Los Angeles County

Metropolitan Transportation Authority

Countywide ExpressLanes Strategic Plan

PREPARED FOR:

Metro

ONE GATEWAY PLAZA

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January 6, 2017

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AB	Assembly Bill
ATM	Active Traffic Management
Caltrans	California Department of Transportation
CAVs	Clean Air Vehicles
CEQA	California Environmental Quality Act
CHP	California Highway Patrol
CRD	Congestion Reduction Demonstration
CTC	California Transportation Commission
CTOC	California Toll Operators Committee
DSRC	Dedicated Short Range Communications
FHWA	Federal Highway Administration
GPLs	General Purpose Lanes
HOT	High Occupancy Toll
HOV	High Occupancy Vehicle
ITS	Intelligent Transportation Systems
LOS	Level of Service
LRTP	Long Range Transportation Plan
MAP-21	Moving Ahead for Progress in the 21st Century Act
Metro	Los Angeles County Metropolitan Transportation Authority
MPO	Metropolitan Planning Organization
MUTCD	Manual on Uniform Traffic Control Devices
NEPA	National Environmental Policy Act
OCTA	Orange County Transportation Authority
O&M	Operations and Maintenance
PA/ED	Project Approval/Environmental Document
PSR/PDS	Project Study Report/Project Development Support
PPP	Public Private Partnership
RapidTOM©	Rapid Toll Optimization Model
RCTC	Riverside County Transportation Commission
RFID	Radio Frequency Identification
RTP	Regional Transportation Plan
SB	Senate Bill
SCAG	Southern California Association of Governments
SCS	Sustainable Communities Strategy
SOVs	Single Occupant Vehicles
SRTP	Short Range Transportation Plan
TCA	Transportation Corridor Agencies
VPDS	Vehicle Passenger Detection Systems
VMT	Vehicle Miles Traveled
WSDOT	Washington State Department of Transportation

EXECUTIVE SUMMARY

This Countywide ExpressLanes Strategic Plan builds on the success of the I-110 and I-10 Congestion Reduction Demonstration pilot program (also known as ExpressLanes) by establishing a vision for Metro to deliver a system of Express Lanes for Los Angeles County using a network approach to maximize regional benefits. A countywide ExpressLanes network will create a more reliable, faster travel option that makes better use of existing vehicle capacity in carpool lanes - also known as high occupancy vehicle (HOV) lanes. The plan also aims to address the degradation in HOV lane performance already experienced on many freeway corridors in the county, and provide Express Lanes users with a seamless customer experience.

The Strategic Plan identifies the most promising Express Lane corridors and potential funding sources needed to implement the plan. The Metro Countywide ExpressLanes Strategic Plan was prepared as an extension of *Southern California Association of Governments (SCAG's) Express Travel Choices Phase II Study - Regional Express/HOT Lanes Implementation Plan and Concept of Operations*. The Metro Strategic Plan is consistent with the analysis methodology used in the SCAG study to estimate the potential mobility benefits and revenue generated by Express Lane projects. This approach ensured that the Metro Countywide ExpressLanes Strategic Plan is consistent with the SCAG regional study and minimized duplication of effort.

The Strategic Plan is intended to be updated periodically to reflect changes in project costs, revenues, economic conditions, and project priorities that will undoubtedly occur over the next 30+ years.

The primary objectives of Metro's Countywide ExpressLanes Strategic Plan are to:

- Identify and recommend potential corridors that can benefit from HOV to High Occupancy Toll (HOT) or Express Lane conversion;
- Develop a resource plan for existing and future Express Lane corridors;
- Respond to degraded HOV facilities across Los Angeles County as well as transportation needs which have outpaced traditional revenue sources;
- Provide recommendations regarding tiers of projects, phasing, planning-level costs and revenue forecasts, and a timetable for implementation;
- Provide a high-level assessment of vehicle occupancy requirements on existing and planned HOV/Express Lane facilities.

The Countywide ExpressLanes Strategic Plan screened all planned, in construction, and existing carpool lanes in Los Angeles to assess the potential benefits and costs of conversion to ExpressLanes operation. The individual corridors included in the Strategic Plan were evaluated using a two-phased screening process assessing their mobility benefits and financial feasibility.

The screening process utilized the SCAG Regional Travel Demand model and the Rapid Toll Optimization Model (RapidTOM) to quantify the mobility benefits of potential ExpressLanes based on available capacity in the HOT lanes, congestion in the general purpose lanes (GPLs),

and the value of time savings by using the HOT lanes. This analysis also provided a general indication of the financial feasibility of an Express Lane.

The corridors were ranked according to their mobility and financial feasibility score and then qualitative factors were applied including connectivity with other Express Lane corridors, transit benefits, funding availability, and the potential ability to accommodate two Express Lanes in each direction. Project segments in Tier 1 had the highest combined mobility and financial screening scores and tended to exhibit the most robust forecasts of traffic and revenue. Segments in Tiers 2 and 3 exhibited comparatively lower screening results and, as such, tended to have less robust traffic and revenue performance.

Recognizing that the implementation of a Countywide ExpressLanes network would require substantial investment and time to plan and construct, it was assumed that the individual segments comprising the network would be implemented in tiers approximately ten-years apart as follows:

- Tier 1 — near-term (within 5-10 years)
- Tier 2 — mid-term (within 15 years)
- Tier 3 — longer-term (within 25 years)

Following the identification of the three project tiers, a preliminary, high level ExpressLanes Resource Plan was prepared to estimate the cost of the strategic plan projects and identify existing and potential funding sources.

The analysis led to the recommendation to develop a 621 lane-mile Express Lane network, mostly comprised of single lane facilities but dual lane facilities are preferred where right-of-way allows. The proposed Express Lane network is shown in **Figure 1** and is made up of the existing I-110 and I-10 ExpressLanes and the Tier 1, 2, and 3 projects.

Some of the proposed ExpressLanes projects are funded through Measure M (**Table 1**). For projects without identified funding, staff will attempt to secure other sources of funding including bonds, Transportation Infrastructure Financing and Innovation Act (TIFIA) loans, grants, and net toll revenue loans from other ExpressLanes within the County if permitted.

In order to move forward with a system of Express Lanes in Los Angeles County, Metro will submit Tier 1 projects as a network to the California Transportation Commission to request tolling authority for those corridors; begin planning studies for Tier 1 projects to analyze the mobility benefits, cost, and right-of-way requirements of single and dual ExpressLanes, prepare traffic and revenue studies, develop preliminary concept of operations reports, and prepare a comprehensive financial plan. In addition, Metro will conduct a detailed analysis to identify locations and configurations of HOV direct connectors.

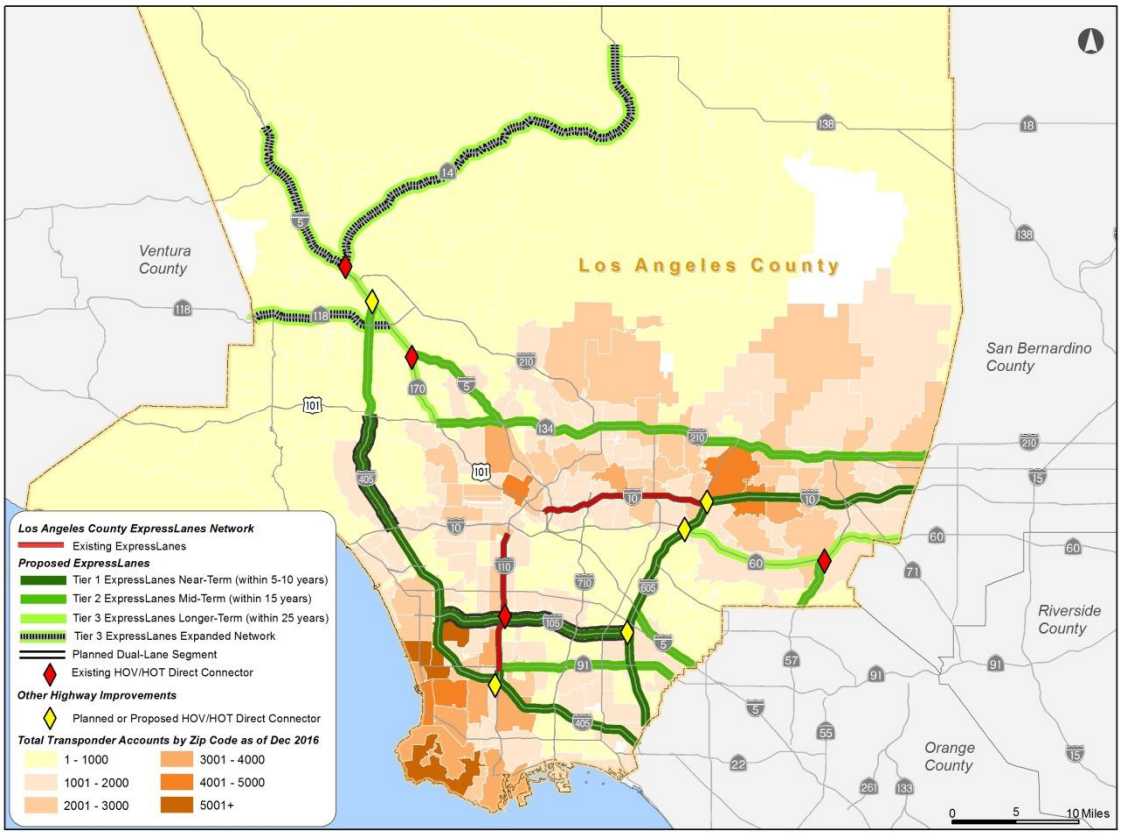


Figure 1: Los Angeles County Strategic Buildout Express Lanes Network

Table 1: Express Lane Projects Funded through Measure M

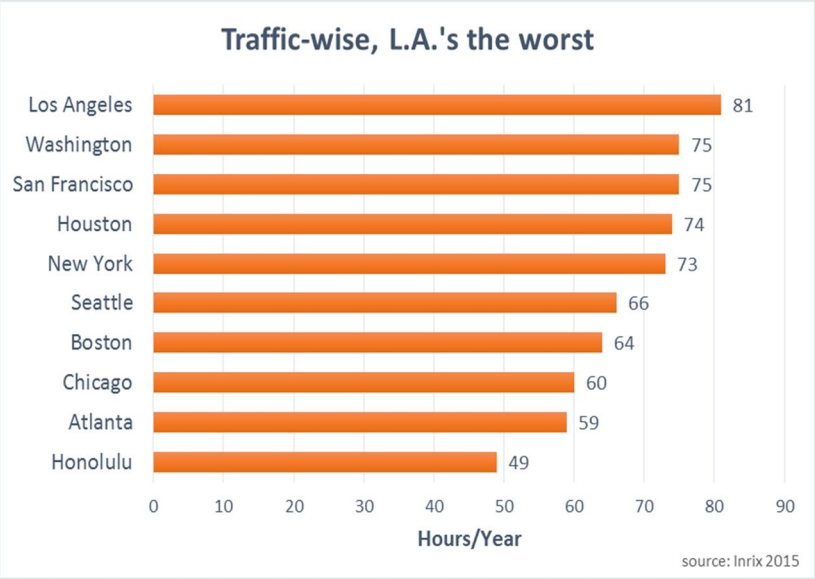
Tier 1	Measure M Funding
I-10 between I-605 & LA/SB county line	None identified*
I-105 between I-405 and I-605	$175,000,000
I-110 ExpressLane extension south to I-405/I-110 interchange	$51,500,000
I-405/I-110 Int. HOV Connect Ramps and Interchange Improvements	$250,000,000
I-405 between US-101 & I-10	$260,000,000
I-405 between I-10 and LA/OC county line	None identified*
I-605 between I-10 & LA/OC county line	None identified*
I-605/SR-60 Interchange HOV Direct Connectors	$130,000,000
Tier 2	
I-5 between I-605 & LA/OC county line	None identified*
I-5 between SR-170 & SR-134	None identified*
SR-57 between SR-60 & LA/OC county line	None identified*
SR-91 between I-110 and LA/OC county line	None identified*
SR-134 between I-210 & SR-170	None identified*
I-405 between US-101 and I-5	None identified*
Tier 3	
I-5 between SR-170 and Parker Road	None identified*
SR-14 between Avenue P8 & I-5	None identified*
SR-60 between I-605 & LA/SB county line	None identified*
SR-118 between I-5 & LA/Ventura county line	None identified*
SR-170 between I-5 & SR-134	None identified*

* May be eligible for Measure M Highway Funds

BACKGROUND

Los Angeles area freeways have consistently ranked among the worst in the nation for traffic congestion, which has resulted in hours of delay, productivity losses, wasted fuel consumption and air pollution. Accordingto SCAG, in Los Angeles County alone, vehicles travel about 205 million miles each weekday, with a projected growth to 223 million by 2040. And according to Inrix, Angelenos spend the most hours per capita in congestion compared to other U.S. cities. However, due to limited freeway rights-of-way, insufficient funding, and environmental concerns, opportunities to add freeway capacity are very limited. If left unaddressed, the growing congestion of the freeway system will threaten the economic and environmental sustainability of the region.

The Metro Countywide ExpressLanes Strategic Plan establishes a vision for a system of Express Lanes throughout Los Angeles County. A system of Express Lanes would provide travelers with a seamless network of transportation option in congested freeway corridors.



Express Lanes are priced to ensure vehicles travel at least 45 miles per hour (as required by law), so reliability and time savings are maintained.

Figure 2: Hours per Capita in Congestion

Joining a growing number of major metropolitan regions grappling with similar congestion issues, the Los Angeles County Metropolitan Transportation Authority (Metro), in collaboration with the Federal Highway Administration (FHWA) and the California Department of Transportation (Caltrans), launched a pilot congestion pricing strategy through its Congestion Reduction Demonstration (CRD) pilot program, now known as the Metro ExpressLanes.

The ExpressLanes program in Los Angeles County began in 2008 when the federal government awarded Metro, in partnership with Caltrans, a $210.5 million grant to develop an ExpressLanes pilot program in Los Angeles County on the I-110 (Harbor Freeway) and the I-10 (San Bernardino Freeway) in 2012 and 2013, respectively. The Metro ExpressLanes pilot program was one of six sites across the nation funded by the U.S. Department of Transportation (USDOT) through its Urban Partnership Agreement (UPA) and CRD program to demonstrate congestion pricing and other supporting strategies. Specifically, the Metro I-110 and I-10 project converted the existing carpool lanes to ExpressLanes, sometimes referred to as HOT lanes - where carpoolers, vanpoolers and eligible clean air vehicles were permitted to use the lanes at no charge with a valid FasTrak® Flex switchable transponder, while single occupant vehicles (SOVs) were given the option to pay a variable toll to avoid congestion. On the I-110 ExpressLanes, the HOV policy is HOV-2+, which requires two or more occupants to travel toll free. On the I-10, the HOV policy is HOV-3+ during peak periods (5-9 am and 4-7 pm Monday-Friday) and HOV-2+ at all other times.

The I-110/I-10 ExpressLanes are dynamically priced based on real-time traffic demand in the facility, with prices increasing or decreasing based on the current usage of the Express Lanes. By using variable pricing to manage traffic demand, traffic flow in the Express Lanes is continuously managed to maintain speed and flow, providing a reliable option to the heavily congested general purpose lanes (GPLs).

The implementation of the ExpressLanes pilot program on I-110 and I-10 has resulted in a number of benefits. For example, the project has provided congestion reduction benefits not only to single occupant vehicles traveling on the Express Lanes but also for carpoolers and bus riders using the ExpressLanes and GPLs.

Due to the success of the ExpressLanes pilot program, California State Senate Bill (SB) 1298 was signed into law in September 2014 granting Metro the authority to conduct, administer, and operate the I-110/I-10 ExpressLanes program indefinitely as well as issue bonds to finance the program. Furthermore, the Metro Board of Directors approved a motion in November 2014 to identify and recommend potential corridors that would benefit from additional HOV lane conversions to Express Lanes (see **Appendix A**).

In response, staff has prepared this Strategic Plan to provide the framework for implementation of future Express Lanes in Los Angeles County. An Express Lanes network will create a more reliable, faster travel option that makes better use of existing vehicle capacity in carpool lanes, as well as provide a seamless customer experience. The primary focus of this Strategic Plan is on the conversion of existing and planned HOV lanes to Express Lanes. As a result, new construction and freeways without existing or planned HOV lanes were not considered, except for a proposal to extend the existing I-110 ExpressLanes south to I-405. This document is intended to provide policy direction on the next set of corridors that are viable for conversion to Express Lanes and the financial resources available to fund these projects. Additional project-level planning and financial analysis is required for individual corridors to be implemented.

1. INTRODUCTION AND OVERVIEW

For more than two decades, Los Angeles County has relied on HOV lane investments as its main form of highway system expansion as a strategy to address growing congestion, maximize the value of limited transportation funding, and help meet air quality improvement goals. Currently, Los Angeles County is home to one of the most robust and extensive HOV lane networks in the country, and the system is continuing to grow. In total, Los Angeles County has 466 lane-miles of HOV lanes and an additional 160 lane miles under construction, in design, or planned.

The proven benefits of Express Lanes include:

- *Improved travel time reliability;*
- *Greater vehicle and person throughput;*
- *Increased transit, vanpools, and carpools within the corridor;*
- *Decreased fuel consumption;*
- *Improved air quality;*
- *New revenue generation source; and*
- *Potential for reinvestment in corridor*

The *Caltrans 2015 Managed Lane Annual Report* documents that approximately 378,000 vehicles carrying 805,000 people use HOV facilities in Los Angeles County on weekdays. During peak periods, individual HOV lanes accommodate approximately 1,400 vehicles and carry 3,000 people per hour. For example, on the I-405 southbound at Skirball Center Drive during the AM peak each general purpose lane is carrying 1,328 vehicles and 1,437 people per hour while the HOV lane is carrying 1,649 vehicles and 3,678 people per hour.

However, the HOV system has been a victim of its own success, due to high demand and legislation that allows designated Clean Air Vehicles (CAVs) to use the HOV lanes without meeting the minimum vehicle occupancy requirement. Many HOV facilities throughout the county are just as congested as the regular GPLs. According to the *Caltrans 2014 HOV Lane Degradation Determination Report*, most HOV facilities in Los Angeles County are degraded and do not meet the Federal performance standard. An HOV lane is considered degraded if average traffic speeds during the morning or evening weekday peak commute hour fall below 45 miles per hour for more than 10 percent of the time over a consecutive 180-day period. In other words, average traffic speeds in a given HOV lane cannot drop below 45 mph more than two weekdays each month in a six month period.

A countywide network of ExpressLanes offers an opportunity to address the challenges of increasing congestion in both the HOV and GPLs. This has been demonstrated by the I-10 and I-110 ExpressLanes, which have proven to be a successful strategy for optimizing vehicle throughput through the application of vehicle occupancy and eligibility restrictions, variable pricing, and access control. By doing so, ExpressLanes can generate travel time savings, more reliable trip times, and reduced congestion without adversely impacting traffic flow in the adjacent general purpose lanes, thereby improving overall corridor performance. Furthermore,

revenue generated through the ExpressLanes is used to fund increased transit and other transportation improvements within the corridor.

The ExpressLanes in Los Angeles County are located on I-110 between Adams Boulevard and 182nd Street and on the I-10 between Alameda Street and the I-605 (San Gabriel Freeway). **Figure 2** shows the location of the existing I-110 and I-10 ExpressLanes. The goals of the ExpressLanes are to:

- Provide a safe, reliable, predictable commute for ExpressLanes users
- Reinforce the MTA's ongoing efforts to increase vehicle occupancy rates and transit ridership
- Optimize vehicle throughput through dynamic pricing
- Generate sufficient revenue to sustain the financial viability of the ExpressLanes

The tolls for vehicles traveling on the ExpressLanes are adjusted in real-time based on the level of traffic congestion in the corridor, referred to as a variable toll or demand-based pricing. The toll rate adjusts dynamically as often as every five minutes based on supply/demand to ensure optimal traffic flow in the ExpressLanes. As traffic in the ExpressLanes increases, the toll rate also increases to reduce the number of vehicles the

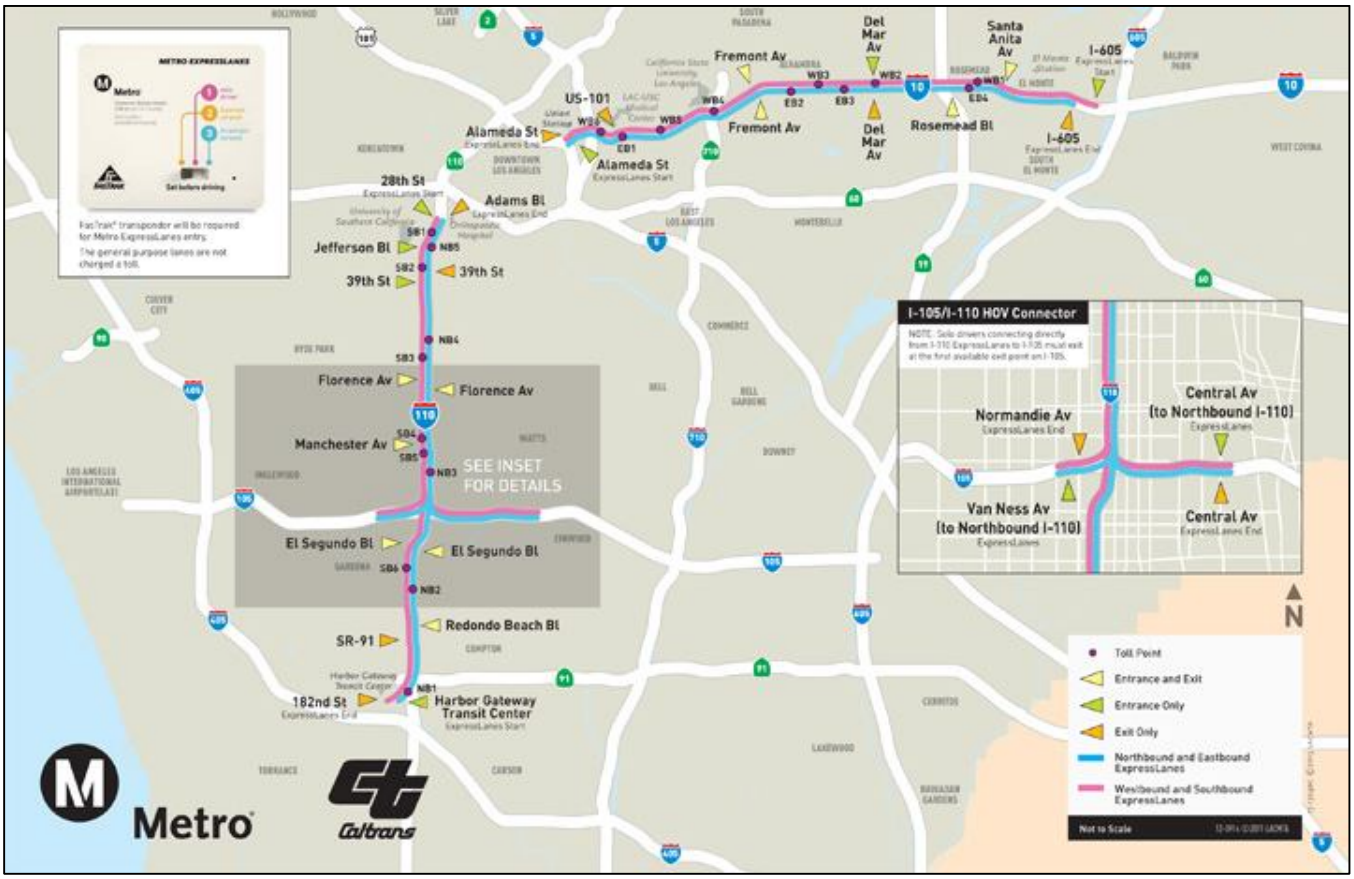


Figure 3: Metro I-110 and I-10 ExpressLanes

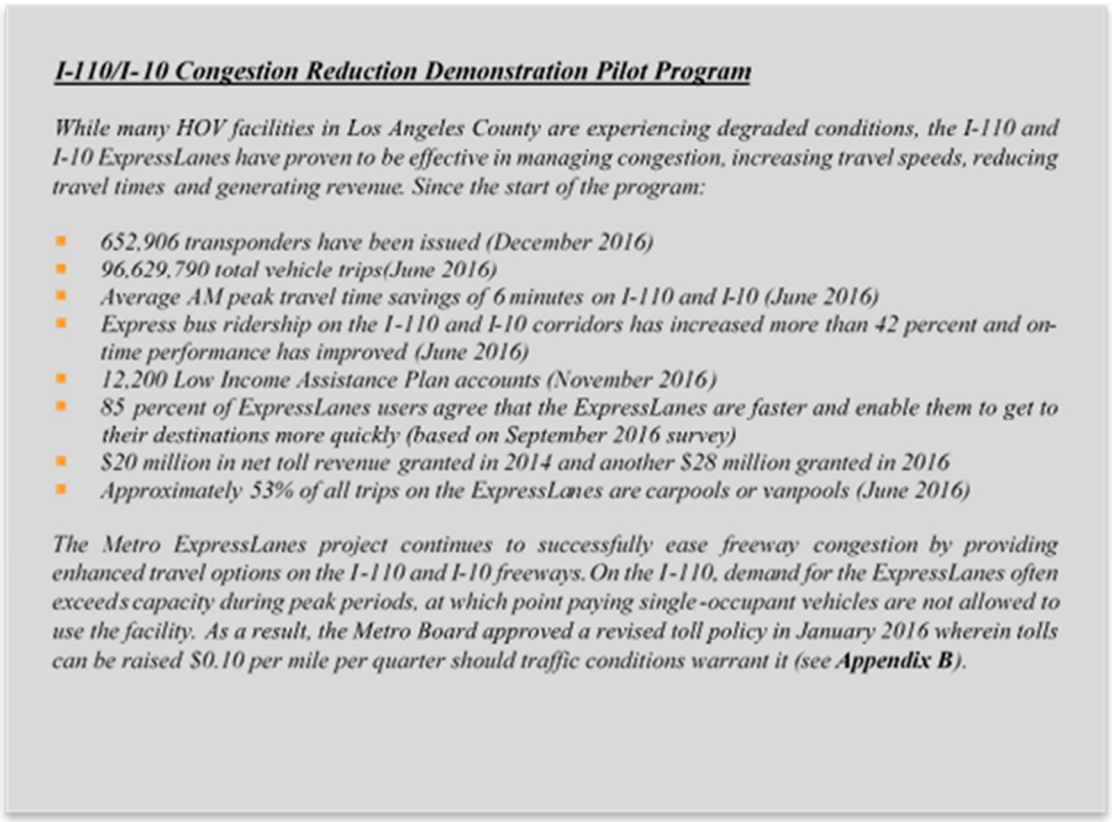
ExpressLanes increases, the toll rate also increases to reduce the number of vehicles entering the lane. Conversely, toll rates are reduced when traffic levels in the lane decrease to incentivize more vehicles to use the available capacity in the lane. With the exception of certain types of vehicles including transit vehicles, emergency vehicles responding to incidents, CAVs, motorcycles, and carpools/vanpools, all vehicles are required to pay a variable toll.

On the I-110 ExpressLanes, the HOV policy is HOV-2+, which requires two or more occupants to travel toll free. On the I-10, the HOV policy is HOV-3+ during peak periods (5-9 am and 4-7 pm Monday-Friday) and HOV-2+ at all other times. Tolls range from a minimum $0.10 per mile (off-peak) to a maximum $1.70 per mile (effective January 9, 2017) depending on congestion levels (maximum toll rate may increase by $0.10 per mile per quarter should traffic conditions warrant it (see **Appendix B**). If travel speeds in the ExpressLanes fall below 45 mph, the lanes revert to HOV only access, with non-HOV vehicles no longer able to buy into the lanes. In doing so, travel time reliability for ExpressLanes users and transit riders is preserved. However, to maximize the effectiveness of the ExpressLanes, enforcement is a critical element to ensure that users are adhering to the requirements and rules of the ExpressLanes to minimize the number of violators and thereby providing more capacity for paying users and carpools.

By incentivizing the use of the available capacity in the ExpressLanes, the I-110 and I-10 ExpressLanes have proven to be effective in increasing travel speeds and reducing travel times without adversely impacting traffic flow in the GPLs, thereby improving overall corridor performance. **Table 2** summarizes the performance of the ExpressLanes.

In addition to the mobility benefits generated by the I-110 and I-10 ExpressLanes, toll revenues are being reinvested in the corridors for the benefit of all users. In fact, one of the main goals of the ExpressLanes is to increase transit ridership. Therefore, $6.9 million in toll revenue is provided annually to help fund the Metro Silver Line as well as Torrance, Gardena, and Foothill Transit services operating on the ExpressLanes. This has helped increase ridership on the Silver Line by 50% from 10,600 average weekday boardings in 2012 to 15,400 in 2016. In addition, in 2014 almost $20 million was granted to a variety of highway, roadway, transit system, and active transportation/system connectivity projects through a competitive grant program known as the Net Toll Revenue Reinvestment Grant program. In 2016, Metro granted an additional $28 million through the program.

Table 2: Metro I-110 and I-10 ExpressLanes Performance Overview



I-110/I-10 Congestion Reduction Demonstration Pilot Program

While many HOV facilities in Los Angeles County are experiencing degraded conditions, the I-110 and I-10 ExpressLanes have proven to be effective in managing congestion, increasing travel speeds, reducing travel times and generating revenue. Since the start of the program:

- *652,906 transponders have been issued (December 2016)*
- *96,629,790 total vehicle trips(June 2016)*
- *Average AM peak travel time savings of 6 minutes on I-110 and I-10 (June 2016)*
- *Express bus ridership on the I-110 and I-10 corridors has increased more than 42 percent and on-time performance has improved (June 2016)*
- *12,200 Low Income Assistance Plan accounts (November 2016)*
- *85 percent of ExpressLanes users agree that the ExpressLanes are faster and enable them to get to their destinations more quickly (based on September 2016 survey)*
- *$20 million in net toll revenue granted in 2014 and another $28 million granted in 2016*
- *Approximately 53% of all trips on the ExpressLanes are carpools or vanpools (June 2016)*

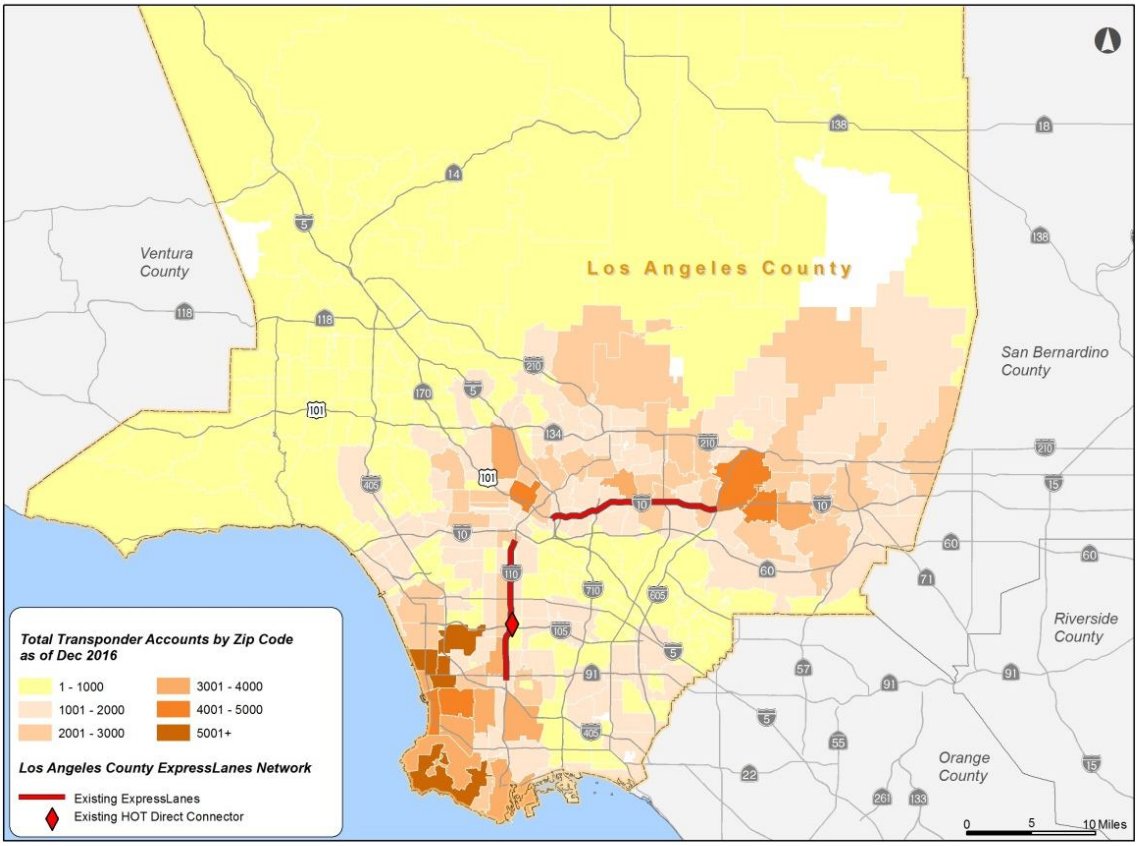
*The Metro ExpressLanes project continues to successfully ease freeway congestion by providing enhanced travel options on the I-110 and I-10 freeways. On the I-110, demand for the ExpressLanes often exceeds capacity during peak periods, at which point paying single-occupant vehicles are not allowed to use the facility. As a result, the Metro Board approved a revised toll policy in January 2016 wherein tolls can be raised $0.10 per mile per quarter should traffic conditions warrant it (see **Appendix B**).*

Building on the success of the I-110 and I-10 ExpressLanes, an expansion of the ExpressLanes program has the potential to help address three of the most pressing transportation challenges facing Los Angeles County: reliable mobility, environmental sustainability, and financial viability. The rationale for building additional Express Lanes includes:

- Continuing challenges posed by traffic congestion and a desire to improve travel conditions using system management strategies
- The emphasis on travel time reliability and customer choice
- Degraded traffic performance with significant portions of HOV facilities in Los Angeles County including large segments of the I-405, I-105, I-10, I-605, and SR-91 corridors not meeting the Federal performance standard.
- Limited rights-of-way for freeway expansion/widening
- The ongoing designation of the South Coast Air Basin, which includes Los Angeles County, as a federally designated air quality non-attainment area
- Declining availability and reliability of traditional revenue sources to fully pay for new highway facilities

From a user perspective, Metro continues to see growth in the number of accounts opened and transponders issued. Currently, over 640,000 transponders have been issued and another 10,000-12,000 new transponders are issued every month. The increased penetration of FasTrak® Flex transponders throughout Los Angeles County indicates that there is increasing awareness and acceptance of Metro ExpressLanes among the general public **(Figure 4).** Not only is there increasing usage of the Metro ExpressLanes, a recent survey by Metro of regular ExpressLanes users indicated that 75% would support adding ExpressLanes to other roadways.

Figure 4: Fastrak Transponder Accounts by Zip Code, December 2016



State legislation has also been passed recently in support of Express Lanes. This began with California State Senate Bill 1298, which was signed into law in September 2014 and granted Metro the authority to conduct, administer, and operate the ExpressLanes program indefinitely as well as issue bonds to finance the program. In addition, Assembly Bill 194 (Frazier) was signed by the Governor in October 2015 removing the limitation on the number of HOT lane facilities that could be approved in the State. Additionally, it authorized transportation agencies such as Metro to seek California Transportation Commission's (CTC) concurrence to develop

and operate additional HOT lanes. Furthermore, the passage of AB 194 gives the Metro Board authority to implement a network of Express Lanes.

The success of the ExpressLanes pilot program, public acceptance, and support of ExpressLanes customers to add ExpressLanes to other freeways coupled with recent state legislation and Metro Board direction to develop this Countywide ExpressLanes Strategic Plan, should help spur the expansion of the Express Lanes in Los Angeles County. The next chapters provide the framework and methodology by which potential Express Lanes were analyzed and prioritized for implementation.

2. PRELIMINARY EXPRESSLANES NETWORK SCREENING AND PHASING RECOMMENDATIONS

This ExpressLanes Strategic Plan builds on the success of the I-110 and I-10 Congestion Reduction Demonstration pilot program by establishing a vision for Metro to deliver a system of Express Lanes for Los Angeles County. This vision will provide transportation benefits at the regional level rather than on a corridor-by-corridor basis. A countywide ExpressLanes network will create a more reliable, faster travel option that makes better use of existing vehicle capacity in carpool lanes.

This Strategic Plan identifies the most promising Express Lane corridors and proposes a phased implementation plan over a 25+ year period. The Metro Countywide ExpressLanes Strategic Plan was prepared as an extension of Southern California Association of Governments (SCAG's) Express Travel Choices Phase II Study - Regional Express/HOT Lanes Implementation Plan and Concept of Operations. The Metro Strategic Plan is consistent with the analysis methodology used in the SCAG study to estimate the potential mobility benefits and revenue generated by ExpressLanes projects. This approach ensured consistency between the Metro ExpressLanes Strategic Plan and the SCAG regional study.

The primary objectives of the ExpressLanes Strategic Plan include the following:

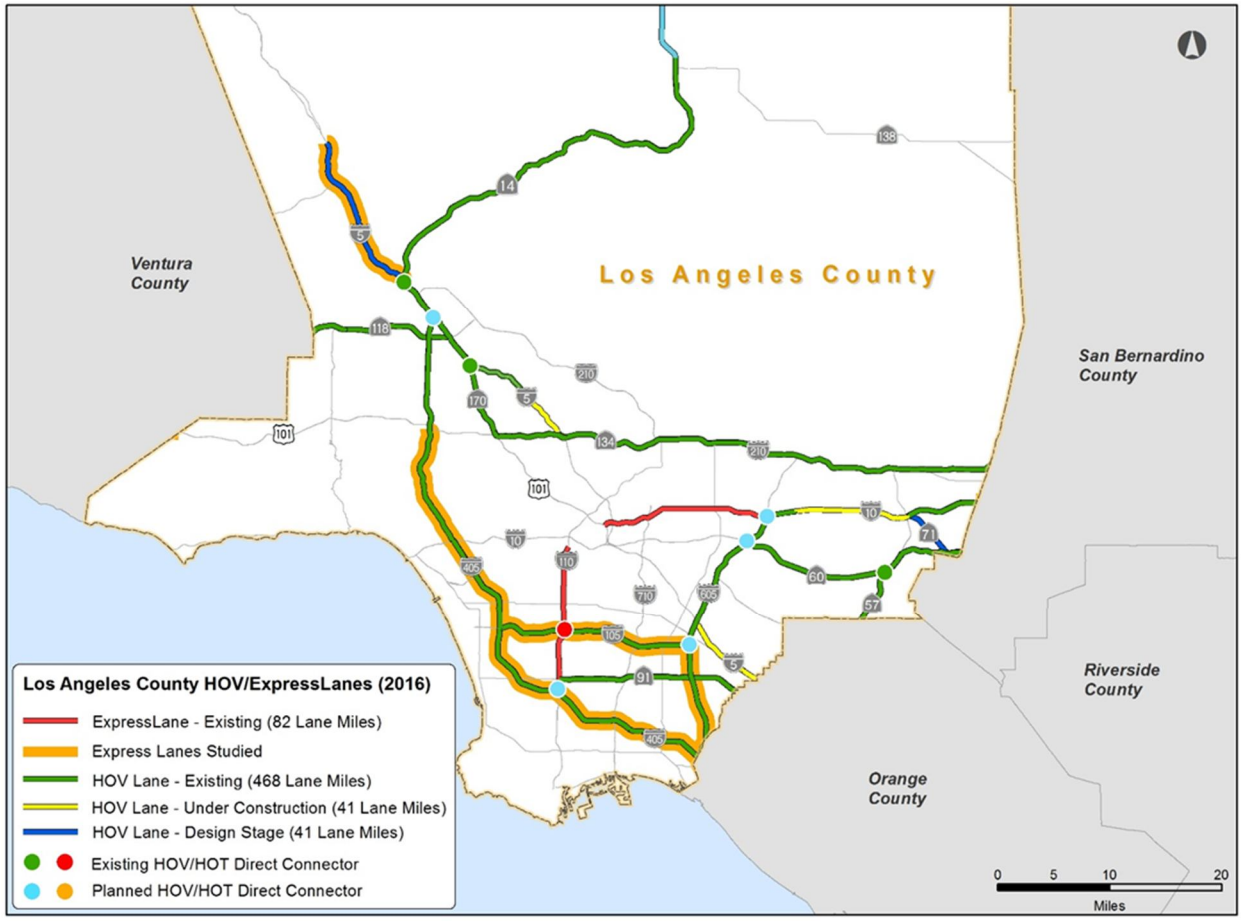
- Identify and recommend potential corridors that can benefit from Express Lanes conversion;
- Develop a Resource Plan for existing and future Express Lanes corridors;
- Respond to degraded HOV facilities across Los Angeles as well as transportation needs which have outpaced traditional revenue sources;
- Provide/outline recommendations to include the tiers of projects, phasing, planning-level costs and revenue forecasts, and a timetable for implementation;
- Provide a high-level assessment of vehicle occupancy requirements on existing and planned HOV/Express Lanes facilities.

The Strategic Plan assessed the conversion of current HOV facilities and those that are planned or under construction for potential conversion to express lane operation. These facilities were identified by reviewing the following documents:

- Metro 2009 Long Range Transportation Plan (LRTP) Highways Recommended Plan
- Metro 2014 Short Range Transportation Plan (SRTP) Highways Recommended Plan
- 2015 Federal Transportation Improvement Program (FTIP)
- SCAG 2012-2035 Financially Constrained Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS)

A map showing existing, in construction, and planned HOV lanes is shown in **Figure 5**. The conversion of GPLs to Express Lanes operation was not considered due to federal law

Figure 5: Existing, In Construction, and Planned HOV Lanes in Los Angeles County



which prohibits such conversions due to the region's air quality non-attainment status and the expected impacts to traffic. Furthermore, the analysis assumed a minimum travel speed of 45 miles per hour in the Express Lanes for 90 percent of all trips, and that vehicles with three or more occupants will be allowed non-tolled use of the Express Lanes. The evaluation utilized planning-level traffic and revenue forecasts together with conceptual cost estimates to screen Los Angeles County freeway corridors according to specific mobility and financial criteria described in the next section.

The screening analysis led to a phased implementation plan for projects over a 25+ year period, broken into Tier 1 - near term (within 5-10 years), Tier 2 - mid-term (within 15 years), and Tier 3 - long-term (within 25 years). The project phasing recommendations are based on estimates of toll revenue, construction costs, and operations and maintenance costs for each of the various corridor segments.

In addition, the Strategic Plan includes policy level recommendations, including a high-level assessment of vehicle occupancy requirements on existing and planned HOV/Express Lane

facilities. Furthermore, relevant Federal, State and local statues, and policies are listed in **Appendix C**.

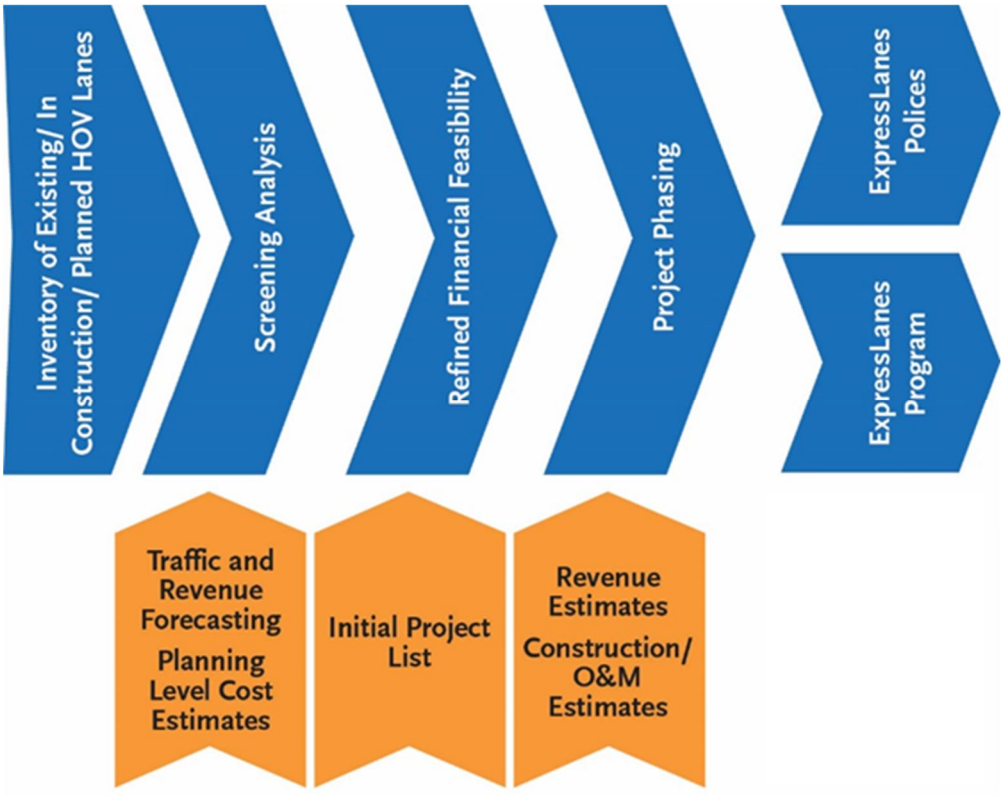


Figure 6: Strategic Plan Development Process

2.1 METHODOLOGY AND CORRIDOR SCREENING ANALYSIS

The Strategic Plan analysis included corridor screening and the preparation of a Resource Plan (see **Figure 6**). The corridor screening analysis estimates the potential mobility benefits of providing Express Lanes in each corridor, together with a high-level, initial financial feasibility assessment.

