



Research Support

November 2025

Project Title:

Connected and Automated Vehicle (CAV) Infrastructure

Task Number: 3904

Start Date: December 15, 2022

Completion Date: October 31, 2025

Task Manager:

Nathan Loebs
Transportation Engineer (Electrical)
Nathan.Loebs@dot.ca.gov



DRISI provides solutions and knowledge that improves California's transportation system.

Maintenance, Operation and Enhancement of Cellular Vehicle-to-Everything (C-V2X) Communication Infrastructure Phase III

California Connected Vehicle Testbed Maintenance – Phase 3

WHAT IS THE NEED?

U.S. Department of Transportation (U.S. DOT), in the past, has provided financial and technical support to the California Department of Transportation (Caltrans) for developing the, now defunct, Dedicated Short Range Communication (DSRC) communication infrastructure on its Testbed site along El Camino Real (ECR) in Palo Alto. The Testbed is fully operational but needs to be maintained and supported so that it will be useful for other Caltrans projects, as well as for projects to be conducted by a variety of other public and private sector organizations in the region.

DSRC at 5.9 GHz (75 MHz Bandwidth) has been rendered obsolete by Federal Communication Commission (FCC) and a new standard has been introduced called Cellular Vehicle-to-Everything (C-V2X). This new standard has introduced new challenges for the Testbed as the existing hardware now needs to be replaced and the new hardware needs to be purchased to replace the existing obsolete hardware. The new hardware also needs to be integrated to the existing traffic controllers which is quite challenging. The Testbed provides a unique capability to deliver time-critical, safety-critical messages between the roadside infrastructure and vehicles with high reliability and low latency. This new 30 MHz band has been allocated by Federal Communication Commission (FCC) for Intelligent Transportation System (ITS) use. Caltrans, in conjunction with private and academia, is in the process of developing applications based on connected vehicle technology.

This task is a part of the Connected and Automated Vehicle (CAV) Infrastructure Development project. The primary goal of this project is to develop the hardware and applications

and to keep the Testbed fully functional so that various applications can be developed in the CAV area. These applications include, but are not limited to, Curve Over Speed Warning System, Traffic Probe Data Processing, Intersection Safety and Mobility Applications, etc.

WHAT ARE WE DOING?

This task will take care of the following activities.

1. Upgrade the Testbed to the new C-V2X standard
2. Regular maintenance of the Testbed including special setup requests from various users
3. Support to new users
4. Provide liaison to national network of Testbeds
5. Increase the awareness among the possible users of the Testbed
6. Regular upgrades and enhancement of Testbed capabilities
7. Providing demonstrations to the other states and agencies.

WHAT IS OUR GOAL?

The end goal of this task is to have a fully functional Testbed with complete support to its users.

WHAT IS THE BENEFIT?

This Testbed will provide a platform for software developers who will be developing transportation applications that will help drivers in reducing travel times, saving fuel, and drive with augmented safety. Caltrans will be the primary beneficiary as the developed applications will help Caltrans to manage the traffic flows better while reducing the carbon footprint.

WHAT IS THE PROGRESS TO DATE?

January 1, 2025 – March 31, 2025

All work for this project is now being conducted under Task 4510 - Maintenance, Operation, and Enhancement of Cellular Vehicle-to-Everything (C-V2X) Communication Infrastructure Phase IV. Researchers are currently working on the Draft Final Report and Presentation.