

1. EXECUTIVE SUMMARY

The Metropolitan Transportation Commission (MTC) is working with the California Department of Transportation (Caltrans) to assist local agencies in evaluating new ramp metering projects for State Route 4 and State Route 242. KAI was tasked with completing the first phase of the study, which included working with MTC, Caltrans, Contra Costa Transportation Authority (CCTA), TRANSPAC, and TRANSPAN to:

1. Study the feasibility and effects of ramp metering on SR 4 and SR 242,
2. Develop a staging plan for implementation of ramp metering on SR 4 and SR 242, and
3. Develop recommended ramp metering rates for the initial implementation segment.

This Ramp Metering Study and Implementation Plan is the result of those efforts. The next phase of this study, should the study participants choose to proceed, would be to develop a memoranda of understanding with local agencies, monitor traffic conditions following ramp meter activation, and conduct a "before and after" study of the effects for the initial implementation segment.

The Year 2015 was selected as the base analysis year for this study as ongoing construction east of Loveridge Road on SR 4 is projected to be completed that year. Draft metering rates were developed through an iterative process of evaluation using FREQ models developed and calibrated for both SR 4 and SR 242 corridors in order to optimally balance ramp delays and queues, as well as reduce mainline travel times. For the purpose of this evaluation, it was initially assumed that all on-ramps within the study limits would be activated by 2015 with the exception of freeway-to-freeway connectors (including the I-680/SR 4 and SR 4/SR 242 interchanges).

The 2015 metering plan is summarized as follows:

- Ramp meters would be activated only in the westbound direction on SR 4 and the southbound direction on SR 242 during weekday AM peak periods (6 AM to 10 AM).
- Ramp meters would be activated only in the eastbound direction on SR 4 and the northbound direction on SR 242 during weekday PM peak periods (3 PM to 7 PM).
- All meters (with the exceptions noted below) would be set to serve the peak hour demand at each ramp. Therefore, queues would not be expected to extend beyond a few vehicles and delays would not be expected to exceed the few seconds it would take to clear the cyclic surges of traffic arriving at the ramp meter from an upstream signal. The purpose of these meters is not to reduce the flow of traffic entering the freeway, but to smooth it, which would result in an approximate 2.5% increase in capacity at freeway bottleneck locations.
- During the AM peak period in the westbound direction of SR4, optimal metering rates are suggested for on-ramps upstream of Solano Way in Concord. The purpose of these meters would be to delay the onset of the expected bottleneck at Solano Way, providing mainline travelers with travel time savings.

- During the PM peak period in the eastbound direction, optimal metering rates are suggested for on-ramps west of a bottleneck at Port Chicago Highway, as well as on-ramps along SR 242 northbound that would also feed traffic into that bottleneck.

For on-ramp locations where optimal metering rates are suggested, the rates are set so that ramp queues would be contained within available storage at the ramps during the entire peak period. In so doing, the ramp queues would not interfere with traffic operations on adjacent arterial streets.

With implementation of this metering plan, freeway mainline operations would be affected as follows:

- SR 4 westbound travel time during AM peak period would be reduced by 10 minutes on average from SR 160 to Alhambra Avenue.
- SR 4 eastbound travel time during PM peak period would be reduced by over 9 minutes on average from Alhambra Avenue to SR 160.
- SR 4 westbound to SR 242 southbound (from SR 160 to I-680) travel time during AM peak period would be reduced by over 7 minutes on average.
- SR 242 northbound to SR 4 eastbound (from I-680 to SR 160) travel time during PM peak period would be reduced by over 1 minute on average.
- Freeway system (including both mainline and ramps on SR 4 and SR 242) vehicle hours of travel would be reduced by 10% during AM peak period and reduced by 11% during PM peak period.
- The productivity of the freeway system, measured in terms of vehicle miles of travel on the freeway, would be increased by 2% in both AM and PM peak periods.
- Average travel speeds through the freeway system would be improved by 13% in the AM peak period and improved by 14% in the PM peak period.

Potential traffic diversion effects were evaluated on key intersections and arterials. Based on the assessment, the amount of potential diversion would not result in a significant change in traffic operations on those facilities.

Ramp metering would result in benefits to the overall system performance measures for all roadway facilities in both Central and East Contra Costa County—as indicated by reductions in vehicle hours of delay, vehicle miles of travel, as well as increases in average system mean speeds—during both AM and PM peak hours.

