

CALIFORNIA DEPARTMENT OF TRANSPORTATION



**2015 CALIFORNIA HIGH-OCCUPANCY VEHICLE LANE
DEGRADATION DETERMINATION REPORT**

Prepared by

**Division of Traffic Operations
Office of Traffic Management**

Submitted to

**Federal Highway Administration
California Division**

December 1, 2016



2.6. DISTRICT 12 ANALYSIS

District 12, located in Orange County, was established by the California State Legislature in 1988. The District has a population of 3.15 million people.⁴ District 12 is responsible for 284 centerline miles of highway and operates HOV lanes on Routes 5, 22, 55, 57, 91, 405 and 605.

Degradation increased from 171 lane-miles to 175 lane-miles between the first and second halves of 2015, respectively. Figures 17 and 18 provide maps of the degraded segments in District 12. Degraded segments along the same route are combined into corridors for easier reference. The corridors may include gaps of non-degraded segments. Tables 12 and 13 list the corridors with degraded HOV lanes in District 12.

⁴ State of California, Department of Finance. *E-4 Population Estimates*.
< <http://www.dof.ca.gov/Forecasting/Demographics/Estimates/E-4/2011-20/> >

Figure 17

**DISTRICT 12 DEGRADED HOV LANES
JANUARY 1 TO JUNE 30, 2015**



System Plan for Managed Lanes on California State Highways



System Metrics Group, Inc.
Final Report
October 2016



December 12, 2016

To: Members of the Board of Directors

From: Laurena Weinert, Clerk of the Board

Subject: California Department of Transportation Draft Managed Lanes Network Study

Regional Planning and Highways Committee Meeting of December 5, 2016

Present: Directors Bartlett, Do, Donchak, Miller, Nelson, Spitzer, and Ury

Absent: Director Lalloway

Committee Vote

Following the discussion, no action was taken on this receive and file information item.

Staff Recommendation

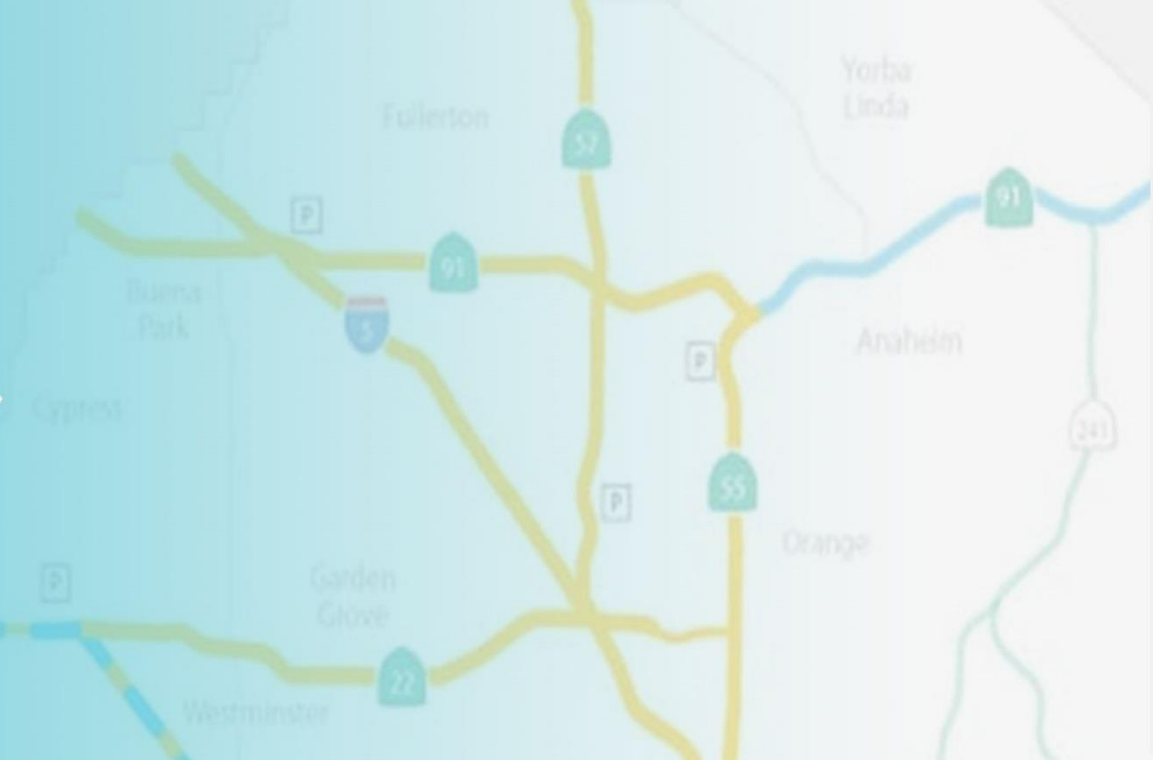
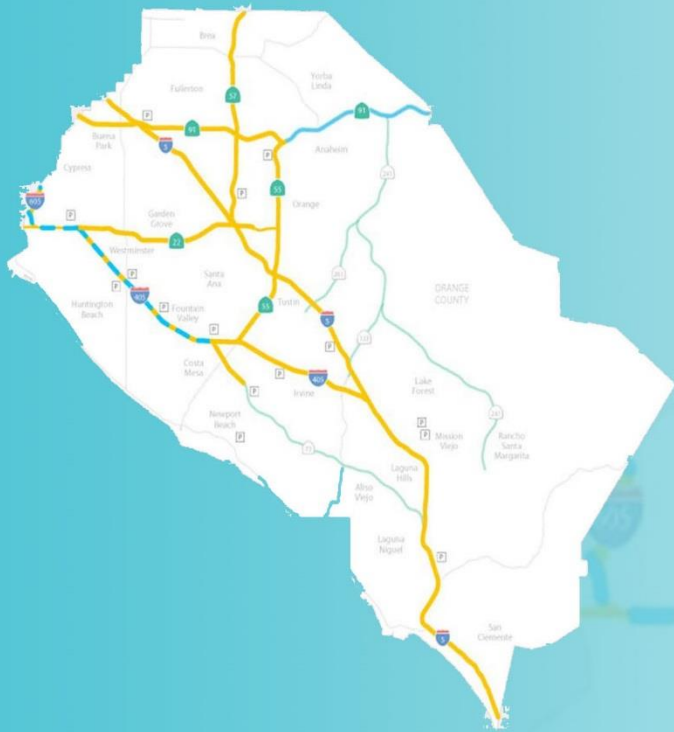
Receive and file as an information item.



ORANGE COUNTY TRANSPORTATION AUTHORITY

**California Department of Transportation Draft Managed
Lanes Network Study**

PowerPoint - Board



California Department of Transportation Draft Managed Lanes Network Study



December 2016



- Purpose – Prioritize Managed Lane Freeway Corridors for Project Development
- Presentation Overview
 - Background – Why Now?
 - Study Process
 - Study Results/Recommendations
 - Next Steps

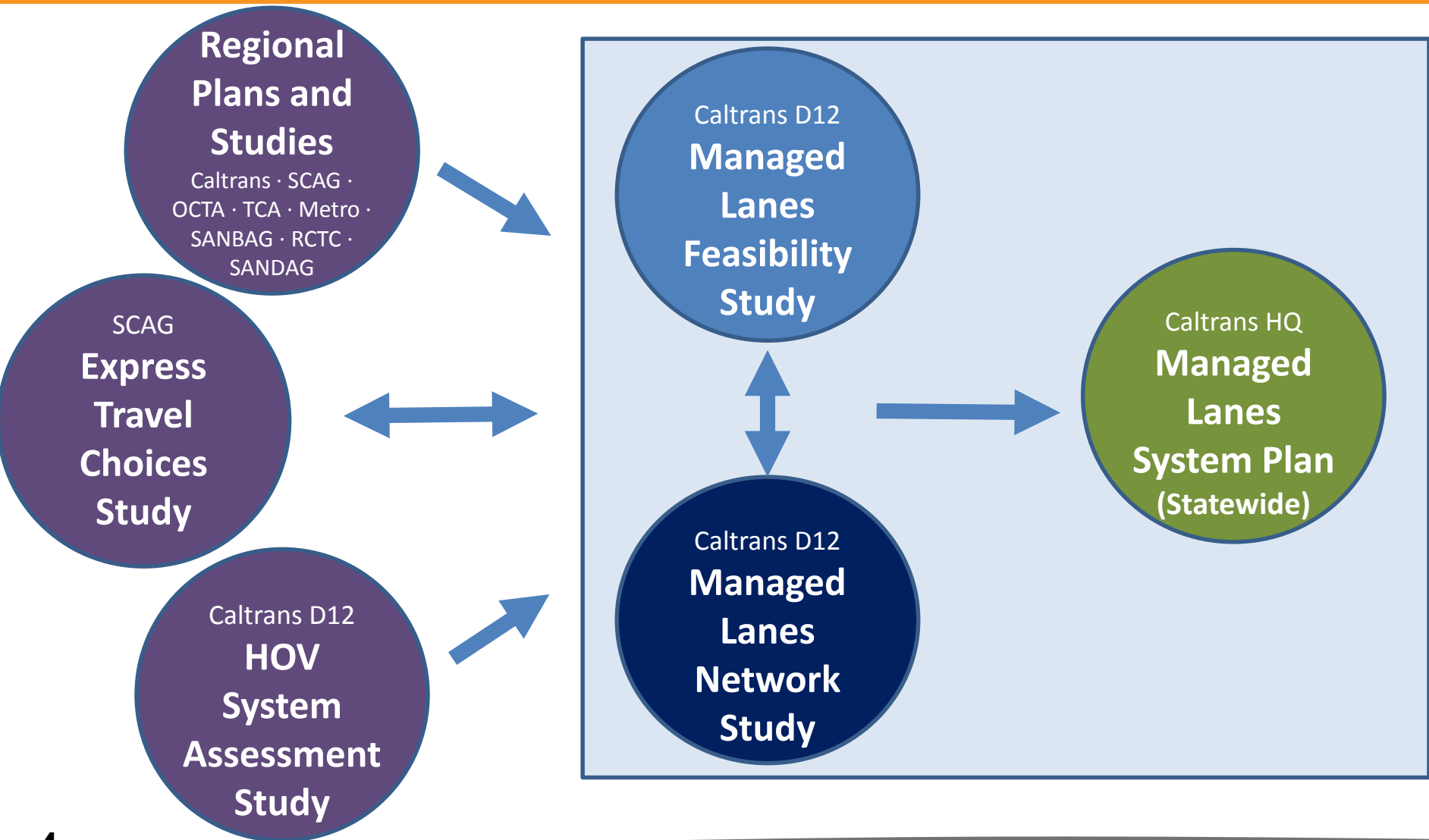
OVERVIEW

WHY NOW?

- Managed Lanes Planning
 - California Transportation Plan 2040
 - Caltrans Policy (Deputy Directive 43-R1)
- HOV Degradation



MANAGED LANES STUDIES



EVALUATION

Data

- OCTAM – OCTA model
- PeMS – Caltrans database

Analysis

- DTRAM – managed lanes modeling for demand, operations and revenue

Collaboration

- Representatives from FHWA, SCAG, OCTA, TCA, Caltrans HQ/Districts, Business Community and Public



EVALUATION SCENARIOS

Scenario 1 (“Single-Lane HOT”)

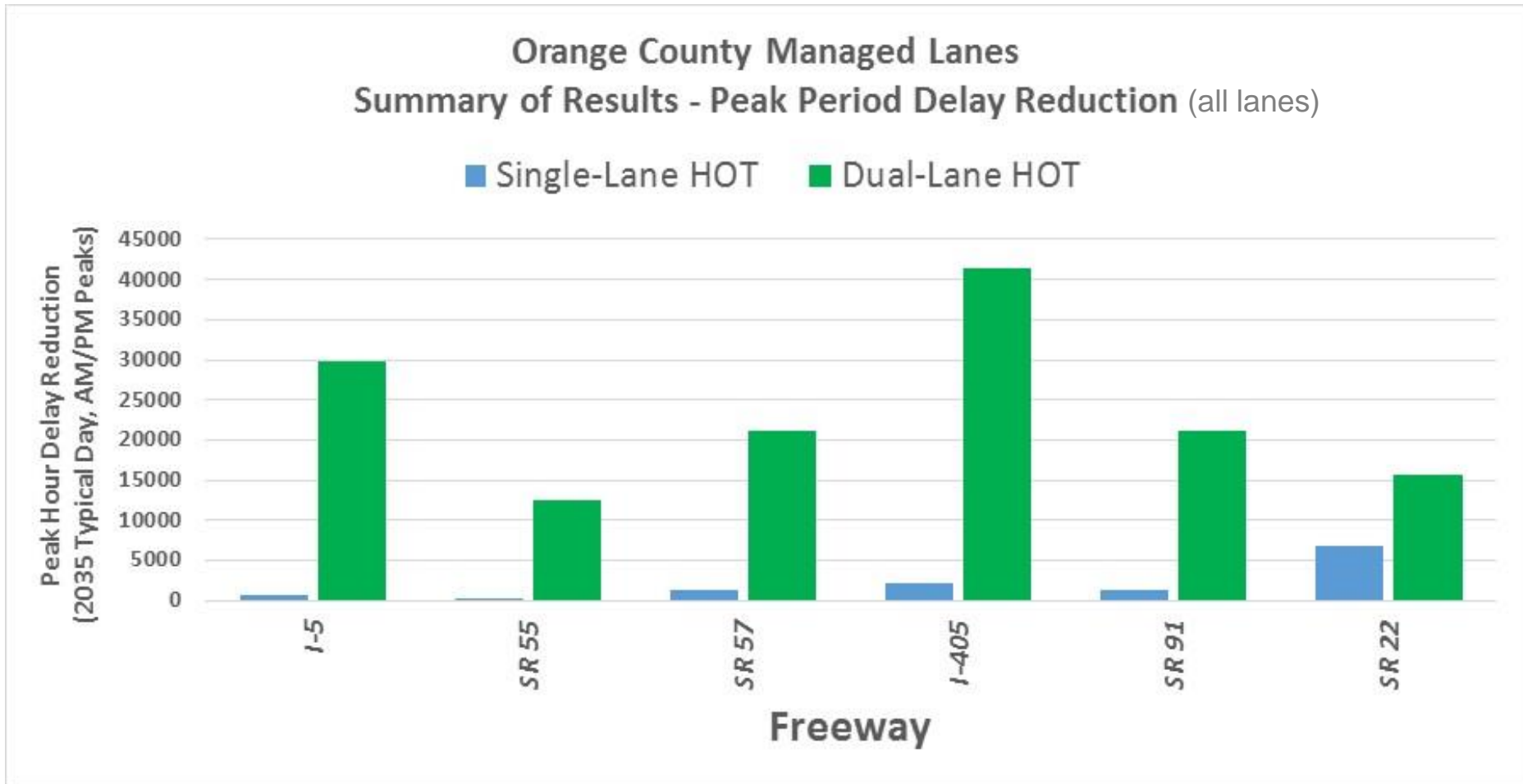
- **Convert** existing (HOV-2+) to Express Lanes (HOT-3+)

Scenario 2 (“Dual-Lane HOT”)

- **Add lanes** to create two managed lanes in each direction.

