

Proven Safety Countermeasures

Longitudinal Rumble Strips and Stripes on 2-Lane Roads

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Longitudinal rumble strips are milled or raised elements on the pavement intended to alert inattentive drivers through vibration and sound that their vehicles have left the travel lane. There are a number of possible applications that can be used:

- **Shoulder rumble strips** are installed on a shoulder near the edge of the travel lane. They significantly reduce run-off-road (ROR) crashes.
- **Edge line rumble strips** are very similar to shoulder rumble strips, but placed at the edge of the travel lane, typically in line with the edge line pavement marking.
- **Center line rumble strips** are installed at or near the center line of an undivided roadway, and may be comprised of either a single or double line of rumbles. They reduce cross center line crashes such as head-on collisions and some run-off-road left crashes.
- **Rumble stripes** are either edge line or center line rumble strips where the pavement marking is placed over the rumble strip. This countermeasure increases nighttime visibility of the pavement marking.



Background

Roadway departure crashes account for approximately 53% of fatal crashes each year on the Nation's highways. In 2009, 8,780 single-vehicle roadway departure fatalities occurred on two-lane roads. Rumble strips are designed primarily to address the subset of driver error crashes caused by distracted, drowsy, or otherwise inattentive drivers who unintentionally drift from their lane. Since driver error occurs on all roadway systems (including 2 lane roads), rumble strips are most effective when deployed in a systemic application.

Continuous rumble strips can be applied on many miles of roads in a cost-effective manner. NCHRP 641: Guidance for Design and Application of Shoulder and Centerline Rumble Strips documented the following crash modification factors:

- Center line rumble strips on rural two-lane roads: 44% reduction of head on / fatal and injury crashes.
- Center line rumble strips on urban two-lane roads: 64% reduction of head-on / fatal and injury crashes.
- Shoulder rumble strips on rural two-lane roads: 36% reduction of run-off-road fatal and injury crashes.

While FHWA also recommends the use of rumble strips on multi-lane facilities, the focus here is on two-lane facilities where their use has been somewhat limited in practice and studies show even higher crash reductions than on other roadways.



Guidance

Federal, state, and local agencies and tribal governments administering highway projects should consider rumble strips or rumble stripes on highway projects using Federal funds as follows:

Continuous milled center line rumble strips (including in passing zone areas):

- System-wide on undivided rural roads with posted speeds of 50 mph or greater where the lane plus shoulder width beyond the rumble strip will be at least 14 feet (i.e. systemic safety projects).
- Along rural and urban two-lane road corridors where significant numbers of opposing direction crashes involving any form of motorist inattention have been identified (i.e. location-specific corridor safety improvements).
- Along any highway with a history of head-on and opposing direction sideswipe collisions or where center line rumble strips were overlaid during the paving process. (e.g. reconstruction or resurfacing projects.)

Continuous, milled edge line or shoulder rumble strips:

- System-wide on rural highways with posted or statutory speeds of 50 mph or greater. (i.e. systemic safety projects)
- Along rural or urban corridors where significant numbers of run-off-road crashes that involve any form of motorist inattention have been identified. (i.e. location-specific safety improvement projects)
- Along any highway with a history of run-off-road crashes or where shoulder or edge line rumble strips were overlaid during the paving process. (e.g. reconstruction or resurfacing projects.)

NOTE: On new and reconstruction projects, four feet of paved shoulder should extend beyond the rumble strip.

Key Resources

NCHRP Report 641, Guidance for the Design and Application of Shoulder and Centerline Rumble Strips, 2009

http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_641.pdf

Technical Advisory 5040.39, Shoulder and Edge Line Rumble Strips

http://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips/t504039/

Technical Advisory 5040.40, Center Line Rumble Strips

http://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips/t504040/

FHWA Guidance: Revisions to T 5040.39 Shoulder and Edge Line Rumble Strips and T 5040.40 Center Line Rumble Strips

http://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips/t5040_memo/

AASHTO Highway Safety Manual (available for purchase)

<http://www.highwaysafetymanual.org/pages/default.aspx>

Crash Modification Factor (CMF) Clearinghouse [quick search 'rumble strips']

<http://www.cmfclearinghouse.org>

FHWA Contacts

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FHWA Resource Center: Frank Julian, frank.julian@dot.gov, 404-562-3689

FHWA Website: http://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips/

