



Data-Driven Safety Analysis

PROJECT CASE STUDY

Systemic Planning Process Benefits Missouri Pavement Project

Historically, the Missouri Department of Transportation (MoDOT) only painted centerline and edge line stripes on routes with 1,000 or greater daily traffic volume. Routes with annual average daily traffic (ADT) of less than 1,000 only received a centerline stripe.

As part of a 2008 edge line striping program for High Risk Rural Roads (HRRR), MoDOT performed a systemic safety analysis on all state-owned roadways without a painted edge line, over 18,000 centerline miles. They found that more than two-thirds of severe crashes were occurring on roadways carrying 400 to 1,000 in ADT.

MoDOT was interested in improving safety on these routes because they represented a system of roadways that had a large number of the severe crashes. The agency took a proactive safety approach and painted edge lines on all 7,500 miles that fell in this ADT range, even though many of these roads had never had a severe crash. The results so far have shown a 15 percent decrease in total crashes.

Safety Tools Used

MoDOT evaluated the results of adding edge line pavement markings by performing a “before and after” comparison on 570 miles of rural, two-lane state highways using their Countermeasure Evaluation Tool. MoDOT developed the Countermeasure Evaluation Tool as a customized spreadsheet that incorporates Empirical Bayes methodology to estimate the effectiveness of an implemented countermeasure.

MoDOT compared the expected number of crashes with and without the edge line treatment for the three years before the installation of the edge lines in 2009 to the two years after the installation. Data input into the spreadsheet included segment beginning and end mile posts, annual ADT, crash frequencies for each segment (non-intersection), and roadway type (rural two-lane, undivided).

SYSTEMIC SAFETY ANALYSIS BENEFITS

Improved Safety

Systemic analysis can be applied to rural roadways where a significant number of crashes happen over a wide area.

Informed Decision-Making

Systemic analysis helps determine where safety countermeasures can be used most effectively.

Optimized Investment

Funding can be directed to the projects and locations that will produce the most safety benefit per dollar.

Overall Effectiveness	Various Counties	
Security Level	Total	F & DI
► Observed Crashes Before Period	576	105
► Observed Crashes After Period	327	46
► Effectiveness (% Change)	15.18	19.30
► Direction of Change	Decrease	Decrease
► Significance	Significant at 95% confidence level	Not significant at 90% confidence level

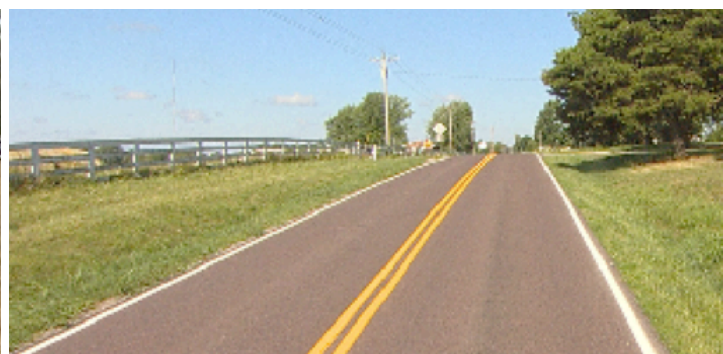
(Source: MoDOT)

Along the 570 miles that were compared, the combined study locations showed that the new edge line stripe was very effective at reducing not only the total crashes, but also the run-off-road right crash type. The analysis revealed a 15.2 percent decrease in total crashes, for all crash types, after the countermeasure was implemented.

The findings were significant at a 95 percent confidence level, indicating a high degree of certainty that the edge lines contributed to the reduction. The analysis also found a 19.3 percent decrease in severe crashes after the countermeasures were implemented; however, the relatively low density of injury crashes prevented the result from being statistically significant.

Key Takeaway

- ▶ Systemic safety analysis can be very helpful in states with an extensive rural and/or local roadway network, or when interested in a particular crash type (e.g., roadway departure or pedestrians).



Route M in Boone County before (left) and after (right) adding edge line pavement markings. (Photo courtesy Missouri DOT)

Conclusions

MoDOT's use of systemic safety analysis for project evaluation led to implementation of a low-cost countermeasure that reduced crashes on low-volume roads with low-crash frequency and density. While the results were stronger for total crashes, there was still a net reduction in fatal and severe injury crashes on improved corridors.

Agencies can employ this type of analysis to make the most efficient use of limited funds in deciding whether to continue or discontinue funding or to implement a particular countermeasure for specific crash types and locations. It allows funds to be directed to the projects and locations that will produce the most benefit in terms of reduced crashes for the least investment.

ADDITIONAL RESOURCES

- ▶ Further details on MoDOT's systemic analysis process are available at <http://safety.fhwa.dot.gov/systemic/mo.htm>
- ▶ More information on Data-Driven Safety Analysis is available on the Every Day Counts website at <http://www.fhwa.dot.gov/everydaycounts/edc-3/analysis.cfm>

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Every Day Counts (EDC), a State-based initiative of FHWA's Center for Accelerating Innovation, works with State, local and private sector partners to encourage the adoption of proven technologies and innovations aimed at shortening and enhancing project delivery



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