Centerline Rumble Strips

Head-on and sideswipe crashes result in numerous fatalities and injuries each year
In New York State, approximately 120 deaths and 3,500 injuries occur each year from non-intersection head-on and opposite direction sideswipe crashes. Nationwide data shows that 1 in 5 non-intersection fatal crashes involve two vehicles crashing head-on. 75% of these crashes occur on undivided two-lane roads. 30% of the deaths are persons under the age of 25. For all roads, 1/3 of head-on crashes involve vehicles "negotiating a curve" and 2/3 of head-on crashes involve vehicles "going straight."  NCHRP Report 500 Vol. 4

Distracted Drivers are a Significant Safety Problem
NHTSA reports that 80% of all crashes, and 65% of near-crashes, involve some type of driver distraction. In 2008, nearly 6,000 people died in crashes involving a distracted or inattentive driver, and more than half a million were injured. Visit http://www.distraction.gov/stats-and-facts/ for more information on distracted drivers.

A Potential Solution
Rumble strips are intended to save lives and prevent serious injuries by alerting drivers that they are leaving the driving lane. They consist of raised or grooved patterns on the roadway. They provide driver with both an audible warning (rumbling sound) and a physical vibration.

The 2005 National Cooperative Highway Research Program (NCHRP) Synthesis 339 was an early study that used data from a September 2003 Insurance Institute for Highway Safety study on centerline rumble strips. It found that head-on and opposite direction sideswipe injury crashes were reduced by an estimated 25% at sites treated with centerline rumble strips/stripes. This study concluded that centerline rumble strips can result in a 14% reduction of all crashes and a 15% reduction of injury crashes on rural two-lane roads.

Washington State DOT found that the installation of centerline rumble strips resulted in a 37% reduction in all crossover collisions, and a 57% reduction in crossovers with serious and fatal injuries. http://www.wsdot.wa.gov/NR/rdonlyres/1DCF9725-14D1-4341-A091-43E7A73A4298/0/GrayNotebookJun09.pdf#page=18

A more comprehensive study, published in 2009 in NCHRP's Report 641, “Guidance for the Design and Application of Shoulder and Centerline Rumble Strips,” also supports the use of centerline rumble strips as an extremely cost-effective collision countermeasure that is safe for all highway users. In this study, fatal and injury head-on and opposite direction sideswipe crashes in urban areas were reduced by an average of 64%. In rural areas, these types of collisions were reduced by an average of 44%.

For over 10 years, the NYS DOT has utilized rumble strips on the shoulder or edgeline of freeways. NYSDOT’s installation of edgeline rumble strips has helped significantly reduce the number of interstate run-off-the-road crashes. Anticipating that centerline rumble strips will help reduce crossover accidents, NYSDOT piloted Centerline Audible Roadway Delineator (CARD) installations in the Hornell and Buffalo areas, with positive results.

NYSDOT seeks the safest, most effective safety measures for state roadways. Based on the statistics and experience of other states already using CARDs, NYSDOT expects centerline rumble strips to:

- Help prevent head-on and sideswipe collisions.
- Be safe for motorcyclists. CARDs were tested for motorcyclist safety under NCHRP Report 641 “Guidance for the Design and Application of Shoulder and Centerline Rumble Strips,” 2009.
- Be safe for bicyclists. After an extensive search, the Department has not found any evidence that milled-in rumble strips adversely impact bicyclists.
- Be very cost-effective with benefit-to-cost ratios of up to 75 to 1.

Many Other States are Already Using Centerline Rumble Strips:

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Data provided by NCHRP Report 641-Guidance for the Design and Application of Shoulder and Centerline Rumble Strips

Federal Highway Administration (FHWA)
The FHWA’s July 10, 2008 letter “Consideration and Implementation of Proven Safety Countermeasures” states that “Rumble strips or rumble stripes should be provided on all new rural freeways and on all new rural two-lane highways with travel speeds of 50 mph or greater” and “Policies should consider installation of centerline rumble strips (or stripes) on rural two-lane road projects where the lane plus shoulder width beyond the rumble strip will be at least 13’ wide; particularly roadways with higher traffic volumes, poor geometrics, or a history of head-on and opposite direction sideswipe crashes.”

http://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips/resources/memo_rumstripso71008.cfm

Safety
In an effort to address serious injury and fatal crashes, NYSDOT has been studying the potential locations and effectiveness of centerline rumble strips along secondary State Highways. Because of the random, widely distributed nature of severe crashes, a traditional “black-spot” crash analysis was deemed inadequate to fully analyze the potential benefits.
Rumble Strips Can Significantly Enhance the Visibility of Pavement Markings

As the above photo from Michigan DOT shows, pavement markings placed within a rumble strip can provide significantly more wet-night visibility, even as regular markings become covered with water and lose visibility.

Cost Effectiveness:

Cost: Installation is around $0.30 per centerline-foot. Installation of CARDS on 7,040 miles would cost approximately $11.2 million every 10 years (assuming a 10 yr. resurfacing cycle). Cost Impacts are expected to be minor overall. On paving projects where they are used, they may constitute a 1-5% increase in the project cost.

Benefit: Installation of CARDS on Secondary Highways would prevent approximately 20 deaths and 250 serious injuries per year. This is based on 2006, 2007 and 2008 crash data from NYSDMV on the 7,040 miles of state highway (only 6% of the total highway miles in the state) that meet the proposed installation criteria. Using the average accident costs (https://www.dot.ny.gov/divisions/operating/osss/highway/accident-costs), CARDS would save $85 million/year and nearly $1.7 billion in crash costs over 20 years. The resulting benefit to cost ratio is over 75:1.

Proposal Under Consideration - Centerline Audible Roadway Delineators (CARDS)

Width, Depth and Spacing: CARDS are 12" wide and 1/2" deep parallel grooves cut into the centerline of a roadway at 24" spacing.

Placement of CARDS: CARDS should be discontinued before intersections, major driveways, crosswalks, left turn lanes, and concrete bridge decks.

Timing of CARD Placements: New asphalt pavement should be allowed to harden for at least 24 hours before CARDS are milled in, so that the milling machine does not tear the asphalt and asphalt does not build up on the cutters. After the CARDS have been ground and the millings removed, the pavement markings should be installed.

What Locations Should Be Considered for CARD installation?

CARDS could be installed at locations meeting the following criteria:

Median: There is no raised median, two-way left-turn lane (TWLTL) or median barrier. CARDS are appropriate for flush medians and passing zones.

Length: The length of centerline rumble strips to be placed is 1,500’ or more within a project. Because of the cost of mobilizing the equipment to mill in the CARDS, projects that would result in the placement of less than 1,500’ of CARDS may be exempted.

Speed: The speed limit is 45 mph or greater. The likelihood of a severe injury or fatality increases dramatically in collisions at or exceeding speeds of 50 mph.

Volume: There is a current AADT of 2,000 vpd or more. As traffic volumes decrease, the likelihood of such head-on or sideswipe collisions decreases, with or without the use of CARDS.

Pavement: Pavement should be in good condition to avoid the problems associated with milling deteriorated pavements.

Installation of CARDS is evaluated when there is a project along a highway and is not required as stand-alone work on existing pavements. However, installation is encouraged if a head-on or sideswipe crash potential is noted on facilities meeting the first 5 criteria above.