

# Importance of the Safety Band for Connected and Automated Vehicles

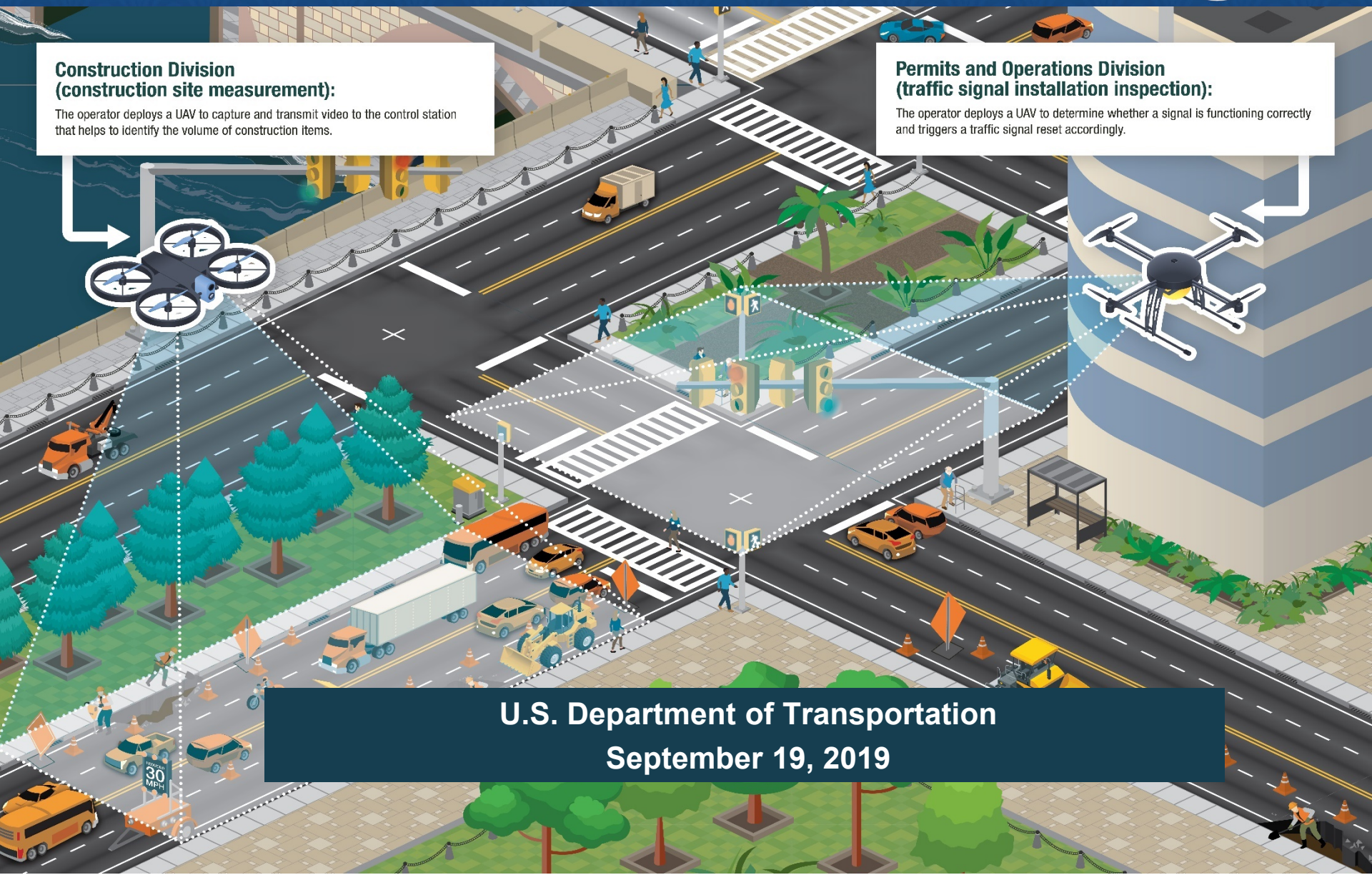


## Construction Division (construction site measurement):

The operator deploys a UAV to capture and transmit video to the control station that helps to identify the volume of construction items.

## Permits and Operations Division (traffic signal installation inspection):

The operator deploys a UAV to determine whether a signal is functioning correctly and triggers a traffic signal reset accordingly.



