

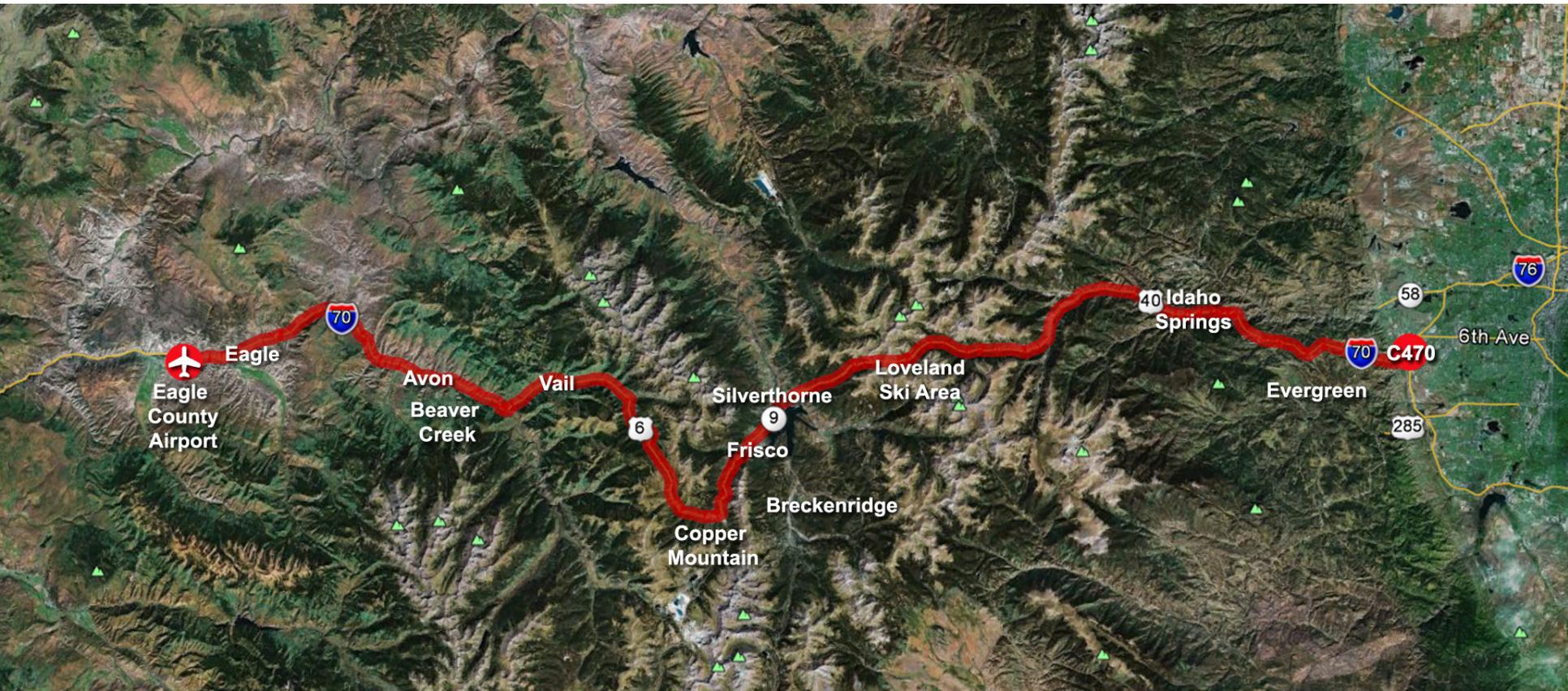
AGS Feasibility Study

Industry Forum/Webinar
June 27, 2012

Agenda

- ▶ History of AGS project
- ▶ Overview of AGS project
- ▶ I-70 Mountain Corridor Conditions
- ▶ Draft System Performance & Operational Criteria
- ▶ Process and Schedule
- ▶ Questions

Location of AGS



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

History of AGS

- ▶ 1998: I-70 Mountain Corridor Major Investment Study
 - Includes recommendation for a “innovative fixed guideway solution conforming to rigid performance specifications and tailored to the special environmental setting.”
 - No technology identified (TGV assumed)
 - Ridership of about 1.7 Million passengers per year

History of AGS

- ▶ 2004: Colorado Maglev Project – Colorado Intermountain Fixed Guideway Authority (CIFGA)
 - DIA to Eagle County Regional Airport
 - Chubu High Speed Surface Transport (CHSST) technology assumed
 - 40,000 passengers per day peak ridership

