METROPOLITAN

TRANSPORTATION

COMMISSION

Memorandum

TO: Operations Committee   DATE: April 5, 2019

FR: Executive Director   W.I. 1237, 6840

RE: <u>Vehicle Occupancy Enforcement Program:</u>
  i. <u>Contract Amendment – HOV Violation Enforcement Services: California Highway Patrol (CHP) ($600,000)</u>
  ii. <u>Smartphone App-Based and Camera-Based Occupancy Verification Systems Update</u>

This memo requests approval for a $600,000 contract amendment with CHP to continue enforcement of the I-80 HOV lanes between the Bay Bridge and Carquinez Bridge in FY 19-20. In addition, this memo provides a follow-up to the November 2018 Operations Committee meeting, at which the Committee asked staff to continue to explore and report back on two tools (smartphone app-based and roadside camera-based systems) that are as yet unproven but that seem to have the potential to improve enforcement of occupancy requirements in express lanes and high occupancy vehicle (HOV) lanes.

CHP HOV Violation Enforcement Services in I-80 HOV Lanes

In June 2018, this Committee approved a $1.2 million contract amendment with CHP for HOV violation enforcement services on I-80 between the Bay Bridge and Carquinez Bridge in FY18-19 for reasons that remain applicable today:

- These HOV lanes are degraded, meeting federal speed requirements less than half of the time.
- These HOV lanes connect the Bay, Carquinez, and Richmond-San Rafael Bridges, thus improving HOV lane operations for commuters at multiple bridges.
- These HOV lanes will be the last ones in MTC's authorized network to be converted to express lanes; in the meantime, CHP is the best option for improved performance.

Staff recommends continuing this program under which CHP has caught a large number of carpool cheaters. In February 2019, CHP issued 1,900 citations and warnings (roughly 95 each weekday), of which 75% were for HOV occupancy violations. Staff anticipates $250,000 to $400,000 of unused carryover funds from FY18-19, and requests this Committee approve a $600,000 contract amendment for I-80 enforcement services in FY19-20, subject to future budget adoption, for a total FY19-20 budget between $850,000 and $1 million.

Smartphone App-Based Occupancy Verification Tool

In November 2018, the Committee asked staff to provide more information before piloting app-based occupancy verification tools. Broadly speaking, these apps are used by carpool drivers and passengers to report and verify the number of vehicle occupants. BAIFA issued a Request for Information (RFI) to more than 50 firms in January 2019 to learn more about the technology, existing use, and questions raised by the Committee in relation to privacy, inclusion of children and those without smart phones, and ability to prevent cheating. BAIFA received six submittals from firms representing a broad range of product maturity: Cambridge Transportation Labs, GoCarma, Hytch, Rideflag, Seamgen and TKLABS. Staff held discussions with the four firms that have relatively more mature products.

Detailed findings are summarized in Attachment A, but key takeaways include:

- <u>Product Maturity</u>: Firms are in different stages of product development.
- <u>Added-Value</u>: Occupancy verification can be combined with other app-based features like carpool matching, behavioral incentives and/or toll payment to deliver added-value for users.
- <u>Device Requirements</u>: At least one person must have a smartphone (not necessarily the driver). To address persons without a smartphone (including kids), either a proxy device is provided or one person's smartphone camera is used to verify all occupants.
- <u>Managing Cheating</u>: Apps may not identify cheaters immediately, but use pattern recognition to look for violations over time. Apps can identify if two smartphones are always near one another, which could be the basis to take an action like send a warning, charge the full toll or temporarily suspend discount privileges. Some apps use a phone's camera to capture real or proxy images of carpool participants (some without saving the image) and/or as a second-level verification to guard against one person having multiple phones. The combination of technologies, rules of use and data analysis can make it hard to cheat using the apps over time.
- <u>Privacy/Data Security</u>: Firms suggest limiting the type of data collected and/or automatically purging data, and have restrictions on sharing, selling and distributing data. An app provider would need to comply with MTC's Personally Identifiable Information (PII) policy.
- <u>Testing/Deployment Approach</u>: Testing/Deployment should focus on toll bridges or express lanes first to cost-effectively utilize existing infrastructure, e.g., license plate cameras and communications systems used today to catch toll cheaters. Deployment on HOV lanes poses a significant challenge, as it would require: license plate camera installations; a change in policy that <u>all</u> carpools <u>must</u> use the app; and the need for CHP to automatically issue citations (not currently allowed per California law).

Staff finds the apps sufficiently promising to proceed with a pilot to gauge public acceptance, verify accuracy and gain experience with the systems, including privacy considerations and cheating deterrence. The voluntary pilot would provide an incentive to carpoolers to use the app in a designated express lane corridor. The expected time frame for pilot completion is approximately one year from contract award.
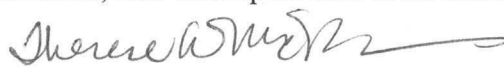
Camera-Based Occupancy Verification Tool

In November 2018, staff reported on the Phase 1 pilot, in which three vendors installed and tested camera-based systems. These systems use machine learning to count the number of vehicle occupants in images taken from the roadway median. Staff is working to identify a location at an existing toll bridge or express lane for a Phase 2 pilot. The pilot would include integration with existing toll systems to determine the feasibility of using camera-based technology to assess a vehicle's occupancy to collect the proper toll amount due.

Recommendation

Subject to future budget approval, staff requests this Committee authorize the Executive Director, or designee, to negotiate and enter into a contract amendment with CHP to enforce vehicle occupancy in the I-80 HOV lanes between the Bay Bridge and Carquinez Bridge for one year in a not-to-exceed amount of $600,000.

