Rapid Speed
Transportation Innovations
Future Reality or Just a Pipe Dream

Colorado APA Conference
October 4, 2018 – 1:45-3:15
Agenda

— Presentations
  • Rebecca White – CDOT Government Relations
    Overview & Role of Public Agencies
  • Lindsey Sousa, AICP, LEED AP – AECOM
    Policy Implications
  • Joe Racosky – AECOM
    Rocky Mountain Hyperloop Feasibility Study
  • Nick VanderKwaak, AICP – AECOM
    Arrivo Feasibility Study

— Workshop – Feedback from You!
Role of Public Agencies
Rebecca White, CDOT Government Relations
FY 2016-2017 $1.44 Billion Budget

CDOT RESPONSIBILITIES

- Administers $208 million each year in federal grants
- 3,454 bridges
- Maintains & operates 23,000 total lane miles of highway
- Division of transit and rail
  - Administers fed/state grants and operates Bustang
- 6.1 million miles plowed of snow per year
- 35 mountain passes open year-round
- Airport planning interface with FAA

Source: Colorado Department of Transportation, 2014
RoadX VISION: Crash-free, Injury-free, Delay-free and Technologically-transformed travel in Colorado.

RoadX MISSION: Team with public and industry partners to make Colorado one of the most technologically advanced transportation systems in the nation, and a leader in safety and reliability.

Colorado Is Open For Business - Colorado invites partners to join us in accelerating the adoption and deployment of technological solutions.
ROADX PROJECT CLASS (RPC)
Identifying Projects Based on Technology Readiness and Risk

RPC 1
First of Its Kind Projects
35% of Budget
- HYPERLOOP
- SMART POWERED LANES
- PANASONIC
- ETC.

RPC 2
Bringing Proven Tech to Colorado
55% of Budget
- SMART 25
- SMART 70
- SMART TRUCK PARKING
- ETC.

RPC 3
Supporting Existing Projects to Create the Roads of Tomorrow
10% of Budget
- TRAFFIC SIGNAL UPGRADES
- FIBER EXPANSION
- NORTH I-25
- ETC.

TECHNOLOGY READINESS LEVELS (TRL)
- Basic Technology Readiness
- Research to Prove Feasibility
- Technology Development
- Technology Demonstration
- System / Subsystem Development
- System Test, Launch & Operations

TRL 1 - 3
TRL 4 - 7
TRL 8 - 9
State Rapid Speed Benefits and Opportunities Study

Funded by the state and shared during development with technologists. Will address, among other issues:

• Which agency will oversee and regulate this new technology?
• What governance structure will apply?
• Which environmental approval processes will be applied?
• Determine what CDOT’s and private partner’s role in ownership, construction, operations, maintenance, and funding will be?
• While individual technologists may define specific beginning routes, how will this impact larger network and land use?
Technologists Feasibility Analysis

Funded by technologist and shared during development with the State Benefits and Opportunities Study. Will include:

- Technology assessment
- Routes and market assessment
- Operations Plan
SMART POWERED LANES
POWER AS YOU GO
HIGH SPEED PROJECTS
Lindsey R. Sousa, AICP, LEED AP

About AECOM

450 Offices

87,000 Employees

150 Countries
THE FUTURE OF INFRASTRUCTURE
Expert opinions from around the world on the challenges and opportunities ahead

FUNDING AND FINANCING
Finding solutions in a resource-constrained environment

FASTER, SMARTER, BETTER
New approaches to delivering future infrastructure

SKILLS 2030
How to build the future workforce

RESILIENCE
Future proofing and mitigating physical and digital attacks

INNOVATION
Take a trip to a day in the life of 2030

SKILLS
INNOVATORS WANTED
21%
Sourcing the right skills
81% feel the industry is fully prepared to secure the right skills to meet future industry challenges.

