



# COLORADO

Department of  
Transportation



**DMCC Meeting  
March 17, 2017**

**FY 2016-2017**  
**\$1.44 Billion Budget**



# CDOT RESPONSIBILITIES

ADMINISTERS  
**\$208**  
MILLION  
EACH YEAR IN FEDERAL  
**GRANTS**

**3,454**  
  
**BRIDGES**

CDOT  
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

## Purpose

To save lives and make lives better by providing freedom, connection and experience through travel.



2017

## Values

Safety, people, integrity, customer service, excellence and respect are at the heart of all that we do.

## Summit

The best DOT in the country for all customers by focusing on our people, leading-edge technology and a healthy multi-modal system.

## Peaks

## Base Camps

### Technology

Help Our People with Technology

Big Data

Improve Travel Experience with Technology

### People

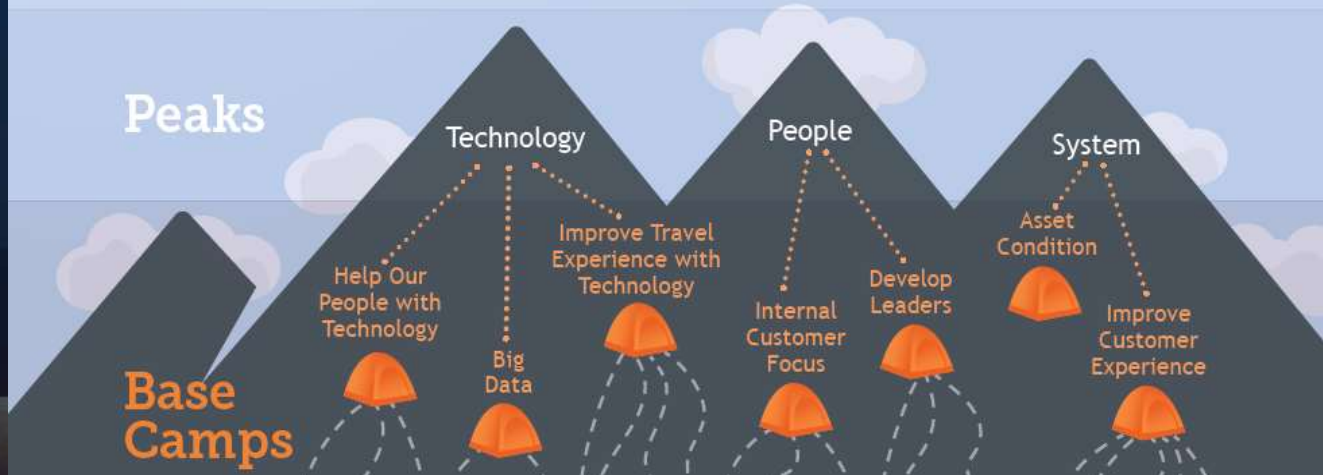
Internal Customer Focus

Develop Leaders

### System

Asset Condition

Improve Customer Experience



# OUR CHALLENGE

## Continued Growth



1991



