



# CONNECTED VEHICLE PILOT Deployment Program



## Wyoming I-80 Connected Vehicle Pilot



### Talking Freight Webinar

Kate Hartman, Ali Ragan, Deepak  
Gopalakrishna, Sheila Foertsch

ITS Joint Program Office



# TODAY'S AGENDA



- Overview of the USDOT Connected Vehicle Pilot Program
- Wyoming Connected Vehicle Pilot Project – Motivation
- Deployment Overview
- System Overview
- State Trucking Association Perspective



# CONNECTED VEHICLE PILOT DEPLOYMENT PROGRAM

PROGRAM GOALS

## Spur Early CV Tech Deployment



Wirelessly Connected Vehicles



Mobile Devices



Infrastructure

## Measure Deployment Benefits



Safety



Mobility



Environment

## Resolve Deployment Issues



Technical



Institutional



Financial

## PILOT SITES



WYDOT



NYCDOT



Tampa (THEA)

STAY CONNECTED

- Participate in **Design/Build/Test Phase Webinars/Conference Presentations** from the three Pilot Sites (see website for exact dates and times)

Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018
●	◆	◆	●	◆	◆	◆
TRB	Application Deployment	SXSW			Operational Readiness	

◆ Public Webinars      ● Conference Presentations

- Visit Program Website for Updates: <http://www.its.dot.gov/pilots>
- Contact: Kate Hartman, Program Manager, [Kate.Hartman@dot.gov](mailto:Kate.Hartman@dot.gov)



# THE THREE PILOT SITES



- Reduce the number and severity of adverse weather-related incidents in the I-80 Corridor in order to improve safety and reduce incident-related delays.
- Focused on the needs of commercial vehicle operators in the State of Wyoming.



- Improve safety and mobility of travelers in New York City through connected vehicle technologies.
- Vehicle to vehicle (V2V) technology installed in up to 8,000 vehicles in Midtown Manhattan, and vehicle to infrastructure (V2I) technology installed along high-accident rate arterials in Manhattan and Central Brooklyn.



- Alleviate congestion and improve safety during morning commuting hours.
- Deploy a variety of connected vehicle technologies on and in the vicinity of reversible express lanes and three major arterials in downtown Tampa to solve the transportation challenges.

# Connected Vehicles and Freight



- Freight and trucks have always been well-represented during early testing of CVs
  - Connected Commercial Vehicles—Retrofit Safety Device Kit Project
  - Connected Commercial Vehicles – Integrated Truck
  - Freight Advanced Traveler Information Systems (FRATIS)-Dynamic Mobility Applications Bundle
  - NHTSA Heavy Trucks V2V Research
- Wyoming CV Pilot is the next logical step for CVs and Freight





# Wyoming DOT CV Pilot Deployment Overview

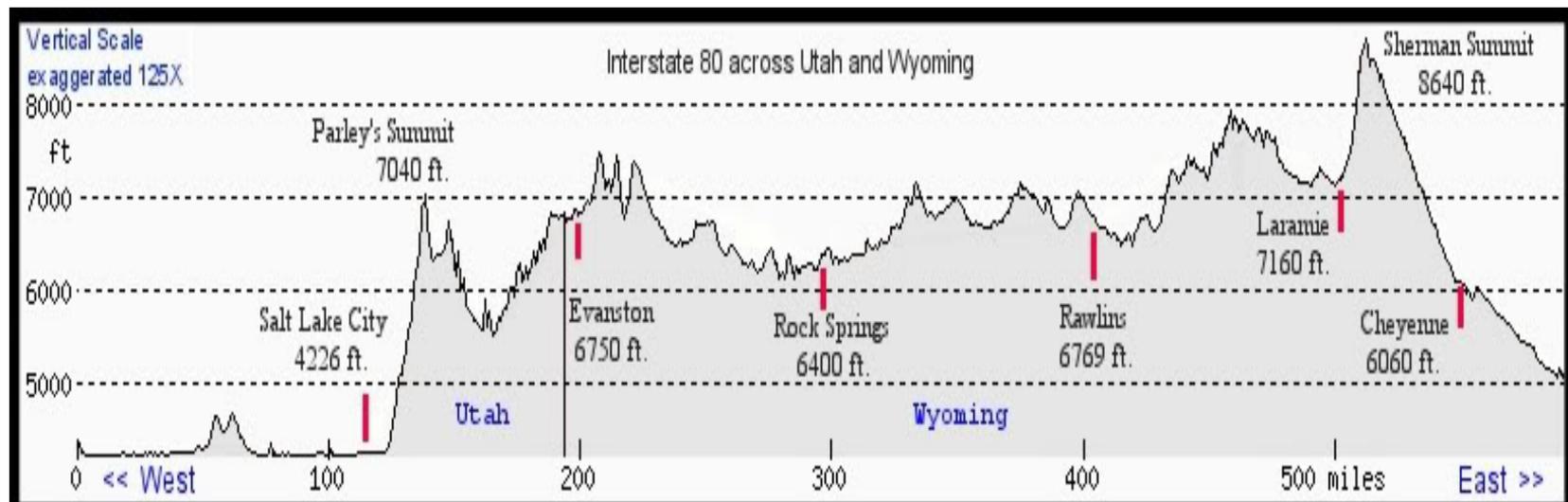
Ali Ragan, Wyoming DOT





# I-80 in Wyoming

- Major corridor for east/west freight in the northwest part of the country
- 402 miles long from Utah to Nebraska
- More than 32 million tons of freight per year (at 16 tons per truck).
- Truck volume is 30 to 55% of the total traffic stream on an annual basis
  - As much as 70% of the traffic stream on a seasonal basis
- Elevation all above 6,000 feet, with the highest point reaching 8,640 feet (2,633 m) above sea level at Sherman Summit



# The Problem



## Heavy Freight Traffic

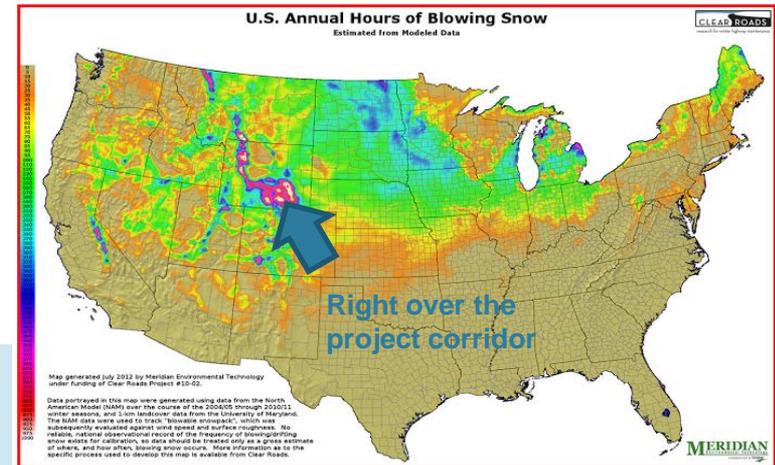
- Major E/W freight corridor
- Freight = over half of annual traffic

