Technical Note No: 6

Sub: APRRP-Roads –Road Safety Interventions and Road furniture such as Traffic signs, Markings and other Appurtenances - Guidelines – Communicating - Reg.

Ref: 1) Inspection of APRRP works by PMC Team in different districts.

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Background:

During the inspection of APRRP works by PMC Team it was observed that Road Infrastructure such as Traffic signs, Markings, Speed breakers and KM/HM stones etc. are not provided and constructed properly as per IRC / MoRD specifications which may lead to confusion to the road users and cause accidents. Hence there is a need to streamline the execution of Road Safety Interventions as per actual requirements of that particular road based on the relevant codes and specifications.

Purpose of Road Signs:

The purpose of road signs is to promote road safety and efficiency by providing for the orderly movement of all road users on all roads in both urban and non- urban areas. Road signs notify the road users about regulations and provide warning and guidance needed for safe, uniform and efficient operation.

Classification of Road Signs:

1. Mandatory/Regulatory Signs
2. Cautionary/Warning Signs
3. Informatory/Guide Signs

1. Mandatory/Regulatory Signs:

All Mandatory or Regulatory Signs are **circular** in shape. They are with red Circular ring and letters on white background. The exceptions in shape are the octagonal red **STOP** sign.

1.1 STOP Sign:

1.1 Purpose

The sign is intended for use on roadways where traffic is required to stop before entering a major road. This is a Mandatory/Regulatory sign (Fig. 1)

1.1.2 Combination with marking

The stop sign shall always be used in combination with certain road markings, such as stop line and the word "STOP" marked on the pavement.

1.1.3 Size, shape and colour

The sign (shown in Fig.1) shall be octagonal in shape and shall have red background and white border. The word "STOP" written in white (in English or local language) with 150 mm height letters, centrally positioned. The height of the octagon and border shall be as per Table 1.

Table 1 Sizes and Dimensions of "STOP" signs

Approach speed on minor road	Size	Height (mm)	Border (mm)	Font Size (mm)
Up to 50 kmph	Small	750	25	125
51 – 65 kmph	Normal	900	30	150
> 65 kmph	Large	1200	40	225

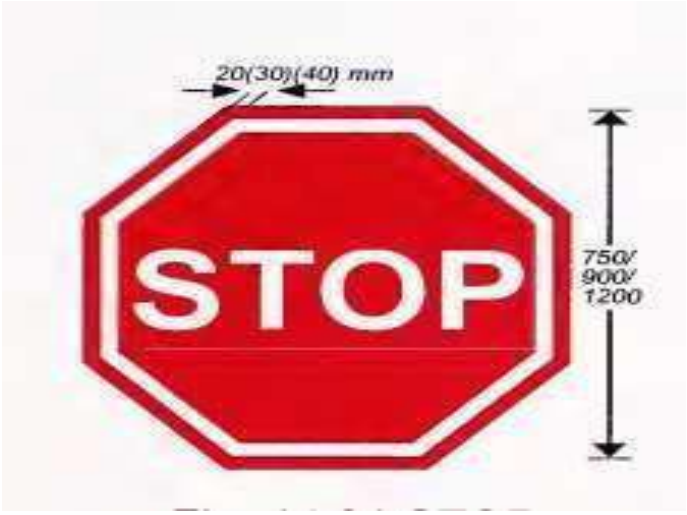


Fig. 1 STOP

1.1.4 Location

The sign shall be installed on the left side of the approach road. Normally, these should be fixed 1.5 m in advance of the stop line but in no case more than 6 m as shown in Fig 2.

