



# Transport and Road Digest

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## RUMBLE SURFACES

### INTRODUCTION

Rumble surfaces are intermittent short lengths of coarse-textured road surfacings on which vehicle tyres produce a rumbling sound. Used in conjunction with appropriate roads signs and markings, they can reduce accidents on rural roads by alerting the unwary driver to the need for caution on the approaches to road hazards and by guiding him into adopting a suitable rate of deceleration. If the driver reduces his speed suitably his tyres set up a reassuring rhythmic rumble as his vehicle crosses the intermittent surfaces. Should he fail to slow down, the beat of the rumble becomes quicker and quicker, and imparts a sense of urgency to which he involuntarily responds by braking.

### APPLICATION

Intermittent rumble surfaces can be installed on rural roads where considerable reductions in speed are required, e.g. on the approaches to isolated stop intersections, railway level crossings, off-ramps and terminals of free-ways, outlying traffic circles and unexpected sharp curves.

The use of rumble surfaces should only be contemplated after due attention has been given to appropriate warning signs and other road safety improvements, and where noise generated by them would not be objectionable to persons living or working on adjoining property.

### LAYOUT

The layout of intermittent rumble surfaces, i.e. the number of surfaces and their spacings, depends on the approach speed as well as on the desired terminal speed. To determine the most appropriate layout for a particular site, the average maximum approach speed and the desired terminal speed should be estimated, taking into account features such as alignment, gradient, sight distance and traffic conditions. The layout of the rumble installation can then be determined

from the attached diagram. For example, (i) to alert drivers approaching an isolated stop intersection at 100 km/h and guide them into slowing down to 50 km/h, a rumble installation extending from 215 m to 61 m from the stopline is recommended. This would comprise eight intermittent rumble surfaces each 7 m long, spaced at decreasing intervals of 20, 18, 16, 14, 12, 10 and 8 m apart. Similarly, (ii) drivers approaching a sharp bend at 112 km/h could be guided into slowing down to a required safe speed of 70 km/h by installing seven rumble surfaces between 275 m and 112 m from the beginning of the curve (see diagram).

Rumble surfaces should extend across the full width of the approach lane(s) including any surfaced shoulder. For two-way traffic it is essential to have a white-painted barrier line along the entire length of the rumble installation.

## **CONSTRUCTION**

Rumble surfaces are constructed as an ordinary spray and chip surface treatment consisting of a tack coat followed by the stone, using hand labour or mechanical methods. The designs and techniques as set out in TRH 3 should be followed (see references).

### **Tack coat**

The tack coat could be either a hot bitumen or a bitumen emulsion and should be applied to the existing road surfacings at a rate high enough to ensure durability but not so high that a smooth texture would result. If the existing road surfacing is an open-graded asphalt it would be advisable first to apply a slurry seal to fill the voids before applying the tack coat, in order to achieve a good bond between the rumble surfacing and the underlying layer.

### **Stone**

The stone should be hard, cubical (low flakiness index) and have a good resistance to polishing (high polished-stone value). For most roads a 19 mm size stone is recommended. If necessary this may be reduced to 13 mm in urban areas where tyre noise would be objectionable. The stone should be precoated when a hot bitumen tack coat is used, but not when a bitumen emulsion tack coat is used.

### **Rolling**

Thorough rolling is required, preferably using a pneumatic-tyred roller to avoid crushing of the stone. Care should be taken to sweep up and remove any loose stone to prevent damage to windscreens. It may be advisable to apply a fog spray of bitumen emulsion over the layer of stone to improve retention. After the emulsion has broken, the surface should be blinded with a thin layer of clean coarse sand which should not contain particles larger than 7 mm.

## **EVALUATION**

The success of the rumble installation should be evaluated in terms of accident reductions, speed reductions, improved stop observance, and in terms of the cost of construction and maintenance. For this purpose, approach and terminal speeds, or stop observance and unusual driver behaviour, should be observed and recorded, commencing a few weeks after construction to allow for a period of traffic adjustment. The accidents that occur at the site of the rumble in-

stallation should be recorded by number, type and severity, so that the results for the "after" period can be compared with a similar "before" period.