U.S. Department of Transportation  
September 19, 2019

# The Safety Band: 5.9 GHz



## UNITED STATES FREQUENCY ALLOCATIONS THE RADIO SPECTRUM

### RADIO SERVICES COLOR LEGEND


### ACTIVITY CODE


### ALLOCATION USAGE DESIGNATION

SERVICE	EXAMPLE	DESCRIPTION
Primary	FIELD	Global Lattices
Secondary	Mobile	For Cellular with lower class Mobile



# Importance of the Safety Band

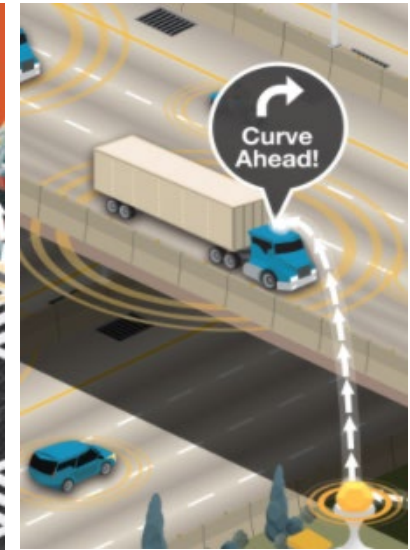


## WHAT THE SAFETY BAND IS USED FOR:

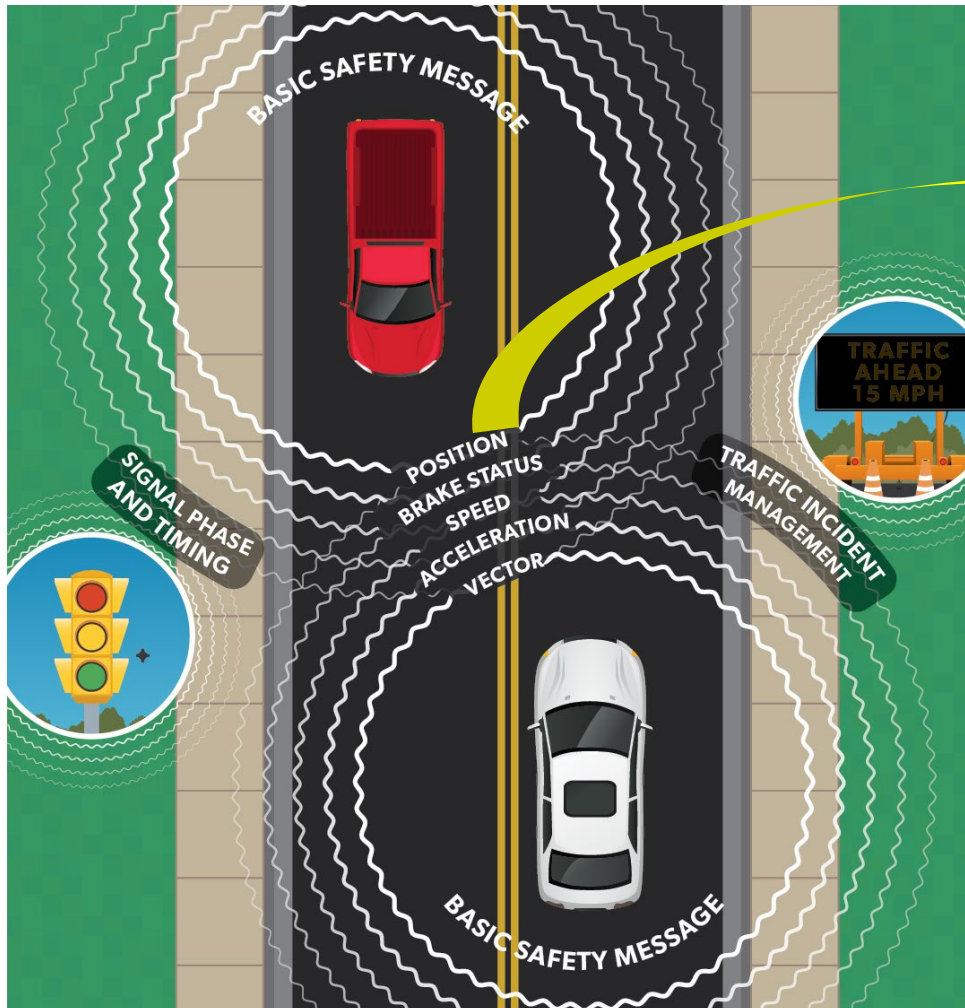
- Traffic light control;
- Traffic monitoring;
- Travelers' alerts;
- Automatic toll collection;
- Traffic congestion detection;
- Emergency vehicle signal preemption of traffic lights;
- Electronic inspection of moving trucks via data transmissions with roadside inspection facilities;
- Red-light violation warnings;
- Reduced speed zone and curve speed warnings;
- and,
- Spot weather-impact warnings and other safety-critical applications.

