"Individual commitment to a group effort - that is what makes a team work, a company work, a society work, a civilization work."
Vince Lombardi

Member Activity Updates

Connected Vehicle Pooled Fund Study

May 2025

Connected Vehicle Pooled Fund Study

Contents

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Alaska DOT

Submitted by: Pam Golden, PE, Statewide TSMO/ITS Engineer

Website: dot.alaska.gov

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.
With respect to CAV, our mission is to keep Alaska moving through service and infrastructure. We aim to be among the first to implement cost effective safety and efficiency enhancing technologies as soon as they become commercial-off-the-shelf and supported and integrated by our control system hardware and software providers and to support others that are testing systems to accelerate the transition to commercialization. **Alaska DOT & PF CAV contacts:** CAV & TSMO: Pam Golden, PE, Statewide TSMO Coordinator, pamela.golden@alaska.gov

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.
1) Statewide improvements in network and system security and capacity in anticipation of increased data transmission needs and public internet connections. 2) Statewide TSMO strategic plan anticipated to be complete in early 2024. 3) Northern Region -Pilot project for digital alerting for school bus stops anticipated to be active in early 2024. Snowplow priority being implemented over next few months. 4) Central Region- Adding additional signals that supply SPaT data to commercial entities. Implemented a cellular network to connect remote signals and add additional latency insensitive (>50ms) bandwidth. In the experimenting/testing phase to move from generic cell networks to ATT FirstNet. Moving to cloud-based SPMs and ASC with our controller supplier. We continue to test and improve radar detection capability to provide better SPMs for ASC.

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.
1) Statewide Research Section: Innovation Corridors project to evaluate technologies applicable to Alaskan conditions 2) Statewide connected intersection plan to start in 2024 3) Creation of smart work zone specifications and adding off the shelf connected devices to M&O work zones 4) Continuation of current plans and projects

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Arizona DOT

Submitted by: Joseph Jones

Website: https://azdot.gov/home

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.
The Arizona Department of Transportation (ADOT) is a multimodal transportation agency serving one of the fastest-growing areas of the country. Connecting Arizona. Everyone. Everywhere. Every Day.

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.
Arizona has several projects underway in various parts of the state. For a comprehensive list, please visit Arizona Projects (https://azdot.gov/projects). The Inside Lane is a monthly newsletter specifically meant for Arizona employees, yet other transportation or related agencies across the nation may find the information helpful or pertinent. One noticeable accomplishment for our agency is completing the revised Intelligent Transportation System (ITS) Master Plan, a roadmap that guides us in addressing our gaps and aligning our future projects and initiatives within ADOT. It's a tool that helps us stay ahead of the ever-changing world. https://azdot.gov/business/its-master-plan Fast Facts about Arizona Strategic Plan 2023

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.
Several projects are in the study or decision-making phase. Please visit https://azdot.gov/planning/transportation-studies for more information.

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: California DOT - Caltrans

Submitted by: Nathan Loebs

Website: https://dot.ca.gov/

https://dot.ca.gov/programs/research-innovation-system-information

https://dot.ca.gov/programs/traffic-operations/cav

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.
Our vision is a brighter future for all through a world-class transportation network. Our mission is to provide a safe and reliable transportation network that serves all people and respects the environment. Caltrans values engagement, equity, innovation, integrity, and pride. Anything we do stems from our goals which includes safety first, cultivate excellence, enhance, and connect the multimodal transportation network, strengthen stewardship and drive efficiency, lead climate action and advance equity and livability in all communities.

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.
Caltrans District 4 Projects, including, California Connected Vehicle Test Bed https://dot.ca.gov/programs/traffic-operations/cav/projects#D4 https://caconnectedvehicletestbed.org/ Caltrans District 11 Projects, including Bus on Shoulder Pilot project, **Connected Vehicle Enabled Intersection Pilot Project** https://dot.ca.gov/programs/traffic-operations/cav/projects#D11 Caltrans District 12 Projects. https://dot.ca.gov/programs/traffic-operations/cav/projects#D12

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.

Caltrans is in the process of rolling out many CAV activities within the next 12 months that include, but are not limited to:

Statewide

- Received 239 experimental FCC C-V2X Licenses, and Caltrans will activate all RSU sites by May 1, 2024
- Working on adoption of NMUTCD-11th Edition into the CA MUTCD
- CAV and Multi-Modal Intelligent Traffic Signal System (MMITSS) Staff Training. Outfit the Research Lab for testing and training the CAV staff.
- GIS platform to illustrate various ongoing Caltrans CAV projects
- Security SCMS V2X Caltrans - INTEGRITY Security Services is being implemented statewide.
- Established a NTRIP Caster on a cloud server which collects RTCMv3 correction data from CRTN (California Real Time Network) base stations. Ported an RTCM server from a research platform to an operational platform that provides RTCM broadcasts at 188 owned and operated RSUs and documented the implemented RTCM operational system for future RTCM operations and maintenance (O&M) needs and system expansion needs

Caltrans District 4 Projects

- Upgrading all 31 intersections roadside units (RSU) to Cellular Vehicle-to-Everything (C-V2X) capabilities
- Deploying and evaluating CV Manager (part of the USDOT-backed open-source JPO ODE suite)

Caltrans District 11 Projects

- Future applications - Queue Warning, Work Zone Warning, Wrong-Way driver, Safety Message matching nearby Changeable Message Signs (CMS)
- Testing motorcycle's on-boar Units (OBU) with Harley Davidson on Signal Phase and Timing (SPaT) and Traveler Information Messages (TIM)

Caltrans District 12 Projects

- Installing 52 RSU on arterials and 120 RSU on freeways
- Future applications -Red Light Violation Warning, Reduced Speed/Work Zone Warning, Pedestrian & Bicycles in Signalized Crosswalk Warning, Advanced Traveler Information System, Integrated Corridor Management (ICM) Strategies, Event and Work Zone Warning, and Wrong-Way Driving

At this time none of the projects listed above have external facing websites. As the projects move further along, we will share with this CV PFS members.

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Colorado DOT

Submitted by: *Mallory Artusio on behalf of CODOT*

Website: https://www.codot.gov/

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.
The mission of CODOT is to provide the best multi-modal transportation system for Colorado that most effectively and safely moves people, goods, and information. The vision of CODOT is to enhance the quality of life and the environment of the citizens of Colorado by creating an integrated transportation system that focuses on safely moving people and goods by offering convenient linkages among modal choices. CODTO values safety, people, integrity, customer service, excellence & accountability, and respect.

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.
For the most up-to-date information on current projects and research, visit https://www.codot.gov/projects. The interactive map is especially helpful to view projects by region. 10-year Vision, Plan, & StoryMap: https://www.codot.gov/programs/yourtransportationpriorities/your-transportation-plan/10-year-vision Resource Documents: https://www.codot.gov/programs/yourtransportationpriorities/resources-documents

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.
Statewide Programs: https://www.codot.gov/programs Transportation Priorities: https://www.codot.gov/programs/yourtransportationpriorities

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Connecticut DOT

Submitted by: Pete Calcaterra

Website: Connecticut Department of Transportation

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.
The mission of the CTDOT is to provide a safe and efficient intermodal transportation network that improves the quality of life and promotes economic vitality for the State and the region. The vision of the CTDOT is to lead, inspire and motivate a progressive, responsive team, striving to exceed customer expectations.