## Severe Weather Conditions

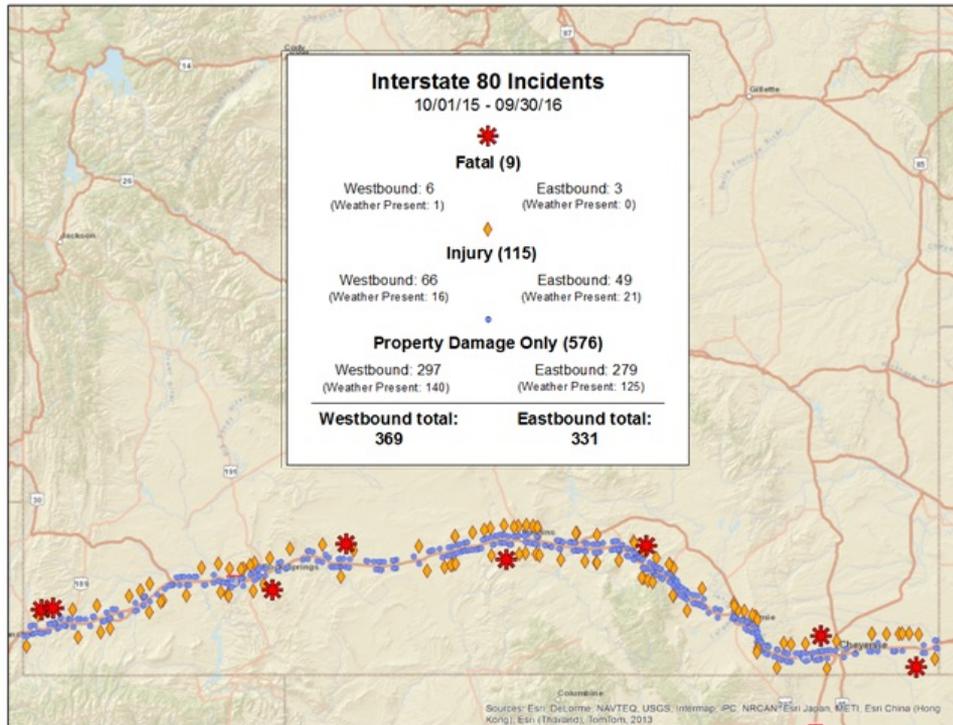
- Roadway elevation
- Heavy winds, heavy snow and fog
- Severe blowing snow and low visibility

## Adverse Impacts on Trucks

- Higher than normal incident rates
- Multi-vehicle crashes
- Fatalities

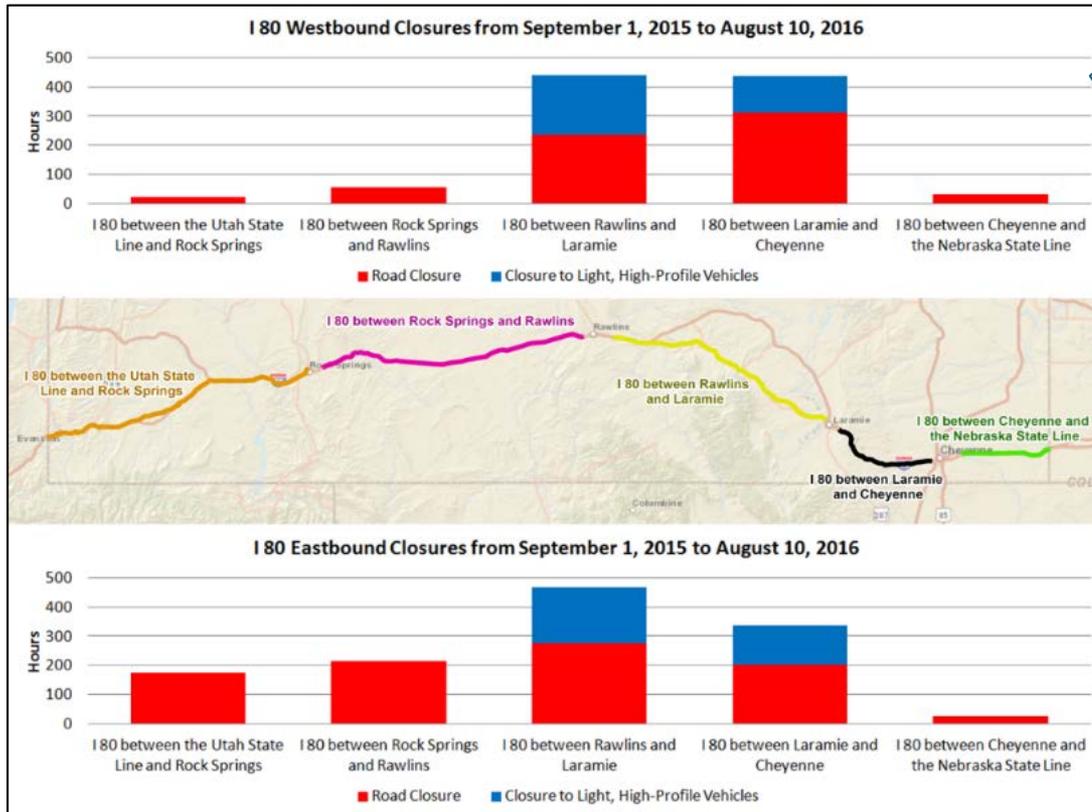
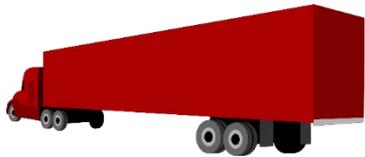


# Impact to Freight



Year	Truck Crashes	% of Total
2010	563	33.9%
2011	642	33.6%
2012	569	40.0%
2013	632	36.5%
2014	690	35.4%
2015	555	40.0%
2016	714	34.3%
2017	408 (partial)	63.1% (partial)

