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Metropolitan Transportation
Authority
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Los Angeles, CA

Metro

Board Report

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AD HOC CONGESTION, HIGHWAY AND ROADS COMMITTEE
JANUARY 16, 2019

SUBJECT: I-10 EXPRESSLANES BUSWAY PILOT PROGRAM

ACTION: APPROVE RECOMMENDATION

RECOMMENDATION

AUTHORIZE the development of an implementation plan for the I-10 ExpressLanes Pilot Program.

ISSUE

This report is in response to Director Fasana's April 2018 Motion 43 amended by Director Solis (Attachment A), requesting that Metro staff work with Caltrans and other stakeholders to develop a pilot exclusively for the I-10 ExpressLanes that increases toll free occupancy requirements from HOV2/HOV3 to vanpools and transit, as a means of preserving the ExpressLanes as a fast, reliable travel option for transit users and all corridor travelers. The Motion requested that Metro Staff report back on:

1. Potential effects of implementing this pilot;
2. Key decision points and milestones for implementation; and
3. Solicitation of feedback and evaluation of potential impacts associated with this pilot, with focus on low-income commuters.

Please note that the Board Motion also mentioned outreach to SCAQMD, but in subsequent conversations with the Board Motion contributors' staffs, this was determined to have been included in error.

BACKGROUND

Historical Perspective
The I-10 ExpressLanes facility was originally built as a busway, and was subsequently opened to HOV3+ traffic for a limited period during a bus strike in 1974. The busway was formally opened to HOV3+ in 1976 to further reduce congestion on the freeway corridor. The ExpressLanes adopted existing occupancy requirements of HOV3+ during peak periods and HOV2+ during the off-peak at the time of opening.

Performance Challenges
The success of the ExpressLanes has resulted in increases in volume year over year since program inception in 2013. A more detailed look at the data for the I-10 reveals that in fiscal year 2018, there were over 15.9 million trips on the I-10 ExpressLanes-a 4.7% increase over the previous year and a 58% increase since 2014. Concurrently, morning commute

speeds have decreased by 12.5% between 2013 and 2018. When traffic density increases to the point that speeds fall below 45mph, the system goes into HOV-Only mode and only HOVs are allowed to enter the ExpressLanes. From 2014 to 2017, HOV-Only time increased by 250% before falling by 14% in 2018.

While the 2018 ExpressLanes Operations Performance Report indicates that 41% of the users of the I-10 ExpressLanes were HOV3+, that data is based on self-declaration. However, based on independent mode-split measurements conducted by Metro in 2018 and the most recent Caltrans Managed Lanes Report, mode split on the I-10 ExpressLanes during peak periods (as measured east of I-710) is:

- Single Occupant Vehicles: 65%
- Carpools with 2 persons: 20%
- Carpools with 3 persons: 4%
- Carpools with more than 3 persons: Less than 1%
- Vanpools: 2%
- Buses: 4%
- Clean Air Vehicles (may include above vehicle types as well): 6%

This data confirm the fact that a sizable proportion of ExpressLanes users mis-represent vehicle occupancy during peak, resulting in increased congestion in the ExpressLanes and increased tolls for those who are accurately reflecting vehicle occupancy.

Travel time reliability for transit vehicles on the I-10 ExpressLanes has also diminished in recent years, impacting on-time performance. Metro operations have had to modify the Silver Line schedules by including additional travel time to maintain a schedule that meets passenger demand. Up to 19% of Foothill Transit buses on I-10 operate behind schedule (varies by month), with the Silver Streak buses delayed by an average of 10 minutes during the AM Peak Hour (8-9 AM).

Enforcement Challenges
There are also enforcement challenges associated with the current exemption of HOV2 and HOV3+ travelers from tolls. This has resulted in a proportion of users on the I-10 ExpressLanes mis-representing their occupancy levels with the intent of improperly obtaining toll-free passage. When travelers mis-represent their vehicle occupancies, it undermines public trust in the ExpressLanes and constrains the ability to effectively manage demand and congestion in the lanes, as discussed in greater detail in Attachment B. While current CHP enforcement and technological solutions under development can be used to discourage this behavior, both of these strategies have limitations.

This proposed pilot is expected to mitigate this source of toll leakage and to therefore enhance fairness/equity across all users, as a product of:

- fewer opportunities for occupancy mis-representation therefore preventing toll rates from being inflated by SOVs declaring as HOVs,
- greater ease of enforcement, and
- a diminished dependency on occupancy detection systems.

DISCUSSION

Increasing the HOV threshold to the Original Requirement

Increasing the HOV occupancy requirement will align with the original intent/spirit of the ExpressLanes/Busway, and will help to mitigate the overutilization of existing ExpressLanes, particularly where capacity is more constrained (e.g., the one-lane segments of the I-10 ExpressLanes). Managing demand by raising HOV minimum occupancy requirements is supported by Caltrans and permitted per Title 23 Section 166 of the U.S. Code as a congestion mitigation strategy.

In response to the motion, this section includes discussion of the following: (1) Potential mobility effects, (2) Low-income commuter surveys, and (3) Inclusion of HOV5+ vehicles for toll exemption.

The key decision points and necessary milestones for implementing this pilot are: (1) obtaining concurrence from Caltrans and FHWA, (2) collecting and analyzing data needs, and (3) developing a formal implementation plan.

In an effort to assess the preliminary impacts of the proposed pilot, staff performed a micro-simulation analysis, conducted a survey of low-income commuters and evaluated the viability of toll free passage for vanpools.

Potential Mobility Effects of Implementing this Pilot

Using an integrated combination of simulation analysis, travel demand modeling, and dynamic toll modeling, the potential mobility impacts of this pilot program were evaluated. At this early stage, these should be interpreted as sketch-planning level results only. This operational impact analysis considered the AM Peak (6-9 AM) and PM Peak (4-7 PM) periods of a typical business day. Detailed analysis results are provided in Attachment B.

ExpressLanes-Specific Mobility Outcomes

- Increase in daily peak period person throughput by 600 persons (a 4% increase from current ExpressLanes throughput).
- Changes in average end-to-end travel times as follows:
    - Increase in Westbound AM Peak by 0.3 minutes.
    - Decrease in Westbound PM Peak by 0.1 minutes.
    - No change to Eastbound AM Peak
    - Increase in Eastbound PM Peak by 1.8 minutes due to queueing at the east end where the ExpressLanes merge back into the general-purpose lanes.
- Increase in average delay cost to ExpressLanes users of $0.18 per person-trip. This is a result of some queueing at the end of the ExpressLanes where they merge back into the general purpose lanes.
- Transit impacts were found to be negligible with respect to average travel time performance. Because simulation models are not designed to directly capture reliability impacts, these could not be evaluated.

General Purpose Lane Mobility Outcomes

- Overall increase in average end-to-end travel times by four minutes. Currently corridor-wide travel times rise above their average levels by as much as 26 minutes from day to day during peak periods due to random variations in traffic. When focusing specifically on the PM Peak eastbound direction, the average projected travel time increase is 21 minutes.

Corridor-wide Mobility Outcomes

- Overall mobility benefit of approximately $3.7 million per day in time/delay cost savings corridor-wide.
- Provision of a more long-term sustainable toll strategy that is less susceptible to congestion-especially congestion caused by vehicles that mis-represent occupancy.

Interpretation

This pilot could potentially achieve the stated goals of reducing ExpressLanes travel times for transit and is anticipated to increase person throughput. The new proposed toll policy also affords other tangible mobility benefits that, while outside the scope of the current analysis, are important to note qualitatively:

- Substantial improvement in travel time reliability when using the ExpressLanes, as the modification of criteria for toll-exempt trips would allow the toll system to manage congestion far more effectively. Travel time reliability is a measure of the predictability and consistency of travel times on the corridor. As travel time reliability improves, travelers benefit by not having to include as much schedule buffer in their travel plans.

- Faster response times for emergency vehicles and Freeway Service Patrol vehicles, which results in faster clearing of incidents and reduced delays.
- Minimizing opportunities for mis-representation of occupancies to avoid payment.

Low-income Commuter Surveys

The 2018 ExpressLanes Customer Survey found the majority of respondents did not support changes to the current toll structure on the I-10 ExpressLanes, though 25% of survey respondents expressed interest in joining vanpools if that were required for toll-free travel. It should be noted that this survey was distributed to current customers only, and is not necessarily a representative sample of all corridor users.

At outreach events targeting low-income commuters along the corridor, feedback was collected from 479 participants regarding the changes being proposed under this pilot. The researchers attempted to target participation by various ethnic groups according to the racial distribution of the population around I-10. ExpressLanes users constituted 51% of the survey sample and completed an average of 3.8 trips per week on the I-10 ExpressLanes. The major findings were:

- Very few have ever used a vanpool on the I-10 ExpressLanes.
- Approximately 41% of current ExpressLanes users would continue to use the ExpressLanes alone or as a carpool while 23% would shift to general purpose lanes under the proposed policy.
- Approximately 56% of non-ExpressLanes users would continue to use the general purpose lanes while 18% would shift to the ExpressLanes under the proposed policy.

Inclusion of HOV5+ Vehicles for Toll Exemption

Federally registered vanpool programs require that the vehicle itself be leased from the program by one of the occupants for reporting and tracking purposes, and that the vehicle have a minimum seating capacity of 7 persons (minimum occupancy requirements vary by program). This requirement can be a deterrent to participation. As a result, Metro ExpressLanes staff is recommending an alternative approach wherein toll-free travel is offered not only to registered vanpools, but also to any vehicles carrying enough passengers to have otherwise qualified as a vanpool based on occupancy.

Based on a review of other ExpressLanes facilities across the country which offer toll-free passage to vanpools, staff found that the majority of the surveyed facilities had a minimum vanpool occupancy requirement of 5 persons. Attachment B provides additional information regarding the treatment of Vanpools in other ExpressLanes facilities throughout the country. Therefore, staff recommends that the occupancy threshold for toll-free passage be set to 5 persons per vehicle.

Key Decision Points and Necessary Milestones for Implementing this Pilot

This section outlines major milestones and key decision points associated with further advancing and implementing this policy, along with progress made in each of these areas to date.

Obtain concurrence from Caltrans and FHWA
Caltrans District 7 indicated support for an HOV5+ occupancy requirement for toll-exempt travel on the I-10 ExpressLanes from the outset. Metro and Caltrans worked collaboratively to submit a formal request from Caltrans seeking FHWA's concurrence regarding the proposed policy change. FHWA recently approved implementation of a pilot program with the condition of submittal of an Implementation Plan for their review prior to deployment. Additionally, FHWA requested inclusion of a before/after study as well as involvement in public outreach activities associated with the pilot.

Additional Data and Analysis
Additional data collection and analysis is needed to support the successful planning and implementation of this pilot. The anticipated timeframe for completing this milestone is Fall 2019. This would include:

1. a more detailed examination of the potential effects of this policy on transit operations;
2. additional market research regarding barriers to toll lane, transit, and vanpool usage among commuters, including

economically disadvantaged stakeholders;
3. a more detailed examination of impacts of the policy on ExpressLanes usage by low-income customers; and
4. a comprehensive assessment of the optimal method for incentivizing HOV5+ and vanpool formation, and for handling the associated toll exemptions through a third party provider.

Develop a Formal Implementation Plan
Results from the additional data collection and analysis activities will inform the development of a more robust, comprehensive implementation plan with additional specificity regarding the various aspects associated with deployment of this pilot project. The anticipated timeframe for completing this milestone is 12-15 months. The implementation Plan would be submitted for approval by FHWA. The plan would include:

- identifying any additional resources required for successful implementation including operational, public engagement/educational, and staffing.
- a detailed cost estimate and schedule,
- a strategy for third-party mobile app integration with the ExpressLanes Back Office System to confirm occupancy and designate toll-exempt trips,
- a comprehensive outreach and education plan, and
- a detailed framework for the Before/After Study.

IMPLEMENTATION OF STRATEGIC PLAN GOALS

The FY18 I-10 ExpressLanes Pilot Program aligns with Strategic Goal 1: Provide high quality mobility options that enable people to spend less time traveling. ExpressLanes provides drivers with the option of a more reliable trip while improving the overall operational efficiency of the freeway network.