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.
CTfastrak is Connecticut's first Bus Rapid Transit system. It is a system of bus routes that utilize a bus-only roadway for all or a portion of your trip. For current project weblinks, visit: https://portal.ct.gov/DOT/Office-of-Construction/Project-Pages/Major-Projects-Weblink

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.
CTDOT values measurable results, customer service, quality of life, accountability & integrity, and excellence. To that end, CTDOT enlists projects that serve its values and mission. 2020FastFacts-onlineFINAL.pdf

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Delaware DOT

Submitted by: *Mallory Artusio on behalf of DelDOT*

Website: https://deldot.gov/

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.
We strive to make every trip taken in Delaware safe, reliable, and convenient for people and commerce. We provide safe choices for travelers in Delaware to access roads, rails, buses, airways, waterways, bike trails, and walking paths. We seek the best value for every dollar spent for the benefit of all. We engage our customers and employees with respect and courtesy as we deliver our services.

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.
Delaware's extensive and interactive project portal can be found here: https://deldot.gov/projects/

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.
For a list of current and future programs, check out: https://deldot.gov/Programs/index.shtml

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: FHWA

Submitted by: John Hourdos

Website: https://www.its.dot.gov/

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.

Mission: To deliver a world-class system that advances safe, efficient, equitable, and sustainable mobility choices for all while strengthening the Nation's economy.

Safety Goal: Make our transportation system safer for all people. Advance a future without transportation-related serious injuries and fatalities.

Equity Goal: Reduce inequities across our transportation systems and the communities they affect. Support and engage people and communities to promote safe, affordable, accessible, and multimodal access to opportunities and services while reducing transportation related disparities, adverse community impacts, and health effects.

Transformation Goal: Design for the future. Invest in purpose-driven research and innovation to meet the challenge of the present and modernize a transportation system of the future that serves everyone today and in the decades to come.

Climate and Sustainability Goal: Tackle the climate crisis by ensuring that transportation plays a central role in the solution. Substantially reduce greenhouse gas emissions and transportation-related pollution and build more resilient and sustainable transportation systems to benefit and protect communities.

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.

Connected and Automated Vehicle Education (CAVe)-in-a-box: Connected and Automated Vehicle education (CAVe) seeks to provide community colleges, trade schools, universities, and other academic stakeholders with unique tools and resources for the development of an intelligent transportation workforce.

Connected Transportation Interoperability (CTI) family of standards: Supported by the USDOT Joint Program Office, ITE, with its partner standards development organizations (AASHTO, NEMA and SAE International), developed an Implementation Guide that defines the key capabilities and interfaces a connected intersection must support to ensure interoperability for state and local infrastructure owner/operators (IOO).

a. CTI 4501 v01 – Connected Intersections (CI) Implementation Guide
b. CTI 4501 v01.01 – Connected Intersections (CI) Implementation Guide (Amended)
c. CTI 4501 v01.01 - Connected Intersections (CI) Implementation Guide (Amended - with tracked changes)

d. CTI 4502 v01 - Connected Intersections Validation Report
e. CTI 4001 v01 – Roadside Unit (RSU) Standard

Connected Work Zone Implementation Guidance Standardization (CWZ Standard): USDOT is sponsoring the Connected Work Zones Standard Implementation (CWZ Standard) to develop, publish, verify, and validate a Connected Work Zone (CWZ) Standard that defines the data elements, capabilities, and interfaces a connected work zone must support to ensure interoperability for state/local infrastructure owner/operators (IOO) and vehicle operators. A connected work zone is defined as a set of technologies that generates or collects work zone information (whether automatically or manually) as well as the infrastructure that broadcasts/distributes this information to the public and to vehicles.

The Work Zone Data Exchange (WZDx) Specification enables infrastructure owners and operators (IOOs) to make harmonized work zone data available for third party use. The objective is to make travel on public roads safer and more efficient through ubiquitous access to data on work zone activity. Specifically, the project aims to get data on work zones into vehicles to help automated driving systems (ADS) and human drivers navigate more safely.

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.

Saxton Transportation Operations Laboratory

Research Areas

- **Accessible Transportation Technologies Research Initiative**
- **Automated Vehicles**
  - Analysis, Modeling, and Simulation
  - CARMA℠
  - CARMA Collaboration Opportunities℠
  - CARMA Engagement/Collaboration℠
  - CARMA Products ℠
  - CARMA Program Overview
  - Integrating Advanced Technologies to Actively Manage Traffic

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Florida DOT

Submitted by: Fred Heery

Website: https://www.fdot.gov

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.

Mission: The department will provide a safe transportation system that ensures the mobility of people and goods, enhances economic prosperity, and preserves the quality of our environment and communities.

Vision: As one FDOT team, we serve the people of Florida by providing a transportation network that is well planned, supports economic growth, and has the goal of being congestion and fatality free.

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.

For overall picture of the FDOT's CAV Program, please visit the program page here:
https://www.fdot.gov/traffic/teo-divisions.shtm/cav-ml-stamp/connected-vehicles

1. **I-75 Florida's Regional Advanced Mobility Elements (FRAME)**
   - A regional connected vehicle (CV) initiative to improve safety and mobility for all road users. The project goal is to use CV and Advanced Traffic Signal Performance Measures (ATSPM) technologies to create an integrated corridor for I-75 and parallel state highways in the vicinity of the Cities of Gainesville and Ocala.
   - The project installed 76 RSUs on I-75 and 129 RSUs and ATSPM on adjacent major arterials in Ocala and Gainesville.
   - RSU that were initially installed (DSRC) are being converted to C-V2X.
   - Currently the project is in operation and collecting data.

2. **Gainesville Pedestrian-Bicyclist CV Pilot at the University of Florida – Passive/active ped detection emphasis.**
   - Project goal is to improve pedestrian and bicyclist safety using CV technologies.
   - The project includes 16 signalized intersections and 11 unsignalized midblock crossings. Project corridors have high pedestrian and bicyclist traffic.
   - Research is being conducted on the devices and applications that were deployed including Passive Pedestrian Detection and Safety Message generation, Mobile App for pedestrians at the Signalized and midblock locations equipped with Rapid Rectangular Flashing Beacons (RRFB) with C-V2X capabilities. This research is supplemented by human factors perspective through surveys, interviews, and field observations and how road users react use of different types of warnings weather through a traffic control device, signage and mobile app.

3. **DEPOT (Data Exchange Platform of Operational Technology), formerly Vehicle-to-Everything (V2X) Data Exchange Platform**- The V2X DEP is being rebranded as DEPOT, as it now ingest more data sets that are not necessarily V2X data. (such as the SunGuide®, Data integration and Video Aggregation Systems (DIVAS), FL511, and HERE Traffic). This project is currently in its fourth and final year, with an expectation of a new contract in future years, exploring data efficiency like deduplication, delta-compression, cold storage and variation in elastic cloud approaches. The DEPOT System has ingested over 10 billion messages since inception (from RSU. Signals, ITS Hardware, other central systems, like SunGuide and FL511), and over 10 million messages daily, with several devices as frequent as 0.1 seconds. DEPOT has over 750 physical CV related hardware devices (RSUs and OBUs) and over 10,000+ central systems data points (ATMS and SunGuide Data Bus). DEPOT was also recently tested for different use cases, such as supplying data for the Emergency Shoulder Use (ESU) dashboard visualization, used to support FDOT Management and Statewide Emergency Managers to make informed decisions on implementing ESU during hurricanes Helene and Milton.

