

# Connected Vehicle Pilots Program

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# CONNECTED VEHICLE PILOT Deployment Program



ITS Joint Program Office



U.S. Department of Transportation  
ITS Joint Program Office

# Program Goals



# Organizing Principles

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- Pilots will be pilot deployments, that is, real-world environment deployments
  - If successful, deployed technologies are expected to remain as permanent operational elements
  
- There will be multiple pilot sites over time
  - Each site will have different needs, focus and applications
    - That is, pilot deployments must address a critical problem
    - The needs of each site must drive the application selection process
  
- Pilot deployments are expected to be both large-scale and multimodal
  - Large-scale implies pilot deployments will have measureable 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



# Proposed Pilot Deployment Requirements

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- Multiple connected vehicle applications must be deployed together
  - Cost-effectively leveraging captured CV and mobile device data
  - Address multimodal problems
  
- Pilot deployments should leverage USDOT-sponsored research
  - Need not include all applications (in fact, this is unlikely to be practical)
  - May include new connected vehicle applications not considered by USDOT
  - All applications selected must work and have an impact
  
- Pilot deployments should include the capture of data from multiple sources
  - At a minimum, vehicles must represent one source of data used in the pilot deployment



# Proposed Pilot Deployment Requirements

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- Multiple forms of communications technologies are desired
  - DSRC desired as one communication technology
  - Integrated or carry-in devices for connected vehicles capable of generating an SAE J2735 Basic Safety Message (BSM)
  
- Well-defined, focused, quantitative performance measures
  - Support an independent evaluation effort
  
- Share pilot deployment data and lessons learned
  - While protecting privacy and intellectual property
  
- Security and credentialing management system



# Partnership and Deployment Phases

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- Partnership Expectation
  - Encourage partnerships of multiple stakeholders
    - Public Sectors
    - Private Sectors
    - Academic/Research Institutions
  - Partnership Expectations
    - A clear leader or a collaboration of organizations
  
- Proposed Deployment Phases
  - Pre-Pilot Deployment Concept Development Stage: 6 – 9 months
  - Pre-Pilot Site Development Stage: 10 –14 months
  - Pilot Deployment Stage: 18 months



# Connected Vehicle Applications

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- The USDOT has made a significant investment in foundational research and initial development of connected vehicle applications
  - Concepts of Operations
  - System Requirements
  - Prototype Design and Testing
  - Prototype Impacts Assessment
  - Analytics, Modeling and Simulation to Assess Potential Long-Term Impacts
  
- Not all CV Application efforts are in the same state of maturity, few are complete
  - But a large number of application development efforts across multiple programs will be substantively complete in late 2014



# Connected Vehicle Applications

## V2I Safety

Red Light Violation Warning  
 Curve Speed Warning  
 Stop Sign Gap Assist  
 Spot Weather Impact Warning  
 Reduced Speed/Work Zone Warning  
 Pedestrian in Signalized Crosswalk Warning (Transit)

## V2V Safety

Emergency Electronic Brake Lights (EEBL)  
 Forward Collision Warning (FCW)  
 Intersection Movement Assist (IMA)  
 Left Turn Assist (LTA)  
 Blind Spot/Lane Change Warning (BSW/LCW)  
 Do Not Pass Warning (DNPW)  
 Vehicle Turning Right in Front of Bus Warning (Transit)

## Agency Data

Probe-based Pavement Maintenance  
 Probe-enabled Traffic Monitoring  
 Vehicle Classification-based Traffic Studies  
 CV-enabled Turning Movement & Intersection Analysis  
 CV-enabled Origin-Destination Studies  
 Work Zone Traveler Information

## Environment

Eco-Approach and Departure at Signalized Intersections  
 Eco-Traffic Signal Timing  
 Eco-Traffic Signal Priority  
 Connected Eco-Driving  
 Wireless Inductive/Resonance Charging  
 Eco-Lanes Management  
 Eco-Speed Harmonization  
 Eco-Cooperative Adaptive Cruise Control  
 Eco-Traveler Information  
 Eco-Ramp Metering  
 Low Emissions Zone Management  
 AFV Charging / Fueling Information  
 Eco-Smart Parking  
 Dynamic Eco-Routing (light vehicle, transit, freight)  
 Eco-ICM Decision Support System