3.3 million



27.7 billion  
vehicles miles traveled

\$  
\$  
\$  
\$\$\$

\$125.70

spent per person

2015



5.4 million



50.5 billion  
vehicle miles traveled

\$  
\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$

\$68.94

spent per person

2040



7.8 million



72.3 billion  
vehicle miles traveled

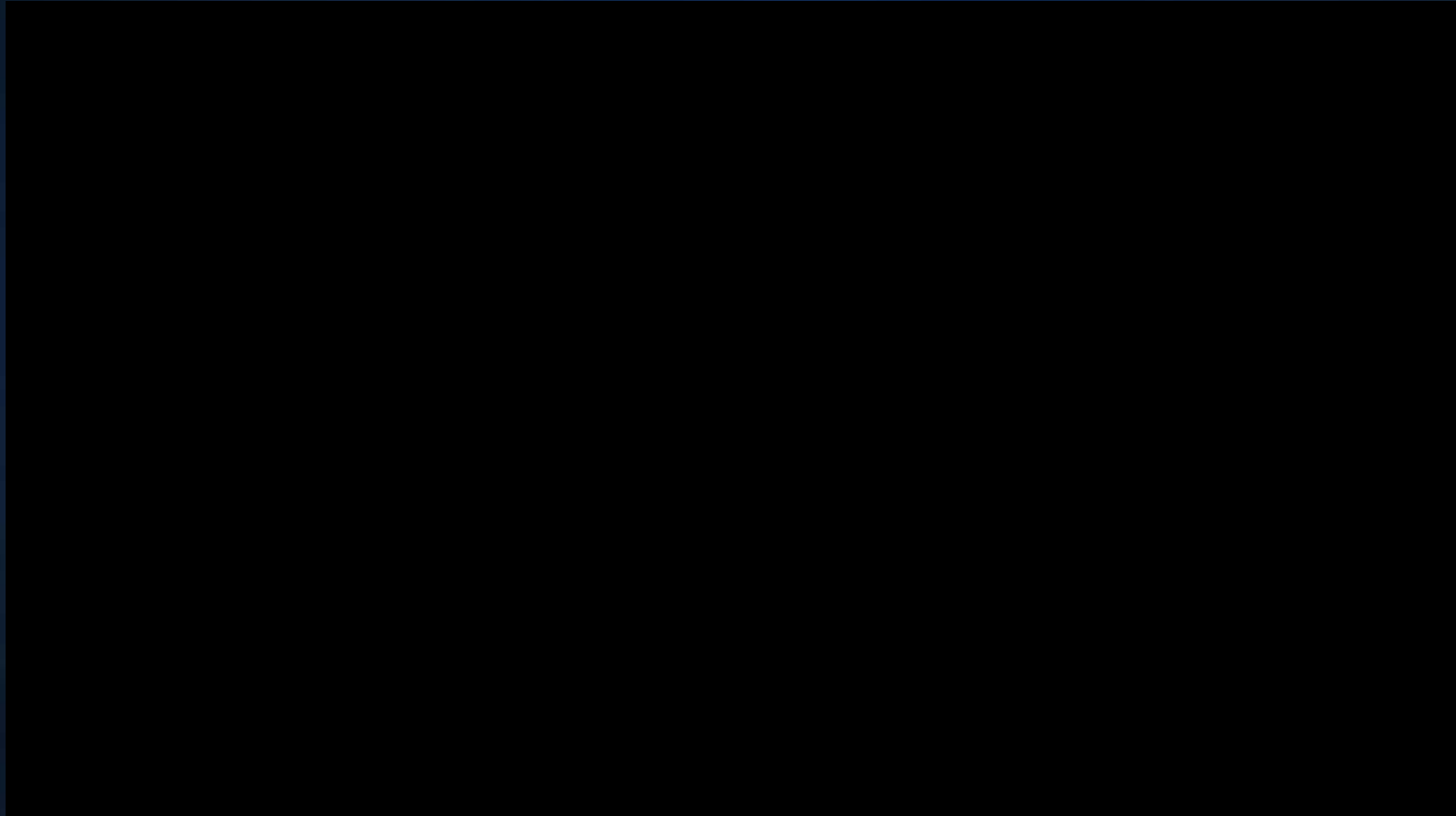
\$

\$41.16

spent per person

*All dollar  
figures  
adjusted  
for inflation*



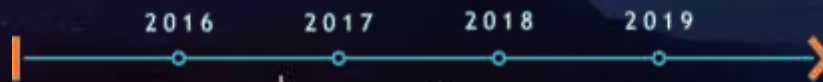


# ROADX

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.



## WHAT COLORADANS THINK

Drivers are not yet comfortable with driverless cars (cost and potential for equipment failure).

Acceptance increases with familiarity.

Road and traffic communication technologies are less familiar than car features, but easier to accept.

Privacy is significant concern, but most trust CDOT to manage their data.

Coloradans can visualize benefits of the new technologies.

Support for CDOT taking the lead in education and testing.