FINANCIAL IMPACT

Funding for support activities including collaborating with other transit providers, conducting additional market research, further assessment of low-income customer impacts, performing additional investigation into optimal methods for handling vanpool/higher occupancy carpool toll-free passage as well as development of an implementation plan is anticipated to be $1.4 million. Funds to initiate these efforts are available in the FY19 budget in cost center 2220. Because this is a multi-year program, the cost center manager and the Executive Officer of the Congestion Reduction department programs will be responsible for budgeting for future years.

Impact to Budget
The funding for this action will come from toll revenues generated from the Metro I-10 ExpressLanes operations. No other funds were considered for this activity.

ALTERNATIVES CONSIDERED

The Board could choose not to implement the pilot. This alternative is not recommended since, based on current analysis, the pilot can increase overall person throughput, assure travel time reliability for transit vehicles, and address current enforcement challenges related to scofflaws, revenue leakage and HOV only minutes.

NEXT STEPS

Upon Board approval, staff will continue development of the I-10 ExpressLanes Pilot Program through the following steps: 1) Begin data collection and establish Before/After Study criteria, 2) Utilize existing consultant resources to conduct market research inclusive of low income communities, 3) Prepare statement of work for development of the implementation plan including a public outreach/education and marketing research plan, staff resources, identification of necessary changes to the back office and roadside systems and signage, and development of program cost estimates; and 4) return to the Board as necessary regarding progress.

ATTACHMENTS

Attachment A - Motion 43
Attachment B - I-10 ExpressLanes/Busway Pilot Preliminary Assessment

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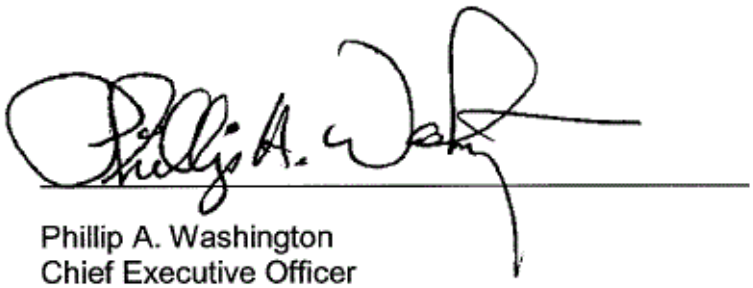

Phillip A. Washington
Chief Executive Officer

ATTACHMENT A

File #: 2018-0195, **File Type:** Motion / Motion Response **Agenda Number:** 43.

REGULAR BOARD MEETING
APRIL 26, 2018

Motion by:

Director Fasana

as amended by Solis

I-10 ExpressLane/Busway Pilot

The I-10 El Monte Busway opened in 1973 as an exclusive busway with stations at El Monte, California State University at Los Angeles, and Los Angeles County USC Medical Center. The El Monte Bus Station, rebuilt and reopened in 2012, is the busiest bus terminal west of Chicago.

Construction of the busway resulted in substantial increases in bus service along the corridor. According to a study by FHWA conducted in 2002, “Executive Report Effects of Changing HOV Lane Occupancy Requirements: El Monte Busway Case Study”, from 1973 to 1976, the number of buses using the lane in the morning peak-hour, peak-direction of travel increased from 21 to 64, with a corresponding increase in passengers from 766 to 3,044. Daily bus ridership levels increased from 1,000 to 14,500 passengers during the same period.

Three-person carpools were allowed to use the Busway for three months in 1974 during a strike by bus operators. The Busway was opened to 3+ carpools in 1976. At the time of conversion to an ExpressLane in 2013, the Busway operated at HOV 3+ during peak hours and HOV 2+ off-peak.

The I-10 Busway / HOV lane is being extended by Caltrans and Metro to the Los Angeles County Line, with an extension to Baldwin Park already open. San Bernardino County is beginning construction this year on an I-10 ExpressLane that would meet up with the Metro / Caltrans lane at the County line and extend to I-15 in 2022, and Redlands in 2026.

The Express Lane allows low occupancy vehicles to use the lanes with payment of a fee, which varies dynamically with traffic levels. To remain consistent with prior HOV 2+ and 3+ requirements, Metro developed a switchable Fastrak transponder for carpools. As ExpressLane acceptance among customers has grown, the busway has grown more congested and has degraded bus service in the corridor. As demand and price have increased, transponders are being switched to HOV 2+ or 3+ to avoid tolls.

The switchable transponder requires CHP to manually observe vehicles to determine if the number of

occupants is consistent with the setting on the transponder. Due to right of way constraints, enforcement of ExpressLane requirements is difficult on I-10, as limited room is available to pull-over and issue citations. CHP enforcement slows traffic in the ExpressLane.

Physical constraints within the right-of-way footprint also limit the ability to place thermal readers that may be able to detect vehicle occupants in the ExpressLane.

One alternative to CHP enforcement is to move to an automated approach where all cars are charged without regard to the number of occupants, through a “Pay-as-You-Use” model.

The Foothill Gold Line and Metrolink also provide east/west service through the San Gabriel Valley. The Gold Line, which will extend east to Montclair, currently is operating at capacity in some locations during peak hours according to the “Metro Rail Capacity Study” that is being presented to the System Safety, Security and Operations Committee in April 2018.

As Metro prepares to expand its ExpressLane network, piloting a new operating approach on I-10 will provide valuable insight on how best to maximize mobility on ExpressLanes.

Therefore, to keep buses moving and enable movement of more people efficiently within the I-10 ExpressLane,

SUBJECT: MOTION BY FASANA AS AMENDED BY SOLIS
I-10 EXPRESSLANE/BUSWAY PILOT

APPROVE Motion by Fasana that:

A. Metro staff work with Caltrans and other stakeholders to develop, within existing federal and state guidelines, a pilot exclusively for the I-10 ExpressLane / Busway that would define carpools as registered vanpools with all other vehicles (other than passenger buses) subject to fees through a “Pay-as-You-Use” model. The Zero Emission Vehicles using the corridor would be eligible for discounts in effect at the time the pilot commences; and

B. Report back to the Metro Board within 180 days on potential effects, key decision points and milestones necessary to implement this pilot including community outreach with feedback and surveys as well as service analysis on impacts and exemptions for low income commuters. The proposed pilot program to be consulted with SCAQMD in relation to Air Quality Management Plan and its impact to sticker program for Electric Vehicle.

I-10 ExpressLanes/Busway Pilot
Preliminary Assessment

- **Vanpool Best Practices**
- **Initial Outreach Findings**
- **Operational Impact**

October 2018

SUBJECT: MOTION BY FASANA AS AMENDED BY SOLIS
I-10 EXPRESSLANE/BUSWAY PILOT
APPROVE Motion by Fasana that:

A. Metro staff work with Caltrans and other stakeholders to develop, within existing federal and state guidelines, a pilot exclusively for the I-10 ExpressLanes / Busway that would define carpools as registered vanpools with all other vehicles (other than passenger buses) subject to fees through a "Pay-as-You-Use" model. The Zero Emission Vehicles using the corridor would be eligible for discounts in effect at the time the pilot commences; and
B. Report back to the Metro Board within 180 days on potential effects, key decision points and milestones necessary to implement this pilot including community outreach with feedback and surveys as well as service analysis on impacts and exemptions for low income commuters. *The proposed pilot program to be consulted with SCAQMD in relation to Air Quality Management Plan and its impact to sticker program for Electric Vehicle.**

NOTE: *The italicized portion of the Board Motion was subsequently determined to be related to a separate Motion pertaining to the Clean Air Vehicle policy and does not apply to this Motion.

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1. Executive Summary

The Board is considering a pilot program to allow registered vanpools and registered higher occupancy vehicles (more than 4 persons per vehicle) to travel in the Metro ExpressLanes free of charge upon meeting certain requirements, as a pilot on the I-10. This white paper examines the potential to remove toll-free options for high-occupancy vehicles with less than 5 occupants (HOV2+ or 3+) while continuing to allow toll-free access on the I-10 ExpressLanes to registered vanpools and some other form of higher occupancy vehicles (HOV5+).

This analysis examines express toll lane (ETL) facilities in several areas of the United States that offer some form of a toll exemption program for vanpools/carpools. While most agencies provide toll-free travel to registered vanpools, they vary in requirements.

Should the Board direct staff to remove the HOV toll-free policies, higher-occupancy vehicles may still be allowed to use the ETLs toll-free with a variety of implementation options, from the stringent federally-registered vanpool, to an Express HOV 5+ policy under which both vanpools and larger carpools would fall. The following are five alternatives to consider when implementing a pilot program, listed from least restrictive to most restrictive:

- **Alternative 1:** All 5+ occupancy vehicles are eligible to receive toll exemption.
- **Alternative 2:** Pay-By-Plate; all 5+ occupancy vehicles with HOV-specific decal are eligible to receive toll exemption. Tolling to be tiered (plate only / FasTrak / decal).
- **Alternative 3:** All 7+ occupancy vehicles are eligible to receive toll exemption.
- **Alternative 4:** All 5+ occupancy vehicles that maintain reporting requirements (to be determined by staff) are eligible to receive toll exemption.
- **Alternative 5:** Only LA Metro Vanpool Program-registered vanpools are eligible to receive toll exemption.

Based on this analysis, **Alternative 1 (all 5+ vehicles toll-exemption eligible)** is the recommended alternative. From a customer perspective, this option offers the highest ease of use, as those customers likely to use the program would probably already own a FasTrak transponder and account in good standing. Alternative 1 follows similar usage of those accounts and transponders to the existing condition, so customers will not have to become accustomed to new processes. Ease of use could be marketed to potentially new ExpressLanes HOV5+ Vehicle Pool as this alternative has the lowest barrier to entry for receiving toll exemption, it has the greatest potential to lower congestion in the ExpressLanes as more travelers may switch to this Express HOV 5+ mode of transport.

Due to its ease of use for the traveling public, this alternative has the highest potential to convert existing 2 and 3+ occupancy vehicles to 5+ occupancy vehicles, thereby reducing congestion for all expressway users.

The core benefit of the future toll scenario is the consistent availability of a faster and more reliable travel option to everyone on the corridor whenever it is needed. While this benefit comes at a travel time cost to the general-purpose lanes, the overall effect is a significant cost savings to the users of the

corridor in the form of improved trip performance and reliability for the trips with the highest value to travelers at all times. Additionally, Metro may employ several mitigation measures to offset any adverse impacts of this policy change, including investment of additional toll revenues, conducting marketing research, and implementing a comprehensive public outreach plan.

Public perception of any change to the toll policy may be a significant issue to existing customers or those considering the use of Metro ExpressLanes, as some customers may be expected to pay for a service they had come to expect, or understood to be free. Introducing a change to this policy will require extensive outreach to all customers of the ExpressLanes, including those that primarily travel on the I-110 corridor, to mitigate the risk of customer confusion when the new policy takes effect. In the 2018 Metro ExpressLanes Customer Survey, the majority of respondents did not support changes to the current toll structure on the I-10 ExpressLanes, though 25% of survey respondents expressed interest in joining vanpools if that were required for toll-free travel. Additionally, based on the surveys conducted, ExpressLanes staff also anticipates a need for focused outreach to low-income segments of the population.

The most significant projected benefits of this pilot are an increase in person throughput on the ExpressLanes by 600 persons daily during the peak periods, and a net economic savings of $3.7 million daily to the users of the corridor in the form of improved trip performance and reliability for the trips with the highest value to travelers at all times. Travel times in the ExpressLanes are also expected to increase by an average of 30 seconds due to queueing at the eastbound end where the ExpressLanes merge back into the general purpose lanes. The pilot is expected to also result in an average increase in toll rates by $0.20/mile during the peak periods, and an average increase in end-to-end travel times in the general purpose lanes by 6 minutes (with more pronounced increases in travel time for the eastbound direction in the PM Peak).

This white paper provides additional detail regarding each of the alternatives and applicable industry standards. The overall white paper is structured as follows:

- Background and Current Policies
- Vanpool Programs in Los Angeles and Other Regions
- Public Outreach
- Operational Issues and Solutions
- Options Analysis
- Recommended Alternative
- Impact Analysis
- Conclusion
- Sources

2. Background and Current Policies

This section provides historical context for the white paper, describing the background of the Metro ExpressLanes and the current tolling policies and issues.

Background of the Metro ExpressLanes

The I-10 High Occupancy Vehicle (HOV) lanes system began operation as the El Monte Busway in 1973. A bus operators job strike in 1974 led to allowing vehicles with a minimum of three occupants to use the Busway for a three-month period. Soon thereafter, a policy was established to allow HOVs with three or more occupants (HOV3+) to use the facility in perpetuity along with buses.