RESULTS: DELAY IMPROVEMENTS

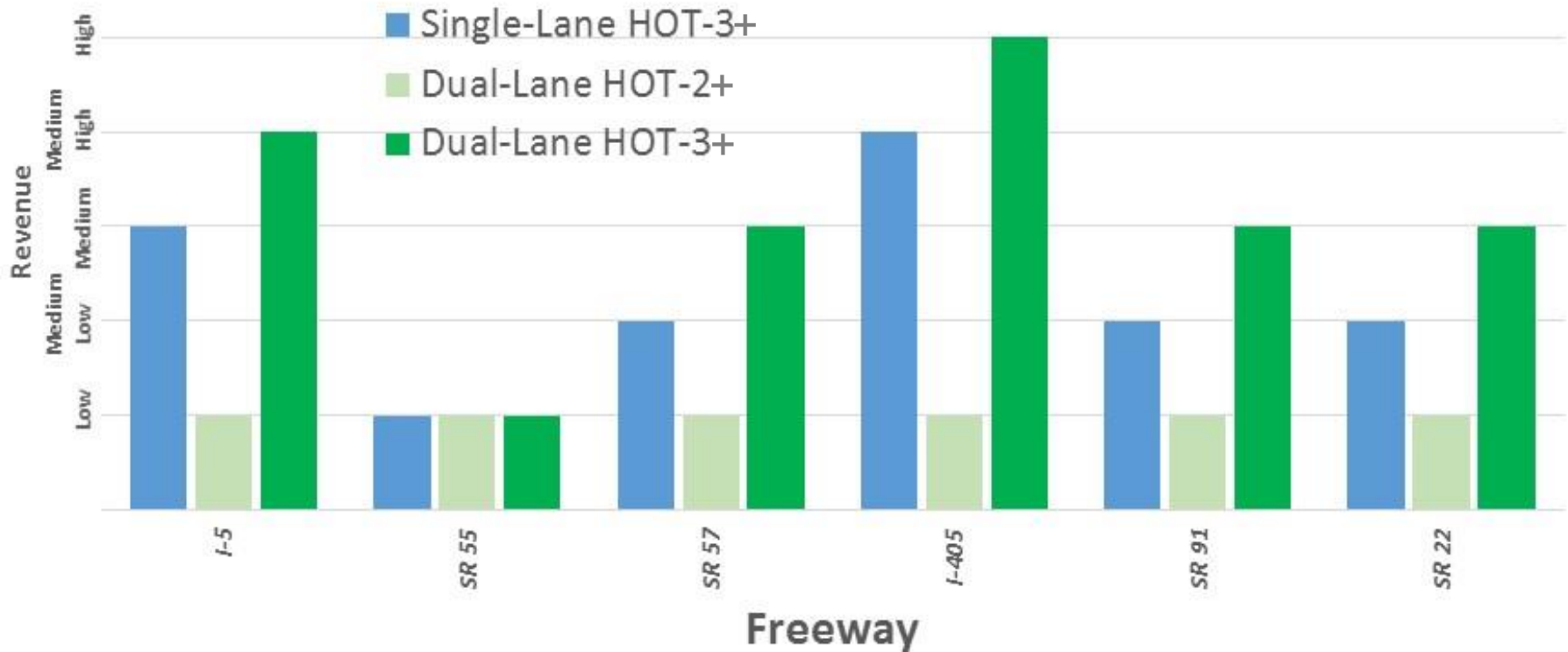
Throughout the peak periods, how much less time will vehicles be stuck in traffic?



RESULTS: TOLL REVENUE

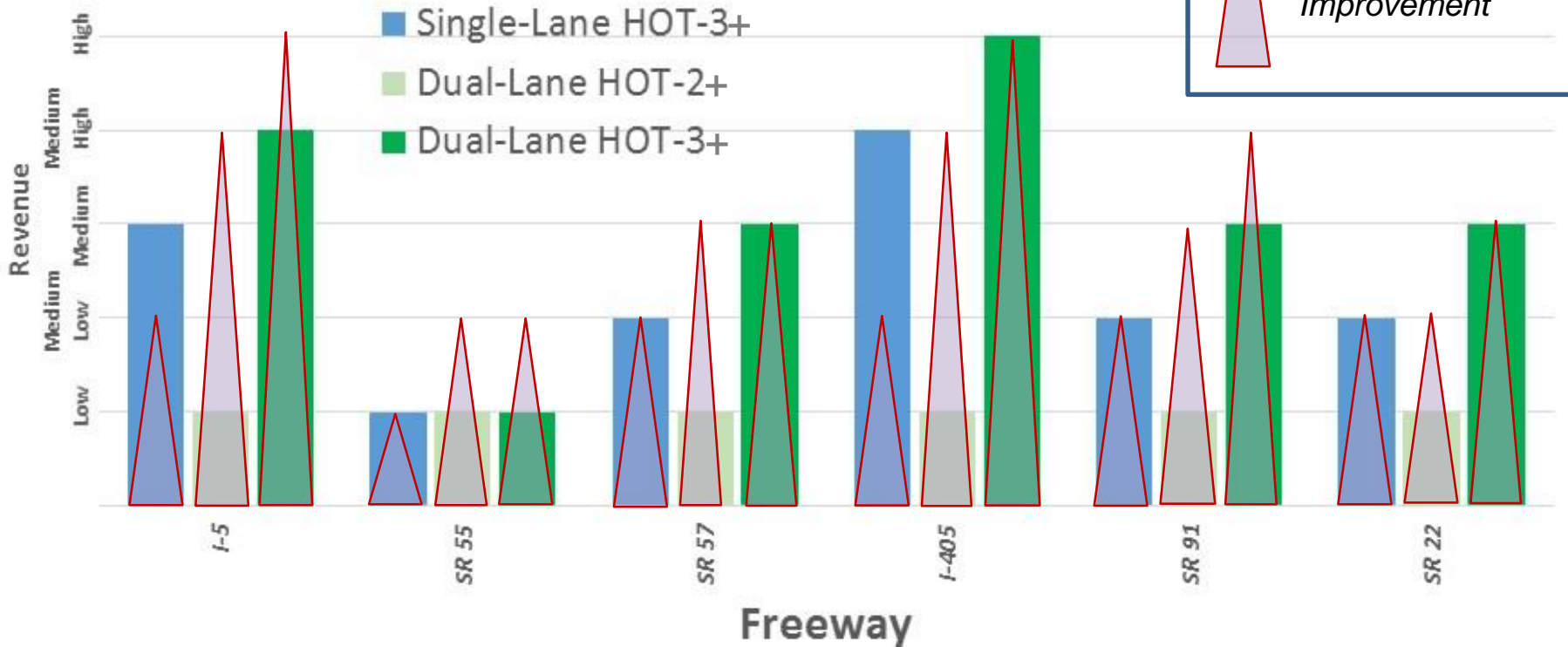
What toll revenue is expected?

Orange County Managed Lanes
Summary of Results - Revenue Expectations



RESULTS: REVENUE AND MOBILITY BENEFITS

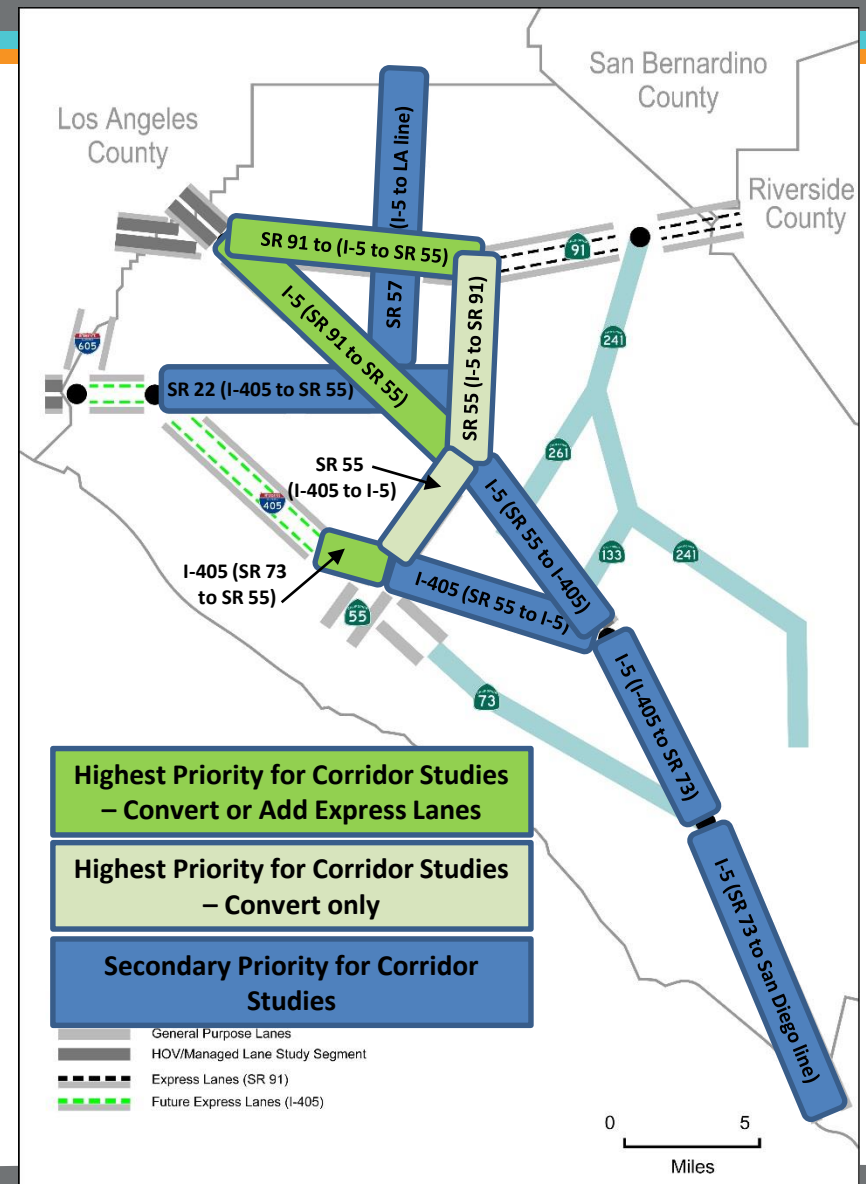
Orange County Managed Lanes
Summary of Results - Revenue Expectations



RECOMMENDED CORRIDORS

Evaluation Measures

- Managed lanes operations
- Speed and delay
- Funding (revenue vs. cost)
- Connectivity and system integration
- Stakeholders and policy
- Independent function



NEXT STEPS

- Continue to work with regional partners
 - Consensus on priority corridors (Early 2017)
 - Initiate PSRs/Corridor Studies (Late 2017)





QUESTIONS AND DISCUSSION

Orange County Managed Lanes Network Study

Summary of Findings and Implementation Plan



Prepared for



Prepared by



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September 2016

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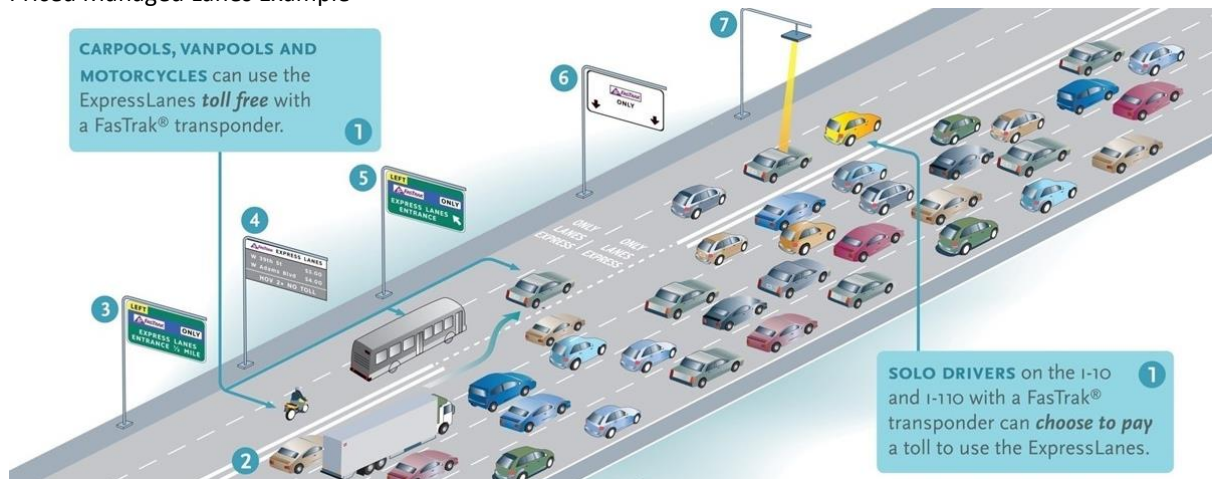
Summary of Findings and Implementation Plan – Orange County Managed Lanes Network Study

1. Background


Managed lanes are an innovative solution to managing congestion, improving safety and offering options to Orange County’s traveling public. “Managed lanes” is the general term for freeway lanes that are actively managed to improve operations or utilization. This document focuses on priced managed lanes, which is a subset of managed lanes, which carry a mix of tolled and High Occupancy Vehicle (HOV) traffic. The terms priced managed lanes, High Occupancy Toll (HOT) lanes, and Express Lanes are typically synonymous with each other, with the latter being the most marketed to the general public. Exhibit 1 depicts a typical example of priced managed lanes and Technical Reference 1 is a detailed survey of recent managed lanes activities.

EXHIBIT 1

Priced Managed Lanes Example



Source: <https://www.metroexpresslanes.net/en/about/howit.shtml>

 Priced managed lanes (often called “HOT” or Express Lanes) are used on the one or two left (inside) lanes. They allow carpools or drivers who pay a toll to avoid the congestion from the general purpose lanes.

Caltrans’ Deputy Directive DD-43-R1 (Technical Reference 2) states that managed lanes “are used to promote carpooling and transit usage, improve travel-time reliability, reduce greenhouse gas emissions, and maximize the efficiency of a freeway by increasing person and vehicle throughput while reducing congestion and delay.”

Managed lanes present the motorist with travel choices. In addition to mobility, managed lanes are consistent with other goals and objectives of Caltrans, District 12 and the Federal Highway Administration (FHWA), including safety, stewardship of the environment, and prudent financial management of public funds.

