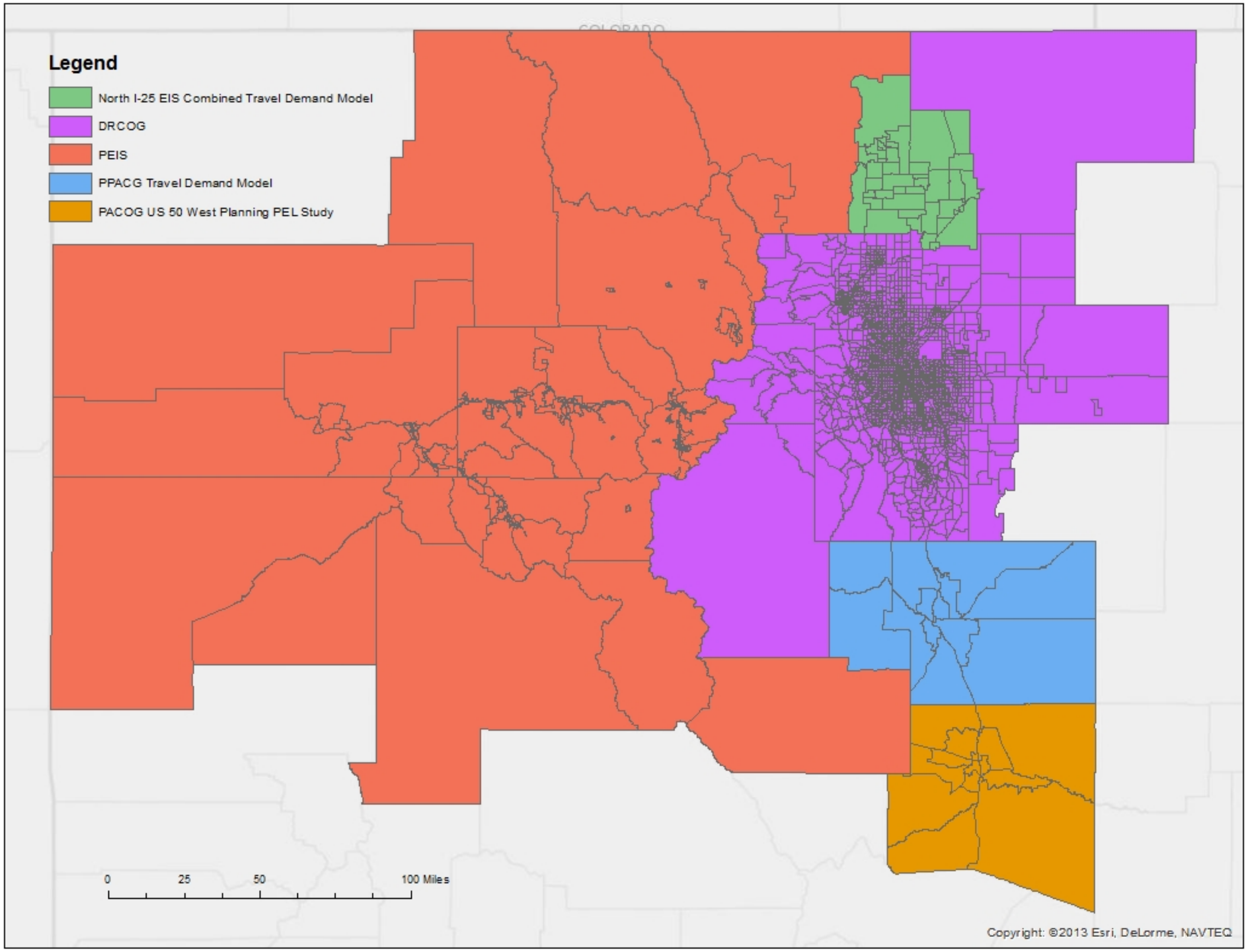
Demand Forecasting Methodology



Forecasts of Annual Ridership and Revenue

- The intercity forecasting model is based on average daily conditions, accounting for:
  - Highway congestion
  - Average daily frequencies for the common carrier services
  - Origin-destination specific travel demand
- Both the intercity and airport choice models forecast annual ridership
- The intra-urban model forecasts daily ridership, which is then converted to an annual value

