



**GOVERNMENT OF INDIA**

भारत सरकार

**MINISTRY OF RAILWAYS**

रेल मंत्रालय

# **Draft Guideline on the provision of Speed Breakers for Control of Vehicular speed on minor Roads**

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## INDEX

S. No.	Description of items	Page No.
1.	Introduction	1
2.	Scope	2
3.	Design of Speed Breakers	3
4.	Minimum Distance of Speed Breakers from the Level Crossing	3
5.	Placement of speed Breakers	4
6.	Specification for Speed Breakers	4
7.	Sign Posting and Marking	5
8.	Maintenance	5
9.	Speed Breakers on approach of Level Crossing of Railway Tracks	5
10.	Reference	6

## Guideline on the Provision of Speed Breakers for Control of Vehicular Speeds on Minor Roads

1. **INTRODUCTION:** Speed breakers on approaches to level crossing had been constructed from safety consideration. However, these may be unsafe apart from causing in convenience to road users when not constructed properly. Railway safety review committee also considered the provision of rumble strips as an unnecessary encumbrance since it impedes the flow of road traffic when level crossing gate is opened to road traffic. They recommended that rumble strips constructed at the approaches of manned gates should be removed.

1.1 **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 decrease 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 the 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.

## 2. **SCOPE:**

### 2.1 **Warrants**

Use of speed breakers is justified primarily under the following 03 circumstances

1. T- intersections on minor roads characterized 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.

### 2.2 **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;
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; and
7. Level crossings, manned or unmanned at all type of roads.

### 3. DESIGN OF SPEED BREAKERS

- 3.1 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 meter long ramps (1:20) at each edge. This design will also enable larger vehicles to pass the hump at about 25km/h, (Fig.2).
- 3.2 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 meter centre to centre shown in Figs. 3, 4 and 5.

### 4. MINIMUM DISTANCE OF SPEED BREAKERS FROM THE LEVEL CROSSING:

Minimum distance of speed breakers from the level crossing shall depend upon speed of vehicle, reaction time, acceleration due to gravity and coefficient of friction (pavement surface and tyres).

Calculation:

$$\text{Stopping distance} = vt + \frac{v^2}{2gf}$$

Here,  $v$  = speed,

$t$  = Reaction time,

$g$  = acceleration due to gravity

$f$  = Coeff. of friction

For Example: Min. distance for Speed of vehicle 20KMPH(5.56 m/sec).

$t$  = 2.5 sec (As per recommendation of IRC)

$f$  = 0.40 (Coeff. of friction for speed 50KMPH),

$g$  = 9.8 m/sec<sup>2</sup>

Stopping distance =  $5.56 \times 2.5 + \frac{5.56 \times 5.56}{2 \times 9.8 \times 0.40} = 17.84 \text{msay } 20\text{m}$

## **5. Placement of speed Breakers**

- 5.1 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 2. At 'T' intersections, speed breakers should be installed on minor roads; or perpendicular arms about 10 meters 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 judgment.
- 5.2 In order 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.
- 5.3 For undivided carriageways, speed breakers should invariably be extended over the entire carriageway width including shoulders.
- 5.4 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.

## **6. SPECIFICATION FOR SPEED BREAKERS**

- 6.1 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 shaped. 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.

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

## 7. **SIGN POSTING AND MARKING**

- 7.1 Drivers should be warned of the presence of speed breakers by posting suitable advance warning signs. A typical warning sign is detailed in Fig. 6. The sign should have a definition plate with the words 'SPEED BREAKER' inscribed there on and should be located 40m 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.

- 7.2 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.

