



**Metro**

Los Angeles County  
Metropolitan Transportation Authority

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Los Angeles, CA 90012-2952 metro.net

**AD HOC CONGESTION REDUCTION COMMITTEE  
JULY 16, 2014**

**SUBJECT: I-405 FREEWAY (ORANGE COUNTY (OC) LINE TO LOS ANGELES INTERNATIONAL AIRPORT (LAX)) HIGH OCCUPANCY VEHICLE (HOV) TO HIGH OCCUPANCY TOLL (HOT) LANE CONVERSION FEASIBILITY STUDY**

**ACTION: RECEIVE AND FILE**

**RECOMMENDATION**

A. Receive and file the attached I-405 Freeway (OC Line to LAX) HOV to HOT Lane Conversion Feasibility Study Preliminary Concept of Operations Report..

**ISSUE**

In September 2010, a Motion # 27 (Attachment A) by Directors Dubois, Knabe, and Villaraigosa directed staff to analyze the Orange County Transportation Authority (OCTA) I-405 widening HOT lanes project and its impacts on Los Angeles (LA) County, including the potential for a corresponding facility in LA County.

Four Alternatives from Orange County to LAX were evaluated, including alternatives that considered the I-605/I-105 corridor and were ranked accordingly. Based upon technical and stakeholder input, the I-605/I-105 Corridor was identified for best overall performance and was selected as the Alternative to move forward into the Preliminary Concept of Operations (ConOps) Report where the operations of the Alternative were further defined. The Executive Summary is included as Attachment B. The entire Preliminary ConOps Report can be found at <http://www.metro.net/projects/expresslanes/public-reports/>.

**DISCUSSION**

In March 2013 staff entered into a contract with Parsons Brinckerhoff, Inc. (PB) to conduct a study to assess the feasibility of implementing a corresponding HOT lane facility in LA County. The study considered all possible routes from the OC line to LAX so alternatives included those for the I-405 corridor as well as alternatives that consider the utilization of the combined I-605/I-105 corridors.

In total four (4) conceptual alternatives that were screened and evaluated:

1. **I-405 Corridor: Single HOT/Express Lane** (Conversion of the existing HOV lane to a HOT/Express Lane in each direction).
2. **I-405 Corridor: Dual HOT/Express Lanes** (Conversion of the existing HOV lane to a HOT/Express Lane and add a second HOT/Express Lane in each direction).
3. **I-605/I-105 Corridors: Single HOT/Express Lane on I-605 and dual HOT/Express Lanes on I-105, without direct connectors** (Conversion of the I-605 HOV lane to a HOT/Express Lane and conversion of the existing HOV lane to a HOT/Express Lane and add a second HOT/Express lane in each direction, at NB I-605/WB I-105).
4. **I-605/I-105 Corridors: Single HOT/Express Lane on I-605 and dual HOT/Express Lanes on I-105, with direct connectors** (Conversion of the I-605 HOV lane to a HOT/Express Lane and conversion of the existing I-105 HOV lane to a HOT/Express Lane and add a second HOT/Express lane in each direction, with direct connectors at NB I-605/WB I-105).

The purpose of the study was to evaluate the feasibility of converting the existing I-405 HOV lanes to HOT/Express Lanes between the OC line and LAX (approximately 22 miles), and to define an initial Preliminary ConOps. The key considerations included the continuity and inter-County coordination with OCTA's I-405 Improvement Project, Federal performance requirements for HOV lanes per 23 USC § 166 (d) and coordination with South Bay and Gateway Cities Councils of Government (SBCCOG and GCCOG).

Because the I-605/OC line to LAX is also connected by a combination of the I-605 and I-105 freeways and these routes have existing HOV lanes with direct access to the I-110 Metro Express Lane facility, two additional alternatives using the I-605 and I-105 corridors were considered.

The feasibility study included the identification of alternatives, the screening and evaluation of these alternatives and then the identification of a preferred alternative to move forward into the Preliminary Concept of Operations (ConOps). The Preliminary ConOps is the final step of the feasibility study process but is only the first step in the planning and project development process.

