

Rumble Strip Data

Rumble Strips -- Nationwide, there is no consensus on uniform policies for the use of shoulder rumble strips, design criteria that would be most effective, or where they should be installed. However, the Federal Highway Administration Office of Highway Safety has created a rumble strip website (<http://www.ohs.fhwa.dot.gov/rumblestrips/>) to illustrate how members of the electronic community can share information, resolve technical issues, and publish results. The website provides an overview of rumble strips and their role in mitigating run-off-road accidents. The website also provides a host of Who's Who in State DOT's, the FHWA, rumble strip providers, and highway professionals with first-hand experience in all aspects of implementing and maintaining rumble strips in all types of climates and terrain's."

States such as, New York, New Mexico, Pennsylvania, and Virginia have adopted comprehensive and uniform policies for statewide construction and use of shoulder rumble strips.

New York - The New York State Thruway Authority (NYSTA) began testing the use of shoulder rumble strips as a countermeasure for drift-of-road accidents in 1990. The NYSTA program is referred to as the STAR (Shoulder Treatment for Accident Reduction) program.¹ Initial test results, based on a comparison of average monthly accident rates by the NYSTA before and after the installation of the shoulder rumble strips show a 70-percent reduction in drift-off-road accidents, attributed to the STAR program, while experiencing a 30-percent increase in traffic volume.

The New York State Department of Transportation (NYSDOT) also had a program to install shoulder rumble strips on the NYS interstate highway system. The initial focus of the program was to install the shoulder rumble strips on highways with the greatest number of drowsy driver accidents.²

New Mexico - The Department of Civil Engineering at the University of New Mexico (UNM) conducted a study to evaluate run-off-road (ROR) accidents on rural highways in New Mexico, and examine alternative methods to reduce ROR accidents.³ ROR accidents accounted for almost 45 percent of the state's highway fatalities. According to the UNM study, indented strips on the roadway shoulders showed to be the most promising shoulder treatment. Preliminary results in test areas indicated that there was a reduction of up to 50 percent of ROR accidents and New Mexico began installing this countermeasure in 1990.

¹ National Sleep Foundation (NSL), Use of Continuous Shoulder Rumble Strips, June 1994.

² NSL, National Forum on Sleeplessness and Crashes [Speaker Abstracts], December 7, 1994.

³ Federal Highway Administration report number FHWA-NMSHTD-91-02, New Mexico State Highway Department, Innovative Treatments for Run-Off-Road Accidents, August 1991.

Pennsylvania - According to the Pennsylvania Turnpike Commission (PTC) a recessed rumble-strip called the Sonic Nap Alert Pattern (SNAP) was developed and milled (installed) into the Turnpike shoulder to help decrease the number of accidents caused by inattentive or drowsy drivers. According to the PTC, "...tires rolling over the strip produce a distinctive warning sound and vibration alerting drowsy or inattentive drivers that their vehicles are drifting along the shoulder of the roadway."⁴

The PTC conducted research and various tests of the SNAP designs. The PTC's results showed that using the following design criteria the recessed (milled in place) rumble strips could produce sound audible in both cars and trucks at approximately an 89 decibel noise level from the travel lane while departing the roadway at a shallow angle of approximately 3-degrees. This design was selected by the PTC as an effective design producing enough sound and vibration to be perceptible in commercial vehicles and yet not too severe for cars or motorcycles.

SNAP design criteria:

- 1) 12-inch spacing at 7-inches-wide by 16-inches-long,
- 2) with a depth of 0.50-inches,
- 3) spaced approximately 4-inches from the edge of the roadway,

Initial results, after installation of SNAP, showed that the drift-off-road (DOR) accidents per month, decreased by 70-percent. Upon final completion of the SNAP design along the Turnpike, DOR accidents were reduced from 3.81 accidents per 100-Million-Vehicle-Miles (MVM) before installation to 1.54 per 100-MVM after installation. This resulted in a total DOR accident reduction of 60-percent for 53 segments, totaling 348 miles of roadway.

Virginia - In November, 1993, The Virginia Department of Motor Vehicle's Crash Investigation Team released *Special Report Number 10 entitled "Run-off-the-road Crash Analysis."* This report stated that "while run-off-the road crashes averaged less than 10 percent of all reported crashes, they accounted for nearly one-third of all highway fatalities from 1986 through 1991." The report recommended that "Highway design, construction and maintenance organizations should consider installing "rumble strips" (or other similar devices such as rougher pavement) along sections of rural interstate shoulders to alert errant motorists that they are off the main travel lanes."