## 8. **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.

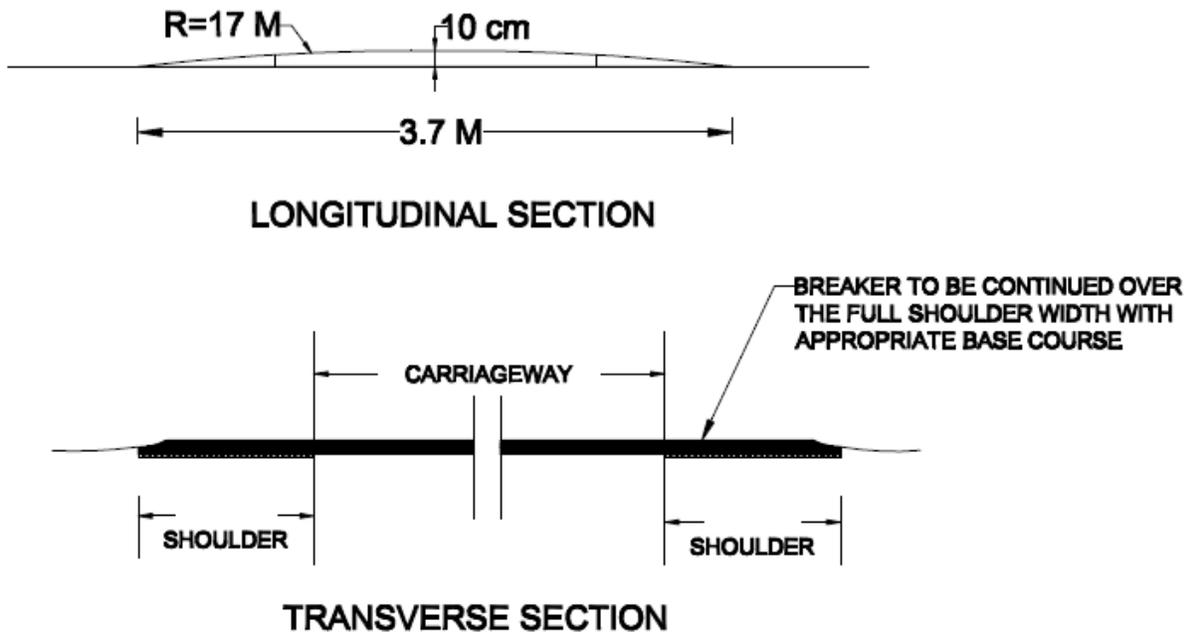
## 9. **Speed Breakers on approach of Level Crossing of Railway Tracks:**

- a) In an article "Speed Breakers – Unjustified & Dangerous Obstruction" of Indian Railway Technical Bulletin, Feb-2002, it is concluded that suitable action plans are made so that the construction of speed breakers, as these are counter-productive and redundant, are banned in approaches of all level crossings. However, if it is not acceptable for unmanned level crossings, suitably designed speed breakers with transitions are only to be provided at an adequate distance with fore warnings.

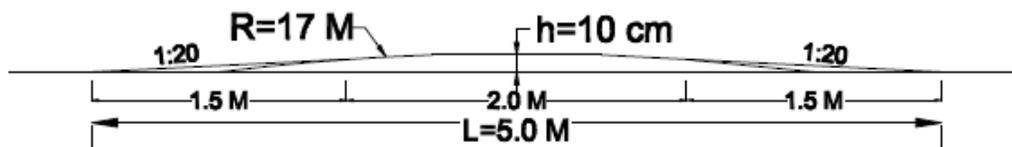
- b) Rumble strips are not recommended by IRC, so these are not to be provided. Similarly, ready made synthetic rumble strips available in market are also not to be provided.
- c) In developed countries instead of speed breaker, a patch of roughened road surface is provided at the approach of Railway crossing so that the user is warned of a Railway crossing ahead. It does not slow down the traffic.

