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Research Notes

California HOT Lane User Impact Study

Develop statewide methodology, model HOT lane use, and analyze user impacts.

Planning & Policy

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Project Title: High Occupancy Lane (HOT) Research

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WHAT IS THE NEED?

The California Department of Transportation (Caltrans) is undertaking this research to gain a clearer, data-driven understanding of who benefits from California's existing HOT lanes and toll roads, and to what extent. As tolling becomes a more common strategy for funding infrastructure and managing congestion, the department needs rigorous evidence about how these facilities affect travelers across different income groups, regions, and travel patterns. The project emphasizes that current data sources cannot accurately show individual travel behavior or the distribution of benefits, prompting Caltrans to commission a more comprehensive, person-level analysis.

A major reason for this study is to address statewide concerns about fairness. Caltrans explicitly notes that transportation fairness has become central to policy discussions, with questions about whether certain communities are disproportionately burdened or excluded from the advantages offered by tolled facilities. By collecting travel-diary data, integrating multiple performance datasets, and modeling behavioral choices, the research aims to determine whether current pricing structures benefit all Californians or primarily higher-income users. The results will allow us to refine or redesign tolling policies including pricing, discounts, or lane configurations to address statewide concerns about fairness.

WHAT ARE WE DOING?

This research begins with acquiring essential data from multiple sources, including toll-operator records, performance data from the Performance Measurement System (PeMS), census-based socioeconomic information, and commercial mobility datasets. In parallel, the research team develops and

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deploys a travel-diary survey to gather person-level travel behavior near HOT lanes and toll roads. As these datasets are collected, the team compiles them into a unified analytical database that links individual trip records, demographic data, network conditions, and observed route, mode, and lane choices.

With the database complete, the research proceeds into model development. The team estimates and calibrates several behavioral models including mode, route, lane (general-purpose vs. toll), departure-time, and vehicle-occupancy choices using both survey data and network performance metrics. These models allow us to calculate each traveler's value of travel time and reliability, and to quantify the comparative benefits of using HOT lanes versus general-purpose lanes.

Finally, the calibrated models are applied to both surveyed travelers and a synthetic regional population to perform equity and distributional impact analyses. We evaluate which population groups benefit most or least, how benefits vary geographically, and how changes in toll-pricing or lane policies might alter outcomes. The research concludes with policy scenario testing, development of reports and memos, and a final presentation of findings.

WHAT IS OUR GOAL?

The research will produce a fully integrated analytical database, calibrated travel-behavior models, and quantified measures of travel-time savings, reliability benefits, and equity outcomes for users of HOT lanes and toll roads. The final deliverable will give us clear, data-driven insights into who benefits from tolled facilities, how those benefits are distributed across population groups, and how potential policy changes such as pricing adjustments or lane reconfigurations would impact travelers statewide.

WHAT IS THE BENEFIT?

This research will help California make better-informed decisions about HOT lanes and toll roads by providing clear, person-level evidence on who benefits from these facilities and how those benefits are distributed. With accurate measures of travel-time savings, reliability improvements, and user costs, we can evaluate whether existing tolling strategies serve all Californians fairly and identify where adjustments may be needed to improve fairness and system performance.

The study will also give the state a robust analytical foundation for future policy choices, including pricing changes, discounts, and potential lane reconfigurations. These insights will support more transparent, equitable, and data-driven transportation planning benefiting not only Caltrans but also regional partners, toll facility operators, and communities statewide that rely on a safe, efficient, and fair transportation network.

WHAT IS THE PROGRESS TO DATE?

The project has completed key early milestones: the kickoff meeting, initial quarterly reporting, major progress in acquiring essential datasets (Streetlight, Replica, ACS, and performance/toll data from), and developing a preliminary survey instrument. The team has also identified preferred survey methods, selected target zip codes, and initiated coordination with regional partners and survey vendors.

Immediate next steps include obtaining remaining data, beginning to integrate all data sources into the analytical database, refining the draft survey instrument, and finalizing a contract with a survey vendor. These steps position the project to advance into modeling and analysis phases in upcoming quarters.

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