The Metro ExpressLanes Program in Los Angeles County began in 2008, when the U.S. Department of Transportation (U.S. DOT) awarded the Metro-CalTrans partnership, a $210.5 million grant to showcase a system of Express Lanes along the I-110 (Harbor Freeway) and the I-10 (San Bernardino Freeway) corridors. The enabling projects were implemented in 2012 and 2013 respectively, where the (then) HOV lanes were transformed to HOT lanes.

Since its implementation, the Metro ExpressLanes Pilot Program on I-110 and I-10 has yielded a number of operational and mobility benefits. The strategy has provided congestion reduction benefits to SOVs while improving trip reliability for carpoolers and bus riders traveling the Express Lanes. Due to the success of the Metro ExpressLanes Pilot Program, California State Senate Bill 1298 was signed into law in September 2014, granting Metro the authority to conduct, administer, and operate the I-110/I-10 Express Lanes Program indefinitely. HOT lanes allow carpoolers, vanpoolers and eligible clean air vehicles to use the facility at no (or reduced) charge while SOVs are afforded the option to travel the facility by paying a variable toll, thus avoiding traffic congestion that often occur in General Purpose (GP) lanes.

Current Tolling Policies and Issues

Metro currently implements congestion pricing to keep ExpressLanes traffic moving at 45 mph, on average. If average speeds fall below that threshold, the lanes may be switched to “HOV Only” access, prohibiting use of the lanes by toll-paying single-occupant vehicles (SOVs) until speeds improve.

I-10 ExpressLanes: These lanes are operational all day every day. Where not physically separated, the I-10 ExpressLanes are separated from the general-purpose lanes by double solid white lines, for which crossing the lines can result in a citation. A FasTrak or FasTrak Flex transponder (for HOVs) is required for use of the ExpressLanes; without a transponder, the registered owner of the vehicle will receive a notice of violation which carries an additional administrative fee. Two-person carpools (HOV 2) with a FasTrak Flex set to 2 are toll-exempt, except during the peak traffic hours of 5am to 9am and 4pm to 7pm Monday through Friday. Three-plus person carpools (HOV 3+) with a FasTrak Flex set to 3+ are toll exempt at all times (both registered- and non-registered vanpools travel toll-free at all times under this category). Solo drivers pay the posted toll at time of entry.

I-110 ExpressLanes: These lanes are operational all day every day. Where not grade-separated, the I--110 ExpressLanes are separated from the general purpose lanes by double solid white lines, for which crossing can result in a citation. A FasTrak or FasTrak Flex transponder (for HOVs) is required for use of the ExpressLanes; without a transponder, the registered owner of the vehicle will receive a notice of violation, carrying an additional administrative fee. Carpools (HOV 2+) with a FasTrak Flex set to 2 or 3+ are toll exempt at all times (both registered- and non-registered vanpools travel toll-free at all times under the 3+ category). Solo drivers pay the posted toll at time of entry.

3. Vanpool Programs in Los Angeles and Other Regions

The Metro Vanpool Program is a Federally-registered program which offers leased vans through the Enterprise Rideshare and CalVans programs. Any vanpool of three or more people is eligible to travel the ExpressLanes free of charge with a FasTrak Flex set to the 3+ position. Metro Vanpools of five or more regular riders may receive subsidies of up to $400 (not to exceed 50% of lease costs) per eligible vanpool. Subsidy eligibility applies if the following conditions are met:

- Vanpool operates at least 30 miles round-trip and three days each week
- Vanpool vehicle must be designed to seat a minimum of 7 occupants
- Vanpools must begin service with at least 70% of vehicle seats occupied
- Vanpool agreement holder agrees to all terms and conditions of the Metro Vanpool Program.
- Vehicle lease fare is less than or equal to maximum lease authorized.
- Vanpools must end at a work site located within Los Angeles County
- Vehicle selected is less than four years old and/or 200,000 miles
- Vanpool vehicles or passengers receiving financial subsidy and/or incentives from any public funding source, private transit, private shuttles, day care/primary school trips, charter trips, owner-operated vanpools vehicle feeder services, and private vanpools are not eligible to enroll in the Metro Vanpool Program.

The Metro Vanpool Program is largely in line with what other public agencies provide in terms of Federally-registered vanpool programs. Some less formal vanpool programs such as those offered through employers may have higher rider occupancy requirements.

This section provides an overview of the Federal and local regulations related to vanpools, as well as an assessment of how many vanpool programs may potentially travel on the Metro ExpressLanes for commuter trips. In addition, this section provides a description of which express lanes facilities offer toll exemptions to vanpools.

Definitions of Vanpool Programs

The federal government has a distinct definition of a vanpool, which is required to be met by public agencies receiving funds to sponsor vanpools. Metro's Vanpool Program is considered Federally registered; as such, any changes to the ExpressLanes program to incorporate vanpools must also meet the Federal definitions, described below.

Metro Vanpool: For purposes of this white paper, this term refers to vanpools enrolled in Metro's existing Federally-registered vanpool program, which meets the definition of "Vanpool" below.

Vanpool[3] (as defined in the Federal Transit Administration National Transit Database Glossary: A transit mode comprised of vans, small buses and other vehicles operating as a ridesharing arrangement, providing transportation to a group of individuals traveling directly between their homes and a regular destination within the same geographical area. The vehicles shall have a minimum seating capacity of seven persons, including the driver. For inclusion in the National Transit Database (NTD), it

is considered mass transit service if it meets the requirements for public mass transportation and is publicly sponsored. Public mass transportation for vanpool programs must:

- Be open to the public and that any vans that are restricted a priori to particular employers in the public ride-matching service of the vanpool are excluded from the NTD report;
- Be actively engaged in advertising the vanpool service to the public and in matching interested members of the public to vans with available seats;
- Whether operated by a public or private entity, be operated in compliance with the Americans with Disabilities Act of 1990 and implementing regulations at 49 CFR 37.31; and
- Have a record-keeping system in place to meet all NTD Reporting Requirements, consistent with other modes, including collecting and reporting full-allocated operating and capital costs for the service.

Publicly sponsored service is:

- Directly-operated by a public entity;
- Operated by a public entity via a contract for purchased transportation service with a private provider; or
- Operated by a private entity as a grant recipient or sub-recipient from a public entity; or
- Operated by an independent private entity with approval from a public entity that certifies that the vanpool program is helping meet the overall transportation needs of the local urbanized area.

This is referred to as "Federally-registered" throughout this white paper and is a requirement for consideration of federal transit funds.

Casual Vanpool: While there is no standard definition of casual vanpool, for purposes of this white paper, the term shall describe vanpools established through a group of individuals with similar commuting patterns, without federal or state guidelines, and no reporting requirements. For the purpose of some express lane discounts, this could also include large families. The practice of spontaneous carpool "slugging" fits within this definition, though it typically applies to carpools looking to use a two- or three- person occupied vehicle to utilize HOV/HOT lanes.

Private Vanpool: While there is no standard definition of private vanpool, for purposes of this white paper, the term shall describe vanpools operating under an employer's vanpool definition and guidelines. The employer may provide incentives to use the vanpool. Vehicles may be leased or owned by the employer, or by the employee, dependent upon the how the employer has set up its program.

State/Local Vanpool: While there is no standard definition of state/local vanpool, for purposes of this white paper, the term shall describe vanpools operating under a state or local governmental agency's definition of vanpool. The agency sets the rules and guidelines for participation and may offer incentives to use the vanpool. Vehicles may be leased or owned, depending upon the agency, and are simply registered with the agency. Dependent upon the agency's policies, there may be reporting requirements of vanpools.

Vanpool Service[4] (as defined in the Federal Transit Administration NTD Glossary): Transit service

operating as a ride sharing arrangement, providing transportation to a group of individuals traveling directly between their homes and a regular destination within the same geographical area. The vehicles shall have a minimum seating capacity of seven persons, including the driver. Vanpools must also be open to the public and that availability must be made known. This service does not include ridesharing coordination.

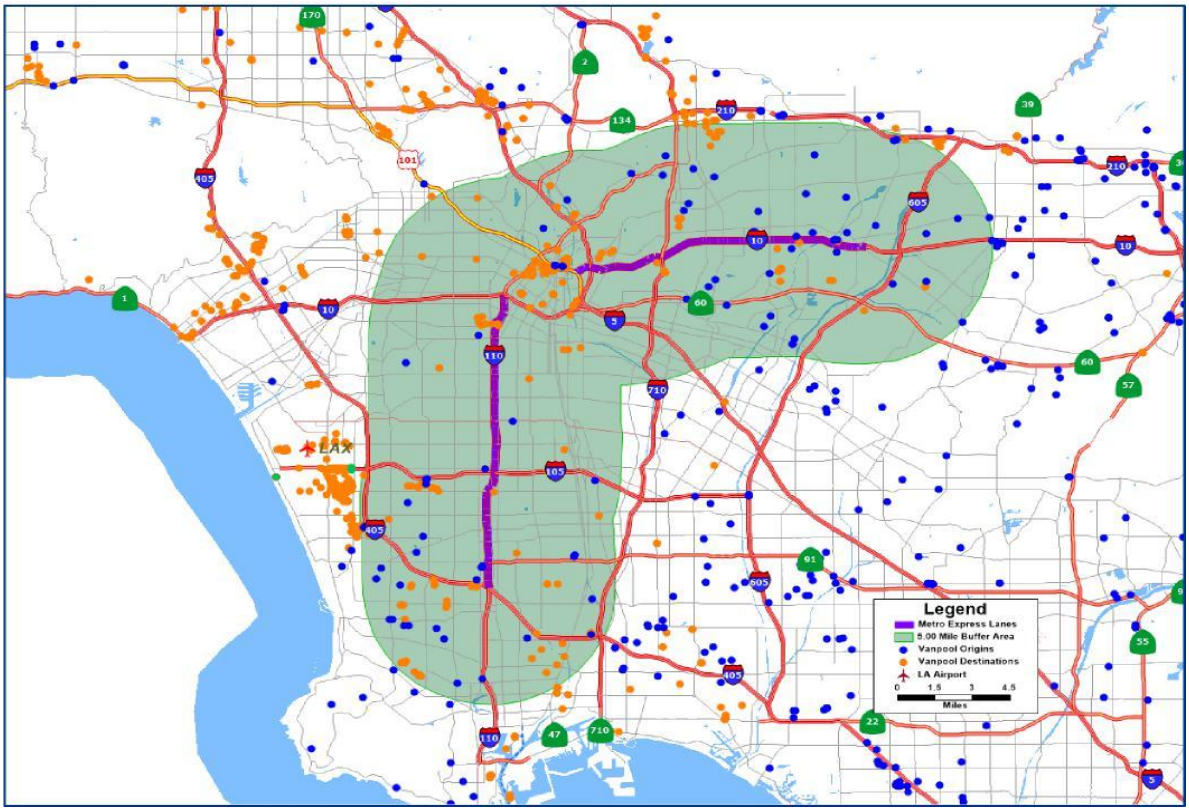
Vanpool Vehicle[5] (as defined in the Federal Transit Administration Van Pool Policy FAQs): Commuter highway vehicle and vanpool vehicle are vehicles with seating capacity for at least six adults (not including the driver); and at least 80% of the mileage use can be reasonably expected to be for the purposes of transporting commuters in connection with travel between their residences and their places of employment.

Vanpool Vehicle[6] (as defined in the California Vehicle Code, Division 1): A "vanpool vehicle" is any motor vehicle, other than a motor-truck or truck tractor, designed for carrying more than 10 but not more than 15 persons including the driver, which is maintained and used primarily for the nonprofit work-related transportation of adults for the purposes of ridesharing.

Current Registered Vanpools in the Metro ExpressLanes

As of June 1, 2018, there were 1,291 registered Metro Vanpool Program vanpools (requiring 7 or more persons). Among them, roughly 89 vanpools start their daily commute within a five-mile buffer area of Metro ExpressLanes (I-110 and I-10), as shown in Figure 1.

Figure 1: Current Metro Vanpool Origins and Destinations



There are about 313 vanpools which end their commute within the five-mile buffer area and 14 vanpools that have both their origin and destination within the buffer area. Therefore, there are a total of 388 vanpools that would potentially use the ExpressLanes on their commute routes, which is approximately 30% of all registered vanpools.