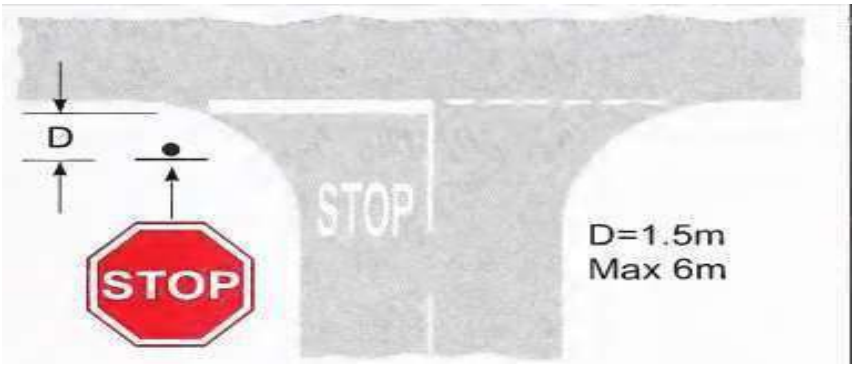


Fig. 2 Location of "STOP" sign

2. Cautionary/warning signs:

2.1 Cautionary/warning signs are triangular in shape with red border and black symbol in white background used to caution and alert the road user so that they take the desired action and may require a reduction in speed or some other manoeuvre.

2.2 Size, shape and colour

The signs shall be in the shape of an equilateral triangle, with apex pointing upwards. It shall have red border and black symbols on white background. The size and placement details shall be as per Table 2.

Table 2 The sizes and Dimensions of Cautionary and their Sitting Distances

Design speed	Size	Side (mm)	Border (mm)	Clear Visibility Distances (m)	Distance of sign from hazard (m)
Up to 50 kmph	Small	600	45	45	45
51 - 65 kmph	Medium	750	60	60	45 - 110
66 - 80 kmph	Normal	900	70	60	110 - 180
> 80 kmph	Large	1200	90	90	180 - 245

2.3 Left/Right Curve

These signs are to be used whenever there is a need of reduction of speed due to change of direction of alignment and radii of the curvature are below the specified limit. These signs are intended to warn the driver to reduce the speed and proceed cautiously.

The left-hand curve sign should be used to mark curve bending to the left and the right-hand curve sign for curves bending to the right (**Fig 3 and Fig 4).**

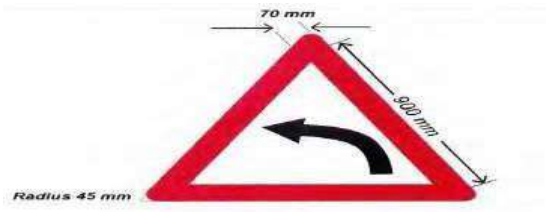


Fig 3. Left Hand Curve

Fig 4. Right Hand Curve

2.4 Right/Left Hairpin Bend

The sign should be used to mark curves of small radii, where the change of direction is so considerable as to amount to a reversal of direction. The symbol should bend to left or right according to the road alignment (**Fig 5 and Fig 6**)

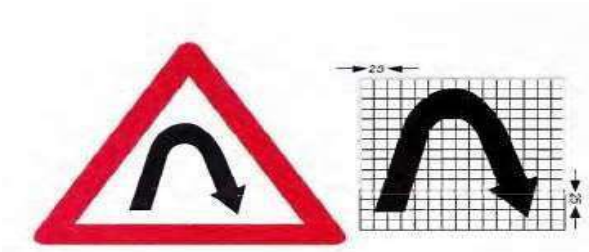


Fig. 5. Right Hairpin Bend

Fig.6 Left Hairpin Bend

2.5 Right/Left Reverse Bend

The sign should be erected where two curves in opposite direction are separated by a tangent less than 120 m in length in plains and 30 m in hills. If the first curve is to the right, a right reverse bend sign shall be used. If the first curve is to the left, a left reverse bend sign shall be used (**Figs. 7 and 8**)

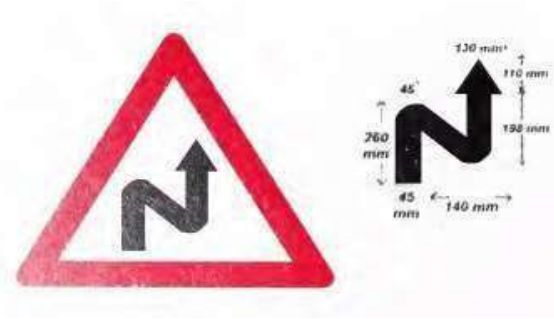


Fig .7 Right Reverse Bend

Fig .8 Left Reverse Bend

2.6 Side Road

The sign should be erected (**Figs.9 and 10)** in advance of the main road intersections. The sign should only be used when the drivers need to be warned of the existence of a junction and no other indication.