Managed lanes are implemented with tools to manage demand, such as pricing, eligibility based on occupancy and vehicle type, and physical access via striping or barriers. Ideally, the demand for the managed lane can be reduced to match the capacity and thereby ensure free-flow conditions. Priced managed lanes are a form of congestion pricing, where tolls allow operating agencies to manage excess demand during peak periods. The economic basis is that when users are forced to pay for negative impacts they create, they will be more likely to change to their behavior, thereby reducing congestion.

Orange County has extensive experience with managed facilities on the HOV network, Express Lanes and toll roads. HOV lanes first opened in Orange County in 1985, on State Route (SR) 55. The HOV lanes on Interstate 5 (I-5), SR 57, SR 91, and I-405 also have all been open for more than 20 years, and have been highly successful. All lanes operate all hours of the day with HOV-2+ requirements (vehicles with two or more occupants, including the driver, are allowed to use the lanes). There are several HOV direct connectors, direct access ramps (DARs), as well as a short two-lane section south of the El Toro “Y” on I-5, and on I-405 between SR 22 and I-605.

Orange County’s HOV network has 216 lane-miles of existing HOV lanes, more than in any other California county except Los Angeles. District 12 is also unique in that nearly all of the non-toll freeways in the County have HOV lanes. The southern end of I-5 is the longest section without HOV lanes, and most of that section is either currently under construction or in planning/design to add an HOV lane. There is a mix of limited-access and continuous striping.

Orange County has only one of seven priced managed lanes (Express Lanes) currently operating in California, on SR 91. The SR 91 Express Lanes provide two lanes in each direction for 10 miles between the SR 91/SR 55 interchange in Anaheim and the Orange/Riverside County Line. The other Express Lanes in the state are I-15 in San Diego County, I-110 and I-10 in Los Angeles County I-580, I-680, and SR 237/I-880 in the Bay Area as shown in Table 1.

Caltrans Highway Design

Manual definitions:

Managed lanes are proactively managed in response to changing operating conditions in efforts to achieve improved efficiency and performance.

Typically employed on highways with increasing recurrent traffic congestion and limited resources.

(a) **High-Occupancy Vehicle (HOV) Lanes**--An exclusive lane for vehicles carrying the posted number of minimum occupants or carpools, either part time or full time.

(b) **High Occupancy Toll (HOT) Lanes**—An HOV lane that allows vehicles qualified as carpools to use the facility without a fee, while vehicles containing less than the required number of occupants to pay a toll. Tolls may change based on real time conditions (dynamic) or according to a schedule (static).

(c) **Express Toll Lanes**--Facilities in which all users are required to pay a toll, although HOVs may be offered a discount. Tolls may be dynamic or static.


TABLE 1
Express Lanes Operating in California

| Express Lanes | County | Length (miles) | Number of Lanes | Free Travel Eligibility |
|---------------|-------------|----------------|--|-------------------------|
| SR-91 | Orange | 10 | 2 lanes per direction | HOV-3+* |
| I-15 | San Diego | 20 | 2 lanes per direction | HOV-2+ |
| I-10 | Los Angeles | 14 | 2 lanes per direction | HOV-3+ |
| I-110 | Los Angeles | 11 | 2 lanes per direction | HOV-2+ |
| I-580 | Alameda | 12 | 2 lanes eastbound and 1 lane westbound | HOV-2+ |
| I-680 | Alameda | 14 | 1 lane southbound | HOV-2+ |
| SR 237/I-880 | Santa Clara | 4 | 1 lane per direction | HOV-2+ |

* Half price on Monday-Friday 4:00 PM to 6:00 PM in the eastbound direction

The network study area is shown in Exhibit 2; it highlights the various study segments. All of Orange County’s freeways are included in the Managed Lanes Network Study, except for the toll roads and Express Lanes (the current lanes on SR 91 and the future I-405 Express Lanes, OCTA’s M2 project that will open in approximately 2023). The Express Lanes are managed by the Orange County Transportation Authority (OCTA).

There is also a network of toll roads in Orange County, consisting of SR 241, SR 73, SR 133, and SR 261, operated by the Transportation Corridor Agencies (TCA). Tolls on these facilities vary by time of day, but the tolling is not dynamic, or responsive to demand. There are four defined tolling periods: peak hour, pre-/post-peak, non-peak, and weekend, each of which is tolled at a predefined rate. These toll roads are managed lane facilities, because variable tolling is used to address variations in the demand. The toll roads are somewhat different, however, in that all lanes are tolled and the tolls are the same regardless of occupancy. Therefore, this study is focused on the existing HOV system and the potential for conversion or construction of managed lanes facilities, and does not identify or propose toll road expansion.




Toll roads and HOT lanes are different. Toll roads charge all drivers on all lanes, and carpools do not get a discount. HOT lanes are similar to HOV lanes, but require tolls (except for carpools, which are free or discounted). HOT lanes are only on the one or two left lanes.

While HOV lanes have been successful in Orange County (and across California and the U.S.) for many years, their effectiveness is beginning to wane as demand increases. Once demand exceeds capacity, the lane becomes congested. Once this occurs, the HOV lanes is deemed “degraded”, which is addressed by a federal requirement. Degradation is defined as when the average traffic speed during the morning or evening weekday peak hour is less than 45 miles per hour (mph) for more than 10 percent of the time over a consecutive 180-day period. In other words, the HOV lane’s average traffic speed cannot drop below 45 mph for an average of more than two weekdays each month.

and speed decrease as congestion sets in. Speeds around 45 mph are the break point between free-flow operations and congestion.

Federal guidelines, including MAP-21 (the Moving Ahead for Progress in the 21st Century Act, 2012) and the FAST Act (Fixing America’s Surface Transportation Act, 2015), require monitoring and remediation strategies when HOV lanes are degraded. In response, Caltrans prepares the annual *California High-Occupancy Vehicle Lane Degradation Determination Report* (the latest is 2014) to assess current performance.

Most of the HOV lanes in Orange County are degraded (see Table 2 and Exhibit 4). Based on federal guidelines, District 12 (Orange County) had approximately 20 percent of the degraded HOV lane miles statewide in 2014. Degradation in Orange County has increased from 139 lane-miles to 146 lane-miles between the first and second halves of 2014. Specifics on peak period operations and specific locations are available in the *Degradation Determination Report*. Of course, managed lane degradation is not limited to Orange County, and there are operational issues at the boundaries with other counties (particularly Los Angeles). However, the focus here is on Orange County facilities.



The status quo is not a viable option. The investment in HOV lanes in Orange County requires improvements to the system to reduce congestion and improve reliability. Those potential improvements to managed lanes are the subject of this study.

TABLE 2

Orange County HOV Segments Identified as Operationally Degraded (Extremely, Very, or Slightly)

| Freeway | Direction | Begin (Interchange) | End (Interchange) | 2014 Degradation* |
|---------|------------|---------------------|--------------------|-------------------|
| I-5 | Northbound | Junipero Serra Rd. | Oso Pkwy. | Slightly |
| | | Bake Parkway | SR 57-SR 22 | Extremely |
| | Southbound | Lincoln Ave. | Jeffrey Rd. | Extremely |
| | | Bake Parkway | Junipero Serra Rd. | Slightly |
| SR 22 | Eastbound | Magnolia St | Glassell St. | Slightly |
| | Westbound | Magnolia St. | I-405 | Very |
| SR 55 | Northbound | I-405 | SR-91 | Extremely |
| | Southbound | SR-91 | I-5 | Extremely |
| SR 57 | Northbound | Lincoln Ave. | LA County | Very |
| | Southbound | LA County | I-5 | Very |
| SR 91 | Eastbound | LA County | SR 55 | Extremely |
| | Westbound | SR 55 | LA County | Extremely |
| I-405 | Northbound | I-5 | LA County | Extremely |
| | Southbound | LA County | I-5 | Extremely |

Source: http://www.dot.ca.gov/hq/traffops/trafmgmt/hov/files/degrd_rept/2014-HOV-degradation-report.pdf

*Levels of degradation: slightly (10 to 49%), very (50 to 74%) or extremely degraded (74 to 100%) of days when the average traffic speed during the morning or evening weekday peak hour is less than 45 mph

EXHIBIT 4

Orange County HOV Lanes Identified as Operationally Degraded (Either Direction, 2014 Data)



Source: http://www.dot.ca.gov/hq/traffops/trafmgmt/hov/files/degrd_rept/2014-HOV-degradation-report.pdf

2. General Benefits of Express Lanes

Caltrans' mission is to provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability. Managed lanes, including priced managed lanes, are consistent with the fulfillment of this mission. Per DD-43-R1, Caltrans uses managed lanes as a "sustainable transportation system management strategy". Express Lanes address regional growth and provide long-term congestion relief. Caltrans must focus on efficient lane management due to limited opportunities for current and future freeway expansion, as well as the need to minimize right of way impacts.

Express Lanes enhance California's sustainability and livability as follows:

- **Travel times and reliability are improved across the system.** With Express Lanes, travel times in the managed lanes will be reduced, and speed variations will become less common. Since some solo drivers will shift to Express Lanes, even drivers who stay in the free lanes can benefit.
- **Travelers have more choices.** Solo drivers can also use these lanes, allowing for the option to pay for faster trips and more reliable travel.
- **Transit use, new transit services, and carpooling are all encouraged.** Travelers are incentivized to use transit or carpools, maximizing people throughput and not just vehicle throughput. Express Lanes make the transit mode choice more attractive, encouraging the modal shift to vanpools, carpools, and buses. Toll revenue can also be used to support these strategies, encouraging the expansion of the transit system. These benefits have already been realized in San Diego County, where transit ridership has increased significantly along I-15 corridor, and new Bus Rapid Transit (BRT) service has been instituted.
- **Express Lanes help Caltrans address federal guidelines.** Degradation is nearly ubiquitous in the Orange County HOV system. The federal guidelines require monitoring and remediation strategies, and Express Lanes are an effective tool for addressing degradation.
- **The managed lanes system is more sustainable.** A priced managed lanes system is more sustainable. There were great investments into the HOV system when they were first introduced. Decades later, they have become so successful that more innovative ways are needed to sustain their effectiveness. Express lanes allow for the flexibility necessary to make the system more sustainable, and they provide for long-term mobility benefits by preserving a portion of the roadway for assured free-flow operation.
- **Caltrans and other agencies can better manage the freeway system.** With Express Lanes, Caltrans and other agencies can manage traffic volumes better and limit congestion. HOV lanes alone are not flexible enough to be an effective tool for active management.
- **Safety is enhanced.** Harmonizing speeds across lanes by reducing stop/starts in the managed lanes and minimizing mainline bottlenecks can significantly reduce the number and frequency of incidents during peak periods. This has been demonstrated in managed lane facilities across the nation.¹
- **There are environmental benefits.** Less congestion means reduced vehicle emissions as speeds are higher and more consistent. Decreases in idling and stop-and-go driving also help improve air quality. Potential benefits include reductions in particular matter (PM), carbon monoxide (CO) and greenhouse gas (GHG) emissions.

¹ FHWA (<http://www.ops.fhwa.dot.gov/freewaymgmt/faq.htm>) notes that "studies have shown that HOV lanes are frequently as safe as, and in many cases safer than, unrestricted lanes".

- **Express Lanes are consistent with regional planning goals.** Express Lanes are in alignment with goals of the Southern California Association of Governments (SCAG) Regional Transportation Plan (RTP) and Senate Bill 375 requirements. They also close the gaps in interconnectivity, providing better mobility for the entire region.
- **Express Lanes improve quality of life.** Travel time savings allow for more time spent with families, businesses to operate more efficiently, and the safe and reliable movement of goods and services, including those services from emergency responders.



3. Approach for Analyzing Managed Lanes

This study is the culmination of a series of efforts conducted by Caltrans and the Southern California Association of Governments (SCAG). Exhibit 5 illustrates the connection between this study and other relevant planning efforts.

The Managed Lanes Network Study is a companion to the Managed Lanes Feasibility Study, and it is a more region-specific assessment of managed lanes in Orange County from the SCAG Express Travel Choices Study, which examined Express Lanes throughout the SCAG region (Ventura, Los Angeles, Orange, Riverside, San Bernardino, and Imperial Counties). Exhibit 6 illustrates that the Managed Lanes Network Study is more comprehensive than the other two studies; it includes an evaluation of added priced managed lanes (not included in the SCAG study) and traffic analysis (not included in the Managed Lanes Feasibility Study).

Similar to the Managed Lanes Feasibility Study, the primary goal of the Managed Lanes Network Study is to identify specific projects to move forward in the project development process. With this report, Caltrans is also putting policies (like DD-43-R1) into practice.

EXHIBIT 5
Relevant Recent Studies (State, Regional, and District 12)

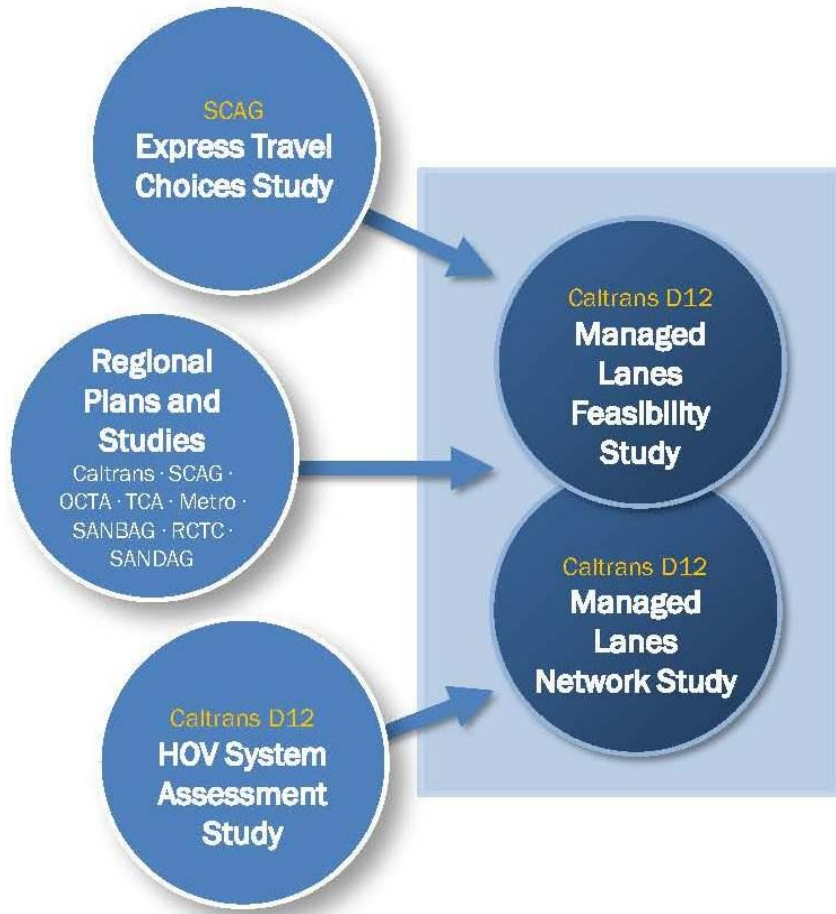
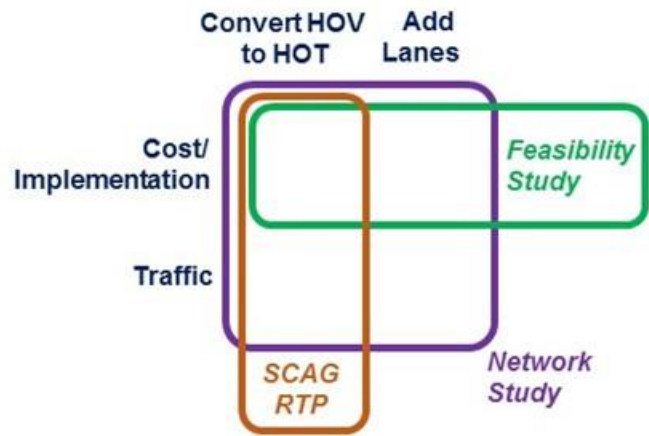


EXHIBIT 6
Comparison of Managed Lanes Studies





The ultimate goal of this study is to identify specific implementation priorities for moving forward with managed lanes projects. Both policy and current operations drive the need for improvements to the managed lanes system.

