



Caltrans Division of Research,
Innovation and System Information

Research



Notes



Transportation
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Project Title:
Statewide Managed Lanes (HOT/
HOV) System Analysis Tools

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Alternative High Occupancy Vehicle (HOV) Lane Operational Strategies for Congestion Mitigation in California

Evaluate HOV lane operational strategies to mitigate congestion and meet the Federal requirement of maintaining the average operating speed above 45 miles per hour (mph).

WHAT IS THE NEED?

With the increase in travel demand and the introduction of more clean air vehicles, some High Occupancy Vehicle (HOV) facilities have become congested and fail to meet the Federal degradation requirement of maintaining the average operating speed above 45 miles per hour (mph). Therefore, there is a need to research and evaluate alternative operational strategies that can be used to mitigate both recurrent and non-recurrent congestion to ensure that they will provide satisfactory performance and will meet the Federal minimum average operating speed requirement. Several strategies will be researched, such as increasing the minimum occupancy requirement in HOV lanes (e.g., from HOV2+ to HOV3+), dual HOV lanes, conversion of HOV lanes to High Occupancy Toll (HOT) lanes, and reassessment of HOV lane usage by clean air vehicles.

WHAT ARE WE DOING?

The research team at the University of California at Riverside (UCR) will initially perform thorough literature review of alternative HOV lane operational strategies across the U.S. and will summarize the findings in a task report. Researchers, in consultation with the Caltrans Project Panel, will identify HOV facilities in California for use as case studies in this research.

The research team will collect data about the selected HOV facilities from a variety of sources (such as satellite images, Google Street View, Caltrans' Performance Measurement System (PeMS), etc.). Researchers will use the Highway Safety Information System (HSIS) and records from the California Highway Patrol (CHP) to retrieve incident data such as type, location, and



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duration. Using the collected data, researchers will analyze HOV lane performance with a focus on average operating speed. Researchers will diagnose the reason(s) for those lanes with degraded speeds and attribute the degraded performance to recurrent and non-recurrent congestion.

Researchers will employ travel demand models to assess the effectiveness of three alternative HOV lane operational strategies: 1) increasing the minimum occupancy requirement to HOV3+, 2) quantify the effectiveness of deploying dual HOV lanes, 3) estimate the short-term and long-term impacts of reducing or eliminating the HOV lane usage by clean air vehicles, 4) determine criteria that could be used to assist deciding on conversion from HOV lanes to HOT lanes, and 5) develop a model to approximate the statewide impact of non-recurrent congestion on HOV lane degradation in California. All the alternative HOV operational strategies will be evaluated under both recurrent and non-recurrent congestion conditions. The modeling results will be compared with those of the existing operational strategy to determine the best alternative.

For a more comprehensive assessment of the alternative HOV lane operational strategies, researchers will also model the performance of the alternative HOV lane operational strategies using traffic simulation tools. First, they will create simulation networks of the case study HOV facilities and calibrate them against real-world traffic data. Then, they will implement the alternative HOV lane operational strategies in the simulation networks. After that, they will simulate the networks under both recurrent and non-recurrent congestion conditions. The simulation of non-recurrent congestion will be performed for a selected number of scenarios that are the most prevalent.

WHAT IS OUR GOAL?

Our goal is to evaluate the operational strategies on HOV lanes that can be used to meet the

Federal degradation requirement of maintaining the average operating speed above 45 miles per hour (mph).

WHAT IS THE BENEFIT?

Implementing managed lanes, including HOV lane, represents one approach being used in metropolitan areas throughout California to respond to growing traffic congestion, declining mobility, as well as air quality and environmental concerns. The results from this research could enable Caltrans to improve the performance of HOV facilities in the state through innovative design of the facilities.

Anticipated benefits of this research include the ability for Caltrans to set appropriate HOV operation policies that could improve the freeway system's overall performance based on scientific research findings and could help Caltrans meet the Federal degradation requirement of maintaining the average operating speed above 45 miles per hour (mph).

WHAT IS THE PROGRESS TO DATE?

Researchers prepared and submitted the draft Task 2 report for the Data Collection and HOV Lane Performance Analysis and Modeling.

Researchers coordinated with Caltrans District 12 to scope out the modeling of High Occupancy Vehicle 3+ (HOV3+) strategies in the district.

Researchers completed the calibration of the Southern California Association of Governments (SCAG) model for the selected HOV corridors and completed the adjustment of the HOV lane selection model.

The next steps are for researchers to model the implementation of HOV3+ and evaluate its impact and to model the implementation of adding a second HOV lane and evaluate its impact.