History of AGS

- ▶ 2010: Rocky Mountain Rail Authority (RMRA) High Speed Rail Feasibility Study
 - Looked at various technologies including conventional HSR and Maglev
 - Considered both I-70 and I-25 systems
 - 2025 ridership (for combined I-70 & I-25) ranged from 19.1 to 28.6 million passengers per year

History of AGS

- ▶ 2011: I-70 Mountain Corridor Programmatic EIS & Record of Decision (ROD)
 - This was a Tier 1 NEPA EIS
 - Preferred Alternative includes:
 - Non-infrastructure improvements (i.e. speed harmonization, TDM)
 - Specific (minimal) highway improvements (interchanges, some auxiliary lanes)
 - Advanced Guideway System (if feasible)
 - Other (maximum) highway improvements (subject to “triggers” and adaptive management)

History of AGS

- ▶ 2011: I-70 Mountain Corridor Programmatic EIS & Record of Decision (ROD)
 - Per the ROD, improvements (including AGS alignment) may be north or south of the existing I-70 highway alignment, or within the highway median, but not necessarily within existing right-of-way
 - Ridership predicted to be about 25% of the highway volume with peak demand of 4,900 passengers per hour per direction

History of AGS

- ▶ 2012: AGS Feasibility Study and Interregional Connectivity Study (ICS)
 - AGS project is focused from C-470/US 6/I-70 west along I-70 to Eagle County Regional Airport (the Mountain Corridor)
 - ICS focuses on a Front Range system from Pueblo north to Fort Collins and from Denver International Airport to C-470/US 6/I-70
 - ICS is doing all ridership modeling for both east-west and north-south systems

AGS Project Overview

- ▶ Colorado DOT Division of Transit & Rail (DTR) is project sponsor
 - DTR was created in 2009 to plan, develop, finance, operate, and integrate transit and rail services
 - Among DTR goals is to pursue high-speed rail, including taking the lead on feasibility, pre-NEPA, and NEPA studies for strategic corridors and working with regions to complete PEIS to include new technologies
- ▶ AZTEC/TYPSA is lead consultant
 - TYPSA Group is a Madrid, Spain based engineering firm with significant HSR and tunneling experience
 - AZTEC is TYPSA Group's US firm

AGS Project Overview

- ▶ Project is envisioned as Public Private Partnership (Design, Build, Finance, Maintain & Operate – DBFMO)
- ▶ Industry is defined as:
 - Concessionaires
 - Financiers
 - Technology
 - Constructors
 - Designers
 - Operators
 - Maintenance



AGS Project Scope

- ▶ 18 month schedule (Apr. 2012 – Sept. 2013)
- ▶ Use prior work like RMRA and PEIS as starting point
- ▶ Focus on Industry
- ▶ Refine Performance & Operational Criteria
- ▶ Prepare RFQ
- ▶ Shortlist 3 proposers
- ▶ Prepare RFP and review Technical Proposals
- ▶ AGS Feasibility Report/Implementation Plan is final deliverable

AGS Project Scope

▶ Request for Qualifications

- Will ask for composition and qualifications of team (DBFMO)
- Will ask that technologies be defined
- There will be limited understanding & approach
- Will include criteria for shortlisting
- Approximately one month for response
- CDOT will advertise the RFQ

▶ Shortlist

- Panel of CDOT staff and other stakeholders will review SOQ's
- Three teams will be shortlisted to receive RFP

AGS Project Scope

- ▶ Shortlist
 - Shortlist will be announced by end of September 2012
- ▶ Request for Proposals
 - RFP will be developed with input from the three shortlisted proposers (October to December)
 - Goal is to make RFP requirements attainable by all three teams provided criteria are met
 - RFP will be developed to hold costs to reasonable level

AGS Project Scope

- ▶ Request for Proposals
 - Target date for RFP is early January 2012
 - Approximately 4 month response time
 - We will work with each team during preparation of technical proposals
 - Alternative Technical Concepts will be allowed
 - Technical proposals will include confidential and non-confidential sections
 - Non-confidential sections will be used for environmental work needed prior to project implementation

AGS Project Scope

▶ Technical Proposals

- Panel of CDOT staff and other stakeholders will review technical proposals
- \$150,000 stipends will be paid to shortlisted teams that submit responsive proposals
- Each responsive proposer will be pre-qualified for development agreement that will be developed while environmental work is being done and funding is being secured
- Best and Final Offer will be requested once environmental costs and funding sources have been identified

AGS Project Scope

- ▶ Data Room
 - Data room will be developed by July 6
 - Information will be forwarded to all registered participants
- ▶ Industry Contact “Clearinghouse”
 - A master list of all interested parties is being kept
 - Will be forwarded to all interested parties by June 29
 - Goal is to link interested parties together for teaming

