DRISI
Caltrans Division of Research, Innovation and System Information

Research Results

Evaluating the Performance of High Occupancy Vehicle Lanes

Does the HOV lane access configuration affect traffic flow?

Transportation Safety and Mobility

DECEMBER 2013

Project Title:
High Occupancy Vehicle (HOV) System Analysis Tools: Statewide HOV Facility Performance Analysis

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WHAT IS THE NEED?

High occupancy vehicle (HOV) lanes are a cost-effective and environmentally-friendly option to move travelers through congested routes. California has the most extensive high occupancy vehicle lane network compared to any other state in the country, with currently over 1,500 lane-miles. In California, the two most common types of HOV lanes are continuous access, prevalent in Northern California, and buffer-separated, limited access, prevalent in Southern California. To assess the effectiveness of HOV facilities in controlling congestion, Caltrans evaluated whether there is a performance difference between the two access types in Caltrans districts 4, 7, and 12 and if converting from limited access to continuous access results in operational improvements.

WHAT WAS OUR GOAL?

The goal was to evaluate whether the type of access to HOV lanes affected operational performance and if changing the access type improved traffic flow in Caltrans districts 4, 7, and 12.

WHAT DID WE DO?

Caltrans, in partnership with the University of California, Berkeley and UC Irvine, evaluated the operational performance of HOV facilities in the San Francisco Bay Area, Los Angeles County, and Orange County. The researchers evaluated highway traffic data to identify the operating characteristics of HOV and general purpose lanes. Key performance measures—speed differential, vehicles miles traveled, and passenger miles traveled—were calculated on a system-wide basis to offer comparisons by corridor, region, and access type. The researchers also compared the performance of HOV facilities in Orange County before and after the access type was converted from limited to continuous using computer simulations and real-world data.

WHAT WAS THE OUTCOME?

Limited-access and continuous-access HOV facilities generally perform at a comparable level in terms of speed differential, vehicle miles traveled, and passenger miles traveled. However, some of the study sites are influenced by operational characteristics that are uniquely associated with individual corridors.

Converting a HOV lane from limited access to continuous access is site-specific and influenced by the local geometric attributes and associated traffic patterns. For most study sites, the conversion led to a slightly lower throughput and better performance during the dissipation of congestion. All the study sites experienced more HOV violations and HOV lane changes. Some segments had increased traffic weaving after the conversion from limited access to continuous access. At certain freeway junctions, such as a freeway-to-freeway HOV direct connector, limited-access configurations can be beneficial in preventing or discouraging last-second traffic weaving maneuvers and safely channeling traffic flows for better performance.

WHAT IS THE BENEFIT?

Based on the findings, both limited-access and continuous-access HOV lanes have advantages. The limited-access lanes have buffered sections that separate the traffic flow from the adjacent lane, resulting in higher freeway throughput. Continuous-access lanes spread out lane changing, reducing major traffic disturbances that can cause delays. HOV facilities could improve traffic by combining these advantages, such as have continuous access for most of the corridor to achieve higher average travel speed, but have buffers strategically placed at critical freeway segments—for example, around non-HOV-related bottlenecks and ramp merges—to facilitate higher throughput on those segments.

LEARN MORE

To view the complete report:
www.dot.ca.gov/research/researchreports/reports/2012/final_report_task_1665.pdf

IMAGES

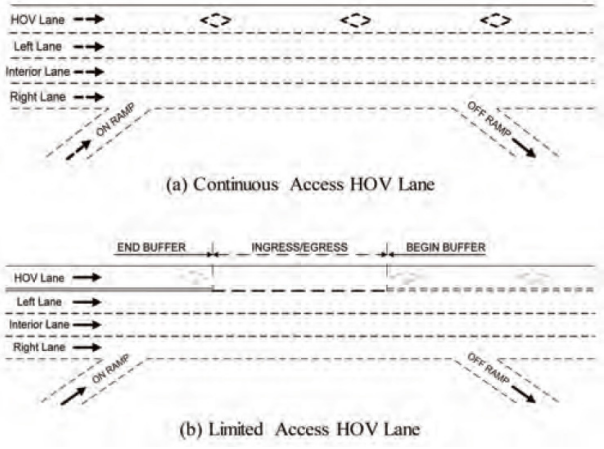

Figure 1: Two access configurations for HOV lanes

Figure 2: Study sites