# Impact to Freight



Winter 2016

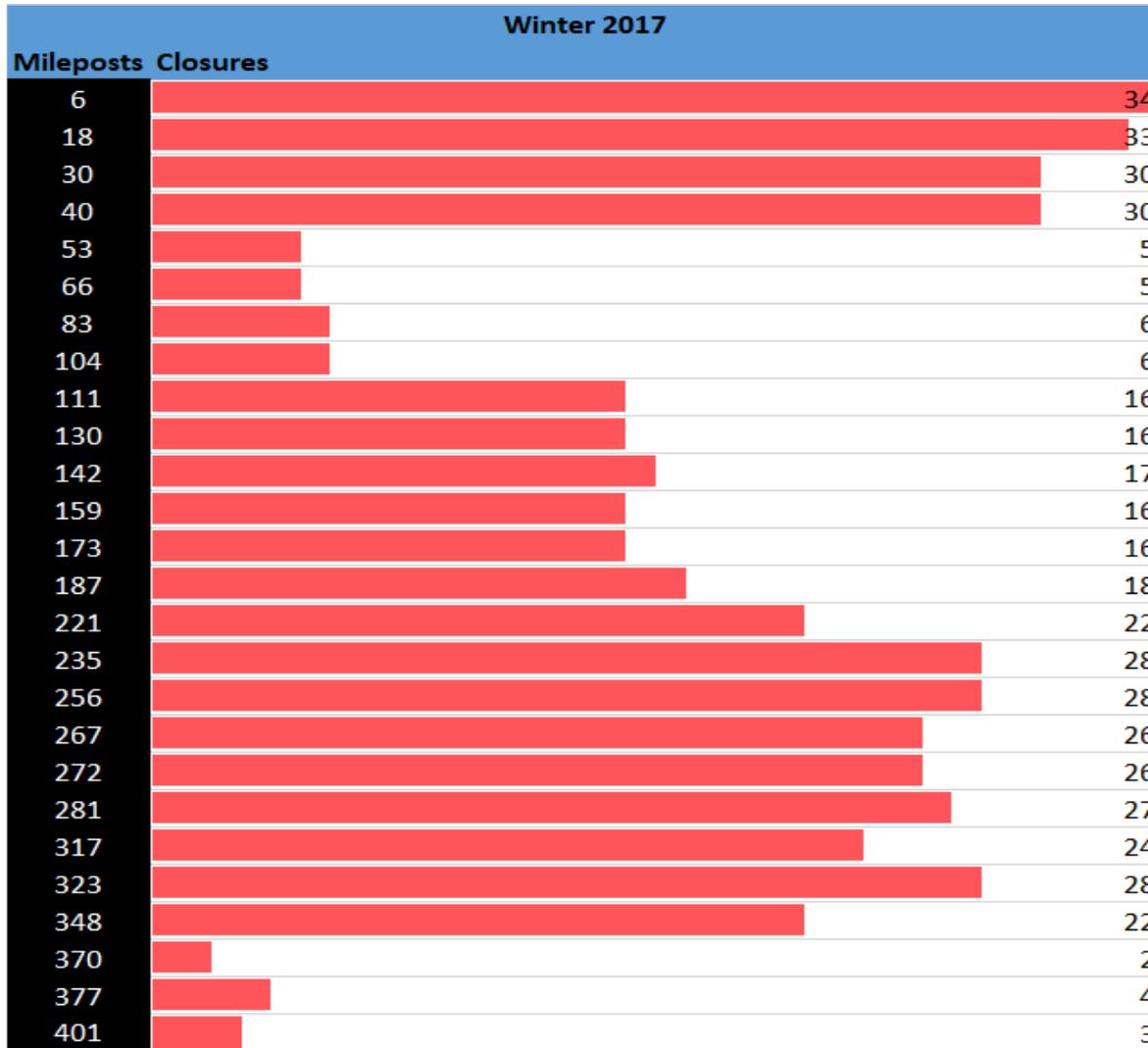
**250 Hours**  
Full Lane Closures

**~180 Hours**  
High Profile  
Vehicle Restriction

**37 Days**  
Inclement Weather



# Corridor-Wide Impact



Winter 2017

**All Segments  
of I-80 had  
closures some  
point in the  
October-May  
timeframe**



# Videos



*Truck Blowover on I-80 on a Wyoming Highway Patrol Vehicle. Video captured by dashcam of another patrol vehicle*

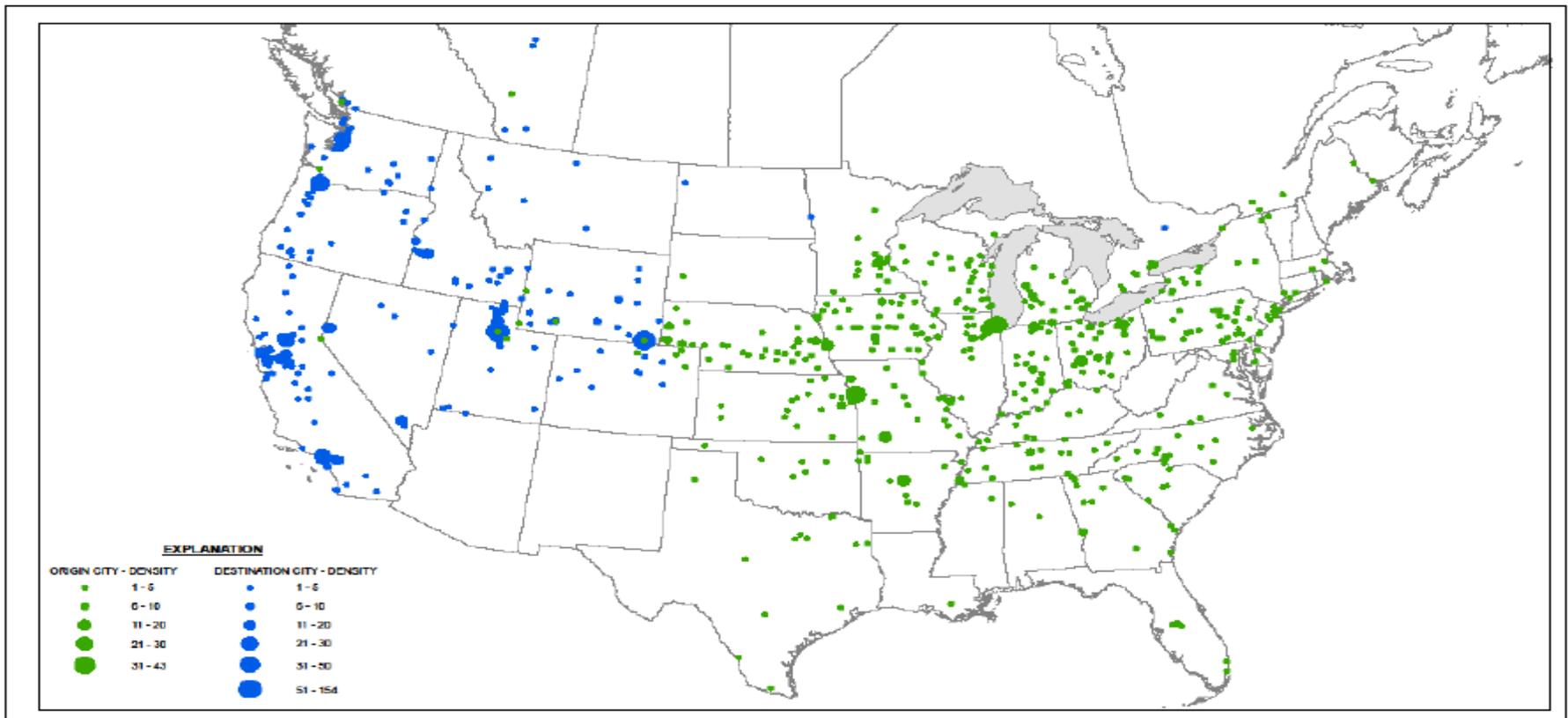
*Multi-vehicle crash on I-80. Notice the truck % on the road. Video captured by traveler who was struck in another multi-vehicle crash on the other direction of I-80*



