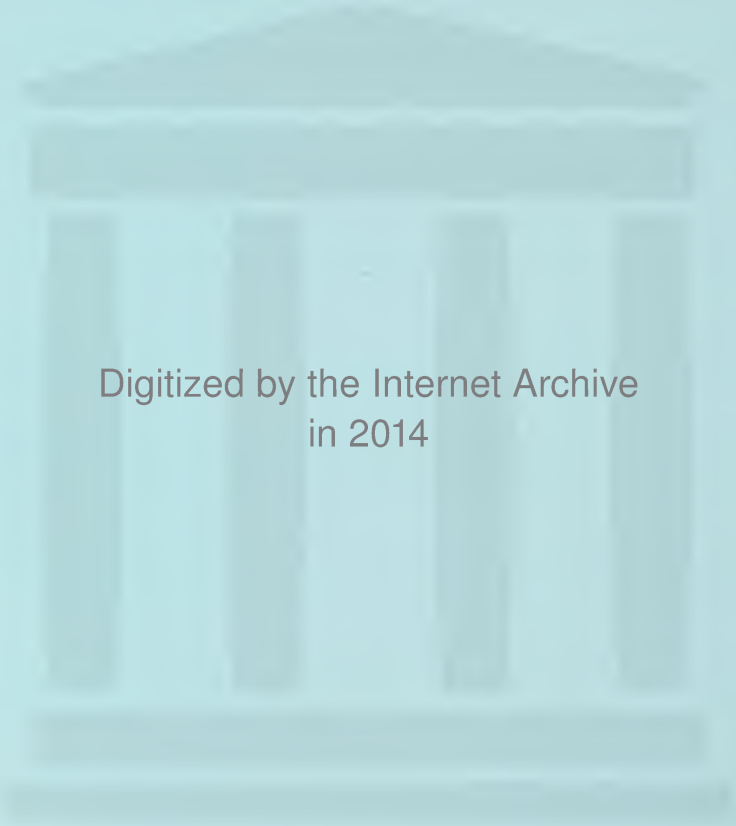
TENTATIVE GUIDELINES ON THE PROVISION OF SPEED BREAKERS FOR CONTROL OF VEHICULAR SPEEDS ON MINOR ROADS

THE INDIAN ROADS CONGRESS
1996



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1. INTRODUCTION

1.1. Development of suitable recommendations on speed breakers have been under the consideration of the Traffic Engineering Committee of the Indian Roads Congress for some time. The Traffic Engineering Committee in their meeting held at Bhopal on the 4th February, 1986 entrusted the drafting of the Standard based on the spot studies of suitable speed breakers to the University of Roorkee. The draft prepared by them was considered by the Committee in their meeting held at Hyderabad on the 17th January, 1987 and it was decided that the draft could be finalised by the IRC Secretariat and Member-Secretary, Traffic Engineering Committee in light of the comments received.

Accordingly, the draft was revised by the Traffic Engineering Committee (personnel given below) in their meeting held at New Delhi on 12th June, 1987 :

Dr. N.S. Srinivasan	...	Convenor
D. Sanyal	...	Member-Secretary
U.K. Agarwal		K. Suryanarayana Rao
K. Arunachalam		Prof. N. Ranganathan
R.T. Atre		Dr. O.S. Sahgal
A.K. Bandopadhyaya		D.V. Sahni
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P. Das		R. Thillainayagam
S.B. Deol		V.V Thakar
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Dr. A.K. Gupta		Prof. Dinesh Mohan
Joginder Singh		P.G. Valsankar
Dr. C.E.G. Justo		C.E. (NH), Kerala (V.S. Iyer)
Dr. L.R. Kadiyali		Director, Transport Research,
V.P. Kamdar		MOT (R.C Sharma)
Dr. S.K. Khanna		The Chief, Transport & Communication
N.V. Merani		Board, B.M.R D.A. (R. Y. Tambe)
Narain Prakash Mathur		S.E. Traffic Engg. &
K.C. Nayak		Management Cell, Madras
A.N. Nanda		The President, IRC & DG (RD)
S.M. Parulkar		(K.K. Sarin)
Sheo Nandan Prasad		-Ex-officio
Dr. S P. Planiswamy		The Secretary, IRC
Dr. S.P. Raghava Char		(Ninan Koshi)
V.S. Rane		-Ex-officio
Prof. M.S.V. Rao		

