



Caltrans Division of Research,
Innovation and System Information

Research



Results

Transportation
Safety and
Mobility

Queue Storage and Acceleration Lane Length Design at Metered On-Ramps in California

Developed queue storage design standards and updated existing acceleration lane length standards for metered entrance ramps for new or reconstructed interchanges.

MARCH 2016

Project Title:
Design Guidelines for Metered On-Ramps in California

Task Number: 2449

Completion Date: October 31, 2015

Task Manager:
Jose Perez,
Transportation Engineer
jose.perez@dot.ca.gov

WHAT WAS THE NEED?

Across California, most of the freeway onramps at urban interchanges are either currently being metered, or proposed to be metered in the near future. The current California Department of Transportation (Caltrans) Highway Design Manual (HDM) does not contain specific standards on queue storage design for metered entrance ramps. Also, at metered onramps, approaching vehicles have to stop before picking up speeds in order to merge with mainline traffic. The standards prescribed in the current Caltrans HDM for acceleration lane length design are found to be insufficient at times. Vehicles, especially buses and trucks, departing the limit line may not have sufficient acceleration lane length to reach safe merging speeds with mainline traffic in the existing onramps. Research was needed to develop specific standards for queue storage design at metered entrance ramps and to update the acceleration lane length design to enable vehicles enough distance to accelerate and reach safe merging speeds with mainline traffic at existing onramps.

WHAT WAS OUR GOAL?

The goal was to investigate and develop standards on queue storage design and acceleration lane lengths to incorporate into the Caltrans Ramp Metering Design Manual and HDM for new or reconstructed interchanges.



DRISI provides solutions and knowledge that improves California's transportation system

WHAT DID WE DO?

Caltrans contracted the Center for Advanced Transportation Education and Research (CATER) at the University of Nevada, to research, develop and deliver a comprehensive set of standards for queue storage design and acceleration lane lengths for new or reconstructed interchanges.

WHAT WAS THE OUTCOME?

A comprehensive set of standards for queue storage design and acceleration lane lengths for new or reconstructed interchanges were developed and delivered to Caltrans for incorporation into the Caltrans Ramp Metering Design Manual and HDM

WHAT IS THE BENEFIT?

The benefits resulting from this task are expected to be the elimination or reduction of onramp queue overspill onto local streets, which cause congestion, and help determine adequate acceleration lane lengths at metered onramps for vehicles to merge onto mainline traffic.

LEARN MORE

View the Final Report

<https://dot.ca.gov/-/media/dot-media/programs/research-innovation-system-information/documents/ca16-2449-finalreport-a11y.pdf>

IMAGES



Image 1: Diamond Ramp with Three Feeding Movements (E St. to NB 99, Caltrans District 3)



Image 2: Diamond Ramp with Two Feeding Movements (Woodman Ave to NB 101, Caltrans District 7)



Image 3: Hook Ramp with Two Feeding Movements (Torrance Blvd to NB 110, Caltrans District 7)

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Image 4: Outer Diagonal Ramp with Two Feeding Movements (Marina Blvd to NB 880, Caltrans District 4)



Image 6: Typical Camera Layout for Queue Storage Data Collection



Image 5: Slip Ramp with Diverging Movement (Bradshaw Road to WB 50, Caltrans District 3)



Image 7: Field Picture of Data Collection.

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Image 8: Illustration of Video Synchronization



Image 9: Merged Video after Time Synchronization

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