



mainroads
WESTERN AUSTRALIA

Guideline Rumble Strips

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1 POLICY STATEMENT

Rumble strips will be provided on roads managed by Main Roads for the safety and efficiency of the network and all roads users, subject to guideline conditions.

2 APPLICATION AND APPROVAL

2.1 Definitions

The definitions provided below are for terms not contained in or have a different meaning for the Guideline to the definitions given in Main Roads [Glossary of Terms](#).

Term	Definition
Main Roads	Main Roads Western Australia
Traffic Signs	A sign recognised in the Australian Standards or Main Roads sign index

2.2 Background

Excessive approach speeds and a lack of awareness of a change in the road conditions ahead are major factors in the cause of crashes. This may arise through a reduced appreciation of travel speed, fatigue or significant change in road environment. The use of rumble strips has been found to be effective in alerting drivers to changed conditions ahead requiring a driver response. Rumble strips consist of narrow raised or specially textured strips placed on a pavement or sealed shoulder, generating noise and vibrations through vehicles in order to alert drivers and encourage them to slow down.

First time users at a site with rumble strips will tend to reduce speed, which may be viewed as a desirable reaction to a typical or unexpected feature. Familiarity tends to erode this response at the site resulting in an insignificant speed reduction over time in a general sample. However, crashes have been shown to fall significantly, implying that the increased driver alertness is maintained (i.e. reaction time to stimuli is increased as attention is aroused). Improving reaction time by increasing alertness is an important facet of traffic engineering at critical decision points. If a reduction in the order of 0.5 – 1.0 seconds can be achieved, this equates to about 15 m – 30 m less distance travelled at 110 km/h; enough to avoid overshooting an intersection.

Rumble strips in themselves are not speed control devices. Their primary function is to draw attention to traffic control devices or potential hazards that drivers may fail to appreciate. Warning devices such as signs are usually adequate to warn approaching traffic of a condition that requires slowing or stopping. However, there may be circumstances where drivers fail to respond adequately to conventional visual warnings, such as due to fatigue. Generally, rumble strips are only used where failure to observe the existing signs or devices will lead to a high probability of serious consequences.

Rumble strips placed on the carriageway are most desirable in advance of conflict points where a crash problem has been documented and where conventional treatments such as warning signs have been found to be ineffective.

Experience has shown that rumble strips can cause drivers on an intersection approach to begin slowing down earlier than they otherwise might. Vehicle speeds at distances of 90m to 150m from a give way or stop sign or rail crossings at treated sites are typically slower than before the installation.

2.3 Application

In WA, rumble strips may be used on the secondary road approach to rural intersections and on the approaches to railway crossings. In looking at railway crossings and at an intersection of a primary rural arterial road with a secondary rural road, rumble strips should only be used where three or more of the following conditions are present:

- The speed limit is 100 km/h or greater but can be used at lower speeds under special circumstances.
- Excessive speeds or inattention are diagnosed as the apparent error in crashes.
- Fatigue may be an issue due to long travel distance and excessive distances between services (townships).
- There may be misleading cues leading up to the intersection, leading drivers to be confused about the priority and location of the intersection.
- The location should have a consistent history of crashes or have a serious concern raised by Road Safety Auditors related to the above factors.
- Drivers on the approach have experienced a long distance of high speed, relatively straight road on which they have had priority at intersections.
- Sight distance to the intersection for the approaching driver may be restricted on the approach.
- The site is unlikely to attract funding for a permanent solution (e.g. changes to geometric layout) in the foreseeable future.

Before the provision of rumble strips, every effort must be made to install signs and devices to standard practice in accordance with:

- AS1742.2: Manual of Uniform Traffic Control Devices Part 2: Traffic control devices for general use.
- AS1742.7: Manual of Uniform Traffic Control Devices Part 7: Railway crossings.
- Main Roads Policy and Guidelines on [Railway Crossing Protection in Western Australia](#).

Only after the above standard practices have been exhausted and shown to be ineffective may rumble strips be installed.

Rumble strips should not be installed on substandard curves on the approach to intersections or rail crossings, particularly in consideration of the possible effects on the control of motorcycles. The slight bumps and different surface textures, particularly with a wet surface, may cause vehicles, especially motorcycles, to lose traction.

The use of rumble strips at a limited number of targeted locations will ensure the effectiveness across the road network.

2.4 Approval

Rumble strips on the pavement surface are considered traffic control devices. Specific signing is a key component of the rumble strip treatment. Rumble strips shall be installed in accordance with this guideline. Rumble strip treatments which vary from this guideline require a separate approval and should be referred to the Main Roads WA Traffic Engineering Standards Manager, for each location prior to installation.

3 TECHNICAL GUIDELINES

3.1 Introduction

Rumble strip treatments may be beneficial by alerting motorists who may be unfamiliar with the road or who are not fully attentive to the driving task through fatigue or distraction.

Rumble strips are placed across the pavement surface to warn road users that they are approaching a part of the road that requires heightened awareness, concentration and a need to possibly slow or stop. When a vehicle passes over a rumble strip, the change in tyre noise provides audible warning to the driver and the slight vertical displacement and contrasting surface texture provides a tactile warning. This alerts drivers that they must act, but drivers must still use visual information (i.e. signs, pavement marking and other cues) to take the appropriate action.