4. **I-4 Florida's Regional Advanced Mobility Elements (FRAME)**
   - Interstate 4 (I-4) is a regional, intercity integrated corridor management (ICM) project running from the Central Business District in Tampa to the southwest side of Orlando at the Florida Turnpike.
   - I-4 and the other ICM routes cross four (4) counties: Hillsborough, Polk, Osceola, and Orange.
   - I-4 FRAME will cover 77 miles of I-4, 122 miles of other limited-access routes, and signalized arterial roadways with a total of 491 traffic signal systems.
   - The project is divided into two construction contracts with the first one spanning District 7 and SR60 and the second one within District 1, District 5 and Florida Turnpike Enterprise FTE).
   - Before and After studies research is being awarded to partner universities for project evaluation. The before studies research concluded in 2023, and after studies research to start collecting data once the project is operational.
   - The project is in the design and implementation phase.

5. **CAV Strategic Plan 2.0 –** FDOT is preparing to release the latest version the CAV Strategic Plan to guide FDOT's ongoing and future CAV efforts. This CAV Strategic Plan outlines how FDOT will work towards mainstreaming the CAV technologies, build on the activities from the CAV 1.0 The CAV Strategic Plan 2.0 was released in February 2025, internally, and is expected to be available in FDOT website in 2025.

6. **Connected Vehicles: Lessons Learned and Best Practices –** Developed over the past year by SME's from across the districts and central office personnel, this document will share lessons learned and provide general guidance related to the planning, design, procurement, construction, operation, and maintenance of connected vehicle (CV) equipment. This was built on the wealth of existing information and documentation on many different aspects of the FDOT Connected and Automated Vehicle (CAV) program. This Lessons Leaned and Best Practices document was released this March 2025, internally, and is expected to be available on the FDOT website in 2025.

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.
Florida's Connected and Automated Vehicle (CAV) Initiative: https://www.fdot.gov/traffic/teo-divisions.shtm/cav-ml-stamp/connected-vehicles

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Georgia Department of Transportation

Submitted by: Alan Davis

Website: www.dot.ga.gov

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.
As the organization in charge of developing and maintaining all state and federal roadways in the U.S. state of Georgia, we want to deliver a transportation system focused on innovation, safety, sustainability and mobility.

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.
On-going deployments: over 1700 RSUs across the state deployed or in a state of deployment, focused on delivering public sector fleet applications such as emergency vehicle preemption, transit signal priority, and freight signal priority. Includes deployment of OBUs onto vehicles. The Ray on I-85: Partnership with Panasonic and Kia Georgia to deploy and demonstrate rural interstate applications, data usage, and freight signal priority/connected intersections. Georgia Ports Pilot: Deployment of OBUs in freight vehicles to enable freight signal priority and to provide in-vehicle alerts automatically when at-grade rail road crossings are blocked. Interstate CV deployment: 4 design-build projects to install RSUs and fiber backhaul along all Georgia interstates; first 2 projects are in procurement currently. V2X Roadmap: 10-year funding program (currently in year 2) to deploy RSUs at all 6500 signalized intersections on state routes, deploy OBUs onto all transit vehicles in metro Atlanta, and enable further development of applications. Multiple research projects are underway focused on analyzing interference from adjacent bands and strategies to mitigate the impact to operations from that interference. Series of five design build projects in various stages of implementation to deploy connected vehicle infrastructure along all of our interstate routes in the state. The first of these is now under construction. This effort is part of an AASHTO moonshot project effort.

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.
As the organization in charge of developing and maintaining all state and federal roadways in the U.S. state of Georgia, we are dedicated to completing the build-out of our interstates.

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Maricopa County Department of Transportation (MCDOT)

Submitted by: David Lucas

Website: https://www.maricopa.gov/5307/Transportation-MCDOT

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.
Maricopa's mission is to provide connections that improve peoples' lives.

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.

Loop 101 Mobility – ATCMTD ICM deployment grant which includes four main system components: ASCT, adaptive ramp metering, CV transit fleet deployment and development of a regional Decision Support System

Anthem ASD Deployment – Deployment of 641 Danlaw DSRC OBUs across school bus, public safety and municipal vehicle fleets, as well as private vehicles for increased market penetration of CV applications

REACT ICM Pilot – Integrate Tempe Police CAD data into the Regional Archive Data System (RADS) for expanded traveler information and incident management

NextGen REACT Services Pilot – Deploy smart work zone devices like arrow boards, barricades and cones and integrate them into the RADS platform for real-time incident management data reporting to AZ511

RADS Core Re-Architect Project – Modernize, optimize and expand the functionality of the Regional Archive Data System to increase reliability, capabilities and system performance by utilizing a hybrid cloud architecture.

Intelligent Transit & Freight Signal Priority – Deploy MMITSS along three high-priority corridors in Phoenix, Tempe and Mesa to provide transit and freight signal priority with CMV partners and ASU intercampus shuttles.

RADS Real-Time Operations Data – Expand arterial data availability and performance reporting to support real-time operations as well as the ingestion of volume and turning movement count data from local agency partners.

USDOT WZDx Demonstration Grant – Upgrade existing local agency work zone data aggregation to utilize the WZDx 4.0 standard and evaluate the effectiveness of the system migration

WZDx for Commercial Motor Vehicle In-Cab Notifications – HP-ITD grant with ADOT to expand the use of work zone notifications to freight vehicles via in-cab notifications on freeway and arterial corridors

DRIVE Arizona – SMART stage 1 grant to pilot the deployment of virtual RSUs and smartphone applications to evaluate the effectiveness of using these platforms to provide CV applications to VRUs and fleet operators

Next Generation Freeway & Arterial Work Zones – Accelerated Innovation Deployment (AID) demonstration grant with ADOT to deploy various smart work zone devices as part of upcoming major freeway (ADOT) and arterial (MCDOT) roadway projects and integrate the use of this technology into our maintenance and construction projects

Regional Connected Vehicle Strategic Plan – Study funded by the Maricopa Association of Governments to summarize the current state of CV technologies and do a readiness assessment of local agencies for deployment

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.

As the organization in charge of developing and maintaining all state and federal roadways in the county, we are dedicated to future plans that assist us in accomplishing our mission.

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Maryland DOT

Submitted by: Richard Woo
Website: cav.mdot.maryland.gov
Email: CAVMaryland@mdot.maryland.gov

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.
The Maryland Department of Transportation (MDOT) is a customer-driven leader that delivers safe, sustainable, intelligent, exceptional and inclusive transportation solutions in order to connect our customers to life's opportunities. Within MDOT, the State Highway Administration has a vision statement to provide a safe, well-maintained, reliable highway system that enables mobility choices for all customers and supports Maryland's communities, economy and environment.

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.