Study Area Zone Structure



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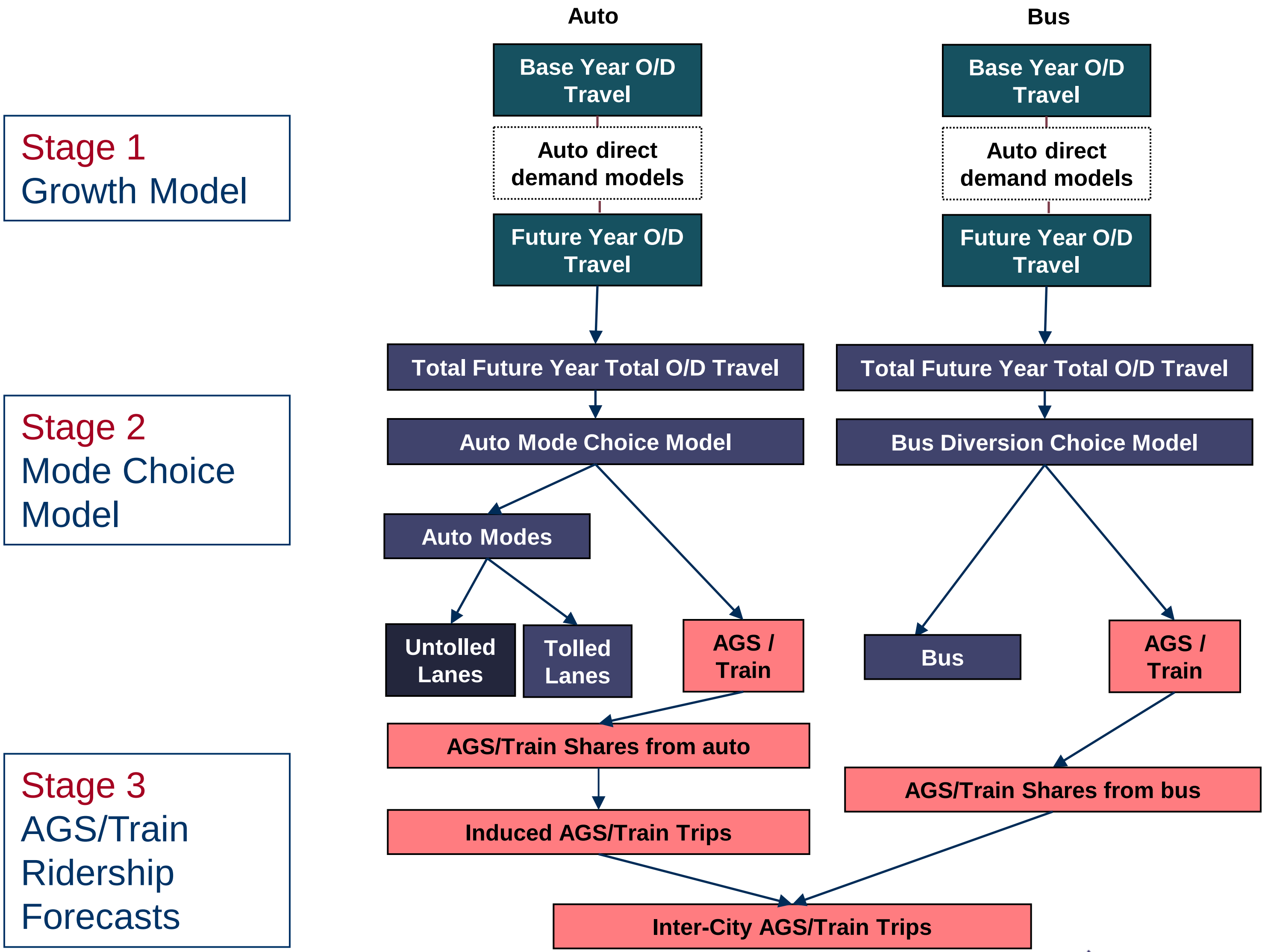
SDG Intercity Travel Forecasting Process