The corridor analysis utilized both the SCAG Regional Travel Demand Model and RapidTOM© (Toll Optimization Model) to analyze freeway corridors in the county. The corridor screening analysis assumed the minimum speed requirement of 45 miles per hour in the Express Lanes, and that HOV-3+ carpools would be allowed free use of the Express Lanes. A HOV-2+ toll free scenario was modeled, but determined that there would be insufficient capacity in the HOV lanes on a majority of freeway corridors to effectively operate Express Lanes. However, it should be noted that any decisions related to conversion of HOV-2+ to HOV-3+ will be made by the Metro Board and Caltrans in conjunction with local stakeholder input. Furthermore, where appropriate as part of the detailed planning studies for each corridor,

an assessment of the feasibility of dual Express Lanes should be undertaken. Chapter 5 of the Strategic Plan provides a more detailed discussion on recommended vehicle occupancy policies.

The first step in the corridor screening analysis was to use the SCAG model to forecast traffic volumes for both 2020 and 2035 on freeway corridors in the County. For purposes of this analysis, the existing and planned HOV lane network was broken into 102 segments. RapidTOM© then utilized SCAG model output to determine an optimal toll rate and Express Lane volume based on available capacity in the Express Lanes and vehicle's value of time. If the toll rate was below a vehicle's value of time, then it is assumed that the vehicle will pay to use the Express Lanes. The number of vehicles using the Express Lanes and the toll rate will continue to increase until the minimum level of service threshold is reached (Level of Service D), at which point there is no excess capacity available in the Express Lanes to be sold and no revenue can be generated. In essence, the RapidTOM© model redistributes SCAG model output for a given freeway corridor based on various tolling scenarios and available lane capacity to derive toll rates and Express Lane volumes.

Based on output from the SCAG regional model and RapidTOM©, three mobility criteria were used to evaluate the corridors:

1) Value of travel time savings, which is calculated by multiplying the value of time per vehicle by the time savings per vehicle;

2) Express Lane person throughput, which is calculated by multiplying the average vehicle occupancy by the number of vehicles traveling in the corridor on the converted Express Lane;

3) Average peak period vehicle speeds in the GPLs.

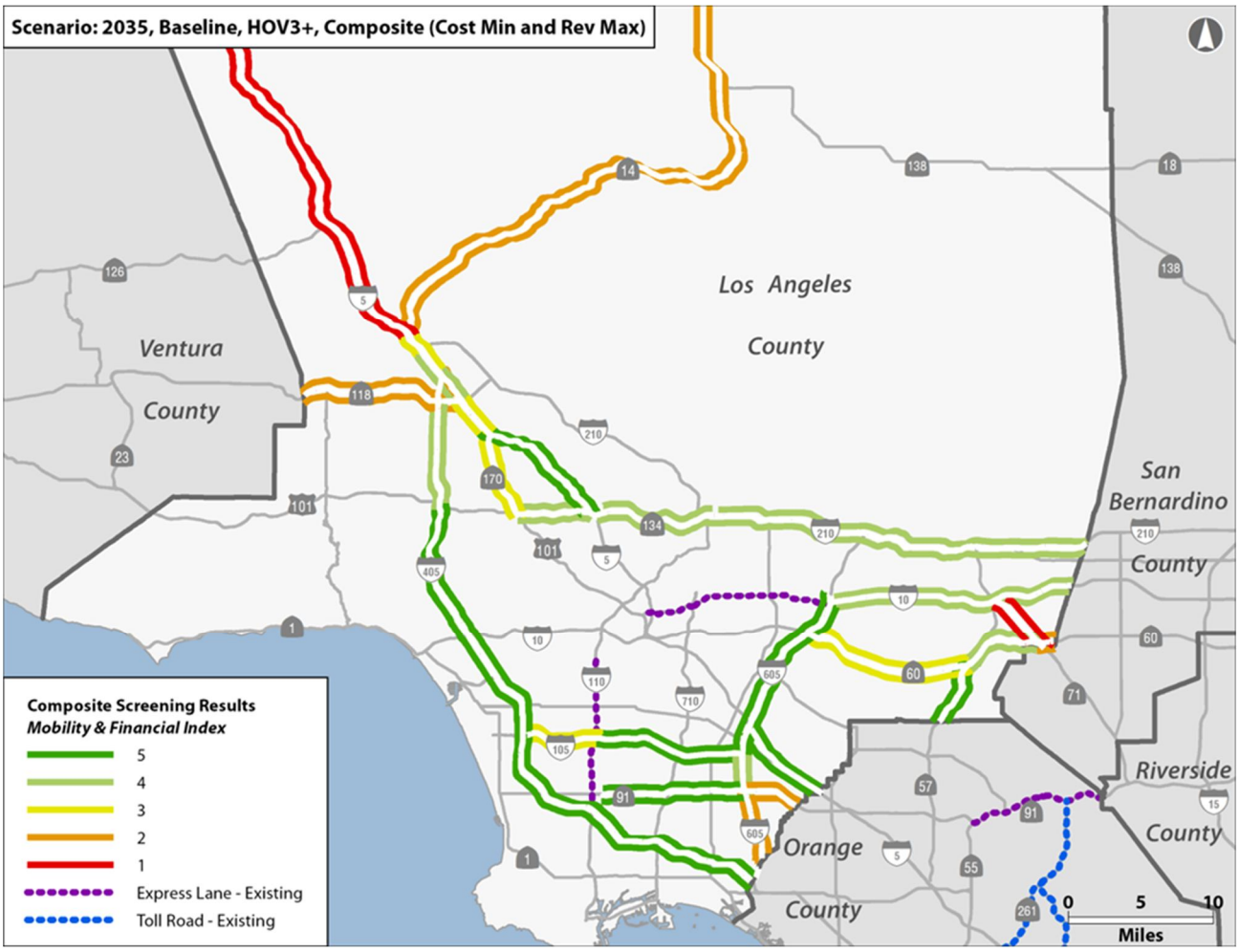
For each of the three criteria, the candidate corridors were ranked into five quintiles, with 5 being the top 20%, 4 being the second 20%, 3 being the third 20%, and so forth.

2.2 INITIAL FINANCIAL FEASIBILITY

The second component in the screening involved an initial financial feasibility calculation. This calculation estimated net revenue for various Express Lane corridors and the capital cost of converting the corridor from HOV to Express Lane operation. Net revenues are calculated using actual costs incurred for the operation and maintenance of the I-110 and I-10 ExpressLanes. Construction capital costs were estimated at a rough order of magnitude level. The resulting revenue/cost ratio provided a general indication of the positive or negative revenue benefit of HOV to Express Lane conversion. For purposes of screening, the Strategic Plan assumed that the conversion to Express Lanes can be accomplished using non-standard lane configurations, as was approved for the I-110 and I-10 ExpressLanes. However, design exceptions must still be approved by Caltrans on a case-by-case basis during project development. As with the corridor screening analysis, the corridors were also ranked by their financial feasibility scores and then divided into quintiles, with each segment receiving a score of 1 (lowest) to 5 (highest).

The final step in the screening analysis involved averaging the corridor and financial feasibility screening results to create a single overall composite screening score. The Express Lane analysis segments were then ranked based on their composite screening score and then broken into quintiles. The results of the composite screening are shown in **Figure 7.** The methodology and results of the corridor screening and initial financial feasibility analysis are summarized in greater detail in **Appendix F**.

Figure 7: Composite Mobility and Financial Screening Results



2.3 TRAFFIC AND POTENTIAL GROSS TOLL REVENUE FORECASTS

The RapidTOM© model provided weekday traffic and revenue for each Express Lane project segment by direction for two forecast years (2020 and 2035), five time periods (morning peak, midday, afternoon peak, evening, night), under two pricing objectives (revenue maximization and cost minimization), and for two exemption cases (HOV-2+ and HOV-3+).

The revenue maximization scenario assumes that toll rates will vary dynamically to maximize toll revenues, which also minimizes delay in the Express Lanes only. Conversely, the cost

minimization scenario assumes that toll rates will vary dynamically at lower overall levels to minimize corridor delay costs. By utilizing somewhat lower toll rates, the latter scenario results in higher utilization of the Express Lanes, which helps to maximize congestion relief for both the Express Lanes and the general purpose lanes.

As noted previously, the combined mobility and financial screening averaged the outputs by route segment for the two pricing scenarios. The segments passing the screening were then grouped into pairs representing both directions of travel.

Tests of the HOV-2+ exemption case, including the aforementioned evaluation under the mobility screening criteria, indicated that all-day HOV-2+ operations are not feasible financially or operationally. In general, when HOV-2+ trips are exempt from tolls, the Express Lanes demand forecasts are sufficiently high so as to provide few, if any, spaces to sell to SOVs during peak periods, especially when trying to maintain speed and reliability objectives. Moreover, the projected low levels of toll paying customers would not be sufficient to generate positive net revenues after deducting toll and facility operating costs and other factors from the gross toll revenue generated. To maximize the effectiveness of the ExpressLanes, ongoing enforcement will be necessary to minimize the number of violators which in turn will provide more capacity for paying users and carpools.

Since the HOV-2+ exemption would be neither operationally nor financially sustainable, a hybrid exemption case was analyzed in addition to the HOV-3+ exemption. Similar to the current I-10 ExpressLane operations, the hybrid exemption combines time of day model results to simulate the following:

- HOV-3+ vehicles exempt during the 4-hour morning (5 am - 9 am) and 3-hour afternoon weekday peak periods (4 pm-7 pm); and
- HOV-2+ vehicles exempt during the remaining 17 mid-day, evening, and night hours of the weekday, as well as all day on weekends.

This hybrid exemption case offers several advantages. During peak periods, offering the toll exemption only to HOV-3+ vehicles ensures that toll-free demand will not exceed the capacity of the lanes, thereby enabling the toll rate to meter lane use by SOV and HOV-2 paying drivers to optimize lane performance. During off-peak times when demand is lower, offering the toll exemption to HOV-2+ vehicles improves the utilization of the Express Lanes.

2.4 PHASING RECOMMENDATIONS

The purpose of the screening process was to identify a subset of the corridors within Los Angeles County with existing or planned HOV facilities that would demonstrate the highest mobility and financial feasibility performance when converted to Express Lanes operation.

After the corridors were ranked, the candidate Express Lane segments were evaluated for a set of qualitative factors that could not be modeled using RapidTOM© in order to derive the final phasing recommendations. These criteria included:

- Connectivity with other existing and potential Express Lane corridors;
- Transit benefits;
- Funding availability; and,
- Ability to provide two Express Lanes in each direction.

Recognizing that the implementation of the Express Lanes network will require substantial financial resources as well as time to plan, design, and construct, it was assumed that the network would be implemented in three phases over a period of approximately 25+ years.

As a starting point for considering the phasing of a future Express Lanes network in Los Angeles County, it was assumed that the individual segments would be implemented in tiers ten-years apart as follows:

- Tier 1 — near-term (within 5-10 years)
- Tier 2 — mid-term (within 15 years)
- Tier 3 — longer-term (within 25 years)

For purposes of planning-level analysis, each corridor segment is comprised of smaller zones between major interchanges. The specific project segment(s) will require more detailed analysis to determine logical termini. These rational end points or project termini should undergo thorough vetting as part of the environmental review process.

Whenever possible given existing right-of-way constraints, Metro intends to implement dual lane facilities providing two Express Lanes in each direction. Dual lane facilities provide more capacity and also give users the ability to pass slower vehicles, whereas with single lane Express Lanes speeds can be constrained by slower moving vehicles. Additional information on the implications of providing dual lane Express Lane facilities is provided in Chapter 5 of this report.

2.5 PRELIMINARY PREFERED EXPRESS LANES NETWORK AND PHASING RECOMMENDATIONS

Tier 1:

The first, or near-term, tier of Express Lanes conversions include projects with high mobility and financial feasibility scores, available funding, connectivity with the currently existing ExpressLanes, and/or the ability to implement dual Express Lanes in each direction. **Figure 8** shows the first tier of Express Lane conversions to be included in Metro's preferred Express Lanes baseline network. The Tier 1 projects are recommended for implementation in the 2017-2027 timeframe and involve conversion of existing HOV lanes to Express Lanes in five freeway corridors. They include I-10 (between I-605 and San Bernardino County Line), the entire length of I-105 (between I-405 and I-605); I-405 (between US 101 to the Orange County Line; I-605 (between I-10 to the Orange County Line); and, I-110 from 182nd Street to I-405. These corridors vary from 2.2 to 77.6 lane miles and have anticipated costs in the $37 to $95 million range for non-standard lane construction, and between $73 and $305 million for full-standard

costs. In addition, the financial feasibility of an extension of the current I-110 ExpressLanes from the SR-91 south to the I-405 and the addition of a new I-110/I-405 HOV/HOT direct connector was analyzed. It should be noted that these two projects would require new construction rather than a conversion of an existing HOV lane. Additional information on Tier 1 projects is provided in **Table 3**.

Figure 8: Tier 1 Express Lanes 10-Year Plan (2017-2027)

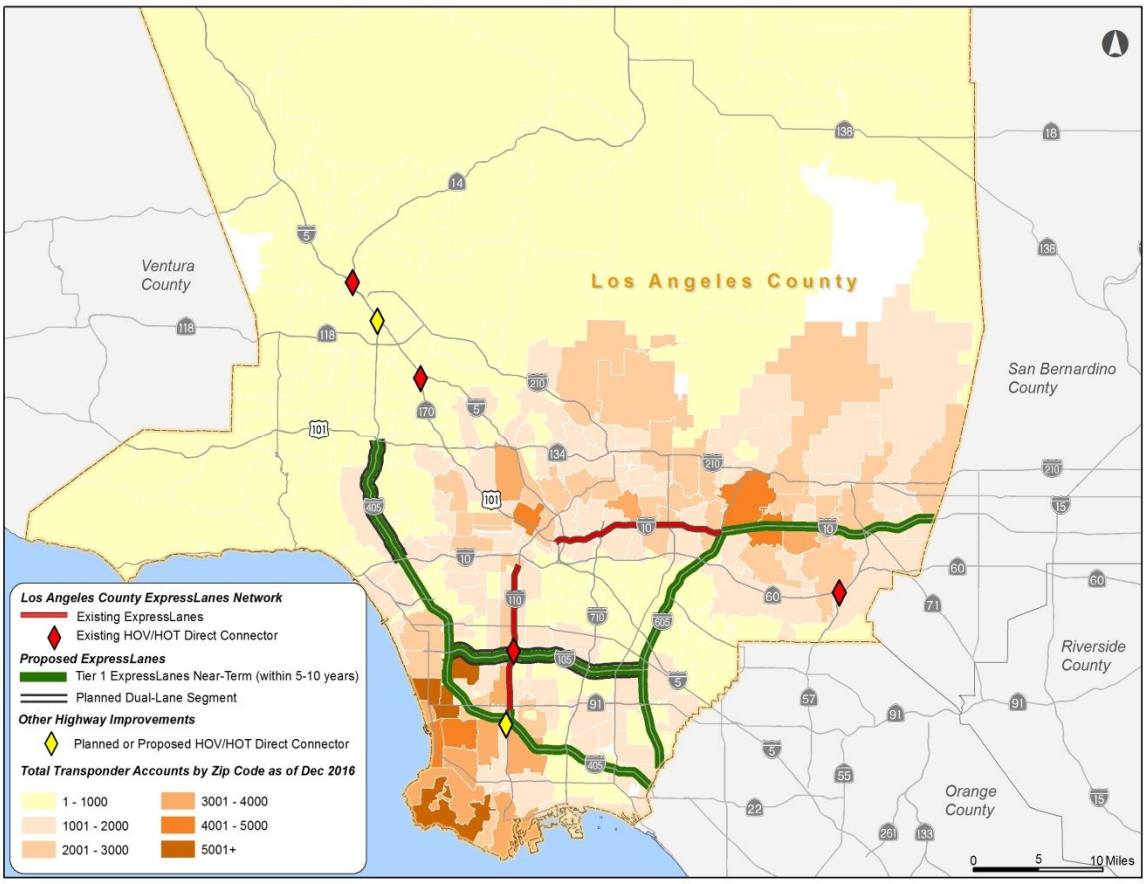


Table 3: Metro Express Lanes Program 5-10 Year Implementation Phasing Plan (Tier 1)

Corridor	From	To	Lane Miles	Scope	Non-Standard Cost	Full-Standard Cost
Existing Network						
I-10	Alameda St.	I-605	39.1	In operation	N/A	N/A
I-110	Harbor Gateway Transit Center	Adams Blvd.	35.3	In operation	N/A	N/A
Tier 1 Baseline Network						
I-10	I-605	LA/SB CL	34.2	Convert existing and future HOV to Single HOT in each direction	$43M	$196.8M
I-105	I-405	I-605	32.0	Convert existing HOV to single HOT in each direction*	$37.4M	$73.2M
I-110	182nd Street	I-405	2.2	Add new HOT lanes by extending existing single HOT lanes in each direction south to I-405; construct new HOV/HOT Direct Connector at I-110/I-405	N/A	$280.4M +$250M (Connector)
I-405	US 101	LA/OC CL	77.6	Convert existing HOV to single HOT in each direction**	$94.5M	$305M
I-605	I-10	LA/OC CL	41.2	Convert existing HOV to single HOT in each direction	$50.3M	$249.6M
I-605/SR-60 Interchange HOV Direct Connectors			0.1	Construct HOV direct connectors at I-605/SR-60 interchange	N/A	$490.6
Tier 1 Total			**187.3**		**$225.2M**	**$1,845.6M**

Source: Conceptual-Level Cost Estimate Report, SCAG Express Travel Choices Phase II Study - Regional Express Lane Network, April 8, 2015

*Metro expects that dual Express Lanes can be implemented on the I-105 (I-405 to I-605); final configuration to be determined through the Project Approval/Environmental Document (PA/ED). Caltrans I-105 PSR-PDS estimated cost for dual-lanes is $125M to $200M.

** Metro expects that dual Express Lanes can be implemented on the I-405 (US 101 to I-10); final configuration to be determined through the Project Approval/Environmental Document (PA/ED). Prior Sepulveda Pass Corridor Systems Planning Study Supplemental Traffic and Revenue Study estimated cost for dual-lanes at $188M.

Tier 2:

The second, or mid-term tier of Express Lane conversions includes corridors with moderate mobility and financial feasibility scores. As shown in **Figure 9**, the Tier 2 Express Lane projects from Metro's preferred Express Lanes baseline network are located on a total of seven freeway corridors varying from 9.6 to 56.2 lane miles. They include the I-5 (between I-605 and the Orange County Line); I-5 (between SR-134 and SR-170), SR-57 (between SR-60 to the Orange County Line); SR-91 (between I-110 to the Orange County Line); SR-134 (between SR-170 to I-210); I-210 (between SR-134 to the San Bernardino County Line); and I-405 (between US 101 and I-5). Additional information on the Tier 2 corridors is provided in **Table 4**.

Figure 9: Tier 2 Express Lanes 15-Year Plan (2027-2032)

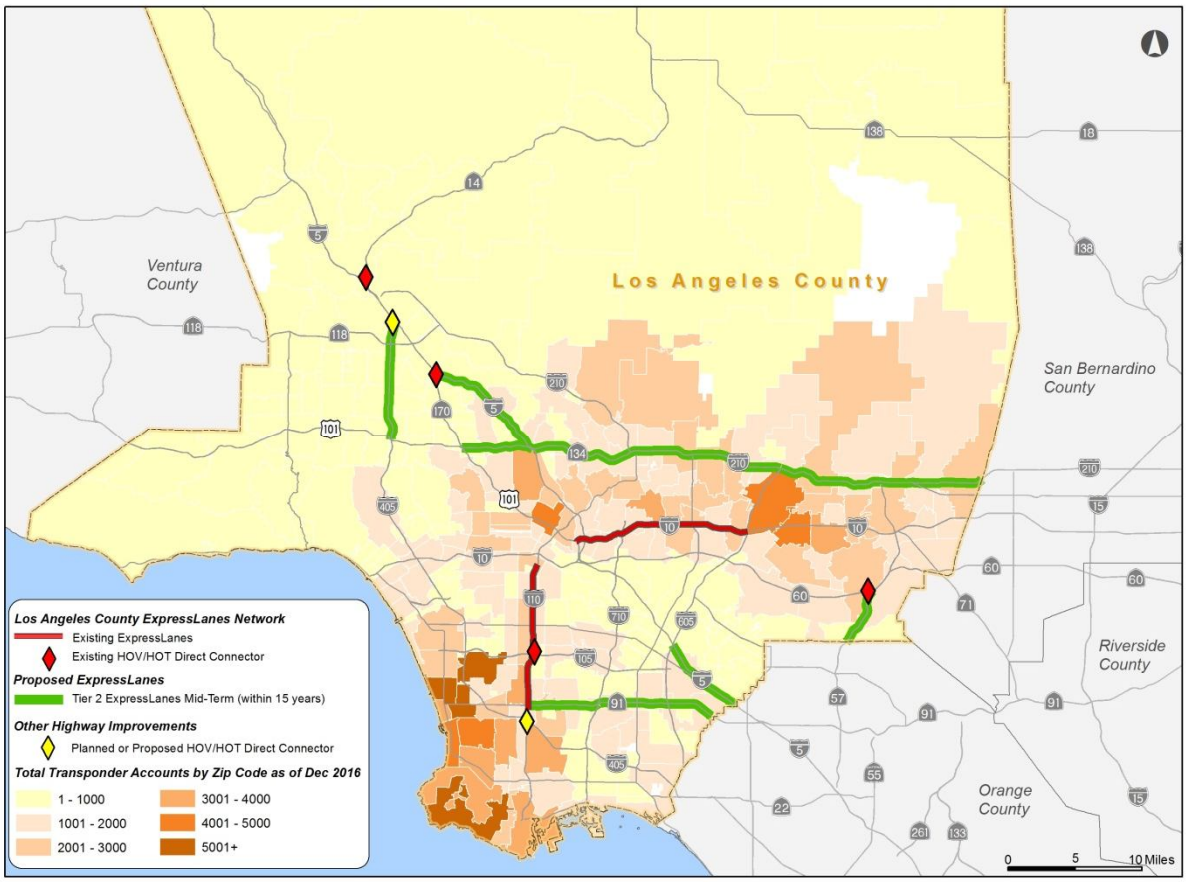


Table 4: Metro Express Lanes Program 15-Year Implementation Phasing Plan (Tier 2)

Corridor	From	To	Lane Miles	Scope	Non-Standard Cost	Full-Standard Cost
Tier 2 Baseline Network						
I-5	I-605	LA/OC CL	12.9	Convert future HOV to single HOT in each direction	$15.4M	$40.5M
I-5	SR-170	SR-134	20.0	Convert future HOV to single HOT in each direction	$23.8M	$52.9M
SR-57	LA/OC CL	SR-60	9.6	Convert existing HOV to single HOT in each direction	$12.1M	$44M
SR-91	I-110	LA/OC CL	29.0	Convert existing HOV to single HOT in each direction	$34.8M	$475M
SR-134	SR-170	I-210	26.2	Convert existing HOV to single HOT in each direction	$33.6M	$1,205M
I-210	SR-134	LA/SB CL	56.2	Convert existing HOV to single HOT in each direction	$68.7M	$2,251.4M
I-405	I-5	US 101	17.4	Convert existing HOV to single HOT in each direction	$22.4M	$73.9M
Tier 2 Total			**171.3**		**$210.8M**	**$4,142.7M**

Source: Conceptual-Level Cost Estimate Report, SCAG Region Value Pricing Project—Regional Express Lane Network, April 8, 2015

Tier 3:

The third, or longer-term tier of Express Lanes conversions includes projects with lower mobility and financial feasibility scores that still passed the screening evaluation. The Tier 3 Express Lane projects are shown in **Figure 10**. These projects range from 13.3 to 36.2 lane miles and are anticipated to be built in the post 2040 timeframe and include conversions of existing or planned HOV lanes to Express Lanes operation in three freeway corridors: I-5 (between SR-170 and SR-14); SR-60 (between I-605 to the San Bernardino County Line); and SR-170 (between I-5 to SR-134).

In addition to these proposed Express Lane conversions, the study considered the financial feasibility of three additional projects: the I-5 (between SR-14 and Parker Road); SR-14 (between I-5 and Avenue P8); and SR-118 (between I 5 and the Ventura County Line). These additional Express Lane projects are not expected to provide strong revenue potential but would provide important opportunities for connectivity. All of these projects were subsequently added to Tier 3 as part of an Expanded Network. Additional information on the Tier 3 corridors is provided in **Table 5**.

Figure 10: Tier 3 Express Lanes 25-Year Plan (2032-2042)

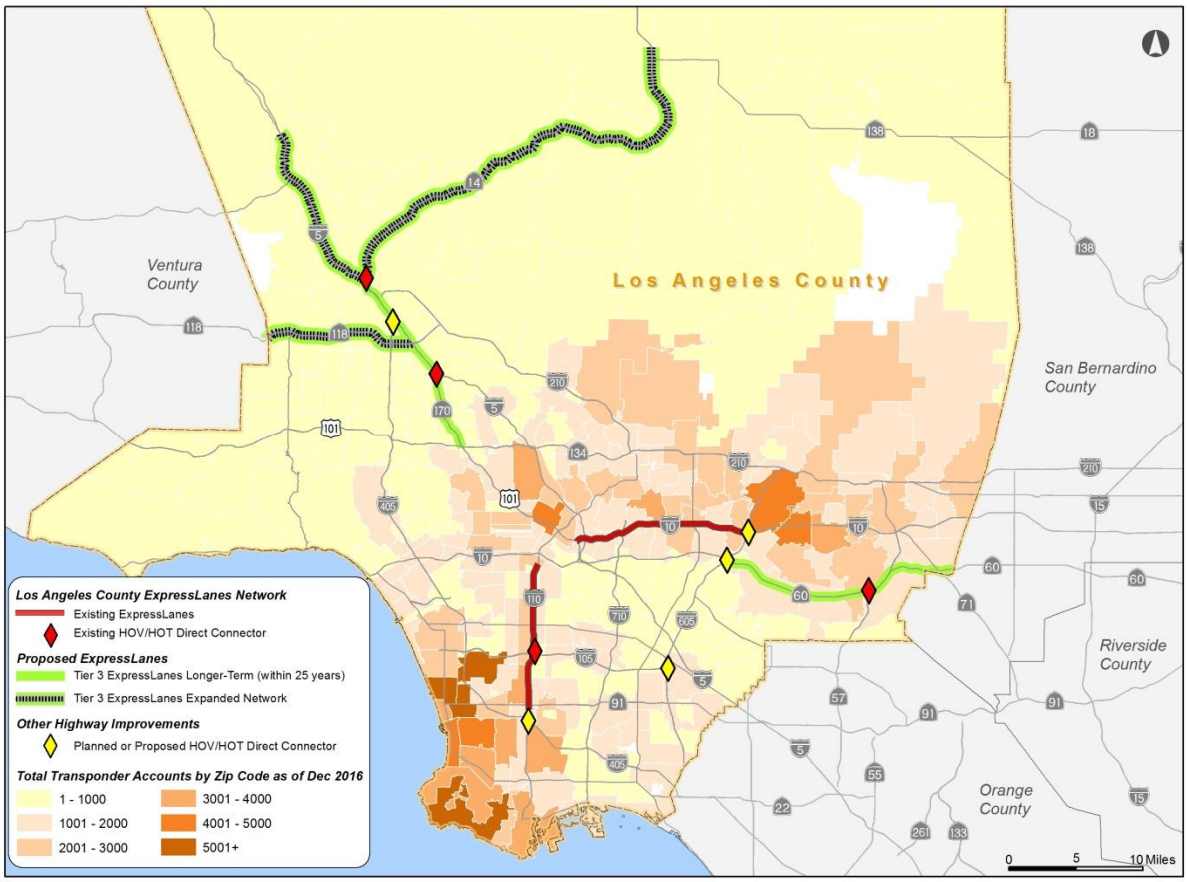


Table 5: Metro Express Lanes Program 25-Year Implementation Phasing Plan (Tier 3)

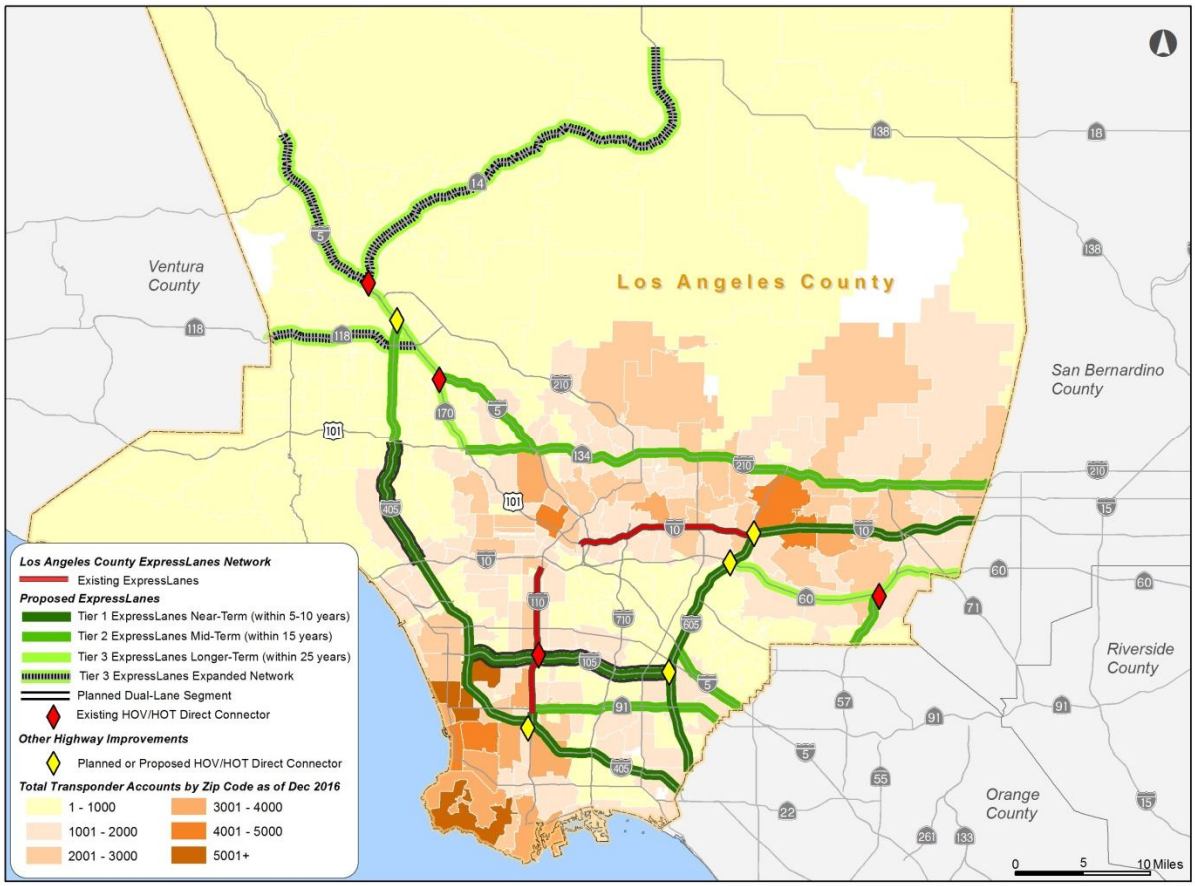
Corridor	From	To	Lane Miles	Scope	Non-Standard Cost	Full-Standard Cost
Tier 3 Baseline Network						
I-5	SR-14	SR-170	17.2	Convert existing HOV to single HOT in each direction	$17.7M	$80.8M
SR-60	I-605	LA/SB CL	36.2	Convert existing HOV to single HOT in each direction	$48.3M	$217.3M
SR-170	SR-134	I-5	13.3	Convert existing HOV to single HOT in each direction	$17M	$57.7M
Tier 3 Expanded Network (included as sensitivity tests for possible inclusion to Tier 3 Baseline)						
I-5	SR-14	Parker Rd.	26.8	Convert future HOV to single HOT in each direction	$95.3M	$370.7M
SR-14	I-5	Avenue P8	71.8	Convert existing HOV to single HOT in each direction	$37.3M	$336.5M
SR-118	LA/VEN CL	I-5	22.8	Convert existing HOV to single HOT in each direction plus I-110/I-405 direct connectors	$26.8M	$92.6M
Tier 3 Total*			**190.3**		**$242.4M**	**$1,686M**

Sources: Conceptual-Level Cost Estimate Report, SCAG Region Value Pricing Project—Regional Express Lane Network, April 8, 2015

Full-Network of ExpressLanes:

The entire Los Angeles County ExpressLanes Network is shown in **Figure 11**. The complete strategic buildout network of 621 lane miles of Express Lanes includes the existing I-110 and I-10 ExpressLanes, together with the Tier 1, Tier 2, and Tier 3 projects listed above. It is also worth noting that SR-60 in Los Angeles County is part of SCAG's proposed Zero Emission East-West Freight Corridor, in which truck-only toll lanes are planned.

Figure 11: Los Angeles County Strategic Buildout Express Lanes Network



HOV Direct Connectors

The Full-Network, as illustrated above, also proposes the implementation of direct connectors between Express Lanes on crossing freeway corridors. Express Lanes direct connectors are proposed to be implemented to accommodate various directional movements at the following locations: I-105 to/from I-405, I-105 to/from I-110, I-105 to/from I-605, I-110 to/from I-405, SR-91 to/from I-110, SR-91 to/from I-605, I-605 to/from SR-60, I-605 to/from I-10, and SR-60 to/from SR-57. The I-110/I-405 and I-605/SR-60 are funded in Measure M.

While direct connectors can represent relatively high cost investments, they can provide substantial travel time savings and safety benefits where high volume movements are observed to transition from one Express Lane to another. This is because the provision of the direct

connector can eliminate the need for a vehicle traveling in the Express Lane to exit the Express Lane and weave across multiple general-purpose lanes to exit to the crossing freeway before weaving across multiple general-purpose lanes to enter the Express Lanes again, similar to the existing HOV/HOT direct connectors at the I-110 and I-105 Freeways (**Figure 12**). The impact of the traffic weaving between the Express Lanes and the general-purpose freeway connectors can be significant in terms of the disruption to through traffic, especially where the general-purpose volumes are also very high. As stated in Chapter 12 of the 2010 Highway Capacity Manual (HCM), "traffic in a weaving segment is subject to lane-changing turbulence in excess of that normally present on basic freeway segments. This additional turbulence presents operational problems and design requirements." These effects of weaving can be amplified where high volumes of traffic is seeking to transition between crossing Express Lanes due to the need for weaving across all freeway lanes to exit from one freeway to the next.

Figure 12: Photo of Existing I-110/I-105 HOV/HOT Direct Connectors

The effect of weaving at the transition between crossing HOV lanes is considered to be a contributing factor in high accident hot spots previously observed in Los Angeles County. As part of the Metro HOV Performance Program completed in 2002, a qualitative assessment of accident hot spots demonstrated a correlation between many of the locations with the highest rate of crashes, and the location of HOV lane access points (or the termini of HOV lanes). Of particular note was the SR-91 WB approach to the I-605 exit ramps where the highest rate of crashes was observed with the weaving associated with transition from the SR-91 WB HOV lanes to the I-605 HOV lanes being considered a contributing factor. The provision of a direct connector at this location is proposed as part of the Full Network to address the weaving impacts that results from the transition between Express Lanes on the respective corridors. Going forward, Metro will be conducting a detailed analysis of HOV direct connectors to determine the necessary movements, right-of-way requirements, and develop planning level cost estimates.

3. RESOURCE PLAN

The Resource Plan identifies available and potential funding sources for the three tiers of ExpressLanes projects described in the previous section. The capital costs identified are high level, rough order magnitude (ROM) estimates. With the exception of the Tier 1 projects listed in **Table 7**, no funding has been identified for the remainder of the projects listed in **Table 6**.

3.1 Capital Costs

The capital costs for the three tiers of projects represent the amounts required for converting existing HOV lanes to Express Lane operation. The exception to this is the extension of I-110 between SR-91 and I-405 which would involve new construction. For segments where a non-standard design conversion cost estimate was prepared in addition to a Caltrans standard design conversion, the lower cost non-standard estimate was used, consistent with the I-10 and I-110 ExpressLanes conversions where non-standard features were constructed. However, it is important to note that Caltrans approval of design exceptions and fact sheets for non-standard lane configurations would need to occur on a project-by-project basis. A two-year construction duration was assumed for all the segments. Furthermore, with the exception of the I-110/I-405 and I-605/SR-60 HOV direct connector projects, the costs for new HOV/HOT direct connectors identified in the Strategic Buildout Network are not included. **Table 6** outlines the high level preliminary costs for standard and non-standard features. As illustrated, the differential between standard and non-standard costs is significant.

Table 6: ExpressLanes Project Tiers

Tier 1*	**Tier 2**	**Tier 3**
I-10 between I-605 & LA/SB CL	I-5 between I-605 & LA/OC CL	I-5 between SR-170 and Parker Road
I-105 between I-405 and I-605	I-5 between SR-170 & SR-134	SR-14 between Avenue P8 & I-5
I-110 ExpressLane extension south to I-405/I-110 interchange	SR-57 between SR-60 & LA/OC CL	SR-60 between I-605 & LA/SB CL
I-405/I-110 Int. HOV Connect Ramps and Interchange Improvements	SR-91 between I-110 and LA/OC CL	SR-118 between I-5 & LA/VC Line
I-405 between US-101 & LA/OC CL	SR-134 between I-210 & SR-170	SR-170 between I-5 & SR-134
I-605 between I-10 & LA/OC CL	I-405 between US-101 and I-5	
I-605/SR-60 Interchange HOV Direct Connectors		
Non-Standard Costs: $1,246.2M	**Non-Standard Costs: $210.8M**	**Non-Standard Costs: $242.4M**
Standard Costs: $1,845.6M	**Standard Costs: $4,142.7M**	**Standard Costs: $1,686M**

*Tier 1 Non-Standard and Standard cost total includes new construction of the I-605/SR-60 HOV direct connectors estimated to cost $490.6M as well as the I-110 ExpressLanes Extension and I-405/I-110 HOV direct connector ramps, estimated to cost $280.4M and $250M, respectively.

3.2 POTENTIAL FUNDING SOURCES

There are several potential funding sources for constructing the ExpressLanes projects, including local, state, federal, and private.

3.2.1 LOCAL FUNDING

i. Measure M

On November 8, 2016 Los Angeles County voters passed Measure M, a ½ cent sales tax for transportation projects. Measure M provides $866.5 million in funding (2015 dollars) for several ExpressLanes projects as listed in **Table 7**.

Table 7: Measure M Funding for ExpressLanes Projects

Project	Measure M Funding	Funding Availability
I-405 from I-10 to US-101	$260,000,000	2024
I-105 ExpressLanes from I-405 to I-605	$175,000,000	2027
I-405/I-110 Int. HOV Connect Ramps and Interchange Improvements	$250,000,000	2042
I-605/SR-60 Interchange HOV Direct Connectors	$130,000,000	2043
I-110 ExpressLane extension south to I-405/I-110 interchange	$51,500,000	2044
Remaining Projects in Tier 1, Tier2 and Tier 3	Eligible for Measure M Hwy Program	TBD

ii. Measure R Sales Tax

A ½ cent sales on retail sales in Los Angeles County, approved by voters in 2008. Eligible uses include construction of specific list of highway capital projects or programs of projects.

iii. Proposition C 25%

A ½ cent tax on retail sales in Los Angeles County, approved by voters in 1990. Eligible uses include expenditures related to Traffic Systems Management (TSM) and Congestion Management Programs.

For those projects not specifically identified in Measure R and Measure M, Metro would need concurrence from the Subregion and the Board for implemntation of Express Lanes.

Additionally, it may be possible to utilize net toll revenue loans from other ExpressLanes projects. However, any decisions related to net toll revenue funds will require Metro Board direction.

3.2.2 STATE FUNDING

Potential state funding sources include:

i. State Transportation Improvement Program (STIP)

A five-year state-regional program, adopted every two even years, of capital improvements on and off the State Highway System that increase the capacity of the transportation system. The STIP consists of two broad programs – the regional program (RIP) funded from 75% of new STIP funding and the interregional program (IIP) funded from 25% of new STIP funding. Funds new construction projects that add capacity to the transportation network. The California Transportation Commission (CTC) must approve each County's STIP in its entirety. CTC allocation is required by the end of the fiscal year that the project is listed in the STIP.

ii. California Infrastructure and Economic Development Bank (IBank)

As of January 2016, IBank has financed nearly $37 billion in infrastructure and economic development projects. IBank has broad statutory authority to issue tax-exempt and taxable revenue bonds, provide loans to state and local governments for public infrastructure and economic expansion projects and loan guarantees to help small businesses.

iii. HOV Violation Fund

Revenue generated from fines collected from violations of Los Angeles County carpool lanes and for crossing double-double solid yellow lines. Metro receives 1/3 of the first $100 if the violation occurs in a city within the County and 1/2 if in un-incorporated areas of the County. Metro programs these funds for the Freeway Service Patrol Program in which Metro contracts for tow trucks to patrol the freeways to improve traffic flow.

3.2.3 FEDERAL FUNDING

Potential federal funding sources include:

i. Transportation Investment Generating Economic Recovery (TIGER) grant program

Since 2009, the TIGER grant program has provided a combined $5.1 billion to 421 projects. Purpose is to support innovative projects, including multi-modal and multi-jurisdictional projects, which are difficult to fund through traditional federal programs.

ii. Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies (FASTLANE) grant program

Authorized at $4.5 billion from FY 2016 through FY 2020 for projects that improve safety and hold the greatest promise to eliminate freight bottlenecks and improve critical freight movements. USDOT awarded $759 million to 18 projects in the initial FY 2016 FASTLANE round. Up to $850 million in FASTLANE funds is available in the current FY 2017 FASTLANE round.

iii. Transportation Infrastructure Finance and Innovation Act (TIFIA) Loan program

Provides credit assistance for highway and transit capital projects eligible for federal aid. Major requirements include a capital cost of at least $50 million (or 33.3 percent of a state's annual apportionment of Federal-aid funds, whichever is less) or $15 million in the case of ITS. TIFIA credit assistance is limited to a maximum of 33 percent of the total eligible project costs.

iv. Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD)

Authorized at $60 million each fiscal year from FY 2016 to FY 2020. Eligible projects involve advanced transportation management technologies, infrastructure maintenance, monitoring, and condition assessment, transportation system performance data collection, analysis, and dissemination systems, advanced safety systems, technologies associated with autonomous vehicles, electronic pricing and payment systems, and advanced mobility and access technologies.

v. Surface Transportation Block Grant (STBG) Program

STBG program funds are apportioned to states in the form of contract authority, subject to the overall Federal-aid obligation limitation. Each State’s STBG apportionment is calculated based on a percentage specified in law. Certain set-asides are required by law from a State’s STBG apportionment, including funding for Transportation Alternatives, 2% for State Planning and Research, and funding for bridges not on Federal-aid highways (Off-system bridges).

vi. Congestion Mitigation and Air Quality (CMAQ) Improvement Program

Formula funding is apportioned to states for projects that contribute to the attainment or maintenance of a national ambient air quality standard, with a high level of effectiveness in reducing air pollution. Vehicle-to-infrastructure communications equipment and electric vehicle and natural gas vehicle infrastructure are eligible projects under the FAST Act's CMAQ program.

vii. National Highway Freight Program

Provides $6.3 billion in formula funds over five years for states to invest in freight projects on the National Highway Freight Network. Potential for truck tolling projects.

viii. Highway Safety Improvement Program (HSIP)

Formula funding apportioned as a lump sum for each State, which then divide that total among apportioned programs and safety projects that are consistent with the State's strategic highway safety plan and that correct or improve a hazardous road location or feature or address a highway safety problem. Eligible projects include installation of vehicle-to-infrastructure communication equipment, and roadway improvements that provide separation between pedestrians and motor vehicles, including medians and pedestrian crossing islands.

ix. Intelligent Transportation Systems (ITS) Program

The program is currently focused on significantly reducing crashes through advanced safety systems based on interoperable wireless communications among surface transportation vehicles of all types, traffic signals, other infrastructure systems, pedestrians, wireless devices, and automated vehicle systems. The Federal share is 80%.

x. Grant Anticipation Revenue Vehicles (GARVEEs)

As of March 2016, 25 States and 3 territories have issued over $19.1 billion in GARVEE bonds which are paid with future Federal highway formula funds. GARVEE financing generates up-front capital for major highway projects at generally tax-exempt rates and enables a State to construct a project earlier than if using traditional pay-as-you go grant resources.

3.2.4 PRIVATE FUNDING SOURCES

Potential private funding sources include:

i. Public-Private Partnerships (P3)

P3 addresses limited funding resources for infrastructure or development projects of the public sector, thereby allowing the allocation of public funds for other local priorities. An example of a concession P3 is a tolled highway project wherein the government agency that owns the facility contracts with the private sector to grant it the right to design, build and operate the highway, along with the right to collect a toll (user charge) from the users of the expressway.