I-70 Mountain Corridor Conditions

- ▶ I-70 crosses the Rocky Mountains and the Continental Divide
- ▶ Highway Distances
 - Denver International Airport to Eagle County Regional Airport – 155 miles
 - US 6/I-70/C470 to:
 - Denver International Airport – 35 miles
 - Eagle County Regional Airport – 120 miles
 - Silverthorne – 55 miles

I-70 Mountain Corridor Conditions

▶ Key elevations:

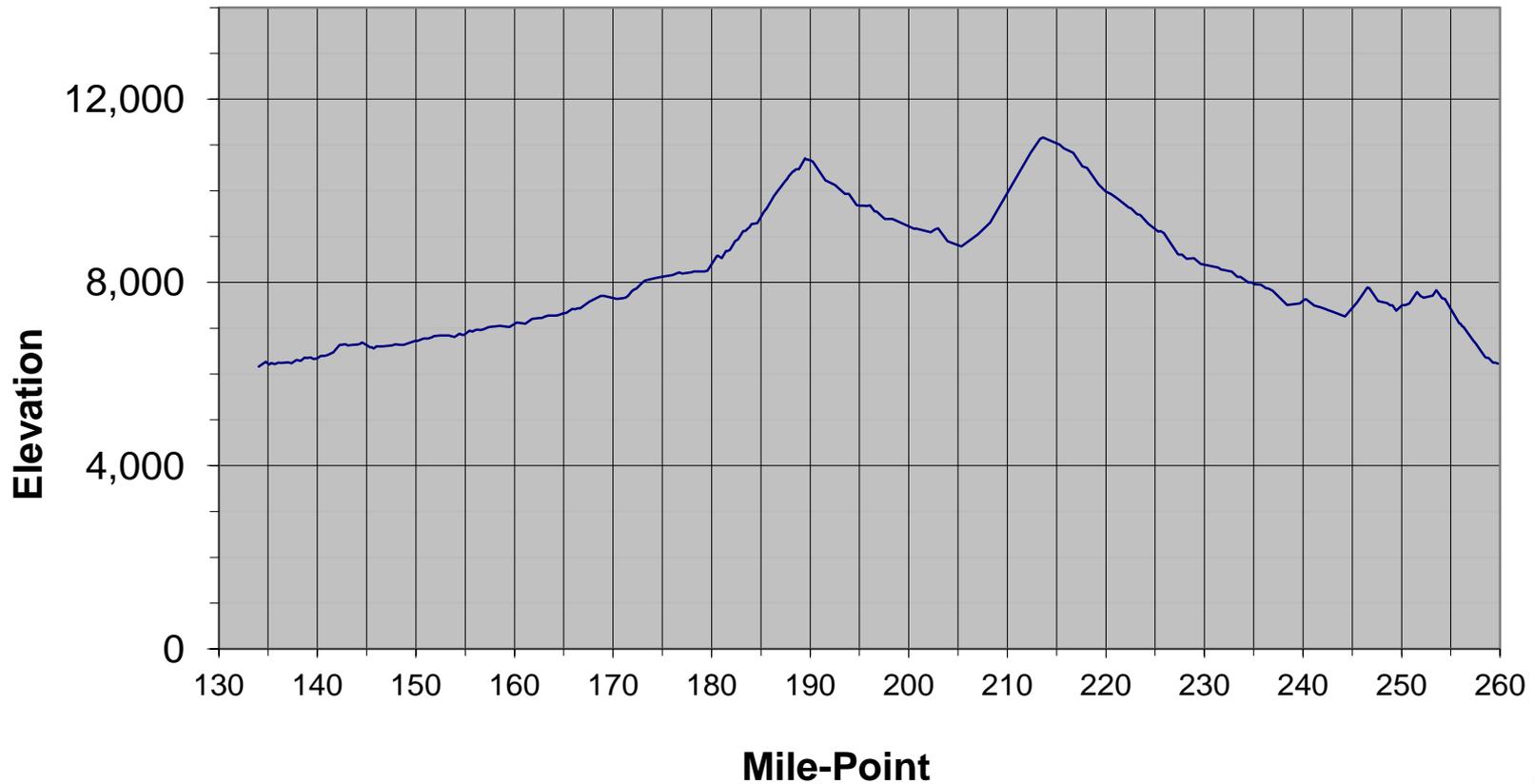
- C-470/I-70 – 6,230' (MP 259.75)
- Top of Floyd Hill – 7,890' (MP 246.52)
- US 6/Bottom of Floyd Hill – 7,259' (MP 244.27)
- SH 103/Idaho Springs – 7,543' (MP 239.65)
- US 40/Empire – 8,277' (MP 231.89)
- Georgetown – 8,609' (MP 227.92)
- Silverplume – 9,125' (MP 225.72)
- East Portal Eisenhower Johnson Memorial Tunnel (EJMT) – 11,009' (MP 215.36)