Intercity Auto Trip Table Developed from Anonymous Cell Phone Movement Data

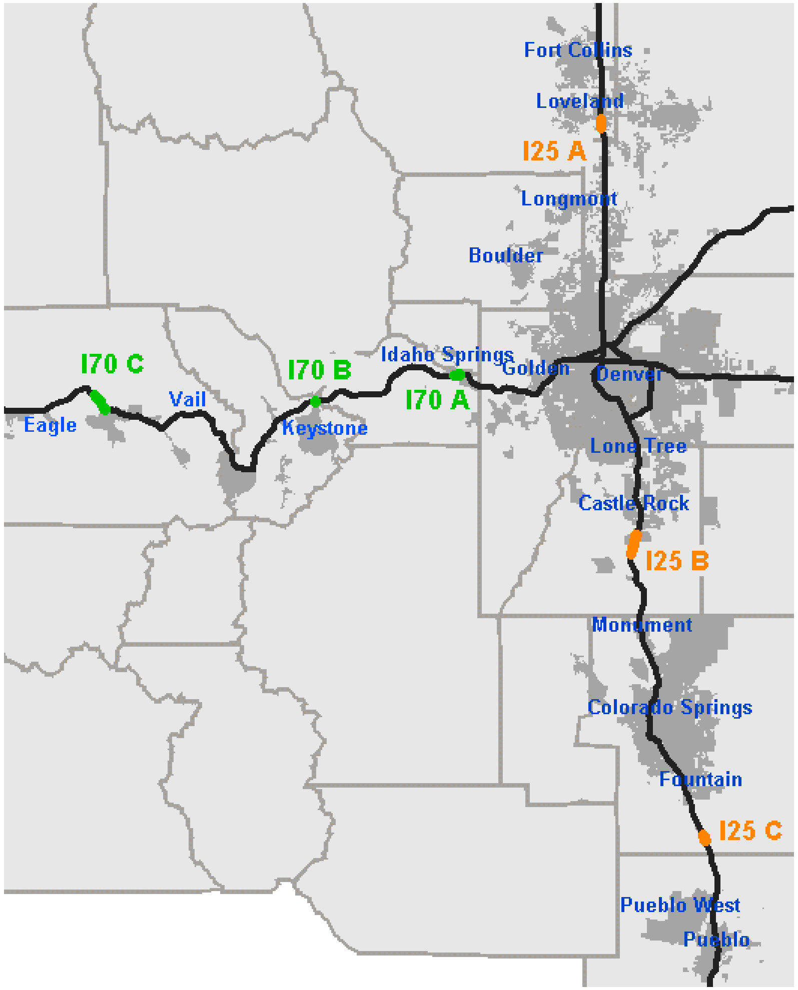
- No ready source of good data on intercity auto travel
- Anonymous location tracking data from Sprint (processed by AirSage)
  - For 3 monthly periods in 2011
    - February – typical winter
    - July – typical summer
    - October – typical other
  - For 4 day types
    - Mondays–Thursdays
    - Fridays, Saturdays, and Sundays separately
  - For 3 traveler classifications
    - Resident
    - Visitor
    - Through
- Supplemented by CDOT monthly traffic count data

Intercity Auto Trip Table Validates Well Against Traffic Counts

- Total trips were assigned to the highway network to get the number of trips crossing 6 links at selected rural locations on I-25 and I-70

- The assigned vehicle trips were within 7% of CDOT AADTs at all traffic locations considered:

Count Location	CDOT AADT	AirSage AADT	Percent Diff.
I70 A	43,000	45,048	4.8%
I70 B	29,000	30,952	6.7%
I70 C	22,000	20,519	-6.7%
I25 A	68,000	63,688	-6.3%
I25 B	60,000	61,299	2.2%
I25 C	31,000	31,722	2.3%



- We removed non-divertible trips from the intercity auto trip table

A Significant Portion of the I-70 Trips Captured by the AGS/Train Option

- AADT of 29,000 in 2012 on I-70 West of Georgetown
  – approx. 34,000 in 2035
- Annual vehicular trips: approx. 12.5 million in 2035
- Annual person trips: approx. 30 million in 2035
- Annual person trips excluding truck and through trips: approx. 24 million

Future Year Trip Tables Grown From Base Year Tables

Purpose	2011 Base Trips (Millions)	2035 Forecast Trips (Millions)	2011-2035 CAGR
Visitor	21.28	25.84	0.81%
Local Work	13.26	15.63	0.69%
Local Non-work	110.20	131.35	0.73%
Total	**~149.70**	**~177.28**	**0.71%**

Similar Growth Rates Observed for Historical Traffic Volumes in the Study Area

Year	I-70 E of Wolcott	I-70 W of Georgetown	I-70 E of Idaho Springs	I-25 at Loveland	I-25 S of Castle Rock	I-25 N of Pueblo
2002-2006 CAGR	2.0622%	0.2111%	0.6819%	0.0660%	0.1705%	-0.5667%
2006-2011 CAGR	-0.5860%	-0.2150%	0.1854%	0.5566%	1.7837%	0.0017%
2002-2011 CAGR	0.5824%	-0.0259%	0.4058%	0.3383%	1.0635%	-0.2513%

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
- Definition of qualifying trip:
  - Made in a personal vehicle or rental car
  - Made within the past 3 months
  - Used part of or all of the relevant portions of I-25 and I-70
  - Took at least 45 minutes in door-to-door travel time OR made trip to DIA in past 6 months and lives in Denver area
- Stated preference alternatives:
  - Current auto travel option
  - Auto travel with tolled facility
  - AGS/Train travel