## Road Weather

Motorist Advisories and Warnings (MAW)  
 Enhanced MDSS  
 Vehicle Data Translator (VDT)  
 Weather Response Traffic Information (WxTINFO)

## Mobility

Advanced Traveler Information System  
 Intelligent Traffic Signal System (I-SIG)  
 Signal Priority (transit, freight)  
 Mobile Accessible Pedestrian Signal System (PED-SIG)  
 Emergency Vehicle Preemption (PREEMPT)  
 Dynamic Speed Harmonization (SPD-HARM)  
 Queue Warning (Q-WARN)  
 Cooperative Adaptive Cruise Control (CACC)  
 Incident Scene Pre-Arrival Staging Guidance for Emergency Responders (RESP-STG)  
 Incident Scene Work Zone Alerts for Drivers and Workers (INC-ZONE)  
 Emergency Communications and Evacuation (EVAC)  
 Connection Protection (T-CONNECT)  
 Dynamic Transit Operations (T-DISP)  
 Dynamic Ridesharing (D-RIDE)  
 Freight-Specific Dynamic Travel Planning and Performance  
 Drayage Optimization

## Smart Roadside

Wireless Inspection  
 Smart Truck Parking

# Pilot Deployment Process

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- **Pilot Deployment Concept Development Process**
  - Identify Local Needs
  - Set Performance Goals
  - Select CV Applications That Work Together To Meet Those Goals
  
- **USDOT Sample Pilot Concepts from Hypothetical Locations**
  - Hypothetical, but realistic examples of localities applying the pilot deployment concept development process



# Sample Deployment Concept – Downtown Sunnyside

~ Improving Congestion in an Urban Arterial Network ~

## Improve Transit Reliability

- Connection Protection
- Transit Signal Priority

## Improve Pedestrian Safety

- Mobile Accessible Pedestrian Signal System
- Pedestrian in Signalized Crosswalk Warning
- Intersection Movement Assist

## Improve Air Quality

- Eco-Approach and Departure at Signalized Intersections
- Eco-Traffic Signal Timing



***Synergies among applications increase benefits and reduce costs***



# Sample Deployment Concept – Halleck Expressway

~ Improving Travel Time Reliability on an Urban Expressway~

## Reduce Incident Delay

- Incident Scene Pre-Arrival Staging Guidance for Emergency Responders
- Incident Scene Work Zone Alerts for Drivers and Workers

## Improve Bottleneck Throughput

- Speed Harmonization and Queue Warning
- Emergency Electronic Brake Lights and Forward Collision Warning