1.2. The revised draft was considered by the Specifications & Standards Committee in their meeting held on the 9th November, 1987. The Committee authorised S/Shri J.B. Mathur, D. Sanyal and K. Arunachalam to jointly modify the draft in light of the comments of the Specifications & Standards Committee.

1.3. The draft as revised was approved by the Executive Committee in their meeting held in New Delhi on the 13th November, 1987. Later on, the document was placed before the Council in their 121st meeting held at Trivandrum on 6th December, 1987. The Council approved the document subject to some minor changes which have since been incorporated.

2. GENERAL

2.1. Roads of different categories and under different situtions are designed for designated design speeds at which vehicles can travel with convenience and safety. However, at certain locations, such as approaches to manned and unmanned level crossings, sharp curves, congested/accident-prone locations, residential streets, etc., control of speed may become necessary to promote orderly traffic movement and improved safety.

2.2. A number of engineering measures are available to control vehicular speed. Some of these are posting of mandatory speed limit signs, use of flashing beacons to alert drivers, road markings of various types, etc.

2.3. Yet, there may be cases, particularly on secondary/tertiary roads and on residential streets in urban areas, where certain physical constraints may become necessary for effecting control on vehicular speeds. In this regard, three types of devices, namely, speed breakers, rumble strips and width restrictions have been used successfully. Choice among these will depend on local factors such as the type of area traversed, the type and volume of traffic, the extent of speed reduction desired, and other local factors. However, speed breakers, in particular, are meant mainly for residential areas, minor roads, and similar situations. Their use on major inter-city roads outside urban areas is not considered a good engineering practice, and the Indian Roads Congress does not favour it.

2.4. Speed breakers, where permitted to be installed, provide visual, audible and tactile stimuli which alert drivers and cause them to slow down. These can have different heights, lengths, spacings, signs, etc. In fact, no particular design is suitable for all

the types of vehicles using the road. For example, a speed breaker designed for trucks can be dangerous to motor cyclists and one designed for motor cyclists will be ineffective for trucks. The design recommended herein is a compromise design to suit average Indian road traffic conditions and is based on field investigations and research.

2.5. Speed breakers are not intended as substitute for proper mandatory, warning or informatory signs but are meant only to draw attention of drivers to a possible hazard ahead.

2.6. These recommendations may require revision in the light of future experience and development in the field. Towards this end, it is suggested that a record of speed and accident conditions, before and after the installation of speed breakers, should be kept.

3. DEFINITION

A speed breaker is a hump surface across the roadway having a rounded shape with width greater than the wheel base of most of the vehicles using the road. When there is decreased variation in sensory stimuli and at locations where speed controls are desired, a speed breaker acts as a strong stimuli to arouse reaction in the brain. Since the driver reaction times are faster in response to audible and tactile stimuli than to visual stimuli, a driver subconsciously reduces his speed. An ideally designed hump should satisfy the following requirements :

(i) There should be no damage to vehicles nor excessive discomfort to the drivers and passengers when passing at the preferred crossing speed.

(ii) The hump should not give rise to excessive noise or cause harmful vibrations to the adjoining buildings or affect the other residents of the area.

(iii) Above the design speed, a driver should suffer increasing level of discomfort (but without losing directional control and without any vehicle damage) depending on the extent through which design speed is exceeded.