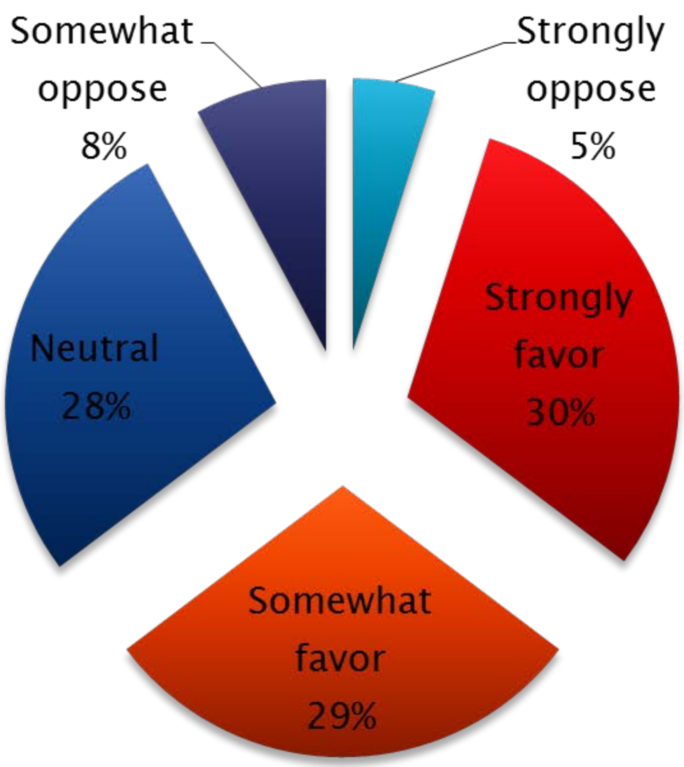
SP Survey Design

- 8 SP experiments for each respondent
- 3 different options for making the trip described
- The experiments forced respondents to make trade-offs
- Travel time and cost values used in the 8 SP experiments were generated from the actual (reference) trip the respondent

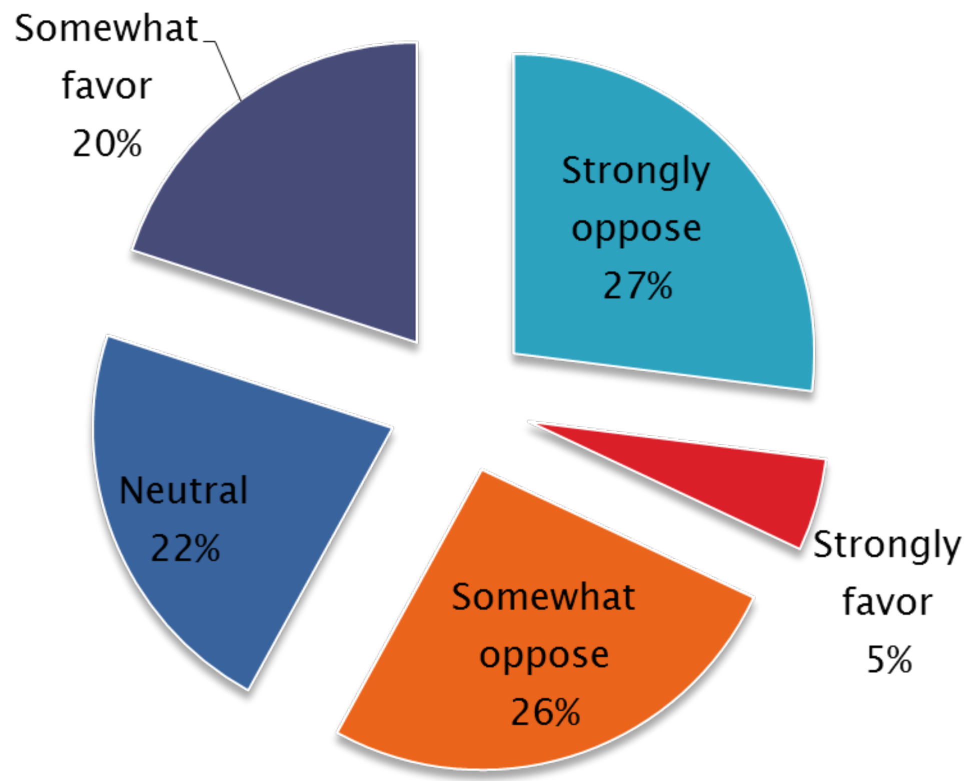
Current Route		New Tolled Route		Travel by AGS/Train	
				Time to get to train:	0h 15m
				On-board train travel time:	1h 42m
Total travel time:	3h 0m	**Total travel time:**	2h 20m	Time from train to destination:	0h 15m
				Total travel time:	2h 12m
				Number of transfers:	1
Price of gasoline at time of trip:	$4.50 per gallon	Price of gasoline at time of trip:	$4.50 per gallon	Cost to get to train station and parking:	$6.00
Toll costs:	$3.00 per trip	Toll costs:	$11.00 per trip	Total one-way train fare for your party of 2:	$50.00
Parking costs:	$6.00 per trip	Parking costs:	$6.00 per trip	Cost from train station to destination:	$4.00
				Total one-way travel cost:	$60.00
I prefer this option: ()		I prefer this option: ()		I prefer this option: ()	