Current projects and research related to CVPFS:

- USDOT awarded Maryland $11.9 million under the Advanced Transportation Technology and Innovation (ATTAIN) grant program to improve safety and mobility along the Eastern Shore. Deployment elements include CAV technology, such as RSUs to receive and emit signal phase and timing (SPaT) broadcasts and curve warnings.
- MDOT received a Federal Communications Commission (FCC) waiver to operate roadside units (RSUs) with cellular-vehicle-to-everything (C-V2X)-based CV technology in the state of Maryland. As a result, all RSUs previously deployed using Dedicated Short-Range Communication (DSRC) radios are being converted to operate on C-V2X.
- MDOT completed the installation of connected vehicle (CV) technology on the US 1 Innovative Technology Deployment Corridor for Traffic Incident Management (TIM) and traveler information dissemination. Testing of CV devices/equipment is ongoing.
- Prince George's County expanded use of CV with a Vulnerable Road User (VRU) detection system. The system uses advanced technologies to detect and track pedestrians and bicyclists and help identify targeted interventions to improve safety.
- Morgan State University has developed a mixed traffic CAV testbed adjacent to the campus; working with the University's National Transportation Center and Baltimore City on vulnerable road user safety using roadside units receiving SPaT, MAP, and BSM data with vehicles, including campus shuttles.
- MDOT partnered with the University of Washington on a Transportation Data Equity Initiative with testing spanning Washington, Oregon, and Maryland. The project aims to create the foundational data tools necessary for both public and private entities to collect, share, manage, and use transportation data. The project is part of USDOT's ITS4US program.

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.
Goals: • More data governance strategies • More V2X deployments **2021-2025 MDOT SHA CAV Strategic Implementation Plan**: https://www.roads.maryland.gov/OTMO/2021-2025_MDOTSHA_CAVImplementationPlan_Final.pdf

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Michigan DOT

Submitted by: *Mallory Artusio on behalf of Michigan DOT*

Website: https://www.michigan.gov/mdot

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.

MDOT is committed to:#

- Serving residents and local communities with the highest level customer service.
- Improving transportation for all modes.
- Implementing new safety strategies to protect public health and environment.
- Seeking new ways to operate equitably, inclusively, and efficiently.
- Creating a transportation system that is safe, integrated, and resilient

Mission: Providing the highest quality integrated transportation services for economic benefit and improved quality of life.

Vision: MDOT will be recognized as a progressive and innovative agency with an exceptional workforce that inspires public confidence.

Values: Quality - Teamwork - Customer Orientation - Integrity - Pride

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.

For an overview of most recent projects and studies, please visit:
https://www.michigan.gov/mdot/projects-studies

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.

Future Programs

Five Year Transportation Plan

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Minnesota DOT

Submitted by: Ray Starr

Website: http://www.dot.state.mn.us/automated/

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.

Minnesota is preparing for connected and automated vehicles by observing trends and advancements in vehicle automation, connected vehicle technology, and other emerging trends. MnDOT's Connected and Automated Vehicle Office (CAV-X) is the convening office for the state's connected and automated vehicle transportation technology engagement, policy, testing and partnerships. The goal of the office is to direct investments and develop CAV policy and programs to advance a transportation system that is safe, equitable, accessible, efficient, healthy, and sustainable.

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.

Grand Rapids Automated Shuttle Demonstration: goMarti

Launched in fall 2022, the goMARTI self-driving shuttle project is the result of a unique partnership of multiple groups with a shared goal of increasing accessibility and transportation options for residents and visitors of Grand Rapids and testing self-driving technology in rural, winter conditions. The operation covers nearly 17 square miles and includes over 70 pickup and drop off points using five autonomous vehicles, including three wheelchair-accessible vehicles. The free, on-demand rides can be requested through a smartphone app. or by calling the local First Call 211 service who help individuals download and navigate the app and place ride requests. While the vehicles are considered self-driving, there is always an autonomous vehicle operator onboard who verifies the vehicle's safe operation and aids passengers as needed.

What began as an 18-month demonstration project led by MnDOT, goMARTI received federal funding submitted by the Department of Iron Range Resources and Rehabilitation to extend the project at least another three years and expand operations to the neighboring communities of La Prairie and Cohasset.

Autonomous Truck Mounted Attenuator (PDF)

This is a phase 2 project that is examining the impacts of an autonomous crash cushion and how it can be used to remove MnDOT maintenance workers from harm's way. Over the winter several modifications to the ATMA trucks were incorporated based on operator comments to improve the ruggedness and ease of operations of the system. Additionally, this year the CAV team provided staffing using mobility positions and performed testing statewide supporting district operations. The approach of dedicating staff for the summer resulted in significantly more opportunity to test the ATMA system in the field. The system continued to face issues but the dedicated crew was generally able to work with the vendor to identify and fix issues quickly. The CAV team plans to continue testing the ATMA system in 2024.

Assessment of Pedestrian Safety and Driver Behavior Near an Automated Vehicle

As more automated vehicles enter shared roadways, an essential aspect of automated vehicle (AV) safety is understanding the interactions between these vehicles and other road users. Anecdotal incidents about aggressive following and overtaking behaviors at crosswalks near the Med City Mover (MCM), a low-speed automated shuttle (LSAV) pilot demonstration in Rochester, MN, suggested the need for a scientific study of the behaviors of drivers of manual vehicles near the LSAV.

In this draft final report, the research team conducted a series of laboratory and field studies aimed at better understanding the safety relationship between LSAVs and the humans they share the road with. Overall, the study found an increased risk of overtaking and multiple threat passing near the MCM which may increase the risk of pedestrian-involved crashes, sideswipe crashes, and rear-end crashes. Study findings suggest that poor human-machine interfaces, exceptionally slow vehicle speeds, and resultant large queues behind the MCM contribute to these risks. Improved communication interfaces, speeds more consistent with the surrounding traffic, and smaller queue size are all important factors that AV developers and future pilot demonstrations must to consider to better promote pedestrian safety near AVs.

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.

Traffic Signal Lidar Detection for Vehicles, Pedestrians, and Bicyclists

This project is to utilize the Velodyne Lidar detection system at two signalized intersections located on the trunk highway system to compare the features and capabilities of this type of lidar detection system to the typical in-pavement loop detection and video detection systems.

Arterial Queue Alerting System (AQuAS) Using Artificial Intelligence Technology

MnDOT will be testing the Currux Vision system. The project will develop, test, and evaluate an Arterial Queue Alerting System (AQuAS) to reduce crashes and speeds along TH 7 westbound during queue events at the Texas Avenue traffic signal.

Variable Speed Limit feasibility study

MnDOT is examining the potential for variable speed limits (VSL) along I-35 in Duluth. This project details a potential implementation strategy that weaves in concept of operations, stakeholder engagement, legislative review, funding assessment, preliminary concept layouts, and cost estimates for an integrated ITS package of solutions. The foundation of the plan is the use of variable speed limits along with other active warning devices, anti-icing systems, and dynamic displays.

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: New Hampshire DOT

Submitted by: Kody McCarthy

Website: https://www.dot.nh.gov/

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.
Our TSMO Bureau's mission statement - The Transportation Management Center's mission is to detect, verify, and respond to incidents that affect the state transportation network. It serves to improve traffic operations, provide the public with current, accurate and useful travel and commuter information that promotes safe and efficient travel, as well as facilitates the maintenance of New Hampshire's transportation system.

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.
https://www.nh.gov/dot/projects/index.htm We do not currently have any projects related to CV/AV.