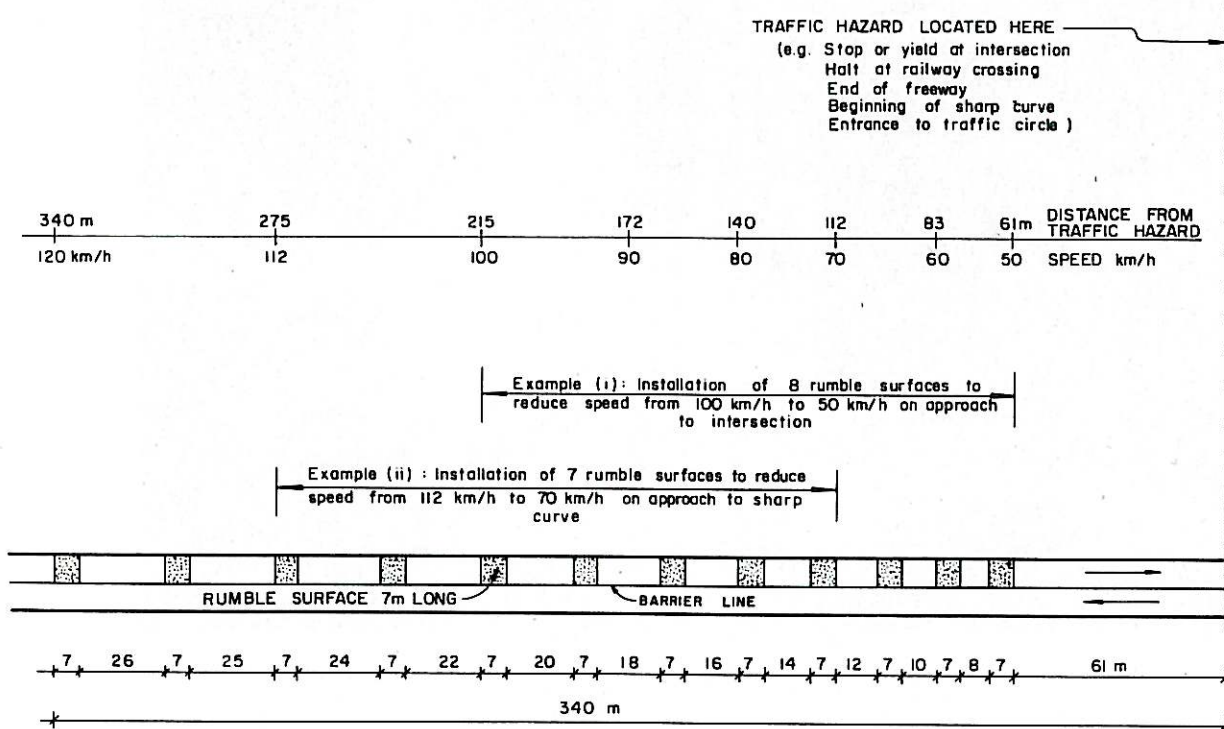
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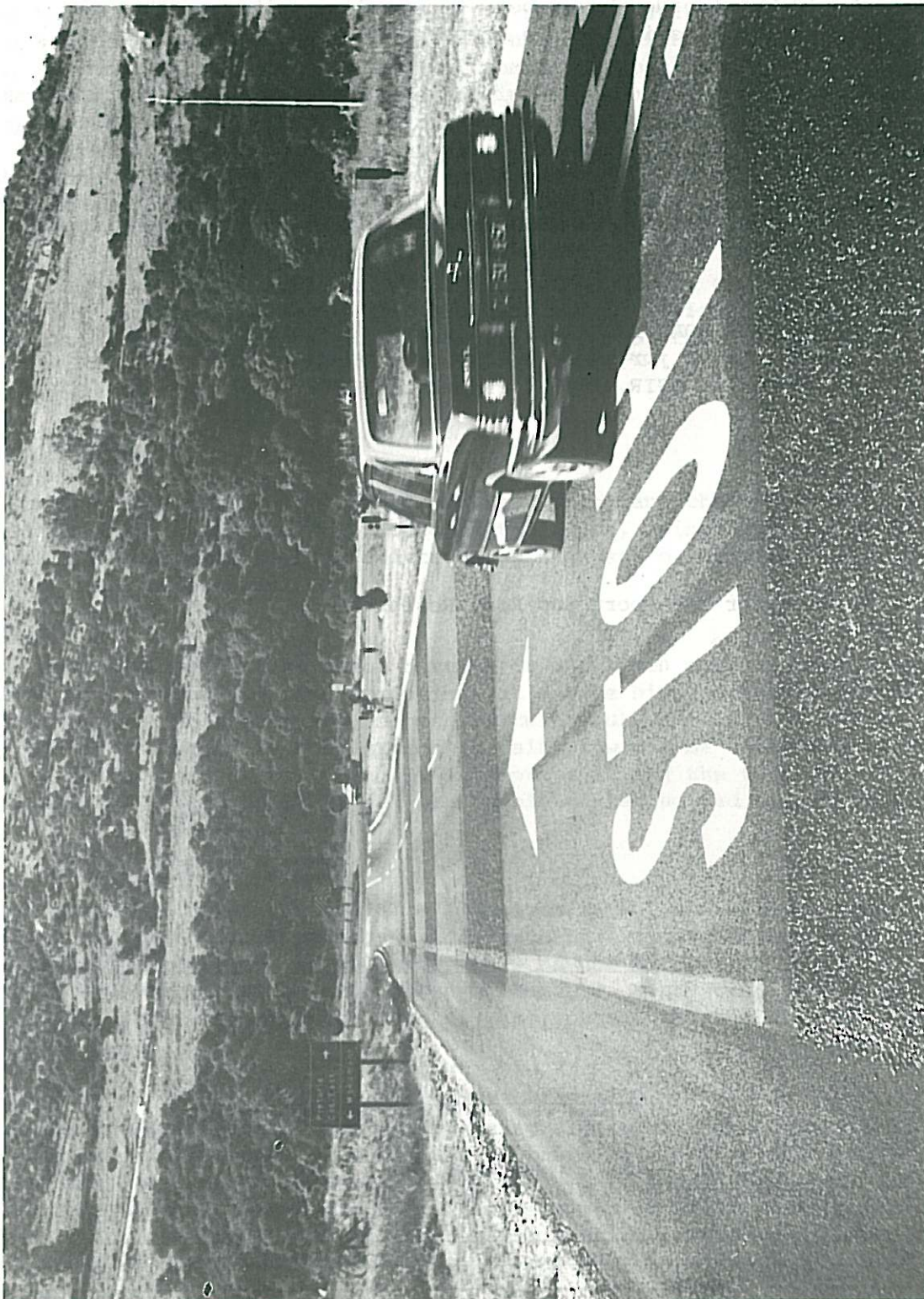
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LAYOUT OF INTERMITTENT RUMBLE SURFACES



Rumble surfaces alert the driver on the approach to a hazardous stop-intersection