CONNECTED VEHICLE PILOT
Deployment Program

Kate Hartman, Program Manager

ITS Joint Program Office
OVERVIEW

- Connected Vehicles Pilot Deployment Program Overview
  - Program Goals
  - Organizing Principles
  - Deployment Requirements
  - Deployment Schedule

- Overview of 2015 CV Pilot Program Award Sites
  - ICF/Wyoming CV Pilot Deployment
  - New York City (NYC) CV Pilot Deployment
  - Tampa (THEA) CV Pilot Deployment

- How to Stay Connected
CV PILOT DEPLOYMENT PROGRAM GOALS

Spur Early CV Tech Deployment

Measure Deployment Benefits

Resolve Deployment Issues

Wirelessly Connected Vehicles

Safety

Technical

Mobile Devices

Mobility

Institutional

Infrastructure

Environment

Financial
CV Pilots are *pilot deployments*, that is, real-world environment deployments

- The successful, deployed technologies are expected to remain as permanent operational elements

Deployment concepts are needs-driven

- Each site has different needs, focus and applications
  - That is, each pilot deployment will address critical problem(s)
  - The needs of each site will drive the deployment process

Pilot deployments are expected to be both *large-scale with multiple applications*

- *Large-scale* implies pilot deployments will have measurable impact, not a specific minimum geographic or vehicle fleet size
- Sites will deploy *multiple applications* drawing on the products of USDOT and other connected vehicle research
CV PILOT DEPLOYMENT REQUIREMENTS

- Multiple connected vehicle applications will be deployed together

- Pilot deployments should leverage USDOT-sponsored research

- Pilot deployments include the capture of data from multiple sources
  - Integrated or carry-in devices for connected vehicles capable of generating an SAE J2735 Basic Safety Message (BSM)
  - Look to pilot deployment data while protecting privacy and intellectual property

- Dedicated Short Range Communications (DSRC) 5.9 GHz will be utilized as the communications technology

- Well-defined, focused, quantitative performance measures
  - Support an independent evaluation effort

- Security and credentialing management system
CV Pilot Deployment Schedule

Phase 1: Concept Development (Current Phase)
- Creates the foundational plan to enable further design and deployment
- **Progress Gate: Is the concept ready for deployment?**

Phase 2: Design/Deploy/Test
- Detailed design and deployment followed by testing to ensure deployment functions as intended (both technically and institutionally)
- Progress Gate: Does the system function as planned?

Phase 3: Maintain/Operate
- Focus is on assessing the performance of the deployed system
- Post Pilot Operations (CV tech integrated into operational practice)
ICF/Wyoming

- 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.

New York City

- Improve safety and mobility of travelers in New York City through connected vehicle technologies.
- Vehicle to vehicle (V2V) technology installed in up to 10,000 vehicles in Midtown Manhattan, and vehicle to infrastructure (V2I) technology installed along high-accident rate arterials in Manhattan and Central Brooklyn.

Tampa (THEA)

- 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.
Objective:
- Reduce the number and severity of adverse weather-related incidents (including secondary incidents) in the I-80 Corridor in order to improve safety and reduce incident-related delays.
  - Focused on the needs of the commercial vehicle operator in the State of Wyoming

Approach:
- Equip fleet vehicles (combination of snow plows, maintenance fleet vehicles, emergency vehicles, and private trucks) that frequently travel the I-80 corridor to transmit basic safety messages (BSMs), collect vehicle and road condition data and provide it remotely to the WYDOT TMCs
- Deploy DSRC roadside equipment (RSE) to supplement existing assets and initiatives
- Road weather data shared with freight carriers who will transmit to their trucks using exiting in-vehicle systems

Deployment Team:
- Prime Consultant: ICF International; Partner State: Wyoming DOT
- Sub Consultants: Trihydro Corporation, National Center for Atmospheric Research, University of Wyoming, Catt Laboratory and McFarland Management
ICF/WYOMING PILOT DEPLOYMENT SITE: HIGH PRIORITY CORRIDOR

Wyoming I-80 Corridor – Connected Vehicle Map

Legend

- High Profile Wind Warning Area
- AVL/Tablet
- Snow Plows
- STIP Areas
- 2015-2018