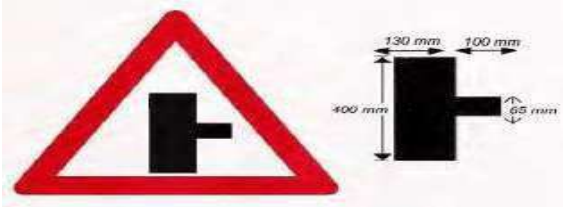


Fig. 9 Side Road Right

Fig. 10 Side Road Left

2.7 Y-Intersection

The sign should be erected on the approach to a bifurcation of any road. The sign should only be used when the drivers need to be warned of the existence of a junction and no other indication (Fig **.11 and 12**).

Fig. 11 Y- Intersection

Fig. 12 Y- Intersection

2.8 T- Intersection

The sign should be erected in advance of T-Junction. The sign should only be used when the drivers need to be warned of the existence of a junction and no other indication, e.g., by a map type advance direction sign (**Fig .13 and 14).**

Fig 13. T- Intersection

Fig 14. T- Intersection Major Road Ahead

2.9 Major Road Ahead

The sign should be erected in advance of crossing with a major road. **(Fig .15**).

Fig 15. Major Road Ahead.

2.10 Narrow Bridge Ahead

The sign should be erected on roads in advance of bridges where the clear width between kerbs or wheel guards is less than the normal width of carriage way **(Fig. 16)**

Fig 16. Narrow Bridge Ahead.

2.11 Pedestrian Crossing

The sign should be erected on roads in advance of both approaches to uncontrolled pedestrians' crossings. This is absolutely essential when visibility of the crossing is impaired by a bend or hump in the road **(Fig. 17)**

Fig 17. Pedestrian Crossing

2.12 School Ahead

The sign should be erected where school buildings or grounds are adjacent to the road **(Fig 18).**

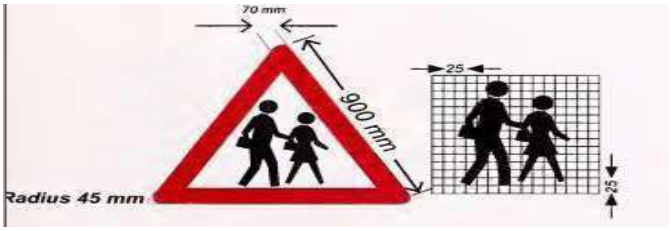


Fig. 18 School Ahead

2.13 Dangerous Dip

The sign should be erected in advance of crossing with a major road. (**Fig 19)**

Fig 19. Dangerous Dip

2.14 Speed Breaker

This sign should be used to warn the drivers of the presence of the speed breaker. This sign should be posted 50-60 m in advance of the speed breaker location (**Fig. 20)**

Fig 20. Speed Breaker

2.15 Unguarded Railway Crossing

The sign should be used on the approaches of railway level crossings where there are no gates or other barriers. A pair of signs shall be used for the purpose: (i) an advance warning sign located at 200 m away from the crossing and (ii) a second sign to be erected near the crossing. The distance of the second sign from the crossing may be 50-100 m in plain and rolling terrain and 30-60 m in hilly terrain. (**Fig. 21**)