Opinion of SP Respondents on New Transportation Options

Opinion: new AGS/Train



Opinion: tolls on I-25 and I-70



Induced Demand – Evidence from Elsewhere

- Induced demand calculated for the AGS/ICS study is around 11%

Induced demand – Other experience							
Project	Type	Year	City Pair	Dist (mi)	Initial Travel Time	Improved Travel Time	Induced Demand (%)
NEC	Forecast	2040	Washington – New York – Boston	400	360 mins	180 mins	12%
New Lines	Forecast	2030	London – Birmingham	110	82 mins	46 mins	18%
New Lines	Forecast	2030	London – Manchester	185	125 mins	66 mins	23%
LGV	Observed	1985	Paris – Lyon	290	180 mins	115 mins	15%
Brazil TAV (Halcrow)	Forecast	2014	São Paulo – Rio de Janeiro	250	N/A	93 mins	13%
Brazil TAV (SDG)	Forecast	2016	São Paulo – Rio de Janeiro	250	N/A	93 mins	14%
Eurostar HS1	Observed	2008	London – Paris	250	155 mins	135 mins	6%

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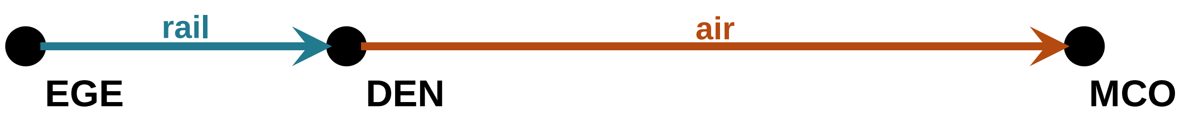
Connect Air Modeling

- A connect air trip consists of an air leg (or a series of air legs) with one end outside the study corridor, connected on the other end to a rail leg within the corridor



- Connect air trips require a rail station at or near the connecting airport
- Connect air trips should be distinguished from on-corridor air trips or airport access trips

Intra-Urban AGS/Train Modeling

- Local (Denver area) AGS/Train trips are forecast using an intra-urban model
- The intra-urban model is adapted from the latest DRCOG four-step travel demand model (COMPASS) implemented in TransCAD
- Utilizing the DRCOG model takes advantage of the model's detailed representation of travel options and conditions in the Denver area
- Explicit modelling of connectivity with the RTD system
  - Intra-city AGS/Train competes with RTD transit, but also feeds RTD routes with travellers to/from otherwise unserved markets
  - Inter-city AGS/Train trips may also use RTD modes for access/egress

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Next Steps in Ridership Modeling

- Joint effort going forward by SDG and CS
  - The travel demand model has been transferred to CS
  - CS will undertake some of the model runs especially the AGS ones
- Efficient use of remaining time and resources
- Address feedback from modellers in the region
- Optimize answers/operating plans by the end of the study
  - Few full corridor runs
  - Some minimum operating segment runs
  - Some additional sensitivity tests
- Final optimization runs for final numbers
  - Revenue maximizing fare analyses

Cambridge Systematics Review and Assessment of ICS Modeling Process

1. Review of Stated Preference Survey
2. Review of ICS Travel Model Structure and Estimation
3. Preliminary Review of Initial AGS Forecasts
4. Next Steps

CS Review of ICS Stated Preference Survey

- Reviewed Stated Preference (SP) survey after implementation
  - Primary concern: respondents asked to make choice based on AGS <u>fare</u>, managed lane toll <u>cost</u>, and auto <u>cost per gallon of gasoline</u>
    - Representation of modal travel costs to respondents
    - Representation of auto travel cost in model estimation / application
    - Agreed with survey team that travellers don't perceive "per mile" fuel / operating costs
    - Similar argument can be made regarding toll responders that are periodically recharged
  - Conclusion
    - Not a "fatal" flaw, but would have preferred additional model testing to investigate impacts

CS Review of ICS Model Design and Estimation

- ICS model design
  - Diversion-type model
    - Common long distance model design
    - Some benefits and liabilities to that design
  - Reasonable mode choice model coefficients estimated without constraints
  - Some variables useful for "policy analysis" excluded
    - Model uses "rail access time" as proxy for "trip frequency" variable & wait time
    - No variable for "reliability"
  - Conclusion
    - No fatal flaws but model design might limit ability to test impacts of some factors

CS Review of ICS Model Design and Estimation

- ICS model sensitivity
  - Elasticity
    - Change in travel demand caused by change in key variables
  - Elasticities based on initial test results provided by ICS consultant
    - AGS ridership is very sensitive to changes in AGS fares
    - AGS ridership is very sensitive to changes in auto travel time
    - AGS ridership is sensitive to changes in AGS travel time
    - AGS ridership is not very sensitive to changes in AGS frequency
    - AGS ridership is not very sensitive to changes in auto operating cost