**Interoperability is central to enabling universal, nationwide and regionwide V2X capability and benefits**

**With over 37,000 deaths on our Nation's roads every year, it is critical that efforts to free up additional spectrum do not come at the expense of life-saving technologies.**



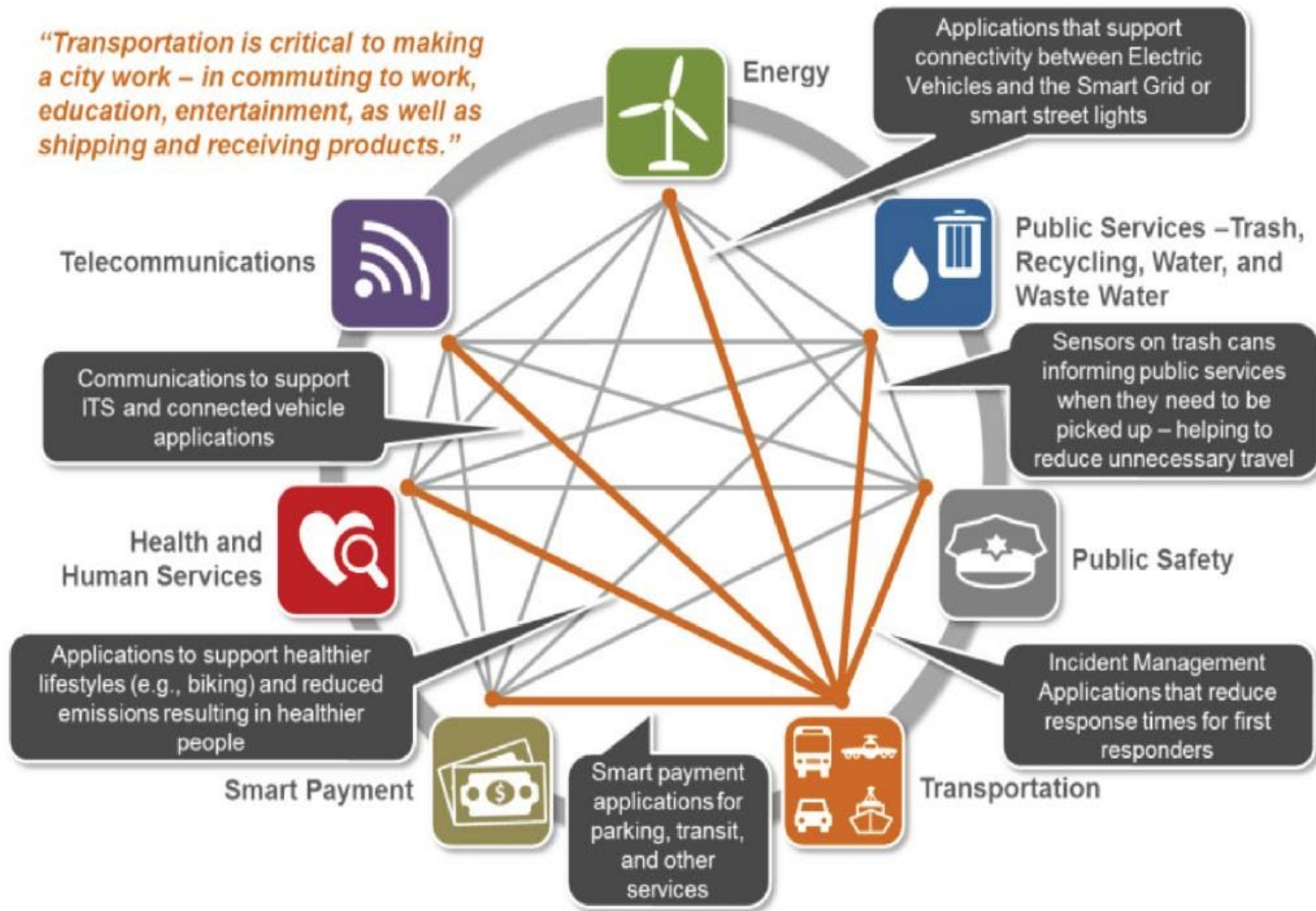
# Criticality of Spectrum Availability



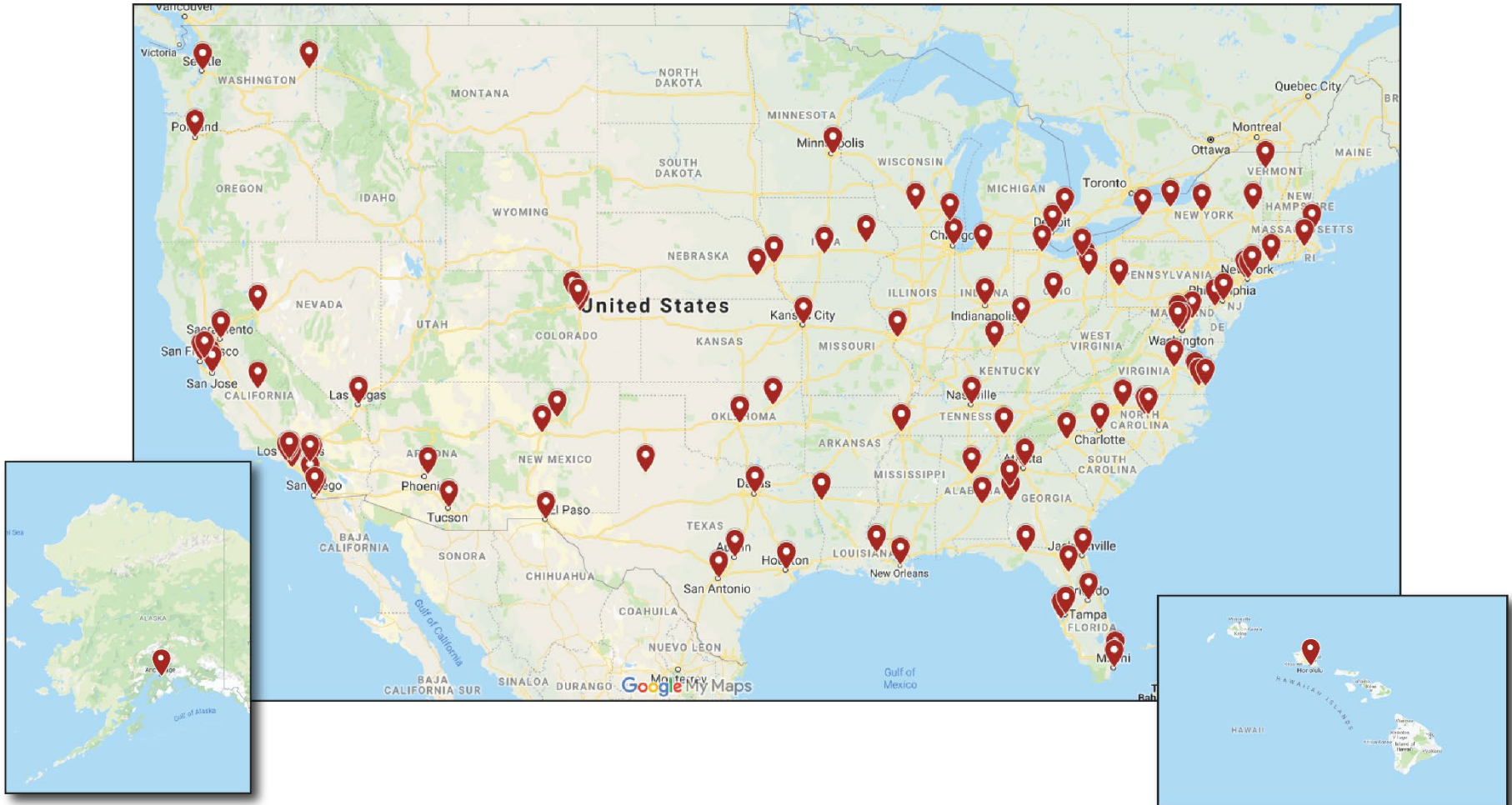
# Transportation in the Context of Smart Cities



