

I. RESEARCH PROJECT TITLE

Promoting Center Line Rumble Strips to Increase Rural, Two-lane Highway Safety

II. RESEARCH PROBLEM STATEMENT

According to the National Highway Traffic Safety Administration (NHTSA) on a national basis, rural roads account for approximately 40% of all motor vehicle travel but 60% of fatal crashes. Approximately 90% of these fatal crashes occur on two-lane roads. Opposing direction crashes account for 20% of all fatal crashes on rural two-lane roads and result in about 4,500 fatalities annually. Centerline Rumble Strips (CLRS) are considered to be effective safety countermeasure for reducing overall and injury cross-over crashes on two-lane, two-way roadways. A comprehensive before-and-after study conducted by Persaud et al. (2004) concluded that head-on and opposing direction sideswipe crashes, the primary target of CLRS, were reduced by the estimated 21% and head-on and opposing-direction sideswipe crashes involving injuries by an estimated 25%. KDOT has installed sections off CLRS on US 50 and US 40; however no others have been installed for two years, and there appears to be no emphasis to keep installing them.

The KSU team believes in the safety benefits of CLRS but there are concerns that have been preventing their widespread use in some states and need to be addressed in Kansas. These concerns need to be addressed so as not to negate their safety benefits that widespread use in Kansas would achieve. These concerns are: roadside noise complaints, drivers reacting to the left, effects on motorcycle riders, pavement deterioration, effects on different types of pavement material, striping visibility, water, snow, and ice accumulation and effects on emergency vehicles.

III. RESEARCH OBJECTIVE

The main objective of this research will be to address some of the major concerns with the CLRS that could prevent their widespread use and safety benefits for Kansas motorists. One of the major concerns, and possible drawback, to CLRS is unacceptable levels of noise to the roadside residents. Therefore external noise toward roadsides and its effect on roadside residences will be investigated. If CLRS are used in no passing zones only, it should not be a problem as theoretically cars shouldn't be on them. In passing zones that could be a problem. The visibility of the centerline pavement markings is an important issue. Based on the results from the previous study the KSU team has found that it is a divided issue. Some respondents/contact say visibility is lessened; others say it is enhanced. A laboratory and field study on the existing CLRS in Kansas and the neighboring states will be conducted to investigate that issue.

Another concern that the KSU team would like to address is the possibility that CLRS milled over the centerline could increase or accelerate the typical centerline pavement joint.

The KSU team would like to investigate the need for placement of the warning sign (s) to warn the drivers about the CLRS installations.

To determine the safety effectiveness of the CLRS the KSU team will compare the number of cross-over crashes, injuries and fatalities for the two locations US 40 and US 50.

Tasks

1. Update literature.
2. Conduct a survey of the residents along the sections of US 40 and US 50. The survey will consist of questions designed to gauge the residents like, dislike, concern or ambivalence to the external noise produced from cars driving over the rumble strips after long-term use.
3. Conduct laboratory and field research on visibility of the centerline striping material and monitor CLRS locations for long-term pavement performance on two types of pavement (US 50 and US 40).
4. Study and analyze the before and after accident data obtained from the two CLRS locations (US 50 and US 40) by using the state-of-the-art statistical methods to determine the safety effectiveness of CLRS.
5. Distribute survey questionnaire to the road users to learn their responses to the installation of the CLRS after long-term use.
6. Investigate the need for warning sign(s) placements where the CLRS are installed.
7. Write and present draft report.
8. Finalize report.

IV. ESTIMATES OF FUNDING AND RESEARCH PERIOD

Period: 18 months

Funding: \$59,000 K-TRAN; \$20,000 UTC. Additional funding from the UTC is requested to support the work of a second graduate student who will design, administer and statistically analyzed national survey of major concerns/problems and safety benefits of centerline rumble strips. The results of this survey will be incorporated into the Kansas guidelines.

V. URGENCY AND POTENTIAL PAYOFF

CLRS appear to be low-cost, effective safety countermeasure for reducing overall and injury cross-over crashes on two-lane, two-way roadways. However, several concerns or potential negative effects have to be proven or refuted. These concerns could keep KDOT from installing extensive miles of CLRS and result in the loss of lives saved by reducing cross-over crashes. This study will address some of the major concerns as outlined in the Project Objectives part of this proposal.

Reducing overall and injury cross-over crashes on two-lane, two-way roadways is always an urgent priority with very high payoff. However, only finite funds are available. If

traffic engineers and local governmental organizations have guidelines to recognize specific situations where CLRS increase safety, funds can be earmarked more effectively.

VI. IMPLEMENTATION STRATEGY

The results will be disseminated in the form of guidelines by KDOT and the Kansas County Highway Association.

VII. PROJECT PERSONNEL

Since fall 1999, Drs. Rys and Russell have been conducting research on CLRS and their use on highways in the United States. They have successfully conducted several studies of this type for KDOT and FHWA, including publishing in 2005 NCHRP Synthesis 339 on Centerline Rumble Strips.

VIII. SUBMISSION INFORMATION

Dr. Margaret J. Rys
Dept of Industrial and Manufacturing Systems Engineering
2015 Durland Hall, KSU
Manhattan KS 66506-5000
Ph. 785-532-3733, Fax 785-532-3738
Email: malrys@ksu.edu