I-70 Mountain Corridor Conditions

- ▶ Key elevations (continued):
 - West Portal EJMT – 11,162' (MP 213.65)
 - Silverthorne – 9,047' (MP 205.42)
 - Frisco – 9,176' (MP 201.00)
 - Copper Mountain – 9,673' (MP 195.26)
 - Vail Pass – 10,668' (MP 190.10)
 - East Vail – 8,252' (MP 179.87)
 - Main Vail – 8,160' (MP 176.03)
 - Eagle – 6,601' (MP 146.65)

Profile of I-70

I-70 Elevation Profile from Dotsero to C-470



I-70 Grades

▶ Grades

- 7.2 miles with grade of 7%
 - 4.2 miles of 7% grade EB approaching west portal of EJMT
- 11.8 miles with grade 6% to 6.99%
- 8.6 miles with grade 5% to 5.99%
- 7.5 miles with grade 4% to 4.99%
- 14.2 miles with grade 3% to 3.99%
- 10.4 miles with grade 2% to 2.99%
- 24.6 miles with grade 1% to 1.99%
- 21.6 miles with grade 0% to 0.99%

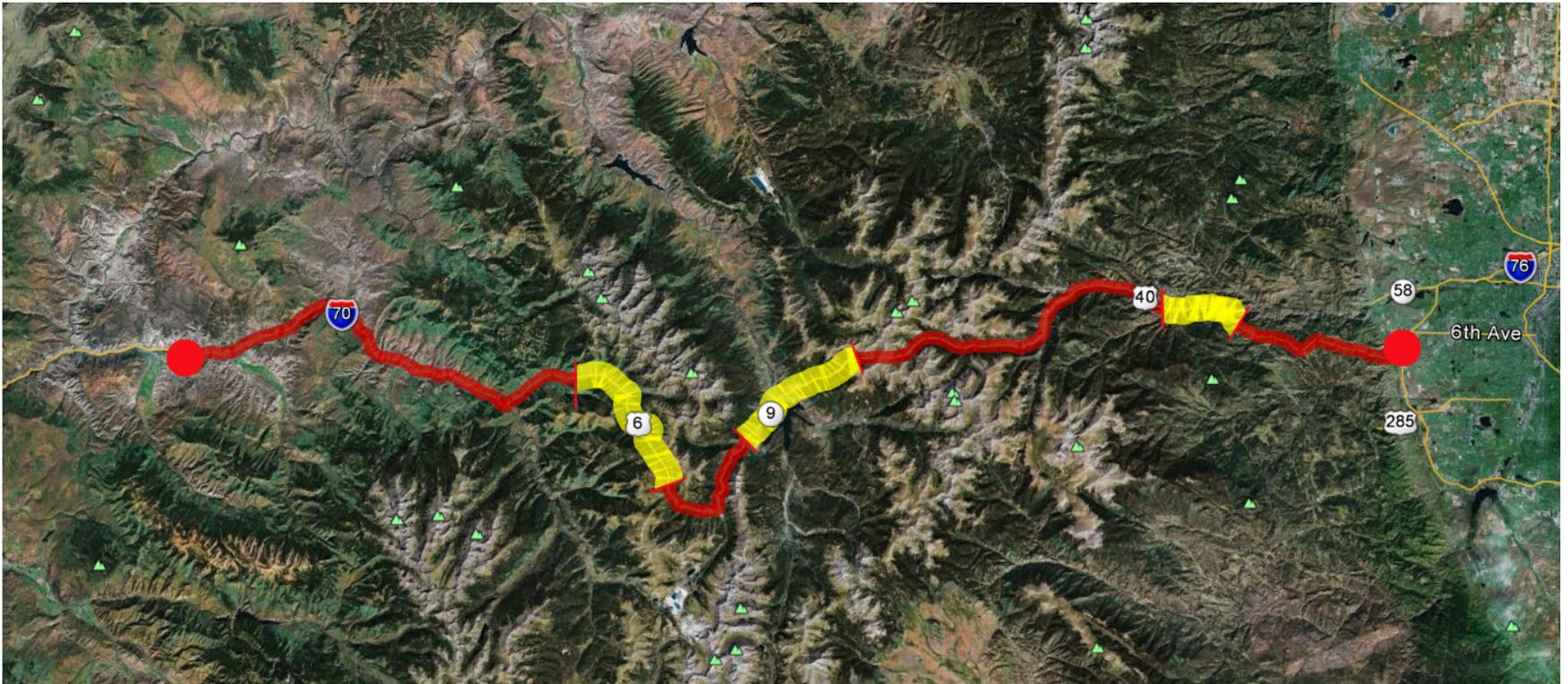
I-70 Curvature

- ▶ Many tight radius curves
- ▶ Numerous sections with posted speed limits of less than 65 mph
- ▶ Some areas have 50 mph posted limits (east of Twin Tunnels to base of Floyd Hill)