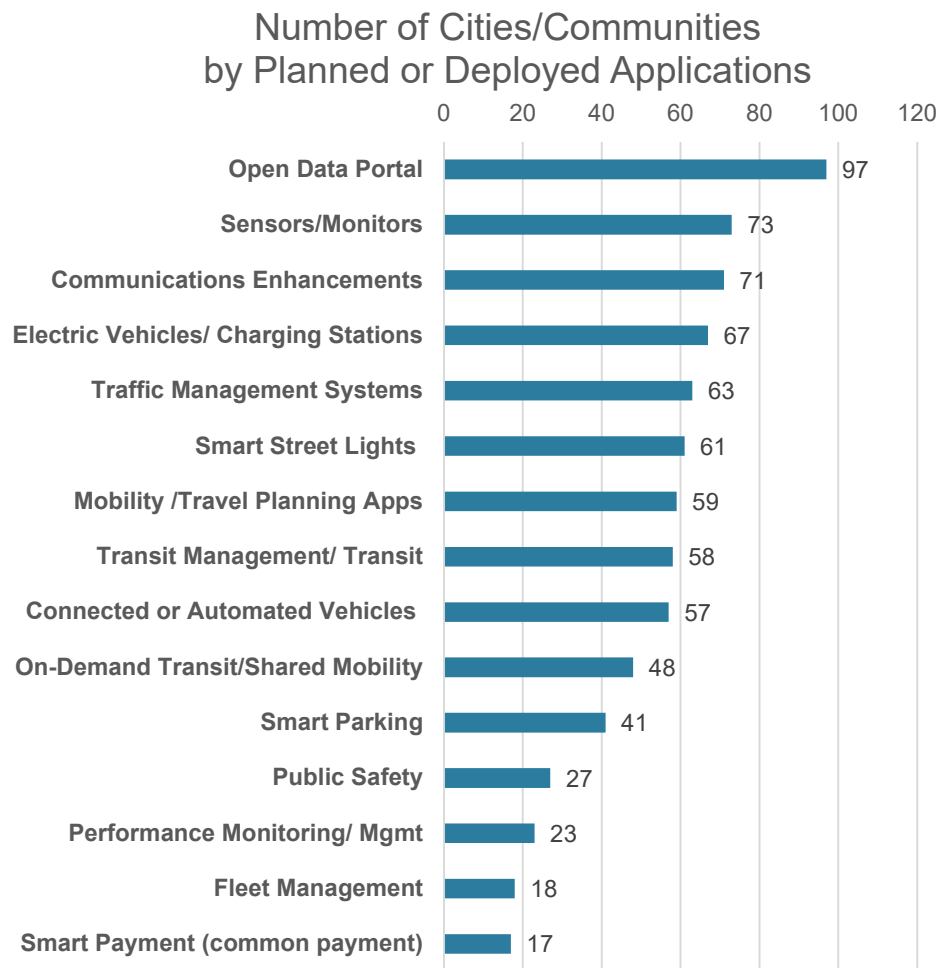
*"Transportation is critical to making a city work – in commuting to work, education, entertainment, as well as shipping and receiving products."*



# Smart Cities Research Underway



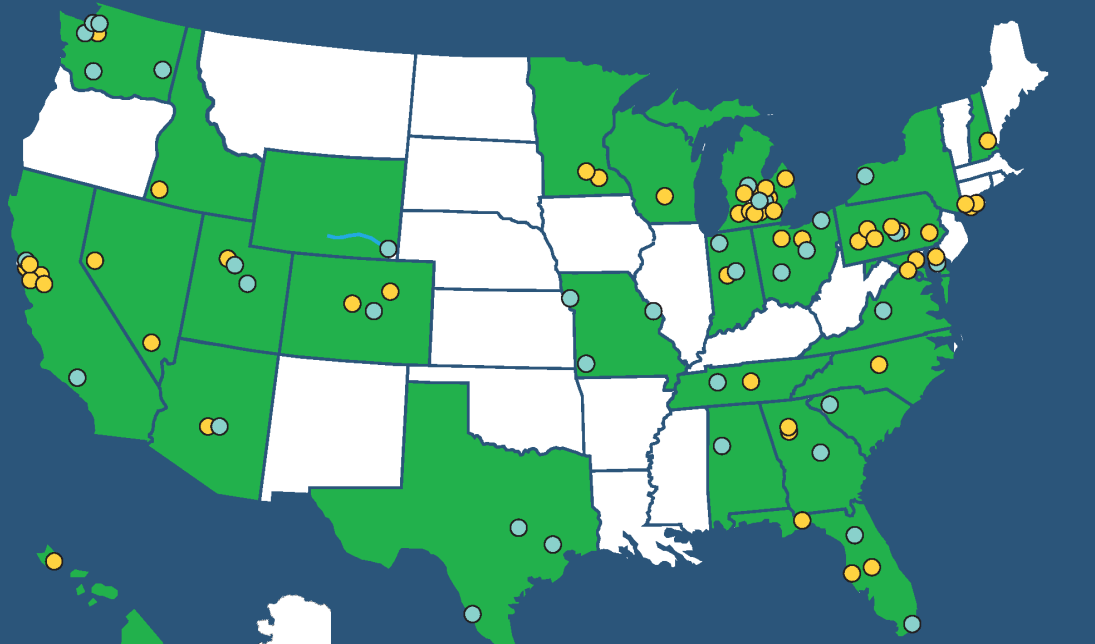
# Smart City Scan: Transportation Applications



*Note: Counts reflect self-reported information available on websites (e.g., planning documents) gathered through August 2019. Based on analysis of 110 cities/communities.*