⁴ Pennsylvania Turnpike Commission—Shoulder Rumble Strip Effective, Drift-Off-Road Accident Reductions on the Pennsylvania Turnpike, Transportation Research Board Record 1573. John J. Hickey, Jr.

On July 22, 1994 the Virginia Department of Transportation Location and Design Division issued an Instructional and Informational Memorandum dictating policy regarding placement of rumble strips on new, resurfaced and replaced limited access highways. The policy states that "Rumble strips shall be placed on the shoulders of limited and non-limited access highways where studies indicate there may be a significant number of "run-off-road" (ROTR) or "drift-off-road" (DOTR) accidents. A joint review including the Traffic Engineering Division, the Environmental Quality Division, and the project designer shall be conducted to make this determination."

In November 1994, the Virginia Department of Transportation Traffic Engineering Division released "A Study of Effectiveness of Various Shoulder Rumble Strips on Highway Safety". The study conducted both roughness and sound level tests and obtained data from a testing van. They tested several different types of rumble strips at speeds of 55 and 65 mph, using an angle of ROTR of 5 degrees under sunny, dry and clean roadway conditions.

The report found that a "milled pattern is superior to a rolled pattern for asphalt shoulders in terms of audibility and tactility effectiveness, quality control and ease of construction. The corrugated pattern is practical for concrete shoulders." The study used a van to evaluate different patterns and a dump truck was used to measure ambient sound.

The report also included information from previous Virginia Department of Transportation surveys. "According to the VDOT 'Survey for Rumble Strip Implementation,' 14 state agencies have tested or installed milled rumble strips. The survey revealed that an increasing number of agencies have adopted or favor the milled rumble strip although some performance differences between both are still not clear. The prime reasons are as below:

1. The quality of rolled type is difficult to control in the field...
2. The effectiveness for both the sound and vibration levels for the rolled type are much less than that of the milled type.
3. The construction time is very limited and not easy to handle.
4. Rolled rumble strips have very little effect on trucks."

Note: The study indicates no findings for the effectiveness of rumble strips in preventing ROTR in motor coach travel.

On January 10, 1996, the State Traffic Engineer wrote to the Assistant Commissioner for finance that 10 percent of all reported collisions involved ROTR. The ROTR accidents accounted for 32 percent of all highway fatalities from 1986 through 1991. The memo went on to state that the installation of milled rumble strips on asphalt shoulders of rural interstates is "An area in which the Department can actively promote highway safety...". The memo also stated that the existing VDOT policy regarding rumble strips was that "Rumble strips should be placed on the shoulders on new rural limited access highways, and on existing limited access highways where shoulders are to be resurfaced or replaced."

The special provisions in the contract for rumble strips issued March 6, 1997 called for a minimum of 1/2 inch depth at center and maximum 5/8 inch allowed depth at the center. The concave area was to be 7 inches long in the direction of travel, 16 inches wide and spaced 6 inches from the edge of pavement. The designs call for one milled strip every foot.

Federal Guidelines on Paved Shoulders - On February 2, 1990, the Federal Highway Administration (FHWA) issued FHWA Technical Advisory T5040.29 on Paved Shoulders. This advisory stated "Shoulder texture treatments that provide an audible/vibrational warning to errant drivers have proven effective in keeping traffic off the shoulder and reducing accidents on long tangent or monotonous highway sections with a history of run-off-the-road accidents.

In the American Association of State Highway and Transportation Officials (AASHTO) strategic plan, one of the key strategies to reduce the number of drift-off-the-road accidents is by increasing driver safety awareness. Strategy 6 – Keeping Drivers Alert recommends the retrofit of rural interstate and other fatigue-prone areas with rumble strips. To address fatigue AASHTO has developed a strategy to retrofit the rural interstate and other fatigue-prone facilities with shoulder rumble strips. They stated that "Fatigue is a major factor in drift-off-the-road crashes on rural interstate and other freeways because of the longer duration of trips and the monotony of the driving task. Field demonstrations of shoulder rumble strips indicate they significantly reduce the number of drift-off-the-road crashes. An investment over 3 to 4 years is recommended to retrofit the shoulders of rural interstate highways and other fatigue-prone facilities with rumble strips. In addition to the rural interstate, rumble strips on urban interstate and on rural two-lane highways with full shoulders should be demonstrated to determine effectiveness...".⁵

⁵ "The AASHTO Strategic Highway Safety Plan, September 1997."