COMMUTING



SUSTAINABILITY



TRANSPORT



SAFETY



CONNECTION







TRANSPORT



TIMING : FALL 2016

Colorado partnered with Otto of Uber to complete the world's first commercial delivery by a self-driving truck. This approximately 120-mile demonstration of self-driving technology in the real-world environment of Colorado is a monumental next step in advancing safety solutions that will help Colorado move towards zero deaths on our roadways. Colorado is enthusiastic about working with Otto and others on:



The long-term impacts and benefits of safely deploying this technology to enhance safety



Improve environmental impacts of highway freight



Foster the economic benefits advanced driving technologies are poised to bring to freight delivery and our state.



**OTTO**



CONNECTION



TIMING : WINTER 2016

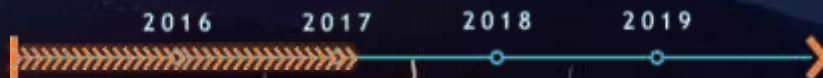


## SMART 70 - GOLDEN TO VAIL

CDOT has partnered with an international mapping firm, HERE to provide drivers with the most real-time data possible to allow drivers to make better decisions when traveling through the mountains. Drivers will be equipped with the knowledge of when they can expect critical safety warnings such as:

- Low visibility
- Multi-vehicle pileups
- Sun glare

Smart 70 will accelerate the advancement of autonomous vehicles by giving autonomous systems instantaneous data and warnings from connected vehicles.





CONNECTION



TIMING : WINTER 2016

## SMART 70 - GOLDEN TO VAIL

### Goal for SMART 70 Deployment

- Test bed for larger, state-wide deployment  
Opportunities to prove out V2X applications under a controlled but real world environment.

- Production and dissemination of data  
Opportunities to collect and use realworld data to effectively transform the way CDOT software platform functions.

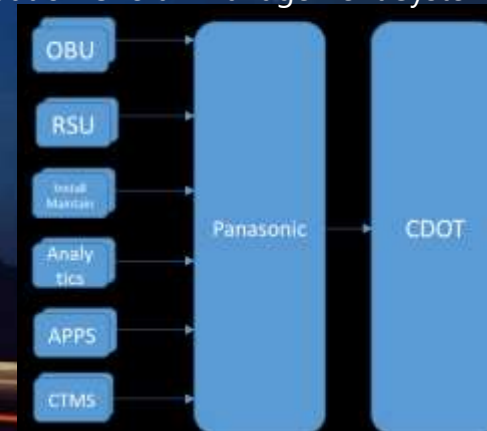
- Increase safety  
Opportunities to measure real-world impact of V2X applications, such as travel speeds, curve speed warnings, driver safety information, road hazards, road temperatures, etc.

Smart 70 will accelerate the advancement of autonomous vehicles by giving autonomous systems instantaneous data and warnings from connected vehicles.

## Panasonic

### Key Takeaways from Deployment

- Validation of V2X Use Cases
- Viability of OBU and RSU Hardware and Software
- Analysis of System Operational Costs
- Research around V2X Data Analytics
- Evaluation of Real World Safety Advantages
- Evaluation of Security Models
- Investigation User Experience for Drivers
- Validation Overall Management System





COMMUTING



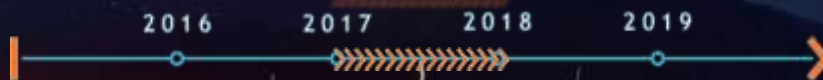
TIMING : FALL 2017

## SMART 25 - RIDGEGATE TO UNIVERSITY

Colorado will be doing a significant software and traffic sensor upgrade to the aging traffic management and ramp metering systems on the highway. This hyper-smart system will help to better manage the flow with vehicles, which could have the result of effectively adding a new lane on I-25 at a fraction of the cost.