Adjacent to the five-mile buffer area of the ExpressLanes, there are a few locations that seem to attract significant vanpool demand. One is the LA International Airport/El Segundo area, which contains about 316 vanpool destinations, and another is the Santa Monica/Beverly Hills area, which has about 138 vanpool destinations. These 454 vanpools are also potential users of the ExpressLanes.

Based on this preliminary analysis, there are a total of approximately 842 vanpools which could potentially travel on the Metro ExpressLanes for commuter trips (defined as being two trips per weekday). That equates to 65% of all vanpools enrolled with the Metro Vanpool Program.

Note: this was a high-level GIS analysis performed. As such, these numbers may underrepresent vanpools using the ExpressLanes since they may begin or end their trips outside of the five-mile buffer established for this exercise. Also, this analysis did not take into consideration other registered vanpool program participants.

Other Express Lane Facilities Which Offer Toll Exemptions to Vanpools

Several other agencies across the U.S. have incorporated vanpools into their tolling policies. Table 1 provides an overview of existing ETL facilities that allow either registered or unregistered vanpools to travel toll-free.

Table 1: Existing ETL Facilities Offering Toll Exemption to Vanpools

Express Lane Facility	Location		Registering Agency	Registration Level Required to Achieve Exemption	Occupancy Declaration		Minimum Occupancy	Occupancy Enforcement
	Region	State			Type	Methodology		
I-10 & I-110 ExpressLanes[7]	Los Angeles	CA	Registration not required for toll exemption	-	Active	FasTrak® Flex set at 3+	3 (exempt under HOV 3+ policy)	Law enforcement observation
State-owned Toll Bridges[8]	San Francisco	CA	511.org	Federal		Registration with 511.org, FasTrak® Flex set at 3+ and use of designated carpool lanes	11	Law enforcement observation
I-405 Express Lanes[9]	Seattle	WA	Washington Department of Transportation (WSDOT)	Federal	Active	Flex Pass set to HOV	5	Law enforcement observation
SR-167 HOT Lanes[10]	Seattle	WA	WSDOT	Federal	Passive or Active	Qualified number of passengers in vehicle or set Flex Pass to HOV if present	5	Law enforcement observation
SR-520 Bridge[11]	Seattle	WA	WSDOT	Federal	Passive	Qualified number of passengers in vehicle	5	Law enforcement observation
MoPac Express Lanes[12]	Austin	TX	Capital Metro	Federal	Passive	TxTag registered to vanpool vehicle	5	Law enforcement observation
I-75 South Metro Express Lanes[13]	Atlanta	GA	State Road and Tollway Authority (SRTA)	Federal	Passive	Peach Pass registered to vanpool vehicle	5	Law enforcement observation
I-85 Express Lanes[14]	Atlanta	GA	SRTA	Federal	Active	Peach Pass registered to vanpool vehicle and pre-travel HOV declaration via Peach Pass GO! app or website	5	Law enforcement observation w/ assistance from automatic license plate readers
I-95 Express Lanes[15]	Miami	FL	South Florida Vanpool	Federal	Passive	95 Express decal on windshield of registered vehicle (must shield SunPass transponder if present)	6	Law enforcement observation
I-95 & I-495 Express Lanes[16]	Northern Virginia	VA	Registration not required for toll exemption	-	Active	E-ZPass Flex set to HOV	3 (exempt under HOV 3+ policy)	Law enforcement observation
I-66 Express Lanes[17]	Arlington	VA	Registration not required for toll exemption	-	Active	E-ZPass Flex set to HOV	2 (exempt under HOV 2+ policy)	Law enforcement observation

As shown in Table 1, these toll facility operators have very similar policies regarding toll exemptions for vanpools. The primary difference may be the level of registration required to claim a toll exemption; the majority of operators require enrollment through some vanpool program, most of which are Federally-registered. Our existing ExpressLanes policy is considerably more inclusive; allowing all HOV 3+ vehicles with the FasTrak Flex set to 3+ a toll exemption.

One standout among the policies is the use of a decal indicating HOV status on the 95 Express Lanes near Miami. Vanpools and HOV 3+ carpools wishing to obtain a toll exemption must register the South Florida Commuter Solutions (SFCS) organization to receive a special decal indicating HOV status. The sticker must be placed in the windshield of the vehicle and the user must shield any SunPass transponder to avoid being charged a toll. The transaction is then processed as an image-based transaction, the review process for which will indicate the presence of an HOV decal, and thus, a non-tolled transaction. The methods through which SCFS has chosen to verify enrollees may be much more labor-intensive than the Board wishes to pursue, but could be alleviated through implementation of any of the ridesharing smartphone apps discussed later in this white paper:

- Users call SFCS to initiate enrollment process
- Call center collects information
  - Address of each participant (must be unique to each user)
  - Employers, work hours, origin and destination, and timing for each user
- Call center then contacts employer for each user to verify this information
- Call center verifies routing to ensure it is reasonable
- Call center issues decal and registers the license plate with SunPass[18]

Many ETL operators offer some sort of HOV toll-exemption policy (typically HOV 3+) under which vehicles of five or more occupants would qualify for toll-free travel, if not under an expressly stated vanpool policy. These policies would include vanpools along the entire spectrum of registration requirements.

Table 2 below provides an overview of vanpool programs which operate in the previous ETLs.

Table 2: Vanpool Programs Near ExpressLanes Facilities

Vanpool Program	Location		Registering Agency	Lease or Own Vehicles	Vanpool Registration Level	Minimum Occupancy	Approximate No. of Vanpools in Program	Relevant Express Lanes
	Region	State						
Metro Vanpool Program[19]	Los Angeles	CA	LA Metro	Lease	Federal	5	1,291	I-10 & I-110 ExpressLanes
OCTA Vanpool Program[20]	Orange County	CA	Orange County Transportation Authority	Lease	Federal	5	530	91 Express Lanes
SANDAG Vanpool Program[21]	San Diego	CA	San Diego Association of Governments	Lease	Federal	7	540	I-15 Express Lanes
King County Commuter Van Program[22]	Seattle	WA	King County Metro Transit	Lease	Federal	5	2,400	SR-167 HOT Lanes & I-405 Express Lanes
CapMetro Rideshare Program[23]	Austin	TX	Capital Metropolitan Transportation Authority	Lease	Federal	5	200	MoPac Express Lanes
DART Vanpool[24]	Dallas	TX	Dallas Area Rapid Transit	Lease	Federal	6	200	LBJ Express, North Tarrant Express, DFW Connector, I-30 Express Lanes, I-35E Express Lanes, SH-114 Express Lanes, 635 East HOV/Express Lanes
METRO STAR Vanpool[25]	Houston	TX	Metropolitan Transit Authority of Harris County	Lease	Federal	5	400	US 290 Northwest, US 59 North, US 59 South, I-45 North, I-45 South, I-10 Katy Managed Lanes
SRTA Vanpool[26]	Atlanta	GA	State Road and Tollway Authority	Lease	Federal	5	-	I-75 South Metro Express Lanes & I-85 Express Lanes
South Florida Vanpool Program[27]	Miami	FL	South Florida Vanpool Program (Miami-Dade County Metropolitan Planning Organization)	Lease	Federal	6	250	I-95 Express Lanes

Vanpool Program	Location		Registering Agency	Lease or Own Vehicles	Vanpool Registration Level	Minimum Occupancy	Approximate No. of Vanpools in Program	Relevant Express Lanes
	Region	State						
Vanpool Alliance Vanpool Program[28]	Northern VA	VA	Vanpool Alliance (public/private partnership)	Lease or Own	State	7	-	I-95 & I-495 Express Lanes
UC Los Angeles[29]	Los Angeles	CA	UCLA	Lease or Own	State	7	150	I-10 & I-110 ExpressLanes
UC Davis - GoVanpool[30]	Davis	CA	UC Davis	Own	State	7	2	None in the area
Stanford University[31]	Stanford	CA	Stanford University	Own	Private (employees/ students only)	5	20	State-owned Toll Bridges in Bay Area
State of California[32]	Statewide	CA	State of California	Lease or Own	State	7	-	I-10 & I-110 ExpressLanes; 91 Express Lanes, state-owned toll bridges, I-15 Express Lanes
City of Los Angeles Vanpool Program[33]	Los Angeles	CA	City of Los Angeles	Lease	Local	8	110	I-10 & I-110 ExpressLanes
Emory University[34]	Atlanta	GA	Emory University	Lease	Private (employees/ students only)	7	11	I-75 South Metro Express Lanes & I-85 Express Lanes

4. Public Outreach

In the 2018 ExpressLanes Customer Survey, the majority of respondents did not support changes to the current toll structure on the I-10 ExpressLanes, though 25% of survey respondents expressed interest in joining vanpools if that were required for toll-free travel. It should be noted that this survey was distributed to current customers only, and is not necessarily a representative sample of all corridor users.

To address the Solis Amendment regarding community outreach to low-income commuters, 510 persons were approached at two outreach events in El Monte and Pomona as well as the Cal State LA Station/bus stop, USC hospital, Union Station and retail and grocery centers along the I-10 corridor in July 2018 to collect their opinions and feedback. Surveys were made available in English, Spanish, and Mandarin. The survey included screening questions to focus on those respondents that traveled on the I-10 ExpressLanes at least once a month and had an income that qualifies for the Low Income Assistance Program (i.e., an income that does not exceed twice the federal poverty level). The investigators attempted to target participation by various ethnic groups according to the racial distribution of the population around I-10. The collected responses included 61% from Latinos/Hispanics, 17% from African Americans, 11% from Caucasians, 8% from Asians, and 3% from other races. The findings from this low-income outreach effort are summarized below, with a total of 479 surveys completed altogether:

- Very few have ever used a vanpool on the I-10 ExpressLanes,
- Approximately 30% would continue to pay to drive alone or carpool in the ExpressLanes under the proposed policy,
- Approximately 40% would shift to the general purpose lanes under the proposed policy,
- Caucasians were the most likely to switch to vanpools under the conditions of the proposed pilot.
- African Americans, Latinos/Hispanics, and Asians were the most likely racial groups to switch to transit under the conditions of the proposed pilot.

Educational Outreach

Outreach will be a critical step toward a successful implementation of this proposed pilot. Adoption of a new policy will require a proactive and aggressive regional campaign to educate existing and new customers. For as long as the I-10 ExpressLanes have been in existence, the toll policy has granted exemption for both HOV3+ vehicles all day and HOV2s vehicles during off-peak periods. Introducing a change to this policy will require extensive outreach to all customers of the ExpressLanes, including those that primarily travel on the I-110 corridor, to mitigate the risk of customer confusion when the new policy takes effect.

Based on the surveys conducted in July 2018, ExpressLanes staff also anticipates a need for focused outreach to low-income segments of the population regarding the following topics:

1) The benefits of using transit on the ExpressLanes
2) Ongoing education and outreach regarding the Low Income Assistance Plan
3) Information about participation in vanpools.

Additional Data Needs

One important aspect of any feasibility analysis is the identification of additional data needs that still remain. For this proposed pilot, these needs include the following:

- Collaborate with transit providers regarding the potential effects of this policy on their operations as well as any needed modifications.
- Conduct additional market research regarding the barriers to toll lane use among low-income stakeholders, barriers to transit use among certain races, and barriers to carpooling among certain races.
- Assess the impact of this policy on ExpressLanes usage by low-income customers through focus groups and surveys to further inform any necessary policy improvements.
- Perform additional investigation into the optimal method for incentivizing vanpool utilization on the

corridor, and for handling vanpool toll exemptions.

5. Operational Issues and Solutions

Implementing this complex change in toll policy requires an analysis of all possible operational impacts. In addition to considering the impact to vanpools, the Board should consider the following issues which may impact the Metro ExpressLanes program:

- Public Perception
- Use of Transponders
- Occupancy Enforcement
- Equity Among All Travelers

This section provides a description of each of these operational issues and potential solutions to address these issues.

Public Perception

Public perception of any change to the toll policy may be a significant issue to existing customers, as some customers may be expected to pay for a service they had come to expect as free. To counter this perception, the pilot would likely include a public education campaign months before implementation and continuing for some time after the rollout of the revised policy to inform the public of what they can expect with the operation of the ExpressLanes and how it benefits both tolled- and non-tolled users.

