



U.S. Department of Transportation  
Office of the Assistant Secretary for Research and Technology

# ***OVERVIEW USDOT CONNECTED VEHICLE PROGRAM***

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# Connected Automation for Greatest Benefits

## Autonomous Vehicle

Operates in isolation from other vehicles using internal sensors



## Connected Automated Vehicle

Leverages autonomous and connected vehicle capabilities

## Connected Vehicle

Communicates with nearby vehicles and infrastructure



# Autonomous Vehicles



## Autonomous & Driverless Vehicles:

- Array of sensors to detect other vehicles and obstacles
- Requires Detailed map
- Use machine learning to make software smarter
- Doesn't rely on communication with other vehicles



*Google's automated vehicle*

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# How Connected Vehicles Work



- A wireless device in a car sends basic safety messages 10 times per second
- Other nearby cars and roadside equipment receive the messages
- Drivers get a warning of a potential crash

***Connected Vehicles  
have the potential to  
reduce non-impaired  
crash scenarios by***

\*Source: NHTSA

**80%\***



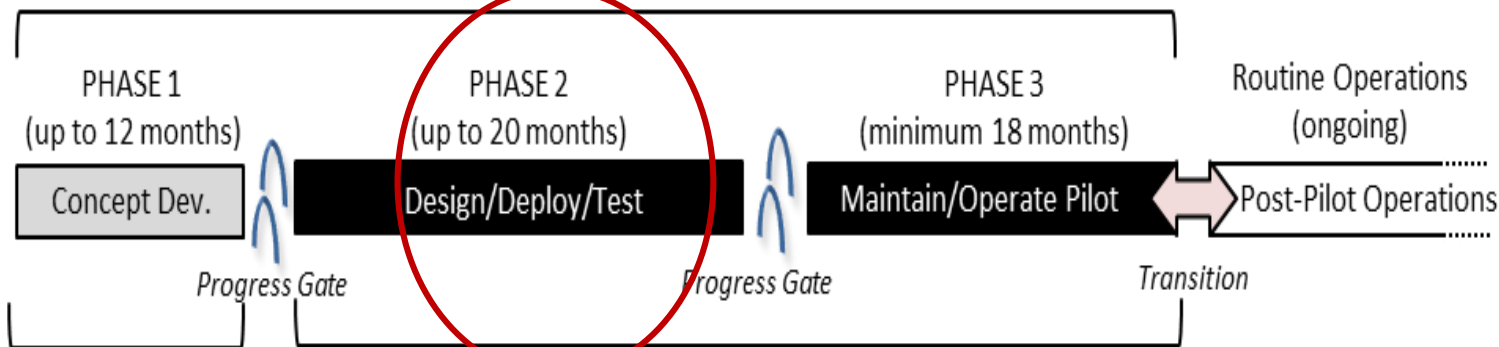
# The Connected Vehicle



# Connected Vehicle Pilot Deployment Program



## Connected Vehicle Pilot Deployment (up to 50 months)



Follow-On Cooperative Agreement

## PILOT SITES



New York City



ICF/Wyoming



Tampa (THEA)

# THE THREE PILOT SITES



## WYDOT

- 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 DOT

- 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

## Tampa (THEA) Tampa Hillsborough Expressway Authority



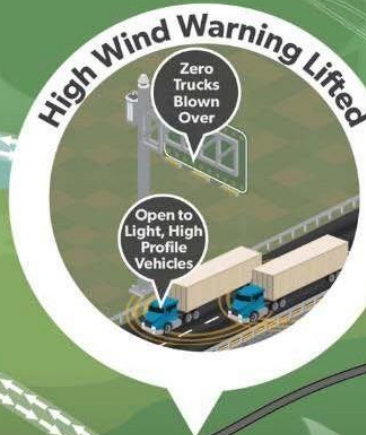
- Alleviate congestion and improve safety during morning commuting hours.
- Deploy a variety of connected vehicle technologies on and in the vicinity of reversible express lanes and three major arterials in downtown Tampa to solve the transportation challenges.





# WYDOT Pilot Deployment Vision

Traffic Management Center



400 Equipped Trucks:

- 100 WYDOT Fleet
- 150 Integrated Commercial Trucks
- 25 Retrofit Vehicles
- 125 Basic Vehicles



122 VSL Signs



75 RSU



402 Miles of I-80

Note: The number is a rough estimate for the concept development phase.



