

## Traffic Operations

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**Project Title:** Safety Service Patrol (SSP) Pooled Fund Study (PFS)

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## Impacts of Changes in HOV/HOT Eligibility Policy on Operations and VMT

Statewide Management Lanes (HOV/HOT) System Analysis Tools

### WHAT IS THE NEED?

To address degraded conditions on high-occupancy vehicle (HOV) lanes on urban freeways, the California Department of Transportation (Caltrans) is currently considering changes in policies governing who is authorized to use high-occupancy lanes to reduce their level of utilization to an acceptable level. This includes potentially increasing the minimum occupancy of allowed vehicles on HOV lanes or modulating the tolls for using high-occupancy toll (HOT) lanes based on vehicle occupancy. An example is the 2019 proposal to implement an HOV 5+ requirement for toll-free travel along the I-10 Express Lanes in the Los Angeles area instead of the current HOV 3+ requirement during peak hours and HOV 2+ at other times.

A key difficulty in evaluating the suitability of proposed eligibility changes to high-occupancy lanes is that relatively little information is available about the potential impacts of such changes on traffic operations and travel demand. This is problematic in the context of SB 743, which requires improvement projects to try to contain induced traffic demand and increases in vehicle miles traveled (VMT). Without much hard evidence, it is difficult to reliably predict what the likely impacts the proposed changes might have. In turn, this makes it difficult to assess the desirability of proposed changes in relation to other projects and to truly select optimal solutions.

### WHAT ARE WE DOING?

Within the above context, this project proposes to use an existing, already calibrated, simulation model of a 15-mile section of the I-210 corridor in northern Los Angeles County to evaluate in a controlled environment how changes in policies governing the authorized use of high-occupancy lanes might



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and in the number of high-occupancy lanes might affect VMT and other metrics of interest under alternate traffic demands. This is a “what-if” study aiming to provide decision-makers with information on what might be the best strategies to pursue from an operational standpoint.

The I-210 corridor currently has a single-lane, limited access HOV 2+ lane that is typical of many high-occupancy facilities on urban freeways. Using this configuration as a base of comparison, the study first considers what might happen if the following types of changes are implemented while assuming that the travel demand remains constant:

- Changes in eligibility on the existing single-lane facility, such as switching from an HOV 2+ to an HOV 3+ facility.
- Conversion of the existing HOV 2+ lane into an HOT lane.
- Adding a new HOV or HOT lane to the freeway, to provide a two-lane, limited-access high-occupancy facility.
- Creation of a two-lane, limited-access high-occupancy facility along the corridor by converting a general-purpose lane into an HOV or HOT lane, i.e., by taking away an existing general-purpose lane.

The second part of the project then looks at what might happen if changes in traffic demand occur. This is the core part of the project. Within each of the above categories of scenarios, simulations are to be conducted with alternate traffic demand characteristics to assess the efficiency of the various proposed changes in eligibility, toll, or geometry in containing VMT increases, or even reducing VMT, while providing efficient corridor operations. Specific demand changes that are to be evaluated in this “what-if” analysis, among potential others, include:

- Increase in the proportions of vehicles with 2, 3 or more passengers
- Increase in motorist acceptance of displayed tolls

- Increase in overall traffic demand along the freeway

At the end of the evaluations, results from the simulations and available impact data from documented similar projects that have been implemented in California or elsewhere will be used to assess whether general impact trends could be associated with the eligibility, tolling, and geometry changes considered. A key focus will be to assess the potential to reduce, or at least contain, VMT while simultaneously providing operational performance improvements. Evaluations of potential traffic shifts between the freeway and the local road network will also be evaluated.

## WHAT IS OUR GOAL?

The goal of this project is to provide Caltrans with information on how changes in the types of vehicles allowed to use HOV lanes, how tolls are being charged HOT lanes, or the number of high-occupancy lanes offered, might affect the operation of freeway corridors. While it is generally understood that adopting more restrictive eligibility policies for HOV/HOT lanes can reduce traffic on these facilities and improve their operation, very little information is available about the potential impacts of such changes on traffic conditions on the adjacent general-purpose lanes and travel demand in general. Similarly, no information is available on what might happen if a general traffic lane is converted into a high-occupancy lane. This lack of information is particularly problematic in the context of SB 743, which requires improvement projects to try to contain induced traffic demand and increases in VMT. The aim of this project is thus to reduce this knowledge gap through a “what-if” simulation study analyzing the operation of a 15-mile section of the I-210 freeway north Los Angeles County under alternate high-occupancy eligibility rules, lane offerings, and traffic demand characteristics. The overall goal is to assess more specifically how various changes in traffic demand may affect strategies currently considered by Caltrans for improving the operation of high-occupancy lanes.

## WHAT IS THE BENEFIT?

Results from this study will be immediately applicable to project evaluations and will allow Caltrans staff to conduct more rigorous evaluations of proposed projects affecting how HOV/HOT facilities are used. They will also support future research on the development of elasticity factors that could be used by planners for pre-assessing the impacts of proposed projects affecting high-occupancy facilities.

Results from this project will help inform Caltrans of the potential associated with each of the tested strategies to produce the desired impact on VMT. They will also help understand how the benefits provided by each strategy can be increased or reduced by changes in travel demand that may be induced by the implemented changes to the high-occupancy facility. In addition to informing decisions, the assessed impact trends will support future research on how changes to high-occupancy facilities could influence traffic demand and further help research on the determination of specific elasticity factors that could be used by project planners to pre-evaluate the impacts of proposed high-occupancy projects.

## WHAT IS THE PROGRESS TO DATE?

There were various efforts and work on the No Cost Extension. The extension is still being processed by Caltrans Contract group as of March 31, 2025. There were various adjustments made to the HOT toll rate calculation algorithm that was implemented within the Aimsun simulation model to expand its capabilities and improve its performance. It was settled on a \$35 mean value of time, assumed to be normally distributed with a \$5 standard deviation. This is based on the current average salary for Los Angeles County.

An effort was made to resimulated the following scenarios to address some identified issues with the initial simulations: 1) HOV2+ eligibility with Clean Air Decals (Current situation), 2) HOV2+ eligibility without Clean Air Decals and 3) HOV3+ eligibility with Clear

Air Decals. Simulation of an initially planned HOV4+ scenario was abandoned as such as the scenario would allow less than 1% of vehicles to use the HOV facility, and would not produce much different results than the HOV3+ scenario, which allows only 5-6% of vehicles on the HOV facility. Started simulations considering the conversion of the existing HOV2+ facility into a HOT2+ facility with dynamic tolling for single-occupancy vehicles. Simulated an initial batch of scenarios assuming that 20% of single-occupancy vehicles are willing to pay tolls. Simulations were conducted for the AM Peak (5-11), Midday (11-14), and PM Peak (14-19) periods.

The researcher started exploring the impacts of assuming higher vehicle occupancies under an HOV3+ eligibility scenario. The goal is to assess how much change in vehicle occupancy would be required to get an HOV facility usage similar to the current HOV2 eligibility. The researcher explored more specifically the impacts of converting 5%, 7.5%, 10%, 12.5%, and 15% of single occupancy and HOV2 vehicles into HOV3 traffic for the AM Peak, Midday, and PM Peak periods. Preliminary results indicate that a 15% switch is usually sufficient to bring traffic back to the HOV facility. This would be a relatively challenging switch to have occurred in reality.