10. **Reference:**

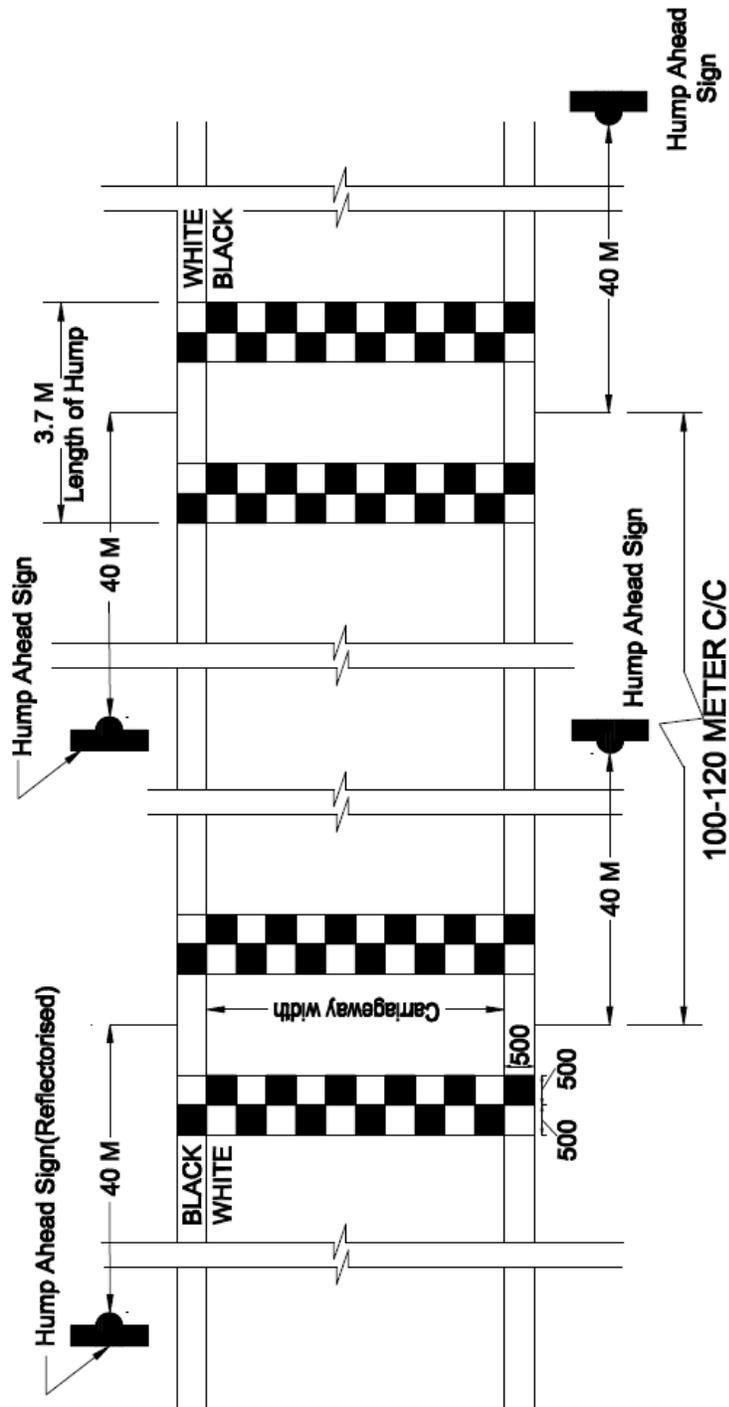
- 1. IRC: 99-1988
- 2. Indian Railway P. Way Manual 1984 (Second reprint 2004).
- 3. Speed Breakers – Unjustified & Dangerous Obstruction on approach of Level Crossings. (Indian Railway Technical Bulletin – 2002, RDSO's Technical bulletin).