CS Review of AGS Forecasts and Next Steps

- Preliminary review of initial AGS ridership forecasts
  - Mode shares of 5–8% for AGS are comparable to those obtained for High Speed Rail in California
    - Revised 2012 Business Plan mode share between Bay Area and San Joaquin Valley ≈ 8%
    - Revised 2012 Business Plan mode share between LA Basin and San Joaquin Valley ≈ 8%
    - Revised 2012 Business Plan mode share between Sacramento and San Joaquin Valley ≈ 1%
    - Revised 2012 Business Plan mode share for long-distance trips ≈ 3%
  - Doubtful whether changes to address identified issues would materially change the results
  - Overall, the ICS model and results seem reasonable

CS Review of AGS Forecasts and Next Steps

- Next steps for CS analysis
  - Received Inter-urban model from SDG
    - Confirm model parameters match documentation
    - Verify we can match ICS results on CS computers
  - Run sensitivity tests
    - Different auto operating costs
    - Different auto travel speeds/travel times
    - Different AGS fares
    - Different AGS speeds/travel times
    - Different AGS service frequencies
    - Different Alternative Specific Constant for AGS
  - Run additional alternatives
    - Minimum operating segment (MOS)
    - Additional/less stations

Preliminary Review – SOFI's

- TODAY – A brief summary of responses received
- AUGUST MEETING – A detailed discussion of responses including supplemental interviews and information

RFFI Responders

- Colorado MAGLEV Group (including General Atomics)
- Maglev Trans (includes TriTrack)
- PPRTC
- Owen Transit Group
- SkyTran Incorporated
- Swift Tram, Inc.

RFFI Responders

- All of the Responders were technology providers who wish for CDOT to move the project forward to procure their technology
- None of the Responders were concessionaires or financial providers
- The primary reason for the lack response from financial firms is considered to be:
  - The lack of a committed funding stream
  - The lack of project definition
  - The uncertainty on timing of the project

RFFI Responses

- Due to the lack of responses by financial providers we are conducting selected interviews and information requests with concessionaires and finance industry professionals

Brief SOFI Summary

- **Federal Funding**
  - Answers ranged from 50% possible federal funding to none
- **Project-generated Revenues**
  - Most answers were vague with no specific dollar value covering items such as
    - transmission of power
    - solar generated power
    - telecommunications
    - advertising and naming rights
  - High value freight, solar and wind power was suggested by one firm at $16 million annually
  - Others felt no meaningful revenues could be generated other than farebox

Brief SOFI Summary

- **Additional Public Funding**
  - Little in the nature of specifics was provided. Discussion of government bonds, gasoline tax, vehicle miles traveled tax, regional sales tax, savings from highway lanes not developed

Brief SOFI Summary

- **Financing Capacity**
  - Very little in the way of substantive information was provided; many indicated the need for project specific revenues, dedicated funding, government bonding support
- **Financing Cost**
  - Broad range of responses such 6% – 6.85% if 100% underwritten by CDOT
  - Other responses were well below at 3-4% which is not available

Brief SOFI Summary

- **Recommended Term**
  - Broad range from 20 to 99 years
- **Availability Payment Structure**
  - Most supported some with request for milestone payments, one said it was not viable
- **General Terms**
  - Guarantee of revenue streams
  - 100% responsibility by CDOT
  - Toll-based concessions

Brief SOFI Summary

- **Governance Structure**
  - Suggestions of regional transit district, CDOT, or completely governed by private entity
- **Delivery Structure**
  - P3 model for capital/O&M, separate of capital and O&M or complete responsibility by CDOT

Brief SOFI Summary

- **Technology Selection**
  - Most respondents claimed theirs to be the best solution
  - Since they are all technology providers this did not provide much insight into technology selection issues

Brief SOFI Summary

- **Roles/Responsibilities**
  - Private: Delivery, or Delivery +O&M, or Delivery+O&M+ Financing, Control of Farebox and other available revenues
  - Public: Environmental, Funding, ROW, Necessary legal authority
  - One suggested sharing risks for: Utilities, ROW, Hazmat, Security, Public Relations, Financing, Farebox Rates and Force Majeure

Brief SOFI Summary

- **Revenue Generation Risk (Farebox)**
  - One group "requires control of farebox pricing"
  - Others would retain fares but require CDOT guarantees of minimum revenue
  - Others insist this risk should be fully on CDOT

Brief SOFI Summary

- **Other Revenue Streams**
  - One group requires control of station rents and freight rates
  - Some are happy to retain revenues as long as CDOT underwrites all debt
  - Some give general statements on possible revenue streams but no specifics on conditions

Brief SOFI Summary

- **Project Components**
  - Two recommend AGS and highway project coupled
    - One option first right of refusal to undertake the highway project if the AGS provides insufficient congestion relief
  - One said tolls on I-70 are not necessary
  - Two indicated no synergies with ICS & AGS.
  - One asked for first right of refusal on ICS
  - One said only combine if it makes both projects more feasible.
  - One said any combination could be beneficial

