



Caltrans Division of Research,
Innovation and System Information

Research

Results

Design

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Project Title:

Before Richmond-San Rafael Bridge
Access Improvements Evaluation Study

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Before Richmond-San Rafael Bridge Access Improvements Evaluation Study

Measure the level of success for each individual improvement made

WHAT IS THE NEED?

At four miles in length, the Richmond-San Rafael Bridge is one of the major over-water crossings in the San Francisco Bay Area. This crossing carries I-580 and connects the Alameda and Contra Costa Counties of the East Bay Region with Marin County on the coast. In its current configuration, each direction of travel only accommodates two traffic lanes, plus an additional shoulder lane for breakdowns and emergency access. As a result of significant growth in traffic volumes, this configuration often lead to significant delays and queues at the bridge approaches during commute hours. In particular, the eastbound PM commute traffic from Marin County often experiences substantial delays, with queues spilling over onto local streets and arterials.

To alleviate the eastbound congestion, Caltrans has decided to pilot the use of the eastbound shoulder lane for general travel during weekday PM peak periods, expanding capacity of the bridge from two to three lanes. While this capacity increase is expected to reduce eastbound travel times, there are potential pitfalls as the shoulder lane will no longer be available to accommodate broken down vehicles, causing them to sit in a general traffic lane. Along with these changes, Caltrans is also proposing to install a removable barrier in the westbound direction (upper deck) to separate the general-purpose lanes from the shoulder and to enable the creation of a multi-use path that will accommodate bicycles and pedestrians. Concerns surrounding the elimination of the westbound shoulder lane are similar to those associated with the eastbound lane in that broken down vehicles will no longer have a location to pull out of the traffic stream.



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WHAT WAS OUR GOAL?

The research was to provide guidance to measure the level of success for each individual improvement made. Caltrans can then make a decision on what improvements made are to be left in place permanently and/or changes that can be made for an overall success. The guidance provided should also be applicable to other projects with similar parameters.

WHAT DID WE DO?

The researchers examined the existing conditions within the study area. This is the first part of a study effort aiming to evaluate the impacts of the proposed pilot modifications on bridge operations. Planned future work will continue to monitor bridge operations during the implementation of the proposed changes, with a comprehensive evaluation similar to the one outlined in this report to be conducted a few months after completion of the changes once traffic conditions will have stabilized. These future evaluations will be used by Caltrans to assess whether to make the modifications permanent.

Utilizing data collected between July 2015 and June 2016, researchers were able to examine traffic volumes, driver delays, and incidents. Looking closely at the primary commute directions, delays were observed in the westbound direction on the Richmond side of the bridge from 6:30 to 9:00 AM as a result of the toll plaza operations and the need for vehicles to quickly merge onto two lanes downstream of the facility. On the Marin approach, eastbound delays were present from 3:00 PM to almost 7:30 PM, with traffic on I-580 sometimes queuing up all the way to US-101 in San Rafael and queues of freeway-bound traffic observed on local arterials near the Marin approach. When comparing to free-flow conditions, congestion delays typically double

travel times during the AM commute and triple them during the PM commute.

In regard to incidents, information provided by Caltrans revealed that severe incidents, i.e., ones that take 60 minutes or more to clear, were extremely rare and that typically incident management procedures were routinely followed. A majority of the incidents involved car breakdowns, running out of gas, or flat tires, with average clearance times under 20 minutes. The largest clearance times occurred with maintenance activities or a severe injury crash but examinations of the distribution of clearance times still indicated that these incidents were cleared fairly reliably. In terms of quantity, there were more incidents westbound than eastbound, with much of the difference between the two directions occurring right at the merge after the toll plaza. Local police observed minor crashes on the Marin County side during the PM commute, as queues of vehicles backed up onto local streets.

Although the genesis of this project was to provide relief to the eastbound PM commute, the new multi-use path is also expected to create a new normal in the westbound lanes. Currently, there are no direct off-street connections for bicycles or pedestrians to the bridge itself. However, existing bus service carries between 400 and 850 bicycles per month, indicating a potential demand for a non-vehicle crossing, particularly in the summer. Future studies will need to examine bicycle counts on the new path and see how they compare with existing counts on the bus service.

The final component of the project was to assess how the existing congestion on the eastbound approach to the bridge affects quality of life in Marin County. This was done by interviewing staff from various local businesses on streets that were commonly used as alternate routes to I-580 and on which traffic congestion often developed.

Employees at these businesses expressed concern over the spillover of traffic onto local streets and how that affected revenue at their place of business. Managers noted that the local street congestion both affected the commutes of their employees, who had to plan for a longer commute time to get to and from home reliably, and the ability of customers to reach their stores.

WHAT WAS THE OUTCOME?

In summary, this report has reviewed the existing conditions around the Richmond San-Rafael Bridge both quantitatively through data collection and qualitatively through stakeholder interviews. After the physical modifications are completed, the research team expects positive changes to occur in traffic congestion during the PM eastbound commute as a result of the additional traffic lane, and unknown changes in both directions in regards to incident response due to the lack of shoulder space to move affected vehicles out of the way. To ensure that appropriate comparisons will be able to be made between before and after situations, special care will thus need to be taken during future studies to ensure that adequate and accurate data can be collected.

WHAT IS THE BENEFIT?

At the end of the next phase of the study, Caltrans can evaluate the impact and success of the individual improvements implemented. This will assist Caltrans to determine with changes are to be left in place permanently and the changes need to be restored to prior to implementation.

The study method utilized for this task can be utilized on other projects of similar scope, reducing the workload and time to develop a new study. Potentially, studies of a similar scope can be carried out in-house using this method if proven successful.