The anticipated results are:

- More reliable trips and travel times
- Fewer crashes
- Reduction in stop-and-go traffic
- More efficient flow of traffic without expanding the roadway



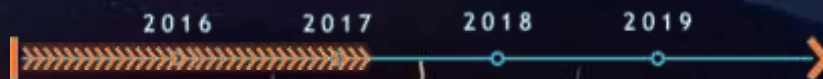
**TRANSPORT****TIMING : WINTER 2016**

## **PHASE 1 - SMART TRUCK PARKING (PRE-PASS, CELLULAR AND DSRC)**

Using detection and cloud-based software that understands and can report available parking spots to truckers, improving:

- Truckers wasted time and fuel
- Excess wear and tear on Colorado's roadways
- Excess pollution

The first phase of this project will integrate six existing parking facilities into the Smart Truck Parking System.





# SUPPORTING ROADX



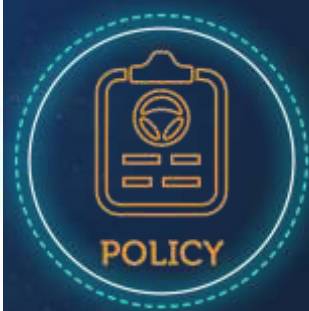
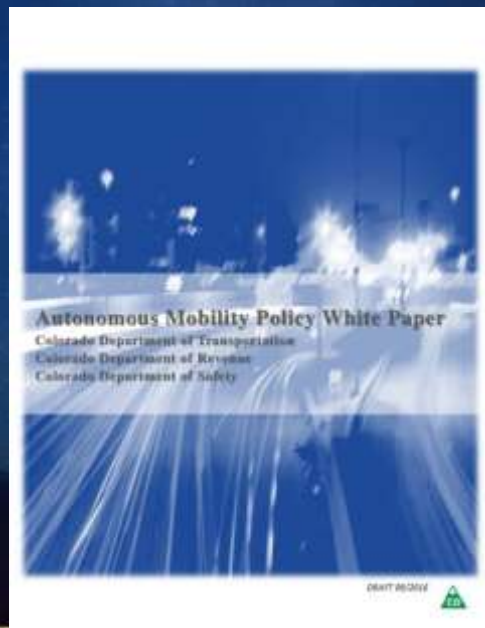
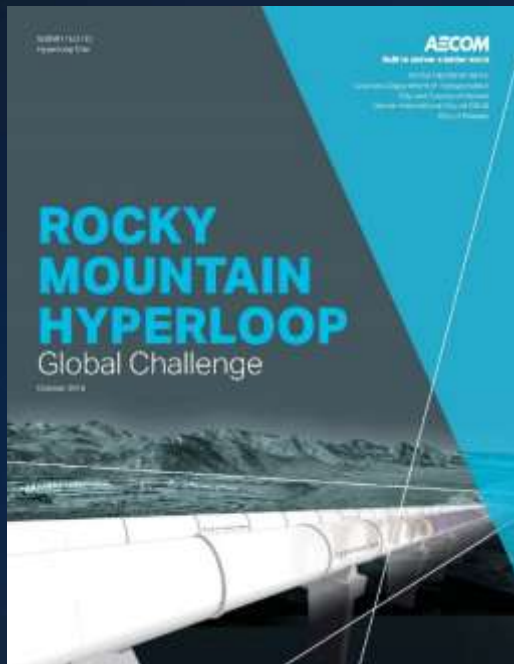
**POLICY**



**PEOPLE**



**PLANNING**



BICYCLE &  
PEDESTRIAN  
CHALLENGE





TRANSPORT



TIMING : SUMMER 2017



Hyperloop is a new way to move people and freight using a custom electric motor to accelerate and decelerate levitated sleds through a low-pressure tube at speeds up to 700 mph.

- The Rocky Mountain Hyperloop team (CDOT, AECOM, Denver, Greeley and the Denver International Airport (DEN)) was selected as one of 35 worldwide semifinalists to build a 40-mile Hyperloop system between DEN and Greeley
- Three finalists will be selected by late summer of 2017



# NEXT STEPS



## Privacy

Address security issues



## People

Educate public



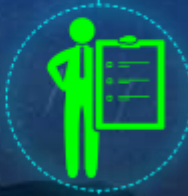
## Technology & Planning

Plan and model for rapid change



## ROI

Invest now in technology platforms



## Regulation

Establish consistent policy direction that supports autonomous future



# QUESTIONS?