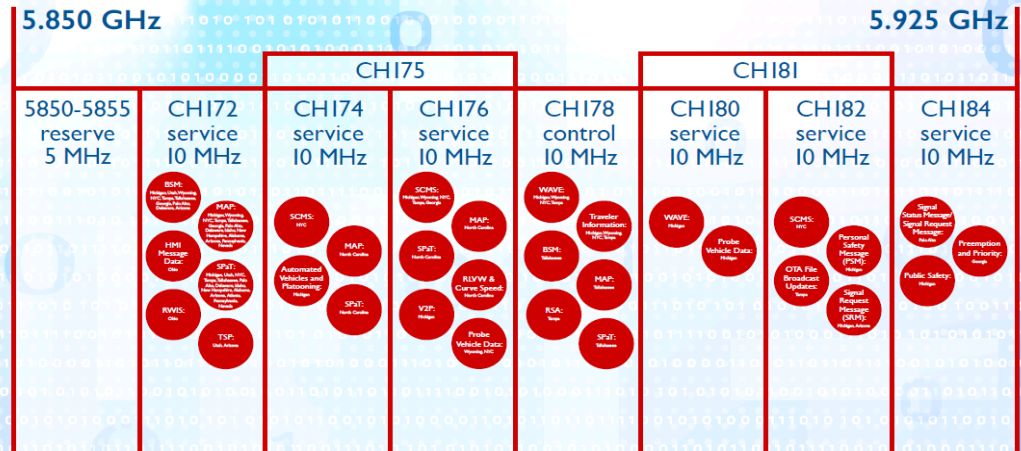
# Use of the Safety Band: Deployment Locations



- Planned Projects
- Operational Projects

Source: Volpe, the National Transportation Systems Center (USDOT), May 2019. The project information and data contained on this map was gathered from publicly available materials and is subject to change.