4. SCOPE

4.1. Warrants

Use of speed breakers is justified primarily under the following three circumstances :

(1) T-intersections of minor roads with rural trunk highways, characterised by relatively low traffic volumes on the minor road but very high average operating speed and poor sight distances. Such locations have a high record of fatal accidents and as such a speed breaker on the minor road is recommended ;

(2) Intersections of minor roads with major roads, and mid-block sections in urban areas where it is desirable to bring down the speeds; and

(3) Selected local streets in residential areas, school, college or university campuses, hospitals, etc. Also in areas where traffic is observed to travel faster than the regulated or safe speed in the area.

4.2. **Other places where these may be used include :**

(1) Any situation where there is a consistent record of accidents primarily attributed to the speed of vehicles e.g. when hazardous sections follow a long tangent approach;

(2) Approaches to temporary diversions;

(3) Approaches to weak or narrow bridges and culverts requiring speed restriction for safety;

(4) On the minor arms of uncontrolled junctions and at railway level crossings;

(5) Sharp curves with poor sight distances; and

(6) Places of ribbon development, where road passes through built-up areas and vehicles travelling at high speeds are a source of imminent danger to pedestrians.

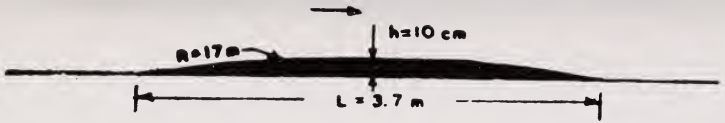
5. DESIGN OF SPEED BREAKERS

5.1. Speed breakers are formed basically by providing a rounded (of 17 metre radius) hump of 3.7 metre width and 0.10 metre height for the preferred advisory crossing speed of 25 km/h for general traffic, Fig. 1. Trucks and buses having larger wheel bases may feel greater inconvenience on passage at such humps. To facilitate appreciable and comfortable passage for larger and heavier vehicles (where their proportion is quite high) humps may be modified with 1.5 metre long ramps (1 : 20) at each edge. This design will also enable these vehicles to pass the hump at about 25 km/h, Fig. 2.

5.2. In certain locations speed breakers may have to be repeated over a section to keep speeds low throughout. More humps may be constructed at regular intervals depending on desired speed and acceleration/deceleration characteristics of vehicles. The distance between one hump to another can vary from 100 to 120 metres centre to centre shown in Figs. 3, 4 and 5.

6. PLACEMENT OF SPEED BREAKERS

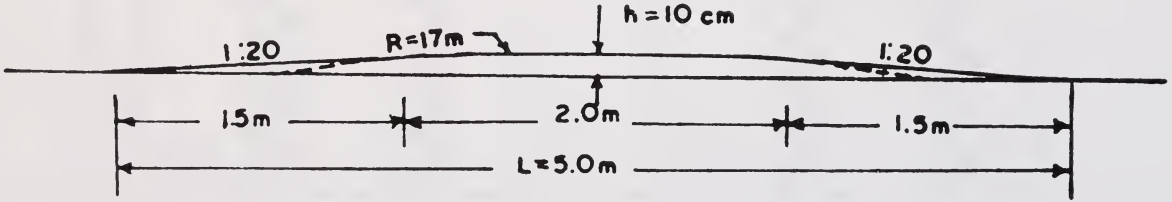
6.1. The pattern of placement of speed breakers depends upon the location and the type of treatment used. Some of the suggested locations have already been indicated in Clause 4. At 'T' intersections speed breakers should be installed on minor roads



(a) LONGITUDINAL SECTION

(b) TRANSVERSE SECTION

Fig. 1. Recommended specification for rounded hump type of speed breaker for general traffic at preferred crossing speed 25 km/h



(a) LONGITUDINAL SECTION
(b) TRANSVERSE SECTION IS SAME AS GIVEN IN FIG. 1

Fig. 2. Recommended specification for hump type of speed breaker for heavy truck and bus traffic at preferred crossing speed 25 km/h