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.
Our current strategic plan (2023-2032): https://www.dot.nh.gov/sites/g/files/ehbemt811/files/inline-documents/nhdot_tsmo_strategic_plan_2023_final_1.pdf

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: New Jersey DOT

Submitted by: *Mallory Artusio on behalf of NJDOT [NJ has not named a new CVPFS representative]*

Website: https://www.state.nj.us/transportation/

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.
NJDOT will provide a world class transportation system that: • Enhances the quality of life for residents and traveling public • Achieves consistent progress through focused investments to keep infrastructure in a State of Good Repair • Stimulates and sustains smart development and economic growth • Employs the latest technologies to adapt to changing conditions and environments • Respects and protects the distinctive and delicate character of the State's natural resources • Eagerly embraces its role as a customer service organization

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.
For current research: https://www.state.nj.us/transportation/works/environment/ and https://www.state.nj.us/transportation/works/

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.
For future planning: https://www.state.nj.us/transportation/works/njchoices/

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Ohio DOT

Submitted by: Nick Hegemier

Website: https://www.transportation.ohio.gov/

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.

Our Mission: To provide a transportation system that is safe, accessible, well maintained, and positioned for the future.

Our Vision: A world-class transportation system that improves the lives of all Ohioans.

Our Guiding Principles:

- We put the safety of the public and our workforce first.
- We value innovation, efficiency, and quality.
- We invest public resources wisely and where it provides the greatest benefit.
- We set the standard of excellence for maintaining our infrastructure.
- We foster relationships based on trust and mutual respect.
- We communicate simply and clearly with employees, partners, and communities.
- We value the diversity and inclusion of our people and customers.
- We work collaboratively with business partners and local agencies.
- We work transparently and hold ourselves accountable to our partners and stakeholders.

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.

A. Terrasound

i. Dublin-based Terrasound develops "fiber sensing" technology. This technology allows buried fiber-optic cable to "listen" to the activity going on around it. This is an active partnership between DriveOhio and Terrasound to determine use cases and applications for this technology for transportation safety and infrastructure management. It is eventually envisioned that data coming out of this project could be integrated into a CV messaging application for various alerts.

B. DERQ

i. While DERQ was initially part of the City of Dublin DENSO pilot project, they have continued to partner with the CIty of Dublin and DriveOhio through the Dublin Connected Roundabout project. This project will be the first to develop predictability of movement

through the roundabout and coordinate traffic flow from the surrounding signalized intersections. A byproduct of the project will be to pilot the broadcast of warning messages to vehicles desiring to enter the roundabout.

C. Connected Intersection Validation

i. DriveOhio is currently partnering with the cities of Dublin and Columbus to install C-V2X RSUs at two intersections for the purpose of validating against the ITE CTI 4501 Connected Intersection Guidance document. MH Corbin has been contracted to perform this work and has subcontracted with WSP. The project will test Emergency Vehicle Pre-emption using C-V2X technology and will also identify technology gaps still presently needed to fully comply with the CTI 4501 guidance. Coordination with Econolite and Siemens (Yunex) will be performed to try to address as many of the gaps as possible, with a goal of these intersections being the first in the nation to fully comply.

D. Application Standardization

i. DriveOhio is leading efforts consulted with HNTB to develop application standard messaging for Curve Speed Warning, Reduced Speed Zones, and Lane Closures. There are over 60 stakeholders from all perspectives involved in this project. The goal for the project is to have a consistent message methodology across IOOs for these applications to eliminate IOOs having to support different OBU manufacturers different requirements for the message content.

E. CAVe-In-The-Box Training

i. Development of workforce development content with the University of Cincinnati to focus on educating Ohio students grade 5 – 12. The goal is to develop lesson plans to get more youth interested in transportation technology to fill the gaps that we are seeing in employment interest within the Transportation industry.

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.

Future projects are guided by the Ohio strategic plan:
https://www.transportation.ohio.gov/about-us/odot-strategic-plan/odot-strategic-plan

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Pennsylvania DOT

Submitted by: Gunnar Rhone

Website: https://www.penndot.pa.gov/

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.

MISSION

Enhance, connect, and add value to our communities by providing a sustainable, equitable transportation system and quality services for all.

VISION

An enhanced quality of life built on transportation excellence.

STRATEGIC THEMES AND VALUES:

Safety at All Levels: We value the safety of our employees, customers and partners in all that we do.

Innovation: We pursue and incorporate evolving technologies and innovative practices to improve transportation.

Mobility and Connectivity: We enhance quality of life through investments in equitable, efficient and safe movement of people and goods.

Customer Service: We are committed to providing a positive customer experience for all.

Communication that Fosters Relationships and Encourages New Ideas: We are committed to effective, transparent, timely communication with our employees, customers and stakeholders.

Recruiting, Retaining and Developing a Diverse and Inclusive Workforce: We build a strong team by respecting one another, promoting teamwork and seeking to recruit and empower our diverse workforce.

Effectively Leveraging Available Resources by Modernizing Technology and Assets: We connect Pennsylvania to the world's economy through environmentally and fiscally sustainable, resilient transportation systems.

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.

Website(s): https://www.penndot.pa.gov/av

Notable Projects and Initiatives

SMART Grants: PennDOT was awarded two SMART Grants in the Networked V2X space. The 2023 Stage I SMART Grant will deploy a pilot of curve speed warning over cellular networks through the V2X Data Exchange. The goal of the project is to integrate the CSW application with OEMs and third parties in Stage I, then expand to other applications in Stage II. The 2024 Stage I SMART Grant will deploy

freight signal priority over cellular networks on two corridors in central PA, and Stage II will expand the pilot throughout the Commonwealth.

V2X Roadmap: This project will create a vision for our V2X ecosystem, integrating both Direct and Networked V2X. The project will prioritize use cases, develop an implementation plan and timeline, identify a funding plan, and develop and O&M plan.

PennSTART: Will be a track for testing AVs and other new tech, as well as a first responder training facility.

CAV Hotspots: We did an analysis to develop a framework to see where some of the most common use cases may first become viable.

ADS Demonstration Grant: Our ADS Demonstration Grant looked into the safe integration of AVs in work zones. The project wrapped up in January 2025 and the final report is now on the project website.

Updated CAV Strategic Plan: We're currently updating our CAV Strategic Plan that can be found on our website. Updating with new goals for the next 5-10 years

V2X Data Exchange: Creating a V2X Data Exchange as part of our new ATMS. Will be about the same as the FDOT V2X Data Exchange.

CV Data Analysis: PennDOT looked into which CV data is available from OEMs and CV data providers. The project looked into the viability of use cases based on penetration and which use cases the data can be used for.

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.
CAV Strategic Plan Long-Range Plan 4 and 12 Year Plan

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Tennessee DOT

Submitted by: Lee Smith

Website: https://www.tn.gov/tdot.html & https://www.tn.gov/tdot/about/transportation-system-overview.html & Traffic Operations Division (tn.gov)

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.

TDOT's overall purpose and function in serving our customers is to provide **a safe and reliable** transportation system that supports economic growth and quality of life. TDOT has a commitment to excellence in managing and improving the state's transportation system, promoting the success of our employees, and strengthening the trust of our customers.

Values:

Stewardship - we take the best possible care of our assets

Integrity - we are professional, honest, and do the right thing

Safety - we identify and mitigate hazardous conditions for our employees, contractors, and the traveling public

Consistency - we are reliable and uniform in our actions and words

Development - we continually grow and share our knowledge, expertise, and experience

Innovation - we look for new and emerging ways to serve our customers

Collaboration - we work together internally and with our partners to share ideas, skills, and insights to get the best results

Family - we promote a culture of caring, concern for others, and pride in what we do

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.