To do so, technical analysis was needed to support the recommendations. This section outlines the types of analysis that were conducted. Section 4 is a summary of the results, and Section 5 identifies the implementation plan priorities.

3.1 Evaluation Scenarios

All of the freeways in Orange County were evaluated to determine how well they would work with priced managed lanes (Express Lanes) instead of HOV lanes. Each freeway was evaluated with two scenarios², customized for each freeway:

- **Scenario 1:** Convert existing HOV lanes (2+ occupancy) to Express Lanes (vehicles with 3+ occupancy would remain free to encourage carpooling and transit). Implement limited physical/capital improvements, except for toll equipment.
- **Scenario 2:** Add lanes, as needed, to create two managed lanes in each direction. Convert new and existing HOV lanes to Express Lanes (the analysis baseline was that vehicles with 2+ or 3+ occupancy would be free³, to encourage carpooling and transit, although those details have not yet been determined.

These scenarios were compared to a future baseline network that included all programmed future projects (e.g., all of the OCTA Measure M2 projects), plus additional projects identified by stakeholders. Technical Reference 3 is a summary of the stakeholders and Technical Reference 4 is a summary of the formal modeling request. The project definitions were the result of a collaborative process among technical stakeholders from OCTA, SCAG, TCA, FHWA, Caltrans Headquarters and neighboring Districts.

The future Express Lanes on I-405 were included as a baseline project, for all scenarios including No-Build. The I-405 Express Lanes project will improve 16 miles of I-405 between the SR 73 freeway in Costa Mesa and I-605 near the L.A. County line. The project includes adding one General Purpose (GP) lane in each direction from Euclid Street to I-605, and the construction of the 405 Express Lanes (two lanes in each direction from SR-73 to I-605). The project is financially committed, and expected to be completed by 2023. It is funded with a combination of federal, state, local, and toll revenues⁴.

An HOV-2 to HOV-3 conversion scenario was considered but not included in the analysis. With this scenario, no pricing would be implemented. The only change would be to modify the occupancy requirements for carpools from HOV-2 to HOV-3. While this scenario would improve managed lanes operations, it would result in increased congestion on the GP lanes, with associated degradation of reliability, safety, and air quality. An HOV-3 scenario would also likely create “empty lane syndrome”, where drivers in the congested GP lanes would see the adjacent HOV lane with mostly available capacity.

² It is possible that both scenarios could occur on the same freeway, as part of a phased implementation plan. A project built on one freeway would have effects (positive and negative) on other freeways in the system. Individual project plans will need to address these effects, as project timing is better known.

³ A scenario with a reduced toll for HOV-2 vehicles (and free for HOV-3+) scenarios is feasible but was not explicitly analyzed. The performance of this scenario would be between the HOT-2 and the HOT-3 scenarios. The decision on tolling HOV-2s would depend on future financial plans, so further future evaluation would be needed.

⁴ More details on toll revenue can be found in Section 6.4 of Technical Reference 6.



Conversions of GP or HOV-2+ lanes to HOV-3+ facilities have rarely been implemented. FHWA guidance⁵ notes that HOV-2+ to HOV-3+ may “result in underutilization of the HOV lanes ... It is very likely that prevailing traffic congestion on general purpose lane will worsen.” One GP lane on the Santa Monica Freeway (I-10) was converted to HOV-3+ in 1976⁶. The increased congestion in the other GP lanes was not well-received by the public and the media. Eventually, a lawsuit was initiated and the lanes were restored to GP by court order. Another example that demonstrates the inefficiencies of HOV3+ conversions is the I-10 (Katy) HOV Lane⁷. The Katy HOV lanes were opened in October 1984 and only buses and vanpools were initially allowed. There were only a total of 86 vehicles using the facility during the morning peak hour. To address this low use, the lane was open to authorized HOV-4+ in 1985. The occupancy requirement was dropped to HOV-3+ later in 1985 and to HOV-2+ in 1986.

3.2 Evaluation Measures

There are many different evaluation measures that can be used for assessing priced managed lanes. For this study, six measures were used, as summarized in Table 3. A balanced set of evaluation measures is important, because not all potential improvements will address every measure. The evaluation measures are generally consistent with those used in the regional Express Travel Choices Study. Technical Reference 5 is a comprehensive assessment of performance measures for managed lanes that provides more details on evaluation.

TABLE 3
Evaluation Measures

| Measure | Purpose | Measured By |
|----------------------------|---|---|
| Managed lanes operations | Address degradation of HOV lanes and ensure performance of Express Lanes | Predicted speed improvement in managed lanes |
| Speed and delay (GP lanes) | Improve operations for all freeway users; improve air quality | Speed change and delay reduction in GP lanes |
| Funding (revenue vs. cost) | Develop financially feasible projects that can help improve corridor operations | Preliminary toll revenue and cost estimates |
| Connectivity and planning | Identify projects that are consistent with regional planning priorities | Evaluation of countywide network, considering other projects |
| Stakeholders and policy | Identify potential conflicts with key stakeholders and their policies | Assessment of other agencies (SCAG, OCTA, TCA) and their programs |
| Independent function | Identify projects that can be developed independently prior to network completion | Consideration of corridor alignment and existing connectors |

⁵ http://ops.fhwa.dot.gov/publications/fhwahop08034/hot1_0.htm

⁶ <http://next10.org/sites/next10.org/files/10%20High-Occupancy%20Vehicle%20Lanes.pdf>

⁷ <http://ops.fhwa.dot.gov/docs/houston/houstoncasestudy.pdf>



3.3 Evaluation Tools

The first three measures listed in Table 3 required detailed technical analysis, using advanced modeling software. Exhibit 7 is an overview of the approach for conducting the planning-level traffic forecasting and economic analysis.

A suite of tools was used to conduct the technical evaluation. The general strategy was to apply a modeling tool that integrates and extends available models and leverages current data. The Orange County Transportation Analysis Model (OCTAM), supplemented by current data from Caltrans' Performance Monitoring System (PeMS), was the primary resource for the evaluation. The key steps were:

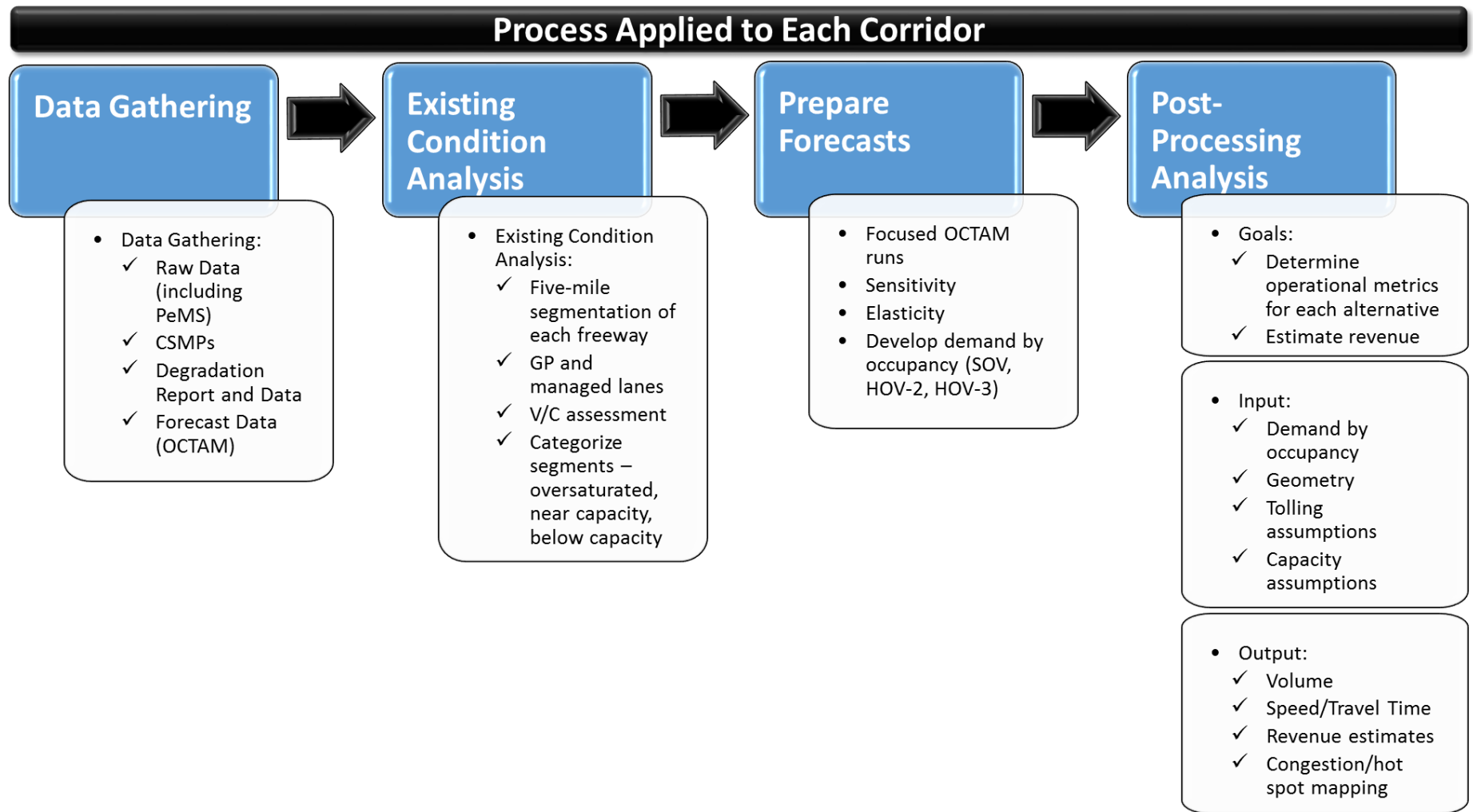
1. Data collection – gather information from available sources.
2. Existing conditions analysis – assess current operations as a baseline to validate the model.
3. Traffic forecasting – extract data from the OCTAM model (year 2040) for the baseline analysis (without new priced managed lanes).
4. Post-processing analysis - assess the operational metrics for each alternative and estimate demand, traffic operations, and revenue on each corridor. Key outputs include volume, speed/travel time and delay, congestion mapping, and revenue. The CH2M Desktop Traffic and Revenue Analysis Model for Managed Lanes (DTRAM-ML) was used for the analysis.

Technical Reference 6 is a summary of these technical details.



EXHIBIT 7

Planning-Level Toll Demand and Revenue Analysis Modeling Approach Flow Diagram



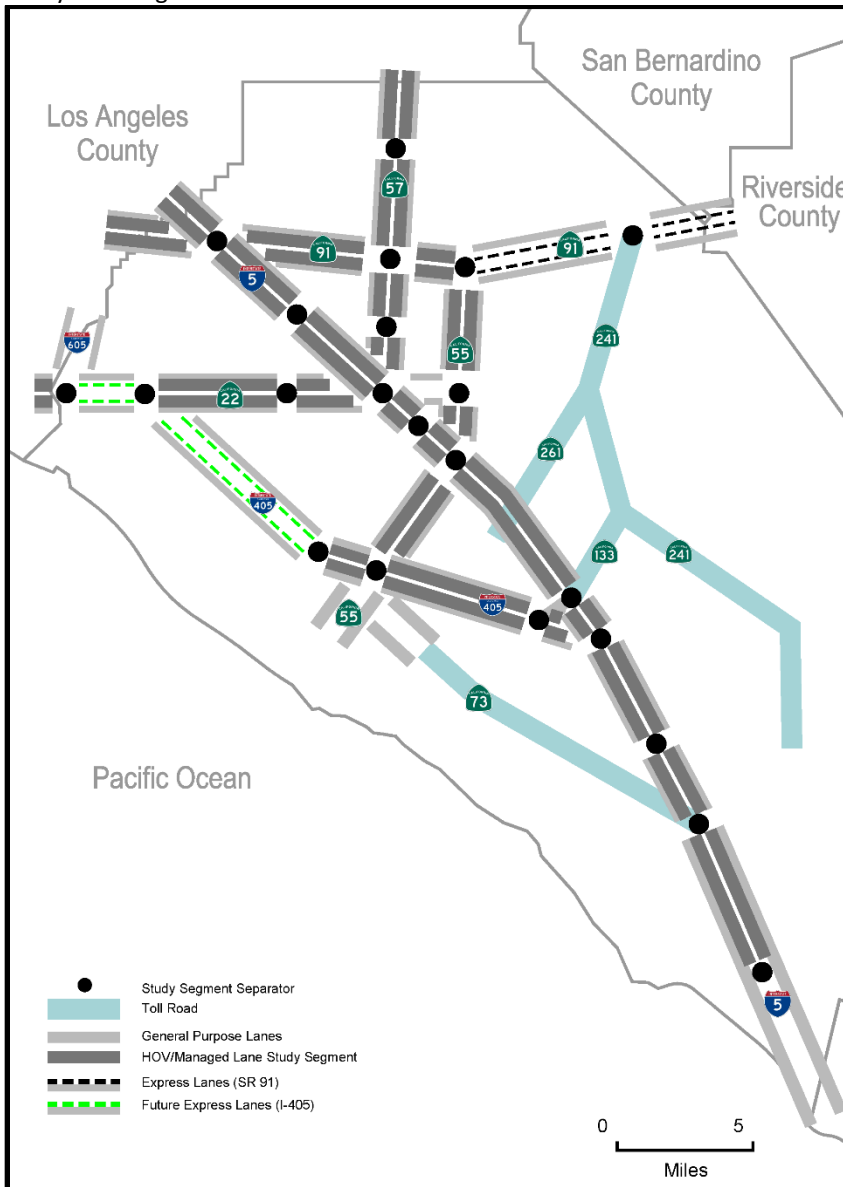
4. Evaluation Results

The DTRAM-ML analysis of managed lanes scenarios resulted in an extensive data set. Variables in the analysis are as follows:

- Segments: up to 11 segments, depending on the freeway, as illustrated in Exhibit 8.
- Directions: northbound/southbound, or eastbound/westbound
- Study periods: AM, midday, PM, and night-time
- Year: 2010 to 2075 (2035 was used as the typical horizon year)
- Freeway element: Managed and GP lanes
- Mode: Single-occupancy vehicle (SOV), HOV-2, HOV-3+, and truck

EXHIBIT 8

Study Area Segmentation



For a single scenario, the demand, volume/capacity (V/C), and speed were calculated. For I-5 alone, the calculations resulted in over 46,000 individual base calculations (not including iterations), or well over one million calculations for all scenarios. The resulting database, which totaled approximately 500 megabytes of data, was summarized by corridor and scenario.

