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7. Author(s) Richard Storm, Jacqueline Dowds Bennett, Beth Wemple		10. Work Unit No. (TRAVIS)	
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16. Abstract This case study demonstrates the application of the Systemic Safety Project Selection Tool by the Missouri Department of Transportation. The MoDOT evaluated the effects of adding edge line pavement markings to 570 miles of rural, two-lane State highways with average daily traffic volumes between 400 and 1000 vehicles. MoDOT completed a "before vs. after" evaluation of edge lines using a customized spreadsheet that incorporates Empirical Bayes methodology to estimate the effectiveness of the implemented countermeasure. Crash data collected after the project provided proof that implementing low-cost countermeasures on low-volume roads with low-crash frequency and density yields a reduction in crashes.			
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Missouri Department of Transportation Evaluation of Project Proves Systemic Planning Process is Beneficial

The Missouri Department of Transportation (MoDOT) used the concepts discussed in the *Systemic Safety Project Selection Tool*¹ (Tool) to evaluate a project that was developed using a systemic planning process. MoDOT evaluated the effects of adding edge line pavement markings to 570 miles of rural, two-lane State highways with average daily traffic volumes between 400 and 1000 vehicles.

Process and Results

MoDOT completed a “before vs. after” evaluation of edge lines using their Countermeasure Evaluation Tool. The Countermeasure Evaluation Tool is a customized spreadsheet that incorporates Empirical Bayes methodology to estimate the effectiveness of the implemented countermeasure. The tool was created during the development of safety performance functions for Missouri.

This countermeasure’s effectiveness is based on a comparison of the expected number of crashes with and without the edge line treatment for the 3 years before the installation (2006, 2007, and 2008) to the 2 years after the installation (2010 and 2011) of the edge lines in 2009. Data input into the spreadsheet included segment beginning and end mile posts, annual average daily traffic, crash frequencies for each segment (nonintersection), and roadway type (i.e., rural two-lane, undivided).

Along these 570 miles, 105 fatal and severe injury crashes and 576 total crashes occurred during the 3 years before the countermeasure was implemented. During the 2 years after implementation, 46 fatal and severe injury crashes and 327 total crashes occurred along the same segments.

Regarding the expected number of total crashes, the analysis revealed that the number of crashes decreased by 15 percent after the countermeasure was put into place; the results of the analysis included a finding of significance at the 95 percent confidence level (indicating a high degree of certainty that the edge lines contributed to the reduction in total crashes). Regarding the expected number of fatal and severe injury crashes, the analysis found a 19 percent decrease in crashes after the countermeasures were implemented; however, this was not significant at the 90 percent confidence level. Despite a 19 percent decrease in the expected number of fatal and severe injury crashes

Implementing edge-line markings along 570 miles of rural highway proved effective according to a “before vs. after” evaluation. The evaluation results showed a 15 percent reduction in total expected crashes and a 19 percent reduction in severe expected crashes.



Photo 1. 4-inch edge-line markings were added to this horizontal curve along a rural Missouri highway. Source: Missouri DOT.

¹ FHWA. 2013. *Systemic Safety Project Selection Tool*. U. S. Department of Transportation. Federal Highway Administration. <http://safety.fhwa.dot.gov/systemic/>.

after edge lines were implemented, the relatively low density of injury crashes prevented the result from being statistically significant. While the result was viewed positively by the MoDOT, the result of statistical significance means there is a lesser degree of certainty that the edge lines contributed to the reduced number of fatal and severe injury crashes.

Benefits

Crash data collected after the project provided proof that implementing low-cost countermeasures on low-volume roads with low-crash frequency and density yields a reduction in crashes. While evidence was stronger for total crashes, there was still a net reduction in fatal and severe injury crashes on improved corridors. Evaluation results can be used by decision-makers to decide whether to continue or discontinue funding or to implement a particular countermeasure for a focus crash type on a focus facility. In this manner, limited safety funding can be appropriately directed to the projects and locations that will produce the most benefit in terms of reduced crashes for the least investment.

Contact

John P. Miller, P.E.

Traffic Safety Engineer

Missouri Department of Transportation

John.P.Miller@modot.mo.gov