I-70 Weather & Wind

- ▶ Dramatic climate changes along corridor
- ▶ Heavy snow during spring, fall & winter months
- ▶ Thunderstorms common during summer
- ▶ High winds possible
- ▶ Ice formation issue especially at lower elevations due to temperature changes
- ▶ Avalanches are also issue

Virtual Site Tours



ADVANCED GUIDEWAY SYSTEM (AGS) FEASIBILITY STUDY



Draft System Performance & Operational Criteria

▶ Travel Time

- The AGS should accommodate both local and express traffic simultaneously.
 - Express – AGS travel times including station dwell time shall be no greater than a travel time calculated as the highway distance between the station locations divided by 65 mph.
 - Local – at least as fast as unimpeded vehicle on highway (including station dwell time), equivalent of existing local transit systems (Summit Stage, Eco-Transit, etc.) between local locations.

Draft System Performance & Operational Criteria

▶ Special Use Vehicles

- The AGS should allow for private entities to design and/or build specific needs vehicles (proprietary) to meet very specialized needs.

Draft System Performance & Operational Criteria

▶ Technology

- The AGS technology should be proven and available. This includes commercial availability, and/or subject to full-size independent evaluation.
- In order to encourage both statewide and national future connectivity, CDOT will give consideration to a company that is willing to license its intellectual property and technology to other companies in a declining over time fee structure such that after 25 years that property will be in the public domain. e.g. year 1–5 fee is 10%, year 5–10 fee is 8%.....year 25 fee is 0%. Additionally, they will share non-proprietary design specifications to encourage a nationwide system.

Draft System Performance & Operational Criteria

▶ Noise

- The AGS shall consider both external (system) noise and internal (cabin) noise as follows:
 - External – noise level generated by the AGS should not exceed those levels specified in the Technical Specifications of Interoperability (TSI, European Directive) Rolling Stock.
 - Internal – ability to hold a conversation without raising one's voice (current research indicates this is approximately decibel levels of about 50–60 db).

Draft System Performance & Operational Criteria

▶ Footprint

- The AGS design should follow context sensitive solutions guidelines to accommodate local community desires and needs. The footprint of the AGS should be minimized to the extent possible to avoid environmental impacts (especially wildlife) and to maximize safety.

▶ Grade

- The AGS system should have the ability to traverse grades as required by the alignment while meeting the travel time requirements.

Draft System Performance & Operational Criteria

▶ Safety

- The AGS should meet the TSI criteria (at guideway) for non-compensated lateral acceleration and braking deceleration.
- The AGS should provide grade separated crossings, an access controlled guideway, emergency egress from the guideway including structures and tunnels, and provide wildlife crossings.

Draft System Performance & Operational Criteria

▶ Weather

- The AGS shall be capable of operating in severe weather events with minimal interruption or delays in service. This includes tolerances for extremes of heat, cold, wind, ice and snow. The AGS proposer shall specify the level of service their system can provide relative to temperature range, wind speed and ice/snow accumulation.
- The alignment will pass through known avalanche zones and will need to be considered in the project design to maintain reliability.

Draft System Performance & Operational Criteria

▶ Wind

- The AGS technology and network must be able to withstand windshear in excess of extreme alpine wind storms such as those frequently experienced throughout the corridor. The AGS infrastructure shall be designed to withstand wind forces as specified in the applicable building codes.
- The AGS provider shall specify the level of service their system can provide for ranges of wind speeds along with the maximum wind speed at which operations must cease.

Draft System Performance & Operational Criteria

▶ Scalability

- The AGS should allow for expansion of alignments to address growth in demand and/or additional station locations or branches.
- The AGS should allow for varying passenger demand (i.e. daily and seasonal peak demand) to address changes in passenger demand within a reasonable time.
- The AGS provider shall describe the ability of their system to respond to this criterion.