Various contractual arrangements, such as Design-Build-Operate-and-Maintain, Design-Build-Finance, and Design-Build-Finance-Operate-and-Maintain, are P3 arrangements reflecting the different appetites for risk and the role of the project proponent.

ii. Bonds

A Revenue bond is another potential source of funds for constructing future Express Lanes projects. Revenue bonds may be issued directly by Metro and secured by repayment from future toll revenues or other sources.

4. FUNDING PRIORITIZATION

Currently available funding is not sufficient to construct all projects included in Tiers 1, 2, and 3. It is possible that Metro may be able to fill this funding shortfall or reduce the need for borrowing by securing federal and/or state funding, as was done for the I-110 and I-10 ExpressLanes. Metro will seek all opportunities to secure funding though traditional and innovative sources. However, in the absence of outside sources, the only source of revenue that could be used to cover the funding shortfall would be loans of toll revenue from the existing and future Express Lanes.

Currently toll revenue from the existing I-110 and I-10 ExpressLanes is used to pay for the following items:

1. Operations and maintenance – This includes account maintenance, fees, violation processing, marketing and public relations, customer service call center, ExpressLanes traffic management, Caltrans maintenance, dedicated CHP enforcement, Freeway Service Patrol incident management, Metro staff costs, and transponders.

2. Transit subsidies – Toll revenues are allocated to the Metro Silver Line, Foothill Transit, Gardena Transit, and Torrance Transit to subsidize added transit services that operate in the I-110 and I-10 corridors.

3. Low income Assistance Plan - The Metro ExpressLanes' Low-Income Assistance Plan (formerly called the Equity Plan) provides discount to qualifying LA County residents who sign up for a Metro ExpressLanes account. Low-Income Assistance Plan account holders receive a $25 discount when they sign up, and also have their $1 monthly maintenance fee waived. To qualify for the program, the Metro ExpressLanes customer must live in LA County and have an income that is no greater than twice the federal poverty level ($40,180 for a family of 3).

4. Carpool Loyalty Program - The Carpool Loyalty Program automatically enters Metro ExpressLanes carpools into a monthly drawing for a chance to win gift card rewards. Each month, 40 winners are selected — 10 HOV-2 winners and 10 HOV-3+ winners in each corridor.

5. Transit Rewards Program – This program allows Metro ExpressLanes customers to earn toll credits by making transit trips in the Express Lane corridors. Using their registered Transit Access Pass (TAP) card, transit riders earn a $5 toll credit for every 32 one-way trips taken during peak hours on transit lines along the I-110 Harbor Transitway or I-10 El Monte Busway. The I-10 and I-110 ExpressLanes currently generate net toll revenues in excess of the cost items identified above.

6. Metro's Board has established the Net Toll Revenue Re-Investment Grant Program to provide funding for projects improving mobility within the I-110 and I-10 corridors. In July 2014, the Board approved $20.7 million in Net Toll Grants to 22 projects enhancing active transportation/system connectivity, transit service, and the highway system. In 2016, the Metro Board approved a second round of Net Toll Grants that distributed $28 million for additional improvements in the two corridors.

While there is currently surplus net revenue available for reinvestment in the I-110 and I-10 corridors through Net Toll Grants, if the Metro Board were to approve construction of new Express Lane facilities supported by these net revenues, then surplus funds for the grant program would be reduced, possibly to the point where in some years surplus funds would no longer be available. Although no funding decisions have been made at this time, it is important to recognize this possibility as Metro considers developing a countywide Express Lanes network.

5. VEHICLE OCCUPANCY

Section 166 of Title 23 of the U.S. Code requires that HOV and Express Lanes on Interstate highways operate at an average travel speeds of 45 miles per hour during peak travel periods. Performance of HOV facilities is considered to be degraded if it falls below the 45 mph threshold more than 10 percent of the time during peak periods over a consecutive 180-day period.

If an HOV or Express Lane facility is considered degraded, then the state must either limit or discontinue the use of the lane by the exempted vehicles or take other actions that will bring the operational performance up to the federal standard within 180 days after being identified as degraded, or risk losing funding from US DOT.

In December 2015 Caltrans submitted a 2014 California High-Occupancy Vehicle Lane Degradation Determination Report to FHWA to document the performance of HOV facilities in the state, as required by federal regulation. According to the Degradation Report, 310 miles of HOV lanes in Los Angeles County out of a total 514 lane miles are degraded.

Preliminary traffic and revenue forecasts for the year 2035 prepared for the SCAG Express Travel Choices Phase II Study indicate that degradation levels will deteriorate further if the current HOV-2+ occupancy rate (**Figure 13**) continues to be used on HOV facilities in Los Angeles County. Nearly all HOV corridors in Los Angeles County will be degraded during the p.m. peak if the HOV-2+ occupancy requirement remains in place. During the p.m. peak, HOV segments shaded in yellow would be degraded between 10 and 49 percent of the time, those shown in orange would be degraded between 50 and 74 percent of the time, and those in red would be degraded over 75 percent of the time. These levels of degradation far exceed the Federal limit of only 10 percent of peak periods with speeds below 45 mph and demonstrate that conditions on Los Angeles County's HOV network would be untenable at the current HOV-2+ occupancy rate. Moreover, conversions to Express Lane operation would not be possible, as there would be no excess capacity available to sell to paying non-HOV motorists.

The provision of additional Express Lane capacity could be expected to mitigate the overutilization of the existing lanes in many of the locations identified in the Caltrans Degradation Report. However, the cost of providing additional Express Lane capacity can be significant, especially in corridors where design exceptions have already been utilized to accomplish the construction of the existing HOV lanes in highly urbanized areas, like many in Los Angeles County.

Although the costs of providing additional Express Lanes capacity can be significant, the potential for revenue generation from the Express Lanes is also increased significantly when comparing single-lane Express Lanes to dual-lane Express Lanes. The provision of a second Express Lane in most cases effectively provides a full lane of capacity that can be priced as part of the Express Lanes management strategy, regardless of the level of HOV participation in the corridor. Evidence from Express Lanes facilities across the country indicates that the level of revenues generated by dual-lane Express Lane facilities is, on average, about ten-times the level

of revenue observed on single lane Express Lane facilities contributing to the ability to offset the cost of implementation in specific locations.

In lieu of providing additional lane capacity, increasing the HOV occupancy requirement can help to mitigate the overutilization of existing HOV lanes. As shown in **Figure 14**, if HOV occupancy requirements are increased to HOV-3+, and adequate enforcement is provided to ensure compliance, traffic degradation on nearly all HOV facilities in Los Angeles County will be eliminated during the p.m. peak period. With the exception of a two-mile segment of the I-5 HOV lanes between SR 14 and I-405 that could be degraded between 10 and 49 percent of the time, all other HOV facilities in Los Angeles County would operate in excess of 45 miles per hour during the p.m. peak, and the vast majority of the HOV network-those segments shown in dark green--would do so over 95 percent of the time.

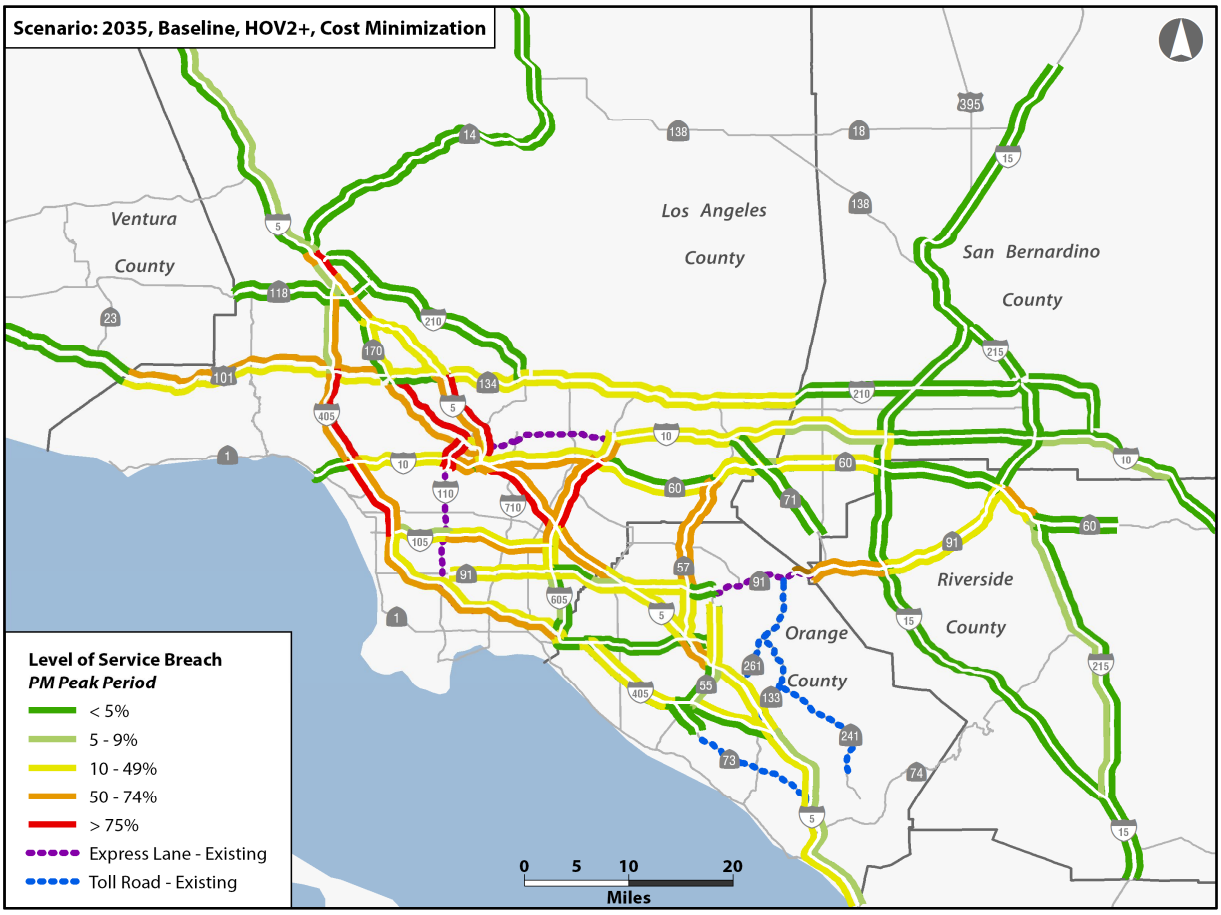


Figure 13: 2035 Forecast Breaches for Level of Service, HOV-2+ Toll Free

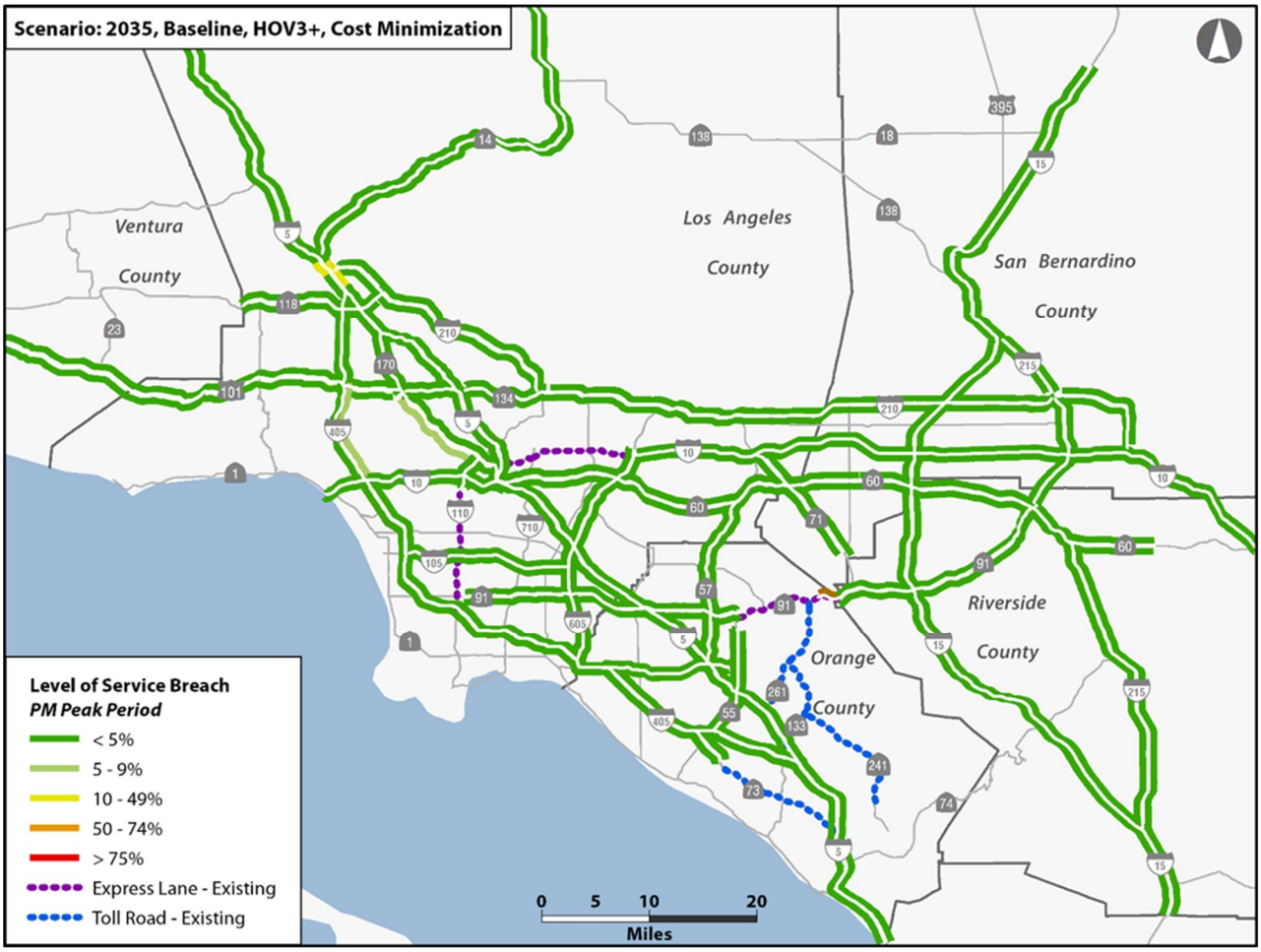


Figure 14: Forecast Breaches For Level Of Service, HOV-3+ Tolled

Given that the increase in HOV occupancy requirements from HOV-2+ to HOV-3+ would divert all HOV-2 motorists to the general-purpose lanes, the HOV lanes would have excess capacity available to accommodate paying non-HOV vehicles. In order to take advantage of that available capacity and to reduce the number of vehicles diverted to the general-purpose lanes, it is recommended that Express Lane operations be introduced concurrently with the increase in the HOV occupancy requirement. In addition, consideration should be given to providing a reduced toll for HOV-2 motorists during the peak period

As with the current occupancy policy on the I-10 ExpressLanes, it is also recommended that the increase in occupancy rates from HOV-2+ to HOV-3+ be limited to peak periods only. This is consistent with best practices as revealed in national research that has found that differential HOV access by time of day is more acceptable to the public than implementing the HOV-3+ occupancy requirement 24 hours per day. As travel demand continues to grow in Los Angeles County, Metro and Caltrans should continue to monitor conditions on the Express Lanes during shoulder and off-peak periods to ensure that traffic conditions do not become degraded at the HOV-2+ occupancy rate.

6. INNOVATIVE TECHNOLOGY OPERATIONAL IMPROVEMENTS

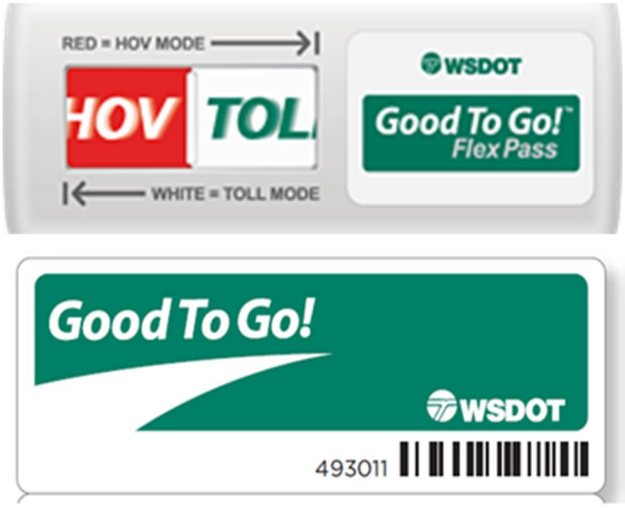
This section highlights several emerging technologies and developments that have the potential to change the way that Express Lanes are developed and operated.

6.1 INTEROPERABILITY

There are state and national efforts to modify tolling protocols to achieve broader interoperability as described below.

The California Toll Operators Committee (CTOC), the entity that maintains toll interoperability throughout the state, has developed a plan to transition from the current tolling protocol (known as Title-21) to the ISO 18000-63 (known as 6C) protocol. The 6C protocol offers significantly lower transponder costs and is an established standard in the toll industry. All other states in the west with the exception of California already use the 6C protocol for tolling, including Washington, Utah and Colorado. 6C transponders come in a variety of forms including a transportable hard case form that allows for occupancy declaration and a non-removable sticker form (see examples from Washington in **Figure 15**).

Figure 15: 6C Switchable Transponder (top) and Sticker Tag (bottom) from WSDOT



The CTOC transition plan envisions a gradual process to replace Title 21 with 6C, including a period of time during which both protocols will be in effect. Nearly all California toll facilities are equipped with multi-protocol readers that are capable of reading 6C and Title 21 transponders. After the administrative rulemaking process to modify the existing Title 21 regulations is complete, it is estimated to take up to 18 months before California toll agencies would all be able to process 6C transactions.

On a national level, the International Bridge, Tunnel and Turnpike Authority (IBTTA) is leading the effort to achieve toll interoperability so that customers can establish a single account that would be recognized on all toll facilities in the country. The initiative, referred to as National Interoperability (NIOP), envisions the eventual adoption of a national tolling protocol and the establishment of central hubs that would permit the exchange of information to allow a transaction recorded at any toll facility to be matched to a customer's home account. There are many institutional challenges associated with establishing interoperability given the many legacy toll programs that currently exist throughout the country. There is no established timeframe or mandate for the achievement of national interoperability.

6.2 CONNECTED AND AUTONOMOUS VEHICLES

Connected and autonomous vehicles have the potential to revolutionize the way transportation facilities operate. The implications of these technologies on Express Lanes is speculative at this early stage of deployment but are worth considering for future planning purposes.

Connected vehicle technology relies on dedicated short-range radio communications (DSRC) to share data among vehicles and with roadside infrastructure. This sharing of data allows vehicles and infrastructure to receive and act on information about nearby vehicles. For example, drivers can be alerted of the risk of a rear-end collision when vehicles ahead are stopped and traffic signal controllers can optimize signal timing based on shared data. Within the context of Express Lanes, connected vehicle applications could potentially be used to communicate between vehicles and toll systems to verify vehicle occupancy, communicate toll rates and other managed lane operational characteristics to vehicles, and could even be used as an alternative to transponder based tolling. Additionally, there are likely to be operational benefits associated with increased roadway capacity and decreased congestion as the penetration of connected vehicles increases over time.

Autonomous vehicles are capable of sensing their environment and taking over some or all of the driving functions from a human driver. Many are predicting that the rollout of autonomous vehicles will fundamentally change the way our transportation system operates. Like connected vehicles, autonomous vehicles have the potential to get more capacity out of our existing infrastructure. A world where the majority of autonomous vehicles are shared could lead to decreased congestion, but some skeptics fear that autonomous vehicles will give people the freedom to move even farther from urban centers and create more congestion since the time normally spent driving could be replaced with other tasks. Both scenarios could lead to thinking differently about the future of how Express Lanes operate.

6.3 NEW MOBILITY AND MOBILE DEVICE APPLICATIONS

Private technology and transportation companies are introducing "new mobility services" at a rapid pace. Examples include ridehailing (e.g., Uber, Lyft), carsharing (e.g., Zipcar, Car2Go), ridesharing (e.g., Carma, Scoop), real-time navigation (e.g., Waze) and driverless vehicles (e.g., Ford, Google, Tesla). The proliferation of these services seems to be outpacing the ability to anticipate their impacts. However, there are opportunities to develop synergies between these new mobility services and the operation of Express Lanes.

In Austin, TX, a federally funded pilot program offered toll rebates to users who carpooled on select toll facilities using the Carma Carpooling service. The Carma Carpooling Austin demonstration project successfully demonstrated the use of an application to provide information about the number of people in a vehicle for the application of toll discounts. This concept could be expanded to incentivize, verify, and apply toll discounts to qualifying vehicles on Express Lane facilities.

Mobile device applications are increasingly of interest for providing the ability to collect toll payments, including declaring eligible carpools. Currently, much of the discussion regarding mobile devices centers on account management, transponder replacement and occupancy declaration, with each representing increasingly viable options for considering during the deployment of new Express Lanes tolling systems. Several companies have developed mobile applications to replace a toll tag in the vehicle. One example (**Figure 16**), GeoToll®, has integrated 6C tag protocols into the Android phone platform allowing the phone itself to act as the transponder. The company has conducted a demonstration for the Washington State Department of Transportation (WSDOT) and has shown that their application can be used within the deployed tolling infrastructure with a comparable level of accuracy to existing RFID tags. While all of these technologies have the ability to impact Express Lanes operations, it should be noted that all are still limited by our ability to enforce the actual occupants in the vehicle.

Figure 16: GeoToll Mobile Device Interface

(source credit: GeoToll)

6.4 ENFORCEMENT TECHNOLOGIES

There are a number of new technologies that are in different phases of development and deployment to aid in the enforcement of Express Lanes. Traditionally, Express Lanes have relied primarily on visual enforcement by highway patrol officers. To aid in manual enforcement, some Express Lanes are equipped with beacons that illuminate depending on the setting of a driver's transponder (or lack of a transponder) to provide a visual cue for targeted enforcement.

Figure 17: Photo of VPDS Camera and Equipment

Source: Metro

There are several technologies have been researched and deployed that have the potential to eliminate or significantly reduce the amount of manual enforcement that is required for enforcement. License plate recognition cameras are in use on toll facilities around the country, including the Metro ExpressLanes, to capture and process the license plates of vehicles.

In Houston, a technology was developed to identify and alert officers of the presence of prohibited vehicles using license plate recognition. The Houston Rapid Alert System (RAS) generates real-time alerts, including an image of the vehicle, vehicle location and amount of money owed in toll violations and fees, which are sent to officers' laptop computers in their patrol vehicles.

Vehicle Passenger Detection Systems (VPDS) have been under development for a number of years, although to date no effective systems have been fully deployed. Current systems being

tested show considerable promise to support enforcement efforts by allowing enforcement personnel to target specific vehicles suspected of occupancy violations. These systems utilize cameras to capture images through the front windshield and through the rear passenger window (**Figure 17**). Once images are captured, image analysis using facial recognition software is performed to determine how many occupants are in the vehicle. The results from recent testing of VPDS on the I-110 ExpressLane have shown that the system can maintain above a 95% capture rate of vehicles using the facility. Utilizing manual review of the remaining 5% of the images can put the capture rate at close to 100%.

7. CONCLUSION AND NEXT STEPS

Los Angeles County freeways have consistently ranked among the worst in the nation for traffic congestion. Express Lanes have proven to be an effective strategy for managing freeway congestion both in Southern California and in other parts of the country.

This Strategic Plan establishes a vision for Metro to deliver a system of Express Lanes that builds on the success of the I-110 and I-10 ExpressLanes pilot program to create a more reliable, faster travel option that makes better use of existing vehicle capacity in the carpool lanes and affords greater flexibility for motorists and transit riders. The Strategic Plan is intended to be updated periodically to reflect changes in project costs, revenues, economic conditions, project priorities and technology innovations that will undoubtedly occur over the next 25+ years.

An analysis methodology consisting of quantitative mobility and financial criteria as well as four qualitative refinement criteria was used to identify a network of over 621 lane miles of Express Lanes. These Express Lanes were then prioritized into Tiers 1, 2, and 3. The first, or near-term tier of Express Lanes conversions include projects with high mobility and financial feasibility scores, available funding, connectivity with the currently existing Express Lanes, and/or the ability to implement dual Express Lanes in each direction. The second, or mid-term tier of Express Lane conversions includes corridors with moderate mobility and financial feasibility scores. The third, or longer-term tier of Express Lanes conversions includes projects with lower mobility and financial feasibility scores that do not offer strong revenue potential but would provide important opportunities for connectivity. Metro intends to pursue Express Lanes projects generally consistent with the three tiers of projects described in this plan and will focus first on the Tier 1 projects. Metro's 621-mile network will be built in phases, with individual projects completed in the next five to twenty-five years or beyond. In addition to the Express Lanes, HOV direct connectors are also needed to encourage use of the Express Lanes by improving mobility and safety through reduced weaving and merging.

Some of the projects in the ExpressLanes strategic plan are funded through Measure M, though most are not. For those projects not funded through Measure M, Metro will attempt to secure other sources of revenue that could include other local funds, bonds, Transportation Infrastructure Financing and Innovation Act (TIFIA) loans, grants, Public Private Partnerships, and net toll revenue loans from other ExpressLanes. It should be noted that if the Metro Board were to approve construction of a new Express Lane facility supported by loans of net toll revenues, then surplus funds for the Net Toll Grant program could potentially be reduced, possibly to the point where in some years no surplus funds would available to grant. Although no funding decisions have been made at this time, it is important to recognize this possibility as Metro considers developing a county-wide Express Lanes network.

To implement the Countywide Express Lanes Strategic Plan, for the Tier 1 projects, it is recommended that Metro conduct further planning studies, including an analysis of potential HOV/HOT direct connectors, develop a comprehensive financial plan and secure CTC authority to toll. These studies would provide detailed cost estimates, design configurations and revenue potential for each of these Express Lane facilities. Policies should also be

considered for the inclusion of Express Lanes as an alternative in the planning process for all Highway projects and the increase of occupancy requirements from HOV-2 to HOV-3+ during peak hours.

With the proposed ExpressLanes projects in Los Angeles County, the existing SR-91 and planned I-405 ExpressLanes in Orange County, planned ExpressLanes along the I-10 and I-15 in San Bernardino County, and SR-91 and I-15 in Riverside County, southern California is on its way to developing a regional Express Lane network that would extend across the four counties.

APPENDIX A - NOVEMBER 2014 BOARD MOTION FOR STRATEGIC PLAN

MOTION BY:

MAYOR ERIC GARCETTI, SUPERVISOR MARK RIDLEY-THOMAS, DIRECTOR JACQUELYN DUPONT-WALKER, & DIRECTOR JOHN FASANA

Executive Management Committee Meeting

November 6, 2014

Item 59 – ExpressLanes Strategic Plan

Congestion Pricing is a strategy to reduce traffic congestion, improve the reliability of highway system performance, and generate new revenue which can be used to fund transportation improvements in the corridors where the revenues are generated.

In June 2007, the Los Angeles County Metropolitan Transportation Authority (MTA) Board unanimously passed a motion directing the CEO to work with Caltrans and other agencies to develop a detailed operating plan for implementing congesting pricing in Los Angeles County.

In April 2008, MTA, in partnership the Caltrans, entered into an agreement with the U.S. Department of Transportation (USDOT).

The agreement identified an award of a $210.6 million federal grant to convert existing High Occupancy Vehicle (HOV) lanes into dynamically-priced high-occupancy toll (HOT) lanes as an initial congestion pricing pilot project, known as ExpressLanes.

MTA converted the high-occupancy vehicle lanes on portions of I-10 and I-110 in Los Angeles County to HOT lanes.

February 23, 2014 marked the successful completion of the federal grant requirement of 12 months concurrent toll operations of the MTA ExpressLanes.

Legislation was enacted in September 2014 that granted MTA the authority to conduct, administer, and operate the program indefinitely, under the same terms and conditions that governed the demonstration program.

CONTINUED

MTA ExpressLanes have proven to be effective in increasing travel speeds, reducing travel times without creating adverse impacts on the general purpose lanes.

The public has accepted tolling as a means of improving mobility. During the first year alone, drivers acquired 259,000 transponders, greatly exceeding the ExpressLanes program's goal of 100,000.

ExpressLanes on I-10 and I-110 garnered significant recognition and acceptance as well as generating toll revenues that are being reinvested in mobility improvements in the surrounding communities and are providing improvements to the regional transportation network.

It is now time to expand upon the success of the Congestion Reduction Demonstration program.

WE THEREFORE MOVE that the MTA Board direct the CEO to develop an "ExpressLanes Strategic Plan" as part of the FY15 ExpressLanes Work Plan which shall include the following:

A. Identification and recommendations of potential corridors that can benefit from ExpressLanes conversion.

B. Development and execution of a master cooperative agreement with Caltrans to jointly execute Project Study Report/Project Development Support (PSR/PDS), Project Approval/Environmental Document (PA/ED) and/or other technical studies for future ExpressLanes corridors.

C. Development of a 10-year and 30-year resource plan for existing and future ExpressLanes corridors.

WE THEREFORE ALSO MOVE that the Board direct the CEO to:

D. Report back to the MTA Board with the first update of the "ExpressLanes Strategic Plan" no later than June 2015.

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APPENDIX B – METRO EXPRESSLANES TOLL POLICY

Los Angeles County Metropolitan Transportation Authority ExpressLanes Toll Policy

Purpose

The policy framework detailed herein establishes policies to operate, maintain, and administer the ExpressLanes to ensure program goals are met. The policies will be used to operate the current Metro ExpressLanes program and any future ExpressLanes facilities in compliance with the program goals and Board direction. This policy framework will be expanded or modified as the ExpressLanes system grows and technology changes.

Program Goals

The following goals are established for the ExpressLanes program. The specific policies that follow derive their authority from these goals, and any future policy decisions should be measured against these goals to ensure compliance with the goals.

- Provide a safe, reliable, predictable commute for customers of the ExpressLanes
- Reinforce LACMTA's ongoing efforts to increase vehicle occupancy rates and transit ridership
- Use dynamic pricing to manage traffic and optimize -people throughput in the corridor
- Provide excellent customer service
- Operate and maintain a self-sustaining ExpressLanes program
- Utilize any surplus toll revenue for corridor improvements and system expansion

Chapter 1: OPERATIONS

Performance Requirements 100.005

In accordance with Section 166 of Title 23, Code of Federal Regulations, the ExpressLanes performance will be monitored to ensure a minimum average operating speed of 45 miles per hour, 90 percent of the time during weekday peak periods.

Mitigation strategies to be deployed, should performance degrade, are as follows:

(a) Increase the maximum toll charged to vehicles to reduce demand as described in 100.005, up to four times, then implement strategy (b), or (c), as appropriate;
(b) Extend the peak period hours, as described in 200.015, then implement strategy (a) or (c), as appropriate;
(c) Discontinue non-HOV vehicle use of ExpressLanes, and implement strategy (a) as appropriate.

Peak period performance will be monitored against ExpressLanes performance requirements. Staff will adjust the peak period to maintain performance standards.

For tolling operations, after four occurrences, within a quarter, of meeting the HOV threshold in a non-peak hour, staff may increase the duration of the peak-period to include the hour. For example, if HOV

Only has occurred four times during the 9:00 am and 10:00 am hour within the past 3 months then the peak period would now be extended to 10:00 AM from 9:00 AM

HOV threshold is defined as:

(a) System in HOV Only mode;
(b) Lasting more than 35 minutes; and
(c) Excludes incidents.

Chapter 2: Toll Rates, Exemptions and Discounts

Toll Rate Setting 200.005

When the ExpressLanes are in operation, the toll rate schedule will be a minimum of $0.10 per mile during off-peak hours and $0.35 per mile during peak hours, as defined in policy 200.015. Toll rates will vary based on, traffic density (traffic volumes/travel speeds) and will automatically adjust using a dynamic pricing system. The trip price is determined by multiplying the miles travelled by the rate per mile in each tolling segment at the time of the trip. Staff will monitor toll rates against ExpressLanes performance and adjust the maximum rate per mile to maintain performance standards and ensure the following ExpressLane toll rate goals are met:

- Provide a safe, reliable, predictable commute for customers of the ExpressLanes
- Optimize people throughput in the corridor.

After four occurrences, within a quarter, of meeting the density threshold, staff may increase the maximum price per mile per segment by $0.10.

Density threshold is defined as:

- Density exceeding 48 (calculated as traffic volume/average travel speed);
- Lasting more than 35 minutes; and
- Excludes incidents.

Toll Exemptions 200.010

Except as provided herein, all vehicles using the ExpressLanes must pay the required toll. Only qualified vehicles may be exempt from paying tolls. The registered owner and operator of the qualified vehicle must comply with the requirements of the agency in order to obtain the exemption. The following vehicles qualify for exemption:

(a) Mass transit and paratransit as defined in Vehicle Code Section 21655.5;
(b) Carpools and vanpools, as established for each tolled facility;
(c) Motorcycles;
(d) California Highway Patrol;
(e) Authorized marked emergency vehicles on bona fide emergencies as defined in Vehicle Code Section 23301.5;
(f) Maintenance vehicles directly involved in maintenance on the ExpressLanes and adjoining bus stations or responding to bus related incidents; and

(g) Tow trucks authorized by Freeway Service Patrol responding to incidents on the ExpressLanes.

Toll Discounts 200.015

The following classes of vehicles may qualify for a toll discount. The registered owner of the qualified vehicle must comply with the following requirements to obtain the discount:

(a) Clean Air Vehicles (see transponder requirement under Section 200.020); and

(b) HOV 2 discount during peak hours, where applicable and indicated by roadway signage.

Staff will implement the toll discounts at a time in the future when operationally feasible.

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APPENDIX C – RELEVANT FEDERAL, STATE, AND REGIONAL EXPRESSLANES POLICIES

TABLE 1: RELEVANT FEDERAL, STATE, AND REGIONAL EXPRESSLANES POLICIES

	Key Policies	Description
Federal	FAST Act MAP-21 (2012)	• Removes requirement of tolling agreements for the construction of new facilities and allows for the construction of new toll lanes provided that the number of general purpose lanes does not decrease. • Permits HOV to HOT lane conversions provided that: (1) the HOV facility is not currently degraded, (2) the presence of tolled vehicles will not result in degradation, and (3) automatic toll collection systems will be implemented.
State	AB 1467 (2006)	• Authorized Regional Transit Authorities (i.e. Metro), in cooperation with Caltrans, to apply to the California CTC to develop and operate HOT lanes (until January 2012). • Limited to four projects statewide as selected by the State Legislature.
	AB 1422 (2008)	• Granted LA Metro legislative authority for the I-110 and I-10 ExpressLanes. • Revenue generated is available for the direct expenses related to the maintenance, administration, and operation, including collection and enforcement of the program. • Remaining revenue must be used in the I-10 and I-110 corridor for planning and construction costs of HOV facilities and improvement of transit services in the corridor.
	Streets and Highways Code Section 143 (2009)	• Allows Caltrans and regional transportation agencies to enter into an unlimited number of Public Private Partnerships (P3s). • Qualifying P3 transportation projects must be designed to improve travel times or reduce delay in the corridor, improve operation or safety in the corridor, and provide air quality benefits in the project region.
	SB 1298 (chaptered)	• Extends the I-110 and I-10 ExpressLanes program indefinitely. • Establishes responsibilities, obligations, and liabilities for Metro, Caltrans and the Department of the California Highway Patrol. • Authorizes Metro to issue bonds pursuant to the Los Angeles County Transportation Commission Revenue Bond Act at any time to finance any costs necessary to implement the program and any expenditures payable from the revenues generated from the program.
	AB 194 (chaptered)	• Re-establishes authority of the CTC to approve HOT lane projects • Authorizes either Caltrans or a local agency to apply to the CTC • Requires for agreements between the local agency and Caltrans and require the active participation of the CHP • Specifies priorities for the sue of net revenues • Authorizes agencies to use bonds backed by toll revenues

	Key Policies	Description
Regional (SCAG)	SCAG RTP/SCS	• Recommends the creation of an express/HOT lanes network as essential to addressing system demands during peak periods.
Local (Metro)	Business Rules	• Toll free travel for vehicles that meet minimum vehicle occupancy requirement, motorcycles, and privately operated buses; all existing carpools would continue to be able to access the lanes without charge. • Trucks are not allowed (other than 2-axle). • Minimum peak tolls shall be no less than 150% of Metro transit fare on the ExpressLanes. • Every vehicle is a customer. All vehicles are required to have a transponder. • Toll/Transit Credits are available to frequent ExpressLanes transit riders. • Tolling will shut down (i.e. no toll users will be permitted to enter the ExpressLanes) when travel speeds fall below 45 mph for more than 10 minutes. • Emergency vehicles may use the ExpressLanes when responding to incidents.
	Key Performance Measures	• Arriving at your destination in less time in either the ExpressLanes or general purpose lanes (travel time savings, average vehicle speed) • Change from driving alone to carpooling, riding transit, and or Metro vanpool (mode shift) • Increase in efficiency by moving more people on the ExpressLanes in a specified period of time (person throughput) • Improved transportation access for the low income commuter (public surveys; credit redemption)
	Transit Rewards Program	• Allows Metro ExpressLanes customers to earn toll credits by riding transit on the ExpressLanes
	Carpool Loyalty Program	• Offers rewards to customers who choose to carpool on the lanes
	Low-Income Assistance Plan	• Provides a discount to qualifying LA County residents who sign up for a Metro ExpressLanes account
	External Agreements	• Funding agreement with the CHP to provide dedicated officers to enforce the ExpressLanes during peak hours • Funding provided to the FSP for dedicated tow trucks for incident management on the ExpressLanes • Interoperability agreements with each California Toll Operators Committee (CTOC) agency
	Net Toll Reinvestment Policy	• All gross toll revenues from the ExpressLanes are first used to pay for maintenance, administration, and operation of the ExpressLanes • All remaining revenue must be used in the respective corridor from which it was collected to provide a direct benefit for reducing congestion.

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APPENDIX D – HOT/EXPRESSLANES HISTORY

1 HOV AND EXPRESSLANES IN LOS ANGELES COUNTY

Los Angeles County is home to one of the most robust and extensive HOV lane networks in the country, and the system is continuing to grow with the planned construction of both HOV and ExpressLanes facilities. In total, Los Angeles County has 460 lane-miles of HOV lanes and an additional 104 under construction or in design or planning. The County also has 75 lane-miles of ExpressLanes in operation.

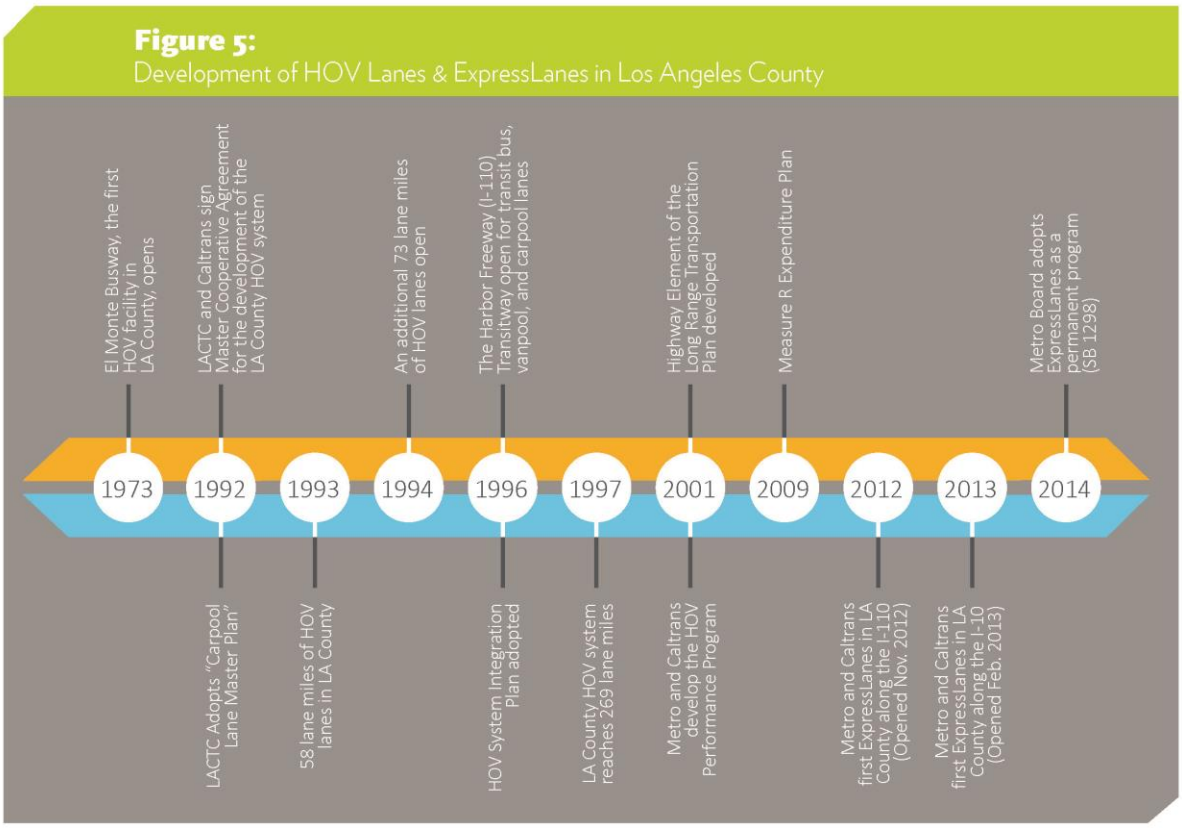
1.1 HISTORY OF EXPRESSLANES IN LOS ANGELES COUNTY

The first ExpressLane project in the United States was implemented on SR-91 in Orange County, California in 1995 and in the ensuing 20 years the concept has expanded to 27 locations both in California and around the country, gaining national recognition as an effective strategy to improve the efficiency and reliability of HOV corridors. **Figure 1** provides a timeline on the development HOV lanes and ExpressLanes in Los Angeles County, beginning with the opening of the El Monte Busway in 1973. By 1997, Los Angeles County had over 269 HOV lane-miles, many of which were starting to become congested during peak periods.

ExpressLanes provide more choices for solo drivers, more rewards for carpoolers, and more transit service.

In 2001, Metro, in cooperation with Caltrans, developed the comprehensive HOV Performance Program, which undertook a detailed evaluation of the performance of the county's HOV system and recommended future improvements including ExpressLanes. The HOV Performance Program allowed Metro to demonstrate the benefits of its HOV investments and plan for system expansion, which ultimately led to the implementation of congestion pricing strategies, including the ExpressLanes.

FIGURE 1: DEVELOPMENT TIMELINE OF HOV LANES AND EXPRESSLANES IN LOS ANGELES COUNTY

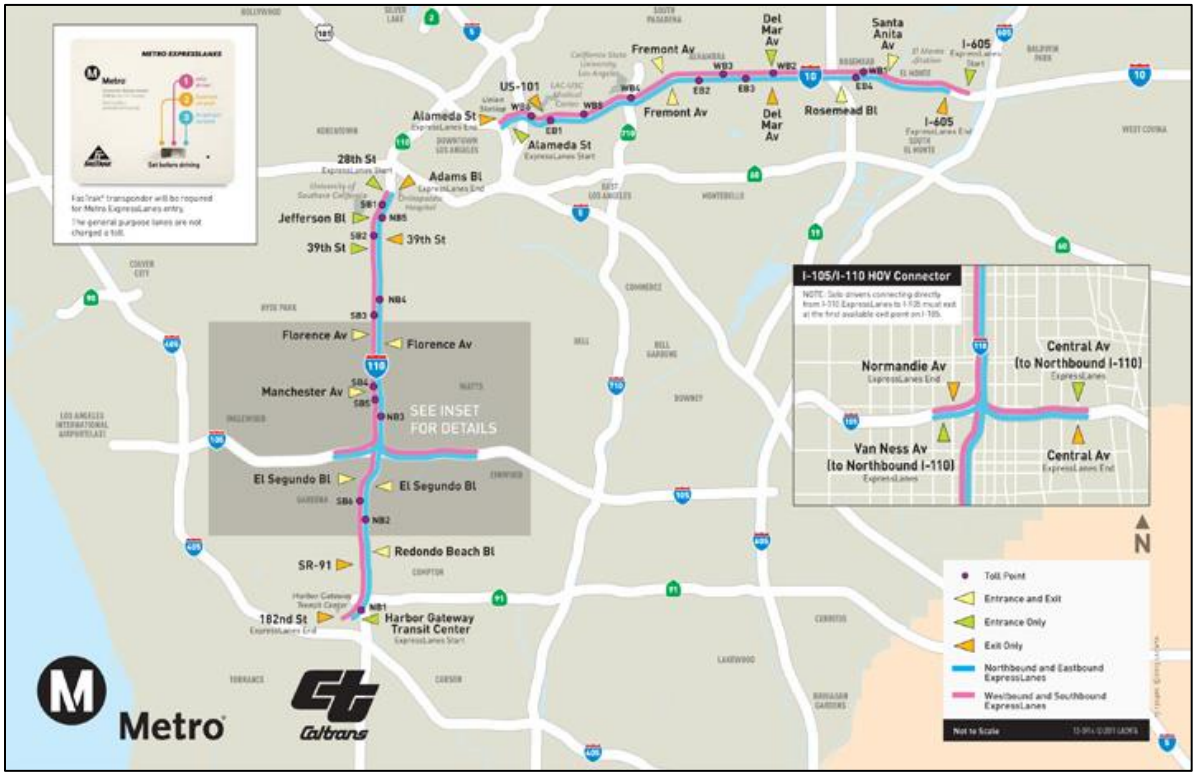


In 2008, the federal government awarded Metro, in partnership with Caltrans, a CRD grant to develop an ExpressLanes program in the Los Angeles County. The ExpressLanes program addresses congestion in the I-110 and I-10 corridor specifically through an integrated strategic set of investments, including congestion pricing, enhanced transit service, improved transit facilities, and parking management. The Metro I-110/I-10 ExpressLanes are notable in that the conversions were made on HOV facilities that were operating at or close to capacity. Pricing is used to regulate flow into the facility, without accompanying changes in either occupancy or vehicle eligibility policies.