#### Alternatives Evaluated

In consultation with the Stakeholder Review Team (SRT) 4 alternatives were identified for evaluation:

- *Alternative 1 – I-405 Corridor Single HOT/Express Lane*
- *Alternative 2 – I-405 Corridor Dual HOT/Express Lanes*
- *Alternative 3 – I-605 and I-105 HOT Lanes without Direct Connectors*
- *Alternative 4 – I-605 and I-105 HOT Lanes with Direct Connectors*

The Stakeholder Review Team met four (4) times throughout the study and consisted of members from the following agencies: Metro (11 Departments); SBCCOG; GCCOG;

Caltrans Districts 7 and 12; SCAG; CHP; OCTA; City of LA; City of Torrance; City of Culver City; Torrance Transit; Long Beach Transit; Redondo Beach Transit Gardena Municipal Bus Lines; Automobile Club of Southern California; Federal Highways Administration; and, Director Knabe's Office. Staff also conducted additional outreach to both the SBCCOG and GCCOG.

### Performance Measures

The performance measures used in the evaluation of the Alternatives were:

- **Corridor Mobility Improvement** (vehicle throughput, travel time and person throughput)
- **Constructability** (physical constraints - availability of full standard shoulders and lanes, topography, at-grade sections; right of way constraints - amount of freeway length requiring widening beyond existing footprint)
- **Connectivity** to HOV and HOT systems
- **Potential Benefit to Transit** (connectivity to bus and rail system and accessibility to park and ride lots)
- **Minimization of Environmental Effects** (air quality and environmental justice)
- **Revenue Potential**
- **Construction Costs**

### Overall Findings

- Alternative 1 is the least expensive and most constructible, but results in fair to moderate improvement in mobility, connectivity, transit potential and revenue.
- Alternative 2 has the highest revenue potential and strong mobility benefits, but requires significant widening at a cost of between \$2.9-\$3.5 Billion (estimated). This does not include right-of-way costs.
- Alternatives 3 and 4 provide very good mobility benefits, connectivity, and transit potential with the Green Line running adjacent to the I-105 as well as express bus services, but revenue potential is moderate. However, Alternative 3 can be easily implemented and at a reasonable cost, of approximately \$134 million (assuming Caltrans approval of non-standard lane configurations and design exceptions to be further analyzed as part of the Project Study Report-Project Development Study phase). Alternative 4's primary benefit is the elimination of weaving and merging to/from the I-105/I-605 HOT lanes and enhanced system connectivity, but the total cost to build the connectors is high. But since there is potential for the cost of the direct connectors to be borne by others, the cost impact is minimized.

Based on the screening and evaluation results, Alternative 3 scored the highest and was selected to move forward to the Preliminary Concept of Operations. Alternative 3 utilizes a combination of I-605 and I-105 as an alternative to I-405 to accomplish the HOT lane conversion from the OC Line to LAX. Both I-605 and I-105 have design considerations that better support the conversion of the existing HOV lanes to HOT lanes. Existing HOV demand in the I-605 and I-105 corridors is more conducive to adding toll paying traffic when compared to the I-405, which experiences HOV lane degradation along substantial portions of the study corridor during peak periods.

## Current Regional Express Lane Activity

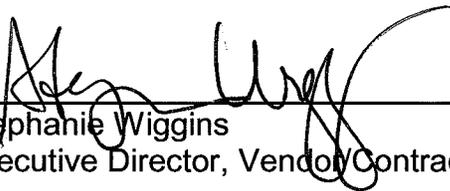
The catalyst of this study was driven by the assumption that OCTA was going to implement a HOT/Express Lane on the I-405 coming out of Orange County. The OCTA Board of Directors has now twice voted on this Alternative (October 2012 and December 2013) and both times has voted against the HOT lane Alternative in favor of adding one General Purposed Lane in each direction. Caltrans was expected to select its preferred Alternative in May 2014. At the time of this writing a preferred Alternative had yet to be selected by Caltrans. Assuming Caltrans meets this timeline the EIR/EIS is expected to be finalized in November 2014 with a Design-Build contract award in November 2015 and Construction to begin in 2016. If the Metro Board wishes to pursue a HOT/Express Lane on the I-105/I-605 corridors, the Preliminary Con Ops is only the first step in project development. There are many necessary steps before the project could actually be implemented and the ConOps finalized. The next step in the project development process would entail the preparation of a Project Study Report-Project Development Study (in compliance with Caltrans requirements), preparation of a Project Approval/Environmental Document, and then detailed design and construction and procurement of a system integrator.

