

# C/CAG AGENDA REPORT

**Date:** March 12, 2015  
**To:** C/CAG Board of Directors **ITEM 6.4**  
**From:** Sandy Wong, Executive Director  
**Subject:** Receive a presentation and provide comment on the San Mateo US 101 Express Lane Feasibility Study

(For further information or questions contact Sandy Wong at (650) 599-1409)

---

## **RECOMENDATION**

That the C/CAG Board of Directors receive a presentation and provide comment on the San Mateo US 101 Express Lane Feasibility Study.

## **FISCAL IMPACT**

Total cost for this feasibility study is \$80,000, shared by C/CAG and MTC on a 50/50 basis. C/CAG share of the funding is from the Transportation Fund.

## **BACKGROUND**

On May 8, 2014, the C/CAG Board authorized a joint effort with the Metropolitan Transportation Commission (MTC) to conduct traffic analysis for Express Lanes on US 101 from the Santa Clara County Line to I-380.

As the first step, this Feasibility Study focuses only on traffic analysis to evaluation traffic operational benefits of express lanes. There will be other issues such as inter-agency coordination, equity, policies, required legislation, maintenance, enforcement, toll technology, and revenue projection, etc. to be considered before an express lane is implemented.

The Feasibility Study evaluated two Concepts:

Concept 1 assumes to convert a carpool lane to express lane.

Concept 2 assumes to convert an existing general purpose lane to express lane.

The CMP Technical Advisory Committee (TAC) received a presentation of the Feasibility Study at their February meeting. The CMP TAC favored Concept 1. They also suggested additional efforts spent on further analyzing Concept 2 should be minimized due to potential additional travel time delay and potential impact on local streets.

The CMEQ committee received a presentation on the Feasibility Study and made the following comments: Need to analyze how many people to be taken off the road to make the concepts work; can transit absorb the load, and how much would it cost; Concept 2 appears to make congestion worse.

**ATTACHMENT**

San Mateo US 101 Express Lane Feasibility Study (Executive Summary)

## EXECUTIVE SUMMARY

In June 2012, a Staged Hybrid HOV Lane Study was completed that analyzed the feasibility of extending the HOV lane on US 101 from Whipple Avenue in Redwood City to I-380 in San Bruno, a distance of approximately 13 miles. The City/County Association of Governments of San Mateo County (C/CAG) is moving forward on a Project Study Report – Project Development Support (PSR-PDS) for the project. The purpose of this study is to perform a preliminary high level conceptual feasibility assessment of two express lane options for the same segment of US 101, to help determine if these additional options might have some fatal flaws that might preclude them from meriting further detailed analyses.

The two concepts are:

- Concept 1: HOV-to-Express Lane Conversion (Hybrid HOT). This concept assumes the same freeway cross section as the proposed Staged Hybrid HOV Lane option from the feasibility study (which involves limited lane additions to the freeway), and converts the HOV Lane into an Express Lane.
- Concept 2: Optimized Express Lane (Convert HOT). This concept retains the current freeway cross section (i.e. no additional widening), and converts the number one (leftmost) general purpose lane directly into an Express Lane.

## ASSUMPTIONS AND APPROACH

Since this was a conceptual feasibility study to determine if the two concepts had potential fatal flaws that might preclude them from consideration for further analysis, the general approach for this study was to use available data, information, and traffic models from the 2012 study, so that the new results can be compared to the older results on a consistent basis. This includes applying the previous 2040 traffic forecast developed for the Staged Hybrid HOV Lane for Concept 1, and extrapolating the previous 2030 convert HOV lane traffic forecast to 2040 conditions, for Concept 2. In addition, traffic operations analysis was focused primarily along the US 101 mainline, with a high-level assessment of other major roadways using information produced by the C/CAG travel demand model.

The study began with an assessment of available capacity in the HOV/express lane to carry additional tolled single occupancy vehicles. Next, freeway traffic operations analysis was conducted using previously calibrated FREQ models for the two concepts.