Transverse rumble devices have typically been created using layers of thermoplastic strips 150mm wide. Exposed aggregate pads can also be used, but these have not been used or trialled in WA.

They are placed to alert drivers to an impending feature such as on the approach to intersections and railway crossings.

Some other road authorities allow them to be used on the approaches to pedestrian crossings, narrow bridges, severe horizontal curves, lane drops, rest areas, toll plazas, speed limit changes, and work zones (temporary/transportable devices).

Rumble strips as specified herein, consist of multi layered 150 mm wide strips of white thermoplastic to a height of 6 mm (± 2 mm tolerance). They are designed to produce an audible and tactile stimulus inside the vehicle to alert the driver to respond appropriately to their surroundings.

3.2 Operating Characteristics

3.2.1 General

Rumble strips should be 6 mm (± 2 mm tolerance) above the normal road level to effectively alert drivers. When the physical properties of the strips are optimal, the noise and vibration associated with high speed is difficult to ignore, encouraging drivers to slow down. Their appearance would therefore arouse the expectation of vibration and, concurrently, induce a planned deceleration response.

The treatment distance should be based upon the 85th percentile speed observed before the treatment, taken at a good vantage point somewhere between 400 m and 500 m from the point of potential conflict. The last 160 m – 200 m preceding the intersection or railway crossing should be left clear for smooth braking.

Coupled with signing, road users should now be well aware of the approaching intersection or rail crossing.

3.2.2 Visual Effect

Main Roads WA provides a contrast in colour for visual effect by using white thermoplastic. The thermoplastic shall conform to Main Roads WA Specification 604.

3.2.3 Surface Texture

The surface of the rumble strips shall have a minimum skid resistance of 45 BPN or equivalent as well as provide an audible and tactile warning to drivers given by the height and spacing of the rumble strip.

3.2.4 Signs and Installation

The action required to safely negotiate the changing road environment is given in accompanying traffic signs. Rumble strips in themselves do not convey much information, and the road user will be actively scanning for more useful information on encountering the markings. It is therefore critical that confusion must not be created and their installation must be clearly related to nearby signs, i.e. advance warning signs, supplementary approach signs (if necessary), delineation devices, regulatory signs and other warning signs.

A Stop sign shall only be used where road users are required to come to a complete stop provided that the requirements are met which are set out in AS1742.2 Clause 2.5.4.

Main Roads WA standard drawing [200631-0043](#) shows the signs to be used at rural intersections as components of the rumble strip treatment.

Main Roads WA guideline drawings [201531-0036](#), [201531-0037](#) and [201531-0038](#) show the signs to be used on the approach to a rail crossing, if required.

Many intersections may already have existing Advance Direction (AD) signs installed which may be located where T-intersection warning signs are to be located. In this case, the AD sign should be re-located to 500m from the intersection.

Similarly, rail crossings will have regulatory or warning signs or active control on the approaches to the crossing as per AS1742.7 and Main Roads WA Policy and guidelines on [Railway Crossing Protection in Western Australia](#).

3.2.5 Drainage

Rumble strips may disrupt drainage patterns across the pavement and sealed shoulder to some extent, and although this is not expected to be significant in typical rural two-lane applications, it may need to be considered in some circumstances.

3.3 Rumble Strip Design and Dimensions

The dimensions of a rumble strip group are shown in Figure 1. Main Roads WA uses 5 groups to form a set of rumble strip markings. The groups are placed at decreasing spacing in the direction of travel of 25, 20, 15 and 10 m between with a total distance between the first and last group of 70 m to form the set pattern shown in Figure 2.