The Metro ExpressLanes Program included a suite of transit improvements with the intent to encourage motorists in both corridors to switch to higher density modes to make their trips.

The ExpressLanes along the I-110 between Adams Boulevard and the SR-91 opened in November 2012. A second ExpressLanes segment opened in February 2013 on the I-10 between Alameda Street and the I-605 (San Gabriel Freeway). **Figure 2** shows the location of the existing I-110 and I-10 ExpressLanes.

Figure 2: Metro I-110 and I-10 ExpressLanes



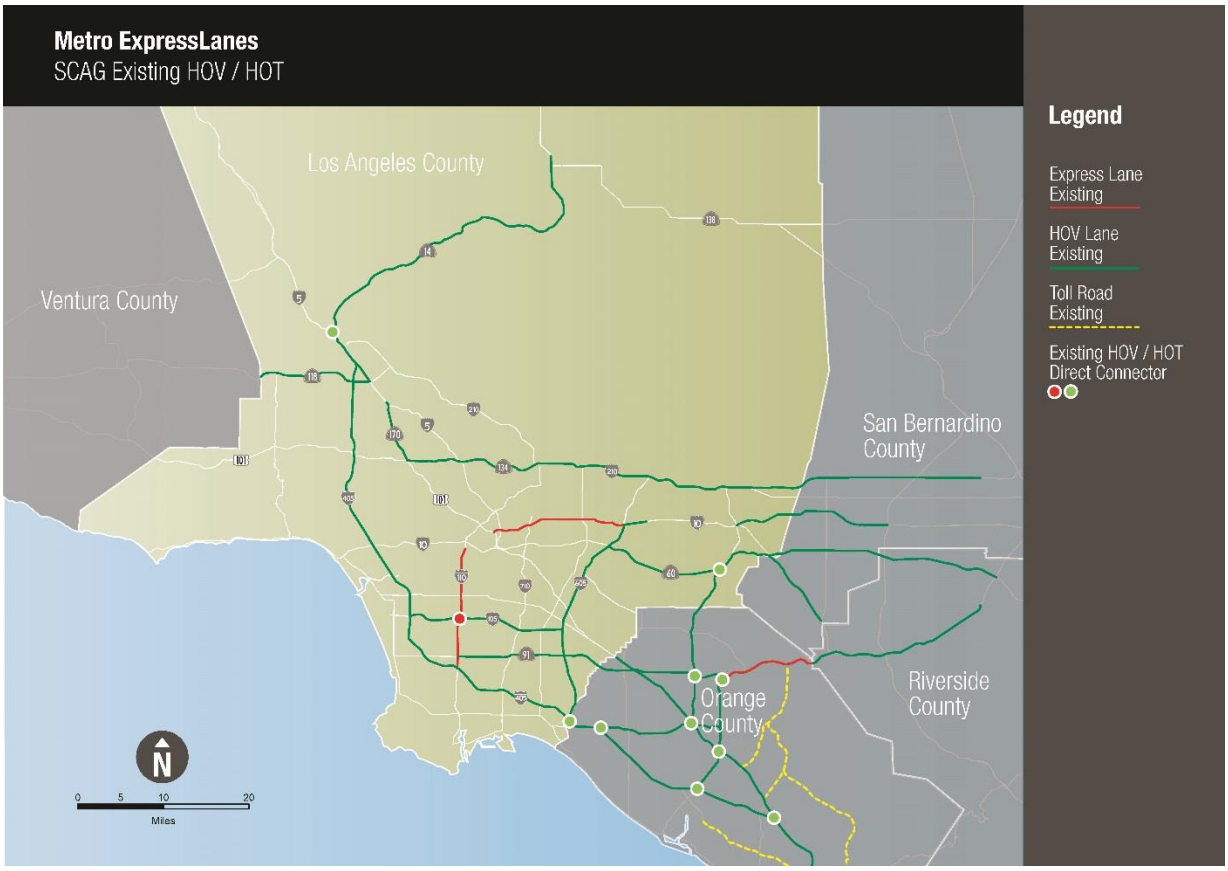
The existing ExpressLanes allow toll-paying vehicles that do not meet carpool requirements to use excess HOV lane capacity. With the exception of certain types of vehicles including transit vehicles, emergency vehicles responding to incidents, CAVs, motorcycles, and carpools/vanpools, all vehicles are required to pay a variable toll. Tolls range from a minimum $0.10 per mile to a maximum $1.40 per mile depending on congestion levels. Qualifying low income commuters also receive a $25 credit through the ExpressLanes Equity Plan. If travel speeds in the ExpressLanes fall below 45 mph, the lanes revert to HOV only access, with non-HOV vehicles no longer able to buy into the lanes.

Metro and Caltrans, together with local partners, developed a package of solutions to increase transit options and person throughput, providing funding for new buses, improvements at transit stations, the LA ExpressPark program, construction of an expanded El Monte Transit Station, and implementation of transit signal priority in downtown Los Angeles.

1.2 EXISTING AND FUTURE HOV/EXPRESSLANE FACILITIES

Caltrans' *October 2014 Caltrans District 7 HOV Annual Report* documents that Los Angeles County's HOV facilities carry approximately 322,000 vehicles with 759,000 passengers per day. On average, individual HOV lanes accommodate approximately 1,300 vehicles carry 3,300 people per hour during peak periods. **Figure 3** shows the existing HOV and ExpressLanes network in Los Angeles County.

FIGURE 3: EXISTING HOV LANE AND HOT LANE FACILITIES IN LOS ANGELES COUNTY



Los Angeles County's HOV lanes carry significantly more person trips per lane than the parallel general purpose lanes during peak periods. The I-10, I-110, and SR-14 HOV lanes accommodate the largest number of person trips during the AM peak period. SR-60, SR-14, I-110, and I-210 HOV lanes carry the greatest number of vehicles per hour per lane during the AM peak period.

Large portions of the Los Angeles County HOV network experience degraded conditions during peak periods. **Figure 4** shows the degraded HOV lane segments in Los Angeles County identified in the *2013 Caltrans HOV Lane Degradation Determination Report*. By federal definition, an HOV lane is considered degraded if average traffic speeds during the morning or evening weekday peak commute hour fall below 45 miles per hour for more than 10 percent of the time over a consecutive 180-day

period. In other words, average traffic speeds in a given HOV lane cannot drop below 45 mph more than two weekdays each month.

As shown in **Figure 4**, significant portions of the HOV lane network in Los Angeles County are considered degraded, including large segments of the I-405, I-105, I-10, I-605, and SR-91 corridors. For the current HOV degradation alone, ExpressLanes conversion can enable better traffic management and can bring back adequate levels of service on the HOV lanes.

FIGURE 4: DEGRADED HOV AND HOT LANE FACILITIES IN LOS ANGELES COUNTY (JAN—JUNE 2013)

Additionally, all HOV lane projects with committed or programmed funding are considered for possible conversion to ExpressLanes operation in the Strategic Plan. With Measure R and the adoption of the 2009 LRTP, funding has been secured to add 104 HOV lane miles and direct connector ramps over the next 30 years in Los Angeles County. These programmed and planned projects have been identified in the following documents:

- Metro 2009 Long Range Transportation Plan (LRTP)
- Metro 2014 Short Range Transportation Plan (SRTP)
- 2015 Federal Transportation Program (FTIP)

- SCAG 2012-2035 Financially Constrained Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS)

Figure 5 depicts the existing and currently planned HOV lanes and ExpressLanes in Los Angeles County.

FIGURE 5: PROGRAMMED HOV AND HOT LANE FACILITIES IN LOS ANGELES COUNTY

2 EXPRESSLANE POLICY CONTEXT AND NECESSARY ENABLING LEGISLATION

Federal, state, and local policies govern Metro's ability to implement new ExpressLanes and guide their operation. In order to expand ExpressLanes on new corridors and build a system, legislative changes will be necessary at a statewide level, and additional policies should be considered by Metro as part of this Strategic Plan. These policies are presented in this section and **Table 1** in Appendix C provides a summary of the relevant policies.

In California, blanket tolling authority at the statewide level does not currently exist, and legislative authority is granted on a facility-by-facility basis. While the current process can be tedious, it also provides some flexibility for such legislation to be uniquely tailored to a specific project.

2.1 FEDERAL

In recent years, the federal government has expanded the authority of states to construct new toll lanes. Moving Ahead for Progress in the 21st Century Act (MAP-21) no longer requires tolling agreements for the construction of new facilities and allows for the construction of new toll lanes, provided that the number of general purpose lanes does not decrease. Under MAP-21, HOV to ExpressLane conversions are permitted on both both interstate and non-interstate facilities provided that:

1) The HOV facility is not currently degraded,
2) The presence of tolled vehicles will not result in degradation, and
3) Automatic toll collection systems will be implemented.

2.2 STATE

The I-110/I-10 ExpressLanes were initially approved in 2008 under Assembly Bill (AB) 1422. In 2014, due to the success of the program, Senate Bill (SB) 1298 extended the I-110 and I-10 ExpressLanes program indefinitely, and established responsibilities, obligations, and liabilities. SB 1298 also authorized Metro to issue bonds pursuant to the Los Angeles County Transportation Commission Revenue Bond Act at any time to finance any costs necessary to implement the program and any expenditures payable from the revenues generated from the program.

In January 2015, AB 194 (Frazier) was proposed, which would allow the California Transportation Commission (CTC) to authorize additional HOT lane projects. Metro officially supports the proposed bill. The bill was passed the California State Assembly in June 2015 and is pending approval by the Senate.

In the near term without the final passage of the AB 194, approval for future ExpressLane projects is likely to come under Streets and Highways Code Section 143 (2009), which allows Caltrans and regional transportation agencies to enter into an unlimited number of Public Private Partnerships (P3). Alternatively, Metro could seek an extension of AB 1467 to allow the approval of additional ExpressLane projects to be delegated to the CTC for approval.

This broad authority to develop a range of transportation projects could include the implementation of a regional network of ExpressLanes. It may be worthwhile for Metro, in collaboration with SCAG, to pursue blanket legislative authority for a regional network of ExpressLanes rather than gaining one-off approvals for individual projects. Not only would this approach provide for regional consistency of standards and requirements, but it would also allow for a more efficient process of deploying a regional system of ExpressLanes.

Caltrans recently completed the update of *Deputy Directive 43 - High Occupancy Vehicle (HOV) Systems*, to address managed lane operations across California. The policy guidance will serve as a guide for Caltrans and its regional partners in planning, developing, operating, and maintaining the State's HOV, HOT and tolled lanes. Metro is also in the process of developing a Master Cooperative Agreement with Caltrans District 7, which includes Los Angeles County, to cover all phases of planning, design, construction, and operation of any future ExpressLanes.

Given the existing legislative framework, Metro would likely gain legislative authority for its ExpressLanes project(s). This legislation could be specific to Metro, or it could pertain to the larger regional ExpressLanes network under development by SCAG. It would be in Metro's best interest to have that legislation include a broad authority to set rates subject to restrictions (if any) of its funding source.

2.3 SCAG REGION

Within the Southern California region, Express/HOT lane strategies have been encouraged by SCAG. *SCAG's 2012-2035 Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS)* emphasizes a system management approach towards prioritizing investments that optimize the performance of the existing system, maintain and improve safety and efficiency, and provide expanded and better travel choices.

The RTP/SCS outlines methods to expand the existing transportation system, and identifies the creation of an Express/HOT lanes network as an essential element to address system demands during peak periods. The RTP/SCS recognizes that Express/HOT lanes take advantage of underutilized existing highway capacity to offer users greater travel time reliability and choices.

The Strategic Plan for Los Angeles County has been prepared in coordination with *SCAG's Regional Express/HOT Lanes Network Pre-Implementation Study and Concept of Operations (ConOps)*. As part of the regional study, SCAG is exploring the feasibility of implementing a regional Express/HOT lane system throughout Los Angeles, Orange, San Bernardino and Riverside Counties. The effort includes the development of a regional ConOps that will coordinate the development of Express/HOT lane strategies and policies between each county.

The SCAG study identifies and prioritizes opportunities for converting existing HOV lanes to Express/HOT lane operations. It also identifies operational policies, including changes to vehicle occupancy requirements, which will be needed to maintain federal performance standards on the regional ExpressLane network. The regional ConOps will identify the recommended regional network,

provide financial and investment plan for the program, and articulate an institutional and legislative framework.

As a partner agency on the SCAG study, Metro has been an active participant and is providing input into the regional ConOps. As such, the regional ConOps will reflect Metro's input on policies, procedures, and technical considerations. Metro has also used the traffic and revenue modeling results and cost estimates, which were prepared as part of the SCAG regional ConOps, as input into the Los Angeles County ExpressLanes Strategic Plan.

2.4 LOCAL (METRO)

In July 2009, Metro adopted the ExpressLanes Toll Policy, which defines business rules and key performance measures by which the ExpressLanes operate. A revised toll policy was approved by the Metro Board in January 2016 wherein tolls can be raised to warrant traffic conditions (see **Appendix B**). These policies apply to future ExpressLanes unless Metro adopts amendments to them. **Table 1** in Appendix C summarizes the pertinent federal and state enabling legislation, policies and agreements affecting ExpressLanes development in Los Angeles County.

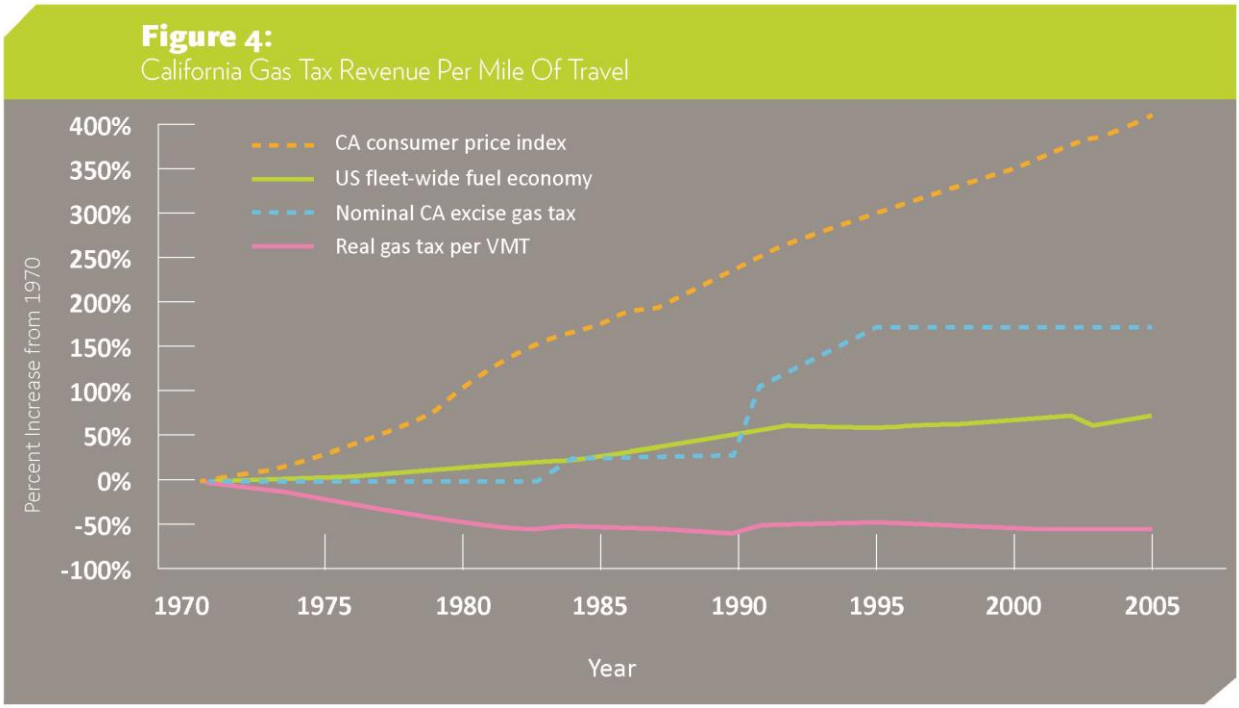
Metro has implemented several innovative programs to address equity concerns and encourage transit use and carpooling. These include the Transit Rewards Program, the Carpool Loyalty Program, and the Low-Income Assistance Plan. To operate and maintain the ExpressLanes, Metro has also entered into external agreements with the California Highway Patrol (CHP) and the Los Angeles County Freeway Service Patrol (FSP).

Metro's ExpressLanes reinvestment policy guides the reinvestment of net toll revenues generated by the I-110 and I-10 facilities. Per the approved guidelines, any net revenue is to be reinvested in the ExpressLanes corridors with funding allocated for transit improvements, active transportation/system connectivity, and highway improvements.

3 FISCAL AND FUNDING CONSTRAINTS

Metro relies on a combination of federal, state, and local funding sources to finance capital improvements and ongoing operating costs. However, many of the current funding mechanisms, especially at the federal level, are unsustainable. The gas tax and other highway use taxes that support the Highway Trust Fund are eroding. The Federal gas tax rate has not increased since 1993, and the 18.4 cent per gallon tax on gasoline enacted in 1993 is worth about 11.4 cents today. Likewise, the California gas tax has not been raised since 1994. This trend will be exacerbated by continued improvements in fuel efficiency and the availability of alternative fuel vehicles in the future (see **Figure 6**).

FIGURE 6: CALIFORNIA GAS TAX REVENUE PER MILE OF TRAVEL



Source: Moving Los Angeles, Access Magazine

In 2008, Los Angeles County passed Measure R, a half-cent sales tax to finance new transportation projects and programs. Over 30 years, Measure R is projected to generate $40 billion for congestion relief projects. Twenty percent of Measure R revenue will be dedicated to HOV lanes, highways, and other highway related improvements. However, the transportation needs of Los Angeles County extend well beyond the funding provided by Measure R.

The Metro 2014 Short Range Transportation Plan calls for $88.2 billion in investment that will allow the completion of six transit and 14 highway projects by 2024. The Plan is funded with more than 45 sources of federal, state, and local revenue. Of the $88.2 billion, $35.1 billion (39.8 percent) is allocated to highways, streets, roads, and multimodal improvements.

As funds generated from traditional federal and state transportation sources are limited, it is important to look at alternative revenue sources, including ExpressLanes, to meet future mobility and air quality needs. ExpressLanes provide the opportunity to generate new revenues to cover their implementation and operating costs, and in some cases support other transportation needs. For example, since their opening, the I-110 and I-10 ExpressLanes have raised $26 million in net toll revenue, which will be dedicated to transportation improvements in the communities surrounding the ExpressLanes corridor. For FY16, $62.2 million in toll revenues are expected to be generated to operate, maintain, improve and reinvest in those corridors.

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APPENDIX E – PREVIOUS/ONGOING RELATED STUDIES AND PROGRAMMED PROJECTS

1 STATEWIDE

Caltrans is currently developing a *Managed Lanes System Plan* that will provide a "blueprint" for managed lanes in California. The Managed Lanes System Plan will be used by Caltrans and regional transportation agencies to develop regional transportation plans, identify funding priorities, and make decisions regarding the operation of managed lanes on state highways.

2 REGIONAL

SCAG's 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) includes a regional Express/HOT Lane network that builds upon the success of the SR-91 Express Lanes in Orange County and the I-110 and I-10 ExpressLanes in Los Angeles County. The Express Travel Choices Phases II Study is refining the network and serves as the basis for this Metro ExpressLanes Strategic Plan. Both the Metro ExpressLanes Strategic Plan and the Express Travel Choices Phase II Study will serve as input to the 2016-2040 Update of the SCAG RTP/SCS.

3 LOS ANGELES COUNTY

Due in large part to the success of the ExpressLanes program and the degraded condition of the existing HOV lane network, Metro and SCAG have been studying the introduction of ExpressLanes on other corridors throughout Los Angeles County. **Table 1** lists the recently completed and ongoing ExpressLanes related studies within Los Angeles County. In addition to region-wide studies, ExpressLane evaluations undertaken to-date have focused on four primary corridors as a result of the recommendations in the Metro 2015 HOV-to-HOT Conversion Technical Feasibility Report:

- I-405 (from I-5 to the Orange County Line)
- I-105 (from I-405 to I-605)
- I-605 (from I-105 to Orange County Line)
- I-5 (from SR-14 to Parker Road)

TABLE 1: RECENT EXPRESSLANE STUDIES IN LOS ANGELES COUNTY

Study	Route/Corridor	Type of Study	Study Completion/Status
Metro 2015 Los Angeles County HOV-to HOT Conversion Technical Feasibility Report	Regional	Feasibility	Completed in November 2010
Metro I-405 Sepulveda Pass Corridor System Planning Study	I-405	Planning	Completed in November 2012
Metro I-405 Sepulveda Pass Corridor Supplemental Traffic and Revenue Study	I-405	Traffic & Revenue	Completed in October 2013
Metro I-405 Freeway (OC to LAX) HOV to HOT Conversion Feasibility Study	I-405	Feasibility/ConOps	Completed in June 2014
Metro I-5 North Traffic and Revenue Study	I-5	Traffic & Revenue	Ongoing
Metro I-105 and I-110 PSR-PDS and PAED	I-105 and I-110	Pending	Ongoing
SCAG Express Travel Choices Study Phase II	Regional	Planning/ConOps	Ongoing
SCAG I-405 Master Plan	I-405	Master Plan	Ongoing

3.1 I-405, I-105, AND I-605 STUDIES

The I-405 studies have focused on two segments—the Sepulveda Pass (between I-110 and I-105—the Sepulveda Pass) and LAX to the Orange County Line (I-105 to the Orange County Line). In November 2012, Metro completed the Sepulveda Pass Corridor Systems Planning Study (SPCSPS), which included an evaluation of various high-capacity transportation strategies through the Sepulveda Pass, including at-grade ExpressLanes. In October 2014, Metro's public-private partnership (P3) department provided an evaluation of the feasibility of implementing four different configurations through the pass—at-grade managed lanes with bus rapid transit (BRT), rail tunnel, toll highway tunnel with BRT, and toll highway tunnel with private rail. Of the four alternatives considered, only the at-grade ExpressLanes with BRT can be funded within the monies available in Metro's LRTP. This alternative consists of dual ExpressLanes in each direction between US 101 and I-10.

Metro completed I-405 Freeway HOV to HOT Conversion Feasibility Study in June 2014. This assessment on the southern portion of the I-405 between LAX and the Orange County line, evaluated four alternatives. They included various configurations along the I-405 corridor or along I-605 and I-105. The study concluded by recommending a phased implementation of ExpressLanes along the I-105 and I-605 freeways instead of the I-405, due to cost and right-of-way constraints. Both I-605 and I-105 have design configurations that are more conducive to the conversion of the existing HOV lanes to ExpressLane operation.

Due to the cost and complexities associated with implementing ExpressLanes on both the I-105 and I-605 freeways, a phased implementation was recommended. The conversion and expansion of ExpressLanes on I-105 between I-405 and I-605 is proposed to be completed first followed by the I-605 section after the completion of the I-605/I-105 HOV Direct Connectors

As of February 2015, Metro staff had begun discussions with Caltrans regarding the development of a Project Study Report/Project Development Support (PSR/PDS) for the I-105 ExpressLanes from I-605 to I-405. Caltrans began work on the PSR/PDS in November 2014 with anticipated completion in the fall of 2015. Metro staff is also in discussions with Caltrans to develop a PSR/PDS for extending the existing I-110 ExpressLanes to the I-405.

3.2 I-5 STUDIES

Metro is exploring options to accelerate the construction of HOV lanes on I-5 from SR-14 to Parker Road in the northern Los Angeles County. In order to construct the project by 2019, Metro is proposing to operate the lanes as ExpressLanes rather than HOV lanes. Metro would construct a single ExpressLane in each direction along the I-5 freeway between SR-14 and Parker Road. The estimated cost of the entire project is approximately $5 billion. In spring 2015, Metro initiated an investment grade traffic and revenue study to determine the financial feasibility of the I-5 express lanes. A design contract for the HOV lanes with an option for ExpressLanes is anticipated to be awarded in fall 2015.

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APPENDIX F – CORRIDOR SCREENING AND PHASING METHODOLOGY

The intent of the screening process is to identify a streamlined network of express lanes—smaller than the network assessed in the screening exercise—that will provide the highest mobility and financial feasibility to Los Angeles County. The optimized, prioritized express lane network is identified by eliminating those analysis segments that are not expected to perform well and retaining those segments that do. It is important to note, however, that certain lower-performing segments may be retained in order to maintain network connectivity so that other segments can reach their full potential.

1 EXPRESS LANE NETWORK AND ALTERNATIVE

The corridor screening and phasing analysis has been conducted following the same methodology as employed in the SCAG Express Travel Choices Regional Express Lanes Pre-Implementation Study. The intent of the process is to identify a preferred network of express lanes for Los Angeles County. The effort began by identifying all existing and planned HOV facilities in the county. This includes planned HOV capacity enhancement projects for which funding has been identified and committed, as well as recommended HOV expansions that have been made in planning studies on highway corridors in Los Angeles County for which funding has not been identified.

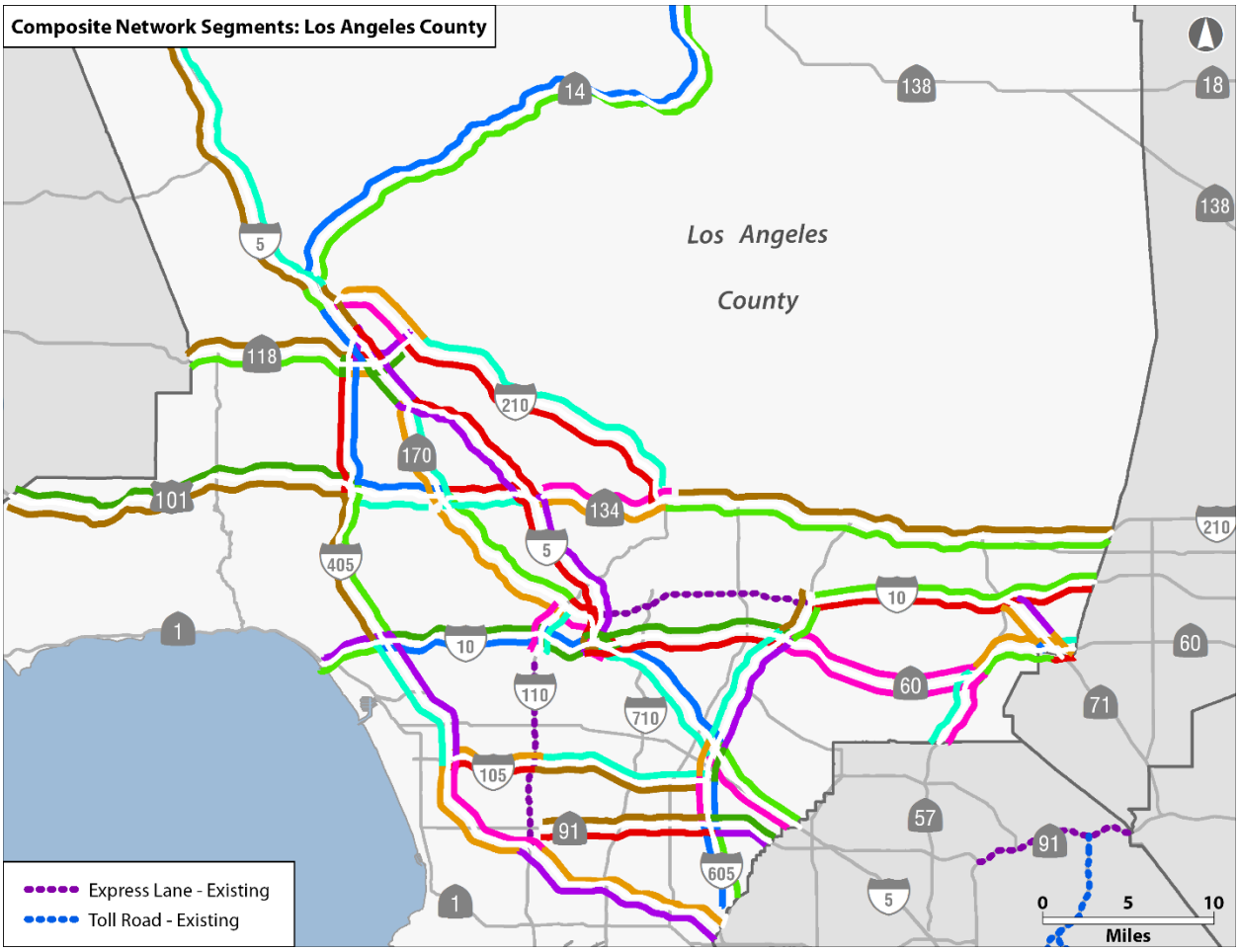
As shown in **Figure 1**, to facilitate the screening analysis the existing and planned HOV corridors in Los Angeles County have been divided into 102 individual, directional roadway segments. The termini for the roadway segments are located at connections with other major freeway facilities where potential variations in traffic volumes, roadway cross sections, and travel characteristics occur, or at county boarders.

The screening process utilizes traffic and revenue forecasts that have been performed for the years 2020 and 2035 for the 2035 RTP Baseline Composite HOT Lane Network (Composite Network) used for the SCAG study. The Composite Network assumes that the existing SCAG highway network will be in place, together with fully funded and committed baseline transportation improvements in the approved RTP/SCS that are possible implement with the revenues generated by the continuation of current gas tax policies. The Composite Network also assumes that all existing and planned HOV facilities will be converted to ExpressLane operations and that select gap closure express lane improvements will be in place by Year 2035. For purposes of comparison and creating annual traffic and revenue forecasts over a financing horizon, all HOV lane scenarios have been modeled for both 2020 and 2035 for the Composite Network.

The travel demand model results for each scenario have been post-processed using ECONorthwest's Rapid Toll Optimization Model (Rapid-TOM©) to determine how motorists would respond to tolling and alternative vehicle occupancy requirements on the priced express lanes. Separate traffic and revenue forecasts have been prepared assuming a two-person occupancy requirement (HOV 2+) and a three-person occupancy requirement (HOV 3+) for receiving an HOV toll exemption. The two different exemption occupancy rates have been modeled for two separate tolling objectives. One objective

assumes that toll rates will vary dynamically to maximize toll revenues (Revenue Maximization), which essentially minimizes delay in the express lanes only. The other objective assumes that toll rates will vary dynamically at lower overall levels to minimize corridor delay costs (Cost Minimization). By utilizing somewhat lower toll rates, the latter objective results in higher utilization of the express lanes, which helps to maximize congestion relief for both the express lanes and the general purpose lanes.

FIGURE 1: LOS ANGELES COUNTY EXPRESSLANE ANALYSIS SEGMENTS



Source: WSP | Parsons Brinckerhoff

2 SCREENING METHODOLOGY

An initial optimized, prioritized network has been identified by reviewing the performance of the general purpose lanes and the priced express lanes on each highway segment using a series of three mobility metrics, and a single financial feasibility metric. The screening process utilizes data from the traffic and revenue forecasts, together with planning level construction cost estimates that have been prepared for each of the highway segments.

The screening analysis was conducted using a spreadsheet database. The results of the different screens were grouped into quintiles ranked 1 to 5 based on their performance, with a higher number indicating superior performance. An overall mobility score was calculated by averaging the three individual mobility metric scores. In a final calculation a composite performance score was determined by calculating the average of the composite mobility score and the single financial feasibility score for each segment. The results of the screening are reported both numerically and using shaded Harvey balls. The numeric results are also used to generate color coded GIS maps showing the performance of the analysis segments.

The individual screening metrics are described in greater detail below.

3 GENERAL-PURPOSE LANE PEAK PERIOD AVERAGE SPEEDS

Given that the majority of vehicles operating on the Composite Network will utilize the general purpose lanes, vehicle operating speeds on the general purpose lanes are important measures of traffic performance. The screening process compares peak period speeds on the general purpose lanes for the different ExpressLane alternatives to the all HOV scenario.

General purpose lane speeds are reported in the following manner in the screening process:

- A.M. and P.M. peak periods
- Purpose-weighted by volume and distance
- 2035 express lanes compared to 2035 HOV lanes conditions, both with an HOV-3 occupancy requirement

4 EXPRESSLANE PERSON THROUGHPUT

The contribution that ExpressLanes make to reducing congestion is to provide access to available roadway capacity to non-HOV motorists. This eases congestion on the general purpose lanes and, using variably priced tolls set in real time, traffic conditions on the express lanes to deteriorate. Express lane utilization is captured in screening process using person throughput. Person throughput has been determined using vehicle volumes and average occupancies by vehicle type. Average vehicle occupancies are a product of the regional travel modeling. Since RapidTOM© does not feed back into the regional mode choice or trip distribution models, the throughput for a segment inclusive of both the express lanes and the general purpose lanes remains constant across alternate toll policy runs of RapidTOM©. The person throughput for the express lanes and general purpose lanes changes individually and can be reported.

Person throughput is reported in the following manner:

- 24 hour
- Express lanes only

- With no weighting
- 2035 express lanes compared to 2035 HOV lanes conditions, both with an HOV-3 occupancy requirement

5 USER COSTS AS VALUE OF TIME

The third mobility screening metric is an aggregate calculation prepared by RapidTOM© to monetize the travel time savings gained by motorists using highway corridors with express lanes. This metric is calculated by tracking the vehicle hours of travel on the managed lane corridors. Each vehicle is assigned a value of time that is derived from a distribution of time values that reflect vehicle occupancy and vehicle type. The toll policy and the resulting performance of the express lanes and the general-purpose lanes determine the sum of the value of all travel time resources in both the express lanes and the general-purpose lanes.

User costs as value of time are reported in the following manner in the screening process:

- 24 hour values
- Aggregated for all travel lanes
- With no weighting
- 2035 express lanes compared to 2035 HOV lanes conditions

6 FINANCIAL FEASIBILITY SCREENING

The financial feasibility screening assessment utilizes a calculation that compares estimated segment toll revenues in 2020 and 2035 less a toll operating cost allowance factor with the cost of converting each segment to express lanes operation, with all amounts expressed in discounted present values. The formula developed for the screening relies on available model output and cost data, and was fashioned to emulate the more detailed financial feasibly assessment and operating cost estimates that were subsequently developed and applied within the financial feasibility analysis of the optimized preferred ExpressLane network for Los Angeles County. The financial screening calculation uses the following inputs and assumptions:

- Capital cost estimates, revenues, and operating cost factors are assumed to be in expressed in constant 2014 dollars
- Segment capital cost for express lanes conversion, in 2014 dollars (discounted from an assumed construction year of 2019 to a 2014 present value)
- Segment express lane length in miles
- 2020 daily volume of toll-paying traffic by segment

- 2035 daily volume of toll-paying traffic by segment
- 2020 daily potential gross toll revenue by segment, in 2014 dollars (discounted from 2020 to 2014)
- 2035 daily potential gross toll revenue by segment, in 2014 dollars (discounted from 2035 to 2014)
- year of express lane conversion construction was assumed to be 2019
- A combined toll collection operating cost factor or allowance was assumed to be $0.10 per toll transaction plus $0.02 per segment mile per toll paying vehicle by segment

The formula for the financial feasibility assessment screening measure is as follows:

$$\frac{\left[\frac{2020\_DailyRevenue-(2020\_DailyTrnsxs\times(\$0.10+HOT\_Length\times\$0.02))}{(1+Real\_Discount\_Rate)^{(2020-2014)}}\right]+\left[\frac{2035\_DailyRevenue-(2035\_DailyTrnsxs\times(\$0.10+HOT\_Length\times\$0.02))}{(1+Real\_Discount\_Rate)^{(2035-2014)}}\right]}{\frac{(Capital\_Cost\_2014\$s/1000)}{(1+Real\_Discount\_Rate)^{(2019-2014)}}}$$

- The real discount rate for discounting future amounts in time already expressed in constant 2014 (uninflated) dollars was assumed to be 3%

The numerator of the equation first deducts the toll collection operating cost allowance factor from gross daily revenues to provide an adjusted revenue value for both 2020 and 2035. The intent is to provide a more realistic measure of daily cash flow net of collection costs, recognizing that this effort precedes the preparation of more detailed operating cost estimates. These two future year adjusted daily revenue amounts, which are already expressed in constant 2014 dollars, were then discounted to present values in 2014. The two figures are added to provide the financial screening measure numerator, calculated for each segment.

The denominator of the equation calculates the present value of the estimated HOV to express lanes conversion construction cost for each segment, expressed in thousands of 2014 dollars and discounted from the assumed year of construction, 2019.

The resulting financial feasibility assessment screening measure or ratio was then indexed such that the average value was equal to 1.0. This measure does not have a specific meaning, but can be thought of as a proxy for cost-effectiveness. A negative numerator, and thus, a negative overall measure value suggests that the given segment is not likely to be self-supporting (generate revenues sufficient to cover operating costs). However, a positive value does not necessarily mean that the segment is sustainable; other factors including revenue leakage, rate of revenue growth, and facility O&M costs will contribute to the segment's financial feasibility.

The financial feasibility calculation captures three important underlying financial considerations:

- Future gross revenue (2035) is worth less (has a lower present value) than opening year revenue (2020). This reflects the fact that the sooner gross revenue materializes, the better it will support financing or pay-go for capital investments, and thus, the higher the scoring.

- An adjusted revenue figure as a proxy for net revenue is a stronger evaluation measure than gross revenue — if there are two segments with equal gross revenues, then the segment with lower volumes and/or a shorter distance should result in lower toll collection operating costs as well as facility maintenance costs (volume and distance serve as proxies for toll collection and operations and maintenance cost factors), and thus a higher feasibility score.
- Between two segments with equal adjusted revenue numerator values, the one with the lower express lanes capital conversion cost will score higher.

As with the mobility screening, the resulting financial feasibility scores are divided into quintiles, with each segment receiving a score of 1 to 5 depending upon where it falls within the overall range.

The inputs for the financial feasibility assessment are taken from two sources: the 2020 and 2035 traffic and revenue forecasts generated by the RapidTOM© and the capital construction cost estimates that have been prepared for each analysis segment. The cost estimates have been generated using generic per-linear-foot centerline construction unit costs for five cross-section types which have been identified based on visual inspections of 102 highway segments included in the screening process.

7 AVERAGING THE REVENUE MAXIMIZATION AND REVENUE MINIMIZATION RESULTS

The Revenue Maximization and Cost Minimization scenarios represent the bounds in the range of dynamic pricing operations that can be used to maximize express lane revenue generation along with lane user time savings and overall corridor time savings / delay reduction, respectively. As such, they represent bookends in the range of average toll rates that would be likely to be charged in a dynamic pricing scheme in order to maintain acceptable traffic service conditions on the express lanes. However, it is likely that the actual toll levels charged on the Los Angeles express lane network will fall somewhere in the middle of that range. Given that the two pricing objectives yield different mobility and financial feasibility outcomes, the performance of the segments has been determined by averaging the results of the two objectives for each of the evaluation metrics.