A secondary assessment was then conducted to determine what demand shifts would be necessary under Concept 2 to achieve the same freeway performance improvements as Concept 1, should the objective of the reviewing agencies be to maintain the performance benefits expected under Concept 1. Using the operations analysis results, a sensitivity analysis was conducted to estimate the needed mode, route and time shifts for Concept 2 to achieve freeway performance that is similar to Concept 1.

Finally, preliminary conceptual cost estimates for both concepts were developed for comparison purposes.

## KEY FINDINGS

Under both concepts there is not a great deal of excess capacity in the express lane during the AM and PM peak periods that could be sold to single occupant vehicles. In general, available capacity for tolled vehicles would occur during the shoulder peak hours, such as before 7 AM, after 9 AM, before 3:30 PM, and after 6:30 PM. In addition, some sections of the express lane would have no capacity for the entire peak period. Availability for tolled vehicles is summarized as follows:

- Northbound AM: up to 450 vph (for 2 hours out of the 4 hour AM peak period).
- Northbound PM: up to 280 vph (for 2 hours out of the 5 hour PM peak period).
- Southbound AM: up to 870 vph (for 2 hours out of the 4 hour AM peak period), not available south of Holly Street.
- Southbound PM: up to 200 vph (for 2 hours out of the 5 hour PM peak period), not available south of Holly Street.

In terms of freeway operations results, compared to the Staged Hybrid HOV Lane option that is currently in the PSR-PDS stage, Concept 1 would provide improvements for the mixed-flow lanes. Concept 2 would result in both longer queues and higher delays for the mixed-flow lanes in most cases. Exhibit 1 provides a summary of US 101 corridor-focused mobility performance results for Year 2040 conditions.

**Exhibit 1: 2040 Freeway Corridor Performance Comparison**

Performance Measures	2040 Baseline	2040 Staged Hybrid HOV	Concept 1 - Hybrid HOT	Concept 2 - Convert HOT	Concept 1 vs Staged Hybrid HOV	Concept 2 vs Staged Hybrid HOV
VMT – vehicle miles of travel	4,925,100	5,145,600	5,166,500	4,836,400	0.4%	-6.0%
VHT – vehicle hours of travel	196,000	187,000	184,000	187,400	-1.6%	0.2%
VHD – vehicle hours of delay	120,400	107,800	104,400	113,000	-3.2%	4.7%
PMT – person miles of travel	5,197,700	5,839,900	5,901,700	5,573,000	1.1%	-4.6%
PHD – person hours of delay	120,600	109,200	105,800	113,400	-3.2%	3.8%
Average vehicle speed (MPH)	25.1	27.5	28.1	25.8	2.1%	-6.2%
Average person speed (MPH)	25.9	29.3	30.0	28.0	2.3%	-4.6%

Source: FREQ analysis, both HOV and mixed-flow lanes, AM and PM peak periods combined.

In summary, comparing Concept 1 to the 2040 Staged Hybrid HOV lane option:

- Overall US 101 freeway productivity would be slightly improved with a 0.4% increase in VMT, and a 1.1% increase in PMT.
- Vehicle hours of travel and vehicle hours of delay would be reduced by 1.6% and 3.2%, respectively.
- Average peak period speeds for both vehicle and person trips would be increased more than 2%.

Comparing Concept 2 to the 2040 Staged Hybrid HOV lane option:

- Overall US 101 freeway productivity would be degraded with a 6% decrease in VMT, and 5% decrease in PMT. This is primarily related to the reduced capacity through the corridor, as well as the predicted effect of the reduced capacity on future peak period traffic demand for the US 101 freeway.
- Vehicle hours of travel and vehicle hours of delay would be increased by 0.2% and 4.7%, respectively.
- Average peak period speeds for both vehicle and person trips would be reduced by 4% to 6%.

