

Photo Source: USDOT

THE CONNECTED VEHICLE TEST BED: AVAILABLE FOR DEVICE AND APPLICATION DEVELOPMENT

The Connected Vehicle Test Bed is currently available for anyone to use in testing their safety, mobility, and environmental applications, services, and components in an environment using the latest technology standards and architecture consistent with the Department of Transportation's (USDOT) Research Program. The Connected Vehicle Test Bed is supported by the Intelligent Transportation Systems Joint Program Office within the Research and Innovative Technology Administration.

The test bed provides users with the capability to test applications that have the potential to save lives and provide continuous real-time connectivity.

- **Safety applications** have the potential to reduce crashes through advisories and warnings. For instance, vehicle operators may be advised of a school zone, sharp ramp curve, or slippery patch of roadway ahead.
- **Mobility applications** will provide a connected, data-rich travel environment based on information transmitted anonymously from thousands of vehicles that are using the transportation system at a particular time, which can help transportation managers monitor and manage transportation system performance.
- **Environment applications** will provide travelers with real-time information about traffic congestion and other travel conditions to help them make more informed decisions that may result in taking alternate routes or public transit. This can help make their trip more fuel-efficient and eco-friendly.



Photo Source: USDOT

The test bed with roadside equipment (RSE) in Oakland County, Michigan, is centered in the cities of Novi, Farmington, and Farmington Hills, with expansion into Southfield. The RSE installation consists of Interstate and divided highway as well as arterial miles.



Now Available

- Additional roadside equipment with signal phase and timing (SPaT) and geometric intersection description (GID)
- Live and operational Florida expansion test bed in Orlando
- Test bed expansion beyond Michigan into California and New York

The Next Generation of Test Beds Will Emphasize:

- A common design architecture
- Interoperable components and shared back-office services
- Working security processes
- Implementation of a revised system architecture

Using the Test Bed:

- The USDOT will provide limited assistance.
- Equipment may be loaned at the USDOT's discretion.
- Data will be provided at no charge.
- If drivers are required to conduct tests, users must pay their costs.



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**Research and
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Administration**

Current Test Bed Capabilities

The Connected Vehicle Test Bed provides the vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication system that others can use to test and demonstrate traveler services through applications that interface within this framework. For example, the Connected Vehicle Test Bed includes a number of features that support in-vehicle signage (the display of messages to drivers), including:

- Onboard equipment (OBE) that stores messages for display when a vehicle enters a geographic area and tracks the vehicle's position to display messages at appropriate locations.
- RSEs that broadcast vehicle messaging data to vehicles and OBE that receives the data and adds new messages to the list of messages for display.
- Back-office servers that receive requests to post in-vehicle messages from other applications and transmit those messages to the appropriate RSE.



V2V and V2I applications could use these in-vehicle signage features to provide traveler services in numerous

ways. For example, a traveler information application could use these features to provide congestion information to drivers. If an incident occurs, this type of application could transmit information about that incident to the Connected Vehicle Test Bed back-office servers, which would then push that information to appropriate RSEs and, from there, to OBE-equipped vehicles. The OBEs could then display information about the incident in any vehicles in its vicinity.



For more information about this initiative, please contact:

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Other support features provided by the Connected Vehicle Test Bed include:

- **Probe Data Services:** The OBE can determine vehicle position and record information from vehicle sensors, then transmit this information anonymously through RSE and back-office servers to agencies that subscribe to receive that information.
- **Signal Phase and Timing (SPaT) Services:** The RSE can be integrated with a traffic signal controller and transmit SPaT data to OBE-equipped vehicles.
- **V2I Communication Services:** The OBE can connect through an RSE to the Internet to receive or transmit data to other systems while connected.
- **V2V Communication Services:** The OBE can broadcast basic safety messages to other vehicles and receive those broadcasts from other vehicles. However, the Connected Vehicle Test Bed does not support V2V safety application testing.
- **Tolling Transaction Services:** Additional tolling transaction hardware can be connected to an RSE, and the RSE provides a communication link between this additional hardware and an OBE-equipped vehicle.
- **OBE Application Hosting:** Additional applications can be installed on the OBE and integrated with the DSRC communications. These applications can access the network to reach internal and external components for added functionality.
- **RSE Application Hosting:** Additional applications can be installed on the RSE and integrated with the DSRC communications. These applications can access the network to reach internal and external components for added functionality.

For more information, please visit:
www.its.dot.gov/testbed.htm

Test Bed Partners:

- U.S. Department of Transportation
- California Department of Transportation
- Florida Department of Transportation
- Michigan Department of Transportation
- New York State Department of Transportation
- Road Commission for Oakland County
- Vehicle Infrastructure Integration Consortium