8 SCREENING RESULTS

The detailed results of the screening evaluation are presented in Appendix H of this report. The appendix contains a summary table that provides the numeric output from each of the four screening calculations and then arrays those results into quintiles, assigning a score of 5, 4, 3, 2, or 1, with higher values indicating superior performance. These scores were then used to generate GIS maps showing the performance of the 102 analysis segments comprising the Los Angeles County Composite network. The maps use the following colors to indicate the scores the different segments achieved

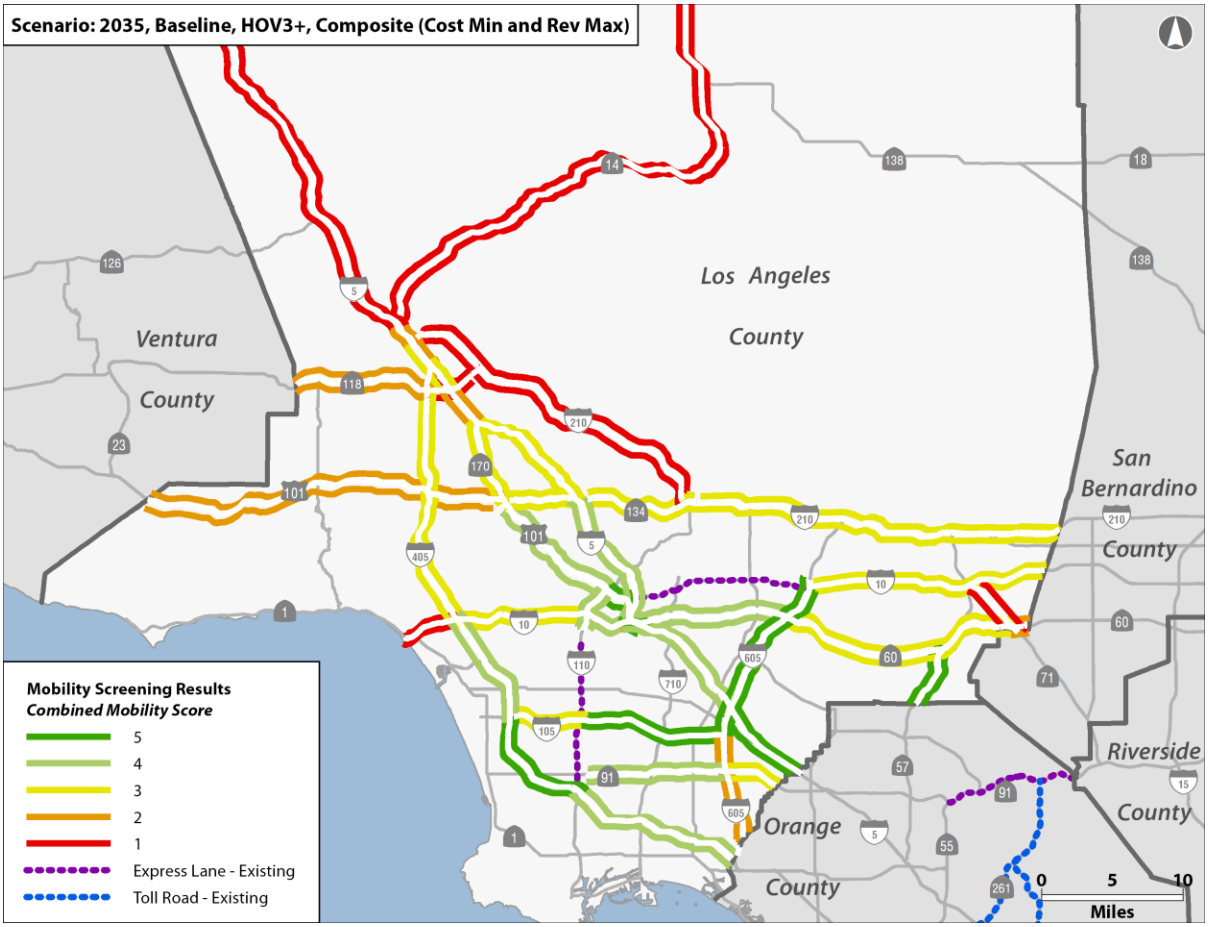
- 5 Dark Green
- 4 Light Green
- 3 Yellow
- 2 Orange
- 1 Red

9 MOBILITY SCREENING

The performance maps document the performance of the average of the Revenue Minimization and Revenue Maximization scenarios for each of the three mobility evaluation metrics. **Figure 2** presents the composite mobility score for HOV-3 Cost Minimization and Revenue Maximization Scenarios, which represents the average of the individual mobility metrics:

- Change in Peak Period General Purpose Lane Speeds
- Change in 24-hour Express Lane Person Throughput
- Use Costs as Value of Time

Figure 2: Composite Mobility Scores: Cost Minimization and Revenue Maximization Scenarios



Source: WSP | Parsons Brinckerhoff

Figure 3 demonstrates that the corridors with the strongest mobility performance tend to be located in the center of Los Angeles County around the City of Los Angeles and in the southeastern portion of the County on highways linking the County freeway network to Orange and San Bernardino Counties. Express lane segments demonstrating the greatest mobility benefits with a score of "5" include:

- I-405 from I-105 to I-110
- I-105 from I-110 to I-605
- I -605 from I-10 to I-105
- SR-57 from SR-60 to the Orange County line

Several of the region's busiest freeway corridors gained a composite mobility score of "4". They include:

- US-101 from SR-134 to I-110
- I-5 from SR-134 to I-605

- SR-60 from I-5 to I-605
- SR-91 from I-110 to I-605
- I-405 from I-10 to I-105
- I-405 from I-110 to the Orange County Line

Several of the segments gaining a composite mobility score of "3" are located in the San Gabriel and San Fernando Valleys. They include:

- I-405 from I-5 to I-10
- SR-170 from I-5 to US-101
- I-5 from SR-170 to SR-134
- SR-134 from US-101 to I-210
- I-210 from SR-134 to the San Bernardino County Line
- I-10 from I-605 to the San Bernardino County Line
- SR-60 from I-605 to SR-71

The bottom two performing quintiles in the composite mobility screening are located largely in the northern reaches of the Los Angeles County and at other edges of the periphery of the County. These weaker mobility performing express lane segments include

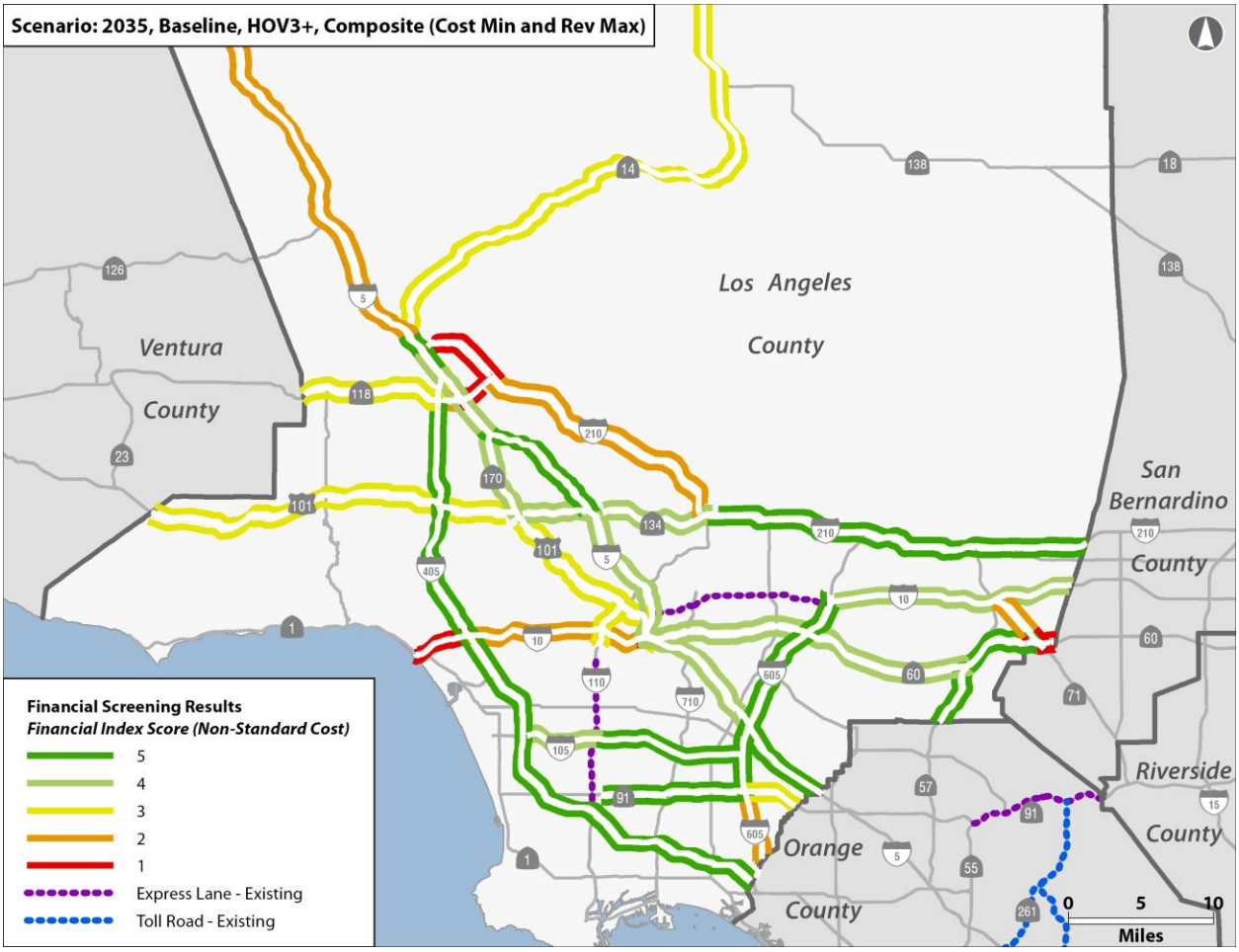
- I-5 north of SR-14
- SR-14 north of I-5
- I-210 from SR-134 to I-5
- SR-118 from the Ventura County Line to I-405
- US-101 from the Ventura County Line to SR-170
- I-10 west of I-405
- I-605 from SR-105 to the Orange County Line
- SR-71 from I-10 to the San Bernardino County line

10 FINANCIAL FEASIBILITY SCREENING

The results of the composite financial feasibility screening analysis for the Cost Minimization and Revenue Maximization pricing objectives are shown in **Figure 3**. Many of the express lane segments in Los Angeles County demonstrated the potential for stronger financial performance compared with segments in other counties in Southern California. Segments performing in the first quintile gaining a financial feasibility score of "5" include:

- I-4-5 from SR-118 to the Orange County Line
- I-5 from SR-170 to SR-134
- I-210 from SR-134 to the San Bernardino County Line
- I-105 from I-110 to I-605
- SR 91 from I-110 to I-605
- I-605 from I-10 to SR-91
- I-5 from I-605 to the Orange County Line
- SR-60 from SR-57 to SR-71
- SR-57 from SR-60 to the Orange County Line

FIGURE 3: COMPOSITE FINANCIAL FEASIBILITY SCREENING SCORES: COST MINIMIZATION AND REVENUE MAXIMIZATION SCENARIOS



Source: WSP | Parsons Brinckerhoff

Express lane corridors in the second financial feasibility performance quintile gaining a score of "4" are largely clustered in the central and eastern portions of the County and include:

- I-5 from I-210 to SR-170
- All of SR-170
- All of SR-134
- I-5 from SR-134 to I-605
- SR-60 from I-5 to SR-57
- I-10 from I-605 to the San Bernardino County line

Several express lanes corridors in the northern and western portions of Los Angeles County garnered a financial feasibility score of "3" performing in the third quintile. They include:

- SR-14 north of I-5
- All of SR-118 from the Ventura County line to I-5
- US-101 from the Ventura County line to I-110
- SR-91 from I-605 to the Orange County line

Several corridors in the bottom two quintiles appear to be unable to generate adequate revenue levels to cover the relatively low operating cost factor applied in the screening measure. Lower performing corridors in the financial feasibility analysis include:

- I-5 north of SR-14
- I-210 from I-5 to SR-134
- I-10 west of I-5
- I-605 south of SR-91
- SR-71 from I-10 to the San Bernardino County line

11 COMPOSITE MOBILITY AND FINANCIAL SCREENING RESULTS

The last step of the screening analysis is to average the results of the composite mobility and financial feasibility screening results into a single overall performance score. Similar to the other components of the screening process, the performance Los Angeles County express lane analysis segments is broken into quintiles, with the highest performing segments gaining a score of "5," and the subsequent quintile a score of "4," and so on.

The results of the composite mobility and financial screening exercise are presented in **Figure 4**. Consistent with the individual mobility and financial feasibility screening scores, highway corridors in the southern and western portions of Los Angeles County tended to outperform those in the northern reaches of the county in the San Fernando and Antelope Valleys.

A total of seven express lane segments gaining the highest score of "5" in the screening process and are included in the first performance quintile. The segments providing the strongest combined mobility and financial feasibility benefits are:

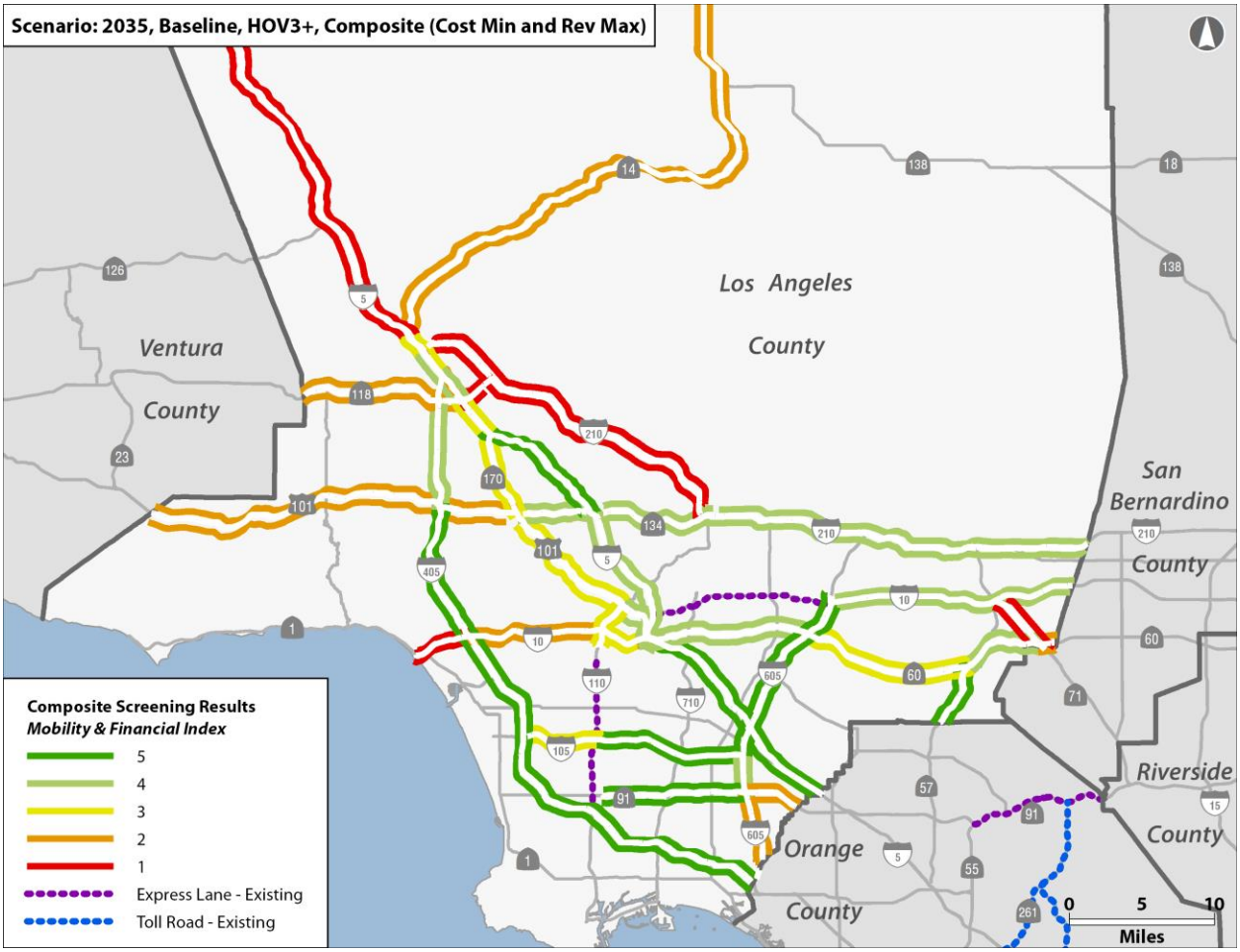
- I-405 from US-101 south to the Orange County Line
- I-5 from SR-170 south to SR-34
- I-5 from SR-60 south to the Orange County Line
- I-105 from I-110 east to I-605
- SR-91 from I-110 east to I-605
- I-605 from I-10 south to I-105
- SR-57 from SR-60 south to the Orange County line

Together these segments would be expected to form the core of a future ExpressLane network in Los Angeles County, and once operational would generate toll revenues that would cover a significant portion of their own implementation costs and also provide additional revenue that could be used to implement additional HOV lane to express lane conversions in the County.

The second quintile of express lane segments tend to be located to the north of the first quintile with many providing access to and from the San Gabriel Valley. The nine express lane segments gaining a composite mobility and financial feasibility screening score of "4" include:

- I-405 from I-5 south to US-101
- I-5 from I-210 south to SR-170
- I-5 from SR 134 south to SR-60
- SR-134 from US-101 east to I-210
- I-210 from SR-134 east to the San Bernardino County Line
- I-10 from I-605 east to the San Bernardino County line
- SR 60 from I-5 east to I-605
- SR 60 from SR-57 east to SR-71
- I-605 from I-105 south to SR-91

FIGURE 4: COMPOSITE MOBILITY AND FINANCIAL SCREENING RESULTS



Source: WSP | Parsons Brinckerhoff

There are a total of eight express lane segments in the third composite performance quintile in Los Angeles County. Many of these are shorter segments and they are located throughout the County and include:

- I-5 from SR-14 south to I-210
- I-5 from SR-118 south to SR-170
- SR-170 from I-5 south to US-101
- US-101 from SR-170 south to I-110
- I-110 from US-101 south to I-10
- I-10 from I-110 east to I-5
- I-105 from I-405 east to I-110
- SR-60 from I-605 east to SR-57

There are a total of seven analysis segments in Los Angeles County that gain a composite performance score of "2," placing them in the fourth performance quintile. These segments are largely located on the periphery of the County and include:

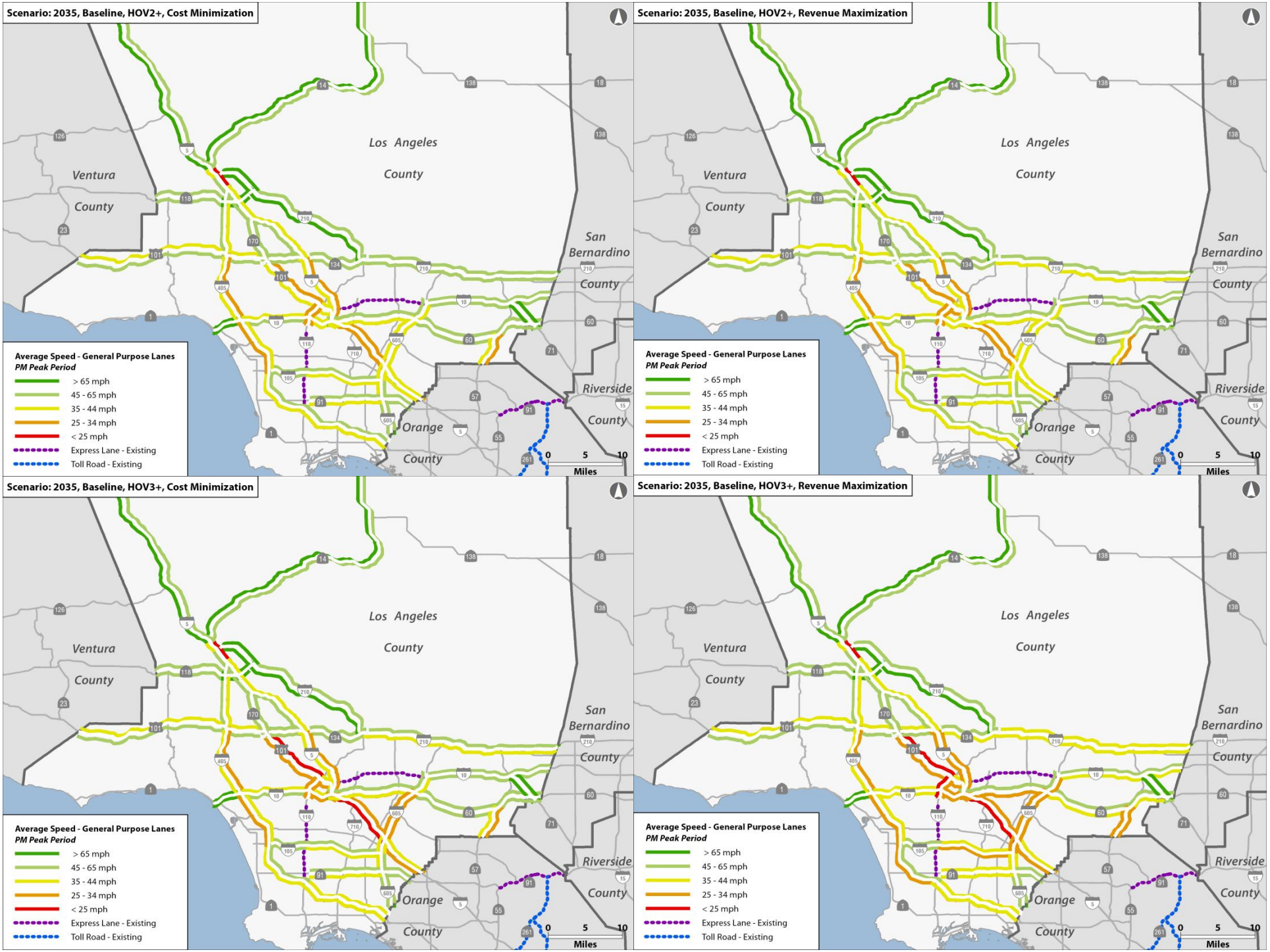
- SR-14 North of I-5
- SR-118 from the Ventura County line east to I-5
- US-101 from the Ventura County line east to SR-134
- I-10 from I-405 east to I-110
- SR-91 from I-605 east to the Orange County Line
- I-605 from SR-91 south to the Orange County line

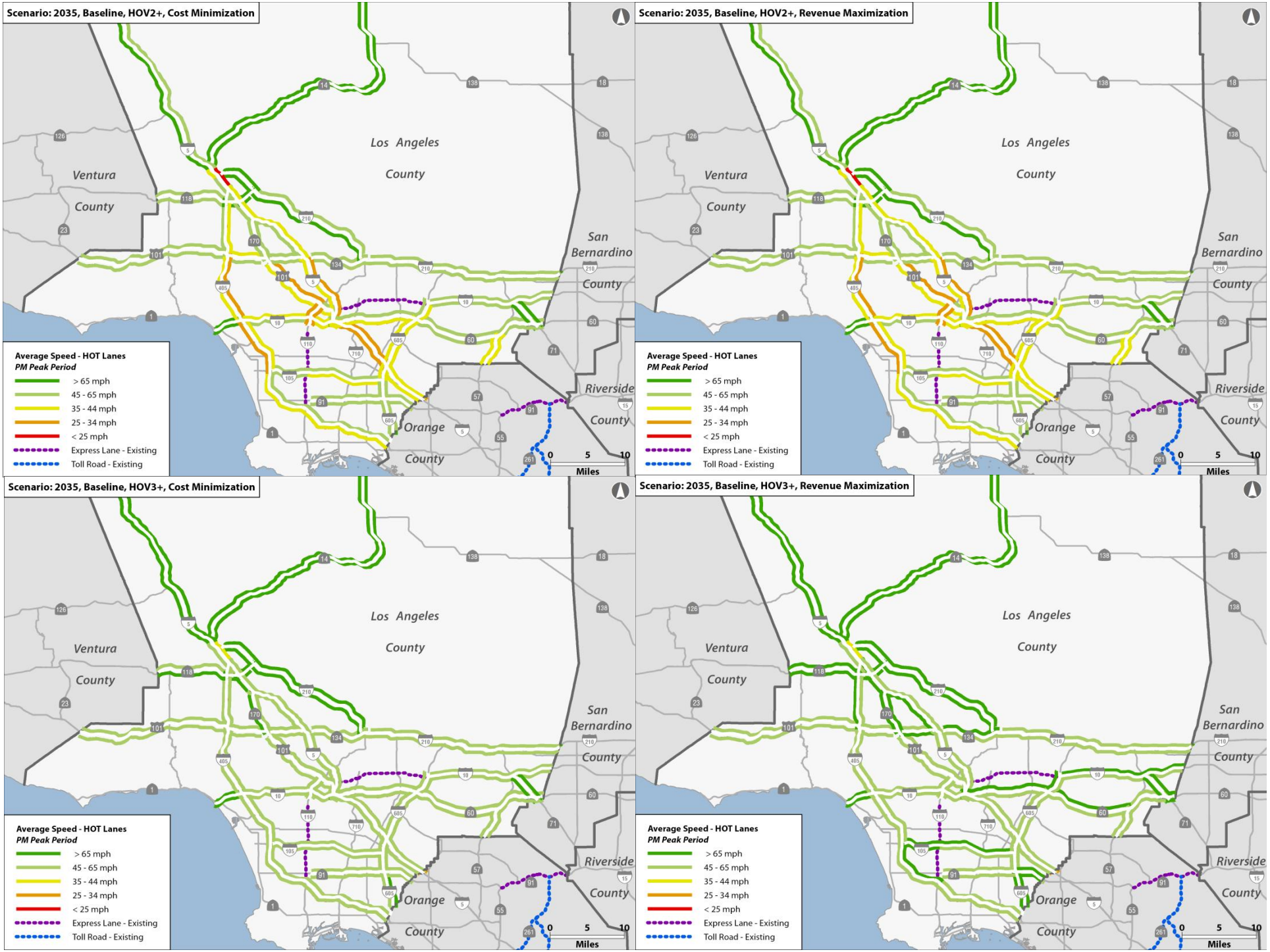
There are a total of five express lane segments in the fifth and poorest composite performance quintile in Los Angeles County. As with the fourth quintile, these segments are located at the periphery of the most populated areas in the County. The fifth quintile includes:

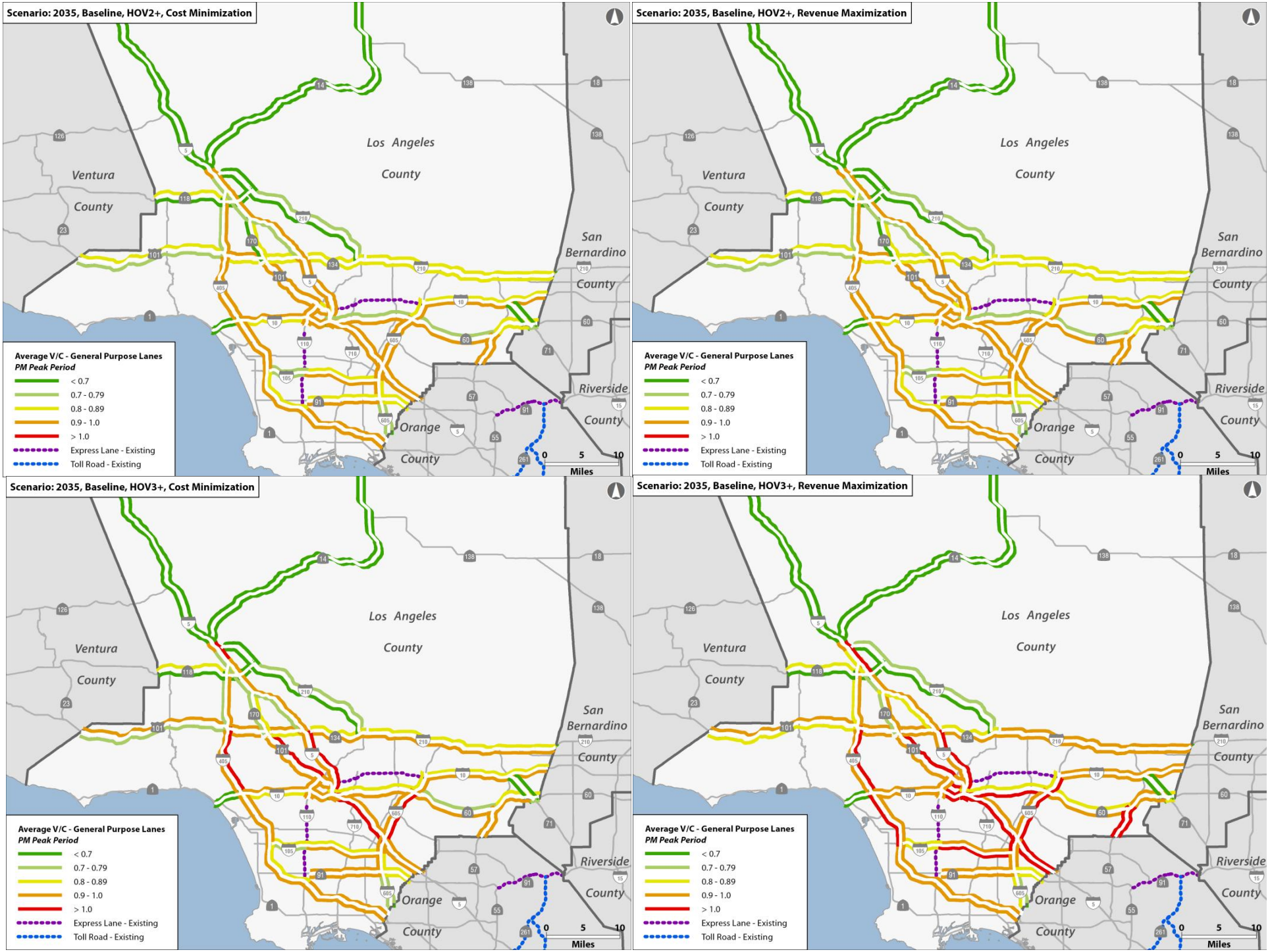
- I-5 north of SR-14
- I-210 from I-5 south to SR-134
- SR 118 from I-5 to I-210
- I-10 from the Pacific Ocean east to I-405
- SR-71 from I-10 south to the San Bernardino County line

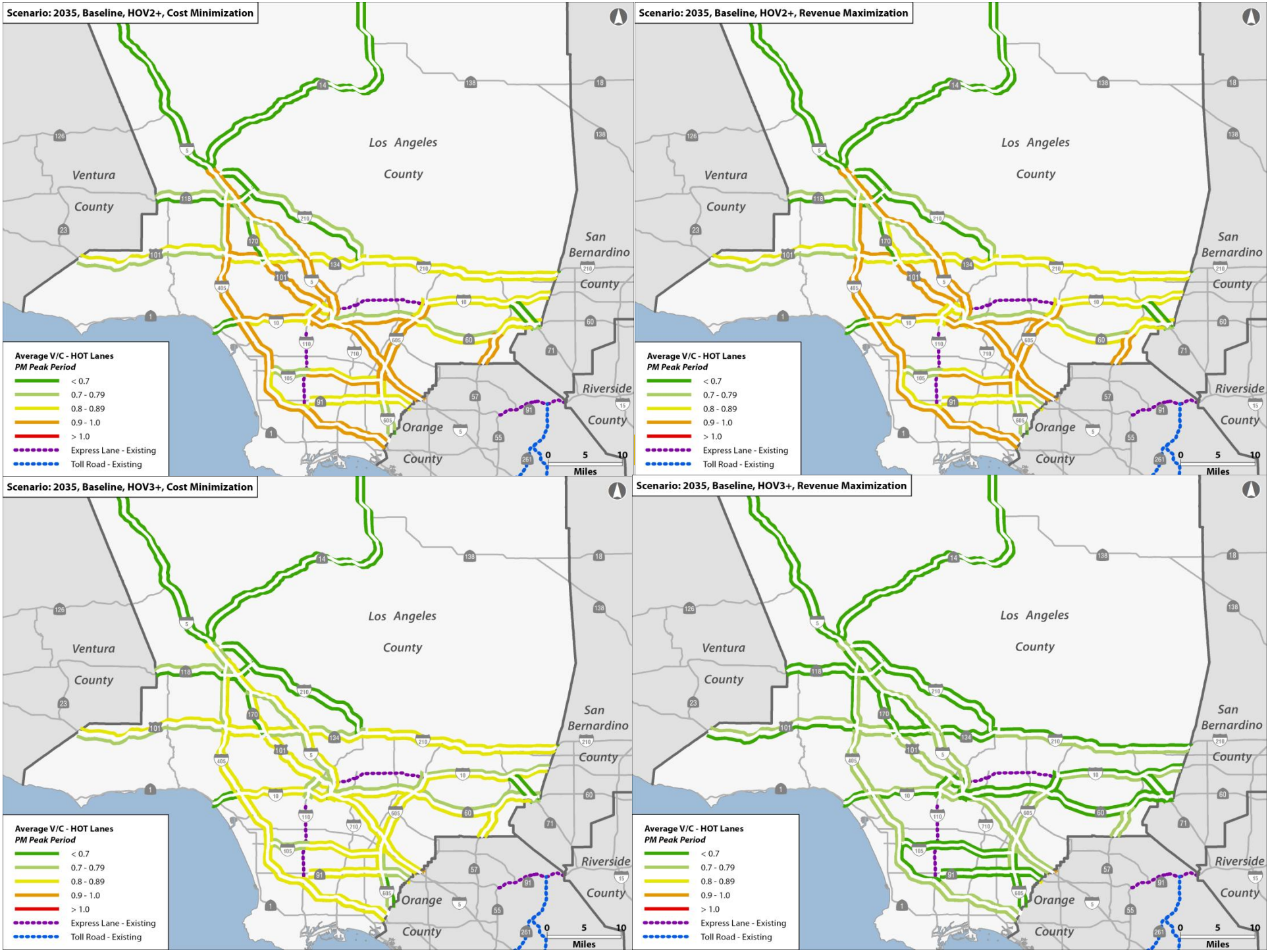
12 SEGMENT-BASED TRAFFIC AND REVENUE PERFORMANCE MAPS

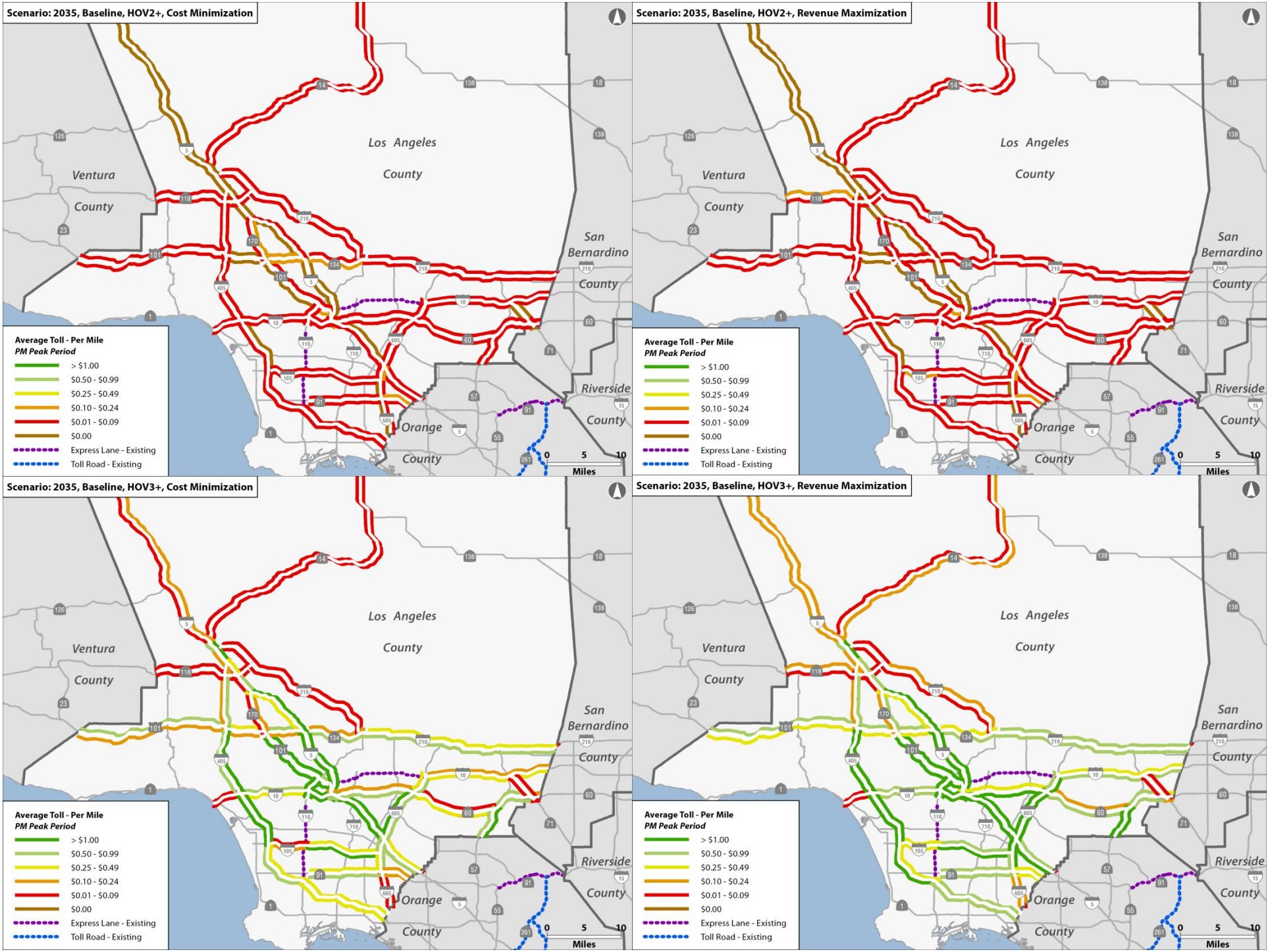
The following performance maps depict the results from the 2035 Baseline Traffic and Revenue forecasts for both HOV-2+ and HOV-3+ toll exemption and cost minimization versus revenue maximization toll policy scenarios. These planning-level forecasts were generated as part of the SCAG Express Travel Choices Phase II Study – Regional Express Lanes Implementation Plan.

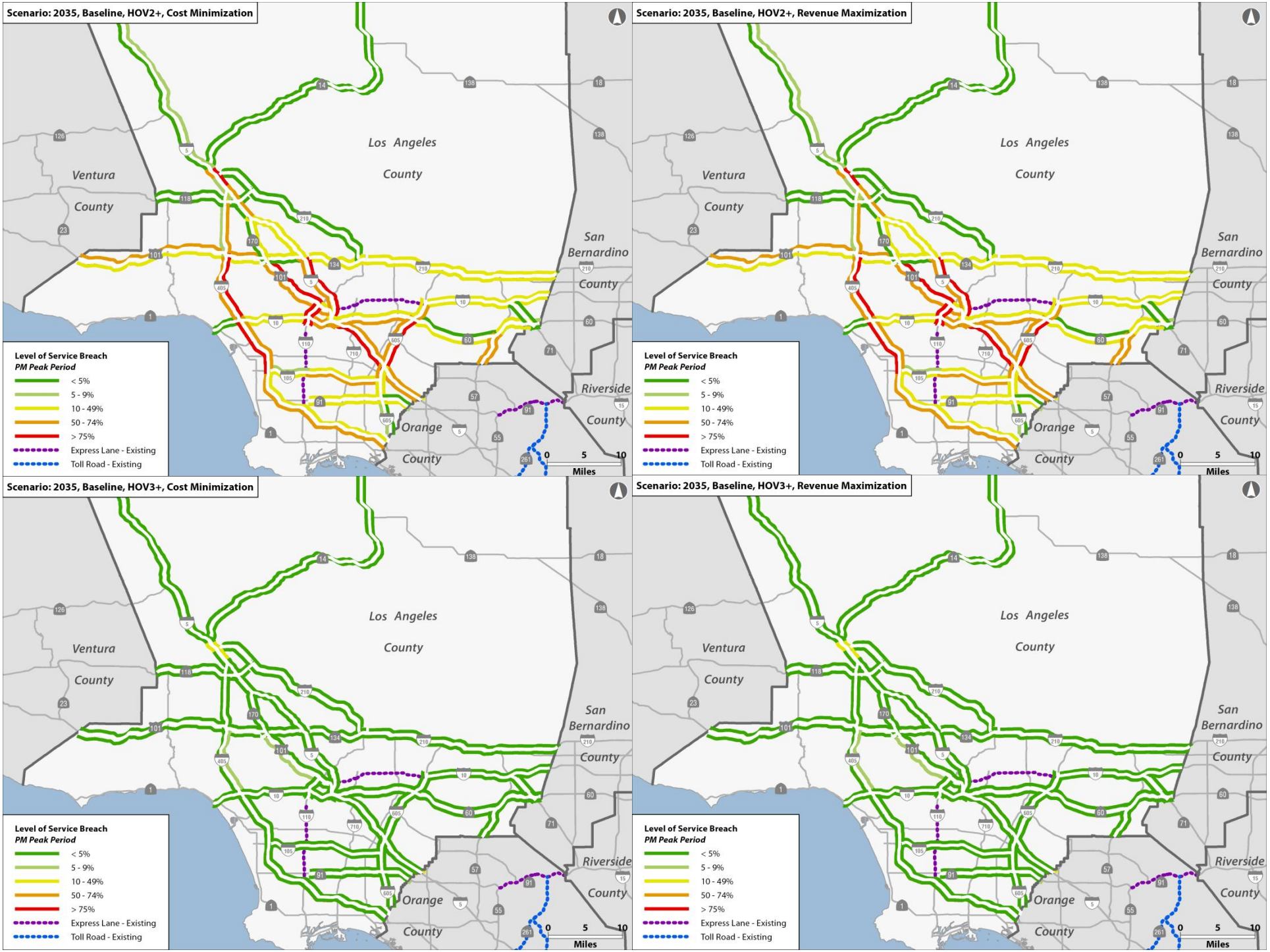

Scenario: 2035, Baseline, HOV2+, Cost Minimization
Scenario: 2035, Baseline, HOV2+, Revenue Maximization
Scenario: 2035, Baseline, HOV3+, Cost Minimization
Scenario: 2035, Baseline, HOV3+, Revenue Maximization
Average Speed - General Purpose Lanes
PM Peak Period
> 65 mph
45 - 65 mph
35 - 44 mph
25 - 34 mph
< 25 mph
Express Lane - Existing
Toll Road - Existing
Los Angeles County
Ventura County
San Bernardino County
Riverside County
Orange County
0 5 10
Miles

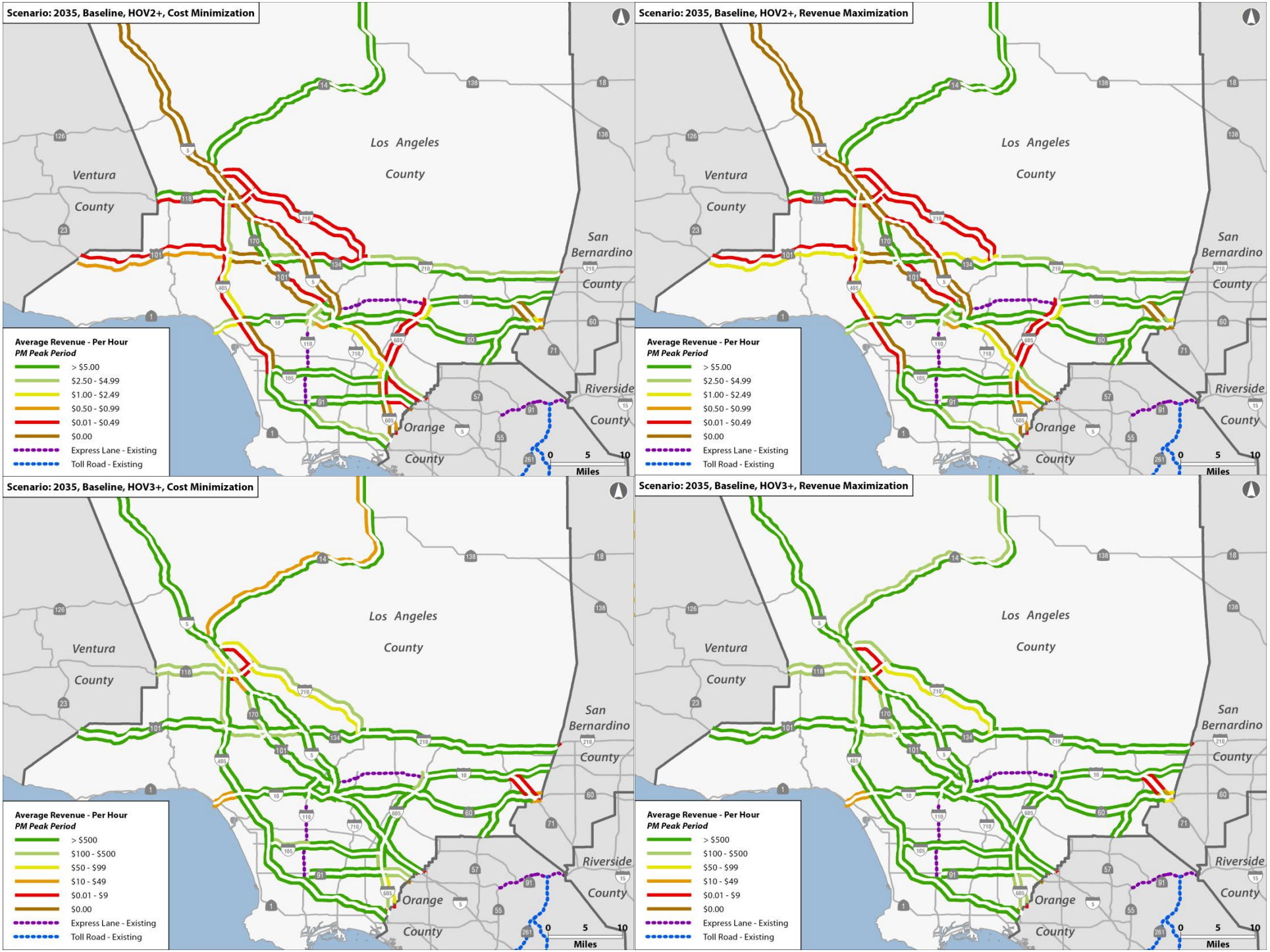

Scenario: 2035, Baseline, HOV2+, Cost Minimization
Scenario: 2035, Baseline, HOV2+, Revenue Maximization
Scenario: 2035, Baseline, HOV3+, Cost Minimization
Scenario: 2035, Baseline, HOV3+, Revenue Maximization
Average Speed - HOT Lanes
PM Peak Period
> 65 mph
45 - 65 mph
35 - 44 mph
25 - 34 mph
< 25 mph
Express Lane - Existing
Toll Road - Existing
Los Angeles County
Ventura County
San Bernardino County
Riverside County
Orange County
0 5 10
Miles

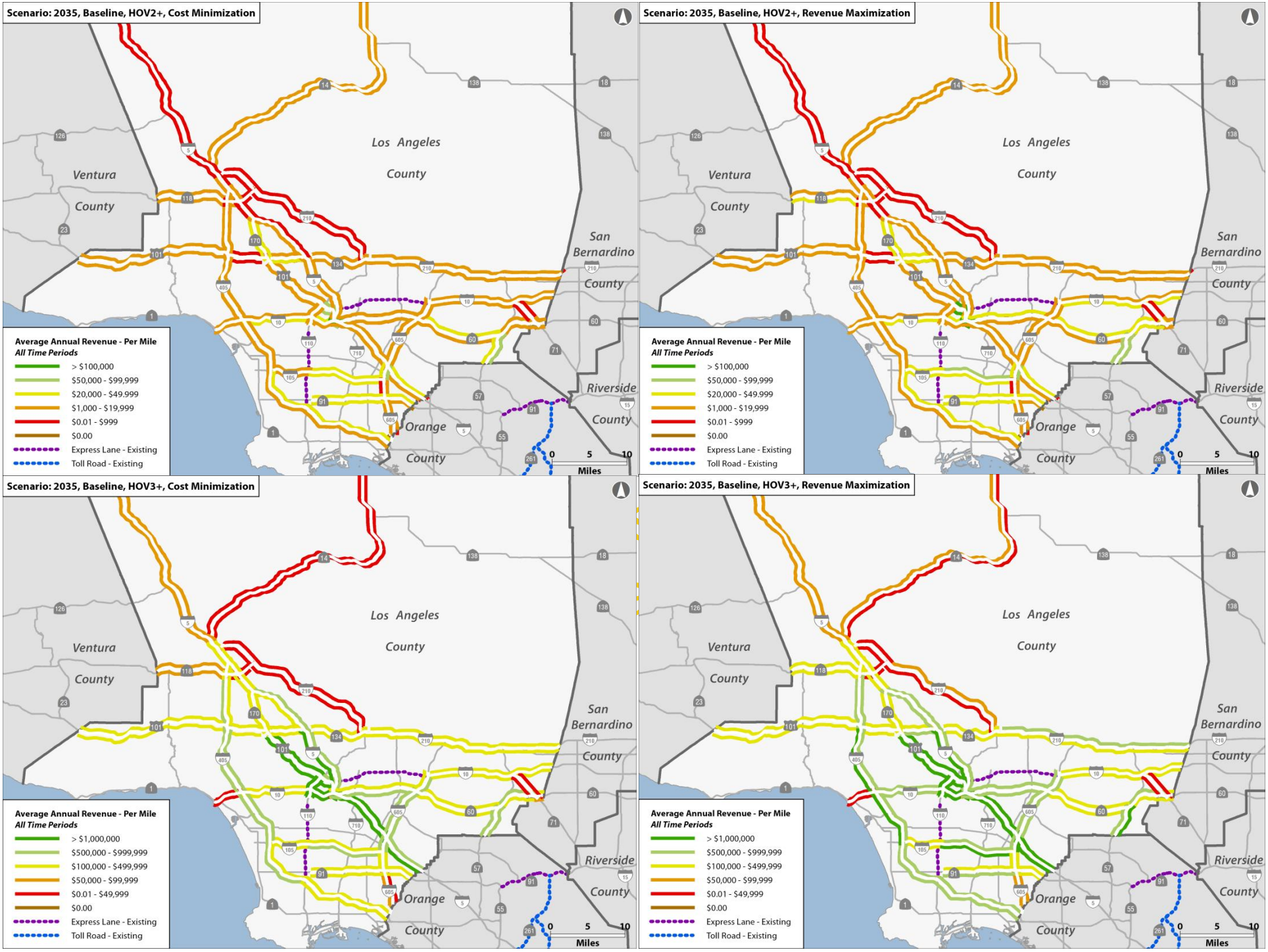

Scenario: 2035, Baseline, HOV2+, Cost Minimization
Scenario: 2035, Baseline, HOV2+, Revenue Maximization
Scenario: 2035, Baseline, HOV3+, Cost Minimization
Scenario: 2035, Baseline, HOV3+, Revenue Maximization
Average V/C - General Purpose Lanes
PM Peak Period
< 0.7
0.7 - 0.79
0.8 - 0.89
0.9 - 1.0
> 1.0
Express Lane - Existing
Toll Road - Existing
Los Angeles County
Ventura County
San Bernardino County
Riverside County
Orange County
0 5 10
Miles


Scenario: 2035, Baseline, HOV2+, Cost Minimization
Scenario: 2035, Baseline, HOV2+, Revenue Maximization
Scenario: 2035, Baseline, HOV3+, Cost Minimization
Scenario: 2035, Baseline, HOV3+, Revenue Maximization
Average V/C - HOT Lanes
PM Peak Period
< 0.7
0.7 - 0.79
0.8 - 0.89
0.9 - 1.0
> 1.0
Express Lane - Existing
Toll Road - Existing
Los Angeles County
Ventura County
San Bernardino County
Riverside County
Orange County
0 5 10
Miles


Scenario: 2035, Baseline, HOV2+, Cost Minimization
Scenario: 2035, Baseline, HOV2+, Revenue Maximization
Scenario: 2035, Baseline, HOV3+, Cost Minimization
Scenario: 2035, Baseline, HOV3+, Revenue Maximization
Average Toll - Per Mile
PM Peak Period
> $1.00
$0.50 - $0.99
$0.25 - $0.49
$0.10 - $0.24
$0.01 - $0.09
$0.00
Express Lane - Existing
Toll Road - Existing
Los Angeles County
Ventura County
San Bernardino County
Riverside County
Orange County
0 5 10
Miles


Scenario: 2035, Baseline, HOV2+, Cost Minimization
Scenario: 2035, Baseline, HOV2+, Revenue Maximization
Scenario: 2035, Baseline, HOV3+, Cost Minimization
Scenario: 2035, Baseline, HOV3+, Revenue Maximization
Level of Service Breach
PM Peak Period
< 5%
5 - 9%
10 - 49%
50 - 74%
> 75%
Express Lane - Existing
Toll Road - Existing
Los Angeles County
Ventura County
San Bernardino County
Riverside County
Orange County
0 5 10
Miles


Scenario: 2035, Baseline, HOV2+, Cost Minimization
Scenario: 2035, Baseline, HOV2+, Revenue Maximization
Scenario: 2035, Baseline, HOV3+, Cost Minimization
Scenario: 2035, Baseline, HOV3+, Revenue Maximization
Average Revenue - Per Hour
PM Peak Period
> $5.00
$2.50 - $4.99
$1.00 - $2.49
$0.50 - $0.99
$0.01 - $0.49
$0.00
Express Lane - Existing
Toll Road - Existing
> $500
$100 - $500
$50 - $99
$10 - $49
$0.01 - $9
0 5 10
Miles
Los Angeles County
Ventura County
San Bernardino County
Riverside County
Orange County


Scenario: 2035, Baseline, HOV2+, Cost Minimization
Scenario: 2035, Baseline, HOV2+, Revenue Maximization
Scenario: 2035, Baseline, HOV3+, Cost Minimization
Scenario: 2035, Baseline, HOV3+, Revenue Maximization
Average Annual Revenue - Per Mile
All Time Periods
> $100,000
$50,000 - $99,999
$20,000 - $49,999
$1,000 - $19,999
$0.01 - $999
$0.00
Express Lane - Existing
Toll Road - Existing
> $1,000,000
$500,000 - $999,999
$100,000 - $499,999
$50,000 - $99,999
$0.01 - $49,999
$0.00
Express Lane - Existing
Toll Road - Existing
Los Angeles County
Ventura County
San Bernardino County
Riverside County
Orange County
0 5 10
Miles

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APPENDIX G – EXISTING TRANSIT RIDERSHIP IN FREEWAY CORRIDORS

Transit benefits are expected as a result of closing gaps in the current HOV system. Travel time savings associated with express bus routes that currently experience deteriorated levels of service due to freeway system bottlenecks would be improved with the availability of a continuous HOV facility that could serve as a bypass to bottlenecks. Los Angeles County's large population and workforce, much of it commuting during peak periods, constitute a major market for public transportation. Over 20 bus routes that serve the county and the county experiences a high mode share for transit work trips. The table on the next page presents the county express bus system service and ridership levels throughout the proposed ExpressLane network study limits and identifies current and funded HOV lanes that would be converted to ExpressLanes and the remaining gaps in the ExpressLanes network.