In terms of the time it would take to travel the entire length of study corridor on the mixed-flow lanes, Concept 2 would result in longer travel times of about 20 minutes than under Concept 1 in the northbound direction during the AM peak hour, and up to about 99 more minutes than under Concept 1 during the PM peak hour. In the southbound direction, Concept 2 would require about 55 minutes longer during the AM peak hour. Travel times would be reduced by 31 minutes during the PM peak hour.

To achieve the same improved freeway performance with Concept 2 as is predicted for Concept 1, ways must be found to discourage approximately 6,250 vehicle trips during the AM and 1,160 vehicle trips during the PM peak period from using the US 101 freeway. This is above and beyond the demand shifts already forecasted by the C/CAG demand model due to the freeway capacity constraints implicit in Concept 2.

Based on existing information provided by BART, Samtrans and Caltrain, both BART and Caltrain are near or have reached capacity during the peak commute time periods. Alternate routes, such as El Camino Real and I-280 may not have the spare capacity to accommodate additional route shifts. Assuming all trip reductions on US 101 would be shifted to buses as a worst case assessment, up to 38 additional express buses would be required during the AM peak hour, and up to 14 additional express buses during the PM peak hour to accommodate these trip reductions on US 101.

Preliminary cost estimates were developed for both concepts and are summarized as follows:

- Concept 1: approximately \$259 million, which includes costs associated with building the HOV lane (\$156 million), and with conversion from HOV to express lane (\$103 million).
- Concept 2: approximately \$346 million, which includes costs associated with conversion from an existing mixed-flow lane to express lane (\$108 million), and required operations and maintenance cost for additional transit services (\$238 million, over a 20-year period). Potential capital cost required to provide these additional services were not included in this cost estimate.

In summary, Concept 1 would provide potential traffic operational benefits for the corridor, while for Concept 2, there would be higher costs associated with providing the level of transit services required to match the freeway travel time improvements provided by Concept 1. In addition, Concept 2 would also result in increased traffic demands on other major roadways within the county, including El Camino Real and I-280.

## FURTHER CONSIDERATIONS

This study was a conceptual feasibility study designed to identify potential fatal flaws with either Concept 1 or Concept 2 that might suggest one or both should be dropped from further study. As such, this conceptual study was conducted as cost-effectively as possible by using information from previous studies, with the objective to conduct a comparison on a consistent basis with the 2012 Staged Hybrid HOV Lane study.

Based on this conceptual study, Concept 1 demonstrated better overall benefit than Concept 2, in terms of overall travel time on the US 101 mainline as well as total costs. If project budget allows, further analysis, as listed below, may provide a more comprehensive analysis to better inform decision makers.

During the study, it was discovered that there were some limitations in primarily using information from previous studies, for example, there was no feedback process between the travel demand model and the operations analysis model on travel times, which may have artificially resulted in low demand volumes on US 101 under concept 2, and in turn, the operations analysis could understate its potential effects. Also, existing traffic conditions on US 101 has changed since the 2012 study, for example, in the southbound direction during the PM peak period, additional bottlenecks have arisen along the study corridor, which in turn, could result in further operational impacts for Concept 2. Based on this initial evaluation, further analyses are suggested:

- Update existing conditions analysis and previously calibrated traffic operations models for US 101;
- Update traffic forecasts using the current bi-county C/CAG-VTA model;
- Conduct traffic operations analysis for US 101 and assess potential impacts on other alternate routes;
- Provide cost estimates to potential capital costs associated with the additional transit services for Concept 2, and also provide detailed logistics for the provision of additional transit (i.e. additional park-and-ride facilities, shuttle services to and from transit centers, etc.);
- Origin/Destination analysis of transit trips;
- Assess potential effects of private company shuttles along US 101, and their effects on future needs for additional transit busses in the corridor;
- Develop O&M (operations and maintenance) costs, and revenue analysis of the proposed express lane options.