# National Impacts



## Origins and Destinations of Westbound Freight on I-80



(Source: FHWA-WY- 09/09F Interstate 80 Freight Corridor Analysis)

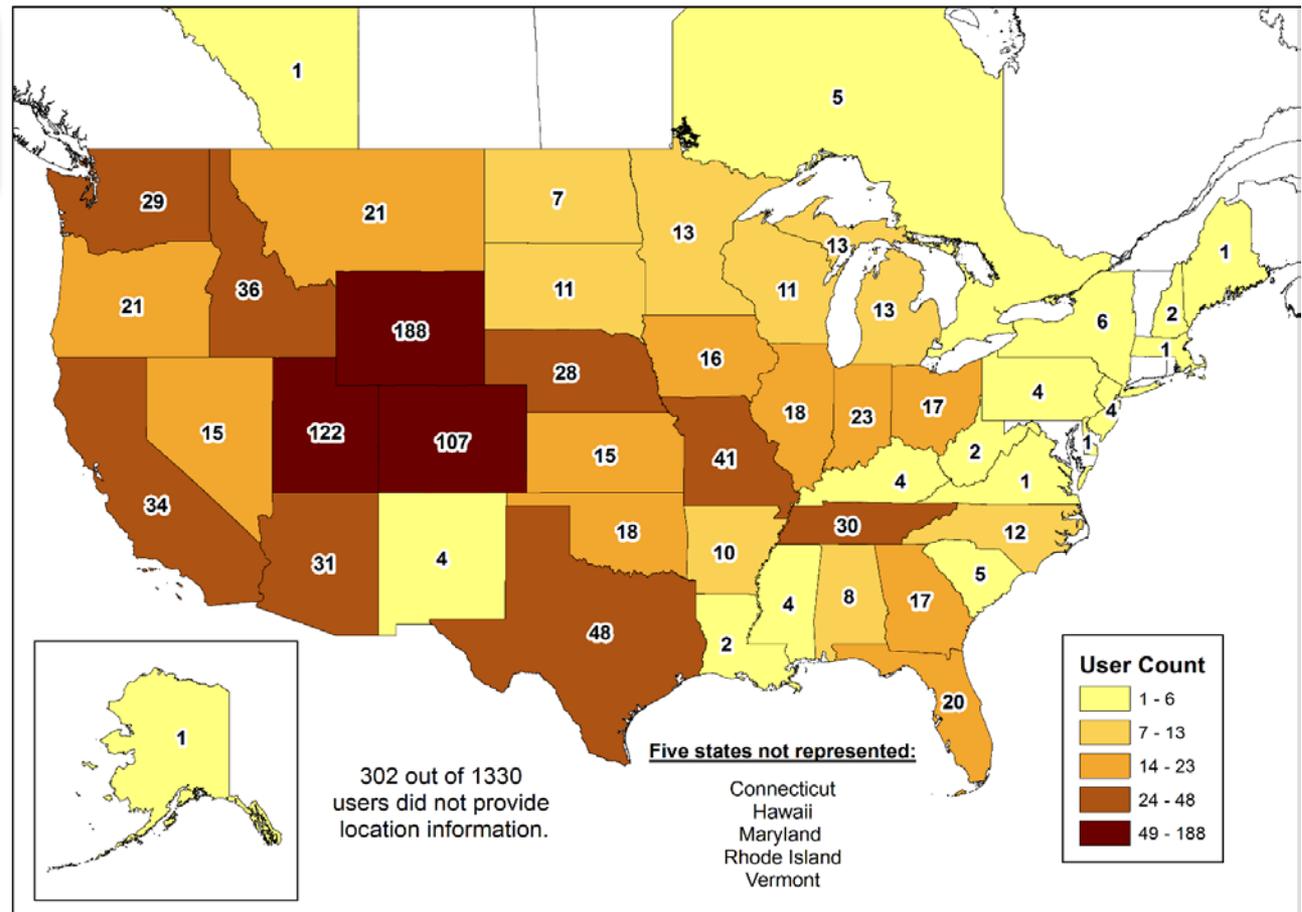


# National Use of Information on I-80



## CVOP Users by Location

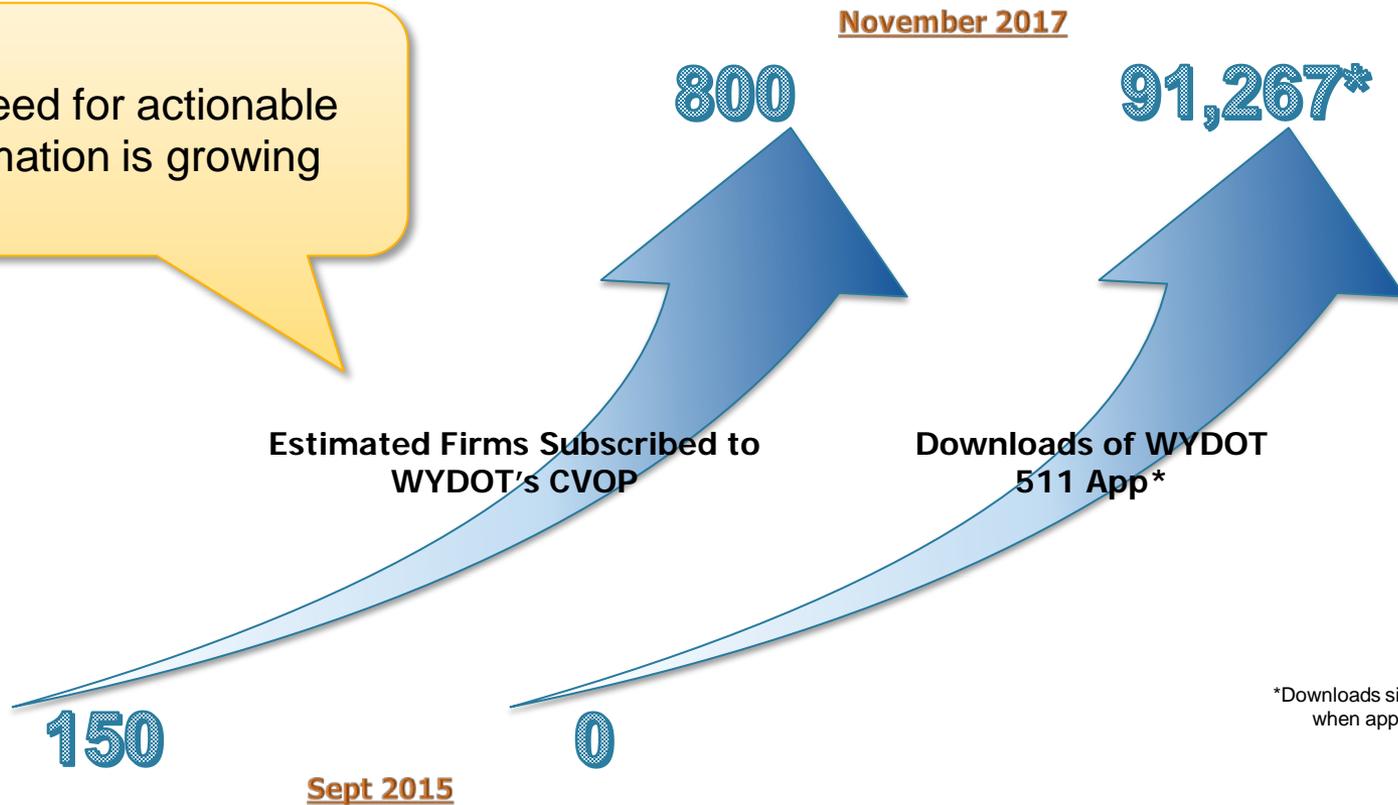
Freight firms across the country need I-80 travel information



# Growth in use of I-80 Information



The need for actionable information is growing



# Pilot Objectives



## Road Weather Condition Input

1. Improve road weather condition reports received into the TMC



## TMC Information Dissemination

1. Improve ability of the TMC to generate wide area alerts and advisories
2. Efficiently manage closures, restrictions and speed limits
3. Effectively disseminate and receive messages from TMC to en-route vehicles
4. Improve information to commercial vehicle fleet managers



## Vehicle/Roadside Alerts & Advisories

1. Effectively transmit and receive V2V messages to reduce incidents and their severity
2. Enhance emergency notifications of a crash



## Outcomes

1. Improve speed adherence and reduce speed variation
2. Reduce vehicle crashes

# Pilot Elements



## CV Environment

75 Roadside Units on I-80  