WyoLink - Signal Strength
- Good
- Spotty
- Unreliable

I-80, Wyoming
- Possible Locations
- Roadside DSRC
- (Going into/out of town off I-80 for supporting VSL Application; These include locations with mm labels)

- WiFi Locations
- (9 within 500 ft of I-80)
- VSL Devices
- (122 on I-80)
- Truck Parking
- (55 on I-80)

Source: Wyoming CV Pilot Deployment Team
<table>
<thead>
<tr>
<th>CV Application</th>
<th>WYDOT Snow Plows</th>
<th>WYDOT Maintenance Fleet Vehicles</th>
<th>Emergency Vehicles</th>
<th>Private Trucks/Commercial Vehicles</th>
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<tr>
<td>1. Road Weather Advisories for Trucks and Vehicles</td>
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<td>2. Automatic Alerts for Emergency Responders</td>
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<td>3. CV-enabled Weather-Responsive Variable Speed Limits</td>
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<td>4. Spot Weather Impact Warning</td>
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<td>5. Work Zone Warnings</td>
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<td>6. Situational Awareness</td>
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<td>7. Truck Parking Availability for Freight Carriers</td>
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<td>8. Freight-Specific Dynamic Travel Planning</td>
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NEW YORK CITY (NYC) PILOT DEPLOYMENT

OVERVIEW

Objective:
- Improve safety and mobility of travelers in New York City through connected vehicle technologies
  - Aligned with the NYC’s Vision Zero initiative, which seeks to reduce crashes and pedestrian fatalities, and increase safety of travelers in all modes of transportation

Approach:
- Equip up to 10,000 vehicles (taxis, buses, commercial fleet delivery trucks, and City-owned vehicles) that frequently travel in Midtown Manhattan and Central Brooklyn to transmit and receive connected vehicle data
- Install V2I technology at high-accident rate arterials:
  - Upgrade 239 traffic signals along 1st, 2nd, 5th, and 6th Avenues in Manhattan and Flatbush Avenue in Central Brooklyn (emergency evacuation route)
  - Deploy Roadside equipment (RSE) along FDR Drive

Deployment Team:
- Prime Consultant: NYC DOT
- Sub Consultants: JHK Engineering, Battelle, Cambridge Systematics, KLD Engineering, Security Innovation and Region 2 University Transportation Research Center
NYC Pilot Deployment Site

Manhattan Grid
- Closely spaced intersections (600’ x 250’)
- Day vs. Night conditions
- Residential/commercial mix
- High accident rate (red dot) (2012-2014)
  - 20 fatalities
  - 5,007 injuries
- 204 intersections

Central Brooklyn – Flatbush Ave
- Over-Height restrictions
  - Tillary St.; Brooklyn Bridge
- High accident rate (red dots) (2012-14)
  - 1,128 injuries
  - 8 fatalities
- Average AM speed 15 mph
- 35 intersections

Manhattan – FDR Drive
- Limited access highway
- Excludes trucks/buses
- Short radius of curvature
- Over-Height restrictions
- $1,958,497 in Over-Height incident delay costs (2014)
  - 24% of City-wide total

Source: NYC DOT
# NYC Pilot Deployment Proposed CV Application-Fleet Distribution

<table>
<thead>
<tr>
<th>CV Application</th>
<th>Taxi &amp; Limousine</th>
<th>NYC DOT/ Sanitation</th>
<th>MTA/ NYCTA Buses</th>
<th>Commercial Vehicles</th>
<th>Pedestrian</th>
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<tbody>
<tr>
<td>1. Mod. Eco-Speed Harmonization</td>
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<td>2. Red Light Violation Warning</td>
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<td>3. Ped. in Signalized Crosswalk Warn.</td>
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<td>4. RT Vehicle in Front of Bus Warning</td>
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<td>5. Mobile Accessible Ped Signal Sys.</td>
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<tr>
<td>6. Curve Speed Warning</td>
<td>✓</td>
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<td>✓</td>
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<tr>
<td>7. Freight Dynamic Travel Planning</td>
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<td>✓</td>
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<tr>
<td>8. Reduced Speed/Work Zone Warn.</td>
<td>✓</td>
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<td>9. I-SIG</td>
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<td>✓</td>
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<td>10-15. V2V Applications (6)</td>
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<td>16. EVAC In-Vehicle Information</td>
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</table>
Objective:
- The primary objective of this deployment is to alleviate congestion and improve safety during morning commuting hours.
  - Deploy a variety of vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) safety, mobility, and agency data applications to create reinforcing benefits for motorists, pedestrians, and transit operation.