Draft System Performance & Operational Criteria

▶ Passenger Comfort

- The AGS passenger acceleration/deceleration/lateral cabin experience should conform to the requirements set forth in the European HSR Rolling Stock passenger comfort parameters/standards.
- The following requirements should be met:
 - Ability to have a cup of coffee on board without concern for spilling it.
 - Work on a laptop
 - Ride comfort – ability to move around without being slammed against a wall.
 - Restrooms.
 - Seating for all passengers.
 - ADA compliant.

Draft System Performance & Operational Criteria

▶ **Baggage Capacity**

- The AGS shall accommodate luggage and outdoor gear including skis, snowboards, bicycles and golf clubs. Loading of such accoutrements must have minimal impact on station dwell and boarding times.

▶ **Light Freight**

- The AGS shall provide for light-weight and high-value packages. This includes food deliveries.

Draft System Performance & Operational Criteria

▶ Heavy Freight

- This criterion is optional. The AGS proposer may accommodate heavy freight with the system. If the proposer chooses to include heavy freight as part of their AGS, the details of this should be presented in the proposal. The provision for heavy freight on the AGS shall not negatively affect the passenger traffic on the system or adversely impact operational efficiencies and maintenance costs.

Draft System Performance & Operational Criteria

▶ Growth

- The AGS provider should describe how the system will accommodate future growth in demand.

▶ Tunnels

- Tunnels are acceptable provided they are a cost-effective solution.

▶ Reliability

- Except for the extreme weather events to be defined by the AGS proposer under the Weather criterion, the AGS should provide 98% on-time reliability. On-time is defined as within 5-minutes of the scheduled arrival or departure time.

Draft System Performance & Operational Criteria

▶ Headways

- The AGS headway times shall be capable of addressing peak period demands of 4,900 passengers per hour in each direction.

▶ Operational Efficiencies and Maintenance Costs

- The AGS proposer shall provide an operational efficiency and maintenance plan.

Draft System Performance & Operational Criteria

▶ Context Sensitive Solutions

- The AGS shall conform to CSS principles for environmental and community considerations in construction and operations in all locations, the development of transit stations of all designs, all system facilities and for all types of technologies.

Draft System Performance & Operational Criteria

▶ Power Generation, Transmission and Distribution

- The AGS shall define the system consumption and the proposer's plan to obtain power/fuel for propulsion.
- The AGS proposer shall describe their system's ability to accommodate electrical power transmission/distribution lines and other utilities within the guideway area both for the system use and for uses outside of the AGS.

Draft System Performance & Operational Criteria

▶ Energy Efficiency

- The AGS provider shall describe the ability of their system to respond to incorporating green technology for renewable power sources such as wind and solar power.

▶ Sustainability

- The AGS should be implemented in a sustainable manner.
- The AGS provider shall describe a basic sustainability plan that as a minimum covers: supply chain, carbon footprint, construction methods and impacts, green materials, life-cycle analysis, and alternative energy.

Draft System Performance & Operational Criteria

▶ Cost

- The AGS provider shall provide a not-to-exceed cost along with their expected/required level of public funding participation for both capital and O&M costs.
- PPPs are encouraged to provide a range of system size and capabilities. This might include scenarios of \$5 B, \$10 B, \$20 B and \$30 B. Providing multiple system sizes is not a requirement. There is no limit on the financial size of the proposed system.
- In addition to phasing options, providers should identify any high-cost, high-risk items which may be better addressed with additional project development, ultimately reducing the total project cost.

Draft System Performance & Operational Criteria

▶ Alignment

- The AGS alignment should, to the extent possible, generally follow the I-70 highway ROW. The system should not be limited to the current CDOT I-70 highway ROW if a more efficient, more direct, more reliable and potentially less expensive alignment is possible. The AGS alignment should optimize ridership potential and minimize environmental impacts to both the corridor's natural and built environments, including impact to corridor communities and the current highway operation. In addition, alignment location considerations should include minimizing the impact to the current I-70 highway operation during the construction of the AGS.

Draft System Performance & Operational Criteria

▶ Termini

- Ultimately the AGS shall operate from Denver International Airport (DIA) to Eagle County Regional Airport. The AGS can be implemented in a phased manner provided the technology is consistent and, at a minimum, the minimum operating segment (MOS) is operational from the Front Range to west of the Continental Divide by 2025. The full system implementation must be achieved by 2050. The provider shall provide an implementation and financial plan concerning the MOS and ultimate system build out.

Draft System Performance & Operational Criteria

▶ Right-of-Way (ROW)

- The system ROW will be defined by the provider and will include the guideway, stations, electrical substations and maintenance facilities/depots. The ROW will be valued and cleared by CDOT, local jurisdictions, Forest Service and other affected parties. The final ROW needed for the system will be made available at no cost to the developer prior to financial close.