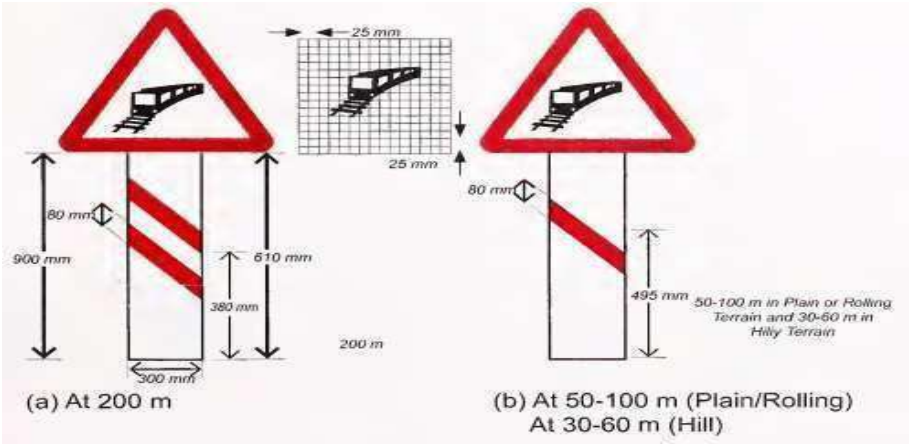


Fig. 21 Unguarded Railway Crossing

2.16 Guarded Railway Crossing

The sign should be used to warn traffic on the approaches to guarded railway crossings. A pair of signs shall be used for the purpose: (i) an advance warning sign located at 200 m away from the crossing and (ii) a second sign to be erected near the crossing. The distance of the second sign from the crossing may be 50-100 m in plain and rolling terrain and 30-60 m in hilly terrain. (**Fig. 22)**

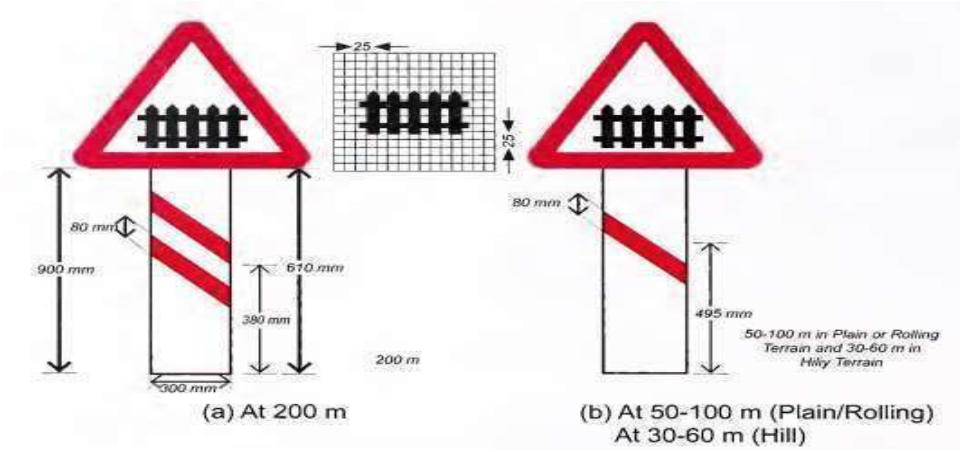


Fig. 22 Guarded Railway Crossing

2.17 Hazard Marker

Road side hazard like bridges, trees which are coming in the road way are to be illuminated by retro reflective Object Hazard Markers (OHM) and for a left hazard **Fig. 23** shall be used and for a right hazard **Fig. 24** shall be used.

Fig. 23 Object Hazard (Left)

Fig. 24 Object Hazard (Right)

3. Facility Information Signs

The signs illustrate in this section give information to the road user regarding location and availability of services in the vicinity.

3.1 Size, shape and Colour

These signs should be rectangular and have a blue background, while black symbol shall be displayed in white square to indicate the facility. The size of the small sized sign 600 mm x 450 mm.

3.2 First Aid Post

The sign should be used to notify the drivers of vehicles on long stretches of roads in rural areas of the first aid facility which may be helpful in case of emergency **(Fig .25**)

Fig. 25 First Aid Post

3.3 Hospital

The sign should be used to notify the drivers of vehicles that they should take the precautions near medical establishments and in particular that they should not make any unnecessary noise. The sign also serves to indicate the location of hospital where medical facilities will be available (Fig .26)

Fig. 26 Hospital

3.4 Police Station

The sign should be erected at the places where the Police Station is situated nearby (**Fig. 27**)

Fig 27 Police Station

3.5 Auto Rikshaw Stand

The sign should be erected where the auto-rikshaws are to wait (**Fig. 28**)

Fig. 28 Autorickshaw Stand

4. Sitting of Signs with respect to Carriage way

- Normally the signs may be placed on the left side of the carriage way.
- On all roads with or without shoulder, the extreme edge of the ground mounted sign adjacent to the roadway shall be at a distance of 600 mm to 3 m from the carriageway.
- On roads without kerb, the bottom edge of the lowest sign shall not be less than 2 m and not more than 2.5 m above the crown of the pavement.