Current Projects

- I-24 Smart Corridor – Multi Phase ICM project; Phase 2 includes ATM elements such as LCS and VSL; CAV elements including 152 RSUs (combo BlueToad and DSRC). SCMS integration is ongoing. Developing use cases through research project.
    - AI DSS – ATCMD Grant to use multiple data flows to optimize TMC
- Chattanooga MLK Smart Corridor (research and production deployment) - 37 RSU; use cases: Ped Safety
- CMAQ-funded deployments- have deployed over 300 RSUs within 18 local agencies statewide.
- Murfreesboro – 15 RSU; use cases: EVP
- Memphis – 12 RSU; use cases: Freight
- Knoxville and Johnson City – SPaT / MAP Projects

- Franklin - 13 RSU; use cases: SPaT / MAP Projects

Partnerships

- Local Agencies – since TDOT does not own or operate traffic signals, we rely heavily on partnerships. Following are examples of programs that have been started to grow in that area.
  - **Tennessee Traffic Signal Users Group (TTSUG)** – established in 2016, TTSUG is composed of nearly all traffic signal maintaining agencies in the state. One of the purposes of TTSUG is to facilitate information sharing among these agencies regarding traffic signal operations, provide training, and bring some consistency to traffic signal operations across the state. TTSUG is a forum for more experienced traffic signal operators to help less experienced ones.
  - **Traffic Signal Maintenance and Modernization (TSMM) Program** – established in 2020, TSMM is the umbrella program brining together and providing strategic guidance to the TSMP and PMII
  - **Traffic Signal Modernization Program (TSMP)** – established in 2019, this is a grant program for any local agency that would like to make improvements to their signal signal system. The value of the program has grown from $250K to $2.5M in the last 4 years
  - **Preventive Maintenance Inspection and Inventory (PMII) Program** – established in 2020, this program provides preventive maintenance services and updates statewide inventory of traffic signals in small, rural, and disadvantaged agencies with population of 2,500 or less.
- OEMs – continuing to grow collaborative relationship with Nissan and other OEMs,
- TennSMART Home | Tennsmart

Autonomous Vehicle Operations

- Enabling Automated Vehicle Legislation
- Einride automated trucks – GE Plant

I-24 MOTION Home | I-24 MOTION (i24motion.org)

The Tennessee Department of Transportation's I-24 Mobility Technology Interstate Observation Network (MOTION) is a four-mile section of I-24 in the Nashville-Davidson County Metropolitan area with 294 ultra-high definition cameras. Those images are converted into a digital model of how every vehicle behaves with unparalleled detail. This is all done anonymously using Artificial Intelligence (AI) trajectory algorithms developed by Vanderbilt University.

- Open Road Test Bed
- MRI for traffic
- CAV Use Cases ·
  - Move Over Law
  - LCS – effectiveness of Yellow Arrow
  - traffic impact of Traveler Advisory Messages (TAM)

- How do we make the most of IOO vehicles (service patrols, maintenance vehicles, attenuator equipped vehicles, CEI vehicles, asset maintenance contractors, etc) enabled with CV radios for V2X communications?
- Fleet applications
- Freight applications

Planning Documents - current

- CAV Investment and Smart Infrastructure - Connected and Automated Vehicles Investment and Smart Infrastructure in Tennesssee - Part 2 (tn.gov)
- TSMO Program Plan TDOT_TSMO_Program_Plan_2022_Final.pdf (tn.gov)

Planning Documents - future

- CAV Readiness
- I-24 DSRC Use Cases
- ITS and Fiber Deployment Plan

For items related to current projects and research in the four regions of Tennessee, visit: https://www.tn.gov/content/tn/tdot/projects.html

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.

Future projects and investments in CAV will be guided by insights from three key planning documents currently under development: I-24 DSRC Use Case Plan; CAV Readiness Plan; and ITS and Fiber Deployment Plan. In general, progressing in maturity from "performed" to "managed" and beyond by taking the knowledge that has been gained by deploying RSUs via construction contract and applying it to strategic planning for CAV in the future.

For future projects, research, and overall strategic direction, refer to: https://www.tn.gov/tdot/strategic-planning-home/tdot-strategic-direction.html

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Texas DOT

Submitted by: Jianming Ma, Tomas Lindheimer

Website: https://www.txdot.gov/

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.

"To support our agency's mission of *Connecting You With Texas*, we deliver excellence to enhance quality of life for all Texans." – Marc Williams, TxDOT Executive Director

Goals: 1) deliver the right projects; 2) focus on the customer; 3) foster stewardship; 4) optimize system performance; 5) preserve our assets; 6) promote safety; 7 value our employees.

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.

- Texas Connected Freight Corridors (TCFC) Project (experimental licenses for C-V2X, CVDF, SCMS procurement) - The TCFC system will go live later this year. Received ATO to integrate our SCMS. Working on enrolling our RSUs and OBUs onto SCMS.
- TxDOT Houston District Emergency Vehicle Preemption
- TxDOT Research Project: Develop Improved Queue Warning System Combining Multiple Data Sources
- TxDOT CAV Workgroup, and Connected Automated Transportation (CAT) Strategic Plan and Program Plan
- Traffic Signal Connectivity Project – the project is near completion
- WZDx: https://www.transportation.gov/av/data/wzdx
- TMSO Program Plan: 21 out of 25 Districts complete (https://www.txdot.gov/safety/tsmo.html)
- SPEEDI (Strategic Planning for Expedited Enterprise-wide Data Innovation)
- Migrate ATMS – Lonestar from on-premise servers to cloud environments
- Network segmentation (separating ITS network from business network)
- Truck Parking Availability System (TPAS) on I-10. – project passes thru many jurisdictions. The system is in pre-construction or will be out to bid this year, depending on the location

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.

- Texas CAV Task Force: https://cavtaskforce.texas.gov/
- I-45 Innovation Corridor – the STR division will work with TTI in deploying innovative solutions.
- ITS Architecture Update
- Improve security, reliability, and resiliency of ITS and traffic signal assets

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Transport Canada

Submitted by: Jonathan Parent

Website: https://tc.canada.ca/en

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.
To serve the public interest through the promotion of a safe and secure, efficient and environmentally responsible transportation system in Canada.

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.

Road infrastructure cyber security: Transport Canada awarded a contract to Deloitte LLP in June 2021 to provide IOOs and other transportation agencies with a suite of cybersecurity risk assessment tools, guidance materials, training, and technical support. The project aims to produce guidance for road authorities to establish or improve an existing cybersecurity program in accordance with the National Institute of Standards and Technology (NIST) framework for improving critical infrastructure cybersecurity as well as tools that will help determine their current profile and establish a target profile. We are completing the following documents/products that are tailored for Road Authorities:

- Cyber Security Primer
- Self Assessment Tool (help assess current and future state of cyber security program)

We are also developing the following documents that will be posted soon:

- FAQ on Cyber security
- Cyber Security Guidance Document (assists road authorities in developing and improving their cybersecurity program - >100 page doc)

We have also launched two cyber security Communities of Practice (CoP), one for executives and one for technical practitioners. These communities are open to representatives from road authorities in Canada who wish to come together with other practitioners, to share their experiences, learn and improve their cyber security preparedness and resiliency.

ITS Architecture: Transport Canada has recently contracted Arcadis to help develop a sample Regional Architecture (RA) to be used as an example in best practices documents and training materials. Workshops will be held to ensure the sample RA accurately depicts the Canadian environment, with the first being held at the ITS Canada Conference in Vancouver in June 2024.

