Example CV Pilot Deployment Concepts: I-876 Productivity Corridor

Randy Butler (FHWA)
I-876 Productivity Corridor:

- 112 Mile multi-state facility connecting ports and intermodal facilities in Northeastern U.S.
- Significant truck movement among urban centers and facilities
- Competition with other regions on Eastern seaboard for travel reliability
- LDM is 18th busiest airport in U.S.
Stakeholders Convene and Identify Key Transportation Challenges

- **Freight Productivity**
  - Heavy congested freeways interferes with timely and reliable freight movement and hinders economic development
  - Underutilized freight facilities, infrastructure, and mobile assets
  - Frequent empty moves within the corridor create non-optimal utilization of assets
  - Port, airport and inter-modal access subject to surge demand and long waits

- **Truck Safety**
  - Truck-vehicle conflicts in hilly merge/weave sections near interchanges
  - Truck-involved crashes caused by lane changing and blind spots
## Stakeholder Set Three Key Improvement Targets

<table>
<thead>
<tr>
<th>Goal</th>
<th>Performance Measure</th>
<th>Performance Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve Truck Travel Times</td>
<td>Freight travel times</td>
<td>Reduce freight vehicles travel times by 17%</td>
</tr>
<tr>
<td>Reduce Number of Wasted Trips</td>
<td>Number of wasted truck trips</td>
<td>Reduce the number of wasted trips by 15%</td>
</tr>
<tr>
<td>Improve truck safety</td>
<td>Number of truck related conflicts</td>
<td>Reduce truck-related conflicts by 30%</td>
</tr>
</tbody>
</table>
# Applications Considered for Improving Freight Reliability

## V2I Safety
- Red Light Violation Warning
- Curve Speed Gap 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)

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

## 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-Communication for 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

## 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

## 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

## Smart Roadside
- Wireless Inspection
- Smart Truck Parking
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*U.S. Department of Transportation
ITS Joint Program Office*
Connected Vehicle Applications Selected in Performance-Driven Approach

**Improve Freight Productivity**
- Freight Advanced Traveler Information System (FRATIS)
- Drayage Optimization (DRG-OPT)
- Freight Signal Priority (FSP)

**Improve Truck Safety**
- Smart Truck Parking
- Curve Speed Warning (CSW)
- Do Not Pass Warning (DNPW) /Lane Change Warning (LCW)
Projected Synergies and Impacts from Truck Safety Apps in the Deployment Concept

**Truck Safety Apps**

- Smart Truck Parking
- Curve Speed Warning (CSW)
- Do Not Pass Warning (DNPW)
- Lane Change Warning (LCW)

**Projected Impacts:**

- Reduced number of truck-vehicle conflicts and crashes
- Reduced crashes improves freight reliability, particularly around hilly interchanges
- Improved freight data helps improve overall corridor mobility
Projected Synergies and Impacts from Freight Reliability Applications in the Deployment Concept

**Projected Impacts:**
- 20% decrease in late arrival of goods
- Reduced number of empty moves
- Optimized use of freight trucks by cargo need
- Signals optimized for access to intermodal facilities when wait times are short

**Freight Reliability Apps**
- Freight Advanced Traveler Information System (FRATIS)
- Drayage Optimization (DRG-OPT)
- Freight Signal Priority (FSP)
Integrated Concept for I-876 Corridor

- Roadside infrastructure used for both electronic inspections and safety applications
- In-Vehicle Truck Technologies support both V2V and V2I applications
- Signals timed to prioritize for gate demand at intermodal facilities
- Intermodal facility wait times measured and shared
- Drayage movements dynamically optimized