5. **Material for sign**:

5.1 **Concrete**: Concrete shall be of M15 grade

5.2 **Substrate**: The substrate shall be either Aluminium sheeting or Aluminium Composite Material (ACM)

5.3 Plate Thickness

Shoulder mounted ground signs with a maximum side dimension not exceeding 600 mm shall not be less than 1.5 mm thick with aluminium and 3 mm thick with aluminium composite material.

6. Colour for Signs

6.1 Signs shall be provided with retro-reflective sheeting and/or overlay film as shown on the detailed drawing. The reverse side of all signs shall be painted grey.

6.2 Except in case of railway crossing sign the sign posts shall be painted in 250 mm wide bands, alternately black and white. The lowest band next to the ground shall be black in colour.

6.3 The mandatory and warning signs shall be provided with White background and red border. The legend symbol for these signs shall be black.

6.4 Colour pattern for direction information signs for Village Roads (ODR and VR) is with white background and arrows/borders/letters will be in Black in colour.

7. Other Useful Information Signs

7.1 Flood Gauge Sign

The sign should be installed at causeways and submersible bridges or culverts to indicate to the road users the height of the flood above the road level (**Fig. 29**)

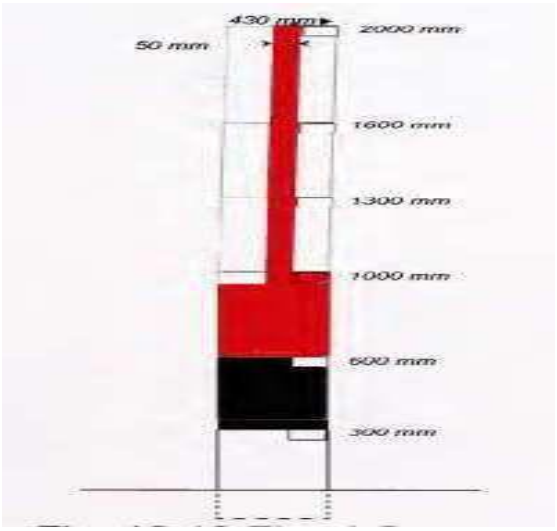


Fig. 29 Flood Gauge

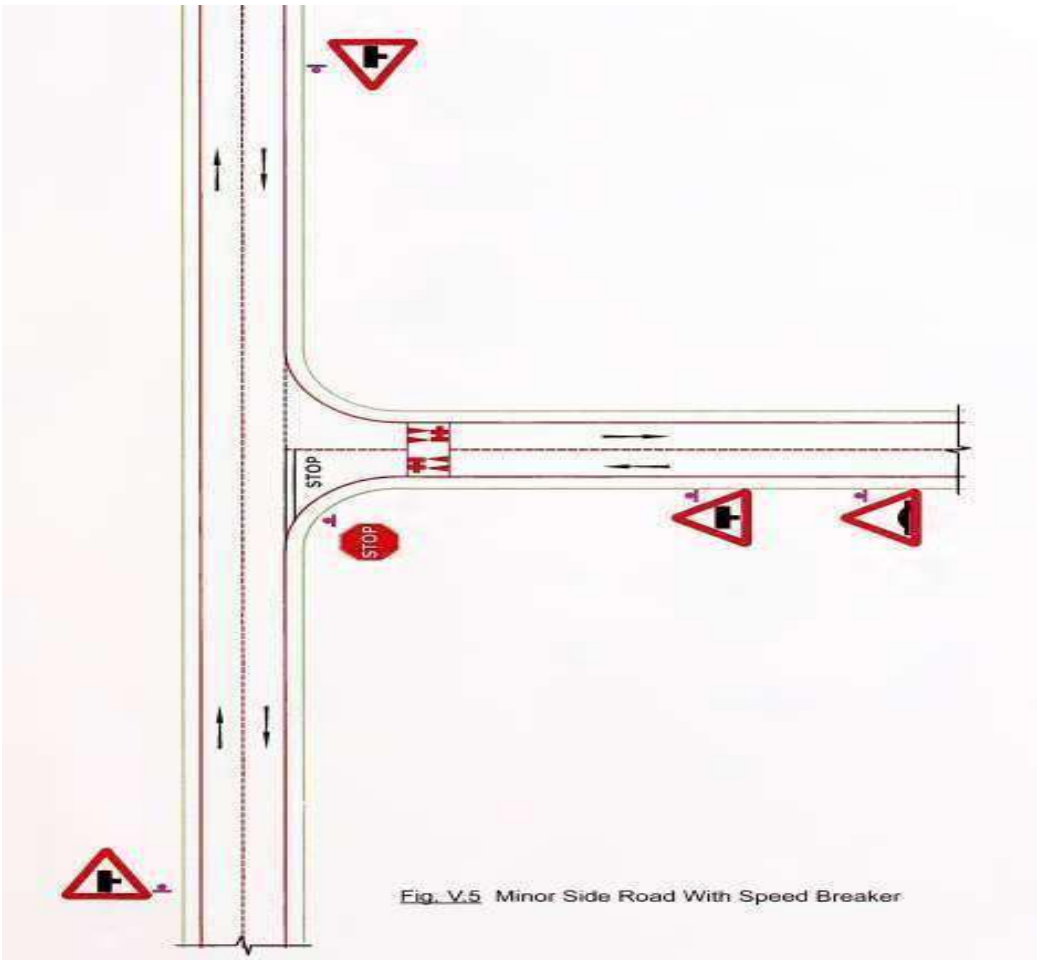


Fig. 30. T- Intersection showing the location of different signs and speed breaker where the Rural Road joins Higher order road.

8. Construction of Speed Breaker

As per IRC:99 guidelines, a speed breaker should have a radius of 17 m with a width of 3.7 m and a height of 10 cm. This is calculated to reduce the speed of the vehicle to 25 kmph.