**Fig. 1: Recommended specification for rounded hump type of speed breaker for general traffic at preferred crossing speed 25KMPH**



**Fig. 2: Recommended specification for hump type of speed breaker for heavy truck and bus traffic at preferred crossing speed 25KMPH**



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

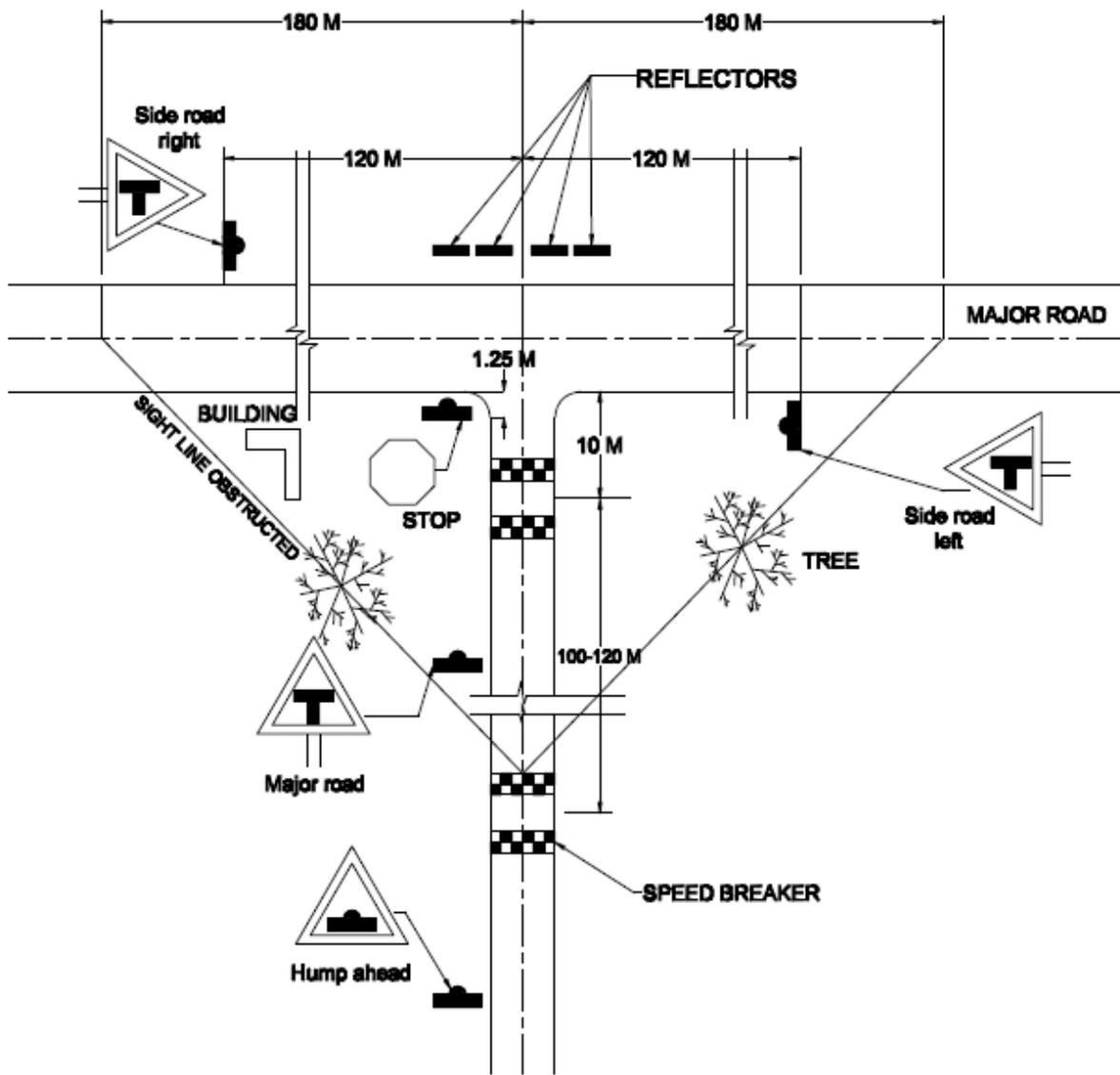


Fig. 4: Speed breakers at T-intersections.