# WYDOT PILOT DEPLOYMENT OVERVIEW

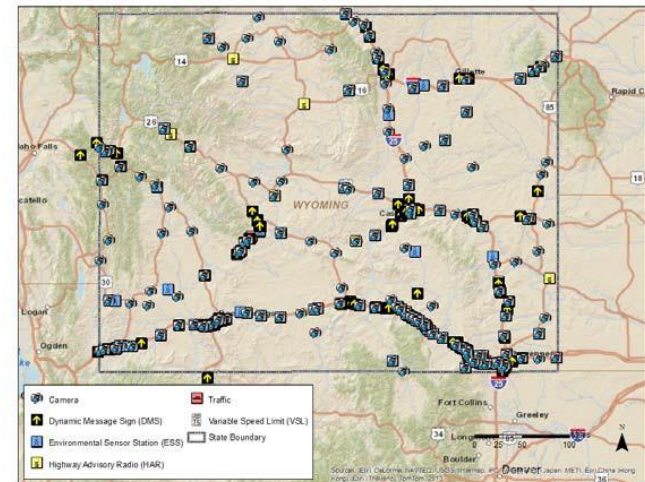


## Objective:

- **Reduce the number and severity of adverse weather- related incidents (including secondary incidents) in the I-80 Corridor**

## Approach:

- Equip fleet vehicles ( snow plows, maintenance fleet vehicles, emergency vehicles, and private trucks)
- Deploy DSRC roadside equipment
- Road weather data shared with freight carriers who will transmit to their trucks using exiting in-vehicle systems



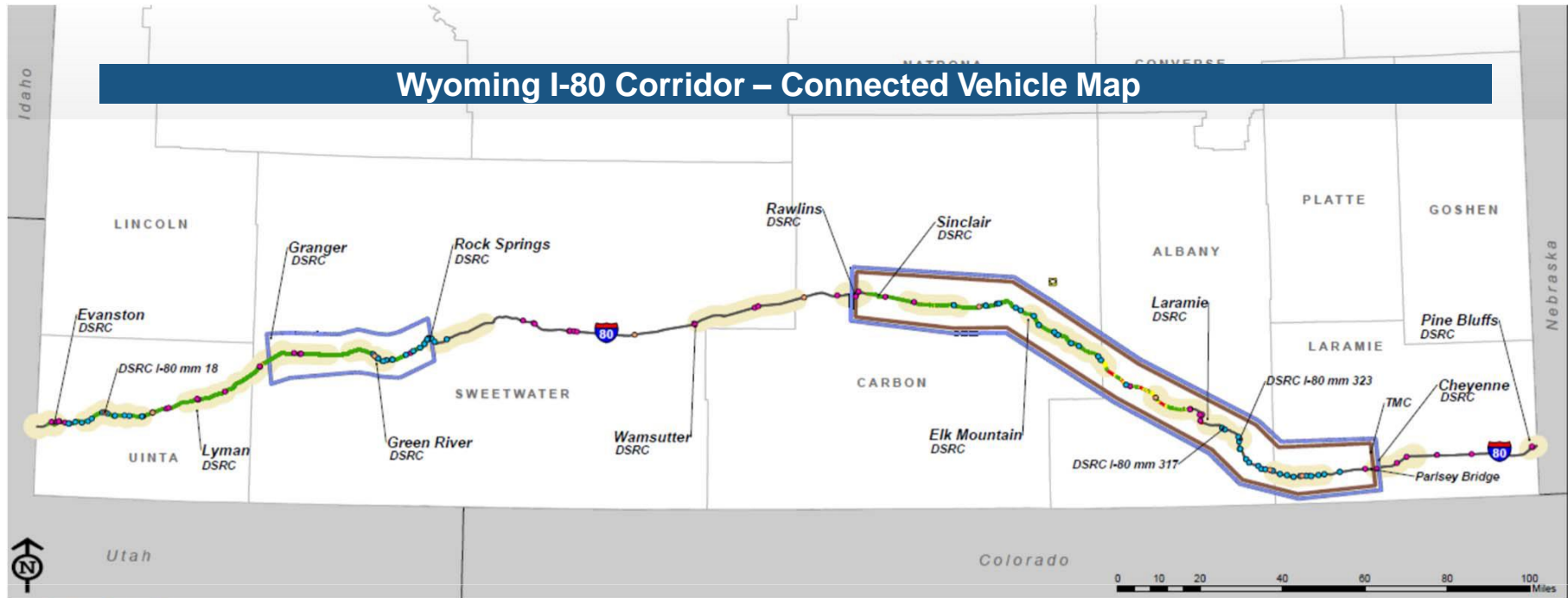
Source: Wyoming DOT



# WYDOT PILOT DEPLOYMENT SITE: HIGH PRIORITY CORRIDOR



## Wyoming I-80 Corridor – Connected Vehicle Map



Created by: mdrake Date: 3/23/2015



The State of Wyoming and its agencies make no express or implied warranties as to this map and the data it displays. Users of this information should review or consult the primary data and information sources to ascertain the reliability or usability of the information. The State of Wyoming and its agencies assume no liability associated with the use or misuse of this information and specifically retain sovereign immunity and all defenses available to them by law.