Approach:
- 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 following transportation challenges:
  - Morning peak hour queues, wrong-way entries, pedestrian safety, bus rapid transit (BRT) signal priority optimization, trip time and safety, streetcar trolley conflicts, and enhanced signal coordination and traffic progression.

Deployment Team:
- Prime Consultant: Tampa Hillsborough Expressway Authority (THEA)
- Sub Consultants: HNTB Corporation, Siemens Industry, Inc., Booz Allen Hamilton, Center for Urban Transportation Research at University of South Florida and Global-5 Communications
TAMPA (THEA) PILOT DEPLOYMENT SITE
AN OVERVIEW OF DOWNTOWN TAMPA
Data exchange will use DSRC (Dedicated Short Range Communications) or other wireless media. SCMS (Security Credential & Management System) will be used where appropriate.
### OVERVIEW OF PILOT DEPLOYMENT PROPOSED CV APPLICATIONS

<table>
<thead>
<tr>
<th>ICF/Wyoming</th>
<th>New York City (NYC)</th>
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<tr>
<td>Work Zone Warnings</td>
<td>Curve Speed Warning</td>
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<tr>
<td>Spot Weather Impact Warning</td>
<td>Pedestrian in Signalized Crosswalk Warning (Transit)</td>
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<tr>
<td><strong>Situational Awareness</strong></td>
<td>Red Light Violation Warning</td>
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<tr>
<td>Freight-Specific Dynamic Travel Planning</td>
<td>Reduced Speed/Work Zone Warning</td>
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<tr>
<td>Automatic Alerts for Emergency Responders</td>
<td>Blind Spot Warning (BSW) *</td>
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<tr>
<td>CV-enabled Weather-Responsive Variable Speed Limits</td>
<td>Emergency Electronic Brake Lights (EEBL) *</td>
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<tr>
<td>Road Weather Advisories for Trucks and Vehicles</td>
<td>Forward Collision Warning (FCW) *</td>
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<tr>
<td>Truck Parking Availability for Freight Carriers</td>
<td>Intersection Movement Assist (IMA) *</td>
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<td>Lane Change Assist (LCA) *</td>
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<td><strong>Tampa (THEA)</strong></td>
<td>**Stationary Vehicle Ahead (SVA) ***</td>
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<td>Curve Speed Warning</td>
<td>Vehicle Turning Right in Front of Bus Warning (Transit)</td>
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<td>Pedestrian in Signalized Crosswalk Warning (Transit)</td>
<td>Advanced Traveler Information System</td>
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<tr>
<td>Emergency Electronic Brake Lights (EEBL)</td>
<td>Emergency Communications and Evacuation (EVAC)</td>
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<td>Forward Collision Warning (FCW)</td>
<td>Freight-Specific Dynamic Travel Planning and Performance Measurement (F-ATIS)</td>
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<td>Intersection Movement Assist (IMA)</td>
<td>Intelligent Traffic Signal System (I-SIG)</td>
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<td>Vehicle Turning Right in Front of Bus Warning (Transit)</td>
<td>Mobile Accessible Pedestrian Signal System (PED-SIG)</td>
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<td>Intelligent Traffic Signal System (I-SIG)</td>
<td>Eco-Speed Harmonization</td>
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<td>Mobile Accessible Pedestrian Signal System (PED-SIG)</td>
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<td>Transit Signal Priority (TSP)</td>
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<tr>
<td>Probe-enabled Traffic Monitoring</td>
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*Deployment of applications is dependent upon Final ConOps and funding*
## Concept Development Activities and Public Events

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<td>Task 1 – Program Mgt.</td>
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<td>Task 2 – Concept of Operations</td>
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<td>Task 9 – Training Plan</td>
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Public webinars to share the concept development activities from the three sites (see website for exact dates and times)
Join us for the **Getting Ready for Deployment Series**

- Discover more about the 2015 CV Pilot Sites
- Learn the Essential Steps to CV Deployment
- Engage in Technical Discussion

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**Facebook:** [https://www.facebook.com/DOTRITA](https://www.facebook.com/DOTRITA)