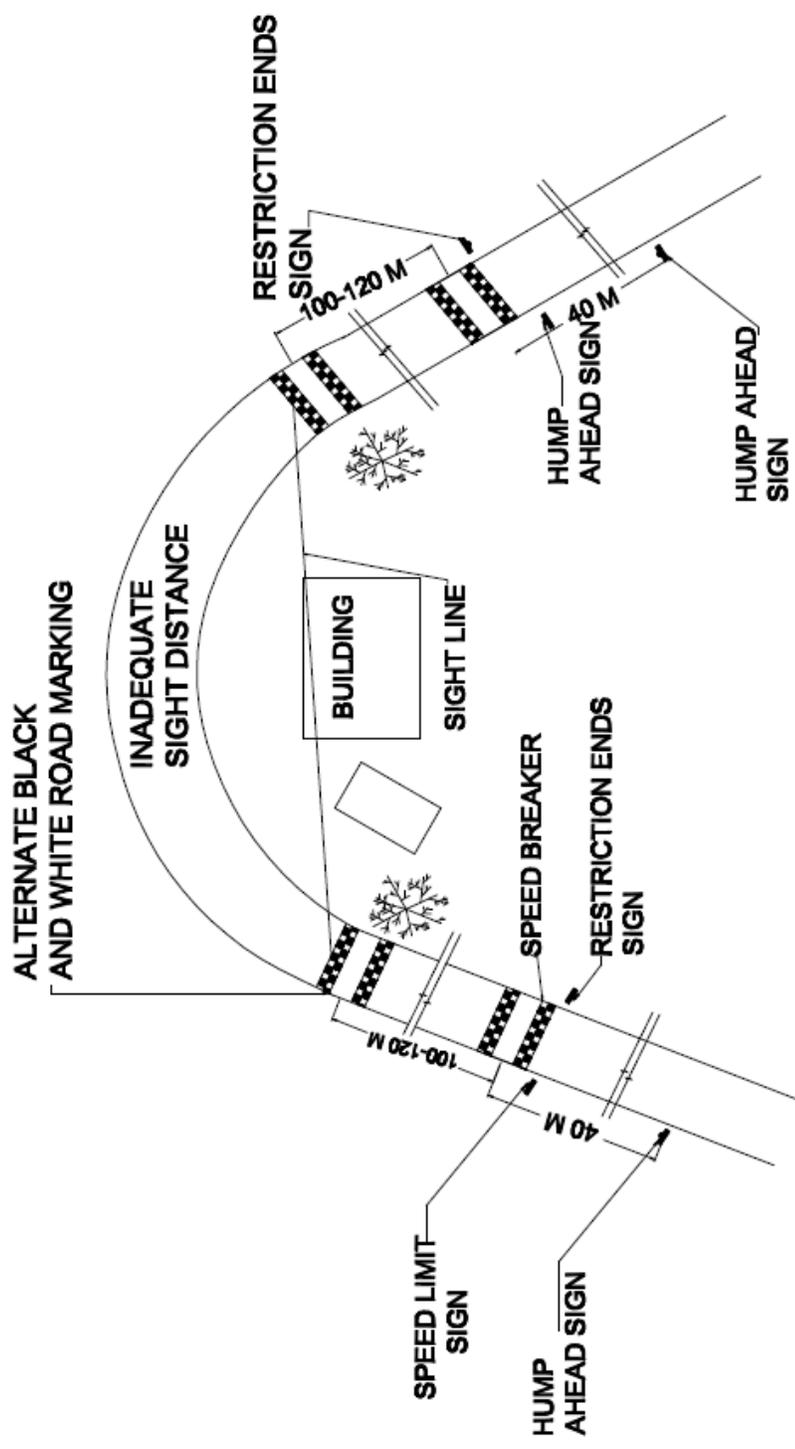