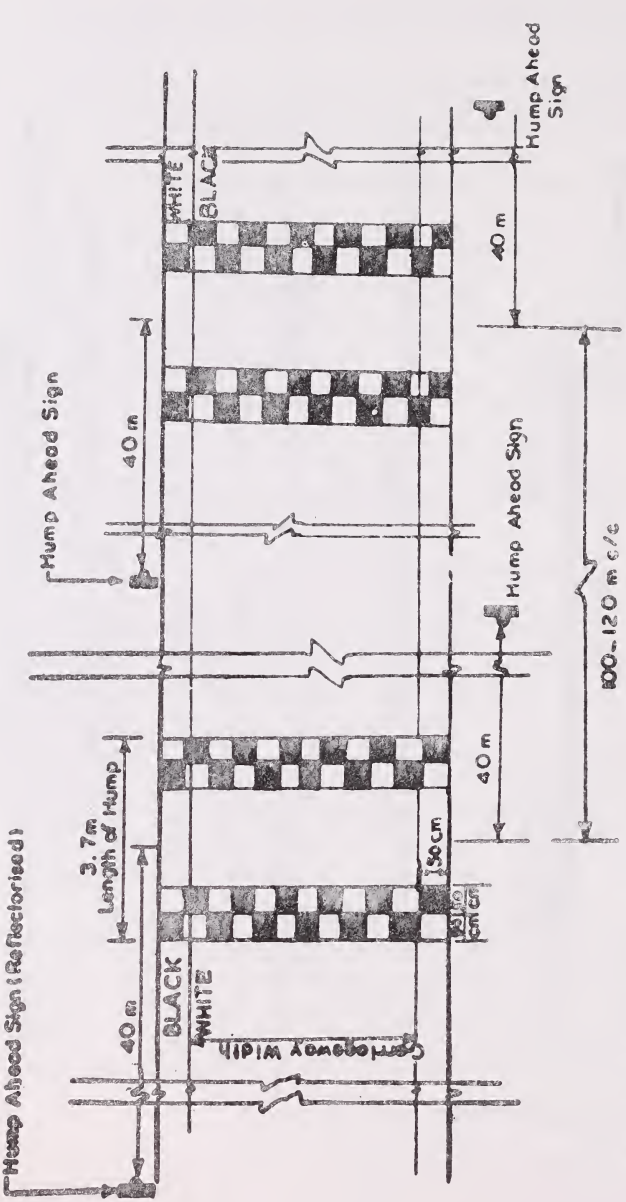


Fig. 3. Recommended placement of hump/humps in mid-block section, hump marking in chequered pattern and sign board locations

