

Advisory on Installation of Bicyclist Compatible Rumble Strips

1.0 Purpose and Background

The purpose of this advisory is two-fold: 1) to alert highway officials and engineers in Wisconsin of the potential problems and hazards posed to bicyclists when rumble strips are improperly designed and/or constructed and 2) to act as a limited resource for guidance and standards currently available on rumble strips, especially as they pertain to making rumble strips bicycle compatible. This advisory is intended for all non-interstate and non-freeway rural roadways in Wisconsin regardless of ownership of the roadway or source of funding for highway improvements. Rumble strips are considered an important cost effective safety measure used to reduce or eliminate certain crash types among motorists.

There are three main types of rumble strips, those that are placed longitudinally along the outside edge of a paved shoulder, those that are placed along the center line or a median shoulder where there is a divided highway, and those that are placed transversely or perpendicular to the roadway at an approach to an intersection.

Rumble strips can be characterized as strips of depressed or grooved sections in a road surface used to delineate the edge of a travel lane next to a shoulder or center line or to alert drivers of an upcoming stop sign at an intersection. When a vehicle passes over the strips, noise and vibration attract the driver's attention to regain attentiveness after they became inattentive at the wheel.

Improperly placed rumble strips or improperly sized shoulders containing rumble strips can be hazardous to bicyclists. The uneven road surface and vibrations resulting from riding over any of the groove type rumbles can cause a bicyclist to lose control, potentially resulting in a crash. Designs in southern states, or non-snow states, occasionally have rumbles elevated or raised from the surrounding pavement, but not in Wisconsin.

WisDOT currently does not have warrants or guidance for shoulder or center line rumble strips placed on or along 2-lane roadways. As a practice, WisDOT has not used rumble strips along 2-lane roadways, except transverse rumbles. The Federal Highway Administration (FHWA) has an advisory on rumble strips located at: http://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips/t504039/.

2.0 Types of Rumble Strips

2.1 Longitudinal Strips

Longitudinal strips are either shoulder or center line rumble strips.

Shoulder rumbles are located along the edge to alert motor vehicle drivers that they are leaving the travel lanes or approaching the edge of the driving surface. Shoulder or center line rumble strips should not be installed on rural 2-lane roadways unless there is a complete engineering study that includes the review of crash types and frequency to help determine whether rumbles are an appropriate crash reduction strategy. Shoulder rumble strips should not be used for the sole purpose of improving safety for bicyclists; their presence is more likely to create a hazard for bicyclists.

Center line rumbles are located along the center line and have certain pattern criteria as well. Center-line rumble strips will discourage motorists from edging close to or across the strips reducing the passing margin when overtaking bicyclists. This is especially acute when bicyclists are likely to be using the travel lane because there are no paved shoulders or the

paved shoulders are narrow. Additionally, bicyclists will need to navigate over the rumbles when turning into driveways or onto side roads.

2.2 Transverse Strips

Transverse rumble strips, constructed as a set of three according to SDD 13A8 and 13A9. They extend partially across the travel lanes to alert drivers to unusual traffic conditions when approaching stop controlled intersections. Bicycle riders wishing to avoid transverse rumble strips may seek to avoid the potential danger by riding around the strips on the right (outside shoulder) or across the center line.

3.0 Guidelines for the Installation of Rumble Strips to Accommodate Bicycles

Rumble strip guidance is condensed from several sources with more detail focused on issues confronting bicyclists. See the FHWA technical advisory for more information on longitudinal rumble strips:

http://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips/t504039/. Specific citations are also given below for WisDOT resources.

3.1 Longitudinal Strips

An engineering study must support the installation of shoulder rumbles along 2-lane rural roadways. Although WisDOT has not adopted guidance, procedures and guidance from other states and FHWA suggest for all applications of shoulder rumbles (2-6 lanes), there must be an intermittent pattern of rumbles (~48-feet) and no-rumbles (~12-feet) and at least a 4-foot wide clear shoulder outside the rumble, preferably a 5-foot shoulder or more depending on anticipated bicycle use. The rumbles should be 12-inches wide and 3/8" to 1/2" deep, approximately zero to 12-inches from the edge of travel lane. Shoulder rumble strips should not be constructed across field entrances, commercial and private and driveways, near railroad crossings or near bridges to allow bicycles to cross into and out of the paved shoulder. See 13A10 for 2-Lane Rural Shoulder Rumble Strips, 13A11 for 2-Lane Rural Center Line Rumble Strips, and 13A5 for divided highways such as freeways and expressways.

3.2 Transverse Strips

Use the installation guidance provided in SDD 13A8 and 13A9. This SDD provides for an 18" passage between the rumble and the edge of the travel lane, but also a paved shoulder to the right of the rumble. Where state or federal funds are being used for the installation, a rumble free shoulder and passage *shall* be provided as specified above. See 13A8 and 13A9 <http://roadwaystandards.dot.wi.gov/standards/fdm/SDD/13a05.pdf> for standard detailed drawing of transverse rumble strips. If a paved shoulder is not present, the passage width should be 3 feet from the right edge of the paved roadway. Where state or federal funds are being used for the installation, this 3' passage *shall* be provided.

4.0 References

4.1 State of Wisconsin DOT (WDOT) Facilities Development Manual (FDM) SDD 13A05 <http://roadwaystandards.dot.wi.gov/standards/fdm/SDD/13a05.pdf> for 13A8 and 13A9; 13A10 and 13A11 drawings are pending.

4.2 State of Wisconsin DOT (WDOT) Bike Facilities Handbook, 2.6.9 Rumble strips <<http://dot.wi.gov/projects/state/docs/bike-facility.pdf#page=33>>

4.3 American Association of State Highway and Transportation Officials (AASHTO); Guide for

the Development of Bicycle Facilities; Chapter 2; Shared Roadways; Paved Shoulders
<http://www.sccrtc.org/bikes/AASHTO_1999_BikeBook.pdf#page=26>

4.4 Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices;
Section 6F.84 Rumble Strips
<<http://mutcd.fhwa.dot.gov/htm/2003r1r2/part6/part6f4.htm#section6F84>>

4.5 Federal Highway Administration (FHWA) Roadway Shoulder and Edgeline Rumble Strips
T 5040.39 Rev1;
http://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips/t504039/
Recommendations Regarding Rumble Strips;
http://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips/

4.6 State of Minnesota DOT (MnDOT) Transportation Research Synthesis: Transverse
Rumble Strips <<http://www.lrrb.org/TRS0701.pdf>>

4.7 Cleveland, Ohio The Morning Journal article: Dangers for Bicycles of Rumble Stripes
(with short YouTube-type video)
<<http://www.morningjournal.com/articles/2010/05/03/news/mj2677092.txt>>

5.0 Contacts

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