Draft System Performance & Operational Criteria

▶ Interface With Existing and Future Transit Systems

- The AGS provider will not be responsible for costs of development and operations of transit systems to connect the AGS stations to local destinations. Local agencies will utilize existing transit systems or develop new transit systems prior to the AGS becoming operational to transport passengers and baggage from the AGS stations to their destinations. The provider will work with the appropriate agencies during design development to develop local transit systems to meet the demands posed by the AGS at each station.

Draft System Performance & Operational Criteria

- ▶ **Potential System Owner and Operator**
 - The AGS will be owned by a governmental authority and operated by the provider for a term to be defined at a later date. The provider shall provide a suggested term for the concession.

Draft System Performance & Operational Criteria

▶ Potential Station Locations

- Preliminary stations locations include:
 - Jefferson County Station Near C-470/US 6/I-70
 - Clear Creek County (1 Station)
 - Summit County (2 Stations)
 - Vail
 - Eagle County Regional Airport
- AGS providers may elect to include additional stations if their technology allows the other criteria to be met with the additional stations and stops.

Draft System Performance & Operational Criteria

- ▶ Additional criteria still to be established:
 - Land Use and Transit Oriented Development (TOD)
 - Financing/Funding
 - AGS Governance Authority
 - Environmental Consequences
- ▶ We are also working on definition of feasibility

Financing / Funding

Potential Funding Levels	Transportation - Corridor	Non-Transportation - Corridor	Non-Corridor
High	<ul style="list-style-type: none"> ➤ System ridership (fares) ➤ Highway tolls ➤ Saved Highway Widening Investment 	<ul style="list-style-type: none"> ➤ Development rights (could be air rights) ➤ Increased density (with development fees and/or development rights) ➤ Transportation benefit district (property tax around stations) ➤ Property tax overlay ➤ Corridor sales tax 	<ul style="list-style-type: none"> ➤ Sales tax ➤ Gas or mileage tax increase ➤ Income tax surcharge ➤ License or vehicle registration fee increase
Medium	<ul style="list-style-type: none"> ➤ Freight revenue (light or heavy) ➤ License or vehicle registration fee increase ➤ Multiple system users 	<ul style="list-style-type: none"> ➤ Development impact fees ➤ Electrical transmission of distribution fees or tax ➤ Electrical transmission or distribution rights 	<ul style="list-style-type: none"> ➤ State bonds (lower debt service) ➤ Carbon or emissions tax (or emissions tax) ➤ State General Fund
Low	<ul style="list-style-type: none"> ➤ Direct connections to high activity centers (max. ridership and convenience) ➤ Interlining air tickets to system rides (and lift tickets) ➤ Connecting bus ridership ➤ Parking fees ➤ FRA grants 	<ul style="list-style-type: none"> ➤ Lift ticket surcharge ➤ Job Development grants ➤ Utility tax increase ➤ Room or bed tax 	<ul style="list-style-type: none"> ➤ State or Federal funding for pre-construction activities (lower risk) ➤ Rental car tax increase ➤ Room or bed tax increase



AGS Project Process

- ▶ April 2012 to June 2012
 - Develop Draft System Performance & Operational Criteria
 - Initial outreach to industry
 - Industry Forum/Webinar
- ▶ July 2012 to August 2012
 - Informal one-on-one discussions with industry
 - Refine Draft System Performance & Operational Criteria
 - Develop RFQ
 - Advertise RFQ on August 2, 2012

AGS Project Process

- ▶ August 2012 to September 2012
 - Review & score Statements of Qualifications
 - Shortlist three teams to receive RFPs (9/25)
- ▶ September 2012 to January 2013
 - Develop RFP in collaboration with shortlisted teams
 - First ridership data from ICS (October 2012)

AGS Project Process

- ▶ January 2013 to May 2013
 - Issue RFP to shortlisted teams
 - Work with teams as they prepare technical proposals
 - Review Alternative Technical Concepts
 - Finalize ridership based on alignment/station locations particular to each proposer

AGS Project Process

- ▶ May 2013 to September 2013
 - Technical proposals due early May 2013
 - Review technical proposals for conformance to RFP (pass/fail)
 - Work with proposers to clarify technical proposals
 - Finalize funding/financing plan
 - Prepare report and implementation plan
 - Decision point – AGS included with PPP for highway improvements?
- ▶ September 2013
 - Begin Tier 2 NEPA studies