Transit agencies currently operate several express bus routes which include freeway bus service, rail feeder services operating express buses to Metro Rail and Metrolink, and limited-stop routes. The majority of express bus routes operate primarily during peak periods in the peak direction to serve commuters. Growth in express bus ridership is dependent upon service levels and travel time reliability however, even without HOV improvements that would directly benefit express bus service, demand will continue to increase.

Appendix D - Existing Transit Ridership in Freeway Corridors

		Segment				Average Weekday Ridership		
Corridor Number	Highway	From	To	Direction	Existing Service	Express Bus (including BRT)	Rail	Total Ridership
1	10	Santa Monica	I-405	EB	Commuter Express 431 and 437 Santa Monica Rapid 10 Metro 534	5,641	-	**5,641**
		I-405	Santa Monica	WB				
		I-405	I-110	EB				
		I-110	I-405	WB				
2	10	I-110	SR-60	EB		-	-	**-**
		SR-60	I-110	WB				
		SR-60	I-5	EB				
		I-5	SR-60	WB				
3	10	I-605	SB County Line	EB	Metrolink (San Bernardino Line) Foothill SIlverStreak 707 Foothill Transit 499 and 699	6,564	11,181	**17,745**
		SB County Line	I-605	WB				
4	101	VN County Line	I-405	EB	Metrolink (Ventura Line) Metro Orange Line Commuter Express (423)	28,295	3,877	**32,172**
		I-405	VN County Line	WB				
		I-405	SR 170	EB				
		SR-170	I-405	WB				
		SR-170	SR-110	EB				
		SR-110	SR-170	WB				
		SR-110	I-5	EB				
		I-5	SR-110	WB				
5	105	I-405	I-110	EB	Metro Green Line Metro 442 Commuter Express 438 Gardena 1X	1,900	37,745	**39,645**
		I-110	I-405	WB				
6	105	I-110	I-605	EB	Metro Green Line Metro 460 OCTA 701 Commuter Express 438 Gardena 1X	7,942	37,745	**45,687**
		I-605	I-110	WB				
7	110	I-10	US-101	NB	Metro Red Line Metro Blue Line	-	215,593	**215,593**
		US-101	I-10	SB				
8	118	VN County Line	I-405	EB	Metrolink (Ventura Line) Commuter Express (419)	472	3,678	**4,150**
		I-405	VN County Line	WB				
		I-405	I-5	EB				
		I-5	I-405	WB				
		I-5	I-210	EB				
		I-210	I-5	WB				
9	134	SR-170	I-5	EB	Commuter Express (549)	397	-	**397**
		I-5	SR-170	WB				
		I-5	I-210	EB				
		I-210	I-5	WB				
10	14	I-5	Kern County Line	NB	Metrolink (Antelope Valley Line) Antelope Valley Transit 785, 786, and 787	1,104	5,950	**7,054**
		Kern County Line	I-5	SB				
11	170	SR-134	I-5	NB	Antelope Valley Transit 786	108	-	**108**
		I-5	SR-134	SB				
12	210	I-5	SR-118	EB	Commuter Express 409 Antelope Valley Transit 785	963	-	**963**
		SR-118	I-5	WB				
		SR-118	SR-134	EB				
		SR-134	SR-118	WB				
13	210	SR-134	I-15	EB	Metrolink (San Bernardino Line) Foothill Transit 690 and 492	2,926	11,181	**14,107**
		I-15	SR-134	WB				
14	405	I-110	OR County Line	SB		-	-	**-**
		OR County Line	I-110	NB				
		I-110	I-105	NB				
		I-105	I-110	SB				
15	405	I-105	I-10	NB	Commuter Express 573 and 574 Antelope Valley Transit 786 Santa Clarita Transit 792 and 797	1,823	-	**1,823**
		I-10	I-105	SB				
		I-10	US-101	NB				
		US-101	I-10	SB				
16	405	US-101	SR-118	NB	Santa Clarita (791, 792, 796, 797) Antelope Valley 786 Commuter Express 573 and 574	2,094	-	**2,094**
		SR-118	US-101	SB				
		SR-118	I-5	NB				
		I-5	SR-118	SB				
17	5	I-605	OR County Line	SB	Metrolink (Orange Line) Metro 460	5,113	9,492	**14,605**
		OR County Line	I-605	NB				
18	5	I-605	US-101	NB	Metrolink (Orange Line) Metrolink (Riverside Line)	-	14,318	**14,318**
		US-101	I-605	SB				
		US-101	I-10	NB				
		I-10	US-101	SB				
19	5	I-10	SR-134	NB	Metrolink (Ventura Line) Metrolink (Antelope Valley Line) Santa Clarita (794, 799) Commuter Express (409, 419) Antelope Valley 785	2,182	9,827	**12,009**
		SR-134	I-10	SB				
		SR-134	SR-170	NB				
		SR-170	SR-134	SB				
20	5	SR-170	SR-118	NB	Metrolink (Antelope Valley Line) Santa Clarita (791, 792, 794, 796, 797, 799) Commuter Express 419 Antelope Valley 786 and 787	2,532	5,950	**8,482**
		SR-118	SR-170	SB				
		SR-118	I-405	NB				
		I-405	SR-118	SB				
21	5	I-210	SR-14	NB	Metrolink (Antelope Valley Line) Santa Clarita (791, 792, 794, 796, 797, 799) Antelope Valley 785, 786, 787	2,506	5,950	**8,456**
		SR-14	I-210	SB				
		SR-14	Kern County Line	NB				
		Kern County Line	SR-14	SB				
22	57	SR-60	OR County Line	SB	OCTA 758	34	-	**34**
		OR County Line	SR-60	NB				

		Segment				Average Weekday Ridership		
Corridor Number	Highway	From	To	Direction	Existing Service	Express Bus (including BRT)	Rail	Total Ridership
23	60	I-10	I-605	EB	Metrolink (Riverside Line) Metro Gold Line	-	46,074	**46,074**
		I-605	I-10	WB				
24	60	I-605	SR-57	EB	Metrolink (Riverside Line) OCTA 758 Metro Silverline Foothill Transit 493 and 497	16,057	4,826	**20,883**
		SR-57	I-605	WB				
		SR-57	SR-71	EB				
		SR-71	SR-57	WB				
		SR-71	SB County Line	EB				
		SB County Line	SR-71	WB				
25	605	SR-91	OR County Line	SB	Metro 577 OCTA 701 Foothill Transit 493 and 497	1,947	-	**1,947**
		OR County Line	SR-91	NB				
		SR-91	I-105	NB				
		I-105	SR-91	SB				
		I-105	I-5	NB				
		I-5	I-105	SB				
		I-5	SR-60	NB				
		SR-60	I-5	SB				
		SR-60	I-10	NB				
		I-10	SR-60	SB				
26	91	I-110	I-605	EB	OCTA 721 Metro Silverline	162	15,017	**15,179**
		I-605	I-110	WB				
27	91	I-605	RV County Line	EB	OCTA 721	162	-	**162**
		RV County Line	I-605	WB				
28	71	I-10	SR-60	SB		-	-	**-**
		SR-60	I-10	NB				

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APPENDIX H – CORRIDOR SCREENING MATRIX

Los Angeles County Metro Expresslanes Strategic Plan - Network Evaluation

Scenario: 2035, Baseline, HOV3+, Composite (Cost Min and Rev Max)

5 4 3 2 1
Most Favorable ← → Least Favorable

GIS ID	County	Corridor	Direction	From	To	Composite Score	Composite Ranking	Existing Condition	Programmed	Mobility and Reliability: Improvement in User Cost as value of time (HOT-HOV)	User Cost Score	Improvement in HOT Person Throughput (HOT-HOV)	Person Throughput Score	Improvement in GP Speed AM (mph) (HOT-HOV)	Improvement in GP Speed PM (mph) (HOT-HOV)	Speed Score	Mobility Score	Financial Feasibility: Annual Revenue (per directional mile)	Annual Revenue (segment)	Standard Capital Cost Estimate	Non-Standard Capital Cost Estimate	Financial Index (Non-standard)	Financial Index (Non-standard) Score
1	Los Angeles	10	EB	Santa Monica	I-405	○	○	None	Unconstrained Plan	-392	○	4,762	○	1.40	1.52	○	○	$11,000	$88,000	$47,060,000	N/A	-0.07	○
14	Los Angeles	10	WB	I-405	Santa Monica			None	Unconstrained Plan														
2	Los Angeles	10	EB	I-405	I-110	◑	◔	None	Unconstrained Plan	-14,001	◕	9,263	◑	5.38	5.78	◑	◑	$546,000	$10,277,000	$2,179,030,000	N/A	0.03	◔
13	Los Angeles	10	WB	I-110	I-405			None	Unconstrained Plan														
3	Los Angeles	10	EB	I-110	SR-60	◑	◑	None	Unconstrained Plan	-28,304	●	10,859	◕	6.39	6.59	◕	◕	$1,368,000	$6,619,000	$99,200,000	N/A	0.05	◔
12	Los Angeles	10	WB	SR-60	I-110			None	Unconstrained Plan														
4	Los Angeles	10	EB	SR-60	I-5	○	◔	None	Unconstrained Plan	-1,161	○	6,508	○	2.93	4.84	◔	○	$23,000	$42,000	$178,770,000	N/A	-0.02	○
11	Los Angeles	10	WB	I-5	SR-60			None	Unconstrained Plan														
5	Los Angeles	10	EB	I-605	LA County Line	◑	◕	None	Funded Future HOV	-7,423	◑	9,275	◑	4.78	5.38	◑	◑	$268,000	$9,080,000	$196,840,000	$43,020,000	0.94	◕
182	Los Angeles	10	WB	LA County Line	I-605			None	Funded Future HOV														
16	Los Angeles	101	EB	Ventura/LA County Line	I-405	◔	◔	None	Unconstrained Plan	-6,668	◑	8,085	◔	3.98	3.55	◔	◔	$282,000	$12,063,000	$1,351,690,000	N/A	0.05	◔
23	Los Angeles	101	WB	I-405	LA/Ventura County Line			None	Unconstrained Plan														
17	Los Angeles	101	EB	I-405	SR 170	◑	◔	None	Unconstrained Plan	-7,991	◑	7,952	◔	3.96	3.52	◔	◔	$162,000	$3,634,000	$327,360,000	N/A	0.07	◑
22	Los Angeles	101	WB	SR-170	I-405			None	Unconstrained Plan														
18	Los Angeles	101	EB	SR-170	SR-110	◑	◑	None	Unconstrained Plan	-27,047	●	10,062	◕	5.38	3.74	◑	◕	$1,318,000	$26,400,000	$680,950,000	N/A	0.29	◑
21	Los Angeles	101	WB	SR-110	SR-170			None	Unconstrained Plan														
19	Los Angeles	101	EB	SR-110	I-5	◕	◕	None	Unconstrained Plan	-39,318	●	12,114	●	8.84	7.33	●	●	$1,494,000	$11,749,000	$319,010,000	N/A	0.25	◑
20	Los Angeles	101	WB	I-5	SR-110			None	Unconstrained Plan														
25	Los Angeles	105	EB	I-405	I-110	◑	◑	Existing HOV		-6,234	◔	9,158	◑	6.74	7.50	◕	◑	$185,000	$2,104,000	$26,410,000	$13,380,000	0.57	◑
28	Los Angeles	105	WB	I-110	I-405			Existing HOV															
26	Los Angeles	105	EB	I-110	I-605	◕	●	Existing HOV		-22,168	◕	12,320	●	9.96	8.93	●	◕	$708,000	$14,087,000	$46,750,000	$23,980,000	3.77	●
27	Los Angeles	105	WB	I-605	I-110			Existing HOV															
29	Los Angeles	110	NB	I-10	US-101	◑	◑	None	Unconstrained Plan	-30,563	●	10,370	◕	5.37	4.07	◑	◕	$1,378,000	$10,046,000	$1,008,630,000	N/A	0.07	◑
30	Los Angeles	110	SB	US-101	I-10			None	Unconstrained Plan														
31	Los Angeles	118	EB	Ventura/LA County Line	I-405	◔	◔	Existing HOV		-2,819	◔	6,521	◔	2.86	4.27	◔	◔	$95,000	$1,284,000	$60,900,000	$17,600,000	0.20	◑
36	Los Angeles	118	WB	I-405	LA/Ventura County Line			Existing HOV															
32	Los Angeles	118	EB	I-405	I-5	◔	◔	Existing HOV		-1,342	○	4,844	○	1.27	2.76	○	○	$49,000	$551,000	$32,090,000	$9,210,000	-0.01	◔
35	Los Angeles	118	WB	I-5	I-405			Existing HOV															
33	Los Angeles	118	EB	I-5	I-210	○	○	None	Unconstrained Plan	-48	○	1,989	○	0.09	0.40	○	○	$2,000	$10,000	$31,810,000	N/A	-0.02	○
34	Los Angeles	118	WB	I-210	I-5			None	Unconstrained Plan														
37	Los Angeles	134	EB	SR-170	I-5	◕	◕	Existing HOV		-11,115	◑	8,823	◑	5.66	6.44	◕	◑	$415,000	$3,989,000	$531,090,000	$12,090,000	1.79	◕
40	Los Angeles	134	WB	I-5	SR-170			Existing HOV															
38	Los Angeles	134	EB	I-5	I-210	◕	◕	Existing HOV		-9,284	◑	9,348	◑	5.97	5.91	◕	◑	$137,000	$5,596,000	$671,920,000	$21,530,000	1.39	◕
39	Los Angeles	134	WB	I-210	I-5			Existing HOV															
41	Los Angeles	14	NB	I-5	LA/Kern County Line	◔	◔	Existing HOV	Funded Future HOV	-1,710	○	3,488	○	1.27	1.57	○	○	$49,000	$5,145,000	$545,590,000	$134,020,000	0.08	◔
42	Los Angeles	14	SB	Kern/LA County Line	I-5			Existing HOV	Funded Future HOV														
57	Los Angeles	170	NB	SR-134	I-5	◑	◑	Existing HOV		-10,213	◑	8,075	◔	4.30	5.39	◑	◔	$127,000	$4,345,000	$57,720,000	$17,020,000	1.38	◕
58	Los Angeles	170	SB	I-5	SR-134			Existing HOV															
59	Los Angeles	210	EB	I-5	SR-118	○	○	None	Unconstrained Plan	-787	○	4,441	○	1.42	2.00	◔	○	$23,000	$264,000	$67,090,000	N/A	-0.02	○
68	Los Angeles	210	WB	SR-118	I-5			None	Unconstrained Plan														
60	Los Angeles	210	EB	SR-118	SR-134	◔	○	None	Unconstrained Plan	-923	○	4,337	○	1.29	1.94	◔	○	$33,000	$1,212,000	$191,630,000	N/A	0.01	◔
67	Los Angeles	210	WB	SR-134	SR-118			None	Unconstrained Plan														
61	Los Angeles	210	EB	SR-134	I-15	◕	◕	Existing HOV		-11,612	◑	9,132	◑	5.81	5.34	◑	◑	$427,000	$22,885,000	$2,251,430,000	$68,660,000	1.90	◕
186	Los Angeles	210	WB	LA County Line	SR-134			Exising HOV															
99	Los Angeles	405	SB	I-110	LA County Line	◕	●	Existing HOV		-15,209	◕	11,085	◕	7.63	7.13	◕	◕	$535,000	$13,573,000	$110,390,000	$30,130,000	2.76	●
189	Los Angeles	405	NB	LA County Line	I-110			Existing HOV															
89	Los Angeles	405	NB	I-110	I-105	◕	●	Existing HOV		-16,942	◕	11,490	◕	7.63	6.72	◕	◕	$596,000	$9,817,000	$71,560,000	$20,750,000	2.97	●
98	Los Angeles	405	SB	I-105	I-110			Existing HOV															
90	Los Angeles	405	NB	I-105	I-10	◕	●	Existing HOV		-21,640	●	10,327	◕	6.04	3.89	◑	◕	$931,000	$15,421,000	$70,880,000	$20,330,000	5.37	●
97	Los Angeles	405	SB	I-10	I-105			Existing HOV															
91	Los Angeles	405	NB	I-10	US-101	◕	●	Existing HOV		-17,754	◕	8,753	◔	4.54	3.45	◔	◑	$859,000	$16,244,000	$92,140,000	$23,240,000	5.15	●
96	Los Angeles	405	SB	US-101	I-10			Existing HOV															
92	Los Angeles	405	NB	US-101	SR-118	◕	◕	Existing HOV		-13,431	◕	9,093	◑	4.42	5.20	◑	◑	$578,000	$8,159,000	$59,870,000	$17,450,000	3.04	●
95	Los Angeles	405	SB	SR-118	US-101			Existing HOV															
84	Los Angeles	405	NB	SR-118	I-5	◔	◔	Existing HOV		-4,821	◔	7,391	◔	3.28	4.78	◔	◔	$175,000	$538,000	$13,990,000	$4,920,000	0.14	◑
93	Los Angeles	405	SB	I-5	SR-118			Existing HOV															
128	Los Angeles	5	SB	I-605	LA County Line	◕	●	None	Funded Future HOV	-26,539	●	12,756	●	7.56	6.36	◕	◕	$1,025,000	$13,138,000	$40,540,000	$15,350,000	5.71	●
192	Los Angeles	5	NB	LA County Line	I-605			None	Funded Future HOV														
112	Los Angeles	5	NB	I-605	US-101	◕	●	None	Unconstrained Plan	-43,133	●	11,908	●	6.66	4.05	◑	◕	$1,952,000	$34,974,000	$1,711,250,000	$10,830,000	5.73	◕
127	Los Angeles	5	SB	US-101	I-605			None	Unconstrained Plan														
113	Los Angeles	5	NB	US-101	I-10	◕	◕	None	Unconstrained Plan	-67,970	●	12,747	●	11.58	8.06	●	●	$2,083,000	$5,564,000	$579,980,000	$2,050,000	3.59	◑
126	Los Angeles	5	SB	I-10	US-101			None	Unconstrained Plan														
114	Los Angeles	5	NB	I-10	SR-134	◕	◕	None	Unconstrained Plan	-27,345	●	9,879	◕	5.76	4.24	◑	◕	$1,236,000	$24,595,000	$912,190,000	$12,180,000	2.72	◕
125	Los Angeles	5	SB	SR-134	I-10			None	Unconstrained Plan														
115	Los Angeles	5	NB	SR-134	SR-170	◕	●	None	Funded Future HOV	-13,508	◕	9,619	◑	4.79	4.66	◑	◑	$581,000	$11,097,000	$52,930,000	$23,750,000	2.98	●
124	Los Angeles	5	SB	SR-170	SR-134			None	Funded Future HOV														
104	Los Angeles	5	NB	SR-170	SR-118	◑	◑	None	Funded Future HOV	-3,922	◔	6,005	○	1.85	1.88	◔	○	$234,000	$1,301,000	$25,940,000	$7,350,000	1.01	◕
123	Los Angeles	5	SB	SR-118	SR-170			None	Funded Future HOV														
105	Los Angeles	5	NB	SR-118	I-405	◑	◕	Existing HOV		-8,459	◑	9,506	◑	2.87	5.72	◑	◑	$102,000	$1,793,000	$33,760,000	$7,770,000	0.74	◕
122	Los Angeles	5	SB	I-210	SR-118			Existing HOV															
106	Los Angeles	5	NB	I-405	SR-14	◑	◑	Existing HOV		-6,754	◑	5,748	○	1.64	2.20	◔	◔	$197,000	$1,965,000	$21,060,000	$2,540,000	1.30	◕
121	Los Angeles	5	SB	SR-14	I-210			Existing HOV															
107	Los Angeles	5	NB	SR-14	LA/Kern County Line	○	○	None	Funded Future HOV	-1,450	○	6,262	○	1.08	1.17	○	○	$63,000	$5,528,000	$973,830,000	N/A	0.02	◔
116	Los Angeles	5	SB	LA/Kern County Line	SR-14			None	Funded Future HOV														
137	Los Angeles	57	SB	SR-60	LA County Line	◕	●	Existing HOV		-23,592	●	10,932	◕	8.25	7.09	●	◕	$899,000	$8,720,000	$44,040,000	$12,100,000	4.26	●
193	Los Angeles	57	NB	LA County Line	SR-60			Existing HOV															
139	Los Angeles	60	EB	I-10	I-605	◕	◕	None	Unconstrained Plan	-15,368	◕	9,219	◑	5.03	5.98	◕	◑	$575,000	$13,919,000	$512,350,000	$15,790,000	1.18	◕
150	Los Angeles	60	WB	I-605	I-10			None	Unconstrained Plan														
140	Los Angeles	60	EB	I-605	SR-57	◑	◑	Existing HOV		-6,879	◑	8,292	◔	4.77	5.40	◑	◔	$243,000	$5,758,000	$110,540,000	$24,190,000	1.25	◕
149	Los Angeles	60	WB	SR-57	I-605			Existing HOV															
141	Los Angeles	60	EB	SR-57	SR-71	◕	◕	Existing HOV		-11,863	◑	9,419	◑	5.18	5.85	◑	◑	$488,000	$5,408,000	$65,880,000	$14,250,000	1.92	◕
148	Los Angeles	60	WB	SR-71	SR-57			Existing HOV															
142	Los Angeles	60	EB	SR-71	LA County Line	◔	◔	Existing HOV		-3,571	◔	8,314	◔	4.09	4.92	◑	◔	$118,000	$202,000	$7,580,000	$3,220,000	-0.60	○
198	Los Angeles	60	WB	LA County Line	SR-71			Existing HOV															
160	Los Angeles	605	SB	SR-91	LA County Line	◔	◔	Existing HOV		-2,085	○	6,825	◔	2.97	4.00	◔	○	$69,000	$696,000	$66,570,000	$12,460,000	0.05	◔
199	Los Angeles	605	NB	LA County Line	SR-91			Existing HOV															
152	Los Angeles	605	NB	SR-91	I-105	◑	◕	Existing HOV		-8,156	◔	8,154	◔	5.63	4.60	◑	◔	$146,000	$1,961,000	$34,280,000	$6,770,000	1.55	◕
153	Los Angeles	605	NB	I-105	I-5	◕	●	Existing HOV															
158	Los Angeles	605	SB	I-5	I-105			Existing HOV		-24,672	●	11,320	◕	7.99	6.24	◕	◕	$783,000	$13,362,000	$26,090,000	$5,540,000	3.56	●
154	Los Angeles	605	NB	I-5	SR-60	◕	●	Existing HOV															
157	Los Angeles	605	SB	SR-60	I-5			Existing HOV		-22,086	●	11,807	◕	8.49	6.47	◕	◕	$818,000	$12,828,000	$94,650,000	$19,100,000	4.60	●
155	Los Angeles	605	NB	SR-60	I-10	◕	●	Existing HOV															
156	Los Angeles	605	SB	I-10	SR-60			Existing HOV		-16,590	◕	11,206	◕	7.52	7.33	◕	◕	$548,000	$2,907,000	$27,970,000	$6,420,000	2.48	◕
162	Los Angeles	71	SB	SR-60	LA County Line	○	○	Existing HOV															
201	Los Angeles	71	NB	LA County Line	SR-60			Existing HOV		-734	○	5,662	○	1.95	3.16	◔	○	$16,000	$43,000	$7,100,000	$3,990,000	-0.41	○
165	Los Angeles	91	EB	I-110	I-605	◕	●	Existing HOV															
176	Los Angeles	91	WB	I-605	I-110			Existing HOV		-12,483	◑	9,820	◕	6.80	6.36	◕	◑	$439,000	$8,916,000	$85,500,000	$25,250,000	2.05	◕
166	Los Angeles	91	EB	I-605	LA County Line	◑	◔	Existing HOV															
204	Los Angeles	91	WB	LA County Line	I-605			Existing HOV		-6,201	◔	9,022	◔	5.63	6.56	◑	◔	$188,000	$1,455,000	$389,460,000	$14,070,000	0.10	◔
177	Los Angeles	71	SB	I-10	SR-60	○	○	None	Funded Future HOV														
178	Los Angeles	71	NB	SR-60	I-10			None	Funded Future HOV	-72	○	3,533	○	0.22	0.25	○	○	$2,000	$14,000	$170,300,000	N/A	-0.01	○

Los Angeles County Metro Expresslanes Strategic Plan - Network Evaluation

Scenario: 2035, Baseline, HOV3+, Cost Minimization

5 4 3 2 1
Most Favorable → Least Favorable

GIS ID	County	Corridor	Direction	From	To	Composite Score	Composite Ranking	Existing Condition	Programmed	Mobility and Reliability								Financial Feasibility					
										Improvement in User Cost as value of time (HOT-HOV)	User Cost Score	Improvement in HOT Person Throughput (HOT-HOV)	Person Throughput Score	Improvement in GP Speed AM (mph) (HOT-HOV)	Improvement in GP Speed PM (mph) (HOT-HOV)	Speed Score	Mobility Score	Annual Revenue (per directional mile)	Annual Revenue (segment)	Standard Capital Cost Estimate	Non-Standard Capital Cost Estimate	Financial Index (Non-standard)	Financial Index (Non-standard) Score
1	Los Angeles	10	EB	Santa Monica	I-405	○	○	None	Unconstrained Plan	-449	○	6,301	○	1.77	1.91	○	○	$7,000	$56,000	$47,060,000	N/A	-0.12	○
14	Los Angeles	10	WB	I-405	Santa Monica	◑	◑	None	Unconstrained Plan	-15,383	◕	11,664	◑	6.78	7.22	◑	◑	$459,000	$8,645,000	$2,179,010,000	N/A	0.03	◑
2	Los Angeles	10	EB	I-405	I-110	◕	◕	None	Unconstrained Plan	-30,512	●	13,553	◕	8.07	8.18	◕	◕	$1,038,000	$5,900,000	$993,200,000	N/A	0.05	◑
13	Los Angeles	10	WB	I-110	I-405			None	Unconstrained Plan														
3	Los Angeles	10	EB	I-110	SR-60			None	Unconstrained Plan														
12	Los Angeles	10	WB	SR60	I-110			None	Unconstrained Plan														
4	Los Angeles	10	EB	SR60	I-5	◔	◔	None	Unconstrained Plan	-1,424	○	9,329	◔	4.04	6.78	◔	◔	$8,000	$15,000	$178,770,000	N/A	-0.04	◔
11	Los Angeles	10	WB	I-5	SR-60			None	Unconstrained Plan														
5	Los Angeles	10	EB	I-605	LA County Line	◑	◑	None	Funded Future HOV	-8,178	◑	11,791	◑	6.01	6.70	◑	◑	$215,000	$7,263,000	$196,840,000	$43,020,000	0.88	◕
182	Los Angeles	10	WB	LA County Line	I-605			None	Funded Future HOV														
16	Los Angeles	101	EB	Ventura/LA County Line	I-405	◑	◔	None	Unconstrained Plan	-7,222	◑	10,231	◔	4.93	4.33	◔	◔	$241,000	$10,322,000	$1,351,690,000	N/A	0.06	◑
23	Los Angeles	101	WB	I-405	LA/Ventura County Line			None	Unconstrained Plan														
17	Los Angeles	101	EB	I-405	SR 170	◑	◔	None	Unconstrained Plan	-8,593	◑	9,852	◔	4.85	4.24	◔	◔	$318,000	$3,189,000	$327,360,000	N/A	0.08	◑
22	Los Angeles	101	WB	SR-170	I-405			None	Unconstrained Plan														
18	Los Angeles	101	EB	SR-170	SR-110	◑	◑	None	Unconstrained Plan	-28,500	●	12,416	◑	6.63	4.42	◑	◑	$1,250,000	$24,656,000	$680,550,000	N/A	0.36	◑
21	Los Angeles	101	WB	SR-110	SR-170			None	Unconstrained Plan														
19	Los Angeles	101	EB	SR-110	I-5	◕	●	None	Unconstrained Plan	-43,579	●	16,323	●	11.94	9.63	●	●	$1,219,000	$10,163,000	$319,010,000	N/A	0.29	◑
20	Los Angeles	101	WB	I-5	SR-110			None	Unconstrained Plan														
25	Los Angeles	105	EB	I-405	I-110	◑	◑	Existing HOV		-7,085	◑	12,047	◑	8.80	9.69	◕	◑	$125,000	$1,428,000	$26,410,000	$13,380,000	0.24	◑
28	Los Angeles	105	WB	I-110	I-405			Existing HOV															
26	Los Angeles	105	EB	I-110	I-605	◕	●	Existing HOV		-24,955	◕	16,397	●	13.43	11.72	●	◕	$557,000	$11,085,000	$46,750,000	$23,980,000	3.85	◕
27	Los Angeles	105	WB	I-605	I-110			Existing HOV															
29	Los Angeles	110	NB	I-10	US-101	◑	◑	None	Unconstrained Plan	-32,518	●	13,477	◕	6.63	4.85	◑	◕	$1,287,000	$9,387,000	$1,008,630,000	N/A	0.09	◑
30	Los Angeles	110	SB	US-101	I-10			None	Unconstrained Plan														
31	Los Angeles	118	EB	Ventura/LA County Line	I-405	◔	◔	Existing HOV		-3,159	◔	8,245	○	3.59	5.33	◔	○	$70,000	$947,000	$60,500,000	$17,600,000	0.07	◑
36	Los Angeles	118	WB	I-405	LA/Ventura County Line			Existing HOV															
32	Los Angeles	118	EB	I-405	I-5	◔	◔	Existing HOV		-1,479	○	6,104	○	1.57	3.42	○	○	$38,000	$422,000	$32,090,000	$9,210,000	-0.15	◔
35	Los Angeles	118	WB	I-5	I-405			Existing HOV															
33	Los Angeles	118	EB	I-5	I-210	○	○	None	Unconstrained Plan	-54	○	2,563	○	0.11	0.50	○	○	$1,000	$7,000	$31,830,000	N/A	-0.04	◔
34	Los Angeles	118	WB	I-210	I-5			None	Unconstrained Plan														
37	Los Angeles	134	EB	SR-170	I-5	◕	◕	Existing HOV		-12,174	◑	11,244	◔	7.21	8.09	◕	◑	$345,000	$3,308,000	$531,090,000	$12,090,000	1.82	◕
40	Los Angeles	134	WB	I-5	SR-170			Existing HOV															
38	Los Angeles	134	EB	I-5	I-210	◕	◕	Existing HOV		-10,220	◑	11,912	◑	7.61	7.40	◕	◑	$272,000	$4,516,000	$673,920,000	$21,510,000	1.38	◕
39	Los Angeles	134	WB	I-210	I-5			Existing HOV															
41	Los Angeles	14	NB	I-5	LA /Kern County Line	◔	◔	Existing HOV	Funded Future HOV	-1,988	○	4,935	○	1.62	2.01	◔	○	$13,000	$3,481,000	$545,590,000	$134,020,000	0.00	◔
42	Los Angeles	14	SB	Kern/LA County Line	I-5			Existing HOV	Funded Future HOV														
57	Los Angeles	170	NB	SR-134	I-5	◑	◑	Existing HOV		-11,616	◑	10,476	◔	5.55	7.06	◑	◔	$253,000	$3,347,000	$57,720,000	$17,020,000	1.30	◕
58	Los Angeles	170	SB	I-5	SR-134			Existing HOV															
59	Los Angeles	210	EB	I-5	SR-118	◔	○	None	Unconstrained Plan	-895	○	6,007	○	1.82	2.55	◔	○	$15,000	$178,000	$67,040,000	N/A	-0.04	◔
68	Los Angeles	210	WB	SR-118	I-5			None	Unconstrained Plan														
60	Los Angeles	210	EB	SR-118	SR-134	◔	○	None	Unconstrained Plan	-1,019	○	5,536	○	1.60	2.40	◔	○	$25,000	$917,000	$191,630,000	N/A	-0.01	◔
67	Los Angeles	210	WB	SR-134	SR-118			None	Unconstrained Plan														
61	Los Angeles	210	EB	SR-134	I-15	◕	●	Existing HOV		-12,760	◑	11,823	◑	7.42	6.69	◑	◑	$354,000	$18,958,000	$2,251,410,000	$68,660,000	2.07	●
186	Los Angeles	210	WB	LA County Line	SR-134			Exising HOV															
99	Los Angeles	405	SB	I-110	LA County Line	◕	●	Existing HOV		-16,816	◕	14,139	◕	9.75	8.95	◕	◕	$427,000	$10,836,000	$1,10,390,000	$30,130,000	2.85	●
189	Los Angeles	405	NB	LA County Line	I-110			Existing HOV															
89	Los Angeles	405	NB	I-110	I-105	◕	●	Existing HOV		-18,661	◕	14,710	◕	9.82	8.42	◕	◕	$487,000	$8,009,000	$71,560,000	$20,750,000	3.15	◕
98	Los Angeles	405	SB	I-105	I-110			Existing HOV															
90	Los Angeles	405	NB	I-105	I-10	◕	●	Existing HOV		-23,181	●	12,855	◑	7.52	4.61	◑	◑	$838,000	$13,876,000	$70,880,000	$20,330,000	6.38	●
97	Los Angeles	405	SB	I-10	I-105			Existing HOV															
91	Los Angeles	405	NB	I-10	US-101	◕	◕	Existing HOV		-18,740	◕	10,706	◔	5.52	4.06	◔	◑	$800,000	$15,118,000	$52,140,000	$23,240,000	6.30	●
96	Los Angeles	405	SB	US-101	I-10			Existing HOV															
92	Los Angeles	405	NB	US-101	SR-118	◕	◕	Existing HOV		-14,423	◕	11,421	◑	5.51	6.45	◑	◑	$517,000	$7,298,000	$59,870,000	$17,450,000	3.52	●
95	Los Angeles	405	SB	SR-118	US-101			Existing HOV															
84	Los Angeles	405	NB	SR-118	I-5	◔	◔	Existing HOV		-5,324	◔	9,629	◔	4.22	6.11	◔	◔	$141,000	$429,000	$13,930,000	$4,920,000	-0.10	○
93	Los Angeles	405	SB	I-5	SR-118			Existing HOV															
128	Los Angeles	5	SB	I-605	LA County Line	◕	●	None	Funded Future HOV	-29,044	●	16,118	●	9.57	7.84	◕	◕	$868,000	$11,096,000	$40,540,000	$15,350,000	6.35	●
192	Los Angeles	5	NB	LA County Line	I-605			None	Funded Future HOV														
112	Los Angeles	5	NB	I-605	US-101	◕	●	None	Unconstrained Plan	-45,874	●	14,773	◕	8.33	4.77	◑	◕	$1,811,000	$32,440,000	$1,711,250,000	$10,830,000	7.04	◕
127	Los Angeles	5	SB	US-101	I-605			None	Unconstrained Plan														
113	Los Angeles	5	NB	US-101	I-10	◕	●	None	Unconstrained Plan	-78,300	●	17,818	●	16.83	11.13	●	●	$1,664,000	$4,838,000	$579,980,000	$2,050,000	3.32	◕
126	Los Angeles	5	SB	I-10	US-101			None	Unconstrained Plan														
114	Los Angeles	5	NB	I-10	SR-134	◕	◕	None	Unconstrained Plan	-28,976	●	12,316	◑	7.16	5.07	◑	◑	$1,144,000	$22,720,000	$912,190,000	$12,180,000	3.24	◕
125	Los Angeles	5	SB	SR-134	I-10			None	Unconstrained Plan														
115	Los Angeles	5	NB	SR-134	SR-170	◕	◕	None	Funded Future HOV	-14,473	◕	12,203	◑	5.97	5.74	◑	◑	$511,000	$9,908,000	$52,930,000	$23,750,000	3.46	●
124	Los Angeles	5	SB	SR-170	SR-134			None	Funded Future HOV														
104	Los Angeles	5	NB	SR-170	SR-118	◑	◑	None	Funded Future HOV	-4,140	◔	7,397	○	2.22	2.20	◔	○	$197,000	$1,197,000	$25,940,000	$7,350,000	1.15	◕
123	Los Angeles	5	SB	SR-118	SR-170			None	Funded Future HOV														
105	Los Angeles	5	NB	SR-118	I-405	◑	◑	Existing HOV		-9,428	◑	12,515	◑	3.61	7.34	◑	◑	$240,000	$1,439,000	$33,760,000	$7,770,000	0.52	◑
122	Los Angeles	5	SB	I-210	SR-118			Existing HOV															
106	Los Angeles	5	NB	I-405	SR-14	◑	◑	Existing HOV		-7,045	◔	7,017	○	1.97	2.59	◔	○	$375,000	$1,859,000	$21,060,000	$2,540,000	1.59	◕
121	Los Angeles	5	SB	SR-14	I-210			Existing HOV															
107	Los Angeles	5	NB	SR-14	LA/Kern County Line	◔	◔	None	Funded Future HOV	-1,554	○	8,094	○	1.33	1.43	○	○	$57,000	$4,940,000	$973,830,000	N/A	0.02	◑
116	Los Angeles	5	SB	LA/Kern County Line	SR-14			None	Funded Future HOV														
117	Los Angeles	57	SB	SR-60	LA County Line	◕	●	Existing HOV		-25,873	●	13,962	◕	10.70	8.95	●	◕	$766,000	$7,427,000	$44,039,980	$12,100,000	4.70	●
193	Los Angeles	57	NB	LA County Line	SR-60			Existing HOV															
139	Los Angeles	60	EB	I-30	I-605	◕	◕	None	Unconstrained Plan	-16,885	◕	11,577	◑	6.36	7.51	◑	◑	$478,000	$11,579,000	$512,590,000	$15,790,000	1.22	◕
150	Los Angeles	60	WB	I-605	I-10			None	Unconstrained Plan														
140	Los Angeles	60	EB	I-605	SR-57	◑	◑	Existing HOV		-7,609	◑	10,518	◔	6.03	6.74	◑	◔	$190,000	$4,512,000	$10,540,000	$24,190,000	1.12	◕
149	Los Angeles	60	WB	SR-57	I-605			Existing HOV															
141	Los Angeles	60	EB	SR-57	SR-71	◕	◕	Existing HOV		-12,787	◑	11,923	◑	6.46	7.23	◑	◑	$425,000	$4,723,000	$65,880,000	$14,250,000	2.11	◕
148	Los Angeles	60	WB	SR-71	SR-57			Existing HOV															
142	Los Angeles	60	EB	SR-71	LA County Line	◔	◔	Existing HOV		-3,973	◔	10,624	◔	5.12	6.14	◑	◔	$86,000	$147,000	$7,580,000	$3,220,000	-1.11	○
198	Los Angeles	60	WB	LA County Line	SR-71			Existing HOV															
160	Los Angeles	605	SB	SR-91	LA County Line	○	◔	Existing HOV		-2,333	○	8,674	◔	3.74	5.00	◔	○	$49,000	$495,000	$46,570,000	$12,460,000	-0.13	○
199	Los Angeles	605	NB	LA County Line	SR-91			Existing HOV															
152	Los Angeles	605	NB	SR-91	I-105	◑	◕	Existing HOV		-8,823	◔	10,219	◔	7.09	5.62	◑	◔	$218,000	$1,690,000	$34,280,000	$6,770,000	1.60	◕
159	Los Angeles	605	SB	I-105	SR-91			Existing HOV															
153	Los Angeles	605	NB	I-105	I-5	◕	●	Existing HOV		-27,735	●	14,576	◕	10.55	7.85	◕	◕	$635,000	$2,726,000	$26,090,000	$5,540,000	3.56	●
158	Los Angeles	605	SB	I-5	I-105			Existing HOV															
154	Los Angeles	605	NB	I-5	SR-60	◕	●	Existing HOV		-24,124	●	15,048	◕	10.93	8.07	◕	◕	$693,000	$10,872,000	$94,630,000	$19,100,000	5.14	●
157	Los Angeles	605	SB	SR60	I-5			Existing HOV															
155	Los Angeles	605	NB	SR60	I-10	◕	●	Existing HOV		-18,367	◕	14,461	◕	9.67	9.37	●	◕	$419,000	$2,323,000	$27,970,000	$6,420,000	2.36	◕
156	Los Angeles	605	SB	I-10	SR-60			Existing HOV															
162	Los Angeles	71	SB	SR60	LA County Line	○	○	Existing HOV		-889	○	8,425	○	2.67	4.28	◔	○	$7,000	$20,000	$7,100,000	$3,990,000	-0.74	○
201	Los Angeles	71	NB	LA County Line	SR-60			Existing HOV															
165	Los Angeles	91	EB	I-130	I-605	◕	●	Existing HOV		-13,777	◑	12,510	◑	8.69	7.99	◕	◑	$355,000	$7,217,000	$85,500,000	$25,250,000	2.12	◕
176	Los Angeles	91	WB	I-605	I-110			Existing HOV															
166	Los Angeles	91	EB	I-605	LA County Line	◑	◔	Existing HOV		-7,002	◔	11,630	◔	7.20	8.32	◑	◔	$133,000	$1,028,000	$389,460,000	$14,070,000	0.04	◔
204	Los Angeles	91	WB	LA County Line	I-605			Existing HOV															
177	Los Angeles	71	SB	I-30	SR-60	○	○	None	Funded Future HOV	-82	○	4,606	○	0.27	0.30	○	○	$2,000	$10,000	$1,70,300,000	N/A	-0.01	◔
178	Los Angeles	71	NB	SR60	I-10			None	Funded Future HOV														