Note that the existing Express Lanes on SR 91 (east of SR 55), and the financially committed future Express Lanes on I-405 (from SR 73 to I-605) are included in the baseline analysis. Therefore, the benefits of these Express Lanes are not part of the assessment of additional Express Lanes in these corridors. In short, the results below reflect the benefits of Express Lanes on SR 91 only west of SR 55, and on I-405 only south of SR 73.

Exhibit 9 is a summary of the delay reduction benefits, which include delay savings on both the managed and GP lanes. The graph includes data for the peak period (either AM or PM) for the entire corridor. Higher numbers indicate where Express Lanes will reduce delay the most, for all drivers (Express and GP). The delay savings are much greater for Scenario 2, where a second managed lane is added, providing substantial additional capacity. Technical details can be found on pages TR-92 to TR-262 in Technical Reference 7.

EXHIBIT 9

Analysis Summary: Delay Improvements

Delay: Throughout the peak periods, how much less time will vehicles be stuck in traffic?

Priced managed lanes will reduce overall delay for the aggregate of all vehicles, on all freeways in Orange County. The biggest reductions will be on the congested I-5 and I-405 freeways. More congestion reduction is projected when a second managed lane can be added.

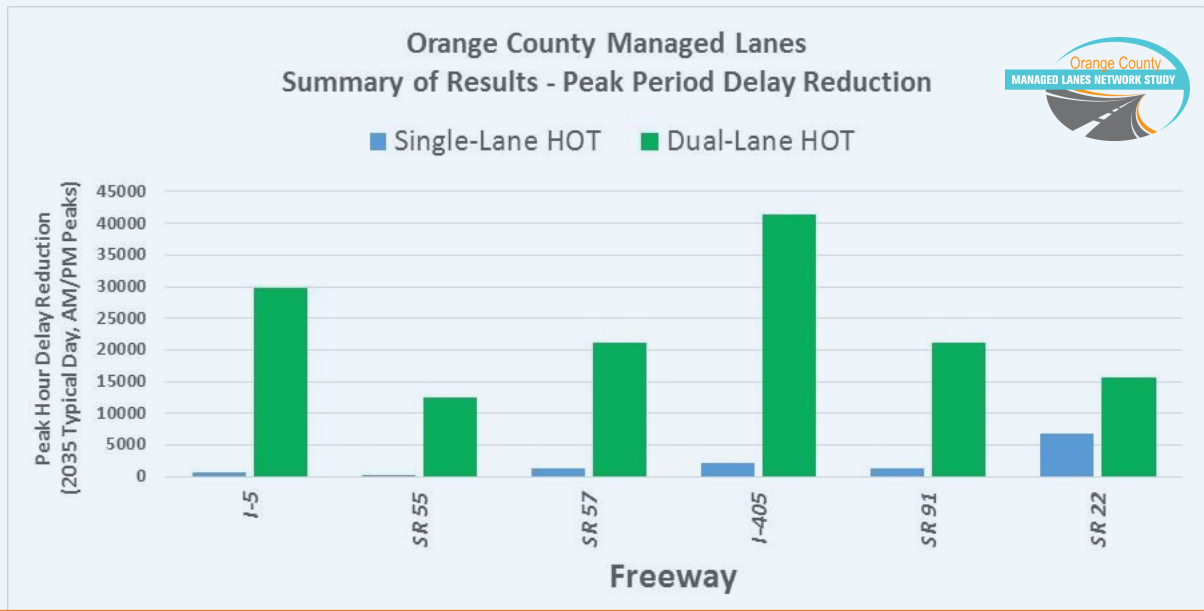


Exhibit 10 is a summary of how well the managed lanes will achieve the primary goal of addressing degradation. The graph includes a proxy estimate of the reduction in degradation in the two peak periods (AM and PM) for managed lanes in each corridor. The differences reflect how well Express Lanes can address degradation in the often-congested HOV lanes. Higher numbers indicate where Express Lanes will reduce degradation the most. The benefits are somewhat greater for Scenario 2, where a second managed lane is added, although the change from HOV-2 to HOT-3 in Scenario 1 still provides substantial benefits. On I-5, the degradation benefits are comparable to those of Scenario 1, primarily because of the high vehicle occupancy on that freeway. Technical details can be found on pages TR-92 to TR-262 in Technical Reference 7.

EXHIBIT 10

Analysis Summary: Managed Lane Improvements

ML Operations: How much will Express lanes eliminate degradation on the managed lanes?

Priced managed lanes will eliminate future degradation on the congested HOV lanes on the I-5, SR 57 and I-405 freeways the most. For both scenarios, speeds will get better with pricing, so managed lanes drivers will have more reliable trips. Adding the second managed lane will improve speeds even more.

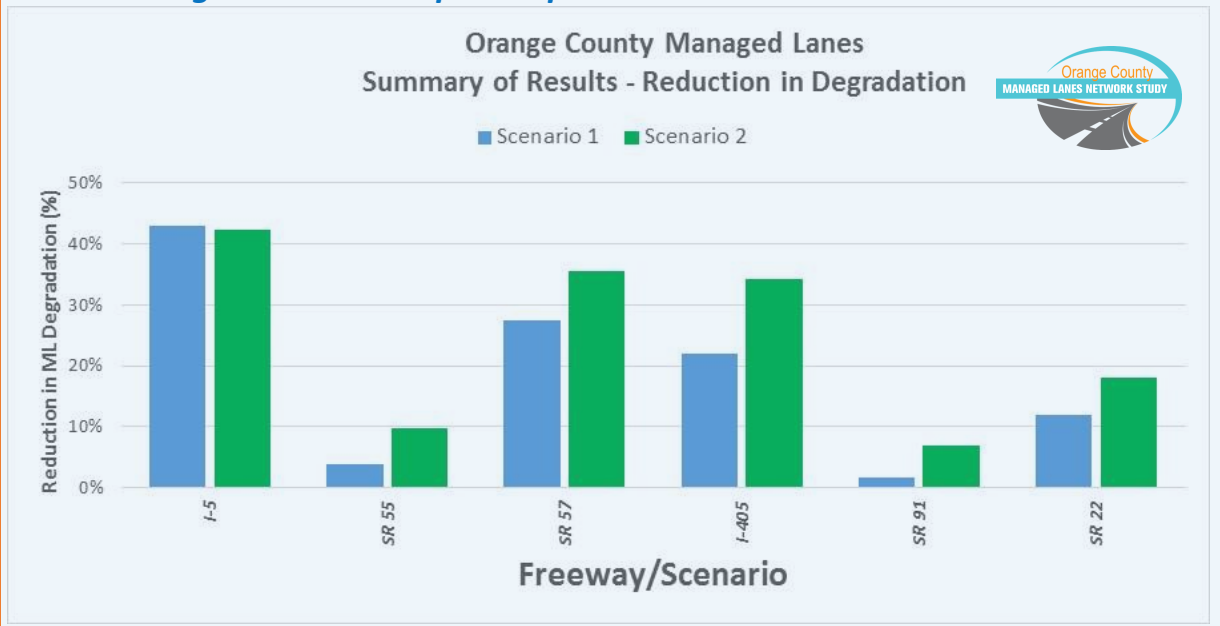


Exhibit 11 is a summary of the speed benefits for the GP lanes. The graph includes data for the peak periods (both AM and PM) for the entire corridor. Higher numbers indicate where Express Lanes will increase speed the most for the GP lanes. There are generally only speed benefits for Scenario 2, where a second managed lane is added, providing substantial additional capacity. Technical details can be found on pages TR-92 to TR-262 in Technical Reference 7.

EXHIBIT 11

Analysis Summary: GP Speed Improvements

Speed: How will speeds change for General Purpose (GP) lanes users?

Priced managed lanes will have a modest effect on GP speeds unless a second managed lane is added (Scenario 2). Scenario 1 speed changes are near zero because some HOVs shift to the GP lanes (counterbalancing paying SOVs shifting to the managed lanes). GP speeds in Scenario 2 are markedly higher.

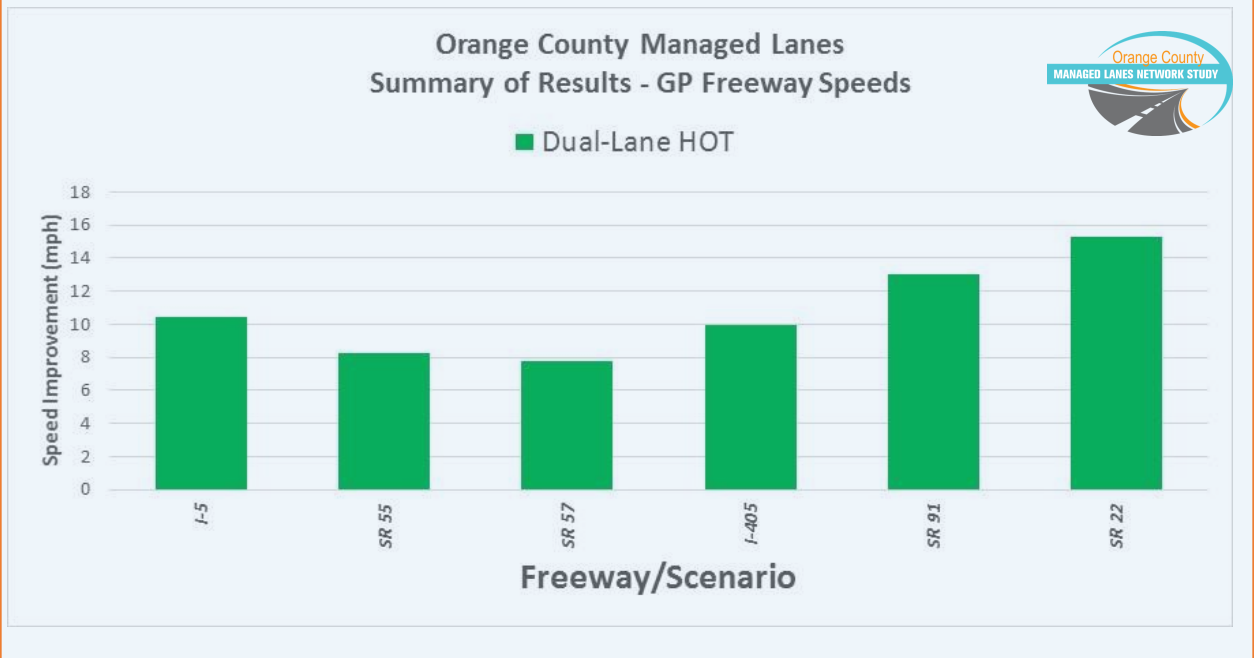


Exhibit 12 is a summary of the expected toll revenue benefits. The graph includes an assessment of annual revenue for each freeway. The DTRAM-ML model includes a toll estimation module, but the projections are less detailed than typical projections with a Traffic and Revenue (T&R) Study. However, DTRAM-ML is accurate for comparing revenues between scenarios because the assumptions are consistent in each analysis. Those revenue projections are presented in Exhibit 12 on the vertical axis (from low to high).

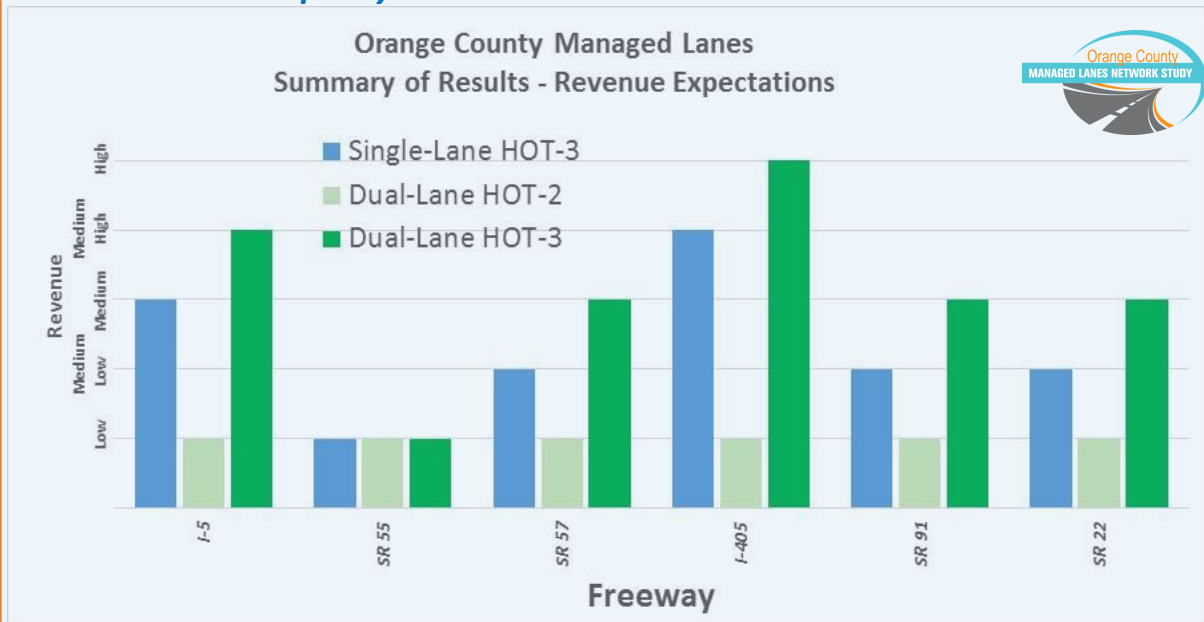
Scenario 1 is shown in blue, and the two Scenario 2 options are shown in green. The Scenario 2 HOT-2 option (light green) has the lowest expected revenue because the available capacity in the Express Lanes will serve more free HOV-2s. The Scenario 2 HOT-3 option (dark green) has the highest expected revenue because of the number of vehicles (SOV and HOV-2) who will pay to use the available capacity in the managed lanes. Technical details can be found on pages TR-92 to TR-262 in Technical Reference 7.

