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Evaluation on Effectiveness of Audible and Vibratory Treatment (AVT) Installations on Arterials and Collectors Based on FDOT Context-based Design Criteria

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Current Situation

Ever heard of rumble strips? If not, you've likely heard them.

Rumble strips are an example of an Audible and Vibratory Treatment (AVT) for roadways. Rumble strips are grooved ground into a roadway on at the edges and centerline that create a "rumble" sound when cars roll over them. The sound and vibration inside the car alert the driver that they could leave their travel lane and lets them correct course.

Rumble strips save lives, but some communities have criticized them because the sound can disturb people living nearby. Recently, a new type of rumble strip has become available, called sinusoidal. Sinusoidal rumble strips offer less noise impact outside the car while maintaining the safety benefits of traditional rumble strips.

But do sinusoidal rumble strips live up to the hype? That is the question the Florida Department of Transportation set out to answer.



The research team selected Type 2 of three sinusoidal rumble strips designs as the most adequate for FDOT roadway departure needs, as seen here on a shoulder on SR-100.

Research Objectives

The objective of this research was to evaluate FDOT sinusoidal rumble strip designs for two criteria: 1) exterior noise issues and 2) their effectiveness to reduce roadway departure crashes and their severities.

Project Activities

Following a literature review, the University of South Florida (USF) Center for Urban Transportation Research (CUTR) team interviewed experts at transportation agencies that currently are the pioneers of sinusoidal rumble strips—California, Indiana, Kentucky, Minnesota, and Washington—on their respective experiences with sinusoidal designs, implementation, and evaluations.

Next, the team selected State Road 100 and U.S. Highway 301 to conduct real-world noise tests, as those roads had all three types of sinusoidal rumble strips. The team then conducted a focus group noise study that involved members in four vehicles making test runs at the sites at the designated speed limit and 5 mph above it. When the test runs concluded, each member completed a follow-up questionnaire and participated in a group discussion on their experience.

In addition, the FDOT State Materials Office conducted noise studies at the same sites to measure noise levels on the shoulder and edge line rumbles for all three types of sinusoidal strips.

After collecting road and traffic data for each site, the team conducted a before-and-after safety evaluation based on the data and Crash Modification Factors (CMFs) for sinusoidal rumble strips developed for this study. For the analysis, the team also assessed the influence of sinusoidal rumble strip presence on lane departure crash severity outcomes.

Last, the team identified 12 sites in District 2 for potential implementation of sinusoidal rumble strips.

Project Conclusions and Benefits

With a lower outside noise and louder inside noise, sinusoidal rumble strips seemed to yield a greater level of safety effectiveness than traditional rumble strips in reducing serious crashes, especially for two-lane rural roadways. FDOT is now better prepared to implement the most adequate sinusoidal rumble strip design that benefits all roadway users.

A statewide initiative has been implemented to install sinusoidal rumble strips on all arterial and collector roads on the State highway system with design speed of 45 mph or greater.

For more information, please see fdot.gov/research.