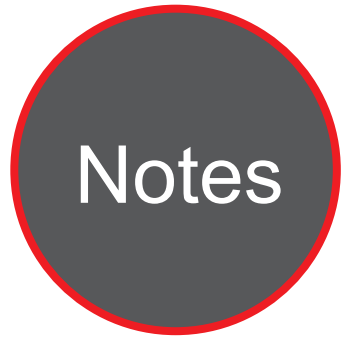




Caltrans Division of Research,  
Innovation and System Information

# Research



# Notes



Advanced  
Research

MAY 2020

Project Title:  
Vehicle Infrastructure Integration  
(VII)

Task Number: 2061

Start Date: March 31, 2009

Completion Date: June 30, 2020

Task Manager:  
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## Support for Research and Deployment of System Ops Applications of VII; TPF-5(206)

Research program to support the research, development, and deployment of system operations applications of vehicle infrastructure integration.

### WHAT IS THE NEED?

Cooperative Transportation Systems holds the potential to support a fundamental advance in surface transportation. While the vehicle component and infrastructure component of the transportation system have traditionally been only loosely coupled, connected vehicle technology will allow the components to “work” actively together – creating Cooperative Transportation Systems. This provides the potential for reduction in congestion, safety improvements, and improved traveler services. To realize this potential, Cooperative Transportation Systems will require unprecedented collaboration between the private and public sectors, on a scale not required in the current loosely coupled system.

As owners and operators of the nation's surface transportation infrastructure, state and local transportation agencies are at the core of Cooperative Transportation Systems. While automakers and device manufacturers will dictate availability of vehicular equipment, transportation agencies will control the deployment and operation of roadside infrastructure and the incorporation of connected vehicle technologies into infrastructure applications (such as traffic signal control).

To guide transportation agency involvement in Cooperative Transportation Systems deployment, American Association of State Highway and Transportation Officials (AASHTO) developed a strategic plan. It identified a need to develop a deployment plan and business plan that will aid the owners and operators in the nationwide deployment of the connected vehicle infrastructure. It also identified the need for infrastructure providers to conduct research to develop applications that will make full use of Cooperative Transportation capabilities.



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

With this background, the pooled fund study entitled "Program to Support the Development and Deployment of Cooperative Transportation Systems Applications" was created by a group of state and local transportation agencies and the Federal Highway Administration to provide a means to conduct the work necessary for infrastructure providers to play a leading role in advancing the Cooperative Transportation Systems.

## WHAT ARE WE DOING?

In this project the focus is on:

1. Develop and evaluate Connected Transportation Systems large-scale system level operations applications
2. Independently research and address issues that will affect the deployment of Connected Vehicle systems by state and local transportation agencies
3. Support AASHTO's Strategic and Deployment Plans
4. Support the United States Department of Transportation's Connected Vehicles Programs and initiatives

## WHAT IS OUR GOAL?

As owners and operators of the nation's surface transportation infrastructure, state and local transportation agencies are at the core of Cooperative Transportation Systems. While automakers and device manufacturers will dictate availability of vehicular equipment, transportation agencies will control the deployment and operation of roadside infrastructure and the incorporation of connected vehicle technologies into infrastructure applications (such as traffic signal control).

To guide transportation agency involvement in Cooperative Transportation Systems deployment, AASHTO developed a strategic plan. It identified a

need to develop a deployment plan and business plan that will aid the owners and operators in the nationwide deployment of the connected vehicle infrastructure. It also identified the need for infrastructure providers to conduct research to develop applications that will make full use of Cooperative Transportation capabilities.

## WHAT IS THE BENEFIT?

This project will add to the potential for reduction in congestion, safety improvements, and improved traveler services.

## WHAT IS THE PROGRESS TO DATE?

This project is multi-dimensional and a multi-phase program to facilitate the field demonstration, and deployment of Connected Transportation Systems infrastructure applications.

Currently, three projects are being sponsored by the pooled fund study:

1. Vehicle-to-Infrastructure Queue Advisory/Warning
2. Using Third Parties to Deliver Infrastructure-to-Vehicle
3. Multi-Modal Intelligent Traffic Signal System – Phase III: Deployment Readiness Enhancements

The proposed 2020 projects include:

1. MAP Guidance
2. Connected Signalized Intersection Verification

A total of 13 projects were completed with the support from the pooled fund study. (Note that, IntelliDrive, the previous name of Connected Vehicle, appears in the early stage projects.)

1. Connected Traffic Control System: Research Planning and Concept
2. Basic Infrastructure Message Development and Standards Support
3. Multi-Modal Intelligent Traffic Signal System

- Phase I: Development of Concept of Operations, System Requirements, System Design and a Test Plan
- 4. Multi-Modal Intelligent Traffic Signal System – Phase II: System Development, Deployment and Field Test (Final Report)
- 5. 5.9 GHz Dedicated Short Range Communication Vehicle-Based Road and Weather Condition Application: Phase I (Final Report)
- 6. 5.9 GHz Dedicated Short Range Communication Vehicle-Based Road and Weather Condition Application: Phase II (Final Report)
- 7. Best Practices for Surveying/Mapping Roadways and Intersections for Connected Vehicle Applications (Final Report)
- 8. Traffic Management Centers in a Connected Vehicle Environment
- 9. Aftermarket On-Board Equipment for Cooperative Transportation Systems: Enabling Accelerated Installation of Aftermarket On-Board Equipment for Cooperative Transportation Systems (Final Report)
- 10. Certification Program for Cooperative Transportation Systems: Preparing to Develop a Standards Compliance and Interoperability Certification Program for Cooperative Transportation Systems Hardware and Software (Final Report)
- 11. IntelliDrive Traffic Signal Control Algorithms (Final Report)
- 12. Investigation of Pavement Maintenance Support Applications of IntelliDrive (Final Report)
- 13. Investigating the Potential Benefits of Broadcasted Signal Phase and Timing (SPAT) Data under IntelliDrive (Final Report)

**Website Links**

Information on the 13 projects  
[http://www.cts.virginia.edu/cvpfs\\_research/](http://www.cts.virginia.edu/cvpfs_research/)

Reports for the 13 projects  
<https://www.pooledfund.org/Details/Study/431>

Connected Vehicle Pooled Fund Study Website  
<http://www.cts.virginia.edu/cvpfs/>

**IMAGE**

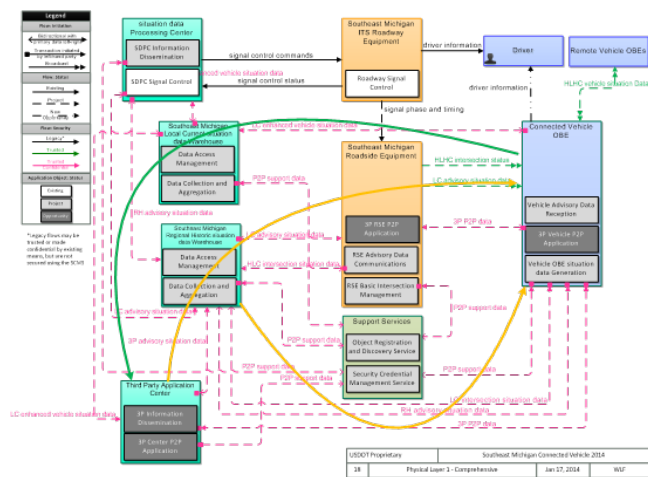


Image 1: Various data flows in the vehicle infrastructure communication environment

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