Data-Driven Safety Analysis

Data-Driven Safety Analysis builds upon decades of work and collaboration to promote the integration of safety performance into all highway investment decisions. Broader implementation of quantitative safety analysis, so that it becomes an integral component of safety management and project development decision-making, will lead to better-targeted highway investments, resulting in fewer fatal and serious injury crashes on our nation's roadways.

More Informed Decision Making → Better Targeted Investments → **Fewer Fatalities & Serious Injuries**

While quantitatively estimating location-specific safety performance on an agency's road network is challenging, recent advances in highway safety analysis can provide transportation agencies with the reliable information they need to make effective investments in improving the nation's roads.

This EDC-3 effort focuses on applications of predictive and systemic analysis in safety management processes and project development decision-making.

Predictive analysis uses crash, roadway and traffic volume data to provide reliable estimates of an existing or proposed roadway's expected safety performance in terms of crash frequency and severity. These methods can help state and local agencies quantify the safety impacts of transportation decisions, similar to the way agencies quantify traffic growth, construction costs, environmental impacts, pavement life, and traffic operations to come up with the best overall solution.

Systemic analysis screens a roadway network to identify high-risk features correlated with severe crash types. Once identified, agencies can target locations containing high-risk features with low-cost treatments system-wide. This approach is particularly applicable when a significant number of severe crashes occur over a wide area, such as on rural and local roadways.

Predictive Analysis in Practice. The Arizona Department of Transportation (ADOT) employed predictive analysis to select a cost-effective safety solution for a 25-mile stretch of two-lane, undivided rural road. The analysis resulted in a benefit-to-cost ratio of lives and injuries saved per dollar invested for three design alternatives: widening the shoulders to 5 feet, widening the shoulders to 8 feet, and superelevation improvements. Based on the analysis outcome, ADOT found that the 5-foot shoulder would provide the greatest safety benefit per dollar spent.

Systemic Analysis in Practice. As part of a 2008 edgeline striping program for High Risk Rural Roads, the Missouri Department of Transportation (MoDOT) evaluated crash data for all state-owned roadways without a painted edgeline, over 18,000 centerline miles, and found that more than two-thirds of severe crashes were occurring on roadways carrying 400 to 1,000 in annual daily traffic (ADT). This amounted to about 7,500 centerline miles. Historically, routes with 1,000 or greater ADT received an edgeline stripe, however MoDOT took a proactive safety approach and painted an edgeline on all 7,500 centerline miles, even though many of these roads had never had a severe crash. The result: a 15.2 percent decrease in total crashes for all crash types (significant at

95 percent confidence level) and a 19.3 percent decrease in severe crashes (no statistical significance due to small sample size).

BENEFITS

▸ **Informed Decision-Making.** By quantifying the safety impacts associated with roadway planning and design, transportation professionals and the general public can make more informed decisions weighing safety with other project goals.

▸ **Optimizing Investment.** With limited resources, agencies need to maximize the safety benefit of every transportation investment. By applying the most current analytical methods, agencies have powerful tools to optimize investments and the safety of all users.

▸ **Improved Safety.** States and other transportation agencies can proactively apply safety countermeasures at roadway locations identified as having the highest potential for improvement, effectively reducing fatalities and serious injuries.

CURRENT STATE OF THE PRACTICE

The EDC-3 effort builds on collaborative work done by the American Association of State Highway and Transportation Officials (AASHTO), FHWA, the Transportation Research Board and industry over the past two decades. Many agencies are already implementing these safety analysis approaches in their safety management processes, and FHWA is promoting these tools to state and local agencies for use throughout project development.

Champion states in predictive safety analysis include Illinois, Louisiana, New Hampshire, Ohio and Washington. Missouri, Minnesota, and Thurston County, Washington, are leaders in implementing the systemic approach to safety.

SUPPORT AND AVAILABLE TOOLS

▸ EDC-3 Data Driven Safety Analysis Web page: http://www.fhwa.dot.gov/innovation/everydaycounts/edc-3/ddsa.cfm

▸ FHWA Roadway Safety Data Program Data Analysis Web page: http://safety.fhwa.dot.gov/rsdp/analyze.aspx

The following are examples of tools agencies can use to apply predictive and systemic approaches for Data-Driven Safety Analysis (FHWA cites specific tools as examples, not as an endorsement of these tools over others):

Predictive approach

▸ AASHTO Highway Safety Manual: http://www.highwaysafetymanual.org

▸ AASHTOWare Safety Analyst software: http://www.safetyanalyst.org

▸ FHWA Interactive Highway Safety Design Model: http://www.fhwa.dot.gov/research/tfhrc/projects/safety/comprehensive/ihsdm/index.cfm

▸ Crash Modification Factors Clearinghouse: http://www.cmfclearinghouse.org

Systemic approach

▸ FHWA Systemic Safety Project Selection Tool: http://safety.fhwa.dot.gov/systemic/fhwasa13019

▸ AAA Foundation for Traffic Safety usRAP software: http://www.usrap.us