## 5.9GHz Spectrum Use Today



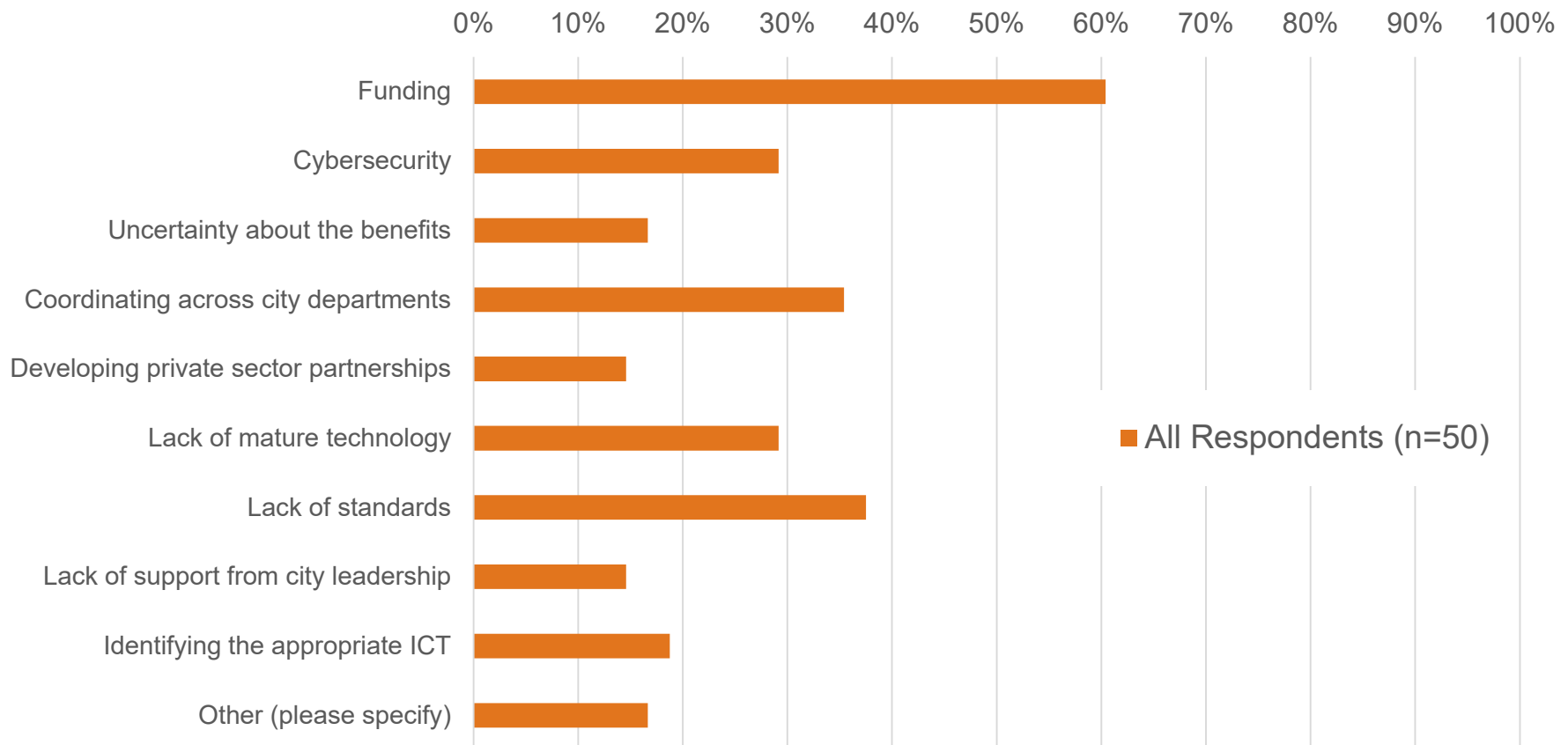


# Survey of Smart Cities/Communities: Preliminary Results



- Survey administered to 107 Smart Cities in August 2019

*“What are the biggest challenges your city faces in planning for and/or deploying Smart City ITS technologies?”*

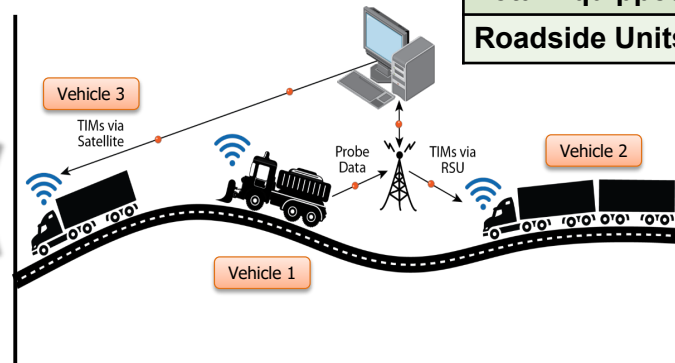
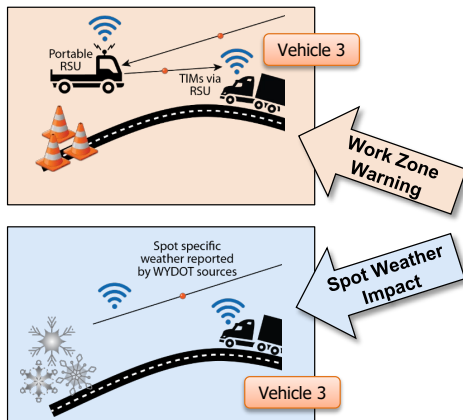


# WYDOT PILOT CV APPLICATIONS AND DEVICES



Category	WYDOT – CV Application
V2V Safety	Forward Collision Warning (FCW)
V2I/I2V Safety	Situational Awareness
	Work Zone Warnings (WZW)
	Spot Weather Impact Warning (SWIW)
V2I and V2V Safety	Distress Notification (DN)

WYDOT – Devices	Estimated Number
WYDOT Maintenance Fleet Subsystem On-Board Unit (OBU)	90
Integrated Commercial Truck Subsystem OBU	25
Retrofit Vehicle Subsystem OBU	255
WYDOT Highway Patrol	35
<b>Total Equipped Vehicles</b>	<b>405</b>
<b>Roadside Units (RSU) along I-80</b>	<b>75</b>

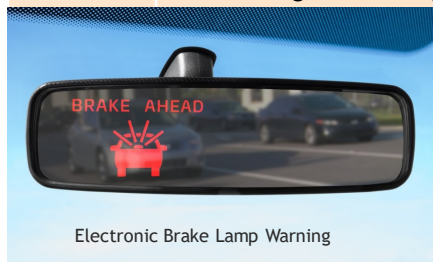


# TAMPA HILLSBOROUGH EXPRESSWAY AUTHORITY (THEA) PILOT CV APPLICATIONS AND DEVICES



Category	Tampa (THEA) – CV Application
V2I Safety	End of Ramp Deceleration Warning (ERDW)
	Wrong Way Entry (WWE)
	Pedestrian Collision Warning (PCW)
V2V Safety	Emergency Electronic Brake Lights (EEBL)
	Forward Collision Warning (FCW)
	Intersection Movement Assist (IMA)
	Vehicle Turning Right in Front of a Transit Vehicle (VTRFTV)
Mobility	Intelligent Traffic Signal System (I-SIG)
	Transit Signal Priority (TSP)

