Estimation of Safety Effectiveness of Composite Shoulder on Rural Two-Lane Roads

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Abstract

There is a need for engineers and planners to understand the trade-offs of safety versus cost given the state department of transportation’s fiscal constraints and a desire to continually strive to make roadway safer. Paved shoulder has been regarded as an effective safety improvement to reduce crashes (e.g. run-off-the-road, roll-over, etc). While a full-width paved shoulder might be the most desirable, there is belief that there is a diminishing safety benefit for each additional increment of paved shoulder width. Thus there may be opportunities for greater system-wide safety benefits from paving longer roadway segments with a composite shoulder than paving shorter roadway segments with a full-width paved shoulder. The object is to determine the safety benefits of composite shoulders - such as a small paved shoulder combined with turf outside of that. This approach fits within Kansas Department of Transportation’s “Practical Improvements” approach to maximize benefits relative to the input costs required.

The research team will study the safety effectiveness of several typical types of composite shoulders that have already been installed in Kansas’ rural two lane road based on their paved component width. Empirical Bayes (EB) Method will be applied in the Before-After study. Safety Performance Function (SPF) models developed in previous studies will be brought into the EB procedure. For each studied site, safety and traffic flow data during “before” and “after”

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periods will be obtained and combined with SPF models to make the safety estimation. Based on
these results, the research team will develop Kansas specific Crash Modification Factors (CMFs)
for composite shoulder compared with segments without shoulder. Finally, Benefit-Cost analysis
is conducted by using these estimations and CMFs, combined with the estimated cost of crashes
and the project.

Keywords: safety—composite shoulder—empirical bayes method—practical improvements