Evaluations conducted for this study demonstrated that substantial travel time savings on freeway mainline would be achieved with the implementation of ramp metering along both corridors. Therefore, it is recommended that ramp meters be activated as soon as possible.

Below is a recommended staging plan that takes advantage of the schedule of current or planned projects to repair and install new equipment along SR 4 and SR 242:

- Stage 1 – to be completed by 2013 with MTC and Caltrans' *Ramp Metering and TOS Equipment Repair and Replacement Project*:
 - SR 4 eastbound and westbound on-ramps between Solano Way and Railroad Avenue
 - SR 242 northbound on-ramps
 - SR 242 southbound on-ramps

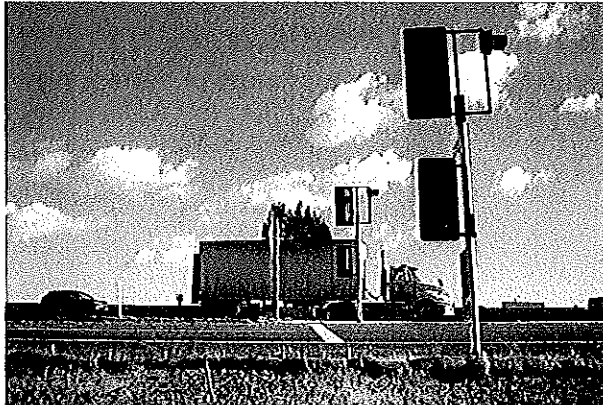
- Stage 2 – to be completed by 2015 with MTC and Caltrans' next *Freeway Performance Initiative Program (FPI), and SR 4 Widening Projects*:
 - SR 4 eastbound and westbound on-ramps west of Solano Way and east of Railroad Avenue

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Ramp metering light discussion likely to occur in 2013



Metering lights along Interstate 80, like this one at the westbound entrance of Interstate 80 at West Texas Street, remain inactive but Caltrans is seeking to reach an agreement with the city that could turn them on. (Robinson Kuntz/Daily Republic)

By Barry Eberling

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FAIRFIELD — Metering lights along local Interstate 80 have sat inactive ever since they were installed more than a year ago, but that could change in 2013.

At the very least, the lights should be the topic of local discussion and perhaps public hearings.

The state Department of Transportation installed metering lights along I-80 on ramps in Fairfield in 2011 as part of the car pool lane project. It also directed Fairfield to install metering lights as part of the city's North Texas Street interchange renovation project completed in 2010. It plans to install more in Vallejo and in Vacaville.

Caltrans is seeking operating agreements with the local cities to turn the lights on, Solano Transportation Authority Executive Director Daryl Halls said. The Fairfield, Vacaville and Vallejo city councils would vote on those agreements.

In addition, Caltrans wants an agreement with the Solano Transportation Authority to turn on the metering lights on the ramps between Highway 12 and I-80 — what Halls called the “freeway-to-freeway” connections.

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A Metropolitan Transportation Commission consultant has been gathering traffic data associated with the local lights. Halls expects the information to be released early next year.

"We want to make sure any impact on the local jurisdictions gets considered," Halls said.

For example, he noted there is a metering light along the ramp leading from Highway 12 in Jameson Canyon onto I-80.

"Obviously, I-80 is a big priority of the state," Halls said. "But we also don't want to create traffic backup on Highway 12."

Some of the local on ramps are short, Halls said. Again, the goal is to make certain that ramp metering lights don't back up traffic onto local roads.

Among the things to be decided is what hours the metering lights would operate and at what intervals the signals would change.

"There's going to be a big discussion early next year and probably through the summer," Halls said. "I just don't know how long it would take."

Ramp metering is a component of what the Metropolitan Transportation Commission calls the Freeway Performance Initiative. The stated goal is to get more capacity out of existing roadways.

Another component of the initiative slated to come to the local I-80 stretch at some point is more traffic information signs similar to the one near Green Valley.

Caltrans first began looking at metering lights during the 1960s in Southern California on Interstate 101. Today, the Los Angeles/Ventura area has meters at 900 ramps and 23 freeway-to-freeway connections, according to a Caltrans report.

The goal of ramp metering lights is to improve freeway traffic flow by spacing out the vehicles that enter.

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