EXHIBIT 12

Analysis Summary: Toll Revenue Benefits

Revenue: What toll revenue is expected?

Priced managed lanes will provide additional funding to operate and maintain the existing freeway and support transit services in the corridors that they serve. Scenario 2 revenue is highest when HOV-3+ occupancy is used.



5. Implementation Priorities

The goal of this study is to determine which freeways will do best overall, and make those a priority when implementing priced managed lanes. The results in Section 4 indicate that some freeways under certain scenarios will perform better for some (but not all) of these measures.

Exhibit 13 highlights results from a combined rating and ranking exercise. Each of the performance measures described in Section 4 was evaluated on a 1-100 scale, and then combined for each freeway and scenario. From there, the ratings were converted to a *Consumer Reports*-style assessment.

The freeway corridors were assessed for the Scenario 1 (conversion) and Scenario 2 (added managed lane) evaluations. The technical (modeling) results were very different for Scenario 1 and Scenario 2, so the two separate evaluations were conducted. The technical comparisons between the two evaluations in Exhibit 13 were independent. A “best” performance rating for Scenario 1 may not be as good as a “good” or “fair” performance rating for Scenario 2, because of the additional capacity as part of Scenario 2. The approach was to compare corridors with similar investments.

EXHIBIT 13

Summary Evaluation

Summary by Freeway

Scenario 1: HOV->HOT Conversion Only

| | I-5 | SR 55 | SR 57 | I-405 | SR 91 | SR 22 |
|----------------------------|-----|-------|-------|-------|-------|-------|
| Managed Lanes Operations | ● | ● | ● | ● | ○ | ○ |
| Speed and Delay | ○ | ○ | ○ | ○ | ● | ○ |
| Funding (Revenue vs. Cost) | ● | ○ | ● | ● | ● | ● |
| Connectivity and Planning | ● | ● | ○ | ● | ● | ● |
| Stakeholders and Policy | ○ | ○ | ● | ○ | ● | ○ |
| Independent Function | ● | ○ | ● | ● | ● | ● |

Scenario 2: Added Managed Lane, for Two HOT Lanes

| | I-5 | SR 55 | SR 57 | I-405 | SR 91 | SR 22 |
|----------------------------|-----|-------|-------|-------|-------|-------|
| Managed Lanes Operations | ● | ● | ● | ● | ● | ○ |
| Speed and Delay | ● | ○ | ● | ● | ● | ● |
| Funding (Revenue vs. Cost) | ● | ○ | ○ | ● | ○ | ○ |
| Connectivity and Planning | ● | ● | ● | ● | ● | ● |
| Stakeholders and Policy | ○ | ○ | ● | ○ | ● | ● |
| Independent Function | ● | ○ | ● | ● | ● | ● |

| | |
|---|------------------------------------|
| ● | Best performance/fewest challenges |
| ● | Good performance/minor challenges |
| ○ | Fair performance/some challenges |
| ● | Poor performance/major challenges |

The last step was to translate the evaluation into implementation priorities. The timeline for project development (from project initiation through environmental documentation through final design through construction) can be several years, and securing funding may add even more time. Therefore, 15-year time periods were used to prioritize improvements. Therefore, implementing managed lanes on the highest priority corridors should be initiated as soon as practical, to complete construction before 2030. The second tier of projects would likely not be considered until after 2030.

Exhibit 14 is the final summary of implementation priorities (primary and secondary) for the corridors in Orange County. The table was developed by considering the technical analysis and input from stakeholders. The assessment of these implementation priorities was based on the assessment in Exhibit 13, comparing across freeways and between the two scenarios. Then, synergies among corridors were considered, to get to a package of corridors for each set of priorities.

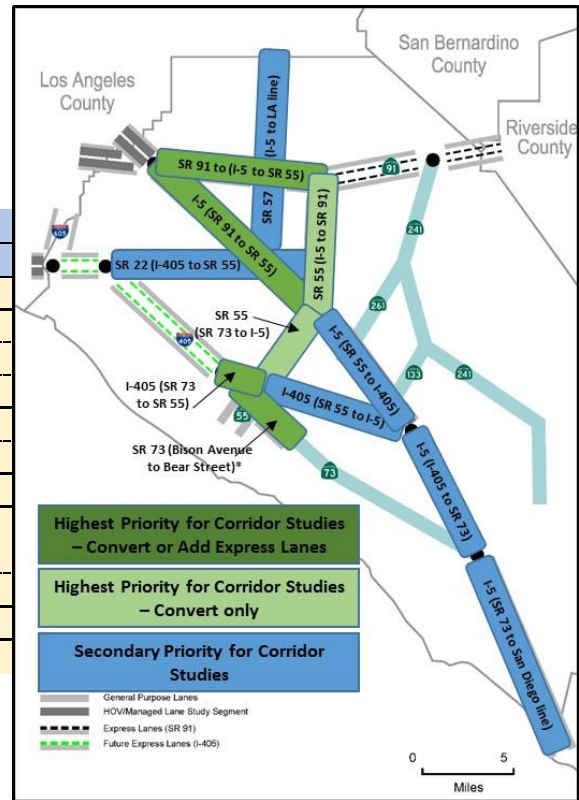
There are different priorities for SR 55 for the convert vs. add lanes scenarios, due to differences in the performance from the modeling findings. For all of the other corridors, the findings are consistent.

EXHIBIT 14

Managed Lane Implementation Priorities

| Segment | Convert | | Add Lanes | |
|--|----------|---|-----------|---|
| | Priority | | Priority | |
| | 1 | 2 | 1 | 2 |
| I-5: SR 91 to SR 55 | ☑ | | ☑ | |
| I-5: SR 55 to SR 73 | | ☑ | | ☑ |
| I-5: SR 73 to San Diego line | | ☑ | | ☑ |
| SR 55: SR 73 to I-5 | ☑ | | | ☑ |
| SR 55: I-5 to SR 91 | ☑ | | | ☑ |
| SR 57: I-5 to LA line | | ☑ | | ☑ |
| I-405: SR 73 to SR 55 and SR 73: Bison to Bear* | ☑ | | ☑ | |
| I-405: SR 55 to I-5 | | ☑ | | ☑ |
| SR 91: SR 55 to I-5 | ☑ | | ☑ | |
| SR 22: I-405 to SR 55 | | ☑ | | ☑ |

*Include consideration of SR 73 north (Bison Avenue to Bear Street) in future project development studies and plans



The end result is a set of recommended corridors to prioritize in the next phase of the project development process. I-5, SR 91, SR 55, and I-405 should be strongly considered for moving forward in the project development process, with a goal of completed construction by 2030 or earlier. Conversion to Express Lanes, including a second lane where feasible, are recommended on:

- I-5 north of SR 55
- SR 91 from the existing Express Lanes, west to I-5
- SR 55 from SR-73 to SR 91
- I-405 from SR 73 to SR 55 (potentially including SR 73 from Bison Avenue to Bear Street)



All of the recommended corridors result in clear benefits with the implementation of Express Lanes, for both the system and individually. As a system, the corridors will form a north-south connection between the existing SR 91 Express Lanes and the new I-405 Express Lanes that will be built by 2023. Proceeding forward, the intent is that the findings of the study will serve as one of the various sources that will help drive the region’s planning documents, including but not limited to future RTP and Long



Range Transportation Plan (LRTP) amendments/revisions. Individually, the key reasons for recommending each corridor for moving forward to the next stage of the project development process are:

- **I-5** ranks very high on improving operations (by reducing speed and delay) on both the managed and GP lanes. As the longest corridor in Orange County, it will also function well as a stand-alone Express Lane corridor, while also connecting to SR 55 and SR 91.
- **SR 91** is the logical extension to the existing Express Lanes to the east (which are being extended into Riverside County). The operations benefits are clear, and it should be well-received by stakeholders because of the existing Express Lanes.
- **SR 55** will see clear benefits for all users if Express Lanes are implemented. As the central spine freeway in the County, SR 55 is an essential piece of the puzzle, and will connect to several other Express Lanes corridors (I-405, I-5, and SR 91).
- **I-405** is the logical extension to the upcoming Express Lanes to the north, which are expected to be completed by 2023. Like SR 91, extending these Express Lanes (and connecting them to SR 55, where there are already managed lanes connectors at the system interchange) is a logical next step. The north end of SR 73 does not have managed lanes, although the freeway was built with sufficient pavement width for HOV or other managed lanes in the median. With the connection to I-405, SR 55, and the SR 73 toll road, Caltrans and the other stakeholders have identified this section as a high priority for Express Lanes consideration. Coupling it with the segment of I-405 (from SR 73 to SR 55) would be a natural fit for a corridor study.

To support the managed lanes network concept, an initial concept of operations (ConOps) has been developed. While it is the first ConOps and covers a broad range, it can serve as the starting point for corridor-specific ConOps throughout the County. The initial ConOps is attached as Technical Reference 8.

Other projects should be considered for implementation in the 2030 to 2045 timeline. While there are benefits in these corridors, the operations, connectivity, and policy issues suggest that they should be a lower priority. Also, regardless of the priority for implementation, all priced managed lanes projects should include monitoring and enforcement programs. Partnership meetings and public workshops should also be included.

In summary, there are clear benefits associated with improving the managed lanes system in Orange County. Converting to Express Lanes (HOT lanes) will help ensure that the investment in HOV lanes can be used as intended: to provide travel time benefits for carpools and transit users. Caltrans and other agencies will be able to better manage the freeway system, and travel time/reliability will be markedly improved. With the implementation of a more robust managed lanes network, travelers will have more choices. As transit use and carpooling become more attractive, they will be encouraged. With improvements in traffic flow, safety and the environment will be enhanced. Finally, Express Lanes will help Caltrans address federal guidelines for degradation. Moving towards two Express Lanes in each direction is ideal, but intermediate projects to convert lanes will also provide noticeable benefits.



New and expanded Express Lanes in the I-5, SR 91, SR 55, and I-405 corridors will help address degradation, improve corridor operations, advance network connectivity, and will be fiscally responsible. Project Initiation Documents (PIDs) should be started to further develop and refinement improvements in these corridors, and move toward implementation.



Technical Reference 1: Literature Survey

Technical Reference 2: Caltrans Deputy Directive DD-43-R1

Technical Reference 3: Stakeholders

Technical Reference 4: OCTAM Modeling Request

Technical Reference 5: Performance Measures for Managed Lanes

Technical Reference 6: Approach for Analyzing Managed Lanes

Technical Reference 7: DTRAM-ML Results

Technical Reference 8: Concept of Operations

All technical references are provided as separate attachments.





Express Lane Planning and Implementation Principles

User Experience

1. Express lane projects shall be designed and implemented to provide safe, reliable, and predictable travel times.
2. Express lanes shall be planned and implemented to support improved regional connectivity.
3. Design and management of the interface of express lane facilities with existing freeway, high-occupancy vehicle, and express facilities shall seek to achieve a consistent, seamless user experience.

Existing System

4. Express lane projects shall not be implemented to replace committed projects to be funded with local transportation sales tax revenues.
5. Although Caltrans and Federal Highway Administration control highway operations, OCTA does not intend to replace existing mixed-flow freeway lanes with express lanes.
6. Existing high-occupancy vehicle lanes may be functionally encompassed within an express lane project, provided:
 - a. The total number of lanes is increased by the project; and
 - b. Both vehicle throughput and average vehicle occupancy levels can be maintained and/or improved.

Operations

7. Express lane operations policies shall:
 - a. Assure coverage of capital and operations costs as well as maintenance responsibilities.
 - b. Maximize overall corridor throughput and efficiency through congestion pricing.
 - c. Promote increased average vehicle occupancy, including incentives for carpools, vanpools, and transit services.

Revenues

8. Any express lane project revenues in excess of what is needed for annual debt payments, financing requirements, and operations responsibilities shall be used for congestion relief projects and expanded transit options in the same corridor area.
9. Continued operations of express lanes, beyond bond retirement dates, shall be subject to demonstrated congestion relief measured by vehicle throughput and average vehicle occupancy levels in the corridor.



ORANGE COUNTY TRANSPORTATION AUTHORITY

Toll Lane Planning and Implementation Principles

Transmittal



BOARD COMMITTEE TRANSMITTAL

December 12, 2011

To: Members of the Board of Directors
From: Wendy Knowles, Clerk of the Board *WK*
Subject: Toll Lane Planning and Implementation Principles

Board of Directors' meeting of December 5, 2011

Present: Chairman Bates, Directors Amante, Bankhead, Campbell, Cavecche, Crandall, Dalton, Galloway, Hansen, Hennessey, Herzog, Moorlach, Nguyen, Pulido, Quon, and Winterbottom
Absent: Vice Chair Glaab and Director Nelson

Board Vote

A vote was not taken; by consensus, the Board's direction was to return this matter to the December 12, 2011 Board meeting.

Board Recommendation

Adopt the revised Express Lane Planning and Implementation Principles.

Board Discussion

On December 5, 2011, the Board of Directors (Board) discussed proposed toll lane planning and implementation principles and requested staff to make a few modifications and return with revised principles for Board action.

The revised document is attached, along with the original staff report. The revised principles 1) refer to "toll lanes" as "express lanes" to distinguish from traditional toll roads; 2) address maintenance and operations "responsibilities" instead of "costs" to accommodate future negotiation on these issues; and 3) reinforce the use of congestion pricing to ensure efficient operations.



BOARD COMMITTEE TRANSMITTAL

While there was discussion regarding express lanes and voter-committed projects, no changes were made in this regard because the language protects against "bait and switch" concerns and the agency continues to be on a path to deliver the commitments to the Measure M2 voters. Any future considerations regarding sales tax funding shortfalls can be addressed in the future through amendments to the principles and/or the Measure M2 Ordinance No. 3, if proven to be necessary.

Also, there was discussion regarding the need for additional financial guarantees, should express lanes not meet the initial financial projections. Staff believes this concern can be best addressed when project level details regarding costs, patronage estimates, revenues, funding sources, and financing are available and can be properly analyzed.

Lastly, language was added to clarify that highway operation is the ultimate responsibility of state and federal departments of transportation while expressing the clear intent that express lanes will not replace existing mixed flow freeway lanes. Staff believes the revised guidelines address the major points of discussion and recommends approval.



ORANGE COUNTY TRANSPORTATION AUTHORITY

Toll Lane Planning and Implementation Principles

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ORANGE COUNTY TRANSPORTATION AUTHORITY

Toll Lane Planning and Implementation Principles

Revised Attachment A

Express Lane Planning and Implementation Principles

User Experience

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3. Design and management of the interface of express lane facilities with existing freeway, high-occupancy vehicle, and express facilities shall seek to achieve a consistent, seamless user experience.