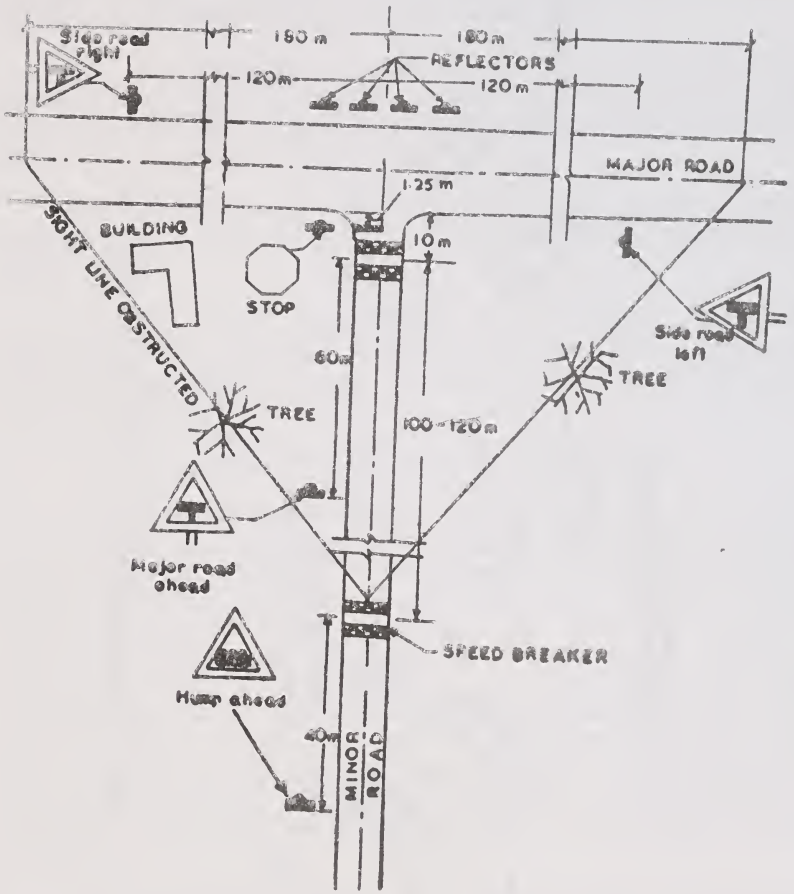


Fig. 4. Speed breakers at T-intersection or railway crossing

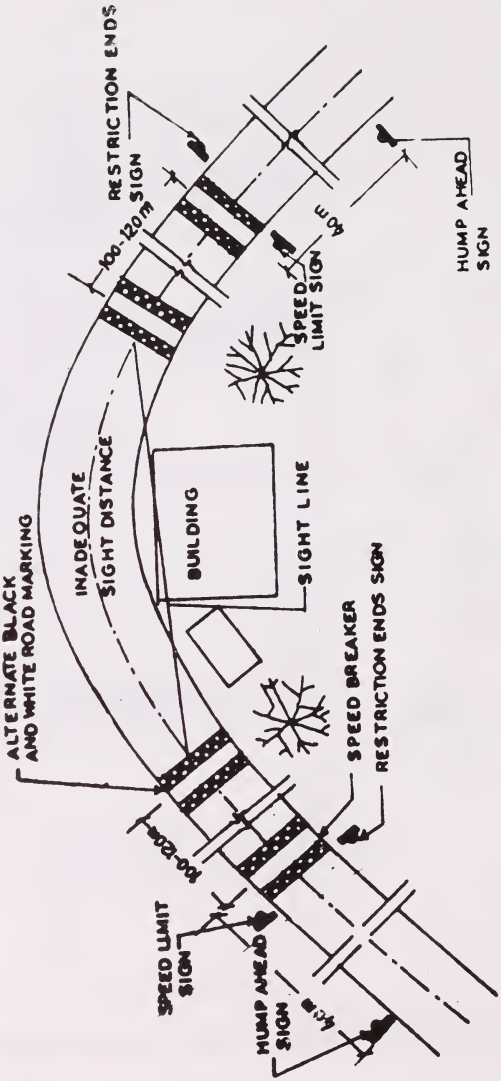


Fig. 5. Plan of speed breakers on approach to a sharp curve

or perpendicular arms about 10 metres away from the inner edges of major roads. Proper sign boards and markings are required to be provided at such locations, Figs. 4 and 6. On sharp curves, available sight distances guide the placement and number of speed breakers, Fig. 5. For other situations the Engineer-in-Charge should use his ingenuity and judgement.

6.2. To check the tendencies of drivers to avoid speed breakers and using shoulders, it is recommended that the speed breakers should be extended through the entire width of shoulder supported on a proper base.

6.3. For undivided carriageways speed breakers should invariably be extended over the entire carriageway width including shoulders.

6.4. On bridges speed breakers should not be provided. However, where frequent accidents have been reported or the bridges are on curves or they are narrow, either approach must have two speed breakers each.