In addition, at its December 2013 meeting, the San Bernardino Association of Governments (SANBAG) Board overwhelmingly voted (24-3) to continue the study of Express Lanes on the I-10 and I-15 corridors. The Board directed their staff to complete the I-10 Corridor Project Approval/Environmental Document (PA/ED), 33 miles in length, for the Express Lane and HOV build alternatives. Concurrently, the Board voted to initiate the PA/ED for an Express Lanes alternative on the I-15 Corridor Project, 32 miles in length, which is the only build alternative for the I-15 corridor. Should the Express Lanes Alternative be selected for I-10, construction is expected to begin in 2019, with completion of the initial segment from the Los Angeles County Line to I-15 in 2021, and overall completion to Redlands in 2024. The current I-15 schedule would follow closely behind, with construction completion of the initial segment from SR-60 to SR-210 by 2024, and the remaining segments to US-395 by 2030.

## **ATTACHMENT**

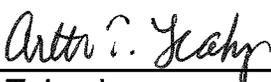
- A. Board Motion #27 Director Knabe, DuBois and Mayor Villaraigosa
- B. I-405 Freeway (OC Line to LAX) HOV to HOT Conversion Feasibility Preliminary Concept of Operations Report – Executive Summary

Prepared by: Kathleen McCune, Director, 213-922-7241



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Stephanie Wiggins  
Executive Director, Vendor Contract Management



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Arthur T. Leahy  
Chief Executive Officer

**Motion by Supervisor Don Knabe, Mayor Antonio R. Villaraigosa  
& Director Diane DuBois**

**Interstate 405 Inter-County Corridor Analysis**

**Planning & Programming Committee**

**September 15, 2010**

The I-405 San Diego Freeway is one of the most congested freeways in the U.S. with two the top five freeway interchange bottlenecks.

According to the 2009 Texas Transportation Institute Mobility Report, travelers in the Los Angeles-Long Beach-Santa Ana area waste 70 hours a year stuck in traffic and has the dubious distinction of ranking number one in the U.S. in annual delays per commuter travel.

MTA is tackling this issue -- in part -- through the development of two high occupancy toll (HOT) lanes projects along the I-110 and I-10 freeways.

The MTA Board also adopted the concept of a countywide HOT lane network in the "Strategic Plan Highway" category of the 2009 Long Range Transportation Plan.

Orange County also is considering implementation of HOT lanes.

The Orange County Transportation Authority (OCTA), in cooperation with Caltrans, is proposing to widen the I-405 freeway between the SR-73 and the I-605 (Los Angeles County line).

Both Caltrans and OCTA are in the process of preparing an Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for this project.

**CONTINUED**

The I-405 EIR/EIS studying four alternatives to help relieve traffic congestion along the 13 mile project segment.

One of the alternatives being studied in the EIR/EIS is the "Express Facility Alternative" (Alternative 3) where new high occupancy toll (HOT) lanes would be built next to the existing carpool lane.

HOT lanes offer drivers the option of driving on a high occupancy vehicle (HOV) lane for a toll, when they would normally not meet the occupancy requirements of the lane.

The effectiveness of a HOT lane system increases as its reach expands.

Conversely, ending a new freeway widening and HOT Lane facility at the I-605 will constrict the project's effectiveness and potentially create an unintentional bottleneck.

There is an opportunity for MTA to explore whether it makes sense to continue OCTA's proposed I-405 widening and HOT lane project in Los Angeles County north of the I-605.

I MOVE that the MTA Board direct the CEO to do the following:

- A. Analyze the Orange County Transportation Authority I-405 widening HOT lanes project and its impacts on Los Angeles County, including the potential for a corresponding facility in LA County;
- B. Complete a corresponding traffic analysis that describes the traffic impacts of the project at and near the Los Angeles-Orange county line; and
- C. Report back in the November/December 2010 MTA Board cycle.