Existing System

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6. Existing high-occupancy vehicle lanes may be functionally encompassed within an express lane project, provided:
 - a. The total number of lanes is increased by the project; and
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Operations

7. Express lane operations policies shall:
 - a. Assure coverage of capital and operations costs as well as maintenance responsibilities.
 - b. Maximize overall corridor throughput and efficiency through congestion pricing.
 - c. Promote increased average vehicle occupancy, including incentives for carpools, vanpools, and transit services.

Revenues

8. Any express lane project revenues in excess of what is needed for annual debt payments, financing requirements, and operations and maintenance responsibilities shall be used for congestion relief projects and expanded transit options in the same corridor area.
9. Continued operations of express lanes, beyond bond retirement dates, shall be subject to demonstrated congestion relief measured by vehicle throughput and average vehicle occupancy levels in the corridor.

Express Toll Lane Planning and Implementation Principles

User Experience

1. Express Toll lane projects shall be designed and implemented to provide safe, reliable, and predictable travel times.
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ORANGE COUNTY TRANSPORTATION AUTHORITY

Toll Lane Planning and Implementation Principles

Staff Report



December 5, 2011

To: Members of the Board of Directors *Will Kempton*
From: Will Kempton, Chief Executive Officer
Subject: Toll Lane Planning and Implementation Principles

Overview

On October 3, 2011, the Executive Committee discussed and gave staff guidance regarding draft principles for toll lane planning and implementation. Revised principles are proposed, consistent with that guidance, for consideration by the Executive Committee.

Recommendation

Adopt the revised Toll Lane Planning and Implementation Principles.

Background

Orange County has been a state and regional leader in the modern development and application of toll facilities and toll lanes as part of the highway system. This includes the San Joaquin, Foothill, and Eastern toll roads built and operated by the Transportation Corridor Agencies and the 91 Express Lanes owned and operated by the Orange County Transportation Authority (OCTA).

In recent years, proposals for additional toll facilities have proliferated in the Southern California region. Projects directly involving Orange County include completion of the State Route 241 (SR-241) toll road in south Orange County; extension of the 91 Express Lanes into Riverside County; direct connection of the 91 Express Lanes and the SR-241 toll road in Orange County; and the consideration of express lanes on Interstate 405 from the State Route 55/ State Route 73 area to the Los Angeles County line. In neighboring areas, San Diego County plans for tolled lanes on Interstate 5 to Orange County, Riverside County plans to extend express lanes on State Route 91 and Interstate 15 (I-15), San Bernardino County is studying toll lanes on Interstate 10 and I-15, and Los Angeles County is pursuing high-occupancy toll lanes on various routes, some of which may connect directly to Orange, Riverside, and San Bernardino counties.

The Southern California Association of Governments (SCAG), in preparation for the 2012 Regional Transportation Plan update, is also conducting a study of toll lanes and the potential for a toll lane system in the SCAG region.

In order to respond to the many and varied toll lane and facility proposals, both within and potentially connecting to Orange County, staff is proposing a set of guiding principles to provide a framework for future Board of Directors (Board) decisions and negotiations in regards to the planning and implementation of toll lanes that affect Orange County's highway system and its users. These principles are meant to apply solely to new facilities implemented and/or operated by OCTA.

Discussion

The increasing consideration and application of tolled facilities and toll lanes on Southern California's highway system is driven by three main factors:

1. The continuing challenges of traffic congestion and the desire to better manage traffic demand and provide improved and more reliable mobility through additional capacity, operational improvements, and pricing;
2. The declining availability and reliability of traditional revenue sources (gas tax and sales tax) to fully pay for new highway facilities; and
3. Emerging environmental concerns and requirements, including pending new air quality and greenhouse gas reduction targets for transportation sources.

The potential for a growing network of toll lanes in Southern California, operated by multiple entities, often with different goals and policies, requires new thinking about planning, implementation, inter-connection, and operations of these facilities. This includes transportation policy issues such as the conditions under which such lanes will be considered and retained, how to treat existing facilities and entitlements such as high-occupancy vehicle lanes, or how to utilize "excess" revenues. In addition, it includes operational policies, such as performance objectives (throughput, congestion management, and revenues); design considerations, such as transitions between facilities and access points; and customer experience issues, such as toll information, varied toll rates, multiple collection technologies, and enforcement policies.

Staff is proposing eight fundamental principles (summarized in Attachment A) designed to guide the Board's approach as it considers various proposals for additional toll lanes on the highway system, whether within Orange County or connecting to the County from surrounding jurisdictions. More detailed and specific policy direction will be necessary as planning and implementation proceeds for any given facility, but these principles communicate a policy framework for project proponents, as well as initial benchmarks for evaluating the suitability of various proposals and projects.

- Principles 1 through 3 establish guidelines for defining the user experience focused on safety, reliability, connectivity, and to the extent possible, a seamless transition to and from various toll lanes and the traditional highway system. Since toll lanes are a service business, user experience and customer satisfaction must be bedrock concepts.
- Principles 4 through 6 define the fundamentals of how toll lanes should be considered in relation to the existing highway system, including keeping faith with existing voter commitments, preserving the existing mixed flow freeway lanes, and preserving the functional elements of existing high-occupancy vehicle lanes.
- Principle 7 establishes priority and benchmark criteria for operations of toll lanes, including cost recovery and maximizing mobility benefits.
- Principle 8 and 9 outline the allowable uses of revenues to be collected from tolls.

These principles have been developed based upon the experience with the 91 Express Lanes and consistent with the existing Board policies governing the 91 Express Lanes operation. As well, these principles take into account pending Board consideration of the addition of, and future connection to, new toll lanes and facilities in Southern California eventually becoming a network that complements the existing highway system.

These principles make a clear statement about the role that toll lanes should play in Orange County and the region, not as a replacement or an alternative for the highway system, but as an additional tool to address the significant challenges of managing congestion, funding transportation improvements, and preserving the quality of life for Orange County and Southern California residents and travelers.

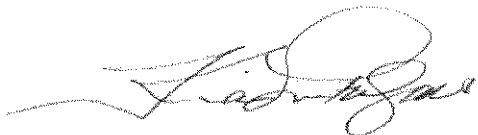
Summary

Toll lane planning and implementation principles are presented to provide a framework for reviewing and making policy decisions on proposals for new toll lane facilities within and connecting to Orange County's highway system.

Attachment

- A. Draft Toll Lane Planning and Implementation Principles

Prepared by:



Kia Mortazavi
Executive Director, Planning
(714) 560-5741



ORANGE COUNTY TRANSPORTATION AUTHORITY

Toll Lane Planning and Implementation Principles

Attachment A

Toll Lane Planning and Implementation Principles

User Experience

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Existing System

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Operations

7. Toll lane operations policies shall:
 - a. Assure coverage of capital and operations costs.
 - b. Maximize overall corridor throughput and efficiency.
 - c. Promote increased average vehicle occupancy, including incentives for carpools, vanpools, and transit services.

Revenues

8. Any toll lane project revenues in excess of what is needed for annual debt payments, financing requirements, and operations costs shall be used for congestion relief projects and expanded transit options in the same corridor area.
9. Continued operations of toll lanes, beyond bond retirement dates, shall be subject to demonstrated congestion relief measured by vehicle throughput and average vehicle occupancy levels in the corridor

91 EXPRESS LANES



OCTA'S 10-MILE TOLL ROAD

AT A GLANCE

HIGHLIGHTS (FISCAL YEAR 2016):

| | |
|------------------------------------|----------------|
| Year OCTA acquired | 2003 |
| Length of toll road (in miles) | 10 |
| Total vehicle volume (in millions) | 13.8 |
| Total customer accounts | 119,782 |
| Transponders assigned to accounts | 182,522 |
| Gross Potential Toll Revenue | \$41.9 million |

WEBSITE: www.91expresslanes.com

Fact sheet as of 7/2016

HISTORY

The 91 Express Lanes is a four-lane, 10-mile toll road extending from the Orange/Riverside County line west to State Route 55. The 91 Express Lanes project was authorized as a toll road by the State of California legislature in 1989. Built at a cost of \$135 million, the toll road opened in 1995.

The California Private Transportation Company (CPTC) was the original owner of the 91 Express Lanes. An agreement with the State of California Department of Transportation (Caltrans) included a non-compete provision that created a 1.5-mile protection zone along each side of State Route 91 (SR-91). This zone prohibited improvements along the corridor and created mobility problems as the region and corresponding transportation demands grew.

To mitigate growing concerns over congestion, the Orange County Transportation Authority (OCTA) acquired the 91 Express Lanes franchise rights in January 2003. This eliminated the non-compete provision, clearing the way for future enhancements that will increase capacity and improve traffic flow along the SR-91 corridor.

TOLL POLICY

The 91 Express Lanes toll policy, known as congestion management pricing, adjusts toll rates based on the number of vehicles on the toll road to maintain a “free flow” commute at all times. Motorists pay tolls through the convenient use of windshield mounted FasTrak® transponders that automatically deduct fees from a pre-paid account. Depending on the time of day, commuters reported saving 30 minutes on average on their drive time by using the 91 Express Lanes.

FUNDING

OCTA purchased the 91 Express Lanes from CPTC for \$207.5 million, including \$72.5 million in cash and the assumption of \$135 million in taxable bonds.

In 2004, the 91 Express Lanes became the first stand-alone toll facility to receive “A” category bond ratings. In 2015, one of the bond ratings were raised to “AA” rating following a debt restructuring. A high bond rating indicates financial strength and well-managed resources and reflects the 91 Express Lane's long history, solid long-term prospects for continued traffic growth, and strong debt-service coverage.

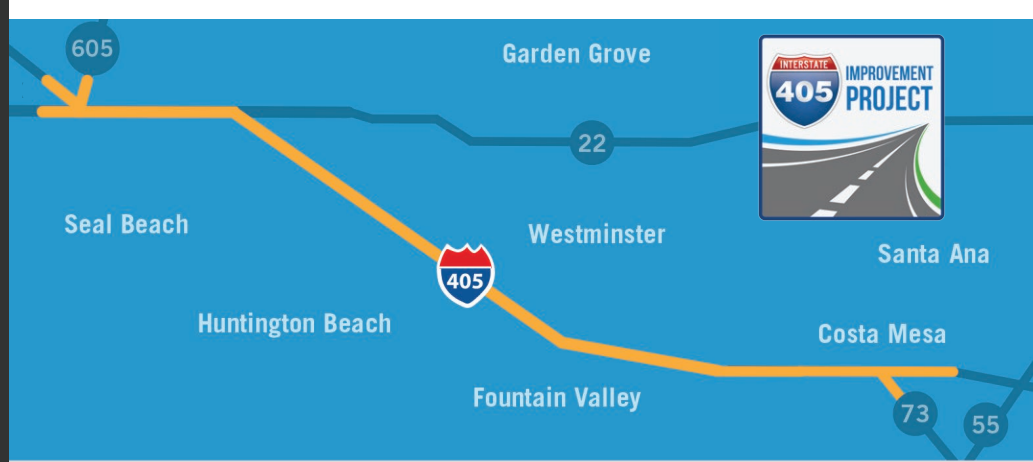
For more information, please visit the 91 Express Lanes website at www.91expresslanes.com, or call (800) 600-9191.



Orange County Transportation Authority

550 S. Main Street
P.O. Box 14184
Orange, CA 92863-1584
(714) 560-OCTA
www.octa.net

INTERSTATE 405 IMPROVEMENT PROJECT



MILES
16 miles

CORRIDOR CITIES/COMMUNITIES
Costa Mesa, Fountain Valley, Westminister, Huntington Beach, Garden Grove, Seal Beach, Los Alamitos, the community of Rossmoor, and Long Beach.

AT A GLANCE

PROJECT COST: \$1.9 billion

FUNDING: Federal & State
Local Measure M/Project K
Tolls/User Fees

PROJECT MANAGER: Jeff Mills, P.E.

COMMUNITY OUTREACH: The Community Outreach Team
888.400.8994
405project@octa.net

WEBSITE: www.octa.net/405improvement

FACEBOOK: [facebook.com/405improvement](https://www.facebook.com/405improvement)
TWITTER: @405improvement

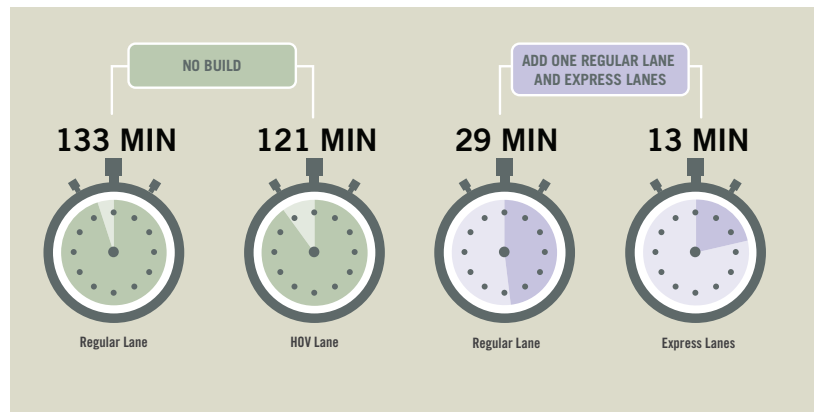
Fact Sheet as of 5/24/17

PROJECT HIGHLIGHTS

Currently, the San Diego Freeway (I-405) is one of the most congested freeways in Orange County, carrying more than 300,000 vehicle trips in some sections each day. By 2040, traffic volumes on the I-405 are expected to increase significantly. This project will increase freeway capacity, improve traffic and interchange operations, and enhance road safety to meet state and federal standards.

PROJECT STATUS / OVERVIEW

OCTA in cooperation with The California Department of Transportation (Caltrans) is widening the San Diego Freeway (I-405) between State Route 73 (SR-73) and Interstate 605 (I-605). The project will improve 16 miles of I-405 and includes adding one regular lane in each direction from Euclid Street to I-605 and making improvements to freeway entrances, exits and bridges. It also will construct the 405 Express Lanes from SR-73 to I-605. The new express lanes – incorporating the existing carpool lanes and connectors that opened in 2014 – will provide two lanes in each direction and give solo drivers the choice to speed up their commute for a toll, and carpoolers ride free.



In 2040, it's expected to take 29 minutes to travel during rush hour from SR-73 to I-605 in the general purpose lanes after improvements to the I-405 are complete. That commute can be reduced to 13 minutes if a driver chooses to take the 405 Express Lanes.

On May 23, 2016, the OCTA Board of Directors approved an initial toll policy for the 405 Express Lanes and a preliminary finance plan for the entire project.

The Measure M project, being constructed in cooperation with Caltrans, will be funded mostly through a combination of local, state and federal funds, with the express lanes portion of the Project paid for by those to choose to pay a toll and use the 405 Express Lanes.

PROJECT SCHEDULE

| | |
|-------------------------|---------------|
| Finalize Toll Policy | 2017 |
| Secure Financing | 2016 to 2017 |
| Design and Construction | 2017* to 2023 |

*construction to start late 2017

170C_043



Orange County Transportation Authority
550 S. Main Street
P.O. Box 14184
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LOCAL NEWS

As Inland toll lanes boom, why are new freeway lanes rarely free?



