



RESEARCH PROJECT CAPSULE [17-1SA]

December 2016

TECHNOLOGY TRANSFER PROGRAM

Evaluating the Effectiveness of Regulatory and Warning Signs on Driver Behavior near Highway/Rail Crossings

JUST THE FACTS:

Start Date:
November 1, 2016

Duration:
24 months

End Date:
October 31, 2018

Funding:
SPR: TT-Fed/TT-Reg

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Sponsored jointly by the Louisiana
Department of Transportation and
Development and Louisiana State
University

POINTS OF INTEREST:

Problem Addressed / Objective of
Research / Methodology Used
Implementation Potential

PROBLEM

Regulatory and warning are two basic categories for traffic control signs. Regulatory signs provide instructions for drivers to obey for safe guidance and steady traffic flow. Warning signs alert road users of impending danger or unusual conditions that might not be immediately apparent. These signs are widely used and much literature has been published on their effectiveness. This study is undertaken for determining the efficacy of these signs at selected railroad crossings in close proximity to roadway intersections.

There are more than 5,000 at-grade highway-rail crossings in Louisiana. From 2012 through 2014, there were 71 highway-rail crossing incidents in Louisiana, of which 16 were fatal. This situation has not improved much, as 26 incidents (including 6 fatalities) were reported during the first half of 2015.

When a railroad crossing is near a roadway intersection and vehicles on the roadway have to stop due to a traffic signal, stop sign, or yield sign, the vehicle queue may extend over the railroad crossing. By law, drivers are not to stop on the crossing. However, due to distraction or other factors, there is a problem of drivers stopping on the railroad when in queue.

Some roadway intersections near railroad crossings have been equipped with preemption signals that allow vehicles to clear the area needed for a passing train prior to its arrival. However, many intersections near railroad crossings have no traffic signals. The Louisiana Department of Transportation and Development (DOTD) is considering using signage near these intersections to draw attention to the need for clearing the area of vehicles prior to a train's arrival.



Figure 1
Railroad crossing in close proximity to a roadway intersection



MUTCD R15-1

Figure 2
Basic regulatory sign required at all public railroad crossings



MUTCD R1-1



MUTCD R1-2



MUTCD R8-8

Figure 3
Crossings may be marked with these regulatory signs to affect driver behavior

OBJECTIVE

The primary objective of this research project is to evaluate the effectiveness of regulatory and warning signs on driver behavior by analyzing their effectiveness in reducing instances of stopped vehicles within the dynamic envelope zone (i.e., the area that a train occupies) of at-grade highway-rail crossings near roadway intersections.

METHODOLOGY

Eight highway-rail crossings with known problems of drivers stopping within the dynamic envelope zone will be selected as test locations. The research team will work with the DOTD highway/rail safety office to establish that candidate locations are suitable. The research team will also work with DOTD district personnel to mount video-based data collection systems at the selected locations.

The video-based systems will be installed in a manner to record the dynamic envelope zone of the highway-rail crossing under existing conditions. Four weeks of continuous video recording will be undertaken at all test locations.

DOTD personnel will then install signage at the test locations pending required authorizations from the railroad and other relevant stakeholders. Sign details will be agreed upon with the DOTD highway/rail safety office.

After installation of the new signage, eight weeks of continuous video recording will be undertaken at the test locations. It is expected that the first four weeks of this post-signage data will not be used for the data analysis as drivers adjust their behavior due to the signage.

The research team will analyze the video data and count the number of instances when the signage was contravened as well as the number of stopped vehicles in the dynamic envelope zone during 2-hour time slots. The data will be sorted for each location for both pre-signage and post-signage data. Statistical analysis of the data will be performed for both day time and night time conditions. The analysis will be used to evaluate the effectiveness of the signage in reducing the number of stopped vehicles in the dynamic envelope zone.

IMPLEMENTATION POTENTIAL

Appropriate signage may reduce instances of stopped vehicles within the dynamic envelope zone of at-grade highway-rail crossings near roadway intersections, offering a significant safety improvement at problematic locations.