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Los Angeles County Metropolitan Transportation Authority

# METRO EXPRESSLANES

Metro I-405 Freeway (OC Line to LAX) HOV to HOT  
Conversion Feasibility Study  
Final Preliminary Concept of Operations Report  
(Executive Summary)

June 4, 2014

**PARSONS  
BRINCKERHOFF**



(with FasTrak)



(with FasTrak)

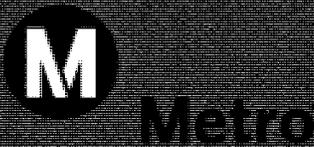


(with FasTrak)



(on Silver Line)

It's about time.



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## EXECUTIVE SUMMARY

In September 2010, Metro's Board of Directors approved a motion directing staff to examine the impacts that an Express Lane alternative on the I-405 Freeway, coming out of Orange County, would have in Los Angeles County. The purpose of the Metro I-405 Freeway (Orange County Line to LAX) HOV-to-HOT Conversion Feasibility Study was to evaluate the feasibility of converting the existing HOV lanes along I-405 to Express Lanes between the Orange County Line (OCL) and LAX (a distance of approximately 22 miles. Based on this feasibility determination, the study defined a Preliminary Concept of Operations to provide continuity in the Express Lane system should OCTA and Caltrans decide to choose the Express Lane alternative as part of the ensuing I-405 Improvement Project Draft EIR/EIS in Orange County.

This Preliminary Concept of Operations Report provides preliminary traffic and toll revenue estimates and findings, which will serve as the basis for the Metro Board of Directors to expand the Express Lanes system from Orange County, as well as directing the design of the respective facilities and guiding the preparation for facility construction and procuring a systems integrator.

As part of this study, the project team, in consultation with the Metro Project Management Team and the Stakeholder Review Team, identified two routes to get from the OCL to LAX, starting at the northern terminus of the I-405 Improvement Project: 1) continuing northbound on the I-405 Freeway; and 2) a combination of northbound I-605 to westbound I-105. Two conceptual build alternatives with different Express Lane configurations were then evaluated for each of the corridor combinations, for a total of four build alternatives as explained below.

### ALTERNATIVES CONSIDERED

Four alternatives were identified as suitable for evaluation: two alternatives connect the OCL to LAX via the I-405 Freeway (Alternatives 1 and 2) and two via the I-605 and I-105 Freeways (Alternatives 3 and 4). The table below summarizes the differences in lane configurations for each of the alternatives. Alternatives 1 and 2 differ in the number of Express Lanes proposed in each direction of the I-405 (single lane in Alternative 1 versus dual-lanes in Alternative 2); Alternatives 3 and 4 are identical except for the inclusion of HOV direct connector ramps in Alternative 4, which enable Express Lane users to transition from the northbound I-605 to westbound I-105 Freeways (and vice versa) without exiting the Express Lanes. These direct connectors were first proposed as part of the Gateway Cities COG SR-91/I-605/I-405 Hot Spots Feasibility Study to augment the existing HOV lane network, and are assumed to be built by others but operated as Express Lanes in the future.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
<b>Alignment</b>	I-405	I-405	I-605 and I-105	I-605 and I-105
<b>Express Lane configuration (each direction)</b>	Single	Dual	Single on I-605; Dual on I-105	Single on I-605; Dual on I-105
<b>Direct Connector Ramps</b>	N/A	N/A	No	Yes

Following an initial screening of the corridors based on HOV degradation criteria (speed and volumes), a detailed evaluation of the above alternatives was conducted, including the evaluation of performance measures such as corridor mobility, constructability, connectivity, potential benefit to transit, environmental effects, revenue potential, and cost. Based on the technical evaluation, Alternative 3 was identified as being preferred because it had the best overall performance. However, it was acknowledged that traffic operations associated with Alternative 3 would be enhanced in the future by the completion of the currently proposed direct connector due to the elimination of weaving to transition between I-605 and I-105. As a result, it was also determined that once the HOV direct connectors at the I-605/I-105 are built, the I-105 and I-605 Express Lanes should be reconfigured to tie in with the connectors to provide a seamless connection between the two facilities and to address any potential bottlenecks, effectively accomplishing Alternative 4.