Arcadis will also deliver several sets of training sessions, using existing materials, related to:

- A detailed overview of ITS Architectures
- Regional Architecture Development
- Systems Engineering

The first English set will be delivered on May 29, June 5 and June 12, while the first French set will be delivered on May 28, June 4 and June 11.

Finally, our training materials will be getting an update to address feedback obtained from previous training sessions and will feature more concrete examples on how to use ARC-IT by using the new sample RA.

In addition to this, Transport Canada has a number of testing activities ongoing at its Motor Vehicle Test Centre (MVTC). Notably, we are testing C-V2X signal transmission in various environmental conditions (such as rain, snow, different humidity levels and temperatures, etc.) and will be publishing a peer-reviewed paper on the topic. We also have a variety of V2I, V2V and V2P applications undergoing testing using C-V2X.

Other notable research activities: this report highlights over 150 research, development and deployment (RD&D) projects that Transport Canada advanced over the past year. It highlights 5 key themes and demonstrates how the results directly impact TC's policies, regulations and decisions.

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.

Website(s): https://tc.canada.ca/en/programs/funding-programs/program-advance-connectivity-automation-transportation-system

The Program to Advance Connectivity and Automation in the Transportation System (ACATS) is helping to prepare Canada for the wider use of connected and automated vehicles on our roads. To do so, the program supports:

- research, studies and technology evaluations
- the development of codes, standards and guidance materials
- capacity-building and knowledge-sharing activities

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Utah DOT

Submitted by: Blaine Leonard

Website: Transportation Technology Group website: www.transportationtechnology.utah.gov

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.
UDOT Vision: Keeping Utah Moving UDOT Mission: Enhance Quality of Life Through Transportation Quality of Life: Better Mobility, Good Health, Connected Communities, Strong Economy UDOT Strategic Goals: Zero Fatalities, Optimize Mobility, Preserve Infrastructure UDOT Strategic Goals website: https://udot.utah.gov/strategic-direction/index.html

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.
Current Operational Deployments: UDOT currently has 540 roadside units deployed throughout northern Utah and 325 equipped vehicles. These corridors support transit signal priority with Utah Transit Authority buses, including three BRT lines, snowplow preemption for UDOT and Orem City plows, emergency vehicle preemption for Orem City fire and ambulance vehicles, and demonstration capability for Curve Speed Warning and Spot Weather Impact Warning. The majority of the RSUs are at signalized intersections, but about 65 of them are along interstates and rural roads. Deployment Expansion with ATTAIN Grant: Using a 2023 ATTAIN Grant, UDOT is adding 300 RSUs at signalized intersections and about 40 vehicles with OBUs. This will be completed by February 2025. At that point, UDOT will exceed one of the goals of the USDOT Accelerating V2X Deployment Plan, with RSUs at over 25% of the signalized intersections in the Salt Lake City metro area (the nation's 57th largest metro area). Simultaneously, our transit partner, Utah Transit Authority, is funding the installation of OBUs on 93 of their buses in 2024. Logan City V2X Project: Installing C-V2X on about 60 signalized intersections (both state and city-owned) and up to 80 fleet vehicles in the city of Logan, Utah. Working with Cache Valley Transit to provide TSP to 39 of their buses. Planning to provide preemption to snowplows and emergency vehicles. Intend to capture BSMs from a variety of fleet vehicles. Connecting the West – USDOT Accelerating V2X Deployment Grant: UDOT was awarded this grant in June 2024, along with partners Colorado DOT, Wyoming DOT, Salt Lake City, and the City and County of Denver. In this project, we will deploy and demonstrate interoperable V2X systems across three states. This program will add 450 RSUs at signalized intersections throughout Utah,

150 RSUs along Utah interstates, and 150 RSUs along I-70 in Colorado. When completed, the deployment will result in a 1200-mile interstate loop (I-70, I-15, I-80, and I-25) with RSUs in three states. This will advance the USDOT goal of equipping the National Highway System with V2X. The program will also equip 215 vehicles – buses and snowplows, demonstrate interoperable TIM messages for roadway safety and mobility, and install LiDAR-based VRU detection and warning systems at 20 intersections. GM will provide an equipped vehicle for testing and demonstration at these sites. All deployment will be complete by March 2026. We will work collaboratively with two similar grants in Texas and Arizona.

DSRC Replacement Project: All DSRC units – 141 RSUs and 87 OBUs, have been replaced with C-V2X.

Evaluating Emissions Benefits from TSP: Using BSM data from transit buses to evaluate acceleration, deceleration and idle times in an attempt to quantify emission impacts of granting TSP to the buses. Project will be complete by June 2025.

VRU Safety Using V2X: Building two prototype installations using LiDAR to detect the positions of pedestrians crossing intersections and warn motorists of their presence. We are developing V2X messages to send information to the motorists and may also post blank-out signs at the intersections. This project has experienced some challenges, but we are learning about the system and planning for solutions to the challenges.

Rural Highway Crash Avoidance using V2X: Developing the capability to warn oncoming vehicles of vehicles which have stopped alongside the road and have their flashers on. This uses TIM messages within V2X technology. Will install C-V2X at selected locations in two major canyons and leverage vehicles equipped with OBUs in two other projects.

LiDAR Evaluation at signalized intersections: Equipping several intersections with LiDAR (various brands and types) to evaluate the capabilities of LiDAR as a detection mode. Evaluating the ability to detect near-miss crashes, ped and bike movements, and determine vehicle classifications. Interested in the differences between different LiDAR types and brands relative to range and performance.

Enabling Trust and Deployment through Verified Connected Intersections – SMART Grant 2023: Continuation of connected intersection testing that was performed with CAMP and the CV PFS in 2021 and 2022 with a goal of developing a reference implementation along one to three corridors (with different hardware configurations). This project includes CAMP, SCMS Manager, and the CV PFS members and support the work of the SAE CTI Committee to advance standards and guidance for nationwide deployments. We are developing testing tools to verify that intersections are broadcasting accurate, consistent, reliable and secure messages. A policy with SCMS Manager will provide a method for a vehicle to know that our intersections are validated. We intend for our tools to be used by others around the country in a collaborative way – this is not a Utah-centric project in the end.

Distributed Acoustic Sensing: Using acoustic sensing technology with buried roadside fiber to detect vehicle speeds and travel times, crashes, rockfalls, and avalanches. Frequent large avalanches in early 2023 provided significant event history to tune the algorithms to recognize the avalanche events. We are tweaking the system which issues automatic alarms when events occur.

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.

V2X Sustainability Plan: Developing a plan for UDOTs V2X deployments to become sustainable from an operations and maintenance standpoint, integrating these V2X systems into the UDOT ITS framework. This will include developing standard plans and specifications so V2X can be incorporated routinely in UDOT signal projects and integrate V2X into UDOT's asset management process.

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Virginia DOT

Submitted by: Mallory Artusio, Mena Lockwood, Noah Goodall

Website: https://www.virginiadot.org/

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.

Our mission is to plan, deliver, operate and maintain a transportation system that is safe, enables easy movement of people and goods, enhances the economy and improves our quality of life.

Our shared values for public service are to be responsive to customer needs, commit to safety and continuous improvement, respect and protect the public investment, make decisions based on facts and sound judgment and accept accountability, strengthen our expertise in using information, tools, and technology to achieve high performance and stay on the cutting edge, and to think ahead and plan creatively.