400 Vehicles with DSRC  
Connectivity



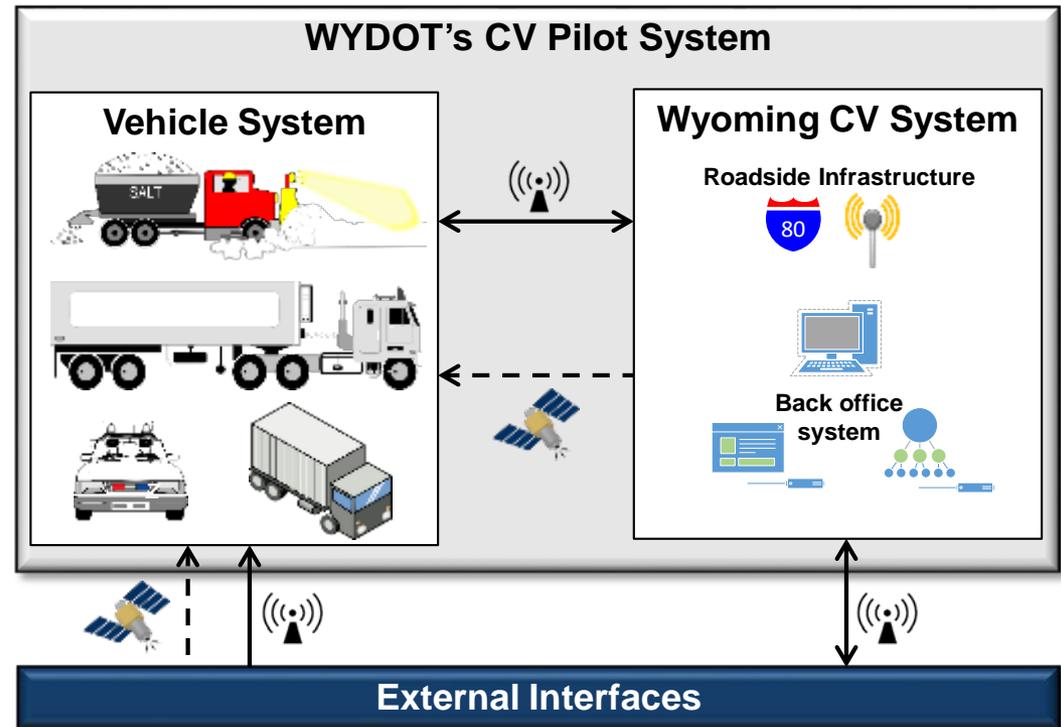
## V2V Applications

Forward Collision Warning  
Distress Notification



## V2I Applications

Situational Awareness  
Spot Weather  
Work Zone Warning





# Participating in the Pilot

Get CVP Equipment on your trucks

Subscribe to CVOP to get customized alerts, forecasts

Ingest the WYDOT Data Feed to support your applications



# Getting CV Equipment on Trucks



- Looking for about 150-200 commercial trucks to equip with On-Board Units
  - \*No PII collected\*
  - Include Android-based user interface
  - Include applications for
    - Speed warnings
    - Forward Collision Warnings
    - Traveler Information Messages
- Selected trucks
  - (necessary) Run frequently on I-80 at various times of the day in I-80
  - (ideal) if home base is in Wyoming or nearby States
- Access to drivers
  - Need ability to train them on CV Pilot applications
  - If in Wyoming, hands-on training
  - Or, virtual training
  - Participation in surveys to assess effectiveness
- Access to fleet managers/dispatchers
  - Use of CV Pilot Information that will be provided to them
  - Participation in interviews/surveys