## Manage Diversions Better

- Enable ATIS
- Intelligent Signal Control



***Synergies among applications increase benefits and reduce costs***



# Sample Deployment Concepts – Greypool County

~ Improving Safety and Mobility in a Rural Area ~

## Increase Accessibility

- Dynamic Transit Operations

## Improve Safety

- Red Light Violation Warning
- Stop Sign Gap Assist
- Left Turn Assist

## Informing Drivers During Bad Weather

- Weather Response Traffic Information



***Synergies among applications increase benefits and reduce costs***



# Sample Deployment Concept – District 13 Operations

~ Improving the Efficiency of Road Maintenance ~

## Improve Snow Removal

- Enhanced Maintenance Decision Support System

## Improve Management of Work Zones

- Work Zone Traveler Information



## Improve Situational Awareness

- Probe-based Pavement Maintenance

***Synergies among applications increase benefits and reduce costs***



# Sample Deployment Concept – I-876 Corridor

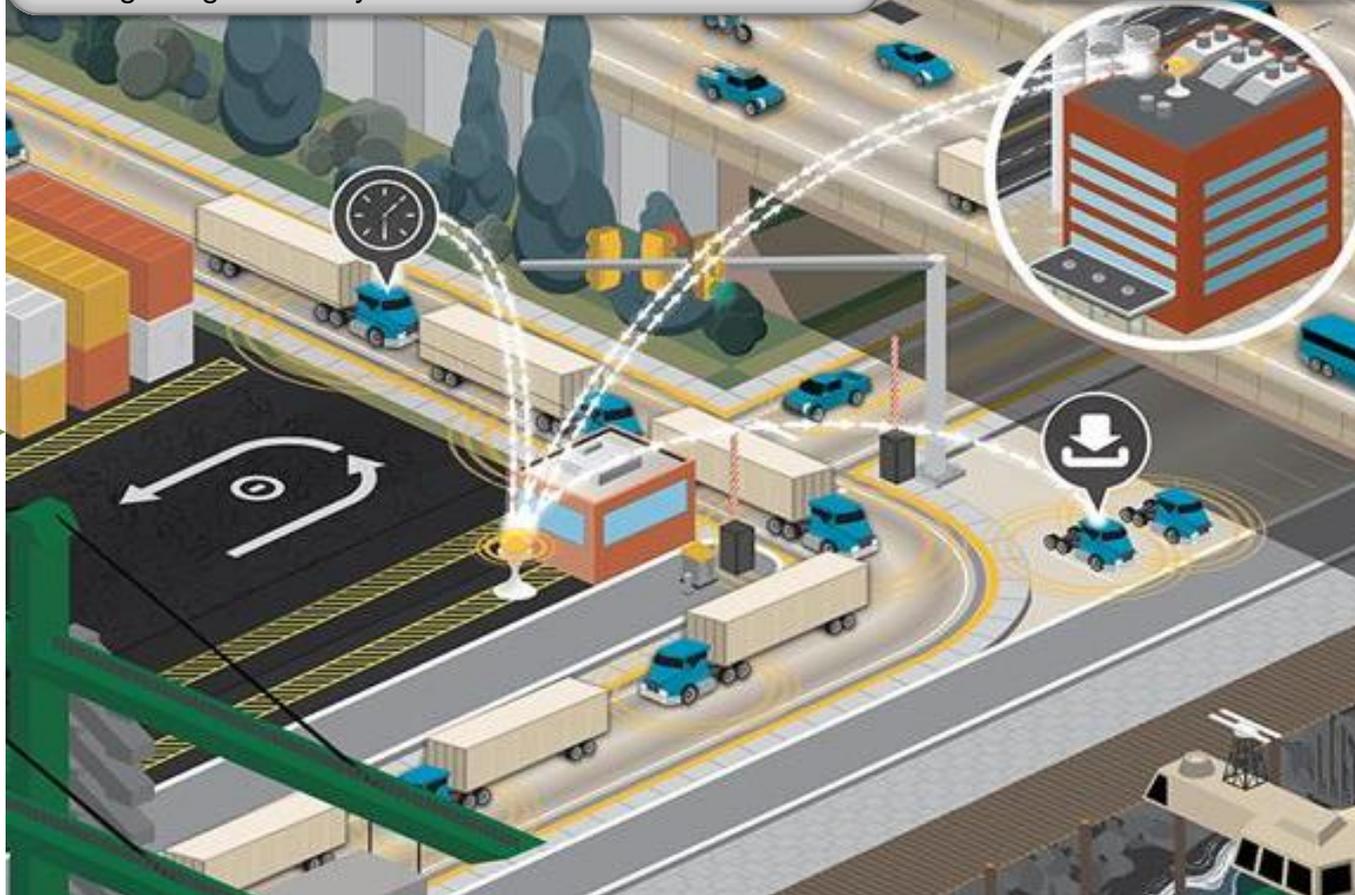
~ Improving Freight Movement in an Inter-State Corridor ~

## Improve Freight Productivity

- Freight Advanced Traveler Information System
- Drayage Optimization
- Freight Signal Priority

## Improve Truck Safety

- Smart Truck Parking
- Curve Speed Warning
- Do Not Pass Warning/Lane Change Warning