Agencies have found that extensive public outreach is helpful in maintaining efficient and legal use of express lanes. For instance:

1. **Georgia:** Before converting I-85 HOV lanes to HOT lanes in Georgia, SRTA held more than 120 public outreach, community meetings or events regarding the project. Additionally, they held multiple media briefings, including some special sessions for area traffic reporters to help spread the word about the upcoming changes to the HOV lanes. This public education push did not end upon conversion of the lanes; rather SRTA kept up a public inquiry task force and implemented an online comments section on their website to ensure the public's voices were being heard. Twelve months after the conversion to HOT lanes, the customer satisfaction rating was at 88%; evidence that the considerable public outreach program was effective.[35] (education – success story)
2. **Minnesota:** When the Minnesota Department of Transportation (MnDOT) decided to implement a value-pricing strategy on I-394 west of Minneapolis, they found that having local political champions and concise public communications were key to initial customer acceptance of the project. The vocal support of local politicians made the project more palatable to their constituents, and clear communications on the benefits to both transit-and non-transit users helped gain additional public acceptance of the project.[36] (MnDOT education)

Upon implementation of the revised toll policy, staff will consider a grace period of several weeks during which occupancy violators may have violation fees reduced or eliminated.

Use of Transponders

As shown in Table 1, different agencies employ different techniques to address the use of the transponders for registered and/or non-registered vanpools. For instance:

- A regular (non-switchable) transponder can be used in conjunction with an HOV declaration app or website, as discussed later in the Occupancy Enforcement section. In this case, a vanpool/carpool vehicle is provided a transponder, and the occupants would be responsible for logging into the system and declaring HOV status ahead of any trip on the ExpressLanes.
- A switchable transponder is another solution for occupancy declaration, and the option which we currently use. In the case of our proposed shift to registered vanpools receiving a toll exemption, just a single HOV or vanpool switch option would be required of the transponder, as HOV options would be reduced to the single vanpool option. The current transponder could still be used, however, with toll algorithms revised to accept both the 2 and 3+ settings as the same category, as the HOV 2 policy would be eliminated.
- The issuance of a special decal (similar to the 95 Express decal in South Florida, discussed previously in the *Vanpool Programs in Los Angeles and Other Regions* section) to vanpools/carpools could simplify the implementation of a toll policy revision. A decal leaves the tolling agency only to verify enrollment and enforce occupancy requirements through the back office. This does require any other FasTrak or FasTrak Flex transponder to be obscured to avoid charges when using the decal to obtain a toll exemption.
- Image-based pay-by-plate (PBP) tolling is another option by which we could allow registered vanpools a toll exemption, nullifying the need for a transponder. This would require the vanpool vehicle's license plate be registered with us so that toll charges are not applied. All other vehicles would be charged as applicable and invoiced at the vehicle's Department of Motor Vehicles-registered address.

Occupancy Enforcement

An ongoing concern for any HOV toll exemption or discount policy is the enforcement of the number of occupants in vehicles claiming HOV status. As tolls rise, the impetus for occupancy violators to use the lanes as an exempt vehicle without meeting occupancy requirements increases, thereby, increasing the risk of traffic flow degradation as well as introducing a revenue risk where vehicles other than HOVs are tolled.

A 2015 study performed for the Utah Department of Transportation, examining performance issues on HOV lanes, found occupancy violation rates of 12-15% in the SR-167 HOT lanes in Washington, and roughly 28% in the I-66 Express Lanes in northern Virginia. By comparison, recent independent occupancy validations undertaken by a consultant team showed that the I-10 ExpressLanes experienced occupancy violation rates ranging from 28-38%, while the I-110

ExpressLanes experienced rates of 19-37% .

Metro staff have also investigated the various means by which an HOV using an express lane can indicate to the lane operator their HOV status for purposes of receiving a discounted toll rate on the facility. At present there are two basic means of doing so: Passive and Active.

- The "**passive**" means is by the simple procedure of fulfilling the requirements of the facility operator's minimum occupancy requirement, generally two persons in a vehicle (HOV 2) or three or more persons in a vehicle (HOV 3+) and driving on the facility.
- The "**active**" means may be either by having the minimum required number of people and a transponder in the vehicle or, having the minimum required number of people in the vehicle and giving advance notification to the facility operator either by pre-registering or using a smartphone app.

In some cases, either the "passive" or "active" method can be used by the driver if the facility operator utilizes both functionalities.

Travelers who commit to using an Express HOV 5+ method of travel may sometimes face the issue of not having enough passengers to meet occupancy requirements due to a co-traveler's absence. To best maintain an equitable and efficient system, the toll operator should implement an either/or policy to address this issue. Simply put, vehicles that typically meet the occupancy requirement, but may not on a given day due to a passenger absence, should not be allowed the toll exemption on those days. This could be addressed with any of the occupancy enforcement methods described below. This differs from Federally-registered vanpool programs such as the Metro Vanpool Program, which typically require a 70% to 80% occupancy rate over a 30-day period, allowing for some vacancies while still obtaining the toll exemption.

The following subsections describe various ways Metro may enforce occupancy requirements.

Enforcement Method #1: Visual Enforcement

Visual enforcement is the primary route of enforcement for most agencies, through either human confirmation at physical HOV lane declaration points, or via the toll system notifying officials of vehicle tag status in tandem with human confirmation of that status. Contracts are often held with state police for occupancy and traffic enforcement, while some agencies use their own traffic enforcement division for these tasks.

Enforcement Method #2: Automated Passenger Detection Systems

As visual technology advances, several automated passenger detection systems have come to market. This section describes the outcomes achieved by systems that have been tested by LACMTA, Caltrans, and New York MTA B&T.

LACMTA: Metro performed a test demonstration of an Automated Occupancy Detection System by Xerox (now Conduent) in October 2015. The test captured 14,093 vehicles over a 24-hour period, and was successful at properly identifying SOVs 94.1% of the time, for usable

images. When combined with supplemental manual image review, the researchers concluded that an accuracy of 99.9% might be achievable. As a result of this test, the Metro Board of Directors approved an extended Proof of Concept deployment of the Conduent Occupancy Detection System at high-risk locations along the I-10 and I-110 ExpressLanes in January 2018. Design of the system was completed and approved in September 2018, and full deployment is anticipated for completion in early 2019.

Caltrans: The California Department of Transportation made a pilot run of Conduent's Vehicle Passenger Detection System (VPDS) along northbound Interstate 5 in early 2015. Results came in at roughly 95% accuracy for the VPDS versus roughly 36% for human detection accuracy.

New York: Metropolitan Transportation Authority Bridges and Tunnels (MTA B&T) recently converted to All Electronic Tolling (AET) on the Verrazano Narrows Bridge (VNB) in New York City. As part of the conversion of the toll collection system to AET, an occupancy detection system (ODS) developed by Conduent was put into place to verify eligibility for the Staten Island Resident Carpool Discount. This system not only detects and verifies vehicle occupancy but is an integral part of the toll collection infrastructure. As the VNB AET system is integrated, it is required to match each transaction from each element of the system (i.e., occupancy and toll collection). There have been reported problems with the interface between the ODS and toll collector, but this should not discourage their use.

The Metropolitan Transportation Commission (MTC): The Metropolitan Transportation Commission (MTC) recently conducted a three-month pilot to assess how accurate automated Vehicle Occupancy Detection (VOD) camera systems are at determining vehicle occupancy. The MTC's goal is to improve HOV lane performance to increase person-throughput, In July 2017, the MTC's Operations Committee approved a pre-qualified bench of VOD system vendors for the purposes of testing technologies in the Bay Area. Vendors included: Conduent, Transcore, and Indra. Vendors piloted their existing systems on I-880 with results which indicated that overall system accuracy rates, as determined and reported by the vendors, ranged between 78% and 88% consistent with what was determined independently through a manual image review of 440 images per vendor (77% to 89%). The MTC considers the system accuracy rate to be low and suggests that the technology is not ready for use in issuing automated warnings or citations in a full-scale deployment on Bay Area. Concerns regarding open access to express and HOV lanes and the need for a robust network of VOD equipment (one or more per mile, coupled with capital cost for system development and integration, on-site equipment/infrastructure, power and communications, the annual operation could be significant..

Additionally, MTC is considering a new pilot whereby smartphone app-based occupancy verification systems are being tested. The systems pair and count individual smartphones in the vehicle providing a verified count of passengers that can be used to determine whether vehicles meet the lane occupancy requirement. Theoretically, MTC reports, data from the systems could be paired with toll tags or license plate camera data to charge those that mis-represent occupancy a toll in express lanes or issue an automated citation. Challenges include agencies agreeing on how to proceed and enforcement roles, California privacy laws, and funding.

Enforcement Method #3: Mobile Phone App Occupancy Declaration

Several agencies have developed mobile-device apps or websites through which HOV travelers must declare their status before travelling on ETLs. These are typically used in conjunction with non-switchable toll transponders but could be explored as an option with switchable transponders as well. The private sector has likewise come up with solutions for HOV occupancy declaration and verification. The following are a few examples of mobile phone app occupancy detection systems:

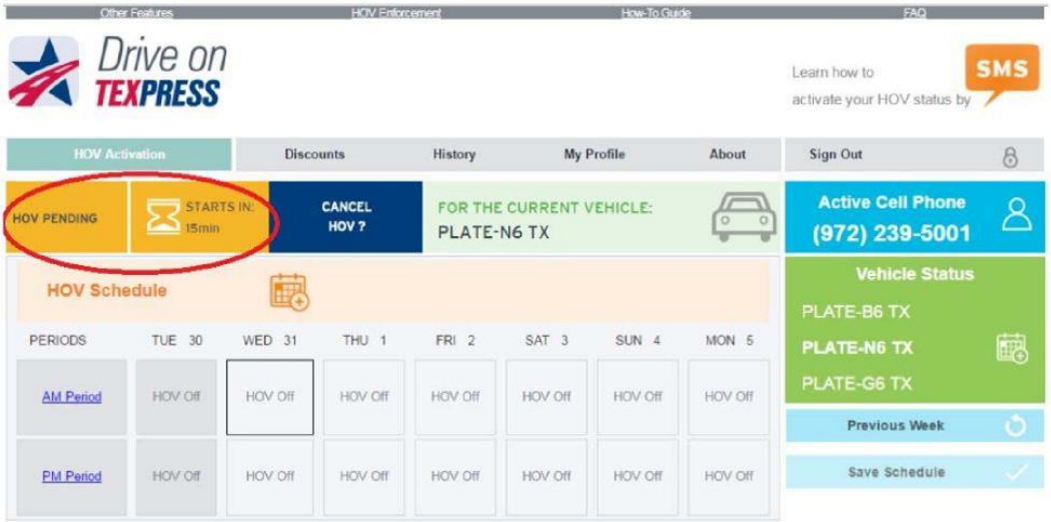
- **Georgia (Peach Pass GO!)**: Travelers must register with the app or associated website and input the correct setting (Toll/Non-Toll(HOV) 15 minutes prior to travel in express lanes to receive HOV discounts. Similar features relevant to our proposed vanpool/carpool toll policy could be modified and added to the Go Metro app, or could be developed as a stand-alone app.

Figure 2: Peach Pass GO! Mobile App

Source: http://www.peachpass.com

- **Texas (DriveOn TEXpress)**: Travelers must register with the app or associated website and input the correct setting (Toll/HOV) 15 minutes prior to travel in TEXpress lanes to receive HOV discounts. Vanpools travel toll-free as HOV 2+ under the TEXpress lanes toll policy, and therefore vanpools would need to activate their HOV status via the app or associated website prior to travel. Similar features relevant to the proposed vanpool/carpool toll policy could be modified and added to the Go Metro app, or could be developed as a stand-alone app.

Figure 3: DriveOn TEXpress Dashboard



Source: http://www.texpresslanes.com

Figure 4: RideFlag Mobile App

- **RideFlag:** RideFlag is a dynamic carpooling mobile app, allowing registered drivers and riders to connect for future- or trips-in-progress. RideFlag has developed an occupancy verification system which can communicate with toll agencies to declare HOV status while eliminating the need for active transponder management by the HOV occupants. The RideFlag system contains and shares vehicle and occupant registration information with the toll agency. All occupants of an HOV must have the app open during a trip to verify occupancy. Such a system could be used on our ExpressLanes to verify vehicle occupancy.
- **Carma Share**[37]: Carma has patented Verified Ride occupancy-verification software which monitors the continuous coordinated proximity of an in-car device to an occupant device. Carma uses this approach to automatically verify vehicle occupancy using

Source: http://www.rideflag.com

smartphones and beacons for enabling high-occupancy toll discounts. Toll agencies may partner with Carma to use the software to verify occupancy in HOV lanes. The Carma Share application could be used turnkey in conjunction with our proposed toll policy revision in verifying occupancy for vehicles.