# Subscribing to CVOP



- Wyoming DOT's Commercial Vehicle Operator Portal (CVOP)
  - Customized road weather forecasts
    - Wind, visibility and surface impacts along Wyoming's three interstates (I-25, I-80 and I-90)
  - Road impact forecasts are written and updated daily by WYDOT's meteorologist
  - Connected Vehicle data will be used to provide more granular forecasts in the coming months

CVOP helps freight operators make decisions. Results from a recent survey are shown below

Operational Change	Always	Often	Sometimes	Rarely	Never	Totals
Change Routing	18 (14%)	30 (23%)	57 (45%)	17 (13%)	6 (5%)	128
Advance or Delay a Trip	20 (16%)	27 (21%)	60 (47%)	18 (14%)	4 (3%)	129
Notify Driver	49 (40%)	38 (31%)	20 (16%)	2 (2%)	14 (11%)	123
Cancel Trip	4 (3%)	7 (5%)	30 (23%)	39 (30%)	48 (38%)	128

# Ingesting WYDOT Data Feed



- WYDOT has also made available a data feed from the TMC for use by third party developers
  - Based on Traffic Management Data Dictionary (TMDD)
- Intended for use by freight dispatchers, freight telematics industry and traveler information service providers
- As pilot progresses, data feed will also include alerts and advisories generated based on CV Pilot data



# Wyoming DOT CV System

Deepak Gopalakrishna

# Wyoming Connected Vehicle Pilot



DSRC Based



Freight-Focused



Integrated with TMC



Integrated with WYDOT Fleets



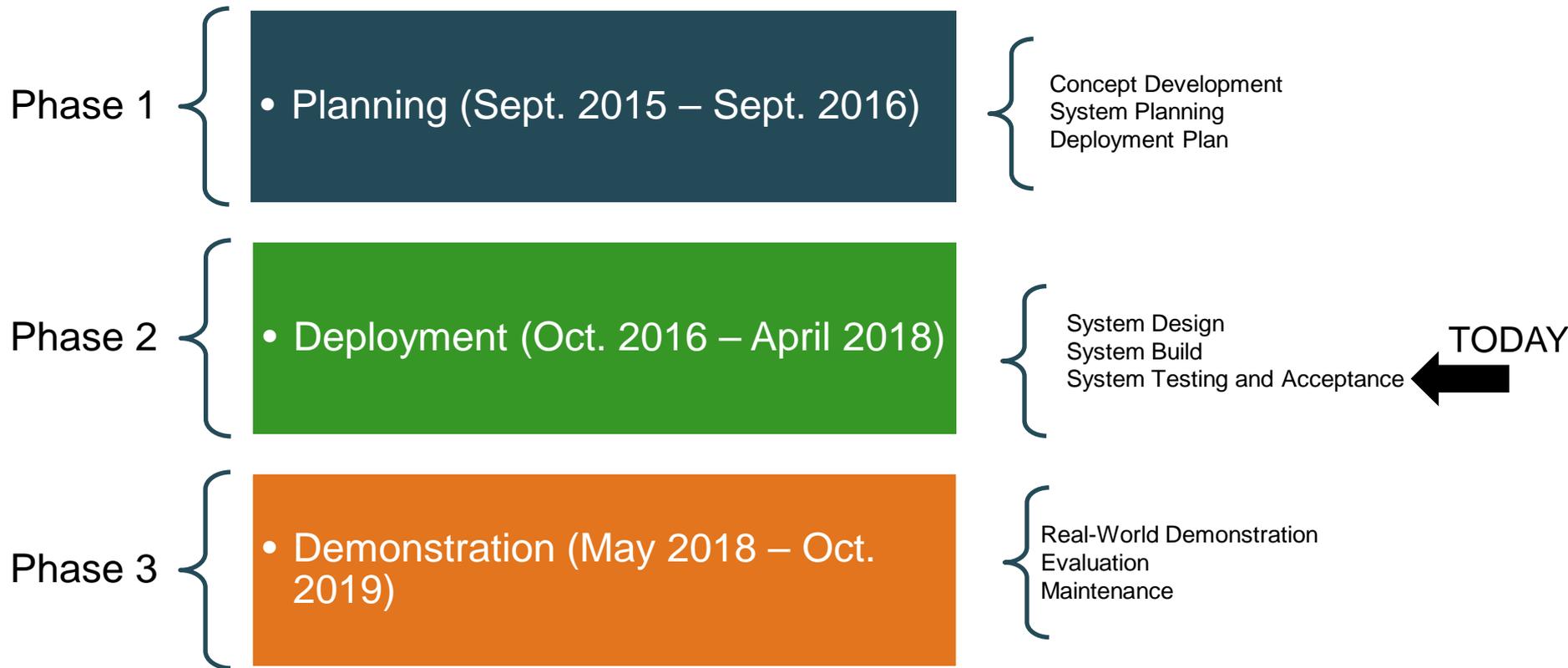
Forward Looking

The Wyoming CV Pilot





# WYDOT CV Pilot Phases



# CV Applications



## On-Board Applications

- Applications available to equipped vehicles



## TMC Operations Applications

- Support for WYDOT Traveler Information and Traffic Management



# Vehicle System



All vehicles that are part of the vehicle system will have:

- Ability to share information via DSRC with connected devices (vehicles and RSUs)
- Ability to broadcast Basic Safety Message
- Ability to receive Traveler Information Messages (TIM)
- Human-Machine Interface (HMI) to communicate alerts and advisories to driver



## Vehicle Sub-Systems

1. WYDOT Fleets
2. Integrated Trucks
3. Retrofit Vehicles
4. Highway Patrol

## On-board Vehicle Technologies

- OBU with DSRC and Satellite Receiver
- Human Machine Interface
- Environmental Sensors (selected vehicles)