### **FACILITY DESIGN CONSIDERATIONS**

A conceptual engineering design was prepared for the preferred Alternative 3, to conceptualize placement of lanes, observation areas, signs, toll readers, and to determine the likelihood for right-of-way acquisition. Both non-standard and full-standard lane configurations were also examined to present a best case and worst case scenario for cost-estimation purposes. However, more detailed design on access treatments, right-of-way requirements, tolling equipment placement, CHP observation areas, and structural impacts is required. Therefore, more detailed information would be provided during the PSR-PDS phase, should this concept advance further.

Alternative 3 proposes to convert the existing HOV lane on the I-605 between OCL and I-105 to an Express Lane within the existing pavement section. The existing cross-section of the I-605 does not meet Caltrans standards, so the same condition is proposed to remain with the Express Lanes, except for minor spot widening to accommodate tolling equipment and signage, and a weave lane/zone at select access locations. This would necessitate Caltrans approval of design exceptions and fact sheets as part of the PSR-PDS phase. However, a full standard condition would require acquisition of new right-of-way along the entire length of the corridor and result in significant impacts.

On the I-105 Freeway, it is proposed that in addition to the conversion of the existing HOV lane, a second Express Lane be added in each direction between the I-605 and the I-405. The Express Lanes would be combined with the existing HOV lanes providing two Express Lanes

in each direction along the I-105 between I-605 and I-405. Since the I-105 Freeway was built to full-standards, the addition of the second Express Lane could be accomplished through the reduction in lane widths and shoulder widths, but this again would require Caltrans approval of design exceptions and fact sheets as part of the PSR-PDS phase. However, a full standard condition would require acquisition of new right-of-way along the entire length of the corridor and result in significant impacts.

### **TOLL OPTIMIZATION**

Planning-level traffic and revenue estimates were prepared to assess the potential demand for Express Lanes. Differences between two policy objectives (revenue maximization vs. travel-time cost minimization) and operational objectives (free use of Express Lanes under HOV2+ or HOV3+) were evaluated. The analysis determined that revenue generation is concentrated in peak periods and that, generally, higher revenues are generated on the I-105 than on the I-605. Annual toll revenues for Alternative 3 are projected to be between \$5.3 to \$7.2 million in 2035 under a HOV 2+ toll free policy, and between \$12.7 to \$20 million in 2035 under a HOV 3+ toll free policy. Further study using “micro-simulation” tools is needed to fully address what effects access point configuration and other design details may have on traffic volumes, revenue, and travel time cost savings.

### **ROUGH ORDER OF MAGNITUDE (ROM) COST ESTIMATE**

ROM cost estimates for Alternative 3, based on the Metro I-10/I-110 ExpressLanes Congestion Reduction Demonstration Project and the Metro/Gateway Cities Council of Governments SR-91/I-605/I-405 Congestion Hot Spots Feasibility Report, were prepared for construction under two scenarios: 1) using non-standard existing freeway lanes and shoulders, with minimum changes to the existing pavement section, and 2) using full standard lane and shoulder widths, excluding the cost for new ROW acquisitions. The ROM cost estimates are as follows:

- Scenario 1 — Non-standard lane configurations: \$134 million
- Scenario 2 — Full standard lane configurations: \$2.6 billion

### **OPERATIONS AND MAINTENANCE (O&M) COSTS**

Estimated annual O&M costs for Alternative 3, taking into account both roadway maintenance costs (e.g., preventive maintenance, sweeping, drainage, electrical systems, graffiti removal, guardrails, etc.) and tolling systems costs, sum to approximately \$7.0 million per year for both the I-105 and I-605 Express Lanes.

### **OPERATING CONCEPT**

The following represent preliminary operating considerations for the implementation of Alternative 3:

- The implementation and operation of the I-105 and I-605 Express Lanes will be administered by Metro, in coordination with Caltrans and the FHWA, and will be

carried out in two phases (initial implementation on the I-105 Freeway, and a full build-out including a connection to the future HOV direct connectors at I-605/I-105 and HOV to Express Lane conversion on the I-605 Freeway if or when they are built in the future as a separate project);