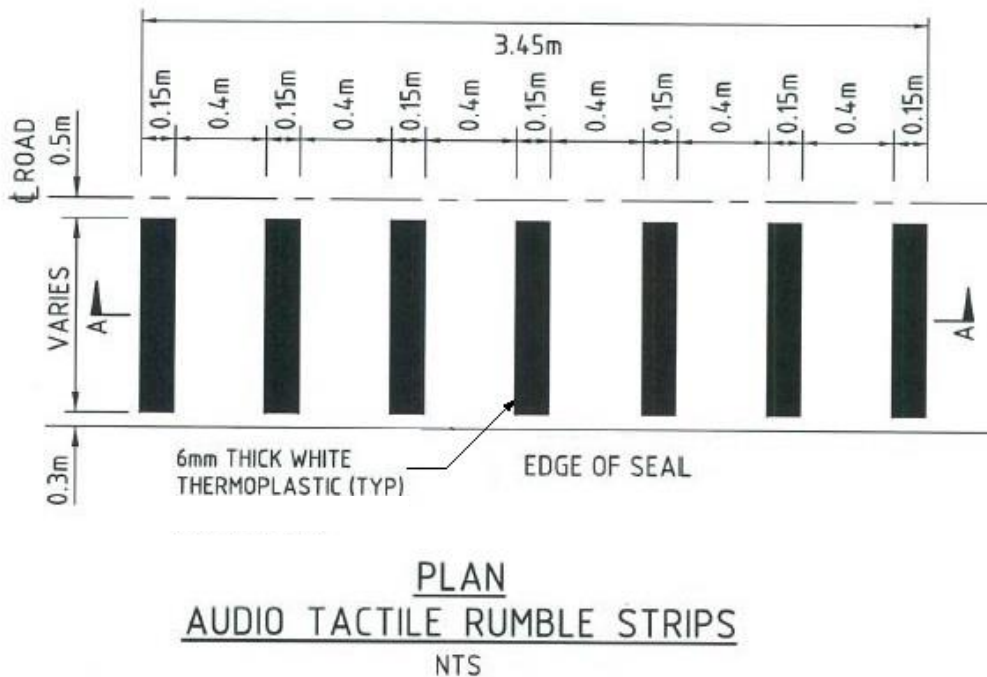


Figure 1: Dimensions of Rumble Strip Group

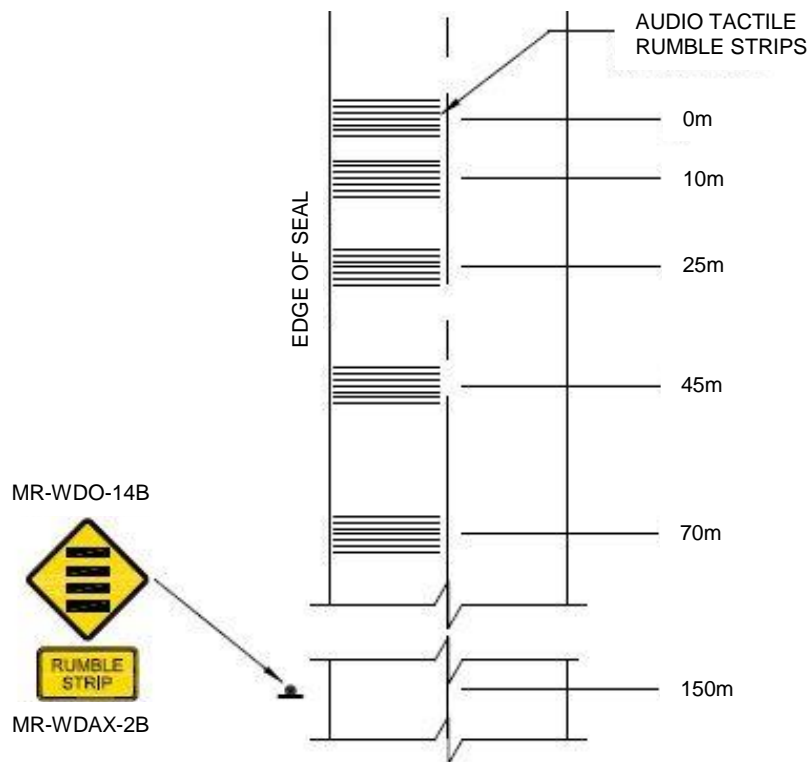


Figure 2: Rumble Strip Set Pattern

Main Roads WA standard drawing [200631-0043](#) shows the signs and pavement markings, including the pattern and spacing for the set of rumble strip groups, to be used at rural intersections as components of the rumble strip treatment.

Main Roads WA guideline drawings [201531-0036](#), [201531-0037](#) and [201531-0038](#) show the signs and pavement markings, including the pattern and spacing for the set of rumble strip groups, to be used at rail crossings as components of the rumble strip treatment.

3.4 Maintenance

Rumble strips should be maintained to a level that the audible and tactile effect of the strips is still present and capable of alerting a fatigued or inattentive road user to the presence of the approaching intersection or rail crossing.

3.5 Adverse Effects

Rumble strips may not be desirable at locations near residences due to a possible increase in outside noise created by the vehicles passing over the rumble strips. If residents are nearby (within 300 m) to a location being considered, consultation should take place explaining the safety benefits anticipated.

Some road users may cross into an opposing lane while no traffic is coming the other way or onto a sealed shoulder to avoid the rumble strips. It is considered that this type of act would be deliberate but rare and usually occur with almost no traffic about.

4 REFERENCES

AS1742.2: Manual of Uniform Traffic Control Devices Part 2: Traffic Control Devices for General Use.

Austrroads Guide to Traffic Management Part 10: Traffic Control and Communication Devices.

5 ACKNOWLEDGEMENT

This document has been developed based on the Department of Planning, Transport and Infrastructure South Australia: Operational Instruction Intersection Rumble Strip 2.43.

6 APPENDICES

Appendix	Title
Appendix 1	Applicable Main Roads Drawings

Appendix 1: Applicable Main Roads Drawings

The following Main Roads drawings are applicable to this guideline:

Drawing Number	Title
200631-0043	Audio Tactile Rumble Strips Location at 'T' Junctions
201531-0036	Railway Crossing & Side Track Pavement Marking & Signing Sign 1 of 3
201531-0037	Railway Crossing & Side Track Pavement Marking & Signing Sign 2 of 3
201531-0038	Railway Crossing & Side Track Pavement Marking & Signing Sign 3 of 3