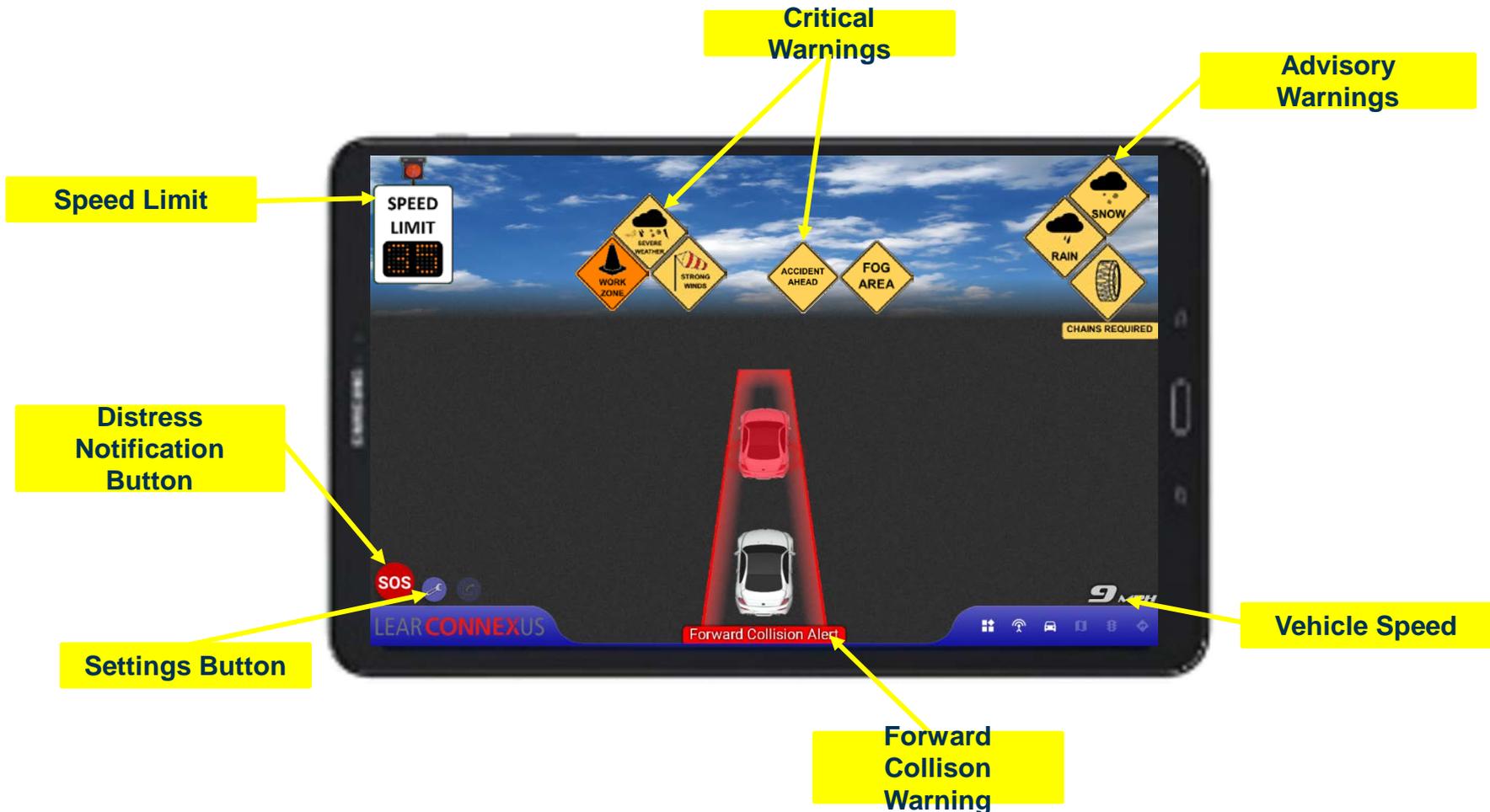
# On-Board Unit



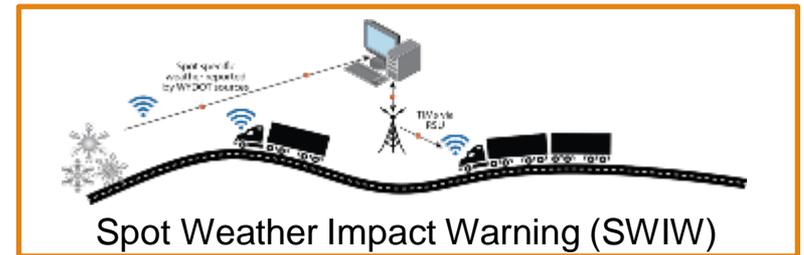
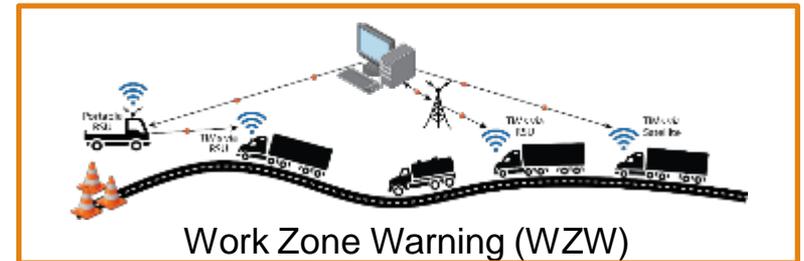
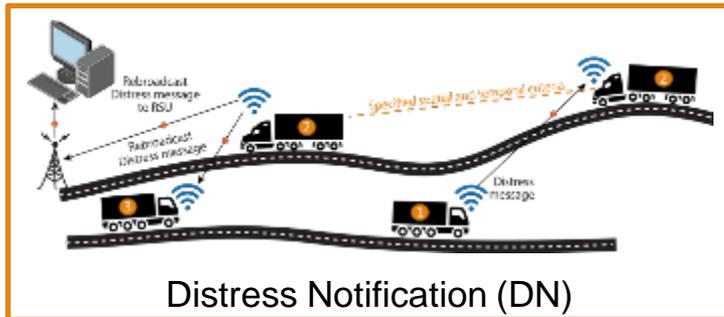
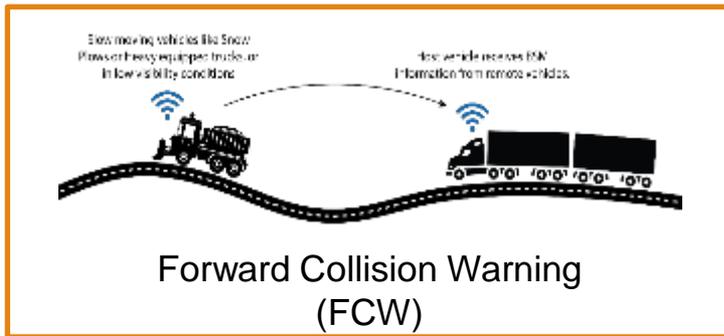
- Receive Traveler Information Messages via DSRC and Satellite.
- Receive and broadcast Basic Safety Messages
- Transmit weather sensor data (if weather sensors are present)
- Connect to User Interface (Android Tablet) in vehicle
- Store and transmit event logs
- (Not shown) Antennae and wiring