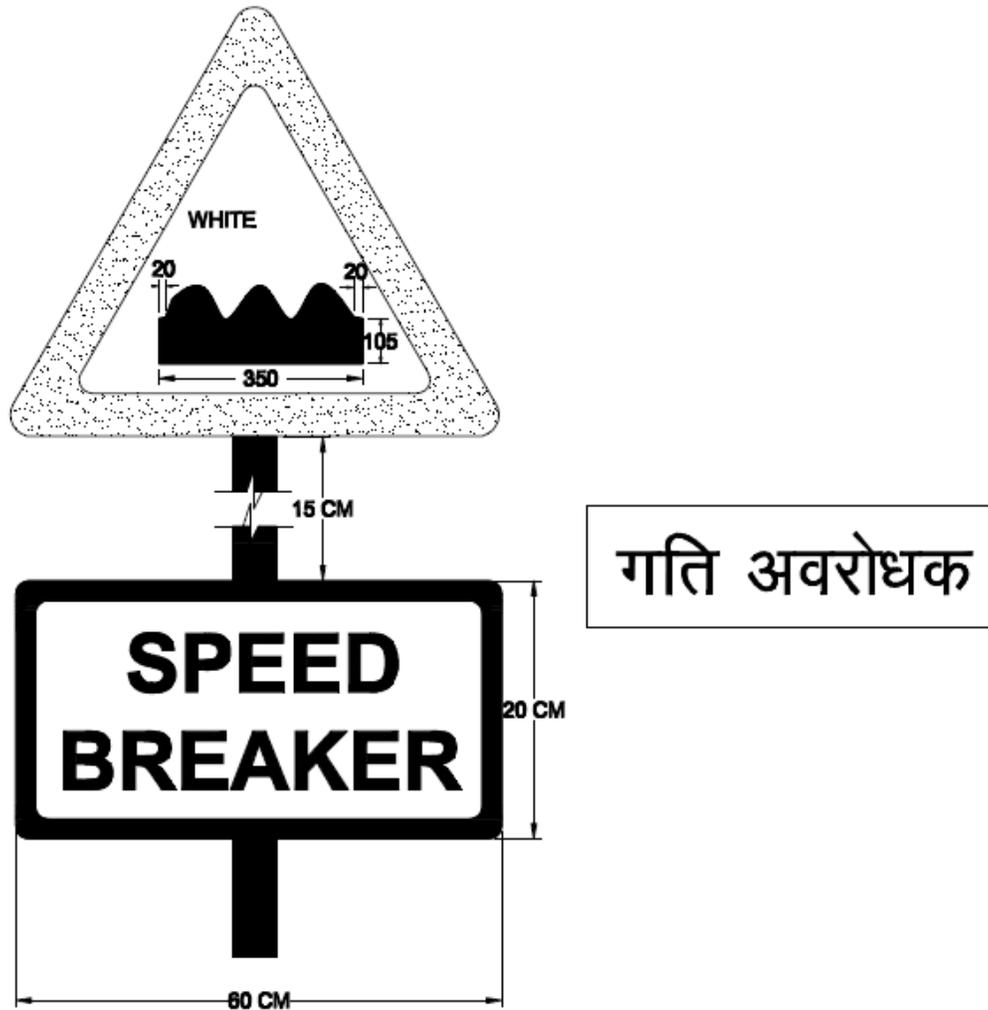


