

Research Spotlight

Project Information

REPORT NAME: Impact of Non-Freeway Rumble Strips—Phase 1

START DATE: June 2010

REPORT DATE: June 2012

RESEARCH REPORT NUMBER:
RC-1575

TOTAL COST: \$262,829

COST SHARING: 20% MDOT,
80% FHWA through the SPR,
Part II, Program

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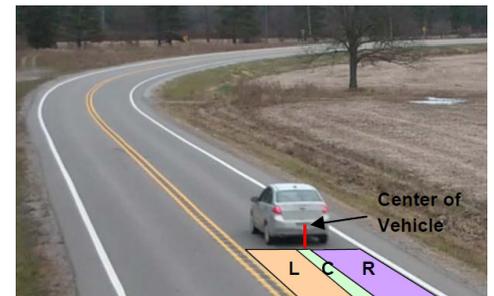
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Evaluating the benefits of centerline rumble strips on rural highways

Michigan began installing centerline rumble strips in 2008 in a new national initiative. Evaluating the impacts of these installations on driver behavior and traffic crashes will help confirm that centerline rumble strips protect motorists. It also will guide future implementation across the state and nationally.



Pole-mounted, high-definition cameras capture centerline encroachment (left) and record how well the vehicle remained centered in its lane (right).

Problem

To reduce lane-departure crashes, MDOT began a three-year statewide initiative in 2008 to install milled centerline rumble strips on all rural non-freeway highways with a posted speed limit of 55 mph. MDOT also installed shoulder rumble strips on roadways with paved shoulders of at least 6 feet in width. Rumble strips cause noise and vibration in vehicles that cross them, providing a warning to drivers whose vehicles are drifting out of their lanes.

With rumble strips installed on 5,400

miles of existing pavements in Michigan, the initiative is to date the largest of its kind in the United States. Consequently, MDOT wished to evaluate the impacts of these rumble strip installations on traffic safety and operation and pavement durability to provide guidance for future implementation both in Michigan and in other states.

Approach

For several rural two-lane highway segments in Michigan, researchers evaluated the effects of rumble strips on driver

“We expect Phase 2 of this project to show that centerline rumble strips significantly improve public safety as well as give transportation agencies in Michigan and other states the data they need to implement their own initiatives.”

Jill Morena, P.E.
Project Manager

behavior, bicyclist safety and comfort, vehicle speed and crash rates, pavement performance and roadside noise.

Research

Researchers used pole-mounted high-definition cameras to collect video data of driver behavior both before and after the installation of centerline rumble strips. The video data shows how well vehicles were centered within their lanes; the frequency of encroachment into the centerline or shoulder; speed; and effects on passing maneuvers. Researchers also conducted a field study to compare how the presence of centerline rumble strips affected the lateral displacement of drivers when passing bicyclists. They also surveyed Michigan bicyclists about the effect of rumble strips on their safety and comfort.

Researchers further:

- Developed a comprehensive database of crash data before centerline rumble strip installation to establish a baseline for later comparison to crash data after installation.
- Used MDOT’s pavement management system video logs to evaluate pavement performance before and after centerline rumble strip installations.

- Evaluated roadside noise due to installations.
- Compared speeds before and after installations.

Results

Researchers found that the presence of centerline rumble strips on rural high-speed non-freeway highways improves driver performance in most conditions: Drivers position themselves more centrally in lanes, leading to fewer encroachments over centerlines and shoulders, thus increasing safety. And while drivers generally tended to ride onto or across the centerline when passing bicyclists, they did so less frequently when centerline rumble strips were present.

Other findings include:

- Pavement performance: Centerline rumble strips did not contribute to short-term transverse cracking in asphalt pavements.
- Noise: Vehicles produced higher levels of roadside noise when traveling over rumble strips than they did traveling over regular pavement, but this noise typically did not exceed the roadside noise level produced by tractor-trailer trucks traveling on normal highways.
- Speed: The installation of centerline rumble strips had no impact on overall travel speed.
- Crash data: Researchers analyzed crash data on roads before rumble strip installation to identify locations where crashes are expected to be alleviated after rumble strips are installed.

Value

Centerline rumble strips are expected to significantly increase the safety of Michigan high-speed non-freeway highways. To confirm this, a second phase of the study will evaluate driver behavior and analyze crash data for three years after installation. The findings will be used to develop guidelines for standard rumble strip installation,

present anticipated consequences and cost-benefit data, and possibly lead to more rumble strips being installed on high-speed county roadways.

These findings could be valuable to other states in designing and implementing safety and operational improvement programs. If significant crash reductions and improvements in driver behavior are confirmed, this research will establish a standard for rumble strip installation in Michigan and across other states.

Research Administration

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This final report is available online at

www.michigan.gov/mdot/0,4616,7-151-9622_11045_24249-283852--,00.html.

Research Spotlight produced by
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