Los Angeles County Metro Expresslanes Strategic Plan - Network Evaluation

Scenario: 2035, Baseline, HOV3+, Revenue Maximization

5 4 3 2 1
Most Favorable ← → Least Favorable

GIS ID	County	Corridor	Direction	From	To	Composite Score	Composite Ranking	Existing Condition	Programmed	Mobility and Reliability: Improvement in User Cost as value of time (HOT-HOV)	User Cost Score	Improvement in HOT Person Throughput (HOT-HOV)	Person Throughput Score	Improvement in GP Speed AM (mph) (HOT-HOV)	Improvement in GP Speed PM (mph) (HOT-HOV)	Speed Score	Mobility Score	Financial Feasibility: Annual Revenue (per directional mile)	Annual Revenue (segment)	Standard Capital Cost Estimate	Non-Standard Capital Cost Estimate	Financial Index (Non-standard)	Financial Index (Non-standard) Score
1	Los Angeles	10	EB	Santa Monica	I-405	○	○	None	Unconstrained Plan	-3.35	○	3,222	○	1.02	1.14	○	○	$15,000	$120,000	$47,060,000	N/A	-0.02	○
14	Los Angeles	10	WB	I-405	Santa Monica			None	Unconstrained Plan														
2	Los Angeles	10	EB	I-405	I-110	◑	◑	None	Unconstrained Plan	-12,620	◕	6,861	◑	3.99	4.35	◑	◑	$612,000	$11,908,000	$2,179,010,000	N/A	0.03	◔
13	Los Angeles	10	WB	I-110	I-405			None	Unconstrained Plan														
3	Los Angeles	10	EB	I-110	SR-60	◑	◑	None	Unconstrained Plan	-26,097	●	8,166	●	4.72	4.99	◕	◕	$1,297,000	$7,378,000	$993,200,000	N/A	0.04	◔
12	Los Angeles	10	WB	SR60	I-110			None	Unconstrained Plan														
4	Los Angeles	10	EB	SR60	I-5	○	○	None	Uncontrained Plan	-897	○	3,687	○	1.83	2.90	◔	○	$38,000	$68,000	$178,770,000	N/A	0.00	○
11	Los Angeles	10	WB	I-5	SR-60			None	Uncontrained Plan														
5	Los Angeles	10	EB	I-605	LA County Line	◑	◕	None	Funded Future HOV	-6,668	◑	6,760	◑	3.55	4.05	◑	◑	$322,000	$10,898,000	$196,840,000	$43,020,000	1.01	◕
182	Los Angeles	10	WB	LA County Line	I-605			None	Funded Future HOV														
16	Los Angeles	101	EB	Ventura/LA County Line	I-405	◔	◔	None	Uncontrained Plan	-6,115	◑	5,939	◔	3.04	2.77	◔	◔	$323,000	$13,804,000	$1,351,690,000	N/A	0.05	◔
23	Los Angeles	101	WB	I-405	LA/Ventura County Line			None	Uncontrained Plan														
17	Los Angeles	101	EB	I-405	SR 170	◔	◔	None	Uncontrained Plan	-7,389	◑	6,052	◑	3.07	2.79	◔	◔	$406,000	$4,079,000	$327,360,000	N/A	0.06	◔
22	Los Angeles	101	WB	SR-170	I-405			None	Uncontrained Plan														
18	Los Angeles	101	EB	SR-170	SR-134	◑	◕	None	Uncontrained Plan	-25,594	●	7,708	◕	4.13	3.06	◑	◕	$1,427,000	$28,144,000	$680,550,000	N/A	0.22	◑
21	Los Angeles	101	WB	SR-110	SR-170			None	Uncontrained Plan														
19	Los Angeles	101	EB	SR-110	I-5	◕	◕	None	Uncontrained Plan	-35,058	●	7,905	◕	5.73	5.02	◕	◕	$1,695,000	$13,336,000	$319,010,000	N/A	0.22	◑
20	Los Angeles	101	WB	I-5	SR-110			None	Uncontrained Plan														
25	Los Angeles	105	EB	I-405	I-110	◑	◕	Existing HOV		-5,383	◔	6,270	◔	4.69	5.31	◕	◔	$244,000	$2,780,000	$26,410,000	$13,380,000	0.90	◕
28	Los Angeles	105	WB	I-110	I-405			Existing HOV															
26	Los Angeles	105	EB	I-110	I-605	◕	●	Existing HOV		-19,381	◕	8,244	●	6.49	6.14	●	◕	$859,000	$17,089,000	$46,750,000	$23,380,000	3.70	●
27	Los Angeles	105	WB	I-605	I-110			Existing HOV															
29	Los Angeles	110	NB	I-10	US-101	◑	◑	None	Uncontrained Plan	-28,609	●	7,263	◕	4.11	3.29	◑	◕	$1,469,000	$10,706,000	$1,008,630,000	N/A	0.06	◔
30	Los Angeles	110	SB	US-101	I-10			None	Uncontrained Plan														
31	Los Angeles	118	EB	Ventura/LA County Line	I-405	◔	◔	Existing HOV		-2,520	◔	4,797	◔	2.13	3.21	◔	◔	$120,000	$1,620,000	$60,500,000	$17,600,000	0.34	◑
36	Los Angeles	118	WB	I-405	LA/Ventura County Line			Existing HOV															
32	Los Angeles	118	EB	I-405	I-5	◔	◔	Existing HOV		-1,205	○	3,583	○	0.98	2.10	○	○	$61,000	$680,000	$32,090,000	$9,210,000	0.13	◔
35	Los Angeles	118	WB	I-5	I-405			Existing HOV															
33	Los Angeles	118	EB	I-5	I-210	○	○	None	Uncontrained Plan	-42	○	1,415	○	0.07	0.31	○	○	$2,000	$13,000	$31,810,000	N/A	-0.01	○
34	Los Angeles	118	WB	I-210	I-5			None	Uncontrained Plan														
37	Los Angeles	134	EB	SR-170	I-5	◕	◕	Existing HOV		-10,056	◑	6,403	◑	4.11	4.79	◑	◑	$485,000	$4,671,000	$531,090,000	$12,090,000	1.75	◕
40	Los Angeles	134	WB	I-5	SR-170			Existing HOV															
38	Los Angeles	134	EB	I-5	I-210	◕	◕	Existing HOV		-8,348	◑	6,785	◑	4.33	4.43	◑	◑	$402,000	$6,675,000	$673,920,000	$21,510,000	1.40	◕
39	Los Angeles	134	WB	I-210	I-5			Existing HOV															
41	Los Angeles	14	NB	I-5	LA /Kern County Line	◔	◔	Existing HOV	Funded Future HOV	-1,432	○	2,042	○	0.92	1.12	○	○	$64,000	$6,809,000	$545,590,000	$134,020,000	0.17	◑
42	Los Angeles	14	SB	Kern/LA County Line	I-5			Existing HOV	Funded Future HOV														
57	Los Angeles	170	NB	SR-134	I-5	◑	◑	Existing HOV		-8,810	◑	5,673	◔	3.05	3.73	◑	◔	$402,000	$5,343,000	$57,720,000	$17,020,000	1.46	◕
58	Los Angeles	170	SB	I-5	SR-134			Existing HOV															
59	Los Angeles	210	EB	I-5	SR-118	○	○	None	Uncontrained Plan	-680	○	2,875	○	1.02	1.45	○	○	$30,000	$350,000	$67,040,000	N/A	0.01	○
68	Los Angeles	210	WB	SR-118	I-5			None	Uncontrained Plan														
60	Los Angeles	210	EB	SR-118	SR-134	○	○	None	Uncontrained Plan	-826	○	3,137	○	0.98	1.47	○	○	$41,000	$1,507,000	$191,630,000	N/A	0.02	○
67	Los Angeles	210	WB	SR-134	SR-118			None	Uncontrained Plan														
61	Los Angeles	210	EB	SR-134	I-15	◕	◕	Existing HOV		-10,463	◑	6,442	◑	4.21	4.00	◑	◑	$501,000	$26,811,000	$2,251,410,000	$68,660,000	1.74	◕
186	Los Angeles	210	WB	LA County Line	SR-134			Existing HOV															
99	Los Angeles	405	SB	I-110	LA County Line	◕	●	Existing HOV		-13,602	◕	8,032	●	5.52	5.32	◕	◕	$642,000	$16,311,000	$1,010,390,000	$30,130,000	2.67	●
189	Los Angeles	405	NB	LA County Line	I-110			Existing HOV															
89	Los Angeles	405	NB	I-110	I-105	◕	●	Existing HOV		-15,224	◕	8,269	●	5.44	5.02	◕	◕	$704,000	$11,626,000	$71,560,000	$20,750,000	2.79	●
98	Los Angeles	405	SB	I-105	I-110			Existing HOV															
90	Los Angeles	405	NB	I-105	I-10	◕	●	Existing HOV		-20,099	●	7,798	◕	4.56	3.17	◑	◕	$1,024,000	$16,967,000	$70,880,000	$20,330,000	4.37	●
97	Los Angeles	405	SB	I-10	I-105			Existing HOV															
91	Los Angeles	405	NB	I-10	US-101	◕	●	Existing HOV		-16,769	◕	6,799	◑	3.57	2.83	◔	◑	$915,000	$17,370,000	$52,140,000	$23,240,000	4.01	●
96	Los Angeles	405	SB	US-101	I-10			Existing HOV															
92	Los Angeles	405	NB	US-101	SR-118	◕	◕	Existing HOV		-12,419	◕	6,766	◑	3.34	3.95	◑	◑	$619,000	$9,021,000	$59,870,000	$17,450,000	2.56	●
95	Los Angeles	405	SB	SR-118	US-101			Existing HOV															
84	Los Angeles	405	NB	SR-118	I-5	◔	◔	Existing HOV		-4,317	◔	5,153	◔	2.35	3.46	◔	◔	$209,000	$647,000	$13,990,000	$4,920,000	0.38	◑
93	Los Angeles	405	SB	I-5	SR-118			Existing HOV															
128	Los Angeles	5	SB	I-605	LA County Line	◕	●	None	Funded Future HOV	-24,034	●	9,393	●	5.55	4.89	◕	◕	$1,183,000	$15,180,000	$40,540,000	$15,350,000	5.08	●
192	Los Angeles	5	NB	LA County Line	I-605			None	Funded Future HOV														
112	Los Angeles	5	NB	I-405	US-101	◕	●	None	Uncontrained Plan	-40,392	●	9,044	●	5.00	3.34	◑	◕	$2,093,000	$17,508,000	$1,711,250,000	$10,830,000	4.42	◕
127	Los Angeles	5	SB	US-101	I-605			None	Uncontrained Plan														
113	Los Angeles	5	NB	US-101	I-10	◕	◕	None	Uncontrained Plan	-57,640	●	7,676	◕	6.32	4.99	◕	◕	$2,502,000	$6,690,000	$579,980,000	$2,050,000	3.86	◑
126	Los Angeles	5	SB	I-10	US-101			None	Uncontrained Plan														
114	Los Angeles	5	NB	I-10	SR-134	◕	◕	None	Uncontrained Plan	-25,714	●	7,442	◕	4.36	3.42	◑	◕	$1,329,000	$26,390,000	$912,190,000	$12,180,000	2.20	◕
125	Los Angeles	5	SB	SR-134	I-10			None	Uncontrained Plan														
115	Los Angeles	5	NB	SR-134	SR-170	◕	●	None	Funded Future HOV	-12,543	◕	7,075	◕	3.61	3.59	◑	◑	$644,000	$12,285,000	$52,930,000	$23,750,000	2.49	●
124	Los Angeles	5	SB	SR-170	SR-134			None	Funded Future HOV														
104	Los Angeles	5	NB	SR-170	SR-118	◑	◑	None	Funded Future HOV	-3,704	◔	4,613	○	1.48	1.56	○	○	$23,000	$1,404,000	$25,940,000	$7,350,000	0.87	◕
123	Los Angeles	5	SB	SR-118	SR-170			None	Funded Future HOV														
105	Los Angeles	5	NB	SR-118	I-405	◑	◕	Existing HOV		-7,489	◑	6,497	◑	2.12	4.10	◔	◔	$364,000	$2,148,000	$33,760,000	$7,770,000	0.96	◕
122	Los Angeles	5	SB	I-210	SR-118			Existing HOV															
106	Los Angeles	5	NB	I-405	SR-14	◑	◑	Existing HOV		-6,463	◑	4,479	○	1.31	1.81	○	◔	$418,000	$2,071,000	$21,060,000	$2,540,000	1.02	◑
121	Los Angeles	5	SB	SR-14	I-210			Existing HOV															
107	Los Angeles	5	NB	SR-14	LA/Kern County Line	○	○	None	Funded Future HOV	-1,345	○	4,430	○	0.83	0.90	○	○	$70,000	$6,135,000	$973,830,000	N/A	0.02	◔
116	Los Angeles	5	SB	LA/Kern County Line	SR-14			None	Funded Future HOV														
117	Los Angeles	57	SB	SR60	IA County Line	◕	●	Existing HOV		-21,311	●	7,903	●	5.80	5.23	◕	◕	$1,032,000	$10,013,000	$44,040,000	$12,100,000	3.83	●
193	Los Angeles	57	NB	LA County Line	SR-60			Existing HOV															
139	Los Angeles	60	EB	I-10	I-605	◕	◕	None	Uncontrained Plan	-13,850	◕	6,860	◑	3.70	4.45	◑	◑	$671,000	$16,259,000	$512,550,000	$15,790,000	1.13	◕
150	Los Angeles	60	WB	I-605	I-10			None	Uncontrained Plan														
140	Los Angeles	60	EB	I-605	SR-57	◑	◑	Existing HOV		-6,150	◑	6,066	◔	3.52	4.07	◑	◔	$295,000	$7,004,000	$130,540,000	$24,190,000	1.38	◕
149	Los Angeles	60	WB	SR57	I-605			Existing HOV															
141	Los Angeles	60	EB	SR57	SR-71	◕	◕	Existing HOV		-10,938	◑	6,955	◑	3.90	4.47	◑	◑	$551,000	$6,093,000	$65,880,000	$14,250,000	1.74	◕
148	Los Angeles	60	WB	SR71	SR-57			Existing HOV															
142	Los Angeles	60	EB	SR71	IA County Line	◔	◔	Existing HOV		-3,169	◔	6,004	◔	3.06	3.70	◑	◔	$151,000	$257,000	$7,580,000	$3,220,000	-0.10	○
198	Los Angeles	60	WB	LA County Line	SR-71			Existing HOV															
160	Los Angeles	605	SB	SR91	IA County Line	◔	◔	Existing HOV		-1,838	○	4,976	◔	2.21	3.01	◔	○	$88,000	$894,000	$66,570,000	$12,460,000	0.23	◑
199	Los Angeles	605	NB	LA County Line	SR-91			Existing HOV															
152	Los Angeles	605	NB	SR91	I-105	◑	◕	Existing HOV		-7,489	◑	6,088	◔	4.17	3.58	◑	◑	$394,000	$2,231,000	$34,280,000	$6,770,000	1.50	◕
159	Los Angeles	605	SB	I-105	SR-91			Existing HOV															
153	Los Angeles	605	NB	I-105	I-5	◕	●	Existing HOV		-21,608	●	8,063	●	5.43	4.64	◕	◕	$591,000	$3,998,000	$26,090,000	$5,540,000	3.56	●
158	Los Angeles	605	SB	I-5	I-105			Existing HOV															
154	Los Angeles	605	NB	I-5	SR-60	◕	●	Existing HOV		-20,049	●	8,566	●	6.05	4.88	◕	◕	$941,000	$14,784,000	$94,650,000	$19,100,000	4.06	●
157	Los Angeles	605	SB	SR60	I-5			Existing HOV															
155	Los Angeles	605	NB	SR60	I-10	◕	●	Existing HOV		-14,813	◕	7,952	◕	5.38	5.30	◕	◕	$667,000	$3,491,000	$27,970,000	$6,420,000	2.61	●
156	Los Angeles	605	SB	I-10	SR-60			Existing HOV															
162	Los Angeles	71	SB	SR60	IA County Line	○	○	Existing HOV		-579	○	2,899	○	1.24	2.04	○	○	$24,000	$65,000	$7,100,000	$3,990,000	-0.08	○
201	Los Angeles	71	NB	LA County Line	SR-60			Existing HOV															
165	Los Angeles	91	EB	I-110	I-605	◕	●	Existing HOV		-11,189	◑	7,130	◕	4.91	4.73	◕	◑	$521,000	$10,614,000	$85,500,000	$25,250,000	1.99	◕
176	Los Angeles	91	WB	I-605	I-110			Existing HOV															
166	Los Angeles	91	EB	I-605	IA County Line	◑	◑	Existing HOV		-5,400	◔	6,413	◑	4.05	4.79	◑	◑	$244,000	$1,882,000	$389,460,000	$14,070,000	0.16	◔
204	Los Angeles	91	WB	LA County Line	I-605			Existing HOV															
177	Los Angeles	71	SB	I-10	SR-60	○	○	None	Funded Future HOV	-62	○	2,461	○	0.17	0.20	○	○	$3,000	$19,000	$170,100,000	N/A	0.00	○
178	Los Angeles	71	NB	SR60	I-10			None	Funded Future HOV														

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APPENDIX I – FINANCIAL FEASIBILITY ASSUMPTIONS AND DETAILED ANALYSIS RESULTS

TABLE 1: T&R SCALING AND EXTRAPOLATION ASSUMPTIONS

Category	Assumption	Justification
Traffic Annualization	308 average weekdays per year	ExpressLanes tend to have higher traffic levels on weekdays than weekends, due to the higher overall corridor and network travel demand on weekdays, though weekends can have broad, midday peak periods. In addition, average weekday toll rates also tend to be higher than weekends, reflecting the higher weekday competition for scarce space in the express lanes. As a result, the annual expansion process needs to acknowledge that weekend express lane toll paying traffic and corresponding revenue would be less than on a weekday. Data from the I-10 and I-110 express lanes (which operate under the hybrid exemption case of HOV 3+ peak / HOV 2+ off-peak), reflects average weekend day toll paying traffic at 48% of weekday levels, with weekend revenue at 15% of weekday levels. These relationships translate to an annual expansion factors of 308 for traffic and 272 for revenue. For the HOV 3+ at all times case, somewhat higher toll paying traffic would be expected, albeit at potentially lower average toll rates. However, due to the lack of a weekend forecasting model and to maintain a conservative revenue estimate, the HOV 3+ case used the same expansion factors as the HOV 3+ peak / 2+ off-peak case.
Revenue Annualization	272 average weekdays per year	
T&R Growth between 2020 and 2035	Compounded Annual Growth Rate (CAGR) between two model years	Both traffic and revenue were assumed to grow at constant rates between 2020 and 2035 as determined by exponential interpolation.
T&R Growth after 2035	Half the CAGR, however if T&R declined from 2020 to 2035, assume full CAGR	Annual T&R were extrapolated at one-half the annual growth rates interpolated between 2020 and 2035 in order to dampen the long-range forecasts. There were a few facilities that were projected to experience declining toll-paying traffic or revenue from 2020 to 2035, perhaps due to growth in toll-free HOV use. Where this occurred, the same rate of decline is assumed to persist beyond 2035 in the extrapolation to 2067.
T&R Ramp Up Adjustment	65%, 80%, and 90% of modeled T&R for years 1, 2, and 3 of operations, respectively	In the initial forecast years for each tier of projects, the traffic and revenue streams are reduced for facility ramp-up effects. Ramp-up adjustments account for the time it takes users to evaluate options, obtain accounts, and otherwise become accustomed to using the toll lanes. The adjustment is applied as a percentage less than 100 percent by which to factor down the traffic and gross toll revenue projections estimated in given year. Steady state conditions, or 100% of modeled T&R, are assumed starting in year 4 of revenue operations.

TABLE 2: OPERATING AND MAINTENANCE COST ASSUMPTIONS

Category	Assumption	Justification
Leakage	10% of Gross Toll Revenue Potential	Includes revenue loss due to HOV occupancy violations, toll customers with insufficient accounts, and misread transponders, as well as a reduction to acknowledge some users will lack an account or other viable payment technology not reflected in the demand modeling. Leakage is deducted first before any other costs.
Credit Card Fees	- 80% of Adjusted Gross Toll Revenue (after leakage) will be subject to credit card fees - credit card fees will be 2% of the above amount of revenue	Because other payment methods will be available, not all revenue will be subject to credit card fees. These assumptions are based on experience from other toll facilities in the United States
Enforcement	$43,528 in 2014$ per lane mile	Includes California Highway Patrol labor to enforce access/egress safety and HOV status, the latter as a result of offering toll exemptions to vehicles with a sufficient number of occupants to qualify. HOV exemption status must be declared by a status switch on the customer's FasTrak transponder pass. However, this switch also creates an opportunity for scofflaw behavior by declaring HOV status without having the required minimum number of vehicle occupants. Enforcement activity is expected to be higher in the initial year of operations in order to set precedent with users.
Toll Collection Operations & Maintenance (O&M)	- $720,000 in 2014$ per facility for marketing, operations oversight, computer programming, and L.A. Metro staff costs - $0.29 in 2014$ per transaction for back-office customer service center operations - $19,713 in 2014$ per centerline mile for traffic management office, systems, and hardware - $49,731 in 2014$ per lane mile for freeway service patrol	Includes expenditures for customer service center (CSC) and back office processing of transactions, lane system toll collection hardware, marketing and public relations, and agency management and oversight costs. Because initial education of the public will be required prior to, and during, the initial year of operations, marketing and public relations costs are assumed to be higher in the first year of operations. Computer programming costs are also assumed to be higher in the first year of each new facility's operations to allow for updating systems and websites with new information. These estimates are based on the I-10 and I110 ExpressLanes, as well as similar facilities in the United States.
Facility Operations & Mainenance (O&M)	$13,441 in 2014$ per lane mile	Includes routine facility maintenance, which is expected to be performed by Caltrans. Costs are based on I-10 and I-110 express lane data and estimated on a per lane-mile basis.

Table 3 and **Table 4** summarize the ExpressLane network capital sources and uses of funds for the eight Baseline and Expanded Network scenarios. Because the capital requirements were an order of magnitude higher for the Expanded Network, the results for the two network cases are presented in separate tables.

TABLE 3: FUNDING SUMMARY FOR BASELINE NETWORK SENSITIVITY TESTS

			Baseline Managed Lanes Network			
	Scenario		1 - 1	1 - 2	1 - 3	1 - 4
	Baseline Network		29 Express Lane Segments on 14 Facilities in 4 Construction Tiers			
	I-110 Ext'n & I-110/I405 Direct Connector		Excluded			
	I-5 (SR-14 | Parker Rd); SR 14 (I-5 | SR 138); & SR 118 (I-5 | LA/Ventura Co Line)		Excluded			
	HOV Exemption Policy		HOV 3+ Peak /2+ Off-Peak		HOV 3+	
	Toll Revenue from Existing I-10 & I-110 [1]		None	$10 M per Year		None
	First Year of Toll Operations [2]	Tier 1A	2020	2020	2020	2020
		Tier 1B	2023	2023	2023	2023
		Tier 2	2027	2031 (+4 years)	2031 (+4 years)	2027
		Tier 3	2039 (+2 years)	2038 (+1 year)	2038 (+1 year)	2039 (+2 years)
USES OF FUNDS	Capital Construction Cost (millions of YOE$)	Total	$711 M	$737 M	$737 M	$711 M
		Tier 1A	$90 M	$90 M	$90 M	$90 M
		Tier 1B	$174 M	$174 M	$174 M	$174 M
		Tier 2	$286 M	$316 M	$316 M	$286 M
		Tier 3	$161 M	$157 M	$157 M	$161 M
SOURCES OF FUNDS	Existing I-10 & I-110 Excess Net Revenue Applied Directly to Construction	Total		$200 M	$200 M	
		Tier 1A		$20 M	$20 M	
		Tier 1B		$30 M	$30 M	
		Tier 2		$80 M	$80 M	
		Tier 3		$70 M	$70 M	
	Toll Pay-As-You-Go Funding Applied Directly to Construction	Total	$167 M	$126 M	$129 M	$167 M
		Tier 1A				
		Tier 1B	$0 M	$0 M	$0 M	$0 M
		Tier 2	$6 M	$39 M	$42 M	$6 M
		Tier 3	$161 M	$87 M	$87 M	$161 M
	Toll Bond Net Proceeds for Construction [3]	Total	$345 M	$319 M	$320 M	$351 M
		Tier 1A	$38 M	$38 M	$38 M	$38 M
		Tier 1B	$162 M	$144 M	$144 M	$166 M
		Tier 2	$145 M	$137 M	$138 M	$147 M
		Tier 3				
	Share of Net Revenue Applied to Debt Service (50% maximum)	Tier 1A	50%	50%	50%	50%
		Tier 1B	50%	44%	43%	50%
		Tier 2	50%	50%	50%	50%
		Tier 3	0%	0%	0%	0%
	Total Borrowing incl. Financing Costs, Capitalized Interest, & Working Capital		$472 M	$436 M	$438 M	$480 M
	Minimum Debt Service Coverage		2.0x	2.0x	2.0x	2.0x
	Funding Gap? (Yes/No)		Yes	Yes	Yes	Yes
	Total Funding Gap (Sources - Uses)	Total	($199 M)	($92 M)	($88 M)	($193 M)
		Tier 1A	($52 M)	($32 M)	($32 M)	($52 M)
		Tier 1B	($12 M)			($8 M)
		Tier 2	($135 M)	($59 M)	($56 M)	($133 M)
		Tier 3				
	Accumulated Restricted Reserve Balance (2020 - 2040) [4]		$811 M	$730 M	$730 M	$814 M
	Gross Revenue Index (2020 - 2040)		0.90	0.82	0.91	1.00
	Comments		- Delaying Tier 3 by 2 years reduces the funding gap by approximately $35m	- There is additional financial capacity to pay for more project construction in Tier 1B - Delaying Tiers 2 & 3 reduces the funding gap by approximately $31m	- There is additional financial capacity to pay for more project construction in Tier 1B - Delaying Tiers 2 & 3 reduces the funding gap by approximately $32m	- Delaying Tier 3 by 2 years reduces the funding gap by approximately $36m

Note: *Results based on traffic and revenue forecasts averaged across the "Revenue Maximizing" and "Cost Minimizing" tolling objectives.*

[1] Available revenues are assumed to be applied to the capital construction costs of any facility within the network.

[2] Operations follow two years of construction, with toll bond proceeds available at the end of the year before construction starts. With an assumed maximum bond maturity of 30 years, toll debt is repaid 27 years after tolling begins.

[3] Net bond proceeds leverage future net toll revenues from only those new facilities constructed within each tier; net bond proceeds are after deductions for cost of issuance, capitalized interest, and working capital reserves.

[4] Represents the accumulation of 45% of net revenues that are set aside as "restricted reserves" assuming that the T&R projections are met.

TABLE 4: FUNDING SUMMARY FOR EXPANDED NETWORK SENSITIVITY TESTS

		Expanded Managed Lanes Network			
Scenario		2 - 1	2 - 2	2 - 3	2 - 4
Baseline Network		29 Express Lane Segments on 14 Facilities in 4 Construction Tiers			
I-110 Ext'n & I-110/I405 Direct Connector		In Tier 3			
I-5 (SR-14 | Parker Rd); SR 14 (I-5 | SR 138); & SR 118 (I-5 | LA/Ventura Co Line)		In Tier 3		Excluded	
HOV Exemption Policy		HOV 3+		HOV 3+ Peak /2+ Off-	HOV 3+
Toll Revenue from Existing I-10 & I-110 [1]		$10 M per Year	None	$10 M per Year	
First Year of Toll Operations [2]	*Tier 1A*	2020	2020	2020	2020
	Tier 1B	2023	2023	2023	2023
	Tier 2	2027	2027	2027	2027
	Tier 3	2040 (+3 years)	2037	2040 (+3 years)	2040 (+3 years)
USES OF FUNDS					
Capital Construction Cost (millions of YOE$)	*Total*	**$1,870 M**	**$1,776 M**	**$1,578 M**	**$1,578 M**
	Tier 1A	$90 M	$90 M	$90 M	$90 M
	Tier 1B	$174 M	$174 M	$174 M	$174 M
	Tier 2	$286 M	$286 M	$286 M	$286 M
	Tier 3	$1,320 M	$1,226 M	$1,028 M	$1,028 M
SOURCES OF FUNDS					
Existing I-10 & I-110 Excess Net Revenue Applied Directly to Construction	*Total*	**$220 M**		**$220 M**	**$220 M**
	Tier 1A	$20 M		$20 M	$20 M
	Tier 1B	$30 M		$30 M	$30 M
	Tier 2	$40 M		$40 M	$40 M
	Tier 3	$130 M		$130 M	$130 M
Toll Pay-As-You-Go Funding Applied Directly to Construction	*Total*	**$248 M**	**$125 M**	**$244 M**	**$248 M**
	Tier 1A				
	Tier 1B	$0 M	$0 M	$0 M	$0 M
	Tier 2	$11 M	$6 M	$10 M	$11 M
	Tier 3	$236 M	$119 M	$234 M	$236 M
Toll Bond Net Proceeds for Construction [3]	*Total*	**$329 M**	**$351 M**	**$332 M**	**$329 M**
	Tier 1A	$38 M	$38 M	$38 M	$38 M
	Tier 1B	$144 M	$166 M	$144 M	$144 M
	Tier 2	$147 M	$147 M	$145 M	$147 M
	Tier 3			$6 M	
Share of Net Revenue Applied to Debt Service (50% maximum)	*Tier 1A*	50%	50%	50%	50%
	Tier 1B	43%	50%	44%	43%
	Tier 2	50%	50%	50%	50%
	Tier 3	0%	0%	50%	0%
Total Borrowing incl. Financing Costs, Capitalized Interest, & Working Capital		$449 M	$480 M	$457 M	$449 M
Minimum Debt Service Coverage		2.0x	2.0x	2.0x	2.0x
Funding Gap? (Yes/No)		Yes	Yes	Yes	Yes
Total Funding Gap (Sources - Uses)	*Total*	**($1,074 M)**	**($1,299 M)**	**($781 M)**	**($782 M)**
	Tier 1A	($32 M)	($52 M)	($32 M)	($32 M)
	Tier 1B		($8 M)		
	Tier 2	($88 M)	($133 M)	($91 M)	($88 M)
	Tier 3	($954 M)	($1,107 M)	($659 M)	($662 M)
Accumulated Restricted Reserve Balance (2020 - 2040) [4]		**$810 M**	**$798 M**	**$811 M**	**$816 M**
Gross Revenue Index (2020 - 2040)		**1.00**	**1.03**	**0.89**	**0.99**
Comments		- There is additional financial capacity to pay for more project construction in Tier 1B - Delaying Tier 3 by 3 years reduces the funding gap by approximately $25m		- There is additional financial capacity to pay for more project construction in Tier 1B - Delaying Tier 3 by 3 years reduces the funding gap by approximately $46m	- There is additional financial capacity to pay for more project construction in Tier 1B - Delaying Tier 3 by 3 years reduces the funding gap by approximately $46m

Note: *Results based on traffic and revenue forecasts averaged across the "Revenue Maximizing" and "Cost Minimizing" tolling objectives.*

[1] Available revenues are assumed to be applied to the capital construction costs of any facility within the network

[2] Operations follow two years of construction, with toll bond proceeds available at the end of the year before construction starts. With an assumed maximum bond maturity of 30 years, toll debt is repaid 27 years after tolling begins.

[3] Net bond proceeds leverage future net toll revenues from only those new facilities constructed within each tier; net bond proceeds are after deductions for cost of issuance,capitalized interest, and working capital reserves.

[4] Represents the accumulation of 45% of net revenues that are set aside as "restricted reserves" assuming that the T&R projections are met.

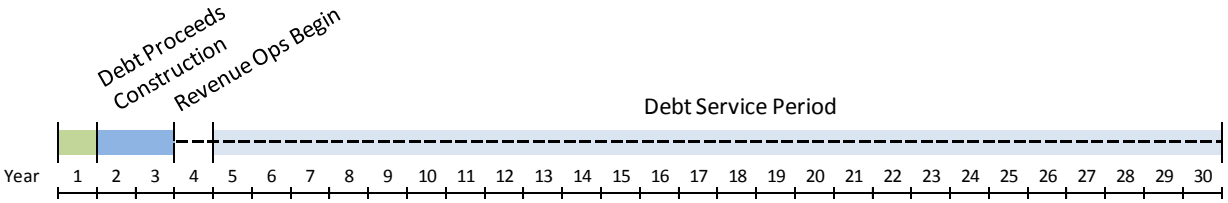
Table 5 The following summarizes the initial and subsequently revised financing assumptions developed by WSP | Parsons Brinckerhoff to conduct preliminary, planning-level phasing and funding analysis for packages of multiple express toll lane projects assuming three tiers of construction delivery. Because of the number of projects, phasing combinations, and other variables, this work required the use of a simplified financial model with more general financial assumptions commensurate with the preliminary, Level 1 traffic and revenue forecasts prepared simultaneously for projects in five counties and the pre-design level preliminary capital cost estimates.

WSP | Parsons Brinckerhoff is not a registered municipal advisor and is performing this work under the Independent Registered Municipal Advisor exemption. LA Metro currently retains Sperry Capital as its municipal advisor, and Parsons Brinckerhoff consulted with Sperry Capital in arriving at the revised set of assumptions noted below. Parsons Brinckerhoff acknowledges that more detailed project-specific analyses will be required to implement Express Lane conversion projects and that LA Metro should seek the advice of their Municipal Advisor prior to taking any action with regard to municipal securities.

TABLE 5: FINANCING ASSUMPTIONS

CATEGORY	REVISED ASSUMPTIONS
Uses of Net Toll Revenues / Cash Flow Available for Debt Service (CFADS)	• 45% of net toll revenues for each tier of projects is set aside as "Restricted Reserves". • Up to 50% of net toll revenues are assumed to be used for debt service on toll revenue bonds. Net revenues used for debt service are pooled among projects within a tier, but not across construction tiers. • Initially, 5% of net toll revenues are assumed to accumulate and may be used directly for pay-as-you-go construction funding in any year following the year of collection. Net revenues used directly for construction are pooled among projects within a tier as well as across construction tiers over time.
Type of Bonds / Structuring / Credit Ratings	An assumption of level debt service allows the exclusive use of current interest bonds (CIBs). Senior and junior lien bond tranches were not separately modeled and the composite interest rate assumption noted below assumes that the bonds would carry a minimum or near minimum investment grade credit rating (BBB/BBB-).
Maximum Bond Maturity	• 30 Years The 30 year maximum bond maturity, combined with three construction tiers and allowing for tier phasing delays to test financial feasibility, requires traffic and revenue forecasts out to year 2064.
Debt Service Coverage	• 2.0x minimum The assumed 50% limit on net toll revenues applied to debt service translates to an overall minimum debt service coverage ratio (DSCR) of 2.0x.
Interest Rates	• 6.0% overall interest rate MMD data for 5/14/2015 were used to develop interest rate assumptions. The 'AAA' rate for the maximum bond maturity of 30 years was adjusted by upward by 1.0% to reflect the spread for a 'BBB' rating. Assuming higher interest rates in the future, an additional cushion of 1.75% was added, which represents the difference between the current rate and the 10-year MMD average, plus an additional 0.5%.
Bond Insurance	• None assumed.
All-in Cost of Issuance / Underwriting Fees	2.0% of the par amount of all bonds, paid from bond gross proceeds.
Capitalized Interest (CAPI)	• 3 Years Interest is assumed to be capitalized during each tier's two year construction period plus the first year of operations. CAPI is treated as a deduction from bond gross proceeds rather than an increase in each tier's capital construction cost.
Working Capital Min. Balance	• $2 million per construction tier, funded from bond gross proceeds
Timing of Debt Issuance	Bonds are assumed to be issued at the end of the year immediately preceding the year in which construction begins on each tier of projects.
Debt Service Reserve Account (DSRA) / O&M and R&R Reserve Accounts	These and other potential reserve accounts have not been individually modeled, and any such reserves are assumed to be funded from net revenues resulting from debt service coverage. Specifically, 40% of net toll revenues are assumed to be set aside as "Restricted Reserves" to account for various reserves that may be required by a bond indenture and/or to account for traffic and revenue risk.

FIGURE 1: TIER CONSTRUCTION AND FUNDING TIMELINE



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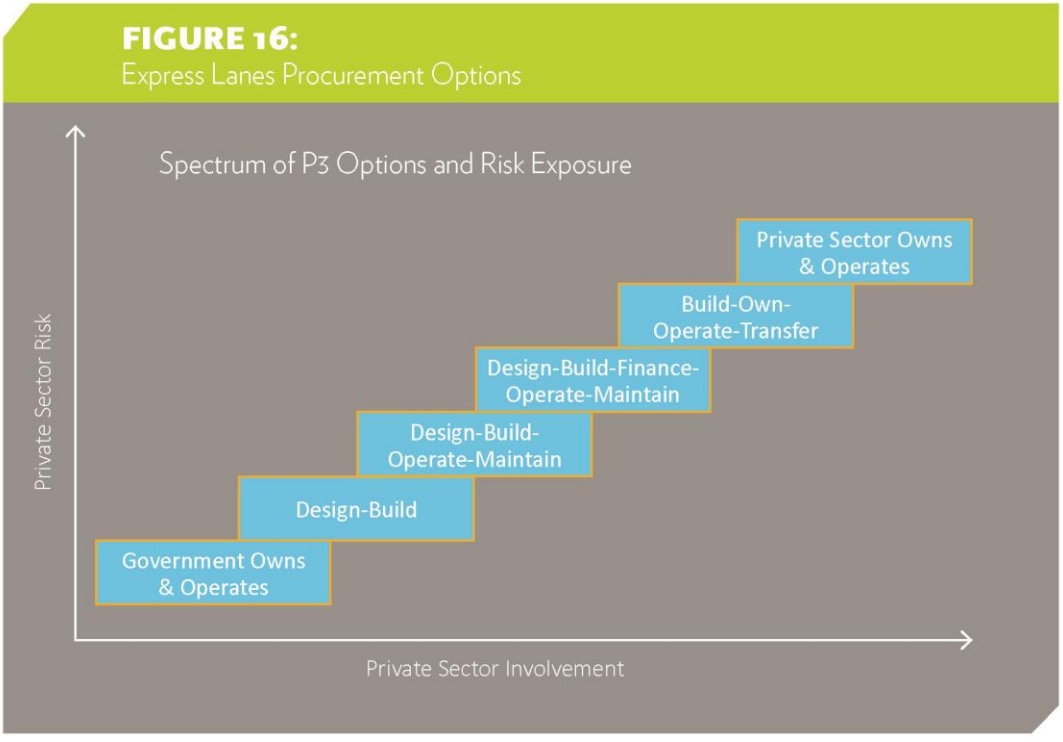
APPENDIX J – DELIVERY OPTIONS

1 PROCUREMENT

There are a variety of procurement options that transportation owners are using around the U.S. to implement transportation improvement programs, including ExpressLane projects. Many of these approaches are also considered to be Public-Private Partnership (P3) arrangements as they allow for greater private-sector participation and responsibility in the design, delivery, financing, operation and maintenance of transportation improvements. These delivery options are a departure from the traditional design-bid-build approach described below.

As shown in **Figure 1**, delivery approaches range from design-build procurements, where design and construction services are grouped into a single, fixed-price procurement, to concessions arrangements, where a private investor/operator is responsible for financing, designing, constructing, operating and maintaining new toll projects. In certain cases, P3 projects may also involve transferring the operation of existing highway facilities to private-sector operators who are also obligated to make capital improvements to the facilities. Each of these models is described in greater detail below.[1]

FIGURE 1: MANAGED LANE PROCUREMENT OPTIONS



[1] The following descriptions are based largely on SHRP2 C12, The Effect of Public-Private Partnerships and Non-Traditional Procurement Processes on Highway Planning, Environmental Review, and Collaborative Decision Making, Task 3—Technical Report, Parsons Brinckerhoff, March 2011.

1.1 DESIGN-BID-BUILD

Design-bid-build is the traditional project delivery method where the public sector sponsor completes the design process to 100 percent, either in-house or under one contract and then awards a separate contract to a contractor to build projects, thereafter owning and operating the new facilities. The owner is responsible for the details of the design and warrants the quality of the construction documents to the construction contractor.[2] As a result, the owner assumes the risks of any errors or omissions encountered during construction that are not included in the design, as well as the risks of delays and associated cost escalations.

1.2 DESIGN-BUILD

Design-build is a project-delivery method that combines two services that are usually separate into a single contract. With design-build procurements, owners execute a single, fixed-fee contract for architectural/engineering services as well as construction with a private entity providing both services. With design-build delivery, the design-builder assumes responsibility for the majority of the design work and all construction activities, together with the risk of providing these services for a fixed fee. When using design-build delivery, owners retain responsibility for financing, operating, and maintaining projects. However, the private-sector design-builder assumes a significant portion of the risk of construction cost overruns. While the design-build procurement process has been prevalent in private-sector work for some time, over the past ten to twenty years it has gained acceptance among many public-sector transportation-infrastructure owners.

Design-build delivery offers a number of benefits to public agencies developing transportation improvements. It allows project completion to be accelerated because design and construction work can proceed concurrently. Opportunities for creative design solutions and the ability to align the project design with construction techniques and equipment also provide the potential to accelerate implementation timeframes and may result in overall cost savings. Shifting the risk of design defects to the private sector also eliminates one of the most common causes of construction claims, creating greater upfront cost certainty for the public sponsor. The potential for owners to realize such benefits is greatest with more complex projects.

The enactment of Senate Bill 4 (SBX2), passed by the California legislature near the end of the second 2009-2010 session and signed into law in 2009, allows Caltrans and regional transportation agencies to enter into P3 agreements until January 1, 2017.[3] Initially, SBX2 imposed a cap on the number of design-build projects that could be built in California, with 10 state projects and 5 local projects, subject to CTC approval.[4] However, this situation was modified with AB 401 which was passed in October 2013 and lifted the cap on projects undertaken by regional agencies and gave Caltrans authority to enter into another 10 design-build contracts. AB 401 also provided the Orange County

[2] NCHRP Synthesis 402, Construction Manager-at-Risk Project Delivery for Highway Programs

[3] California Streets and Highways Code § 143

[4] Public Contract Code §6802, 6803, 6813

Transportation Authority (OCTA) with specific authority to use a design-build approach to procure improvements on the I-405.[5] SBX2 also authorized the Riverside County Transportation Commission (RCTC) to utilize a design-build procurement for the State Route 91 Corridor Improvements Project in Riverside County.

1.3 DESIGN-BUILD-FINANCE

Design-build-finance is a P3 arrangement that uses private capital to accelerate the implementation of projects in advance of the availability of public funds dedicated to the project. Essentially a variant of a design-build procurement, in this case, the private sector design-builder agrees to provide all or some of the construction financing and to be repaid through either milestone or completion payments made by the project sponsor. These arrangements are typically short term and extend no longer than the duration of the construction period. While design-build-finance procurements transfer design and construction risk to the private partner, they do not transfer ongoing operating or maintenance risks and do not generate greater efficiencies than design-build procurements. The primary benefit of design-build-finance arrangements is that they provide project sponsors with short-term gap financing.

1.4 DESIGN-BUILD-OPERATE-MAINTAIN

The design-build-operate-maintain (DBOM) P3 model combines the design and construction responsibilities of design-build procurements with the ongoing operation and maintenance of the highway facility. These services are provided by a private-sector contractor through a single contract, with financing provided by the public sector. The advantage of DBOM procurements is that by combining these services, the private partner has an incentive to use cost-saving, life-cycle costing principles to align the design of the project with long-term maintenance activities. This delivery approach is used by highway operators around the world and is common in the transit sector. DBOM is known by several terms, including "turnkey" procurement and build-operate-transfer (BOT).

The implementation of ExpressLanes on I-10 and I-110 in Los Angeles County is an example of a DBOM procurement.

1.5 DESIGN-BUILD-FINANCE-OPERATE MAINTAIN

Design-build-finance-operate-maintain (DBFOM) procurements are also commonly referred to as "concessions." With DBFOM procurements the private partner assumes responsibilities for designing, building, financing, and operating highway improvements for a designated period of time. In exchange, the private-sector partner has the right to collect the revenues generated by the facility during the concession period. Alternatively, the public agency sponsoring the project may agree to make availability payments to the private-sector partner during the concession period, and retain any toll revenues if the facility is tolled. There is a great variety in DBFOM structures and the degree to

[5] http://www.californiaeminentdomainreport.com/2013/10/articles/events/governor-brown-signs-ab-401-giving-broader-authority-for-regional-transportation-agencies-to-use-design-build/

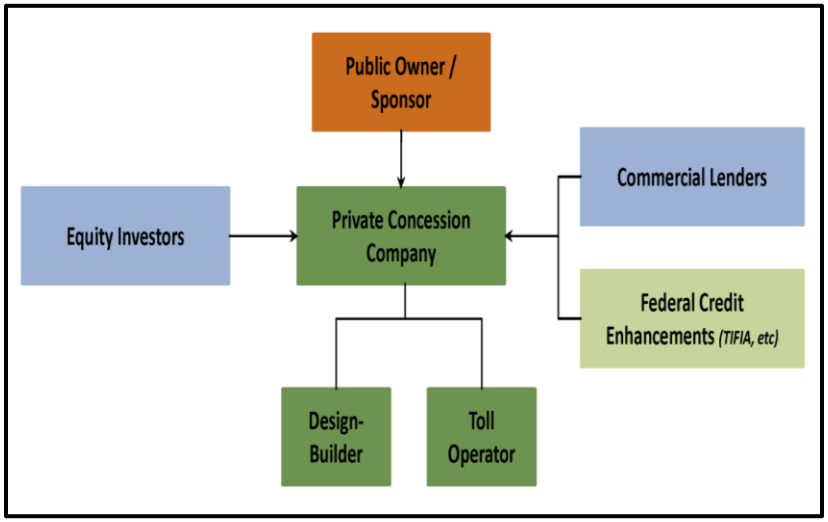
which financial responsibilities are transferred to the private sector; however, DBFOM projects are either partly or wholly financed by debt backed by project revenues. With DBFOM projects, future revenues are leveraged to issue bonds or other debt that provide funds for capital and project development costs. With real toll concessions, project revenues are often supplemented by public-sector grants in the form of money or contributions in kind, such as right-of-way or complementary construction projects.