These technological solutions may be seen to have a prohibitively high initial cost when implemented solely for use in a pilot study. The manufacturers of these technologies may be willing to loan or reduce the cost of their property when used as part of a pilot program, hopeful that the client will appreciate the technology and convert to a full sale.

Significantly increasing the occurrence of visual enforcement along the ExpressLanes by the California Highway Patrol (CHP) could be used as a lower-cost solution relative to the higher initial cost of the technological solutions. Given the relatively small number of Express HOV 5+ vehicles to be verified, it could be much less intensive to implement from an agency side, and less confusing & invasive for the traveling public. This option might make more sense during a pilot study; however, the Board should be willing to accept the costs associated with sustained increased visual enforcement by the CHP should it be enacted long-term.

Equity Among All Travelers

It has been shown that express lanes in general improve traveling conditions for all users, not just those using the express lanes.[38] Likewise, the proposed toll policy revision would not affect any one cohort of traveler more than another, and in fact, could provide more value to all travelers. A vanpool/carpool program could result in a decrease of numbers of vehicles on the corridor, as some HOV 2 and 3+ travelers would seek to upgrade to a vanpool/carpool to take advantage of the toll exemption. Other equity concerns include:

- Bias against children is a non-issue, as they may be counted toward the occupancy of a vanpool/carpool programs if they occupy their own seat.
- Low-income individuals are afforded the opportunity to save money on their commute by ridesharing, especially when available subsidies are factored in. When not ridesharing, these individuals still benefit from decreased congestion because of those who do. We currently have a Low-Income Assistance Plan in place.
- Individuals without smart phones could enroll in a vanpool/carpool program manually; however, there is potential for bias if the occupancy verification system is mobile app-based, as those individuals could have trouble verifying their presence in a vanpool/carpool. A possible solution to this could be an app that allows for multiple logins on one device (though this opens the possibility of abuse).

6. Options Analysis

Should the Board direct staff to remove the HOV toll-free policies, higher-occupancy vehicles may still be allowed to use the ETLs toll-free with a variety of implementation options, from the stringent federally-registered vanpool, to an Express HOV 5+ policy under which both vanpools and larger carpools would fall. The following are five alternatives to consider when implementing a pilot program, listed from least restrictive to most restrictive:

- **Alternative 1:** All 5+ occupancy vehicles are eligible to receive toll exemption.
- **Alternative 2:** Pay-By-Plate; all 5+ occupancy vehicles with HOV-specific decal are eligible to receive toll exemption. Tolling to be tiered (plate only / FasTrak / decal).
- **Alternative 3:** All 7+ occupancy vehicles are eligible to receive toll exemption.
- **Alternative 4:** All 5+ occupancy vehicles that maintain reporting requirements (to be determined by staff) are eligible to receive toll exemption.
- **Alternative 5:** Only LA Metro Vanpool Program-registered vanpools are eligible to receive toll exemption.

The following subsections provide additional detail about each option, including associated impacts.

Alternative 1: All 5+ occupancy vehicles are eligible to receive toll exemption.

This alternative would allow for any carpools of five or greater occupancy to receive the toll exemption with HOV 5+ declaration via a mobile app or website. There would be no other HOV discount. A FasTrak account and transponder would be required of all vehicles using the ExpressLanes, just as it is now. Assuming the use of the current iteration of FasTrak transponder, the lane system would be configured as such that any transponders set at the 2 or 3+ setting would be indicating five or greater occupancy. This setup is very similar to the current system, with the revision of the definitions of the 2 and 3+ settings. An occupancy declaration app could be used with this Alternative.

Alternative 1 has the highest ease of use for the participants; as such, it is assumed this could cause the greatest migration to vehicles with five or more occupants. This alternative would have moderate impacts on the back office, as those tags declaring five-plus occupancy would need to be read as valid in the lane, and toll-exempt in the back office, while those with less than five occupants would be read as valid in the lane and tolled in the back. Additionally, should an occupancy declaration app be used, back office with that app will be required. As this alternative does not necessitate a formal agreement among HOV occupants, but is stricter in its definition of HOV, casual HOVs are implicitly encouraged. Again, contrary to how many subsidized vanpool programs operate with their 30-day-average-ridership, an HOV 5+ option would require those seeking toll exemption to have the required minimum of five occupants for every trip.

***Associated Impacts**: Increased temporary call center and walk-in center staffing might be required. This temporary staffing would be necessary, especially at the announcement of the policy change and then again at the implementation of the 5+ program. It is anticipated that a*

sliding staffing scale for ramp-up and implementation would be needed to address potential spikes in customer contacts. Approximately five added temporary FTEs may be required on the phones and an added temporary full-time employee (FTE) at the walk-in center. Additionally, training would be required for all Customer Service Center (CSC) staff on the new policy, with scripting for handling customer complaints regarding the changes in current pricing resulting from the 5+ policy. An added temporary FTE may also be required to handle increases in service requests for customers choosing to un-enroll from the ExpressLanes FasTrak program. A set of new mailings, emails, outreach communications and roadside messaging should be considered as part of a comprehensive Communications Plan to notify the motoring public of the policy changes. Use of website messaging should be developed and implemented at both the public non-secured web pages, as well as the secured customer portion of the website. Lastly, modifications to the lane systems, algorithms and back office systems would likely be required to accommodate the 5+ policy.

There could also be long-term customer service staffing impacts related to occupancy-violation processing and customer complaint resolutions associated with the increase in price modifications from the new enforcement systems.

Alternative 2: Pay-By-Plate; all 5+ occupancy vehicles with HOV-specific decal are eligible to receive toll exemption. Tolling to be tiered (plate only / FasTrak / decal).

Alternative 2 utilizes a Pay-By-Plate (PBP) and HOV decal system, negating the requirement for vehicles to have a transponder to use the ExpressLanes. This is similar to the HOV decal program in use for the 95 Express in Florida. Toll exemption would be achieved through 5+ occupancy declaration and the display of an HOV decal obtained through an opt-in process with Metro. This alternative assumes the use of an occupancy declaration app for those travelers desiring the exemption. A tiered tolling system could be utilized with this alternative, charging PBP users the highest rates while giving FasTrak account holders a discount from that rate, and allowing HOV decal users a toll exemption as appropriate. HOV decal users would be charged the appropriate market rate for travel made while not meeting the 5+ occupancy requirement. FasTrak settings could be used much like they are now, but with the 2 or 3+ settings indicating 5+ occupancy; non 5+ occupancy vehicles could use the 1 setting to obtain the discounted toll rate. This alternative provides for very high ease-of-use to the customer; as such, improvements in ExpressLanes congestion may not be realized, as more non-FasTrak users may opt to use those lanes. As this alternative does not necessitate a formal agreement among occupants, the occurrence of casual carpooling could be increased as a result of this alternative's implementation. Since this alternative uses a stricter definition of HOV with the additional inclusion of the HOV-indicating decal, casual HOVs are implicitly encouraged, though perhaps not to the extent as seen with Alternative 1.

Associated Impacts: *Increased temporary call center and walk-in center staffing might be required. This temporary staffing would be necessary, especially at the announcement of the policy change and then again at the implementation of the program. It is anticipated that a sliding staffing scale for ramp-up and implementation would be needed to address potential*

spikes in customer contacts. Approximately five added temporary FTEs may be required on the phones and an added temporary FTE at the walk-in center. Additionally, training would be required for all CSC staff on the new policy, with scripting for handling customer complaints regarding the changes in current pricing resulting from the new PBP policy. An added temporary FTE may also be required to handle increases in service requests for customers choosing to unenroll from the ExpressLanes FasTrak program and opt into the PBP process. A set of new mailings, emails, outreach communications and roadside messaging should be considered as part of a comprehensive Communications Plan to notify the motoring public of the policy changes. Use of website messaging should be developed and implemented at both the public non-secured web pages, as well as the secured customer portion of the website. Modifications to the lane systems, algorithms and back office systems would likely be required to accommodate the new policy.

This alternative would have moderate impacts on the back office, as those vehicles declaring 5+ occupancy would need visual confirmation of a decal, and toll algorithms would need to be adjusted removing PBP customers from the toll violators list, until such time that those transactions go unpaid. As an occupancy declaration app or website will likely be used, back office integration with that app/website will be required. The biggest impact to the lane system would be the introduction of the image-based systems to not only identify the license plate, but also the HOV decal.

There could also be long-term customer service staffing impacts related to occupancy-violation processing, the HOV decal declaration identification and customer complaint resolutions associated with the increase in price modifications from the new enforcement systems.

Alternative 3: All 7+ occupancy vehicles are eligible to receive toll exemption.

Alternative 3 would allow registered and non-registered vanpools of 7+ occupancy to receive the toll exemption with HOV 7+ declaration via a mobile app or website. There would be no other HOV discount. A FasTrak account and transponder would be required of all vehicles, just as it is now. In this case, the lane system would be configured as such that any transponders set at the 2 or 3+ setting would be indicating seven or greater occupancy; allowing for the current style of transponder to be used going forward. This setup is very similar to the current system, with the revision of the definitions of the 2 and 3+ settings. An occupancy verification system is essential as part of this alternative. This option is more restrictive than Alternative 1, while still being easy to obtain for those willing to switch to a vehicle carrying 7+ passengers. This alternative would have moderate impacts on the back office, as those tags declaring 7+ occupancy would need to be read as valid in the lane, and toll-exempt in the back office, while those with less than seven occupants would be read as valid in the lane and tolled in the back office. Additionally, should an occupancy declaration app or website be used, back office integration with that app/website will be required. The biggest impact to the lane system would be the changes to the algorithm and its interface with the back office and information signs on the road. Similar to Alternative 1, this alternative implicitly encourages casual HOVs, but with its higher occupancy requirement will likely see lower casual vanpool numbers than that will Alternative 1.

***Associated Impacts**: Increased temporary call center and walk-in center staffing might be required. This temporary staffing would be necessary, especially at the announcement of the policy change and then again at the implementation of the 7+ program. It is anticipated that a sliding staffing scale for ramp-up and implementation would be needed to address potential spikes in customer contacts. Approximately five added temporary FTEs may be required on the phones and an added temporary FTE at the walk-in center. Additionally, training would be required for all CSC staff on the new policy, with scripting for handling customer complaints regarding the changes in current pricing resulting from the 7+ policy. An added temporary FTE may also be required to handle increases in service requests for customers choosing to withdraw from the ExpressLanes FasTrak program. A set of new mailings, emails, outreach communications and roadside messaging should be considered as part of a comprehensive Communications Plan to notify the motoring public of the policy changes. Use of website messaging should be developed and implemented at both the public non-secured web pages, as well as the secured customer portion of the website. Lastly, modifications to the lane systems, algorithms and back office systems would likely be required to accommodate the 7+ policy.*

There could also be long-term customer service staffing impacts related to occupancy-violation processing and customer complaint resolutions associated with the increase in price modifications from the new enforcement systems.

Alternative 4: All 5+ occupancy vehicles that maintain reporting requirements (to be determined by staff) are eligible to receive toll exemption.

This alternative would allow registered and non-registered vanpools or carpools of 5+ occupancy to receive the toll exemption with HOV 5+ declaration via a mobile app or website, and while meeting reporting requirements established by the Board. There would be no other HOV discount. Such reporting metrics could be the same or very similar to those required of current vanpools registered through the Metro Vanpool Program and would help staff to monitor the program. A FasTrak account and transponder would be required of all vehicles, just as it is now. In this case, the lane system would be configured as such that any transponders set at the 2 or 3+ setting would be indicating five or greater occupancy; allowing for the current style of transponder to be used going forward. This setup is very similar to the current system, with the revision of the definitions of the 2 and 3+ settings and the introduction of reporting requirements. As with Alternative 3, an occupancy verification system is an essential part of this alternative. This option is similar to, while being more restrictive than the previous Alternative 3. The ease of use for occupants might initially seem low, but would become routine after time. This alternative would have moderate impacts on the back office, as those tags declaring 5+five-plus occupancy would need to be read as valid in the lane, and toll-exempt in the back office, while those with less than five occupants would be read as valid in the lane and tolled in the back office. Additionally, should an occupancy declaration app/website be used, back office integration with that app will be required. The biggest impact to the lane system would be the changes to the algorithm and its interface with the lanes, back office and roadside signs. It is assumed that this alternative, with its introduction of reporting requirements to staff, would likely not see as great an increase in casual HOVs largely due to the fact that these reporting requirements may be seen as too laborious or intrusive to potential HOV occupants.

