

State tests rumble strips on two-lane roads



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RUMBLE STRIPS THAT ALERT inattentive drivers with sound and vibration to steer back into the correct travel lane are common on Wisconsin's multi-lane state and interstate highways. This summer, the Wisconsin Department of Transportation is adding the strips to a group of two-lane state roads as part of a pilot program to expand use of the safety measure in Wisconsin.

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Wisconsin's effort is a response to reports of those benefits from around the country, says WisDOT Chief Roadway Standards Engineer Jerry Zogg. States with centerline rumble strips on two-lane roads saw a 44 percent reduction in fatal and injury crashes related to head-on and sideswipe crashes. Shoulder rumbles on rural two-lane roads helped reduce severe run-off-the-road crashes by 36 percent.

There is evidence that rumble strips, when present, also help drivers *feel* where the driving lane is when traveling in snow, rain or foggy conditions.

Compelling stats

Zogg calls the crash-reduction statistics "very compelling" since run-off-the-road and centerline crashes accounted for 35 to 40 percent of fatalities in Wisconsin in the last five years. "If we can achieve those kinds of reductions, this is an opportunity to save lives and prevent injuries," Zogg says.

The pilot projects will install rumble strips on four two-lane state road pavement rehabilitation projects and add them to existing two-lane state roads with five retrofit projects—one in each region of the state—for a total of more than 500 miles of centerline

strips and 54 miles of shoulder strips. Contractors will widen the paved shoulder on the pavement rehabilitation projects, Zogg says, so bicyclists can ride clear of the shoulder rumble strips.

Since WisDOT does not plan to do any widening on the retrofit projects, Zogg and his group received input from the department's bicycle/pedestrian coordinators and conferred with the Bicycle Federation of Wisconsin when selecting roads for retrofit projects to balance the needs of all road users.

Narrow the choice

Besides avoiding roads where rumble strips would interfere with a high volume of bicycle traffic, like those with trail crossings, WisDOT used other criteria to narrow the list of pilot locations for the retrofit projects.

They called on the University of Wisconsin Traffic Operations and Safety (TOPS) Laboratory to help identify two-lane roadways with high rates of run-off-the-road and head-on crashes.

Traffic Safety Engineer Andrea Bill, who is research program manager for the TOPS Lab, says

they identified "the worst of the worst" in the state as the starting point for the rumble strip pilot. "Using available data, we can see why certain crashes occur where they do," she notes. "What we found are roads where rumble strips could be a real help."

The TOPS Lab supplied maps and data on each high-crash roadway to the WisDOT regions where people who know the terrain and the traffic could apply other considerations. For example, Zogg explains, the planners looked for retrofit locations where pavements were in good enough condition to undergo the grinding process.

The volume of oversized truck traffic on certain roads influenced the choice of whether to install shoulder rumbles, which can take a portion of the 12-foot driving lane and can force wide loads to ride the strip. WisDOT will not install rumbles on designated Over Size Over Weight routes this summer, but Zogg does not rule it out in the future.

Noise was an issue since the sound tires make on rumble strips can carry. For that reason, WisDOT tried to avoid locating projects in close proximity to residential areas.



Centerline rumble strips on two lane roads, like this example from Mississippi, can reduce fatalities and injuries from head-on and sideswipe crashes by 44 percent.

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Resources

FHWA web page about rumble strips on two-lane roads.

http://safety.fhwa.dot.gov/provencountermeasures/fhwa_sa_12_008.htm



Severe run-off-the-road crashes account for a significant number of fatalities on Wisconsin's rural roads each year. Shoulder rumble strips, shown above, alert drivers to pull safely back into their travel lane.

Finally, because rumble strips can spook horses pulling buggies, Zogg says they will not install them on roadways in Amish communities.

Model for safety

With the pilot underway, WisDOT will review how rumble strips might affect state design standards and issue installation guidelines for public agencies and contractors. Zogg says the department is committed to adding rumbles where appropriate on all future state improvement projects and will continue working with the TOPS Lab to monitor the impact of the safety feature on crash types and frequency. WisDOT transportation planners will use the information from this pilot to determine how to balance application of this safety measure with other initiatives.

Zogg says when they embarked on the process of deciding which two-lane state roads would benefit most from rumble strip installation, WisDOT wanted to create a model for introducing safety counter-measures on state and local roads. "Relying on good data and good collaborations, we found a mix of projects I feel will tell us much more about how this application can make these and other roads safer." ■

Road weight study provides answers from page 1

The study also measured results on two existing concrete sections.

Shongtao Dai, a MnDOT Research Operations Engineer involved in the study, says the dedicated asphalt road sections, known as the "farm loop," gave the researchers control over the tests, from construction and time-of-day traffic patterns to making detailed calculations of each vehicle tested. They installed electronic sensors in the test sections to monitor pavement responses under the test vehicles. Equipment companies participating in the study supplied farm vehicles and drivers. The tests took place in the spring and fall, times of the year when pavements often are at their weakest and the movement of farm equipment is heaviest.

Key study results

Besides confirming that a typical 5-axle, 80,000-pound semi when fully loaded produced lower sub-grade stresses than all the farm equipment tested, the study

posed questions that helped prove or disprove existing assumptions held by various road users and road managers.

Dr. Dai says results showed clearly that individual axle weight is more important than gross vehicle weight when it comes to pavement damage. Increasing the number of axles along with distributing the load evenly can reduce the impact.

Asphalt thickness made a huge difference. The test section with 3.5-inch design thickness had extensive structural failure and severe rutting early in the test while the 5.5-inch section did not experience any significant break down.

The research team found that paved shoulders reduce the potential for damage and provide more support when a large vehicle rides near the edge of the driving lane. Given this and the fact that roads are strongest at their center, the study recommends operators drive heavy equipment at least 16 inches away from the

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The road researchers used portable scales to measure the weight of all study vehicles at the start of each test period, as with this double-axle applicator. It was one of two applicators tested that produced some of the highest stresses and strains recorded.