***Synergies among applications increase benefits and reduce costs***



# CV Pilots Deployment Schedule and Resources

- Proposed CV Pilots Deployment Schedule

Schedule Item	Date
<b>Regional Pre-Deployment Workshop/Webinar Series</b>	<b>Summer-Fall 2014</b>
<b>Solicitation for Wave 1 Pilot Deployment Concepts</b>	<b>Early 2015</b>
<b>Wave 1 Pilot Deployments Award(s)</b> Concept Development Phase (6-9 months) Design/Build/Test Phase (10-14 months) Operate and Maintain Phase (18 months)	<b>September 2015</b>
<b>Solicitation for Wave 2 Pilot Deployment Concepts</b>	<b>Early 2017</b>
<b>Wave 2 Pilot Deployments Award(s)</b> Concept Development Phase (6-9 months) Design/Build/Test Phase (10-14 months) Operate and Maintain Phase (18 months)	<b>September 2017</b>
<b>Pilot Deployments Complete</b>	<b>September 2020</b>

- Resources

- ITS JPO Website: <http://www.its.dot.gov/>
- CV Pilots Program Website: <http://www.its.dot.gov/pilots>



# CV Pilots Website



## Research

- ▶ Safety
- ▶ Mobility
- ▶ Environment
- ▶ Road Weather
- ▶ Policy
- ▶ Connected Vehicle Technology
- ▼ CV Pilots Deployment Project
  - Pilots Deployment Project
- ▶ Short-Term, Intermodal Research
- ▶ Exploratory Research
- ▶ ITS Cross-Cutting Support
- ▶ Success Stories

<http://www.its.dot.gov/pilots>

## Connected Vehicles CV Pilots Deployment Project



### Latest News & Updates

- Sample Deployment concept audio recordings for District 13 Operations is now available (9/23/14)
- Sample Deployment concept audio recordings for Greypool County is now available (9/22/14)
- Deployment concept audio recordings for Downtown Sunnyside and H.W. Halleck Expressway are now available (9/18/14)
- CV Pilots FAQs (Updated September 16, 2014)
- Webinar Part 1 recording is now available - August 27, 2014 - Webinar Series Part 1: Concept, Phases, Waves, and Partnerships (9/4/14)
- The USDOT Connected Vehicles Pilot Deployment Program Webinar Series Part 2: Communications and Role of DSRC is open for registration
- The presentation material of the USDOT Connected Vehicles Pilot Deployment Program Webinar Series Part 1 is available now
- The Descriptions of the Connected Vehicle Applications are available now
- Summary of Responses to the Connected Vehicle Pilot Deployment Program's Request for Information (RFI)

[More news »](#)

### About the CV Pilots Deployment Project

The U.S. DOT (DOT) connected vehicle research program is a multimodal initiative that aims to enable safe, interoperable networked wireless communications among vehicles, infrastructure, and personal communications devices. Connected vehicle research is sponsored by the DOT and others to leverage the potentially transformative capabilities of wireless technology to make surface transportation safer, smarter, and greener. Research has resulted in a considerable body of work supporting pilot deployments, including concepts of operations and prototyping for more than two dozen applications. Concurrent Federal research efforts developed critical cross-cutting technologies and other enabling capabilities required to integrate and deploy applications.

Based on the successful results of the connected vehicle research program, and the recent decision by NHTSA to pursue vehicle to vehicle communications safety technology for light vehicles, a robust connected vehicle pilots program is envisioned as a mechanism to spur the implementation of connected vehicle technology. These pilots will serve as initial implementations of connected vehicle

### CV Pilots Portal

[CV Pilots FAQs](#)

[CV Applications](#)

[Deployment Concepts](#)



[Featured Links](#)

- Active Transportation and Demand Management (ATDM)
- Connected Vehicle Reference Implementation Architecture (CVRIA) and SET-IT
- Connected Vehicle Test Beds
- Open Source Application Development Portal (OSADP)
- Research Data Exchange (RDE)
- Safety Pilot
- Vehicle-to-Infrastructure (V2I) Prototype
- ITS Professional Capacity Building Program (PCB)

### Research Contact

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