INNOVATION
THE INFRASTRUCTURE INNOVATION DEFICIT
3 IN 4
Out of sync
Three-quarters believe that alternative technical concepts from the private sector provide the best opportunity to develop innovative infrastructure solutions.
Why AECOM Leads in Innovation

- We have a culture of innovation and DREAM is a core value.
- AECOM and our people are well suited to adapt to change.
- We have a global footprint and mission to make the world a better place.
- We foster collaboration and partnership by connecting teams across disciplines.
How We Are Helping

**Innovation Strategy**

**Offering:** Partner with clients to develop and implement an innovation strategy.

**Objective:** Help clients prioritize their investment in new technologies.

**Project Snapshot:**
- RoadX Innovation Program Management
- CAPRI

**Feasibility & Pilot Programs**

**Offering:** Engage with clients on defining use cases, testing and evaluating technologies.

**Objective:** Ensure that clients have all of the necessary information and testing required to make an informed decision.

**Project Snapshot:**
- Minnesota DOT Autonomous Bus Pilot Program
- CDOT Dedicated Short Range Communication Receiver Pilot Program

**Technology Solutions**

**Offering:** Work with clients to enhance their existing technology portfolio by implementing innovative solutions.

**Objective:** Help clients address challenges by implementing innovative technology solutions.

**Project Snapshot:**
- AECOM Mobilitics Assessment
- Florida DOT Dynamic Pricing Software
- NJ Turnpike ATMS Software
Latest Research

– Rapid speed technologies have the potential to transform the way we move in Colorado, and could help advance our mobility goals alongside other modes/systems.

– Application of new technologies is a complex process; the partnerships will vary.

– Technologists need clarity and speed; creative partnerships and streamlining strategies need to be advanced.
Case Studies- High Speed Rail

- Brightline – Miami to Orlando
  - 240 Miles/125 mph max speed
  - All Aboard Florida - private developer

- Texas Central – Dallas to Houston
  - 240 miles/205 mph max speed
  - Proposed by investor-funded Texas-Central Partners

- CA High Speed Rail (LA to San Francisco)
  - 520 miles/200 mph max speed
  - California High-Speed Rail Authority (CHSRA)
  - 77.3 Billion cost
Implementation Framework

- Project Planning & Development
  - Planning & Environmental
  - Safety Regulation Processes
  - Governance & Policy
- Project Procurement
  - Financial & Legal Processes
  - Procurement & Partnerships
  - Project Management & Oversight
- Project Implementation
- Project Operations

Project Delivery Strategy
Planning and Environmental

Key Considerations:

– Early Planning/Feasibility Studies
– NEPA requirements, lead federal agency and cooperating agencies
– Ability to streamline
Safety Certification

– Which agency or entity would certify for system safety & human safety?

– Will a new entity need to be formed to certify these new technologies (3rd Party Certification)?
Governance and Policy

– Right of Way Acquisition and Ownership
– Will likely require “megaproject” funding levels
– Likely a public-private partnership (P3) approach
– Need to consider opportunities for Joint Development and Transit-Oriented Development
Service or Asset-Related Revenue Generation

- **Value Capture**
  - Tax Increment Financing
  - Special Assessments Districts
  - Transit-Oriented Development
  - Transit Joint Development (partnered with developers)

- **Potential Utility Partnerships**
  - Leveraging funding by selling or leasing access to utility providers to utilize planned ROW
    - Fiber Optic (telecommunications)
    - Water and Sewer (drinking and wastewater)
    - Oil and Gas (pipeline)
    - Power (electricity and natural gas)
Rocky Mountain Hyperloop

Joe Racosky - AECOM
Hyperloop

- **Transportation System**
  - Cargo or Passenger

- **Technology Driven**
  - Passive Magnetic Levitation
  - Electric Linear Motor
  - Vacuum Pressured Environment

- **Key Advantages**
  - Capable of High Speeds
  - Emission Free Transport
  - Autonomous
Hyperloop One Global Challenge

