



RESEARCH SERVICES SECTION

TECHNICAL SUMMARY

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PROJECT COST:

\$27,568



At 4 inches wide, 3 inches long and 2 inches deep, centerline rumble strips are not easy to spot.

Effects of Centerline Rumble Strips on Motorcycles

What Was the Need?

Centerline rumble strips—grooves that are milled into roadways between lanes—alert drivers when their vehicles wander. They have proven effective in reducing accidents caused by vehicles crossing over into opposing traffic. Mn/DOT has installed these strips on several hundred miles of roadways, slowly phasing the practice in over a period of years.

However, Mn/DOT has not established a specific policy for using centerline rumble strips. One critical element that must be understood before establishing such a policy is their safety for nonconventional vehicle drivers. The impact of rumble strips on motorcycles and three-wheelers had not previously been studied, but over half of all motorcycle accidents in the country are accidents involving only a single vehicle (that is, the motorcycle). Cyclists and engineers have expressed concern that rumble strips may startle riders and cause accidents caused by overcorrection or other responses.

National accident data and research have established driver overcorrection as the primary cause of 2.5 percent of motorcycle crashes in Minnesota and 4.4 percent of these crashes nationally. Rumble strips have not been found to cause stability concerns for cyclists, leaving rider behavior as a central factor in such accidents.

What Was Our Goal?

The objective of this project was to determine if centerline rumble strips contribute to cyclist accidents or negatively affect motorcycle rider behavior. If cyclists are endangered in any way by rumble strips, their design may need to be adjusted to accommodate nonconventional vehicle operator needs.

What Did We Do?

This investigation involved three steps:

- First, researchers analyzed accident data from 1999 to 2006 in Minnesota, matching motorcycle accident sites to the presence of rumble strips and evaluating whether rumble strips may have been a factor in such accidents.
- Second, researchers performed observations of rural highways with centerline rumble strips. Direct observation and video recording drew together 44 hours of data focused on centerline crossing and rider behavior.
- Finally, investigators conducted a controlled observation of rider behavior on a 1-mile closed course that included two sections of centerline rumble strips. Thirty-two riders of touring, cruising and sport bikes (including two new riders) as well as two riders of three-wheeled vehicles were put through the course without being told the focus of the study.

What Did We Learn?

Minnesota accident data includes 9,845 motorcycle crashes from 1999 to 2006. Rural rumble strips were present in 29 of these accidents, one of which took a rider's life. Not one accident report mentioned rumble strips as a factor, and all but two had clear causes unrelated to rumble strips. In only three accidents was road surface even a potential factor.

“We want to establish a policy for where to use centerline rumble strips, so we hired a researcher to investigate the safety impacts of what we have installed.”

–Dave Engstrom,
State Traffic Engineer,
Mn/DOT Office of Traffic,
Security & Operations

“We weren’t able to find any evidence that centerline rumble strips cause problems when motorcyclists cross them. New riders are sometimes nervous about them, so we may want to include the strips in training or license examinations.”

–Kenneth Miller,
Assistant Professor,
St. Cloud State University

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Investigators observed motorcyclists circuit a 1-mile course with rumble strips, marked here by rectangles.

Roadside observation yielded a small number of rumble strip crossings, and no instances of directional changes or unusual riding behavior during crossing. Rumble strips did not seem to inhibit any passing opportunities.

Closed-course examination showed no steering, braking or throttle adjustments during strip crossing. Postride interviews confirmed these observations, and no rider expressed difficulty or concern with crossing rumble strips. Half of the riders noticed the strips before crossing, but no rider described the strips as a hazard either on the closed course or on public roads, though eight found them a nuisance when passing another vehicle.

After analyzing the data gathered in this study, the investigators concluded that there was no indication that centerline rumble strips pose a hazard to cyclists, and that warning signs are unnecessary. New riders, however, may react negatively to the strips. Including rumble strips in motorcycle safety courses and driving examinations should address this concern.

What’s Next?

This research essentially puts the question of centerline rumble strips’ safety impacts on motorcyclists to rest. There is no need to post signs warning of the presence of these strips. Mn/DOT may encourage the Department of Public Safety to require the inclusion of centerline rumble strips in cyclist safety courses or examinations.

However, an official Mn/DOT policy on centerline rumble strips is not yet feasible, as maintenance crews have expressed a number of concerns about rumble strips for winter plowing and deicing. For instance, the grooves have changed deicing salt truck passing practices and increased the amount of salt used in certain cases. By trapping moisture and snow, the strips may contribute to occasional irregular ice patches on roadways. Moreover, snowplows damage pavements by catching the edges of the strips. Research is needed to investigate these issues before an official Mn/DOT policy can be established.

An element present in the investigators’ contract for this project that did not appear in its execution was the consideration of the effects of rumble strips on hand-control handicap vehicles. Further study would be required to gain the insight Mn/DOT desires in this area.

This Technical Summary pertains to Report 2008-07, “Effects of Center-Line Rumble Strips on Non-Conventional Vehicles,” published January 2008. The full report can be accessed at <http://www.lrrb.org/PDF/200807.pdf>.