Staff will continue to develop and seek funding for pilots of the smartphone app and camera-based occupancy verification tools to test functionality and cost-effectiveness, and will report back at the next major milestones.

Therese W. McMillan

Attachments:

- Attachment A: Smartphone App-Based Occupancy Verification System RFI Key Findings

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Smartphone App-Based Occupancy Verification System RFI Key Findings

Topic	Key Findings
Technology	1. **Flexible Solution** – Apps have been built for both Apple iOS and Android platforms. Depending on the firm, app solutions detect the number of vehicle occupants during a particular trip by pairing smartphones and proxy devices using Bluetooth and GPS, and/or by using facial recognition software. There would be no need for manual image review. 2. **Catch Cheaters Over Time** – In general, an app-based solution may not identify a cheater the first time, but after multiple trips, a digital record builds up that can be analyzed. Apps use pattern recognition to look for potential violations. For example, on a toll facility, apps have the ability to identify if two smartphones are always near one another, which could be the basis to send the driver a series of warnings to justify eventually charging a full toll or suspending discount privileges for a period of time. Different apps have different solutions for potential cheating scenarios depending on their technology. For example, some apps use a smartphone's camera to capture real or proxy images of carpool participants who do not have smartphones or as a second-level verification to guard against one person having multiple phones. Built-in technology could protect against the use of mannequins or photographs to cheat the system by looking for facial movement. Overall, some firms have well thought-out solutions that could significantly increase compliance with occupancy rules. 3. **Solutions for Users without Smartphones** – At least one person in the vehicle must have a smartphone (not necessarily the driver). Most firms have options for people without smartphones such as proxy devices or using the camera feature to document the number of people in the vehicle (which could work for children). 4. **Potential to support CHP enforcement** – Subject to a change in California law, apps could potentially be used to provide a list of repeat cheaters' license plate numbers to CHP for targeted enforcement.
Personally Identifiable Information (PII) & Data Security	1. **Limits on PII** – In addition to personal app profile data (i.e. name; address; cellphone; email; license plate and/or toll tag and/or toll account; photo), app users would agree to have their location (when using the app), vehicle occupancy and possibly other data tracked. Most firms appear sensitive to how much data is collected, and some suggest minimizing it. All firms appear amenable to restrictions on sharing, selling or giving away data. Some would share PII with MTC as they consider it to be MTC's data, while others would only share anonymized or aggregated data. 2. **Data Security** – Firms mention 'best practice' measures like device and in-transit data encryption, secure hosting facilities and automatic data purges.

Topic	Key Findings
Pilot & Deployment	1. **Phase 1 Pilot** – Multiple firms recommended a minimum 3 months of operation and 500 to 1,000 participants with incentives for participation. Firms also recommended responsive customer support to quickly surface issues with app implementation so pilot participants have a positive experience. 2. **Integration** – Using an Application Programming Interface (API), apps can provide access to a list of verified vehicles to either the express lanes toll system integrator or the FasTrak® customer service center. While integration won't be needed for the Phase 1 pilot, multiple firms suggested pre-planning how integration could work in Phase 2 as part of the Phase 1 pilot. 3. **Tolled Facilities First** - App-based systems will be easier and more cost-effective to deploy in tolled facilities than HOV lanes because tolled facilities already have toll tag (or account) requirements for customers and license plate cameras to automatically identify violators. For HOV lanes, all vehicles would need to use an app, and license plate cameras would need to be installed for automated enforcement and/or CHP would need to perform enforcement against suspected violators (i.e. people without the app or people who try to cheat the app). The region should focus on toll facility applications first. 4. **Allow Time to Consider the Details of How The App Works** – There is a lot of functionality that can be built in to an app, and the functionality can be turned on or off. There are trade-offs between customer convenience and enforcement rigor. Decisions about the rules of using an app can take a while to make, and should be allotted sufficient time in the schedule.
Cost	1. **Estimated Phase 1 Pilot Cost** – Staff estimates the Phase 1 pilot may cost from $750,000 to $1,000,000. This estimate assumes 500+ participants for 3 months, including: app licensing, set-up, customization, hardware/devices, and project management; recruitment and incentives; customer service; evaluation; and pre-planning for Phase 2. 2. **Phase 2+ Costs** – Beyond Phase 1, costs are uncertain. Different firms suggested different compensation models, which included a mix of components such as one-time costs, annual software licensing/subscription costs, hourly software customization costs and/or transaction fees.

Work Item No.:	6861
Contractor:	California Highway Patrol (CHP) Sacramento, CA
Work Project Title:	High Occupancy Vehicle (HOV) Violation Enforcement Services
Purpose of Project:	Improve I-80 HOV lane performance.
Brief Scope of Work:	Enforce vehicle occupancy requirements in the I-80 HOV lanes between the Bay Bridge and Carquinez Bridge.
Project Cost Not to Exceed:	$600,000
Funding Source:	Toll Bridge Rehabilitation Program Funds
Fiscal Impact:	Funding is subject to approval of the FY 2019-20 BATA Budget.
Motion by Committee:	That the Executive Director or designee is authorized to negotiate and enter into a contract amendment with the California Highway Patrol to enforce vehicle occupancy requirements as described above and in the Executive Director's memorandum dated April 5, 2019, and the Chief Financial Officer is directed to set aside funds in the amount of $600,000 for such an amendment, as specified above.

Operations Committee:

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 Dave Cortese, Chair

Approved: Date: April 12, 2019