Associated Impacts: *Increased temporary call center and walk-in center staffing might be required. This temporary staffing would be necessary, especially at the announcement of the policy change and then again at the implementation of the 5+ program with reporting elements. It is anticipated that a sliding staffing scale for ramp-up and implementation would be needed to address potential spikes in customer contacts. Approximately five added temporary FTEs may be required on the phones and an added temporary FTE at the walk-in center. Additionally, training would be required for all CSC staff on the new policy, with scripting for handling customer complaints regarding the changes in current pricing resulting from the 5+ and reporting requirement policy. An added temporary FTE may also be required to handle increases in service requests for customers choosing to unenroll from the ExpressLanes FasTrak program. A set of new mailings, emails, outreach communications and roadside messaging should be considered as part of a comprehensive Communications Plan to notify the motoring public of the policy changes. Use of website messaging should be developed and implemented at both the public non-secured web pages, as well as the secured customer portion of the website. Lastly, algorithms and back office systems would likely be required to accommodate the 5+ and reporting policy.*

There could also be long-term customer service staffing impacts related to occupancy-violation processing and customer complaint resolutions associated with the increase in pricing modifications from the new enforcement systems. There may also be minor customer service impacts resulting from the reporting elements of this alternative.

Alternative 5: Only LA Metro Vanpool Program-registered vanpools are eligible to receive toll exemption.

Alternative 5 would allow for only Metro Vanpool Program-registered vanpools of 7+ occupancy to receive the toll exemption. Vanpools from other programs would not be eligible for the toll exemption. There would be no other HOV discount. This would require all vanpools to adhere to the current Metro Vanpool Program eligibility requirements. A FasTrak account and transponder would be required of all vehicles, just as it is now. In this case, the lane system would be configured as such that any transponders set at the 2 or 3+ setting would be indicative of a Metro Vanpool, allowing for the current style of transponder to be used going forward. This setup is very similar to the current system, with the revision of the definitions of the 2 and 3+ settings. An occupancy verification system would be an essential part of this alternative. This is the most restrictive of the alternatives presented but would be the easiest for us to enforce. The ease of use for occupants might initially seem low but would become routine after time for those enrolled. This alternative would have moderate impacts on the back office, as those tags declaring registered vanpool status would need to be read as valid in the lane, and toll-exempt in the back office, while those non-vanpool vehicles would be read as valid in the lane and tolled in the back office. Additionally, should an occupancy declaration app/website be used, back office integration will be required. The biggest impact to the lane system would be the changes to the algorithm and its interface with the lanes, back office and roadside signs. The potential for the casual vanpool significantly declines with this option, as occupants must be enrolled through the Metro Vanpool Program.

***Associated Impacts**: Increased temporary call center and walk-in center staffing might be required. This temporary staffing would be necessary, especially at the announcement of the policy change and then again at the implementation of the 7+ program with eligibility elements. It is anticipated that a sliding staffing scale for ramp-up and implementation would be needed to address potential spikes in customer contacts. Approximately five added temporary FTEs may be required on the phones and an added temporary FTE at the walk-in center. Additionally, training would be required for all CSC staff on the new policy, with scripting for handling customer complaints regarding the changes in current pricing resulting from the 7+ and eligibility requirement policy. An added temporary FTE may also be required to handle increases in service requests for customers choosing to un-enroll from the ExpressLanes FasTrak program. A set of new mailings, emails, outreach communications and roadside messaging should be considered as part of a comprehensive Communications Plan to notify the motoring public of the policy changes. Use of website messaging should be developed and implemented at both the public non-secured web pages, as well as the secured customer portion of the website. Lastly, algorithms and back office systems would likely be required to accommodate the 7+ and eligibility policy.*

There could also be long-term customer service staffing impacts related to occupancy-violation processing and customer complaint resolutions associated with the increase in pricing modifications from the new enforcement systems. There may also be minor customer service impacts resulting from the eligibility elements of this alternative.

Additional Occupancy and Transponder Considerations

Regardless of which alternative is selected, staff would like to consider implementing an automatic in-lane vehicle occupancy detection system as part of the pilot program to enforce occupancy requirements and provide the ability to invoice and charge fees to those not abiding by those requirements. Implementing an ODS as part of the enforcement plan for any of the alternatives would be an added benefit and increase the ability to monitor occupancy, thereby decreasing violations.

It should be noted that ODS costs would not be unique to any of the previously mentioned alternatives 1 through 5. Changes to the lane systems, algorithms and back office systems required for the implementation of permanent roadside ODS technology is understood to be significant and would require further consideration as to the cost and benefits associated with placement of the equipment along ExpressLanes corridors.

Likewise, all alternatives have assumed the use of mobile HOV declaration apps or websites and ODS, but the use of apps like RideFlag or Carma could be explored as occupancy declaration and verification options.

While all alternatives are laid out assuming the use of the existing style of FasTrak transponders, Metro may also discuss alternatives with the industry to introduce simple "On/Off" switchable transponders which could be used to indicate compliance. These new transponders would be issued to accounts seeking toll exemptions, while all existing

transponders would be read as tolled, regardless of their switch position.

Summary

Table 3 below presents an overview of existing policy as well as the five alternatives and their relative impacts to customers and staff. All variables for an alternative were evaluated in relation to the same variables in other alternatives; rank terms such as “highest” and “lowest” are not necessarily indicative of a number value as an in-depth quantitative analysis has not yet been conducted. Regardless of which alternative is selected, a limited-term pilot program could evaluate the effectiveness of any toll policy revision that the Board considers.

Figure 5: Overview of Five Alternatives and Impacts

		Customers		LA Metro – Occupancy Violations		LA Metro - Implementation		
Alternative	**Summary**	**Ease to Attain Toll Exemption**	**Expected Vanpool/ Carpool Participation Rate**	**Ease to Enforce Occupancy Requirements**	**Occupancy Violator Rates**	**Cost to Implement**	**Back Office Process Impacts**	**Lane System Impacts**
Existing Status Quo- HOV 2 and HOV 3+ toll exemption policies are in place. Transponder: FasTrak Flex set at 2 or 3+	Any HOV 2 or 3+ vehicle with FasTrak Flex set to 2 and 3+ receives toll exemption (with exception of HOV 2 on I-10 during peak hours). No other HOV discounts or exemptions. FasTrak account required of all ExpressLanes users.	**High** (no change)	**1.5% of all traffic** (Vanpool, on average)	**Low** (Assumes ODS)	**High** (I-10: 28-38% I-110: 19-37% Note: these estimates are without ODS)	**Low** (Current contract plus costs for ODS)	**Low** (Current operation, plus ODS Business Rules and SOPs)	**Low** (Current plans to introduce ODS)
Alternative 1 - All 5+ occupancy vehicles are eligible to receive toll exemption. Transponder: FasTrak Flex set at 2 or 3+	Any 5+ occupancy vehicle with FasTrak Flex set to 2 or 3+ is eligible for the toll exemption. Similar to existing policy, only adjusted to revise the definition of HOV to mean five or more occupants. FasTrak accounts required of all ExpressLanes users.	**Moderate** (considerable change to individual travel habits)	**Highest** (HOV 5+ would still make up very small percent of all traffic)	**Low** (Assumes ODS)	**Lower** (Assumes ODS)	**Low to Moderate** (Adds temp staffing, comm. plan rollout, system and website mods)	**Low to Moderate** (Increased customer confusion and associated complaints)	**Moderate** (Assumes ODS, and algorithm associated system mods)
Alternative 2 – Pay-By-Plate; all 5+ occupancy vehicles with HOV-specific decal are eligible to receive toll exemption. Tolling to be tiered (plate only / FasTrak / decal). Transponder: Optional FasTrak Flex set at 2 or 3+	Any 5+ occupancy vehicle that has applied for and installed a decal indicating its HOV status is eligible to receive toll exemption. Tolls will be highest for PBP customers, while FasTrak users will receive a discount from the higher rate. FasTrak not required of ExpressLanes users.	**Moderate** (considerable change to individual travel habits)	**High** (HOV 5+ would still make up very small percent of all traffic)	**Moderate** (Assumes ODS; decal system and PBP adds complexity)	**Low to Moderate** (Assumes ODS, decal system and PBP adds complexity)	**Moderate to High** (Costs from Alt 1 plus added PBP costs and decal system costs)	**High** (Issues from Alt 1 plus added issues from PBP and decal read errors, also system mods)	**Moderate** (Similar to Alt 1)

		Customers		LA Metro – Occupancy Violations		LA Metro - Implementation		
Alternative	**Summary**	**Ease to Attain Toll Exemption**	**Expected Vanpool/ Carpool Participation Rate**	**Ease to Enforce Occupancy Requirements**	**Occupancy Violator Rates**	**Cost to Implement**	**Back Office Process Impacts**	**Lane System Impacts**
Alternative 3 - All 7+ occupancy vehicles are eligible to receive toll exemption. Transponder: FasTrak Flex set at 2 or 3+	Any 7+ occupancy vehicle with FasTrak Flex set to 2 or 3+ is eligible for the toll exemption. Similar to existing policy, only adjusted to revise the definition of HOV to mean seven or more occupants. FasTrak accounts required of all ExpressLanes users.	**Low** (significant change to individual travel habits)	**Low** (HOV 7+ would likely make up a smaller percentage of all traffic)	**Low** (Assumes ODS)	**Lower** (Assumes ODS)	**Low to Moderate** (Costs from Alt 1)	**Low to Moderate** (similar to Alt 1)	**Moderate** (Similar to Alt 1)
Alternative 4 - All 5+ occupancy vehicles that maintain reporting requirements (to be determined by staff) are eligible to receive toll exemption. Transponder: FasTrak Flex set at 2 or 3+	Any 5+ occupancy vehicle with FasTrak Flex set to 2 or 3+ is eligible for the toll exemption; however, to receive that exemption they must report statistics to staff on a monthly basis (ridership, mileage, origin and destination, etc.). FasTrak accounts required of all ExpressLanes users.	**Lower** (significant change to individual travel habits)	**Low** (HOV 5+ would likely make up a smaller percentage of all traffic)	**Moderate** (Assumes ODS with added registration issues)	**Lower** (Assumes ODS)	**Moderate** (Similar to Alt 1, with added registration issues)	**Moderate** (Similar to Alt 1, with added registration issues)	**Moderate** (similar to Alt 1)
Alternative 5 – Only LA Metro Vanpool Program-registered vanpools are eligible to receive toll exemption. Transponder: FasTrak Flex set at 2 or 3+	Only those customers registered through LA Metro's Vanpool Program and with FasTrak Flex set to 2 or 3+ would be eligible to receive toll exemption. FasTrak accounts required of all ExpressLanes users.	**Lowest** (radical change to individual travel habits)	**Lowest** (Metro Vanpools would likely make up a much smaller percentage of all traffic)	**Moderate to High** (Assumes ODS with added registration issues and Metro exclusivity)	**Lowest** (assumes ODS)	**Moderate to High** (Assumes ODS with added registration issues and Metro exclusivity)	**Moderate to High** (Assumes ODS with added registration issues and Metro exclusivity	**Moderate** (similar to Alt 1)

7. Recommended Alternative

Based on this analysis, **Alternative 1 (all 5+ vehicles toll-exemption eligible)** is the recommended alternative. From a customer perspective, this option offers the highest ease of use, as those customers likely to use the program would probably already own a FasTrak transponder and account in good standing. Alternative 1 follows similar usage of those accounts and transponders to the existing condition, so customers will not have to become accustomed to new processes. Customers wishing to receive a toll exemption would need to become accustomed to the habitual use of the occupancy declaration app or website. Ease of use could be marketed to potentially new ExpressLanes HOV5+ Vehicle Pool participants through an ongoing and aggressive education and outreach plan. As this alternative has the lowest barrier to entry for receiving toll exemption, it has the greatest potential to lower congestion in the ExpressLanes as more travelers may switch to this Express HOV 5+ mode of transport.