Wyoming CV Pilot Deployment Team

### 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 each 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)



# WYDOT PILOT DEPLOYMENT PROPOSED CV APPLICATION-FLEET DISTRIBUTION



CV Application	WYDOT Fleet	Commercial Trucks	Retrofit Vehicles	Basic Vehicles
	100	150-200	20-30	100-150
1. Forward Collision Warning	✓	✓	✓	✓
2. Spot Weather Impact Warning	✓	✓	✓	✓
3. Work Zone Warnings	✓	✓	✓	✓
4. Situational Awareness	✓	✓	✓	✓
5. Distress Notification	✓	✓		✓





Photo Courtesy: MTA New York City Transit

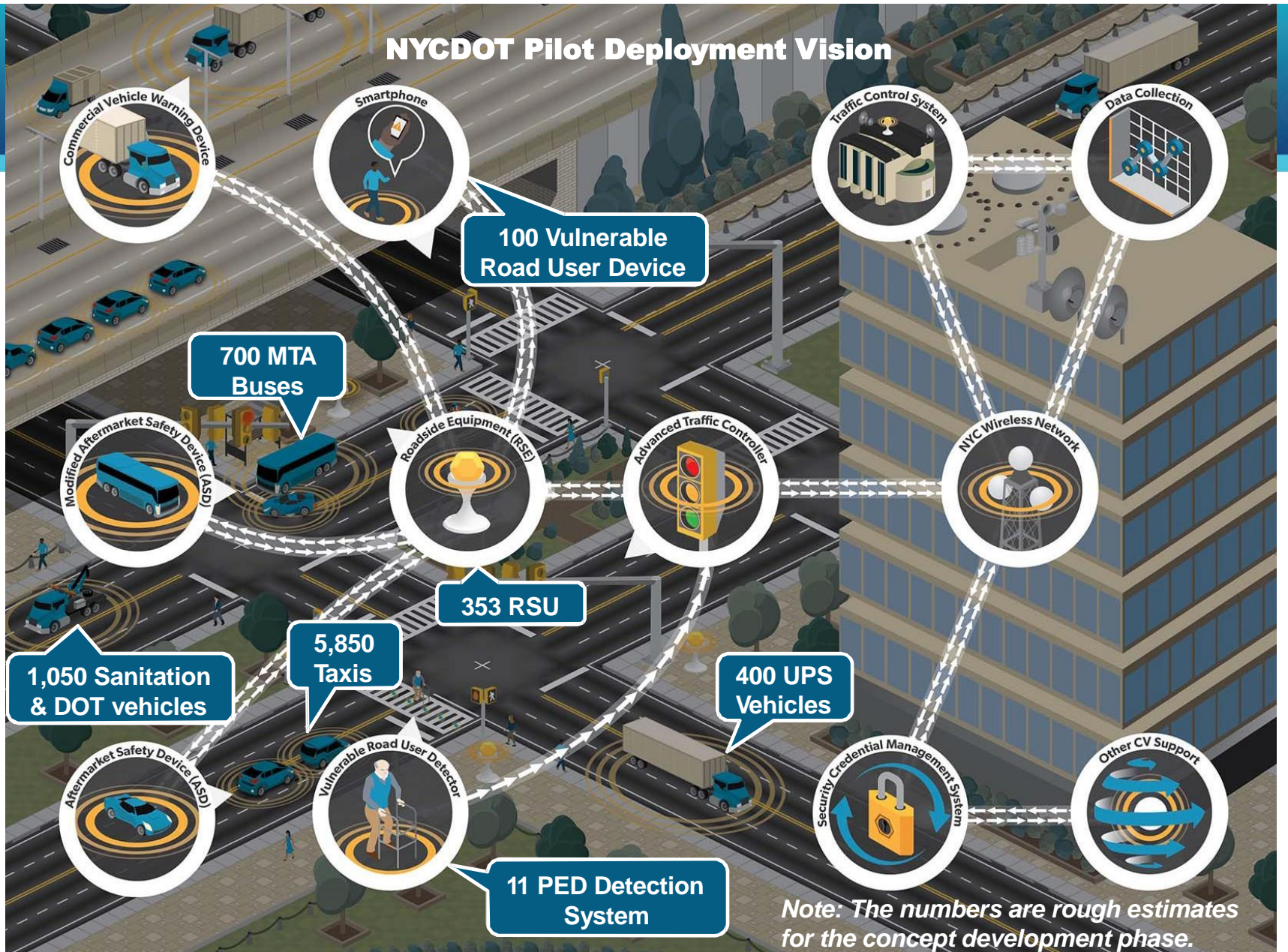


# New York City DOT





## NYCDOT Pilot Deployment Vision



# NYCDOT 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



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# NYCDOT PILOT DEPLOYMENT PROPOSED CV APPLICATION-FLEET DISTRIBUTION



CV Application	Taxi & Limousine	NYC DOT/ Sanitation	MTA/ NYCTA Buses	Commercial Vehicles	Pedestrian
	5,850	1,050	700	400	100
1. Speed Compliance	✓	✓	✓	✓	
2. Red Light Violation Warning	✓	✓	✓	✓	
3. Ped. in Signalized Crosswalk Warn.	✓	✓	✓	✓	✓
4. RT Vehicle in Front of Bus Warning			✓		
5. Mobile Accessible Ped Signal Sys.					✓
6. Curve Speed Compliance	✓	✓	✓	✓	
7. Oversize Vehicle Compliance		✓	✓	✓	
8. Work Zone Speed Compliance	✓	✓	✓	✓	
9. I-SIG	✓	✓	✓	✓	
10-14. V2V Applications (5)	✓	✓	✓	✓	
15. Evacuation Information	✓	✓	✓	✓	



# Advancing in to the Future

