This topic is "practice ready." ☒ **Yes** ☐ **No**

Effect of Paved Shoulders and Shoulder Rumble Strips on Reducing Crashes on Four-Lane Divided Roadways in Kansas

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Abstract

Lane departure countermeasures have been commonly used in Kansas roadways to reduce lane departure crashes as well as the other crash types However, the safety effectiveness of those countermeasures on different crash types may vary due to various contributing factors affecting each crash types. This study was carried out to identify the safety effectiveness of two commonly used lane departure countermeasures which are paved shoulders and shoulder rumble strips on lane departure and all crash types on four-lane divided road segments using Crash Modification Factors (CMFs). Since the date of implementation of the respective countermeasures were not known it was decided to use cross-sectional method, which is to develop generalized linear regression models by assuming negative binomial error structure, so that CMFs can be estimated for considered lane departure countermeasures using respective regression parameters. Crashes per segment per year was taken as the response variable when developing models and both lane departure and all crash types on both tangent and curved four-lane divided road segments from 2009 to 2014 were considered. ArcGIS 10.1 was used to map the crashes and to count the number of crashes on each road segments with their geometric and traffic related characteristic of respective road segments. Results showed that the shoulder rumble strips are effective in reducing all lane departure crashes severities by 9% and 4% while reducing fatal & injury lane departure crashes by 50% and 70% on tangent and curved road segments respectively. However,

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for all crash types shoulder rumble strips showed a crash increasing effect of 2% and 1% while showing a crash reduction effect of 2% and 4% on fatal and injury crashes on tangent and curved road segments respectively. Paved shoulders seems to be reducing fatal & injury lane departure crashes by 30% and 65% on tangent and curved road segments respectively. Furthermore, the paved shoulders reduced all lane departure crashes by 16% on curved road segments, however it has a crash increase effect of 7% on all lane departure crashes on tangent road segments. The results showed that the paved shoulders reduced all crash types by 15% and 31% and reduced fatal & injury crashes by 11% to 7% on tangent and curved road segments respectively. Finally, the models were validated to make sure that the developed models were accurate enough to predict considered crash types so that the estimated parameters can predict the safety effectiveness of each countermeasure. This research is important because the results can be used by the local agencies and Kansas department of Transportation as a tool to screen the alternatives when implementing lane departure countermeasures on four-lane divided road segments in Kansas.

Keywords: Safety effectiveness—lane departure countermeasures—cross-sectional method—model-validation—Crash Modification Factors

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