Capital Cost Estimate Update

- New Alignment/Technology Alternative
  - High Speed Maglev – Hybrid Alignment (Combo of I-70 ROW & Greenfield)
- Right of Way Costs Defined
- Contingencies Separated Out
- Propulsion Costs for 120 mph Maglev Corrected
- Station Costs Consistent with ICS
  - $25 Million Major Station
  - $15 Million Minor Station

Right of Way

Alignment	% Private Land	% Public
Hybrid (AMT and TRI)	42.30%	57.70%
HS Maglev (TRI)	55.20%	44.80%
HS Rail Talgo	57.70%	42.30%
HS Rail Spur	60.50%	39.50%
Right of Way Widths		
Maglev (AMT and TRI)	40 feet wide	4.85 acres/mile
HS Rail	75 feet wide	9.09 acres/mile
Right of Way Cost		
Public	$1/SF	$43,600/acre
Private, Tunnels	$5/SF	$218,000/acre
Private, Surface/Elevated	$22/SF	$958,300/acre
Right of Way Cost Per Mile		
Maglev (AMT and TRI)	Private	Public
Tunnels	$1,056,000	$211,200
Surface/Elevated	$4,646,400	$211,200
HS Rail		
Tunnels	$1,980,000	$396,000
Surface/Elevated	$8,712,000	$396,000

Capital Cost Estimating

- Contingencies
  - Applied to recognize the very preliminary nature of the design
    - 10% “Mountain” factor applied to all civil infrastructure and systems
    - 30% contingency applied to tunnel costs
    - 30% contingency applied to all Design and Construction Costs

Capital Cost Estimating

	Hybrid Alignment - 120 MPH Maglev	
Vehicles	$ 240,000,000	
Propulsion System	$ 156,000,000	
Energy Supply	$ -	
Operation Control Technology	$ 198,000,000	
Communication/Control Technology	$ -	
Guideway/Track Infrastructure	$ 3,723,688,279	
Guideway/Track		$ 1,065,325,171
Bridges & Viaducts		$ 208,721,824
Tunnels		$ 2,227,678,781
Other		$ 221,962,502
Stations	$ 140,000,000	
Operations and Maintenance Facilities	$ 15,200,000	
Construction Support	$ 50,000,000	
Right of Way and Corridor	$ 329,494,912	
Subtotal - Basic Cost	**$ 4,852,383,191**	**45%**
Std. Contingency	$ 49,942,422	
Switch Contingency	$ 10,880,000	
ROW Contingency	$ 65,898,982	
Tunnel Contingency	$ 668,303,634	
Emergency Tunnel Contingency	$ 434,397,362	
Professional Services	$ 1,581,270,000	
Utility Relocation	$ 547,360,000	
Environmental Mitigation	$ 152,050,000	
Overall Contingency	$ 2,508,740,000	
Subtotal - Contingency and Support	**$ 6,018,842,402**	
Grand Total	**$ 10,871,220,000**	**- $ 113,490,000**
Cost per Mile	**$ 90,192,318**	**Difference from Original Estimate**
Support Cost	**21%**	

Capital Cost Estimating

	Hybrid Alignment - TRI Technology	
Vehicles	$ 240,200,000	
Propulsion System	$ 748,300,000	
Energy Supply	$ 235,000,000	
Operation Control Technology	$ 115,557,991	
Communication/Control Technology	$ 7,653,800	
Guideway/Track Infrastructure	$ 4,217,078,206	
Guideway/Track		$ 1,558,715,098
Bridges & Viaducts		$ 208,721,824
Tunnels		$ 2,227,678,781
Other		$ 221,962,502
Stations	$ 140,000,000	
Operations and Maintenance Facilities	$ 49,000,000	
Construction Support	$ 50,000,000	
Right of Way and Corridor	$ 329,494,912	
Subtotal - Basic Cost	**$ 6,132,284,908**	**46%**
Std. Contingency	$ 149,773,601	
Switch Contingency	$ 10,880,000	
ROW Contingency	$ 65,898,982	
Tunnel Contingency	$ 668,303,634	
Emergency Tunnel Contingency	$ 434,397,362	
Professional Services	$ 1,940,000,000	
Utility Relocation	$ 671,540,000	
Environmental Mitigation	$ 186,540,000	
Overall Contingency	$ 3,077,880,000	
Subtotal - Contingency and Support	**$ 7,205,213,581**	
Grand Total	**$ 13,337,490,000**	
Cost per Mile	**$ 110,653,555**	
Support Cost	**21%**	

