DRISI
CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION
TRANSFORMING IDEAS INTO SOLUTIONS

Research Notes

Future Mobility Research Center (FMRC) Contract

To identify and execute a diversified portfolio of multidisciplinary transportation research projects with collaboration among California Partners for Advanced Transportation Technology (PATH) staff, UC Berkeley faculty, and post graduate research students.

Advanced Research

MAY 2026

Project Title:
Future Mobility Research Center

Task Number: 4260

Start Date: January 12, 2024

Completion Date: December 31, 2026

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WHAT IS THE NEED?

The California Department of Transportation (Caltrans) needs an academic partner to assist in the task of understanding, considering, and utilizing Intelligent Transportation System (ITS) technologies that may be exceptionally beneficial to California's travelers. California PATH Research Center is a critical component in the statewide ITS Research Program focusing on improving mobility and safety with advanced ideas, technologies, and a deployment emphasis. It provides Caltrans the tools needed to meet its Safety and System Performance goals by conducting leading-edge research, evaluating and conducting controlled experiments and field operational tests, and developing public/private/academic partnerships, using the expertise of a knowledgeable and experienced staff in ITS research.

WHAT ARE WE DOING?

In partnership with Caltrans staff, the PATH research team will assist the Department in the following research focus areas:

Transportation Safety Research Program: focuses on investigations of driving behavior, efficient means to investigate crashes and identify solutions, collision avoidance systems, safety and mobility applications for connected vehicle (CV) and automated vehicle (AV) systems, safety performance of highway networks and managed lanes and provide for increased safety and mobility by focusing on the communications technologies, which is the basic premise and promise of connected vehicles.

Traffic Operations Research Program: focuses on advancing the state-of-the-art in traffic management and traveler

Caltrans

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

information systems and producing results that can be implemented in the field. Ongoing research projects fall in the following major categories: CV/AV test-bed development and deployment, integration of traffic signals and ramp meters, integrated corridor management (ICM), variable speed limits and coordinated ramp metering for freeway traffic control, traffic surveillance, methodologies for data processing, analysis and performance measurement, development and application of modeling tools, and formulation and testing of advanced operational strategies for intersections, arterials, freeways and corridors.

Mobility and Multi-Modal Applications Program: encompasses a wide variety of activities including the integration of vehicular and infrastructure technologies that improve safety and mobility including passenger, transit, and heavy vehicles. PATH research team will work closely with transit and traffic operation agencies to address real world problems in Bus Rapid Transit (BRT), adaptive transit signal priority, seamless connection among different transport modes, transit safety, connected transportation, and automated vehicle activities.

CV/AV Applications Development Program: focuses on a variety of applications development activities, including truck platooning, cooperative adaptive cruise control, Eco-Driving, connected automation, adaptive traffic signals based on CV/AV data, signal preemption, intelligent signals and pedestrian assistance are few to mention.

WHAT IS OUR GOAL?

To develop solutions to the problems of California's surface transportation systems through cutting edge research by harnessing the knowledge of transportation researchers, working in conjunction with experts in the fields of information technology, electrical engineering, civil engineering, mechanical engineering, economics, transportation policy, and behavioral studies.

WHAT IS THE BENEFIT?

PATH Research Center is beneficial for the success and growth of the Department's multi-disciplinary, multi-campus research program involved in ITS research by providing research management services. Working closely with Caltrans staff, PATH will identify potential synergistic ventures between state and national level research programs, solicit and secure external funding from a variety of sources to leverage the core research support funded by Caltrans, provide outreach, and serve as a liaison between Caltrans and other federal and state agencies nationwide.

WHAT IS THE PROGRESS TO DATE?

Deliverable 1.2b: Generating a Work Zone Data Feed

Collaborated with TRC (Transportation Research Center Inc) and others (Valtech, PSS Innovations), brought in prototype work zone hub, smart barrels devices, and tested them in Richmond Field Station. Showcased how the smart devices were able to generate accurate geometry information of the work zone defined by the Global Positioning System (GPS) coordinates of those smart barrels, and visualize the work zone area on Google Earth. Finally used the PATH server to disseminate the work zone data in both Work Zone Data Exchange (WZDx) format and Traveler Information Message (TIM) format.

Deliverable 2.2a: Evaluation of Relationship between Vehicle Miles Traveled (VMT), Energy, and Emissions

Developed a Python script allowing the AimsunNext model to:

- Export VMT and Vehicle Hours Traveled (VHT) statistics for each section in a simulated network
- Compile VMT distributions by speed bins for each vehicle type across a simulated network

Developed Excel spreadsheets calculating vehicle emissions using Emission Factor (EMFAC) rates and VMT distribution statistics.

Deliverable 2.2b: Policy Recommendations on Metrics to Prioritize Climate Action Projects

Performed a general assessment of the readiness of the AimsunNext D12 model that was delivered to Caltrans by Jacobs. Developed simulation scenarios for the D12 model, enabling users to run mesoscopic simulations for the Overnight, AM Peak, Midday, PM Peak, and Evening control periods. Developed various Python scripts to help manage changes to origin-destination matrices. Fully redeveloped the modeling of the I-405 freeway to reflect the recent freeway reconstruction and conversion of the previous one-lane High Occupancy Vehicle (HOV) facility into a two-lane High Occupancy Toll Lane (HOT) facility. Updated the reference Performance Measurement System (PeMS) traffic data for multiple mainline and HOV sensors to include observed speeds. Fixed the location of many traffic detectors to match their actual locations. Split many PeMS stations into separate HOV and mainline sensors, to reflect how traffic data is actually captured and allow a better representation of HOV traffic (the initial model only considered total flow at each station, not distinguishing mainline and HOV). Added reference to PeMS traffic counts to on-ramps, off-ramps, and freeway-freeway connectors.

Assessed the adequacy of modeled truck volumes (deemed somewhat inadequate, as the model assumes that trucks represent a relatively fixed percentage of traffic, while their proportion actually varies across the day). Checked the operation of the San Diego Ramp Metering System (SDRMS) ramp meters.

Fixed the operation of several traffic signals to ensure correct operations at all signalized intersections. Added the ability to perform microscopic simulations in addition to the mesoscopic simulations. Updated the model calibration to ensure the correct replication of observed bottlenecks during the Overnight and AM Peak periods. Significantly increased the proportion of HOV vehicles within the network.

Deliverable 3.3c: Digital Infrastructure Data Exchange Exploration

Conducted the conceptual design of a digital infrastructure for work-zone data sensing, exchange and utilization. The architecture and approaches have been documented in Smart Work Zone Digital Twin.