# User Interface in Vehicle



# Onboard Applications



# Work Zone Warning



## TMC Application

- Operator Adds Planned Work Zone
- Sends Information to System



## Backend Services

- Builds messages
- Determines Affected Area



## RSU

- Broadcasts Alerts



## Vehicles

- Receive Alerts



## Satellite

- Broadcasts Alerts



# Spot Weather Warning



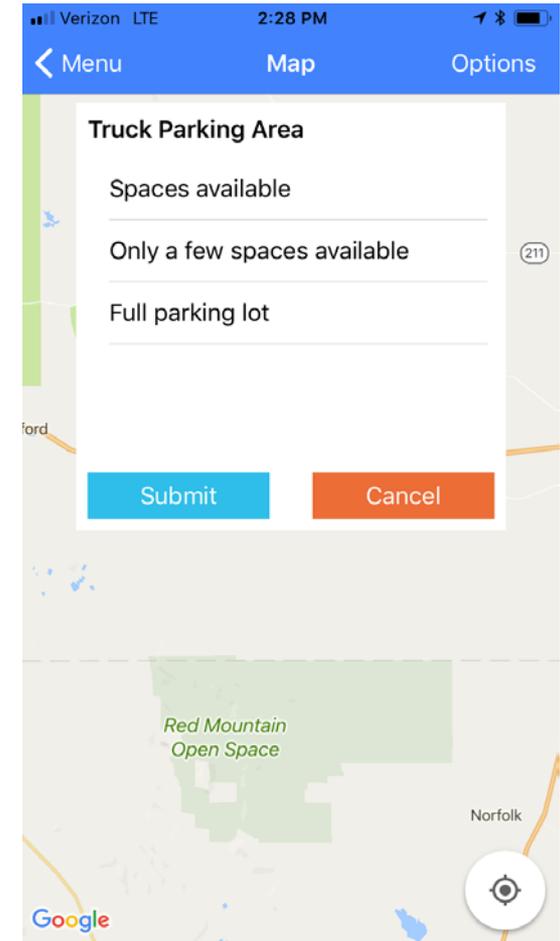
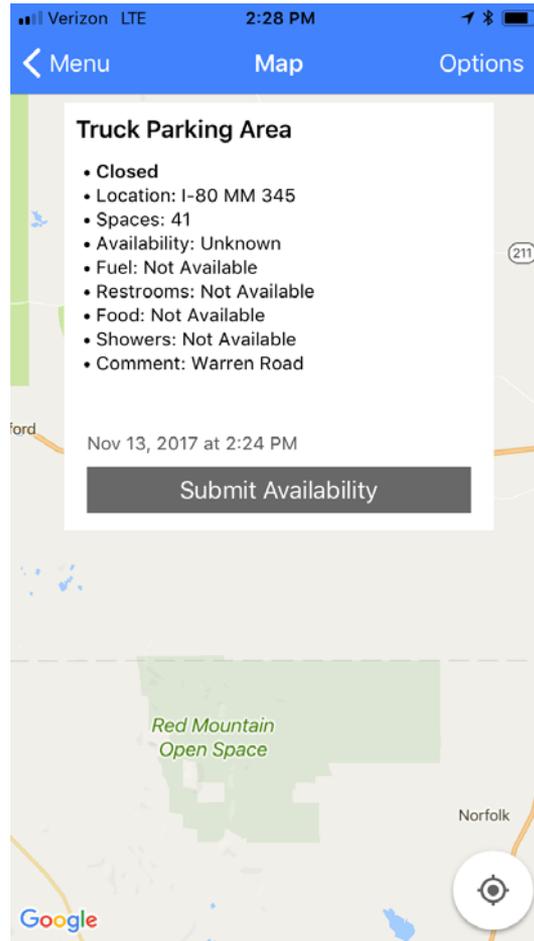
# TMC Operations Applications



CV Data will support several TMC functions for traffic management and traveler information on I-80. All these applications will be enabled by external interfaces to the existing TMC Systems from the Wyoming CV System

- Support Variable Speed Limit, Closures, Restriction Management*
- Support Wyoming Traveler Information (WTI) Updates*
- Support Commercial Vehicle Operators Portal Updates*
- Support Third-Party Interface*

# Enhancements to Wyoming 511 App





# Perspective from Wyoming Trucking Association

Sheila Foertsch

# Comments



- Safety of truck travel in Wyoming is a critical need
- Wyoming Trucking Association members depend on accurate, timely information from Wyoming DOT to make important trip decisions
- Wyoming DOT and Wyoming Truck Association have been working closely since the project inception.
- Our collaboration
  - Ensures that project concepts are driven by the real needs of truckers
  - Ensures that truck driver concerns are discussed and addressed early in the system development process
  - Unique aspects of winter driving and freight operations in Wyoming to support system planning are identified and factored into project decision-making
  - Allows Wyoming DOT access to the trucking community for project outreach, recruitment and demonstration



# Contact Information for Speakers



- Kate Hartman, USDOT ITS-JPO, [Kate.Hartman@dot.gov](mailto:Kate.Hartman@dot.gov)
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- Deepak Gopalakrishna, ICF, [Deepak.Gopalakrishna@icf.com](mailto:Deepak.Gopalakrishna@icf.com)
- Sheila Foertsch, Wyoming Trucking Association, [sdfoertsch@aol.com](mailto:sdfoertsch@aol.com)



# For More Information



**WYDOT** | CONNECTED VEHICLE PILOT

PROBLEM THE PILOT ABOUT GET INVOLVED RESOURCES

## WYOMING DOT CONNECTED VEHICLE PILOT

IMPROVING SAFETY AND TRAVEL  
RELIABILITY ON I-80 IN WYOMING

LEARN MORE

<https://wydotcvp.wyoroad.info/>

# STAY CONNECTED



## Join us for the *Getting Ready for Deployment Series*

- Discover more about the CV Pilot Sites
- Learn the Essential Steps to CV Deployment
- Engage in Technical Discussion

## Visit the Pilot Site Websites for more Information:

- NYCDOT Pilot:  
<https://www.cvp.nyc/>
- Tampa (THEA):  
<https://www.tampacvpilot.com/>
- Wyoming DOT:  
<https://wydotcvp.wyoroad.info/>

## Contact for CV Pilots Program:

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