Fig. 5: Plan of speed breakers on approach to a sharp curve



**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

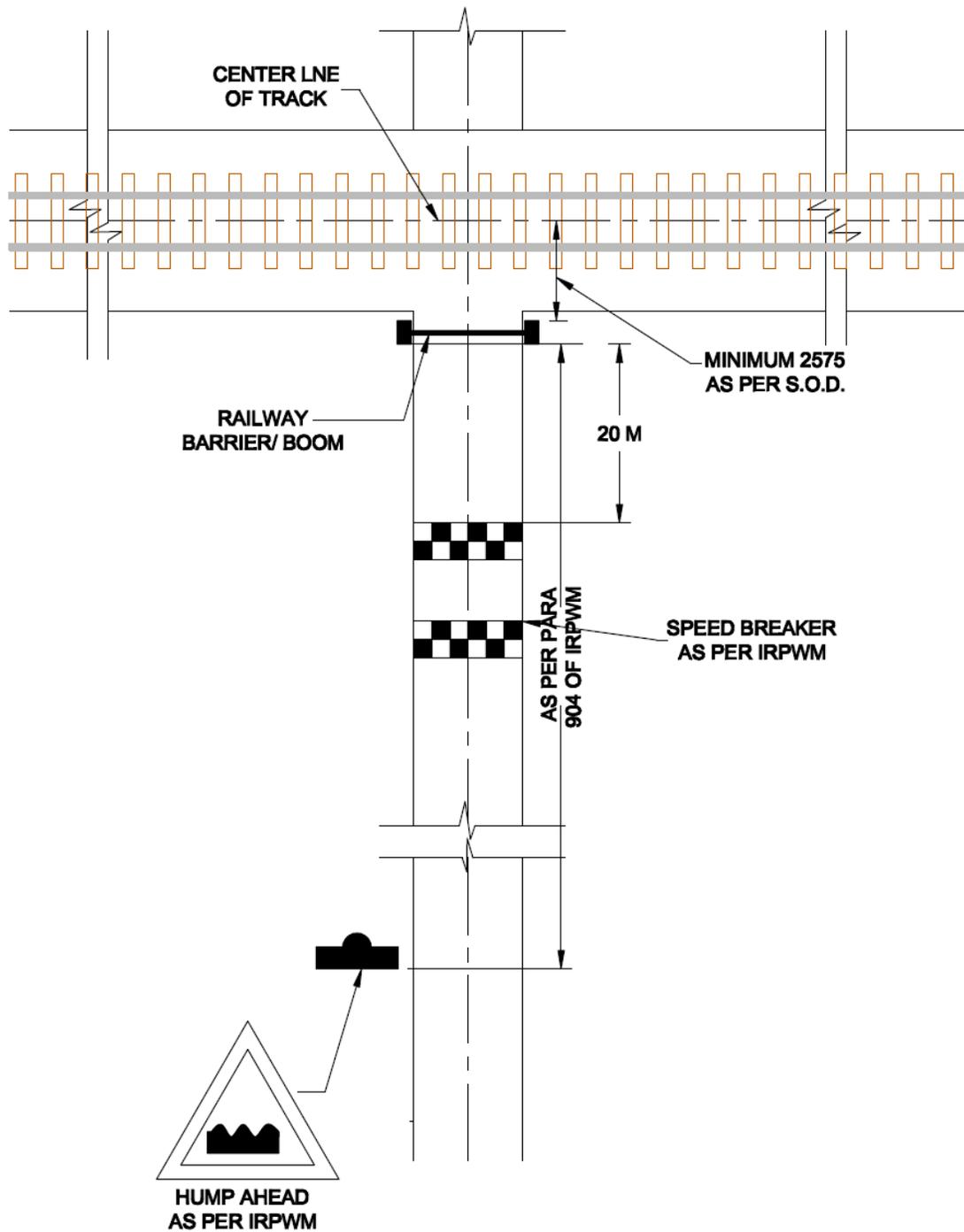
Size of  $\Delta$  60 cm or 90 cm (standard)

Red strip width 4.5 cm or 7.0 cm

Post (8cm x 8cm x 0.8 cm)

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

**Fig.6: Recommended hump warning align with definition plate**



NOTE: DESIGN OF RAILWAY CROSSING AHEAD, HUMP AHEAD & SPEED BREAKER SHALL BE GOVERNED AS PER IRPWM

### PROVISION OF SPEED BREAKER AT RAILWAY CROSSING

Fig. 6: Provision of Speed Breaker at Railway Crossing