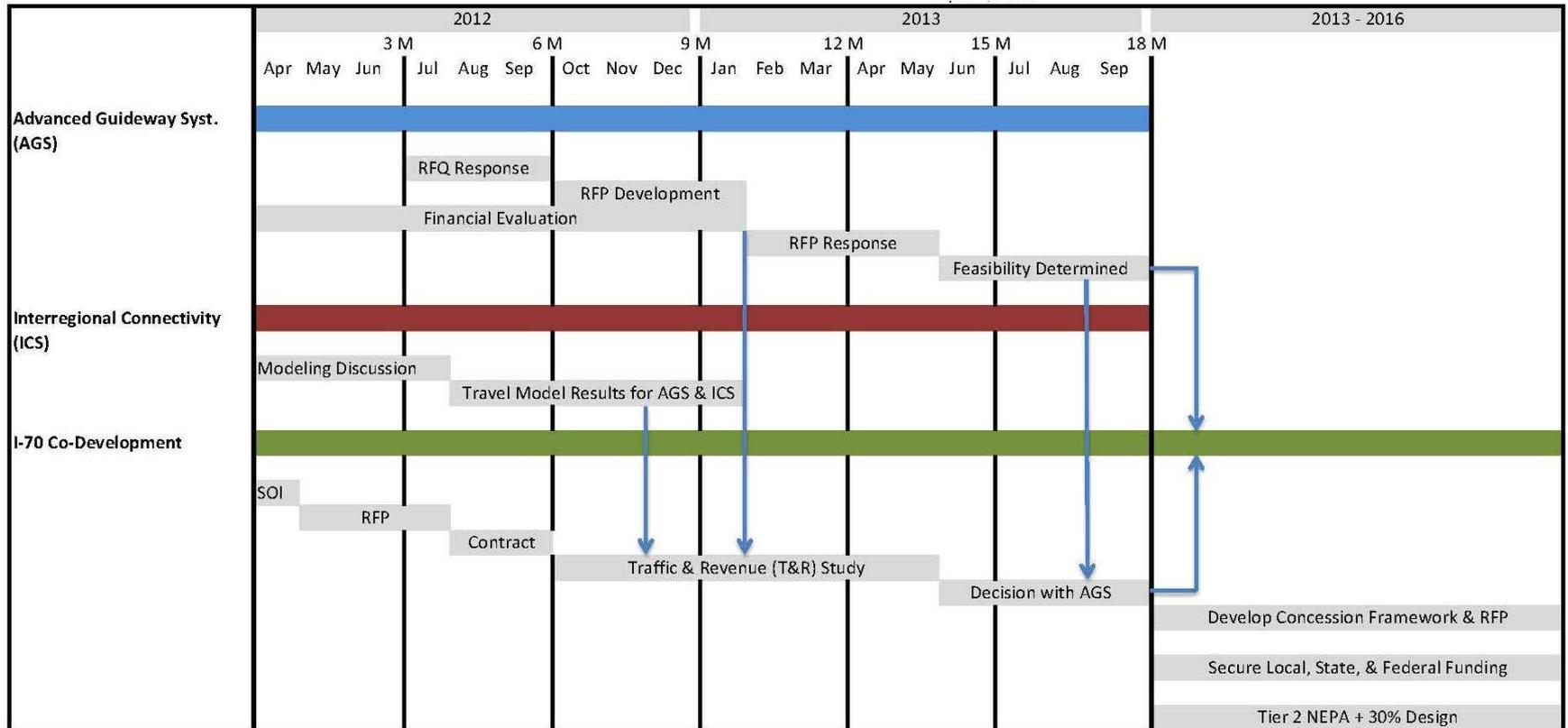
AGS Project Process

- ▶ September 2013 to 2017
 - Tier 2 NEPA studies
 - Preliminary engineering
 - Establish organizational structure for AGS
 - Secure public funding sources
 - Prepare Development Agreement in collaboration with three proposers
- ▶ 2017 to 2019
 - Proposers prepare “Best and Final Offer”
 - Select one team for implementation
 - Financial Close by end of 2019

AGS Project Process

- ▶ 2020 to 2025
 - Construct, test and commission Minimum Operating Segment (MOS)
 - Open MOS to public by end of 2025

AGS/ICS/Co-Development Project Coordination



Questions

- ▶ To ask a question, use the raise hand command
- ▶ Since this is an industry forum and to make best use of time, it is requested that public attending webinar email questions to us or CDOT
 - Mike Riggs (Industry) – mriggs@aztec.us
 - David Krutsinger, CDOT DTR (Public) – david.krutsinger@dot.state.co.us

Closing Remarks

- ▶ We realize that this probably raises more questions than it answers
- ▶ We will be available starting tomorrow to meet in-person or via conference call with any interested parties
- ▶ If you want to meet, please contact us at 720.708.4176 or via email at mriggs@aztec.us