Tampa (THEA) – Devices	Estimated Number
Vehicle Equipped with On-Board Unit (OBU)	1,080
HART Transit Bus Equipped with OBU	10
TECO Line Street Car Equipped with OBU	8
<b>Total Equipped Vehicles</b>	<b>1,100</b>
<b>Roadside Units (RSU) at Downtown Intersections</b>	<b>44</b>



# NYC PILOT CV APPLICATIONS AND DEVICES



**VISION ZERO**  
 “Traffic Death and Injury on City streets is not acceptable”



Category	NYCDOT – CV Application
V2I/I2V Safety	Speed Compliance
	Curve Speed Compliance
	Speed Compliance/Work Zone
	Red Light Violation Warning
	Oversize Vehicle Compliance
	Emergency Communications and Evacuation Information
V2V Safety	Forward Crash Warning (FCW)
	Emergency Electronics Brake Lights (EEBL)
	Blind Spot Warning (BSW)
	Lane Change Warning/Assist (LCA)
	Intersection Movement Assist (IMA)
V2I/I2V Pedestrian	Vehicle Turning Right in Front of Bus Warning
	Pedestrian in Signalized Crosswalk
Mobility	Mobile Accessible Pedestrian Signal System (PED-SIG)
	Intelligent Traffic Signal System (I-SIGCVDATA)

NYCDOT – Devices	Estimated Number
Taxi Equipped with Aftermarket Safety Device (ASD)	3,200
DCAS Fleet Equipped with ASD	3,200
MTA Fleet Equipped with ASD	700
NYCDOT Fleet Equipped with ASD	700
DSNY Fleet Equipped with ASD	170
<b>Total Equipped Vehicles</b>	<b>8,000</b>
<b>Roadside Units (RSU) at Manhattan and Brooklyn Intersections and FDR Drive</b>	<b>400</b>
<b>Vulnerable Road User (Pedestrians/Bicyclists) Device</b>	<b>100</b>
<b>PED Detection System</b>	<b>10</b>



MTA: Metropolitan Transportation Authority; DSNY: City of New York Department of Sanitation; \* In addition, 600 spare ASDs will be purchased.



# WE DOCUMENT DEPLOYMENT EXPERIENCES



- <https://www.its.dot.gov/pilots/index.htm>

Connected Vehicles

Connected Vehicle Pilot Deployment Program



CV Pilots News & Events

- Tampa (THEA) Connected Vehicle Pilot Investigated Roadside Unit (RSU) Transient Surge Immunity 5/14/19
- CV Pilots presentation sessions at the ITS America Annual Meeting in Washington DC 5/6/19
- Connected Vehicle Pilots Phase 2 Interoperability Test Report is now available 4/26/19
- Connected Vehicle Pilot Deployment Program, Driving Towards Deployment: Lessons Learned from the Design/Build/Test Phase is now available 4/26/19
- New York City CV Pilot to Use High-Accuracy Positioning Techniques 3/25/19
- Wyoming DOT (WYDOT) Connected Vehicle Pilot Determines Appropriate Tractor-Trailer Antenna Placement and Equipment Configuration 3/20/19

[More news >](#)



New York City DOT  
Pilot



Tampa-Hillsborough  
Expressway Authority Pilot



Wyoming DOT Pilot

## CV Pilots Deployment Resources

- [Program Overview](#)
- [Success Stories and Lessons Learned](#)
- [Technical Events/Publications \(list view\)](#)
- [Technical Events/Publications \(table view\)](#)
- [Featured Links](#)



## Success Stories

- Keeping Stakeholders and the Public Informed
- Bringing Local Agencies to Work Together
- Promoting Interoperability
- Providing Open Source CV Applications and Sharing Data
- Accelerating Collaboration and CV Deployment

## Lessons Learned

- Driving Towards Deployment: Lessons Learned from the Design/Build/Test Phase
- Connected Vehicle Pilot Deployment Program Phase 1 Lessons Learned
- Interoperability Testing amongst the three Connected Vehicle Pilots
- NYC Pilot's demonstration at the ITS-NY Annual Meeting and Technology Exhibition
- Integrating and Testing Large Disparate Systems





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## **Visit CV Pilot and Pilot Site Websites for more Information**

- CV Pilots Program: <http://www.its.dot.gov/pilots>
- NYCDOT Pilot: <https://www.cvp.nyc/>
- Tampa (THEA): <https://www.tampacvpilot.com/>
- Wyoming DOT: <https://wydotcwp.wyoroad.info/>



NYCDOT



Tampa (THEA)



WYDOT

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