- The I-105 and I-605 Express Lanes will allow single-occupant vehicle (SOV) drivers to pay a toll for access to the lanes;
- Tolling will shutdown (i.e., no toll users will be permitted to enter the Express Lanes) when travel speeds fall below 45 mph for more than 10 minutes;
- The new Express Lanes would operate 24 hours a day/7 days per week, and will be separated from the general-purpose lanes by double solid white lines;
- With electronic tolling there is no manned toll collection at toll plazas. All tolls will be electronically collected (all cashless) and will be dynamically priced to manage congestion in the lanes as with the current I-10/I-110 ExpressLanes;
- Minimum and maximum tolls will be consistent with adopted toll policies set by the Metro Board;
- All vehicles (both single occupancy vehicles and high occupancy vehicles) must have a tag (an Automatic Vehicle Identification (AVI) switchable transponder (i.e., FasTrak® to use the Express Lanes), except for public transit buses and motorcycles. The switchable transponder will allow HOV vehicles to self declare their occupancy status. Vehicles with 2 or more occupants per vehicle will be allowed to use the Express Lanes toll free;
- Trucks with greater than 2 axles are prohibited;
- Emergency vehicles may use the Express Lanes when responding to incidents;
- Vehicles displaying a DMV issued white or green Clean Air Vehicle decal can use the ExpressLanes toll-free with a switchable FasTrak set to 3 (3+ person carpool), or until such time the clean fuel vehicle exemption expires on January 1, 2019;
- The Electronic Tolling system will interface with the TAP Program systems for awarding Express Lane toll credits to customers who also use transit in the same corridor;
- Qualifying residents of Los Angeles County will receive a \$25 credit when they set up their account (proof of eligibility required). This credit can then be applied to either the transponder deposit or pre-paid toll deposit;
- Information on current tolls will be disseminated through variable and static message signs, printed, web-based media, and 511;
- Signage requirements for Express Lanes shall comply with the 2012 California Manual on Uniform Traffic Control Devices (CaMUTCD) and the 2009 Federal MUTCD, where applicable, and to provide uniformity for motorists;



- Toll violations will be handled through license plate video enforcement and occupancy violations through visual inspections by CHP;
- The new Express Lanes will integrate with the existing back office operations in Gardena to carry out customer service center functions including, sales, call center operations, account processing, accounting, equity discount/equity program management, violation processing, and other administrative functions; and
- Gross toll revenues will first be used to cover the costs to operate and maintain the Metro ExpressLanes. Per State law, net toll revenues must be reinvested in the corridor where generated in transit and/or carpool lane improvements. Use of net toll revenues will be allocated pursuant to the Board adopted LA County Congestion Reduction Demonstration Program: Guidelines for Net Toll Revenue Allocation.

### **PHASING RECOMMENDATIONS**

Due to the cost and complexities associated with implementing Express Lanes on both the I-105 and I-605 Freeways, a partial implementation of Alternative 3 is recommended. A phased approach to delivering improvements on both corridors, where the conversion and expansion of Express Lanes on the I-105 Freeway (between I-405 and I-605) is delivered first and longer-term implementation of I-605 Express Lanes is deferred until the future I-605/I-105 HOV Direct Connectors are built. Then the I-105 Express Lanes would be reconfigured to tie into the direct connectors to address potential weaving issues and lane balancing, and the existing I-605 HOV lanes would be converted to Express Lanes (between I-105 and OCL). Completion of the direct connectors would essentially result in Alternative 4 being implemented. But given the uncertainty in funding for the direct connectors, the phased implementation of Alternative 3 is the preferred approach. Integration with the existing I-10/I-110 ExpressLanes program should be handled so as to make the expansion of the program seamless to the customer. How the new I-105 and I-605 Express Lanes will be designed, constructed, operated and ultimately tied into direct connectors will require more detailed design and environmental review.

Initial steps necessary to move forward include: 1) expanding Metro's tolling authority to introduce new Express Lanes on the I-105 and I-605, through recently introduced Senate Bill 1298 (Hernandez) or other means; 2) Confirming with the Court that the introduction of Express Lanes on I-105 does not violate the Consent Decree that governed the I-105 freeway's original construction; 3) Incorporating the study's recommendations as part of Metro's next L RTP and SCAG RTP/SCS; and 4) Continuing to evaluate long-term improvement needs, including transit options and other capacity enhancing and operational strategies, for the entire I-405 corridor, as was recommended by the Gateway Cities and South Bay Cities COGs.



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