The west bound toll lanes on the 91 freeway are used but not as much as the main lanes of the 91 freeway on a afternoon commute Friday in Corona, CA. August 11, 2017. (TERRY PIERSON, THE PRESS-ENTERPRISE/SCNG)

By **IMRAN GHORI** | ighori@scng.com | The Press-Enterprise
PUBLISHED: August 13, 2017 at 8:00 am | UPDATED: August 15, 2017 at 7:50 am



In March, toll lanes debuted in the Inland area with the opening of the 91 Express Lanes in Corona.

They won't be the last.

Within a decade, there could be four toll lane corridors in the region.

Their growth in the Inland area reflects a regional and national trend in which transportation agencies are turning to toll lanes to finance freeway improvements and manage congestion. The lanes are easier to build because they're paid for by tolls. Still, some say paying to drive on the freeway isn't fair to those who cannot afford the fees.

"The idea is catching on quickly and spreading throughout the country," said Martin Wachs, a professor emeritus of urban planning at the UCLA Luskin School of Public Affairs and an expert on transportation policy and planning.

The Riverside County Transportation Commission spent more than a decade planning its \$1.4 billion [91 toll lane project](#), which added two toll lanes plus one general lane on an 8-mile corridor from the Orange County line to the 15 Freeway.

The agency already is looking ahead to its next project on the [15 Freeway, from Cajalco Road south of Corona to the 60 Freeway](#) at the San Bernardino County line. The \$471 million project, which will add two lanes in each direction over 14.6 miles, is expected to start construction early next year and open in 2020.

And, to the north, the San Bernardino County Transportation Authority is moving forward with plans for a 33-mile corridor on [the 10 Freeway](#) that would add two toll lanes from the Los Angeles County line near Montclair east to Redlands. The \$1.8 billion project will be the first toll project in that county.

The agency also is considering a second toll lane project on the 15, from the 60 to Highway 395 in Hesperia — essentially continuing north from where the planned Riverside County lanes would end. Officials will decide what to do next year when the environmental review is done. Construction could begin in mid-2020.

Why toll lanes?

A combination of factors are leading to construction of toll lanes instead of just widening existing freeways with more general lanes, Wachs said.

One prime reason is that charging a toll allows the agencies to manage congestion, while general lanes only provide short-term relief and quickly fill up as they are built, he said.

Traffic studies have shown that motorists will readjust their driving patterns and more will drive during peak times when free lanes are added, Wachs said.

“The only way to ensure that traffic is moving more swiftly is to charge people for it,” he said. “It can always reduce congestion because you can raise the price higher and higher until some people choose not to use it.”

When Riverside County began planning for the 91 widening, they wanted a project that would have a larger impact than just a general lane, said John Standiford, deputy executive director of the Riverside County Transportation Commission.

“I think there was a desire to build as much as we could,” he said. “We were looking at the 91 and the even bigger 15 project that we’re doing now.”

Another reason why the agency chose toll lanes was that such a project would continue toll lanes on the Orange County portion between the 55 Freeway and the county line. Riverside County residents were already a significant portion of the 91 toll lane drivers, Standiford said.

Dollars matter

Funding is another big reason behind toll lanes.

State and federal transportation dollars are scarcer for projects that don’t do more to manage congestion through carpool or toll lanes, Standiford said.

Tim Watkins, spokesman for the San Bernardino County Transportation Authority, agreed. His agency also explored a carpool-only option for widening the 10 Freeway, but would have had trouble finding a way to pay for it.

“It’s just not available for us to do it the other way,” Watkins said.

Both agencies are funding toll lanes by bonding and loans that will be paid back through future toll lane proceeds.

The Orange County Transportation Authority is considering several projects on major freeways, including the 5, 405 and 55. The agency, which today has toll lanes only on the 91, is planning one toll lane project — on the 405 between the 73 and 605 freeways.

Orange County also is home to a network of toll roads that are not part of regular freeways and are exclusively for users who pay a premium price.

In Los Angeles, the Metropolitan Transportation Authority adopted an ambitious express lanes strategic plan in January that lists 21 projects it is considering over the next 25 years. So far, five have funding available.

The agency now runs toll lanes on the 110 from Los Angeles to Torrance and the 10 from the 101 to the 605 that officials say have been successful.

One project Los Angeles County is considering would have a San Bernardino County connection — a continuation of the 10 toll lanes from the 605 to the county line.

If completed, drivers would see continuous toll lanes on the 10 from Los Angeles to Redlands. The same will happen with the two 15 Freeway projects in Riverside and San Bernardino counties and is already happening on the 91, between Orange and Riverside counties.

Both the Riverside and San Bernardino county agencies do have some non-toll projects in the works.

The Riverside County agency plans the Mid-County Parkway, a new 16-mile highway that will connect Perris and San Jacinto between the 215 and 79 freeways.

In San Bernardino County, the authority is working on plans to widen the 210 freeway through Highland, San Bernardino and Redlands. The project would close a bottleneck by adding an extra lane in each direction on a 6.1-mile stretch where the freeway now goes from four lanes to three.

Toll network

Transportation planners foresee more such connections in the coming years.

"There seems to be a network that is being established of Express Lanes," Watkins said.

That was one of the issues raised by Ontario City Councilman Alan Wapner, president of the transportation authority board, when the 10 Freeway project won approval last month.

"When we narrow the lanes down, there's going to be bottlenecks at the entrance of the county," he said. "It only makes sense that we be consistent with our neighboring counties."

As agencies turn towards toll lanes, they continue to be controversial among some residents and politicians.

Critics have referred to them as "Lexus lanes," saying wealthy drivers who can afford them benefit most.

When San Bernardino County Supervisor Josie Gonzales voted against the 10 project last month, she said she couldn't support a project that many residents in her working-class district couldn't afford.

Wachs, the UCLA professor, said there's no question that rich drivers can afford to pay to drive toll lanes. But he said those driving in regular lanes benefit because of the traffic that is taken out of those lanes and into toll lanes.

"People are not demanding these, but it's becoming more acceptable politically," Wachs said. "It's something the regional transportation agencies are promoting because it's a rational way to address congestion."

Tags: [15 Freeway](#), [91 Freeway](#), [Top Stories PE](#), [Transportation](#)



Imran Ghor

Imran Ghor has been a reporter with The Press-Enterprise since 1999. He covers Moreno Valley and Jurupa Valley.

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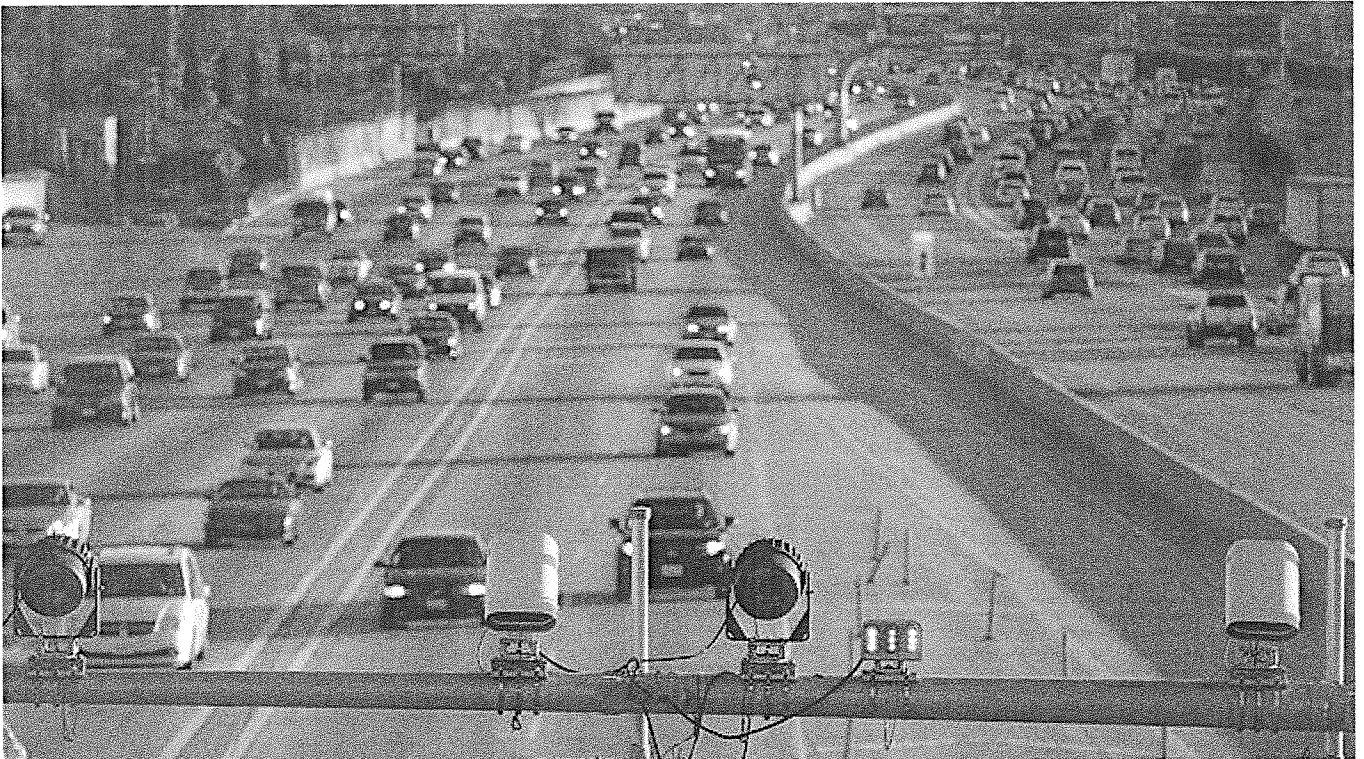
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Opinion There's only one way to fix L.A.'s traffic, and it isn't Elon Musk's tunnels. We need tolls — lots of them



Cameras and electronic sensors stand over the express lane south of the Slauson Avenue transit station on the 110 Freeway. (Los Angeles Times)

By **Herbie Huff**

MARCH 3, 2017, 7:25 AM

Los Angeles is fed up with its traffic. Despite billions spent in herculean efforts to expand our roads, our freeways are as clogged as ever. We spent \$1.6 billion to widen the 405 Freeway in 2014, and yet commute times through the Sepulveda Pass are the same. Perhaps even more frustrating, we're spending billions more to get people out of their cars and onto Metro — and not only is our traffic problem unmoved, transit ridership is declining.

Things have gotten so bad that billionaire futurist Elon Musk recently promised to “just start digging” tunnels underneath L.A. With enough layers of tunnels, says Musk, any amount of cars could be provided for.

With all due respect to Mr. Musk, this plan encapsulates everything that's wrong with how we think about traffic. Instead of building our way out of the problem, there is a proven solution to fighting traffic, one that's much easier, more effective and less costly than our current approach. It's putting a price on the use of our roads.

Nobody likes paying for anything they are used to getting for free, and freeway tolls are no exception. But why are we willing to pay for electricity, gasoline or air travel, but not for roads?

The reason that electrical power and air travel don't fail every time they get crowded is that we raise prices to manage demand. If things cost more, people use less of them. We all accept that airline tickets are more expensive during the holidays. And yet we miss that this very same, simple system of *pricing* could solve our congestion problem. Roads are the only piece of infrastructure we allow to consistently fail due to overuse.

Since 2003, cities across the country have been experimenting with something called "dynamic tolling" as a traffic solution. This entails adding what are called High-Occupancy/Toll (HOT) lanes on freeways. In a HOT lane, carpools drive for free, while solo drivers have to pay. Tolls are usually collected via a transponder, without ever having to slow down. Two of these experimental HOTs are right here in Los Angeles on the 110 and the 10 freeways.

In these HOT lanes, congestion is basically a thing of the past. On one highway in Miami, for example, average speeds went from 20 mph to 62 mph. On a Minneapolis road, speeds of 50-55 mph are maintained 95% of the time. Here in Los Angeles, average speeds on the 10 and 110 are 45 mph in the general purpose lanes and 65 mph in the HOT lanes. And the free flowing lanes are benefiting transit riders, too. Transit usage jumped 10% following the opening of the 10 and 110 ExpressLanes. Despite a poor, under-publicized rollout by Metro, these facilities have created far more traffic relief than the 405 widening at a fraction of the cost.

Dynamic tolling works by varying the price of the toll lanes by time of day. It costs more when traffic is typically busy, and less when fewer people want to use it. Prices can range from \$0.50 to around \$8 per trip.

A free-flowing road also carries more cars than a congested road, so by keeping things moving, the price actually increases the capacity on the road. Minneapolis' HOT lane, for instance, carried 33% more cars than it did when it was free.

The system works because when prices go up, it sends a signal to drivers that there are lots of other cars on the road. Just as with airfare, people respond to these signals.

People have more flexibility in their drive times than you might imagine. Roughly half of peak-hour trips are not commutes to work or school. With HOT lanes, when prices are high, people adjust accordingly. If it's worth it, they get in the lane and save time. If they don't want to pay, they have that most American of options — choice: They could use the unpriced lanes, go at a different time, carpool, or take transit to avoid the cost.

Experts have pointed to tolls as a traffic solution for decades, yet building political support for road fees continues to be a challenge — the most common complaint being: "Oh, so only rich people can drive?"

This critique ignores the fact that working Americans often suffer the most severely from the impacts of poor mobility. Working-class parents who are late to pick up their kids from day care, for example, often pay severe financial penalties. Having the option to reach their destination quickly could actually save them money. In fact, experience with dynamic tolling in the United States has shown that people of all income levels use these lanes. This objection also ignores just how inequitable and dysfunctional our current system is. Tolls may disproportionately burden the poor, but so do sales taxes, gas taxes and every other way we pay for roads.

Moreover, if you're concerned about progress and justice, consider how corrosive the traffic problem is to our public life. Competing for space in unpleasant and unpredictable traffic erodes our hospitality. Clogged roads dim our civic pride and diminish our ability to imagine a better future for our city. How many opportunities — both individually and as a city — have we rejected because we were afraid of traffic? We miss out on sporting events, or we refuse to build housing, or we fight against bike lanes and other roadway safety projects that could save lives.

Is there another way besides tolls? Unfortunately, no. We've tried them all. We've tried keeping neighborhoods suburban. We've tried density. We've tried building billions of dollars' worth of transit lines. We've tried widening roads at great expense.

Why are we so willing to try expensive, desperate policies, often with dire, unintended consequences, in order to solve traffic *without* pricing the roads? The bottom line is, when you give away something valuable for free, you create insatiable demand. Traffic is the result.

The definition of insanity is trying the same thing over and over and expecting different results.

Herbie Huff is a researcher and lecturer at the UCLA Institute of Transportation Studies.

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