Kansas Department of Transportation

TECHNICAL SUMMARY

Study of KDOT Policy on Lane and Shoulder Minimum Width for Application of Centerline Rumble Strips

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Introduction

Roadway departure crashes correspond to approximately 40% of all traffic crashes. According to the most recent national crash statistics, in 2009, there were 11,185 fatal roadway departure crashes on rural highways, resulting in 23,169 fatalities. Thus, roadway departure crashes are a significant problem in the United States. Centerline rumble strips (CLRS) are raised or indented patterns installed mainly on two-lane undivided highways, utilized to alert drivers that they are crossing the center of the travel lane, by producing noise and vibration when crossed by vehicles' tires. CLRS primarily address the problem of drowsy or inattentive drivers on two-lane, two-way highways drifting left out of their lane and striking an oncoming vehicle. It is estimated that 50–70 million adults in the United States have chronic sleep and wakefulness disorders. Understanding the disadvantages associated with the use of CLRS may result in reliable guidelines, which can increase the use of CLRS, contributing to saving lives.

Figure 1. Centerline Rumble Strips in Kansas

Project Objectives

The objectives of this research were: a) to obtain updated information on departments of transportations' policies and guidelines for installation of CLRS in the United States

in order to identify current practices; b) to verify the before-and-after safety effectiveness of CLRS currently installed in Kansas; c) to determine if CLRS cause levels of exterior noise that can disturb nearby residents and propose a minimum distance from houses for installation of CLRS in Kansas; d) to estimate the effects of CLRS on vehicles' operational speed and lateral position and to verify if it is safe to install CLRS on sections of highways with narrow shoulders; and e) provide recommendations of when it is beneficial to install rumble strips, given known values of traffic volume, shoulder width, and the presence of other types of rumble strips.

The methodologies that were applied in this research include: a) an email survey that was sent to all state DOTs to verify their current guidelines for installation of CLRS; b) application of Bayesian before-and-after methods to investigate the safety effectiveness of CLRS in Kansas; c) field data collection according to standard procedures to verify if CLRS produce exterior noise levels that can disturb residents that live nearby to treated highways, d) standard field data collection methods to investigate how CLRS impact vehicular lateral position and operational speed; and e) modeling and interpretation of regression equations to predict number of crashes.

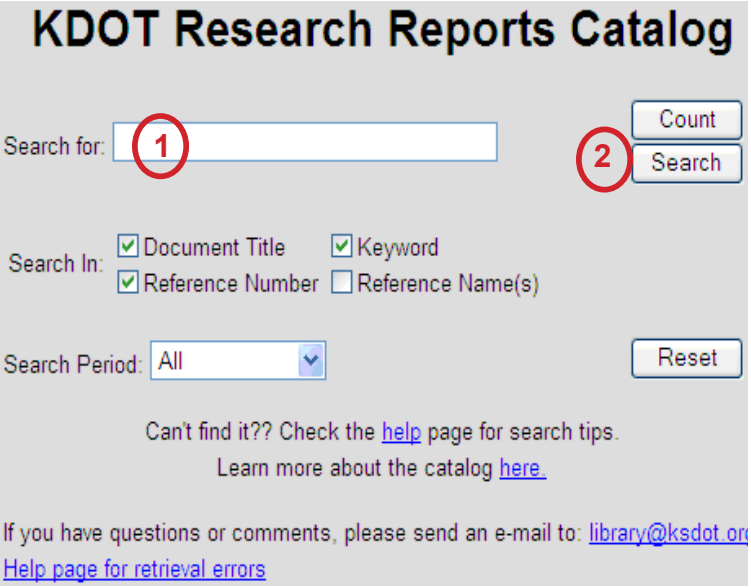
Project Results

Based on the analysis of safety performance function (SPF) models for total correctable crashes, on roadways with narrow shoulders, shoulder rumble strips only are recommended for all annual average daily traffic levels (AADTs) considered in this study. For AADTs lower than 5,750 vehicles per day, CLRS are recommended. For AADTs greater than 3,000 vehicles per day, the both configuration is also recommended. The study of SPFs was limited by the fact that only 29 sections of highway were used to build the models.

Overall, both patterns currently installed in Kansas have provided crash reductions and are recommended. Shoulder width and traffic volume should be considered as crash predictors for enhancement of the benefits.

Project Information

For information on this report, please contact Dr. Eugene Russell at the Kansas State University Department of Civil Engineering; 2133 Fielder Hall; Manhattan, Kansas 66506; 785.532.1588; geno@ksu.edu.



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