



Rumble Strips Alert Drivers, Save Lives and Money

Today's busy urban freeways demand 100 percent concentration from drivers, who are unlikely to suffer from boredom or sleepiness while running wheel-to-wheel with other high-speed vehicles.

The situation is far different on rural freeways between cities, where drivers often become drowsy or hypnotized by the constant speeds, the lack of other traffic, and the monotony of the landscape. The result? Frequently the driver runs off the shoulder, and, although in most instances the driver is able to recover control, too often the vehicle turns over and the driver ends up as a statistic.

The California Department of Transportation (Caltrans) has applied rumble strips to the shoulders of its rural highways to provide an audible warning to inattentive drivers.

Problem

Drivers on California's Interstates 15 and 40 across the Mojave Desert tend to lose concentration because of the vast distances and the unchanging terrain; often they travel at high speeds in their hurry to reach Las Vegas and the Colorado River recreation areas. "Drifted Off Road" (DOR) accidents are common. Similar problems have been noted in other areas of California and in Alaska where long hours of winter darkness add to the driver's lack of concentration.

Solution

Experiments in Alaska, Illinois, Iowa, Kentucky, Utah, and foreign countries showed that rumble strips included in the construction of high-type rural roadways with paved shoulders provide an effective warning to drivers who are about to leave the roadway.

The Caltrans traffic engineers were called on to evaluate the state of the art in designing and installing rumble strips, with a view to adapting and refining the design best suited to California. As is



Roller used in California desert project to impress grooves on paved shoulder to alert dozing drivers drifting off highway. (photograph from California Department of Transportation)

often the case, the evaluation and further development of previous and ongoing research was as beneficial as though it were innovative research carried out from the ground up.

The rumble strips are a continuous series of parallel grooves pressed into the asphalt on the shoulder while it is still hot. A modified roller is used. Tires running on the rumble strips transmit an audible and vibratory signal to the driver.

In December 1975, Caltrans decided to add grooved rumble strips to the outside shoulders of a 23.5-mile section of I-15 leading to the Nevada state line. This was an ideal location for determining the benefits of a method of preventing DOR accidents because interchanges are widely separated and roadside distractions and other confusing factors that might contribute to accidents are minimal. The cost of installing the rumble strips, using an easily modified vibratory roller, was less than \$1,000 per mile, or about \$23,000 for the entire project.

Preliminary results were favorable, and this success led to the installation

of shoulder rumble strips in the late 1970s as part of the overlaying of an additional 130 miles of I-15 and 5 miles of I-40 east of Needles.

Caltrans is now permitting and encouraging the placement of these rumble strips on carefully selected segments of highway throughout the state. Their use is outlined in the 1986 edition of Caltrans' *Traffic Manual* under Special Pavement Treatments.

A California Highway Patrol report reads: "Our officers have on several occasions contacted drivers of vehicles stopped along the shoulder where rumble strips exist. Conversation disclosed that the drivers were apparently asleep or dozing when they were aroused by an 'unusual noise.' Each had stopped his vehicle to inspect the tires or undercarriage for defects. It appears that driving across or upon the rumble strip does create a noise or sensation sufficient to gain a drowsy driver's attention."

Benefit

During the first 7 years of experience on the 23.5-mile section of I-15 there was a 49 percent reduction in DOR accidents, and accidents of all kinds, including DOR, were reduced by 19 percent. The 49 percent improvement in safety at this location is equivalent to a reduction of 10 fatal accidents, 52 injury accidents, and 26 property damage accidents per year. Using Caltrans' figures for economic costs of accidents, this means an annual savings of \$6.15 million. Comparable savings are anticipated on the additional 135 miles.

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Suggestions for "Research Pays Off" articles are welcome. Contact Nancy A. Ackerman, Editor, TR News. Transportation Research Board, 2101 Constitution Avenue, N.W., Washington, D.C. 20418 (telephone 202-334-2972).