Capital Cost Estimating

	Greenfield - HS Maglev	
Vehicles	$ 240,200,000	
Propulsion System	$ 748,300,000	
Energy Supply	$ 235,000,000	
Operation Control Technology	$ 114,701,631	
Communication/Control Technology	$ 7,653,800	
Guideway/Track Infrastructure	$ 8,683,531,941	
Guideway/Track		$ 1,711,594,292
Bridges & Viaducts		$ 118,329,180
Tunnels		$ 6,636,376,201
Other		$ 217,232,268
Stations	$ 140,000,000	
Operations and Maintenance Facilities	$ 49,250,000	
Construction Support	$ 50,000,000	
Right of Way and Corridor	$ 223,904,348	
Subtotal - Basic Cost	**$ 10,492,541,720**	**41%**
Std. Contingency	$ 319,272,890	
Switch Contingency	$ 17,920,000	
ROW Contingency	$ 44,780,870	
Tunnel Contingency	$ 1,990,912,860	
Emergency Tunnel Contingency	$ 1,294,093,359	
Professional Services	$ 3,681,480,000	
Utility Relocation	$ 1,274,360,000	
Environmental Mitigation	$ 353,990,000	
Overall Contingency	$ 5,840,810,000	
Subtotal - Contingency and Support	**$ 14,817,619,980**	
Grand Total	**$ 25,310,170,000**	**+$ 269,970,000**
Cost per Mile	**$ 213,630,611**	**Difference from Original Estimate**
Support Cost	**21%**	

Capital Cost Estimating

	Greenfield - HS Rail	
Vehicles	$ 180,000,000	
Propulsion System	$ -	
Energy Supply	$ 280,463,479	
Operation Control Technology	$ 219,112,093	
Communication/Control Technology	$ 61,351,386	
Guideway/Track Infrastructure	$ 11,766,531,034	
Guideway/Track		$ 1,032,256,862
Bridges & Viaducts		$ 652,490,948
Tunnels		$ 9,743,773,973
Other		$ 338,009,250
Stations	$ 110,000,000	
Operations and Maintenance Facilities	$ 49,250,000	
Construction Support	$ 50,000,000	
Right of Way and Corridor	$ 268,005,695	
Subtotal - Basic Cost	**$ 12,984,713,687**	**40%**
Std. Contingency	$ 253,958,263	
Switch Contingency	$ 6,400,000	
ROW Contingency	$ 53,601,139	
Tunnel Contingency	$ 2,923,132,192	
Emergency Tunnel Contingency	$ 1,900,035,925	
Professional Services	$ 4,711,680,000	
Utility Relocation	$ 1,630,970,000	
Environmental Mitigation	$ 453,050,000	
Overall Contingency	$ 7,475,260,000	
Subtotal - Contingency and Support	**$ 19,408,087,519**	
Grand Total	**$ 32,392,800,000**	**+ $ 471,290,000**
Cost per Mile	**$ 297,391,912**	**Difference from Original Estimate**
Support Cost	**21%**	

Capital Cost Estimating

- Minimum Operating Segment
  - West Suburban Station to Breckenridge

Alignment/Technology	MOS Cost	% of Total Cost
120 MPH Maglev	$5,544,557,000	51%
High Speed Maglev/Hybrid Alignment	$6,801,837,000	51%
High Speed Maglev	$14,141,727,000	56%
High Speed Rail	$19,009,540,000	59%

Capital Cost Estimating

- During Final Design Costs Will Likely Go Down Due to Design Refinements
  - Better topographic mapping (we used USGS)
  - Refine alignment to minimize tunneling

- Costs Are In 2013 Dollars

120 MPH Maglev on Hybrid Alignment

Segment	Miles	Cost (~$100 M /mi)	Low Cost	High Cost
C-470 to Breckenridge	61	$6 Billion	$ 350 M/year	$ 470 M/year
C-470 to Eagle Airport	117	$12 Billion	$ 695 M/year	$ 920 M/year

Low Cost Assumptions

4% Annual Finance Rate

30-year term

High Cost Assumptions

6.5% Annual Finance Rate, 30-year term OR

80% @ Gov't 4% Rate, 20% @ Private 15% Rate

120 MPH Maglev on Hybrid Alignment: with Current Funding Commitments

Minimum Operating Segment	Total Capital Cost (2013$)	Annualized Capital Cost (2013$)
C-470 to Breckenridge	$ 6 Billion	$420 Million/year
Federal Funding	$0	$0
State Funding	$0	$0
Local Funding	$0	$0
Estimated Excess Farebox Revenue (>O&M Cost)	$0.6 Billion (30 years x $20 Million/ yr)	$20 Million/year for MOS* (2035 Ridership)
Unfunded Net Deficit Remaining	$5.4 Billion	$400 Million/year

*$20 Million/year is estimated based on $30 Million/year excess revenues for the full-corridor high speed maglev, and assuming 2/3rds will ride the MOS. Not a modeled number. Medium speed (120 mph) maglev data not yet available.

AGS/ICS/Co-Development Coordination

- Traffic & Revenue Study consultant selected
- I-70 Peak Period Shoulder Lane (Empire Junction to Twin Tunnels) consultant selected
- PLT's for both have been identified and will be or have already been meeting

Conclusions, Final Remarks & Next Steps

- Next PLT meeting
  - August 14, 2013 – Eagle County (Site TBD)