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.

Website: https://www.virginiadot.org/projects/default.asp

Notable Projects and Initiatives

Project Pipeline: A performance-based planning program to identify cost-effective solutions to multimodal transportation needs in Virginia.

SMART SCALE: SMART SCALE equitably matches funds to projects in areas in need statewide.

State of Good Repair: The State of Good Repair program provides funding for deteriorated pavements and bridges in Poor Condition (Structurally Deficient).

Paving Schedule: Find out where paving has been scheduled in your area.

Interstate 95 Corridor Improvement Plan: An I-95 study to improve specific segments of the corridor.

Improve 95 in Fredericksburg: Seven projects are underway to unlock gridlock on I-95 in Fredericksburg.

I-64 / I-264 Interchange Improvements: Improvements to this busy interchange will provide additional capacity and reduce congestion while improving safety in Southside Hampton Roads.

I-64 Express Lanes: Express Lanes are coming to help ease traffic in Hampton Roads.

I-64 Widening: The Interstate 64 Widening Project will reduce congestion along one of the most heavily traveled highways on the Virginia Peninsula.

I-64 / I-664 Corridor Improvement Study: The potential solutions under consideration in the I-64/I-664 Corridor Improvement Plan.

I-495 Southside Express Lanes Study: Environmental study to potentially extend the express lanes system on the southern section of I-495 (Capital Beltway)

I-495 Northern Extension: An environmental project is under way to extend the 495 Express Lanes.

Transform 66: On Interstate 66 Outside and Inside the Beltway in Northern Virginia, work is underway to implement multimodal improvements with new travel choices.

I-81 Improvement Program: Running through the VDOT Bristol, Salem and Staunton districts.

Connect Route 7: Route 7 improvements will ease congestion, increase capacity, improve safety, and expand mobility for cyclists and pedestrians.

Hampton Roads Crossing Study: VDOT and the Federal Highway Administration conducted a Supplemental Environmental Impact Statement to reevaluate the Hampton Roads Crossing Study.

HRBT Expansion: This project will expand the Hampton Roads Bridge-Tunnel and I-64 in Hampton and Norfolk to increase capacity and ease congestion.

Route 29 Solutions: Eight projects to improve travel on the busiest north-south corridor in the Charlottesville / Albemarle County region.

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.

Website: https://www.virginiadot.org/projects/pr-studieslongrange.asp

These long-range plans generally project the transportation system needs and requirements 20 to 25 years into the future and help shape local, regional, and state strategies for addressing economic growth, safety, congestion, air quality, and public mobility. These plans are continuously updated every three to five years, in order to provide a comprehensive and accurate strategy for addressing the ever-changing needs of Virginia's citizens and businesses.

State Highway Plan: A 20-year vision plan that identifies recommended improvements to the interstate and primary highway systems.

Statewide Multimodal Plan: An excellent opportunity for all Virginians to participate in the development of the commonwealth's future multimodal transportation system.

Transportation Modeling in Virginia: Provides VDOT with tools for forecasting and analyzing future passenger and freight movements on Virginia's statewide multimodal transportation system.

Northern Virginia Land Development Services: Everything you wanted to know about land development and VDOT's role in working with developers and local governments in the planning process for Northern Virginia.

Connected Vehicle Pooled Fund Study – Member Activity Update

May 2025

Organization: Wisconsin DOT

Submitted by: David Karnes

Website: www.wisconsindot.gov

Organization Background

Mission Statement – Briefly describe your organization's mission, purpose, and goals.

Mission

Provide leadership in the development and operation of a safe and efficient transportation system.

Vision

Dedicated people creating transportation solutions through innovation and exceptional service.

Values - the WisDOT Idea

- **Integrity** - Building trust and confidence in all our relationships through honesty, commitment and the courage to do what is right.
- **Diversity** - Creating an environment, inclusive of all people and opinions, which cultivates opportunities to bring varied perspectives to the work being done and decisions being made.
- **Excellence** - Providing quality products and services that exceed our customers' expectations by being professional and the best in all we do.
- **Accountability** - Being individually and collectively responsible for the impact of our actions on resources, the people we serve, and each other.

Todd Szymkowski has started with WisDOT Bureau of Traffic Operations as the Statewide Traffic Systems Engineer, and will be taking on CV projects and planning efforts for our Bureau.

Projects & Research - Current

Please provide information on current projects and research. Limit 1 page.

General WisDOT CAV site: https://wisconsindot.gov/pages/projects/multimodal/cav.aspx

UW TOPS Lab site: https://topslab.wisc.edu/

[Complete] CV Pilot Project, Phase 1, focused on integrating and operating CV devices in a controlled laboratory-like setting. Funded by SPR – Part B (Research) $150,000.

[Complete] CV Pilot Project, Phase 2, provided opportunity for increased knowledge and understanding of CV device integration with existing WisDOT field infrastructure. Funded by SPR – Part B (Research) with $200,000. Phase 2 installed and integrated 8 RSUs along STH 100 (Ryan Rd) near IH 94 in Milwaukee County, focusing on an arterial deployment scenario.

[Current] CV Pilot Project, Phase 3, installed and integrated 6 RSUs along the Madison Beltline near the Park Street and Fish Hatchery Road interchanges, focusing on a freeway deployment scenario. It establishes and maintains partnerships with City of Madison and UW-TOPS Lab.

CV Pilot Project – Phase III – Madison WI

- Freeway deployment, extending the Park Street Connected Corridor to the Beltline.
- Bringing data back to UW-TOPS Lab for processing via software on UW-TOPS servers.
- Installed and integrated 6 dual-mode RSUs.
- Actively working on BSM and TIM transmission with both C-V2X and DSRC, along with establishing the "data pipeline".
-

WisDOT WZDx

- WZDX feed published in Feb 2023 with planned work zone event information via the Lane Closure System (LCS) API
- FY23 concept of operations project, ends in October 2023
- Determine how to associate a connected device with a planned event from LCS
- Planned FY24 project for the development of the FY 23 project.
    - Integrating portion of connected devices with the ATMS and 511 layer.

WisDOT CAV Update

- The WisDOT CAV Strategic Work Plan was developed by DBSI, WisDOT's Division of Budget and Strategic Initiatives. It was originally released in 2021 with an update expected in 2023. Defines department-wide goals and objectives.
- Updating the WisDOT Bureau of Traffic Operations (BTO) Roadmap to include relevant info from all operations program areas and to complement the WisDOT CAV Strategic Work Plan. We anticipate this revision will be complete in 2024.

Future Projects & Goals

Please provide information on future projects and goals. Limit 1 page.

With the Phase 3 pilot connected vehicle (CV) infrastructure was installed on and integrated with existing WisDOT field infrastructure near the Madison Beltline interchanges with Park Street (USH 151) and Fish Hatchery Road.

Phase 4 will:

Continue integrating and developing the WisDOT CV system along the Madison Beltline. Tasks may include, but are not limited to:

- Deploying and testing a CV application
- Integrating with WisDOT TMC systems (e.g., ATMS, WI 511)
- CV data collection, management, sharing, etc.
- Integrating CV messages (e.g., SPaT, MAP, BSM) into the WisTransPortal database
- Integrating WisDOT CV data with the City of Madison - Park Street Corridor data
- Processing data using FHWA's V2X Hub