Many recent DBFOM concession projects in the U.S. - particularly those with a high implementation costs—have been financed using availability payments. Others have relied on a combination of toll revenues, government grants, private debt, and private-investor equity. DBFOP P3 financings have also been further enhanced by federal financing tools such as the Transportation Innovation Finance Innovation Act (TIFIA) and private activity bonds (PABs). TIFIA encourages the use of P3s by providing flexible repayment terms, and both TIFIA and PABs have the potential to provide credit to P3 projects at favorable interest rates when compared to the private capital market. Together, these mechanisms help public agencies sponsoring DBFOM projects and their private investment partners mitigate the risk associated with these transactions.

DBFOM concessions often extend for 25 to 50 years or more and are awarded through competitive procurements. With the DBFOM approach, the public sponsor retains ownership of the highway assets and stipulates maintenance protocols and specific improvements to be made over the concession period, thereby ensuring that the assets are properly maintained during and returned in good condition. DBFOM concessions are often attractive to public transportation agencies, as they can provide access to new sources of equity and financing, and deliver similar schedule and cost-efficiency benefits.

The structure of a typical DBFOM concession is shown in **Figure 2**. The agency sponsoring the project could be a state department of transportation (DOTs), Metropolitan Planning Organization (MPO), transit agencies, public benefit corporation, toll highway authority or other state, regional and local agencies. The project sponsor awards the DBFOM procurement to a private limited-liability concession company which is usually comprised of a group of firms who have agreed to partner in the development of the project and to invest their own equity in the concession company. The concession company then leverages future revenues it will receive for operating the highway facility and raises debt to cover the cost of implementing from the municipal finance and commercial credit markets. In many cases these traditional sources of finance may be supplemented by Federal credit tools including PABs, TIFIA, Section 129 loans, or state infrastructure bank (SIB) loans. With its financing in place, the concession company would then enter into a fixed-priced design-build contract to implement the project and a separate operations contract to collect tolls and maintain the project. These contracts may be awarded to subsidiaries of the firms which formed the concession company.

FIGURE 2: TYPICAL DBFOM CONCESSION STRUCTURE



2 ENVIRONMENTAL CLEARANCE

The expansion of the Los Angeles County ExpressLanes program will require compliance with both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA).

A tiered approach to preparing an Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) may be appropriate for a countywide ExpressLanes program. Under the traditional approach, a single EIS/EIR is prepared as the basis for approving a single project where the mode choice has not be finalized, while the tiered approach is often used for a program or large scale project when then basic project definition is clear.

The tiered approach includes two or more rounds of environmental analysis and review. In Tier 1, the EIS/EIR typically analyzes a program or large scale project. In Tier 2, individual projects or sections are assessed in more detail with the preparation of additional EIS/EIRs.

Table 1 provides a summary of some topical areas and how they differ among the tiered and corridor-specific environmental clearance approaches. While tiering is authorized under NEPA, the process is not recognized in other federal laws and regulations that play key roles in the environmental review process. Consideration must be made to ensure compliance with these non-NEPA requirements as there is currently no defined process for incorporating them into a tiered EIS process.

MAP-21 includes numerous provisions intended to increase innovation and improve efficiency, effectiveness, and accountability in the development of transportation projects from planning, environmental review and project delivery. These provisions include broadening the ability to acquire or preserve right-of-way for a transportation facility prior to completing the environmental review process, providing earlier coordination between agencies, creating greater linkages between the planning and environmental review process, using a programmatic approach where possible, and consolidating environmental documents.

The conversion of an HOV lane to ExpressLanes operation does not require NEPA under MAP-21. However, a NEPA evaluation is needed if Federal funding is used or if previous commitments need to be amended. In addition, even if a project may not involve any discretionary Federal action, conformity requirements (such as air quality) must be met if it is a regionally significant project within an air quality nonattainment or maintenance area.

TABLE 1: COMPARISON TIERED AND TRADITIONAL EIS/EIRS

	Tiered EIS/EIR	Traditional Corridor-Specific EIS/EIR
System-wide Level Analysis	General location of alternative and mode are agreed upon in Tier 1. The Tier 2 analysis focuses on specific alternatives that advance out of Tier 1 as reasonable and feasible and meet the purpose and need.	Potential for more alternatives, different modes, alternative locations within a wider corridor that meet the purpose and need. The alternatives analysis may include more modes and locations than those coming out of a Tier 1 ROD
Agency Support	Acceptance of general mode and location in Tier 1 allows for focused efforts on fewer alternatives in Tier 2. Higher degree of customization and education of resource agencies about the process generally required	Projects that come out the MPO are considered valid
Right-of-way	Right-of-way can be secured and purchased in advance of construction allowing for potential cost savings in land costs increase in the future	Right-of-way is secured after approval of the environmental document with the cost determined at the time of construction
Data Collection	Can develop a regional repository of GIS data collected in Tier 1 to be used for the Tier 2 projects	Can be redundancy with data collection on corridor-by-corridor approach
Indirect and Cumulative Impacts	Regional analysis of indirect and cumulative impacts eliminates redundancy compared to a corridor-by-corridor approach	Indirect and cumulative impacts are assessed separately for each corridor
Land Use Impacts	Regional assessment of land use impacts provides opportunity to prevent development encroachment onto future rights-of-way	Land use impacts are calculated on a project by project basis
Natural Resource Impacts	Early identification of the total natural resource impact of projects and the potential to identify mitigation strategies. Larger areas may be secured for mitigation.	Natural resource studies are conducted separately for each corridor
Section 106 and Section 4(f)	Section 106 and Section 4(f) processes need modification under tiered approach	Traditional process for Section 106 and Section 4(f) survey, and Caltrans/SHPO concurrence
Air Quality	Regional assessment of air quality	Air Quality assessed on corridor level
Public Controversy	Tiering may reduce risks of tolling if public education campaign can gain support	If the public rejects the tolling concept on one corridor there is the risk of failure for other corridors

Notes: Table modified from the Atlanta Regional Managed Lanes System Plan, Georgia Department of Transportation, Office of Planning, January 2010

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APPENDIX K – RECOMMENDED EXPRESSLANES OPERATIONS AND POLICIES

Implementing a system of ExpressLanes requires a long-term commitment to operations and maintenance. While there is some level of overlap with the ongoing operations and maintenance of the general-purpose lanes, many issues are unique to maintaining reliability and travel speed benefits on the ExpressLanes. These elements include: toll equipment, systems, and enforcement; component and system maintenance; operations monitoring; and incident management.

At a minimum, the Metro ExpressLanes operations plan must include policies that establish processes for the following operational needs in order to meet Federal law:

- Enrolling customers in the electronic toll collection (ETC) program
- Automatically collecting tolls from customers
- Enforcing violations
- Varying the toll rate to manage demand
- Measuring, monitoring, and reporting system performance

The success of ExpressLanes depends upon the ability to closely monitor and manage demand and operations in order to maintain a high level of traffic service and reliability.

During the implementation of the I-110/I-10 ExpressLanes, Metro adopted a set of operations policies which have guided the operations and administration of the current ExpressLanes. The established ExpressLanes business rules include:

- Toll free travel for vehicles that meet minimum vehicle occupancy requirement, motorcycles, and privately operated buses; all existing carpools would continue to be able to access the lanes without charge.
- Trucks are not allowed (other than 2-axle)
- Minimum peak hour tolls shall be no less than 150 percent of Metro transit fare on the ExpressLanes
- Every vehicle is a customer. All vehicles are required to have a transponder.
- Toll/Transit Credits available to frequent ExpressLanes transit riders.
- Tolling will shut down (i.e., no toll users will be permitted to enter the ExpressLanes) when travel speeds fall below 45 mph for more than 10 minutes.
- Emergency vehicles may use the ExpressLanes at will when responding to incidents
- As the ExpressLanes program expands, the existing operations structure will need to be reevaluated for efficiency and effectiveness. Systems and policies that were established on a corridor basis may not work as well when expanded countywide. A concept of operations will be required for any ExpressLanes facility, starting at the planning stage, and will need to be updated as projects become more clearly defined. Moreover, existing policy requires that toll revenues must generally stay within the corridors that they were generated. However, in order for a system

of ExpressLanes to be feasibly implemented, the policy must be relaxed so that the pooling of toll revenues is permitted, so that initially opened projects can help finance the cost of subsequent corridors. Outlined below are specific actions and policy considerations that should be taken into account as Metro expands its ExpressLanes program. **Table 1** at the end of this section provides a summary of the recommended actions.

1 PERFORMANCE MEASUREMENTS

Federal law requires that ExpressLanes have clearly defined operational goals, and these goals drive performance monitoring programs to ensure that the performance of the lanes is not degraded. A facility is considered degraded when the average speed during the morning or evening peak periods is less than 45 mph for 10 percent or more of the time over a consecutive 180 day period.

Changes in operational strategies may be needed in order to meet state and federal performance standards, preserve service levels, or address other freeway performance issues.

In order to demonstrate that the I-10 and I-110 ExpressLanes meet Federal and local operational standards, the Metro Board approved the use of the following measures of effectiveness:

- Travel time savings
- Average vehicle speed
- Mode shift to carpool, bus, or vanpool
- Person throughput
- Transportation access for the low income commuter

An effective monitoring program is critical in demonstrating whether required performance standards are being met. At a minimum, roadway detection devices must be capable of collecting speed, volume, density, and throughput data on the ExpressLanes frequently and reliably. Two systems are generally used to assemble the needed data:

- **Toll Collection Systems**. The current Metro ExpressLanes are equipped with multiple tolling points where transponders are read and license plate images are captured. In addition to the toll point equipment, additional cameras and lane speed detection equipment is used to monitor travel conditions and set toll rates.

- **Traffic Monitoring Systems**. System detectors have also been installed in the ExpressLane corridors to detect speeds at designated locations. These sensors are wireless and transmit their data to roadside wireless access points.

- The toll collection system relies on an algorithm that evaluates operating conditions on the facility based on speeds and volumes and determines whether the toll rates need to be modified. In addition the algorithm its self may be modified along with other operating policies in order to ensure optimal performance. Potential actions to improve performance could include:

- Enhancing enforcement on the facility
- Modifying occupancy or vehicle exemption requirements for toll-free or discounted-toll usage
- Revising variable pricing schemes, including altering the toll rate structure and associated business rules

1.1 RECOMMENDATIONS

Recommendations regarding the establishment of a performance monitoring program for a county-wide ExpressLane network include:

- Adopting a clear set of performance measures for a countywide network, including specific targets for measures of effectiveness
- Evaluating toll rate performance for countywide network on a monthly basis
- Evaluating occupancy and vehicle exemption impacts for countywide network on a monthly basis
- Revising toll rate algorithms, occupancy requirements, and vehicle exemptions to maintain performance measures of effectiveness

2 EXPRESSLANES ADMINISTRATION AND OPERATIONS

The ExpressLanes on I-10 and I-110 are dynamically priced, using real-time volume and speed information from the corridors to vary the toll rates. Given the complexity of the system and the efficiency gained from marginal cost pricing, it is recommended that dynamic pricing be applied county-wide as the ExpressLanes network is expanded. While the price to use the ExpressLanes is set automatically by dynamic pricing algorithm; it can also be controlled manually from the toll processing center ("back office") at any time.

Electronic toll collection requires a significant amount of in-lane equipment, as well as a back-office operation to handle transactions, monitor traffic conditions, and manage the price algorithm to maintain ExpressLanes performance. The back office operation also processes tolls, issues invoices, collects payments, and maintains customer accounts.

The day-to-day operation of the I-110 and I-10 ExpressLanes is currently managed by a toll system operator (contracted to Xerox, as of May 2015) and overseen by the program manager (Jacobs, as of May 2015) together with Metro. The program manager provides day-to-day operating and maintenance (O&M) support services to Metro while the toll system operator is responsible for operating the toll collection system.

The Gardena Customer Service Center (CSC), is responsible for transponder distribution, outreach, accounting, traffic monitoring, mail processing and reporting. Toll Facility Operators monitor the operations between the a.m. and p.m. peak periods to ensure the dynamic price algorithm is operating

as expected and to respond to incidents. The operation is not staffed 24/7 but system support is provided 24/7 remotely by the toll system operator. Operators have access to corridor cameras, speed sensors, and tolling management software. They also have the ability to modify corridor pricing, manage incidents and coordinate with CHP and the Freeway Service Patrol.

As of May 2015, the actual back office systems for the ExpressLanes are located in Tarrytown, NY at a Xerox facility. These systems provide the core processing functionality of the tolling system, including the Transaction Database, User Account Database, Tag Database, Dynamic Pricing, Trip Building, Tolling System Management, CSC Interface, Public Website, Reporting, Financial Database, Maintenance and Operations Management system (MOMS), California Toll Operators Committee (CTOC) Transfers, Department of Motor Vehicles (DMV) Processes and User Access Control. Together these systems display price levels, bill customers, and provide the data required to operate the ExpressLanes to the required performance standards.

Violation images are captured via the License Plate Readers located at each tolling point and are processed by Optical Character Recognition (OCR) software. License plate images that do not meet a minimum threshold of confidence are sent to a Xerox facility in El Paso, Texas for visual review and are processed with the correct license plate number.

The current structure of a single vendor supporting all O&M services provides Metro with the advantage of only interacting with one vendor. That said, this structure may also create a series of potential risks with a county-wide ExpressLanes system:

- **Vendor Staffing**. The expanded ExpressLanes program may require additional staff. Although staffing requirements are not linearly scalable with the size of the ExpressLane system, there is a risk that a single vendor may not be able to provide staff to attend to all needs, including program management responsibilities. Having a responsive project manager will be essential in supporting an expanded network.

- **Single Vendor/Service Provider.** There is also the potential for a bias regarding areas of improvement with a single vendor. For example, if staff members have software and systems-oriented backgrounds, this may result in a natural bias for investing time and resources in systems and software activities. This perspective may be appropriate during the initial launch, but in the long term this must be evaluated relative to other supporting services, such as customer service improvements or marketing efforts, in order to optimize the use, effectiveness, and efficiency of the network.

In addition to vendor staffing, Metro ExpressLanes leadership and support resources should also be continuously reviewed. The current ExpressLanes staff is limited to a handful of individuals managing and maintaining a large program of services and vendor services. As the ExpressLanes program expands, Metro should invest in its human resources to develop qualified in-house staff to complement the use of vendors.

2.1 ADMINISTRATION AND OPERATIONS RECOMMENDATIONS

Recommendations regarding the administration and operation of a county-wide ExpressLane network include:

- Reevaluating having O&M contract with single vendor for countywide system
- Investing in in-house Metro staff to manage operations and administration

3 OCCUPANCY, TOLLING RATES, AND EXEMPTIONS

Maintaining the required throughput and travel time performance of the ExpressLanes requires the active management of all vehicles accessing the lanes. Experience over the past 18 years in California and states across the country have demonstrated that the use of variably-priced toll is an effective tool in metering the flow of traffic on priced managed lanes. Vehicles meeting vehicle occupancy requirements and those qualifying for other exemptions may use the lanes at no cost. Motorists in all other vehicles must pay the variably priced toll to use the lanes. Rates fluctuate in real time as congestion levels change. Motorists chose whether or not to use the lanes based on their own personal needs, the toll rate, and the level of congestion.

Metro currently permits toll-free travel for vehicles that meet the following criteria:

- **Eligible Carpools**. On the I-110 ExpressLanes, HOV-2+ (carpools with two or more people) are permitted to travel free of charge at all time. On the I-10 ExpressLanes, the minimum occupancy rate for toll-free travel is HOV3+ (three or more people) during peak periods between 5:00—9:00 a.m. and 4:00—7:00 p.m. Monday—Friday. HOV-2+ vehicles may travel on the lanes at no cost at all other times. These same occupancy requirements were used on the I-10 and I-110 HOV lanes before their conversion to ExpressLanes. However, following the conversion of the I-10 and I-110 managed lanes, all vehicles using the

The California Vehicle Code allows qualifying inherently low-emission vehicles (ILEV) –which are primarily zero-emission vehicles and certain alternative fuel vehicles, with decals issued by the Department of Motor Vehicles—to use HOV lanes regardless of their occupancy rate. There is no limit on the number of these white-colored decals issued to ILEVs, and the decals are valid until January 1, 2019.

In addition, vehicles that meet California's advanced technology partial zero-emission vehicle (AT PZEV) standard, which are generally plug-in hybrid vehicles, are eligible for green-colored decals. These green-colored decals are available to the first 40,000 applicants that meet the AT PZEV requirement and are valid until January 1, 2019.

The California Air Resources Board maintains the list of eligible vehicles for these programs. If the federal authorization allowing qualifying low-emission and energy-efficient vehicles is not extended past its current expiration date of September 30, 2017, these state programs would end at that time.

Given that they are not required to pay tolls, there is no mechanism to manage the use of the ExpressLanes by low-emission and energy-efficient vehicles. Extensive utilization of the ExpressLanes by these toll-exempt users would inevitably lead to increased levels of traffic and congestion in the lanes. Therefore, the region may wish to explore a policy that explicitly identifies the prioritization rating of AT PZEVs and energy-efficient vehicles relative to HOVs and other toll users.

ExpressLanes must have a FasTrak® transponder whether they pay a toll or not.

- **Motorcycles**. Motorcycles may use the ExpressLanes toll-free at all times and they are not required to carry a FasTrak® transponder.
- **Clean Air Vehicles (CAV)**. Vehicles meeting California's CAV program requirements (as established in the California Vehicle Code) may use the ExpressLanes at no cost. These vehicles must display a white or green CAV decals issued by the California DMV and they must also carry switchable FasTrak® transponder in the HOV-3+ occupancy setting.

The amount of available capacity for toll paying vehicles is driven by congestion in the parallel general purpose lanes and the number of qualified HOVs and exempt vehicles on a given ExpressLanes facility. The amount of available capacity for paying vehicles will vary by facility and may require tailored occupancy requirements, as demonstrated on the I-110 and I-10, in order to maintain required speeds during peak travel periods. Even so, performance degredation continues to be a risk during peak periods on Metro's exisitng ExpressLanes. This dynamic can be expected to occur on other corridors as they are added to the ExpressLane network in Los Angeles County.

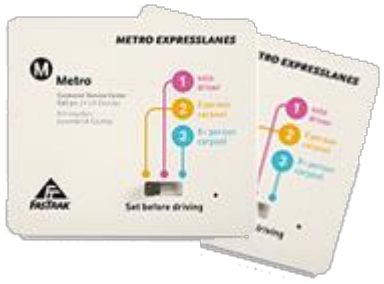
Metro's legislative authorization to toll the I-10 and I-110 ExpressLanes gives it the authority to set toll rates on the facilities. Metro has established a toll regimen for the I-110 and I-10 ExpressLanes that ranges from a minimum of $0.25 to a maximum of $1.40 per mile. California law requires Metro to conduct a public hearing 30 days prior to changing these parameters.

3.1 OCCUPANCY, TOLLING RATES AND EXEMPTIONS RECOMMENDATIONS

Recommendations regarding vehicle occupancy requirements, toll rates, toll exemption policies for county-wide ExpressLane network include:

- Consider raising the maximum toll rate to help better manage demand
- Continuously reevaluating HOV minimum occupancy requirements for toll-free travel in order to maintain performance targets
- Identifying throughput, travel time, and revenue objectives for each facility to help determine appropriate toll-free use policies
- Setting HOV minimum occupancy policies on a per facility basis rather than countywide, in order to optimize the performance of each ExpressLanes corridor
- Seeking exemptions to providing toll-free access to the ExpressLanes for Clean Air Vehicles

4 TOLLING TECHNOLOGY AND SIGNAGE



There are a number of different technologies that can be used to collect tolls from priced managed lane customers. These include legacy FasTrak® transponders, switchable FasTrak® transponders, and license plate tolling. In addition, the requirement for non-toll-paying vehicles to carry a switchable transponder could also be lifted. License plate tolling is not currently available on ExpressLane facilities in California ExpressLanes. However, the Transportation Corridors Agency (TCA) in Orange County does allow for post-trip toll payment through license plate image capture as a violation enforcement and mitigation mechanism.

It would be possible to introduce license plate tolling on the ExpressLanes in Los Angeles County as well as a registration requirement for toll-exempt vehicles (as is done in Miami, Dallas, and Atlanta). However, without a compelling reason to change from current procedures, the preferred approach is to require all vehicles traveling in the ExpressLanes during operational hours, including toll-free and toll-paying vehicles, to carry a FasTrak® transponder, with eligible toll-free vehicles to declare their occupancy rate using the switchable transponder. This process enables the toll system to distinguish between toll-paying and toll-free vehicles and use license plate recognition (LPR) cameras to capture license plate images of any vehicle not carrying a toll tag for violation processing. This approach also gives Metro with the option of migrating to a policy of charging all vehicles using the ExpressLanes using license-plate toll collection if desired.

The specific benefits of this approach include:

- Flexibility to respond to changes in operational policies based on HOV and toll vehicle demand
- Revenue could be enhanced by tolling HOV2+ vehicles during peak periods

Additionally, CTOC has recommended that future ETC installations in California utilize ISO 18000-6C protocol transponders. Switchable ISO 18000-6C transponders are being used in Colorado and Washington, but they are dual-phase transponders and do not provide an HOV3+ occupancy setting. Metro should monitor the development of ISO 18000-6C technology, as they are less expensive and are likely to be adopted at the national level in response to federal interoperability requirements included in MAP-21.

License plate tolling can supplement transponders and allow occasional customers who do not have a transponder to use the ExpressLanes. However, license plate toll transaction cost over 3.5 times that of transponder-based transactions due to image processing, DMV lookups, invoicing, and revenue loss associated with out of state plates. In order to compensate for these costs, other agencies have implemented a surcharge where vehicles without transponders are subject to a higher per transaction costs. Metro should also remain mindful of emerging technologies such as smart phone apps, etc. that could be used to pay tolls in the future.

Signage is also key issue for ExpressLane networks. The signage plans for I-110 and I-10 have worked well, but these are relatively simple facility with only two toll zones each. Signage for longer and more complex managed lane systems with intermediate traffic generators may require more complex signage, especially where these intermediate origins and destinations complicate the use of segmental pricing. Additionally, ExpressLanes networks that include facilities on in interconnected freeway corridors also pose challenges to delivering clear information to motorists on roadside signs. This challenge is exacerbated when connected facilities utilize different business rules. This situation has the potential to cause confusion at the point of policy divergence. Clear, concise signage will be essential to the success of an ExpressLanes network in Los Angeles County.

As Metro unrolls its ExpressLanes network, it will need to determine effective toll rates and provide timely information to motorists using standardized signage. . If variable pricing is to be successful in balancing demand with available ExpressLanes, then Metro must provide customers with clear information on the prevailing toll in advance of access points and then ensure that the price indicated is indeed what is charged.

ExpressLanes customers need to receive advance pricing information far enough upstream from access points that allows them to digest the information and make an informed decision whether or not to use the ExpressLanes. This information needs to be provided on roadside signage.

Consistency with the Manual on Uniform Traffic Control Devices (MUTCD) is of primary concern. A regional signage template is needed to provide consistent information on pricing, occupancy requirements, access and egress locations. This information can be provided using variable message signs, or integrated in pricing signage as an option that is currently deployed on the I-15 in San Diego.

4.1 RECOMMENDATIONS

Recommendations regarding tolling technology and signage include:

- Continuing to require switchable transponders for all ExpressLanes users, including HOV vehicles
- Continuing to use license plate imaging technology to enforced toll evasion for vehicles without transponder tags
- Exploring the costs and benefit of using license-plate tolling for secondary tolling, rather than as an enforcement mechanism
- Being mindful of emerging technologies such as smart phone apps and ISO 18000-6C tags, for collecting tolls and reevaluate applicability of new technology over time
- Developing signage consistent with MUTCD and norms across Los Angeles County

5 ENFORCEMENT

In Los Angeles, the enforcement of the ExpressLanes is currently regulated by the California Vehicle Code (CVC), and the CHP is the designated agency for enforcement action for vehicles on the

ExpressLanes Metro has a funding agreement in place to compensate CHP for its enforcement services. As the Metro ExpressLanes network is expanded, it will be necessary for Metro to revisit its agreement with CHP to ensure that the proper level of enforcement coverage is provided and that CHP is fairly compensated for its services.

The FSP is responsible for incident management on the ExpressLanes and provides dedicated tow trucks to clear disabled vehicles on the lanes in a timely manner.

For the purposes of ExpressLanes enforcement, violations are classified into three types: (1) toll violations, (2) eligibility violations and (3) buffer crossing violations. The requirement for eligible toll-free vehicles to declare their eligibility status via switchable transponder allows the toll system to automate the toll violation process. The CHP enforces eligibility violations, including violation of the occupancy requirements for toll-free travel, and buffer-crossing violations. Toll violations are automatically enforced through license plate recognition system. CHP officers are only expected to visually observe vehicles when alerted by enforcement beacons present in the ExpressLanes toll zones, which are triggered when a self-declared toll-free vehicle passes through the toll zone. Vehicles without a valid transponder read are handled via license plate recognition for matching the transaction to an account or for issuance of a toll violation.

In addition to current forms of enforcement, there are two emerging technologies to detect and communicate the number of occupants in a vehicle that may emerge over the next decade. The first is infrared cameras capable of detecting the number of people in a vehicle. This mechanism has been developed by multiple vendors, including the current ExpressLanes toll operator (Xerox), and is currently undergoing field tests throughout Southern California. The second mechanism is interrogation via an on-board unit (OBU) to get occupancy based on seat detectors in the vehicle, a component of Connected Vehicle improvements under development by the USDOT Connected Vehicle Pilot Program. OBU's are used in newer vehicles to control airbag operations, seat belt warnings and other functions.

Fully automated enforcement for occupancy has not been deployed to date in any express lanes and there are a number of obstacles that must be overcome, including validity in court, privacy concerns and accuracy. Even though automated occupancy detection may not be used for violations, it may provide helpful information for Metro on performance monitoring and reporting.

5.1 RECOMMENDATIONS

Recommendations on enforcement for the ExpressLanes network include:

- Maintaining current enforcement procedures for toll, occupancy, and buffer crossing violations
- Expanding enforcement and incident management agreements with CHP and FSP for the build out of the ExpressLanes network
- Monitoring development of automated occupancy enforcement systems and identifying opportunities for testing on the Metro ExpressLanes system

- When deemed ready, deploying automated occupancy enforcement systems as appropriate for performance monitoring and/or occupancy violations

6 CUSTOMER SERVICE

Customer service for ExpressLanes users is provided on-line and at two customer service centers located in Gardena and El Monte, California. Services include opening accounts, paying violations, adding value to accounts and resolving disputes. In addition, there is a phone-based customer service center in Sandy, Utah. Phone calls are routed through the LA 511 Interactive Voice Response System. The systems and staff for customer service not only monitor account activity and address customer concerns, but also provide an opportunity to market and expand the use of switchable FasTrak® transponder tags.

6.1 RECOMMENDATIONS

Recommendations for customer service include:

- Evaluating the need for expanded in-person customer service locations throughout Los Angeles County to correspond locations with ExpressLanes network
- Evaluating the possibility of broker models, using the eight transportation management associations as a base for in-person customer service in lieu of expanded locations
- Establishing a centralized regional customer service center to accommodate the Metro ExpressLanes network

7 NET TOLL REVENUES

The *ExpressLanes Guidelines for Net Toll Revenue Allocation* was adopted by the Metro Board in October 2013. The purpose of this policy is to guide the reinvestment of net toll revenues generated by the I-10 and I-110 ExpressLanes beyond what is needed to cover direct expenses related to the maintenance, administration, and operation, including marketing, toll collection, and enforcement of the ExpressLanes. Per California State law, direct expenses shall not exceed three percent of gross revenues and all remaining revenue generated must be used in the corridor from which the revenue was generated. Using State law as the basis, the reinvestment guidelines are:

- Establish a reserve fund of 3-5 percent, consistent with the Board Approved Toll Policy to ensure financial sustainability of the Metro ExpressLanes;
- Direct allocation of revenue to fund the incremental transit service implemented to support the deployment of the Metro ExpressLanes. The incremental services include Metro Silver Line, Foothill Silver Streak, Foothill Route 699, Gardena Line 1, and Torrance Transit Line 4;

- Net of set-asides identified above, establish allocation targets of 40 percent for other transit uses, 40 percent for system connectivity/active transportation, and 20 percent for highway improvements to support sustainable transportation strategies; and,
- Leverage net toll revenues with other funding sources and require a maintenance of effort, consistent with Metro's other discretionary grant programs.

As the ExpressLanes program is expanded countywide, there is a potential opportunity to share revenue across corridors. Some corridors may not be independently financially viable (due to higher construction costs or lower levels of congestion) but yet still provide regional interconnectivity and mobility benefits. The ability to share resources within the program would enable the development of a more robust and beneficial ExpressLanes network. This approach would allow ExpressLanes program revenues to be used to fund the development of new ExpressLanes corridors, as well as the ongoing operating and maintenance expenditures associated with existing ExpressLanes facilities.

7.1 RECOMMENDATIONS

Recommendations on the use of net toll proceeds include:

- Establishing ExpressLanes program revenue expenditure plan that would allow revenue to spent across Metro ExpressLanes corridors
- Exploring impacts of ExpressLanes program revenue sharing on Metro transit systems

8 LOW INCOME AND EQUITY PROGRAMS

The first program of its kind in the nation, the Metro ExpressLanes' Low-Income Assistance Plan (formerly called the Equity Plan) provides a discount to qualifying LA County residents who sign up for a Metro ExpressLanes account. Low-Income Assistance Plan account holders receive a $25 discount when they sign up, and also have their $1 monthly maintenance fee waived. The sign-up discount can either be applied to the customer's transponder deposit, or to their pre-paid toll deposit.

Metro ExpressLanes customers must live in Los Angeles County and have an income that is no greater than twice the federal poverty level ($40,180 for a family of 3) to be eligible for the Low-Income Assistance Plan. To sign up for the Low-Income Assistance Plan, customers must demonstrate their eligibility by providing a pay check stub or tax return, or proof that they receive public benefits, MediCal coverage, or Los Angeles Unified School District Lunch support, or are an electronic benefit transfer (EBT) user. Low-Income Assistance Plan discounts are limited to one per household. As of September 2014, there are 5,296 Low-Income Assistance Plan accounts and $132,400 in toll credits have been issued.

As the ExpressLanes network is expanded, concerns regarding equitable access to regional mobility benefits provided by the network can be expected to grow. The Low-Income Assistance Plan is a low-cost, high-impact strategy for maintaining access to the ExpressLanes network for lower income users especially when combined with meeting occupancy requirements for toll-free use.

8.1 RECOMMENDATIONS

Recommendations on low income and equity programs include:

- Continuing the Low-Income Assistance Plan
- Expanding marketing and education of the Low Income Assistance Plan to targeted communities, based upon corridor implementation

9 OCCUPANCY TRANSITION POLICY

Currently, many HOV lane facilities in Los Angeles County experience varying degrees of performance degradation during peak hours. Performance degradations are documented in the *2013 California High Occupancy Vehicle Lane Degradation Determination Report* published by Caltrans, which indicates that almost one-third of all HOV lanes- in Los Angeles County are degraded. In the future, as HOV demand continues to increase and as the ExpressLanes allow additional vehicles on the managed lanes, the need to increase HOV occupancy requirements on congested segments will become more acute.

It is expected that the growth in HOV-2 demand over time on existing Metro HOV lanes will cause operating conditions to fall below the minimum 45 mph operating speed threshold specified in Section 166 of Title 23 of the United States Code. This minimum average operating speed applies to any HOV facility that allows an exemption for vehicles that do not meet the occupancy requirement, including ExpressLanes with paying vehicles and HOV lanes that allow low emission vehicles. MAP-21 identifies strategies to bring a facility that falls below the minimum operating threshold into compliance. These include increasing the HOV occupancy requirements, varying tolls to reduce demand, reducing the number of violators, discontinuing access exemptions for non-HOV vehicles, or adding additional lanes.

While increasing the occupancy rate from HOV2+ to HOV3+ on congested HOV facilities will resolve the issue of degradation, it will introduce other operational concerns. Because there are typically far fewer vehicles with 3 or more occupants, an HOV3+ occupancy requirement would result in significant underutilization without allowing paying non-HOV vehicles to use the managed lanes. The conversion of HOV lanes to ExpressLanes operation allows the unutilized capacity on the ExpressLanes to be used by toll paying vehicles (including HOV2+).

Changes to the HOV occupancy requirements are evaluated by Metro, Caltrans District 7, and CHP. An increase in the occupancy requirement will need to be supported by an analysis of operational and community impacts. With the implementation of ExpressLanes, any operational impacts associated with an increase in the HOV occupancy requirement (i.e., shifting vehicles into the general purpose lanes) would be mitigated by variably priced tolls which would ensure that the lanes do not become over utilized.

Depending on future HOV demand levels, it may be advantageous to increase occupancy requirements to HOV-3+ during peak periods only when HOV demand is highest, as is currently done

on the I-10 corridor. During off-peak periods, the HOV requirement could revert to HOV-2+ to continue providing an incentive to carpool, even during less congested times of day. Under this scenario, HOV-2 vehicles could also be charged a reduced toll, based on market demand, as evaluated by Metro. National research has found that differential HOV access by time of day may be preferable to the public than an across-the-board increase in occupancy requirements from HOV2+ to HOV-3+.

9.1 RECOMMENDATIONS

Recommendations on occupancy transition policy include:

- Establishing an HOV-3+ toll-free policy throughout Los Angeles County for all ExpressLanes and HOV lanes during peak periods
- Evaluating the possibility of reverting to HOV-2+ toll-free policies during off-peak periods for individual corridors whose performance would not be exacerbated by such allowance
- Evaluating the possibility of a differential toll rate for HOV-2's (as compared to SOV's) as continued incentive to carpool

10 TRANSIT INTERCONNECTIONS

Because the Metro ExpressLanes program is designed to 'move more people, not more cars,' the ExpressLanes has incorporated multiple strategies to improve and promote transit service and transit facilities along the I-10 and I-110 corridors. One of these strategies is the Transit Rewards Program, which allows Metro ExpressLanes customers to earn toll credits by riding transit on the ExpressLanes. Using their registered Transit Access Pass (TAP) card, transit riders earn a $5 toll credit for every 32 one-way trips taken during peak hours on transit lines along the I-110 Harbor Transitway or I-10 El Monte Busway. The toll credits can then be used to pay tolls on the Metro ExpressLanes. The Rewards Program is the first of its kind in the transit and toll industry. It has also been replicated in Atlanta, Georgia, which features another HOV-3+ express lane.

National research has indicated that drivers willing to use transit do so irregularly. As such, they sometimes drive and they sometimes use transit. In order to encourage greater use of transit, this program provides an incentive for modal behavior change while minimizing the cost to Metro.

10.1 RECOMMENDATIONS

Recommendations on transit incentives include:

- Continuing the Transit Rewards Program
- Expanding marketing and education of the Program to targeted markets, based upon corridor implementation

11 MARKETING AND BRANDING

By many measures, the Metro ExpressLanes public education, outreach and marketing efforts have been found to be successful and provide guidance for future ExpressLanes marketing and branding efforts.

Early in the ExpressLanes Program, a Public Outreach and Communications Plan was put in place to offer a systematic and strategic approach for reaching diverse groups of people and interests throughout the I-10 and I-110 corridors. The Plan provided a structure that allowed for the scheduling, documentation and evaluation of each step in the public involvement process. The concerns, issues, creative ideas and needs of community members informed the outreach effort throughout the course of the demonstration project.

The purpose of the initial public outreach effort was threefold:

- To provide the public multiple opportunities to review the proposed options, the implications of the options, and alternative implementation approaches for the Demonstration Project
- To create and distribute public information packages using a multi-media approach that is user friendly and culturally sensitive to the communities affected by the program
- To provide policy makers with information about the public's opinion about the options

The plan incorporated a number of strategies aimed at encouraging community participation through proactive engagement of business, civic and other stakeholder groups, including elected officials. Metro also held regularly scheduled project open houses and community briefings that allow interested stakeholders to receive the latest project information. It also developed an interactive project website; conducted regular media updates; and maintained an ongoing presence at community events. These forums provided multiple venues for Metro to receive input from the public.

In addition, the Metro has offered rewards to customers who choose to carpool on the lanes. Whenever a Metro ExpressLanes account holder carpools on the ExpressLanes, they are entered into a monthly drawing for a chance to win gift card rewards. Each month, forty winners are selected from the pool of carpoolers, with 10 HOV-2 winners for each corridor, and ten HOV-3+ winners selected from each corridor. Two-person carpools receive $20, and carpools of three or more people receive $30 in the form of Visa gift cards. Alternatively, winners may also opt to receive toll credits instead. As of January 2015, Metro has awarded $2,500 through this program.

Review Efficacy of Past Outreach, Marketing, and Education Efforts

As the ExpressLanes program expands into other corridors, it will be important to understand where the marketing and outreach has been successful so Metro can build on that legacy and avoid repeating less successful tactics.

Prior to expanding the ExpressLanes program, past outreach, marketing and education efforts should be assessed. This can be done by analyzing performance data, reviewing media and coverage, talking

with key Metro staff involved in the efforts, and analyzing the voluminous comments received from the public over the past several years.

Having an understanding of what the issues and successes were before, during and after ExpressLanes opened will prepare Metro for what to expect as the ExpressLanes program expands.

Continue ExpressLanes Brand

The current Metro ExpressLanes Program brand should be continued as new ExpressLanes corridors are added. However, each new corridor that comes online will need its own marketing, community outreach and public education campaign. Past efforts will provide the template for what should be undertaken in future corridors.

Metro should also update its ExpressLanes website and social media feeds as new facilities are added to the network.

MAP-21 has mandated electronic toll collection interoperability by October of 2016.

Maintaining Customer Loyalty and Enhancing Customer Service

Maintaining customer loyalty and enhancing customer service should be a priority as the ExpressLanes network is expanded. This will require:

- Constant communication with the customers
- Maintaining an ExpressLanes website providing updated information on traffic status of the lanes and account information, as well as customer service centers and multiple online and retail locations where new customers can sign for FasTrak accounts
- Continued use of focus groups, polling and surveys

Evolving Outreach Strategies

As the ExpressLanes program expands, Metro should assess how its customers will want to receive information on the program. This should include exploring mobile applications, real-time traffic advisories specific to ExpressLanes, and expanding social media channels and forums.

11.1 RECOMMENDATIONS

Recommendations on marketing and branding include:

- Review efficacy of past outreach, marketing, and education efforts
- Continue ExpressLanes brand
- Maintain customer loyalty and enhance customer service
- Evolve outreach strategy

12 INTER-COUNTY COORDINATION

The design of Metro's ExpressLanes program differs from others in adjacent counties (e.g., SR-91) in significant ways. These include its use of switchable transponders for HOV declaration, dynamic pricing that is based on real-time traffic conditions, and a policy that differentiates between HOV-2 and HOV-3+ during peak hours. Harmonizing these policies and operations with other connecting facilities will be a necessary step for enabling a seamless regional travel experience for the regional HOT lane user.

In the broader Los Angeles/Orange County region, there are three separate tolling operations: Orange County Transportation Authority (OCTA) 91 Express Lanes, Transportation Corridor Agencies (TCA), and Metro ExpressLanes. Each of these facilities has separate customer service locations and customer facing outreach operations. Given the nature of transportation in Southern California, there is a high likelihood that customers from one of these facilities would at times make use of one of the other facilities. This creates a potential for user confusion given the multiple faces of tolling and operations within the region. One approach to mitigate this issue would be to implement a unified customer service facility or operation such that from a customer point of view interface to the various tolling facilities is via a single interface. A single customer service center (CSC) could also result in cost efficiencies for all of the agencies involved such that a single entity is in place to support customer interaction and account services. Similar systems have been successfully implemented in the Bay Area where a single regional facility services multiple tolling facilities utilizing different toll technologies.

Even outside of a full integration, usage of existing services, such as 511, to provide this level of interface is possible. For the Metro ExpressLanes, the interface to the CSC is via the 511 phone system which also happens to serve Orange County. Providing hand off to both the 91 Express Lanes and TCA phone systems from within the 511 system would begin to create a more unified customer experience while also providing natural outreach support for ExpressLanes and the 511 service itself.

California state law requires that the switchable FasTrak transponders are compatible with all toll facilities statewide. The tolling industry, both vendors and operators, have been in the process of selecting a standard to meet this requirement. Considerable time and study on both the policy and technical issues of this transition has taken place and appropriate staff resources should be provided to monitor and participate in these discussions as these decisions will impact current operations, deployed hardware, and future improvements.

Metro has interoperability agreements with each California Toll Operators Committee (CTOC) agency—BATA (Bay Area Tolling Authority), TCA, OCTA, SBX (South Bay Expressway), and SANDAG (San Diego Association of Governments). These agreements enable Metro FasTrak account holders to use their transponders when traveling on facilities operated by those agencies.

12.1 RECOMMENDATIONS

Recommendations for inter-county coordination include:

- Exploring the possible use of a single customer service center for all ExpressLanes facilities in greater Los Angeles
- Integrating customer service with the existing 511 service
- Continuing ongoing interoperability efforts

TABLE 1: RECOMMENDED ACTIONS SUMMARY

	Policy and Operational Recommendations
Enabling Legislation	• Seek an extension to AB 1467 • Support AB 194
Procurement	• Consider alternative delivery approach to accelerate project implementation
Environmental Clearance	• Tiered environmental clearance for countywide network
Performance Measures	• Adopt a clear set of performance measures for a countywide network, including specific targets for measures of effectiveness • Evaluate toll rate performance for countywide network on a monthly basis • Evaluate occupancy and vehicle exemption impacts for countywide network on a monthly basis • Revise toll rate algorithms, occupancy requirements, and vehicle exemptions to maintain performance measures of effectiveness
Administration and Operations	• Reevaluate O&M contract with single vendor for countywide O&M • Invest in in-house Metro staff to manage operations and administration
Occupancy, Tolling Rates, and Exemptions	• Continuously reevaluate HOV minimum occupancy requirements for toll-free travel in order to maintain performance targets • Identify throughput, travel time, and revenue objectives per facility to help determine appropriate toll-free (unmetered) use policies • Set HOV minimum occupancy policies on a per facility basis rather than countywide, so as to maximize the performance of the ExpressLanes • Seek exemptions from providing toll-free (unmetered) access to the ExpressLanes for Clean Air Vehicles
Tolling Technology and Signage	• Continue with mandatory switchable transponders for ExpressLanes use • Continue with violation enforcement of non-tagged vehicles via license plate imaging systems • Explore the cost-benefit of using license-plate tolling for secondary tolling, instead of an enforcement mechanism. • Be mindful of emerging technologies such as smart phone apps and ISO 18000-6C tags, for collecting tolls • Use signage consistent with MUTCD and across Los Angeles County
Enforcement	• Maintain enforcement procedures for toll, occupancy, and buffer crossing violations. • Expand enforcement and incident management agreements with CHP and FSP for the build out of the ExpressLanes network • Monitor development of automated occupancy enforcement systems and identify opportunities for testing on the Metro ExpressLanes system • When deemed ready, deploy automated occupancy enforcement systems as appropriate for performance monitoring and/or occupancy violations

	Policy and Operational Recommendations
Customer Service	• Evaluate the need for expanded in-person customer service locations throughout Los Angeles County to correspond locations with ExpressLanes network • Evaluate the possibility of broker models, using the eight transportation management associations as a base for in-person customer service in lieu of expanded locations • Establish a centralized regional customer service center to accommodate the Metro ExpressLanes network
Net Toll Revenues	• Establish ExpressLanes program revenue expenditure plan that would allow revenue to spent across Metro ExpressLanes corridors • Explore impacts of ExpressLanes program revenue sharing on Metro transit systems
Low Income and Equity Program	• Continue Low-Income Assistance Plan • Expand marketing and education of the Plan to targeted communities, based upon corridor implementation
Occupancy Transition Policy	• Establish an HOV-3+ toll-free policy throughout Los Angeles County for all ExpressLanes and HOV lanes during peak periods. • Evaluate the possibility of reverting to HOV-2+ toll-free policies during off-peak periods for individual corridors whose performance would not be exacerbated by such allowance • Evaluate the possibility of a differential toll rate for HOV-2's (as compared to SOV's) as continued incentive to carpool
Transit Interconnections	• Continue Transit Rewards Program • Expand marketing and education of the Program to targeted markets, based upon corridor implementation
Marketing and Branding	• Review Efficacy of past outreach, marketing, and education efforts • Continue ExpressLanes Program Brand • Maintain customer loyalty and enhance customer service • Evolve outreach strategy
Inter-County Coordination	• Coordinate and share excess revenue where facilities meet at the county line and there are benefits that cross county lines

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