

Rumble Strips & Rumble Stripes

More than half (53 percent) of U.S. fatal crashes occur after a driver crosses the edge or centerline of a roadway. Two-thirds (67 percent) of these fatal crashes occur in rural areas.

What causes drivers to drive off the roadway or out of their lane?

Many factors, and combinations of factors, contribute, including driver fatigue and drowsiness; distracted driving; and slippery road surfaces and poor visibility in adverse weather conditions. These factors are sometimes compounded by driving too fast. Alcohol and drugs can contribute to both fatigue and speed. Driver fatigue also is induced by highway hypnosis, which occurs when long, monotonous stretches of highway reduce the driver's concentration.

How do rumble strips prevent crashes?

For those drivers who are about to unintentionally drive off the pavement edge or cross the centerline, rumble strips create noise and vibration inside the vehicle through interaction with the vehicle tires. Often this alert is strong enough to get the attention of a distracted or drowsy driver, who can quickly make a corrective steering action to return to the roadway safely. Rumble strips also alert drivers to the lane limits when conditions such as rain, fog, snow or dust reduce driver visibility.

How do rumble stripes improve visibility at night and in bad weather?

A rumble strip becomes a "rumble stripe" when an edge line or center line pavement marking is placed on it. The contour of the rumble strip drains water, and provides a reflective back wall that allows the pavement marking to maintain its retroreflectivity at night during rain and post-rain events (when normal pavement markings lose their function).



Rumble stripes daytime (left) and at night in the rain (right). Note the brightness of the rumble stripe at night, as compared to the normal pavement marking to the left of the rumble line. Michigan DOT (by permission)

Crashes Down

*Eleven States and one national study have analyzed the effectiveness of **centerline rumbles** in reducing crashes. These studies conclude that crossover crashes were reduced 18 to 64 percent, with most studies showing 40 to 60 percent reductions.*

***Shoulder rumbles** were first used on freeways, where their effectiveness has been studied extensively. Fourteen States and two multistate studies report reductions in single-vehicle run-off-road freeway crashes of 14 to 80 percent, with most reporting reductions in the 30 to 40 percent range. The three States that restricted their crash analysis to crashes caused by distracted or drowsy driving (the true target crashes for rumble strips) report 40 to 80 percent reduction in those crash types.*

Centerline Rumble Strips

Centerline Rumble Strips are an effective countermeasure to prevent head-on collisions and opposite-direction sideswipes (often referred to as cross-over or cross-centerline crashes). Centerline Rumble Strips are primarily used to warn drivers whose vehicles are crossing centerlines of two-lane, two-way roads.

Design Features – In order to minimize nuisance to motorists and neighborhood property owners, the rumble line is often discontinued in the vicinity of intersections and major commercial driveways. State DOT practices vary regarding the placement of rumble strips in no passing zones.



Centerline rumble strip

Shoulder Rumble Strips

Shoulder Rumble Strips are an effective means of preventing run-off-the-road crashes. They are primarily used to warn drivers when they have drifted from their lane.

Design Features – Placement of shoulder rumbles close to the travel lane increases their effectiveness at intercepting and alerting a drifting motorist. Especially on narrow-shouldered roads, some agencies place the rumble line at the shoulder edge, in conjunction with the edge line pavement marking, creating a “shoulder stripe.”



Gapped shoulder rumble strips allow bicycle flow between shoulder and driving lane.

To accommodate bicyclists, common modifications to shoulder rumble strips include 1) avoiding rumbles unless a minimum of 4 ft. of paved shoulder is available; 2) leaving a periodic gap in the rumble line to allow bicycles to travel between the shoulder and travel lane; 3) modifying the depth and width of the rumble cut to make traversing the rumble strips safer for cyclists.

For More Information

FHWA Office of Safety Roadway Departure Web Site
http://safety.fhwa.dot.gov/roadway_dept

NCHRP Report 641: Guidance for the Design and Application of Shoulder and Centerline Rumble Strips has the most current information on rumble strips and their effectiveness.

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