



Fiscal Year (FY) 2024-25 Research Initial Scope of Work (ISOW)

Task ID: 4447

Task Title: Using 3rd Party Probe Data for High Occupancy Vehicle (HOV)

1. What is the need? Briefly describe the problem this research will address and the reason(s) for conducting this research. Include any pertinent background information. If this request is part of a multi-task project, explain how this request relates to the project as a whole.

Additional HOV lane speed data sources are needed to supplement existing data for areas without data monitoring equipment (including areas with malfunctioning equipment) and verify data received from existing functioning infrastructure. HOV lanes include High Occupancy Toll (HOT) lanes and Express Toll Lanes. Under 23 USC 166 California is required to provide "continuous monitoring" of HOV lanes and determine their performance in terms of degradation and report in the annual California HOV Facilities Degradation Report. Caltrans has agreed to meet this requirement by collecting HOV lane traffic data from in-pavement traffic monitoring stations used to determine the performance of an approximate 1-mile segment of the facility. To provide continuous monitoring, 100% of managed lane mile needs to be monitored, however, there are traffic data detection "gaps" on HOV facilities due to issues with malfunctioning traffic monitoring stations. Malfunctioning monitoring stations have either failed, thus collecting the wrong data, or have communication issues preventing the data from being accurately transmitted to the local traffic management center. Fixing the malfunctioning detector equipment is often expensive and exposes workers to traffic on or near the roadway. Therefore, the detectors are usually only fixed or upgraded as part of other scheduled projects which prevents data detection gaps from being resolved. Addressing the detection gap problem would increase the number and percentage of managed lane miles monitored to meet the requirements under 23 USC 166 and allow Caltrans to have the data it needs to ensure lanes are meeting their intended goals of providing users a reliable trip. The measured number of Managed Lane Miles Degraded has decreased since 2019. However, this is not necessarily a result of improved HOV lane performance because the number and percentage of Managed Lane Miles Monitored has also gone down. This is primarily due to malfunctioning traffic monitoring stations not correctly reporting traffic count data. In addition to not meeting the continuous monitoring requirements under 23 USC 16, this has also had the effect of reducing the number of HOV lane miles that Caltrans can measure degradation. For example, between 2019 and 2022, the Percentage of Managed Lane Miles Monitored dropped from 73.4% to 59.7%. Third-party probe data

derived from various sources including vehicle manufacturers and cell phone companies have proven to be useful in providing sample speed data however there are limitations to its usefulness for determining HOV lane specific lane speeds.

2. What will the research do? Briefly describe the research that will address the need. What is the estimated timeline (years/months) to complete the research.

Develop a means of utilizing third-party probe data to identify the speed of vehicles within HOV lanes with a high level of confidence. Differentiate the data from adjacent lanes, account for limitations of GPS accuracy and differentiate between data from each lane on dual HOV lane facilities. Verify the data provided from the tool compared to HOV lane traffic data from functioning in-pavement traffic monitoring stations. (12-18 months)

3. What is the product? Briefly describe the anticipated product of this research and how it will solve the problem.

The product of this research will be a tool that can be used as the foundation for the California HOV Facilities Degradation Report. The data provided from this tool will also provide supplemental data for areas without data monitoring equipment and verify data received from existing infrastructure. The tool will be expected to:

- identify vehicle speeds for all HOV facilities in California using third-party probe data;
- provide the numerical level of confidence for each output;
- have the ability to produce a report for individual routes selected, all routes by district or statewide;
- allow users to select district, county, route, postmile, direction, date range, and timeframe;
- allow users to select a threshold speed that will be used to automatically identify HOV lane segments where vehicle speeds are below the selected threshold;
- produce reports and geographical speed maps showing the speed on HOV facilities.

4. What is the plan to implement the product following a successful research project? Briefly describe the steps the customer's division or program will take to achieve implementation.

The research will be funded by the Division of Traffic Operations and the Office of Mobility and System Performance will act as division lead during development. The product will be implemented soon after the successful development to support the Division of Traffic Operations and districts to better identify, prioritize, invest in, and evaluate HOV Lane improvements projects throughout the State. Within the first year after development (Spring 2026), the tool will be used by the Mobility Programs Branch within the Office of Mobility and System Performance to provide speed data in the annual California HOV Facilities Degradation Report for the growing number HOV lane segments with missing data due to malfunctioning traffic monitoring stations. The Mobility Programs Branch will also evaluate the possibility of replacing the current method of utilizing in-pavement sensors to monitor HOV Lane performance. Also, within the first year after successful development (Summer 2025), the tool will be provided to the Managed Lanes functional managers for each district. Districts would be able to

regularly produce HOV lane performance reports and geographic speed maps to better monitor their HOV lanes and evaluate the effects of operational strategies on HOV lanes easily and quickly.

5. What is the benefit(s)? Briefly describe the benefit of the research to California (And other entities if applicable).

This research will help California achieve the 100% Managed Lane Miles Monitored goal to meet its requirement to provide continuous monitoring and evaluate the performance of HOV lanes as required by 23 USC 166. These efforts are also expected to allow Caltrans to better identify and address the causes of degradation. The FHWA has also advised Caltrans that California is in violation of the "continuous monitoring" statute under 23 USC 166 and has tasked the State with establishing, maintaining, and supporting a performance monitoring, evaluation, and reporting program that provides for continuous monitoring, assessment, and reporting. This research would help California meet this requirement by filling the existing data "gaps" with third-party probe data. Failure to comply with the federal statutes could subject Caltrans to sanctions under section 1.36 of title 23, Code of Federal Regulations (CFR), which includes withholding federal funding and project approvals. Additionally, the product of this research would also benefit the districts directly by allowing them to regularly produce HOV lane performance reports and geographic maps to better monitor their HOV lanes and evaluate the effects of operational strategies on their facilities.

6. Strategic Management Plan Goals

Enhance and Connect the Multimodal Transportation Network

7. Does the research align with one secondary goal?

Lead Climate Action

Please briefly describe how the research aligns with the secondary goal selected above.

By improving HOV lane performance and promoting higher vehicles occupancies, HOV lanes can reduce single occupancy vehicle use, thereby reducing vehicle miles traveled, reducing greenhouse gas emissions, and improving overall air quality which will significantly improve environmental quality, sustainability, and livability for people in all communities.

8. Project Manager:

Note: Project manager's name will be redacted prior to posting ISOW

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9. Customer Representative/Division:

Note: Customer representative name and division will be redacted prior to posting ISOW

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