



Transportation Consortium of South Central States

Key Points

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Louisiana Transportation Research
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\$171,213

Establishing Guidelines for Ramp Metering Performance Evaluation and Implementation Practices in LA

Brief Project Description

This project proposes re-evaluating the currently implemented ramp metering and queue override strategies on I-12 and conduct a comparative performance evaluation of different combinations of control solutions for each ramp location. The control solutions may include 1) changing the ramp metering strategy, 2) utilizing other ATM strategies such as hard shoulder running, 3) adding length to the on- and/or off-ramps, 4) adding lanes to the on- and/or off-ramps, 5) widening the auxiliary lanes, or 6) adding length to the auxiliary lanes. Based on the evaluation results, the research team will develop guidelines for implementation of ramp meters in Louisiana.

Problem Statement

Urban freeways in most of the US metropolitan areas are operating near or beyond capacity during peak hours due to the significant increase in travel demand. Such traffic conditions often result in frequent traffic breakdowns that lead to gridlocks over the surface transportation network. The transportation community and policy makers recognize the need for better traffic management of the available network capacity as a viable alternative to widening and capacity expansion projects. Recently, further emphasis has been placed on Active Traffic Management (ATM) strategies such as ramp metering, speed harmonization, managed lanes and others. ATM strategies aim to control flow entering and exiting the managed areas of the roadway facilities to reduce the occurrence of breakdowns. Ramp metering control strategies are becoming quintessential approaches for alleviating recurrent congestion and improving mobility on freeways. While ramp meters control the traffic flow from on-ramps, they may also result in spillbacks on adjacent surface streets. To solve this problem, traffic management centers deploy queue-override strategies or some of the recently introduced coordinated ramp metering strategies.

Ramp metering with fixed time control strategy was implemented in June 2010 on the I-12 corridor in Baton Rouge, Louisiana, in order to mitigate traffic congestion and improve traffic safety. In a recent comparative evaluation study (Ishak et al. 2016), the performance of fixed-time ramp metering control was compared to the dynamic feedback local ramp



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metering control (ALINEA) and the coordinated Heuristic coordinated ramp metering control (HERO). Although the study recommended a hybrid implementation of ALINEA and HERO strategies to improve the overall freeway operational conditions, some sections of I-12 remained locally congested with significantly low speeds and travel times. This raised a question on the effectiveness of the implemented ramp meters at certain locations along I-12. Therefore, this project proposes developing guidelines for ramp metering implementation in Louisiana. The guidelines will account for several factors such as the ramp metering strategy, geometric features of the ramp location, travel speed, and traffic flow, among other factors.

Objective

The main focus of the proposed research is the development of guidelines for ramp metering implementation and performance evaluation along I-12, in Baton Rouge, LA. The specific objectives are:

- 1- Evaluate the performance of the currently implemented ramp metering and queue override strategies on I-12 using recently collected traffic data.
- 2- Examine the feasibility of several control solutions at congested ramp junctions.
- 3- Develop guidelines for ramp metering implementation and performance evaluation along I-12 and make final recommendations.

Intended Implementation of Research

The research team will summarize all the study's results, which would include a cost-benefit analysis that will be used to assess the pros and cons of each control solution and identify the optimal control solution for each ramp location. The results will be presented in the form of guidelines to identify the requirements to make ramp metering successful at each ramp location. These guidelines will act as a checklist for future implementations of ramp meters for the LADOTD. The results may also be disseminated via journal articles, quarterly and final reports, and workshops/webinars.

Weblinks:

<http://transet.lsu.edu/research/research-in-progress/>

<https://rip.trb.org/View/1488598>