Metro could see the greatest impact at the lowest cost with Alternative 1. The ease to implement this alternative is relatively low as the necessary infrastructure is in place, though some revision of software would be required. Back office revisions would be required to allow those vehicles meeting the requirements to receive the toll exemption and staff would need to be trained on the new policies, which are not radically different from existing. The cost to implement this alternative is relatively lower than some of the others with the primary costs outside the occupancy verification system being those associated with public education on the proposed program and cost to train staff. Due to its ease of use for the traveling public, this alternative has the highest potential to convert existing 2 and 3+ occupancy vehicles to 5+ occupancy vehicles, thereby reducing congestion for all expressway users. With that said, it should be assumed that some of those 2 and 3+ users will continue using their current mode of travel while splitting the tolls among the occupants.

Automated in-lane vehicle occupancy detection systems (ODS) are a potential solution to occupancy violations, with positive outcomes from a few pilot programs that were studied. These occupancy detection systems could be a significant contributor to increased HOV usage, as those former occupancy violators may move to higher-occupancy vehicles to avoid tolls. Without the occupancy detection system, and with reliance upon existing occupancy enforcement methods, the Board can expect to experience similar occupancy violation rates as it does now. Once occupancy violators experience being caught for every violation as a result of ODS implementation, occupancy violations would likely be kept to an absolute minimum.

A pilot program using an occupancy detection system is in the initial stages on the I-110 ExpressLanes. Upon completion of the pilot program with ODS, further study and analysis of the I-110 pilot program should be undertaken to determine any operational or enforcement benefits that may be gained with the installation of an occupancy detection system on the I-10.

8. Impact Analysis

Summary Results from Simulation and Economic Analysis

To evaluate the potential anticipated outcomes associated with a policy change for the I-10 ExpressLanes wherein all vehicle types except vanpools and passenger buses are subject to tolls (noting that clean air vehicles would continue to qualify for a toll discount), a micro-simulation model was constructed of the entire I-10 ExpressLanes corridor, calibrated to current traffic/toll data, and analyzed under a future policy scenario as described.

To provide early results as rapidly as possible, the analysis team identified and implemented several assumptions and constraints which were determined to be reasonable by experts in the areas of toll modeling, demand modeling, and traffic simulation modeling. Consequently, as with any findings produced during the sketch-planning stages of project evaluations, these results and outcomes must be considered only preliminary and approximate in nature. For example, this simulation focused only on the AM Peak (6–9 AM) and PM Peak (4–7 PM) periods of a typical business day only; therefore, the results presented here are based upon analysis of these critical travel periods only.

ExpressLanes Outcomes

Preliminary results from our accelerated analysis methodology suggest the following outcomes for the ExpressLanes:

- **Throughput:** An increase in ExpressLanes person throughput by 600 persons per day, corresponding to an increase of 4%.
- **Travel time:** An average increase in end-to-end travel times by an estimated 51 seconds. The travel time increase was mostly caused by queueing in the eastbound direction during the PM Peak at the east end of the ExpressLanes, where traffic merges back into the general purpose lanes. This could be mitigated by extending the ExpressLanes farther along I-10 in the future.
- **Transit performance:** The simplified modeling approach did not afford sufficient analytical fidelity to obtain insight into transit-specific performance outcomes. In the preliminary analysis results, transit performance remained effectively unchanged between the present and future scenarios.
- **Toll Rates:** An increase in average per-mile toll rates by $0.20/mile. Part of the increase is a result of the fact that current toll rates are subject to a toll cap (which artificially suppresses the average per-mile rate to levels that are lower than necessary to effectively control congestion in the ExpressLanes), whereas toll rates in the future scenario were unconstrained. This increase in average toll rate is also influenced by the fact that in the future scenario, the ExpressLanes provide a more substantial travel time savings compared to the general purpose lanes, which drives up demand for the ExpressLanes and results in higher toll rates to ensure the lanes continue to flow freely.

General Purpose Lanes Outcomes

Preliminary results from our accelerated analysis methodology suggest the following outcomes for the general purpose lanes:

- **Travel Times:** An overall average increase in vehicle trip times of four minutes. Some eastbound travel times in the PM Peak period exhibited more pronounced growth than other directions and times of day, with an average PM Peak travel time increase of 21 minutes. This could be mitigated by extending the ExpressLanes farther along I-10 in the future, as the majority of this added travel time is the result of ExpressLanes traffic merging back into the freeway general-purpose lanes at the current terminus of the lanes at I-605 (a pre-existing bottleneck location in the Eastbound direction). For context, the corridor-wide travel times currently fluctuate above their average levels by as much as 26 minutes from day to day during peak periods due to stochastic effects. [38]

Corridor-Wide Outcomes

Preliminary results from our accelerated analysis methodology suggest the following outcomes for the complete corridor:

- **Fuel Consumption:** An additional daily consumption of 3,300 gallons of gasoline. This could be offset through investment of toll revenues into programs that improve air quality, such as conversion of Freeway Service Patrol vehicles to clean propulsion technologies, or provision of additional incentives for transit riders. For context, California motorists consume approximately 40,000,000 gallons of gasoline per day. [39]
- **Emissions:** An additional emissions cost of $1,200 per day for the corridor. This could be offset through investment of toll revenues into programs that improve air quality, such as investment in freeway landscaping improvements to increase tree densities along the corridor. For context, Los Angeles motorists produce approximately $1,761,643 in emissions costs per day. [40]

Supplemental Economic Analysis

For additional insight into the impacts of this alternative tolling strategy, a supplemental sketch-planning economic analysis (based on demand and toll models only) was also performed to assess the value of the estimated changes in travel times between the current and future scenarios. It showed that the true mobility cost of congestion on the corridor would decline substantially under the new proposed toll policy, from $9.2 million initially to $5.5 million in the future scenario, for an overall daily economic savings across all corridor users of $3.7 million.

Interpretation

The core benefit of the future toll scenario is the consistent availability of a faster and more reliable travel option to everyone on the corridor whenever it is needed. While this benefit comes at a travel time cost to the general-purpose lanes, the overall effect is a significant cost

savings to the users of the corridor in the form of improved trip performance and reliability for the trips with the highest value to travelers at all times. The new proposed toll policy also affords other tangible benefits that, while outside the scope of the current analysis, are worth noting:

- Substantial improvement in travel time reliability for high-priority trips through increased availability of the ExpressLanes as a fast and predictable alternative to the highly variable conditions in the general purpose lanes. This translates into less of a need for travelers to budget additional buffer time in their trips to ensure they arrive on time to their most important events.
- Faster response times for emergency vehicles and Freeway Service Patrol vehicles, which results in faster clearing of incidents and reduced delays to all roadway users.
- Simplified enforcement of toll policies to reduce leakage, thereby increasing fairness and reducing the need for enforcement stops that cause disruptions to smooth traffic flow.

Additionally, several mitigation measures can be employed to offset any adverse impacts of this policy change, including investment of additional toll revenues in:

- Transit improvements and incentives, such as more frequent service, fare subsidies/discounts, or enhanced onboard amenities.
- Improved incident management strategies on the corridor to address traffic delays caused by incidents and to improve travel time reliability in the general purpose lanes.
- Corridor infrastructure that targets the external impacts of traffic including emissions, noise, and road surface degradation.

9. Conclusion

Overall, Alternative 1 (all 5+ vehicles toll-exemption eligible) offers the highest ease of use, in addition to the greatest impact at the lowest cost. As this alternative has the lowest barrier to entry for receiving toll exemption, it has the greatest potential to lower congestion in the ExpressLanes as more travelers may switch to this Express HOV 5+ mode of transport resulting in a faster and more reliable travel option.

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METRO EXPRESSLANES
MOTION RESPONSE #43
I-10 EXPRESSLANES PILOT PROGRAM

Board of Directors – Ad Hoc Congestion, Highway and Roads Committee

January 16, 2019

Board Motion and Response

Director Fasana's motion, amended by Director Solis, requests development of an I-10 ExpressLanes Pilot that increases the toll-free occupancy requirements from HOV2+/HOV3+ to vanpools and transit vehicles only, as a means of preserving the ExpressLanes as a fast, reliable travel option for transit users and all corridor travelers.

- This is Metro staff's report back on:
  - Potential effects of implementing this pilot
  - Key decision points and milestones for implementation
  - Solicitation of feedback and evaluation of potential impacts associated with this pilot, with focus on low-income commuters
- Recommended Action: Authorize the development of an implementation plan for the I-10 ExpressLanes Pilot Program

Metro

Summary of Item 8

In the **I-10 ExpressLanes,** the following vehicles travel toll-free:

CURRENT	PROPOSED
HOV 3+ DURING PEAK PERIODS HOV 2+ DURING OFF-PEAK PERIODS	HOV 5+ AT ALL TIMES

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Historical Context

1973: Facility initially opens as a busway.

1974: HOV3+ vehicles temporarily allowed in busway during a 3-month transit strike.

1976: HOV3+ vehicles allowed to use busway during peak periods.

1981: HOV3+ vehicles allowed to use busway at all times.

2000: HOV2 vehicles allowed to use busway during non-peak periods.

2013: Busway converted to ExpressLanes.

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I-10 ExpressLanes Performance Challenges

58%

increase in ExpressLanes trips

from 10,093,413 in FY14 to 15,924,317 in FY18

201%

increase in HOV-Only minutes

from 1,101 in FY14 to 3,314 in FY18

12.5%

decrease in AM Peak ExpressLanes speeds

from 60.8 mph in FY14 to 53.2 mph in FY18

- Additional I-10 travel time has been added to the Metro Silver Line schedule to keep buses on time.
- Up to 19% of Foothill Transit Silver Streak buses operate behind schedule.
- Significant proportion of traffic mis-representing vehicle occupancy to improperly obtain toll-free travel.

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Potential Effects of Implementing Pilot

- Overall mobility benefit of approximately **$3.7 million per day** in time/delay cost savings corridor-wide.
- Increase in ExpressLanes person-throughput by **600 persons/day** (a 4% increase for ExpressLanes throughput)
- Increase in end-to-end travel times in the general-purpose lanes by **4 minutes** on average.
- Increase in congestion of the eastbound I-10 ExpressLanes at I-605 due to forced merging into the general-purpose lanes.
- Improvements in transit travel time reliability, based on qualitative evaluation by subject area experts.
- Provision of a more long-term sustainable toll strategy that is less susceptible to congestion—especially congestion caused by vehicles that mis-represent occupancy.

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Impacts to Low-Income Commuters

Survey findings from 479 low-income commuters on I-10

- Very few (3%) have ever used a vanpool on the I-10 ExpressLanes.
- Approximately 50% currently use the I-10 ExpressLanes.
- Under the proposed pilot, respondents indicated they would do the following:

	Would use the ExpressLanes			Would use the General Purpose Lanes
	As SOV/HOV	As transit	As vanpool	
Current ExpressLanes Users	41%	13%	21%	23%
Current General Purpose Lane Users	18%	5%	17%	56%

*Rows will not sum to 100% due to some respondents indicating "another form of transportation" which could include active transportation.

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Vanpool Program

- Federally registered vanpool programs require participants to lease vehicles with seating capacity of at least 7 persons. This is a potentially significant barrier to participation.
- To facilitate vanpool participation, staff recommends that the occupancy threshold for toll-free passage be set to 5 persons per vehicle.
- Staff will explore strategies to further incentivize vanpooling for commuters.

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Timeframe Considerations

Integration will be required with the **new Back Office System,** expected to come online by early 2020.

Comprehensive outreach strategy to all customers and corridor users requires substantial time to complete.

Significant lead time required to engage a **third-party contractor** to verify vanpools & handle toll exemptions.

Before-and-after study requires a considerable data collection period before go-live.

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Key Decision Points and Milestones

- **Obtained concurrence from Caltrans and FHWA**
  - As a condition of concurrence, FHWA requires a before-and-after study and significant public outreach.
- **Collect and analyze additional data** on
  - Effects on transit operations
  - Barriers to ExpressLanes, transit, and vanpool usage
  - More detailed assessment of low-income impacts
- **Develop a formal implementation plan and return to the Board with recommendations in 12–15 months.**
  - Optimal method of verifying vanpools and handling toll exemptions through integration with ExpressLanes Back Office
  - Determine cost associated with implementation

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$1.4 M

total anticipated cost