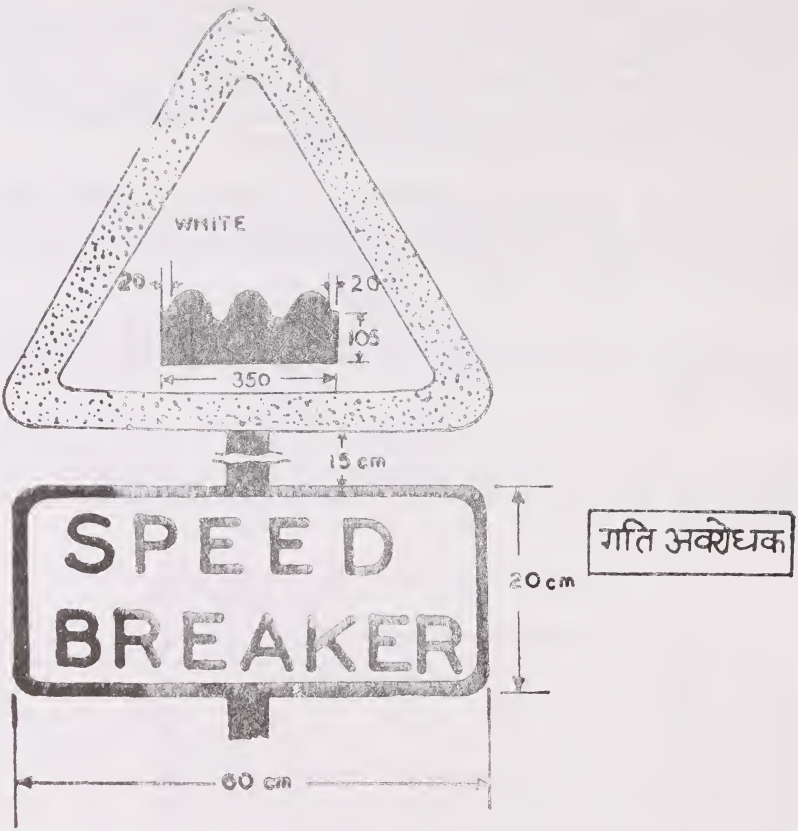
7. SPECIFICATION FOR SPEED BREAKERS

7.1. Speed breakers are laid by first marking the location of hump on the pavement and marking indents in this area for proper bonding. Surface is then cleared of all dust and loose particles and a tack coat applied. Forms of requisite heights, shape and width are then placed, and hot premixed bituminous material is poured to the required depth and shape. Forms are then lifted and the surface finished to required shape, and edges rounded by trowel. The premixed material should be well compacted before opening to traffic. Allowance should be made for compaction, and irregularities should be corrected using bituminous materials having fine aggregate or by scrapping, as necessary. The material is then allowed to cure before opening to traffic.

7.2. Arrangements for proper drainage of the speed breakers must be made to prevent formation of ponds and puddles.

8. SIGN POSTING AND MARKING

8.1. Drivers should be warned of the presence of speed breakers by posting suitable advance warning signs. The warning signs, Fig. 6 should be of the design 'HUMP OR ROUGH ROAD' detailed in IRC : 67-1977 'Code of Practice for Road



SIGN DETAILS :

Lateral Placement Left

0.60 m on kerbed roads

2.3 m on unkerbed roads

Mounting Height

2.0 m on kerbed roads

1.5 m on unkerbed roads

Use reflective paint or strip

Size of △ 60 cm or 90 cm (standard)

Red strip width 4.5 cm or 7.0 cm

Post (8 cm × 8 cm × 0.8 cm)

T—Iron to be painted white and black in alternate 25 cm bands

Fig. 6. Recommended hump warning sign with definition plate

Signs'. The sign should have a definition plate with the words 'SPEED BREAKER' inscribed thereon and should be located 40 m in advance of the first speed breaker. Location of this sign is indicated in the illustrations of typical cases contained in Figs. 3, 4 and 5.

8.2. Speed breakers should be painted with alternate black and white bands as shown in Fig. 3 to give additional visual warning. For better night visibility, it is desirable that the markings are in luminous paint/luminous strips. Embedded cat-eyes can also be used to enhance night visibility.

9. MAINTENANCE

Care should be exercised to repair the hump at regular intervals and also to remove the dust or mud collected on either side of the hump. Repainting of markings on the hump is the most important maintenance activity, as this provides an essential visual warning to the drivers.