2600 Applicants – 10 Finalists

https://hyperloop-one.com/global-challenge
Colorado is Ready for Hyperloop  *Current Challenges*

- Population: +47%
- Vehicle Travel: +47%
- Avg. Traffic Delay on congested corridors: 2 to 3 times

7.8 million Coloradans
41.8 billion miles traveled during peak hours (if we do nothing)
Colorado is Ready for Hyperloop  

**State of Innovation**

- Fast growing economy
- Most active state
- 2nd most highly educated
- 5th most innovative state
- 8th most “future-ready” city
- 5th highest among all states for net migration
- Large millennial workforce
The differentiating benefit of Hyperloop is travelling further, in less time, and with the access at the ground level.
Strategic Transformation

Disruptive Connectivity Ignites New Possibilities
Strategic Transformation **Front Range**

- Diversified economy with high value-added industry clusters
- Enhanced transportation network
- Influence future land use patterns
- Further reputation as a first mover in terms on advanced transportation systems, technology, and sustainability

**INDUSTRY CLUSTERS**

- Education
- Aerospace
- Renewable Energy
- IT/Computer
- Science & Manufacturing
- Advanced Manufacturing
- Health and Bioscience
- Logistics/Distribution
Colorado’s ski and outdoor recreation industry generates more than **$4.8 billion** annual economic benefits. Hyperloop can supply goods and improve the quality of recreational experience with lower environmental impact.
Leadership and Investment
Deliver Results

Demonstrated Delivery
• P3/Accelerated
• Multimodal
• Regionalism
Rocky Mountain Hyperloop *Colorado and the Spirit of the West*
SUPER URBAN HIGH SPEED SYSTEM

USER BENEFITS
- Fast! 20min to anywhere
- On-demand and automated
- Door-to-door capability
- Point-to-point without stopping
- Integrates with automobiles, bike-friendly, and pedestrian friendly

OWNER BENEFITS
- Agnostic to infrastructure type
- Can be built on existing roadways
- Energy efficient operations
- No need for vacuum system
- Optimized supply and demand with smaller vehicles
- Positive IRR opportunities provide attractive PPP investments

REGIONAL BENEFITS
- Integrates with existing networks
- Increases regional throughput and decreases congestion
- 100% electric with no emissions
- Supports public transit, private autos, sharing economy, and goods movement

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MULTIPLE MODES ON ONE PLATFORM

CITY ZIPPER
- 10X > HOV & Express Lanes
- Up to 18K vehicles per hour per direction
- Market entry product

PALLET ZIPPER
- 10X > Delivery Trucks
- Up to 18K vehicles per hour per direction
- Market entry product

SUPER METRO
- 10X > Metro/Light Rail
- Up to 250K passengers per hour per direction
- Urban high capacity

DOOR TO DOOR
- 10X > Autonomous Car Fleet
- Long-Term vision
- Seamless customer experience
- No stations

SAME INFRASTRUCTURE SUPPORTS ALL PRODUCTS
ONE CHASSIS SUPPORTS ALL VEHICLES

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• V2V and V2I connectivity provides safer environment than autonomous vehicles on open roadway
• Enclosed environment prevents accidents with pedestrians and bicyclists
• Ambient pressure environment allows for passenger egress in emergency evacuations
• Wayside propulsion creates a virtual conveyor belt preventing rear-ending of vehicles
Arrivo is ideal for large metropolitan regions with dense population and congested networks.
Time for a few Questions

Thank you

rebecca.white@state.co.us
lindsey.sousa@aecom.com
joe.racosky@aecom.com
nick.vanderkwaak@aecom.com
Discussion and Feedback

- Break into small groups
- Assign a note taker and presenter
- Discuss directed questions (15 min)
- Report back to large group (15 min)
Question 1: Considerations for bringing high speed modes to Colorado

Question 2: Implications for local communities

Question 3: Implications upon land use

Question 4: Potential connections to other modes