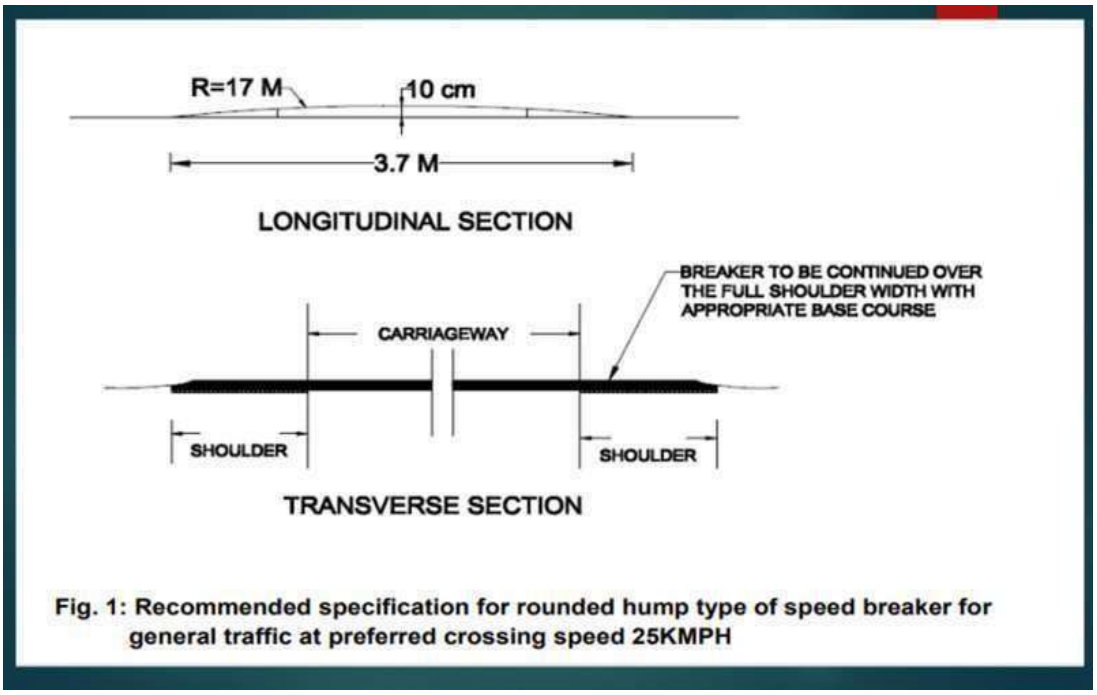


Fig. 1: Recommended specification for rounded hump type of speed breaker for general traffic at preferred crossing speed 25KMPH

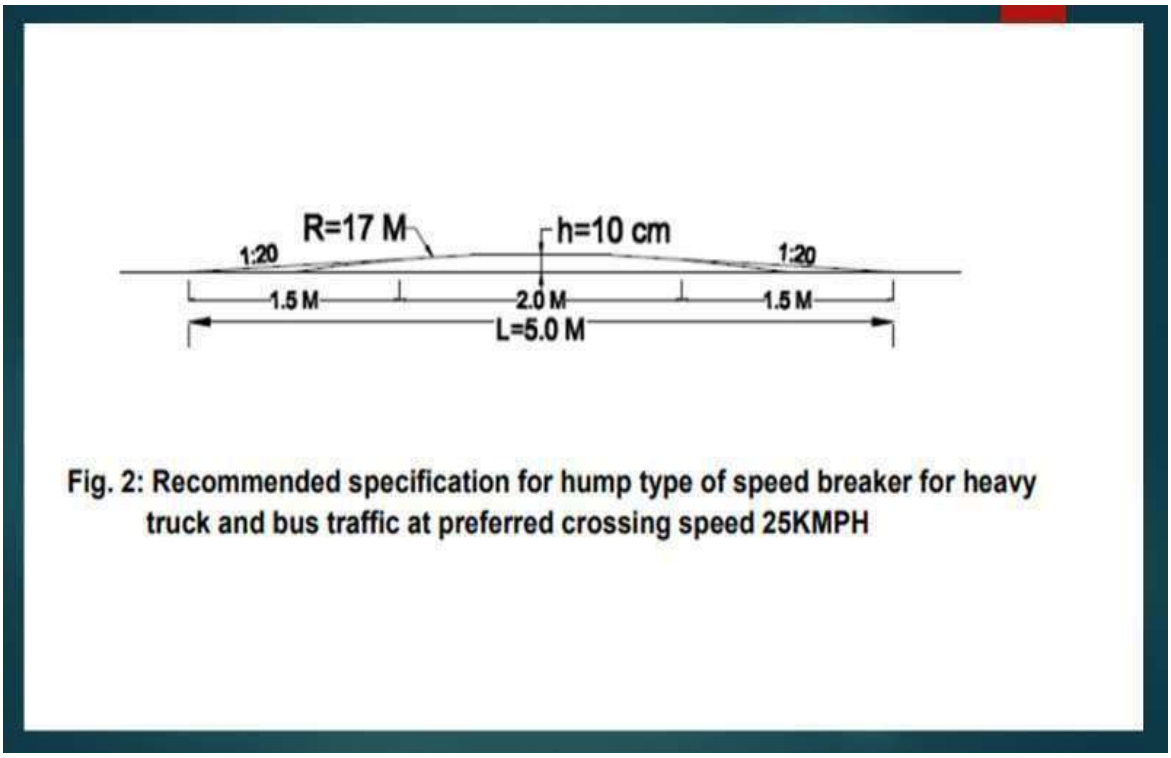


Fig. 2: Recommended specification for hump type of speed breaker for heavy truck and bus traffic at preferred crossing speed 25KMPH

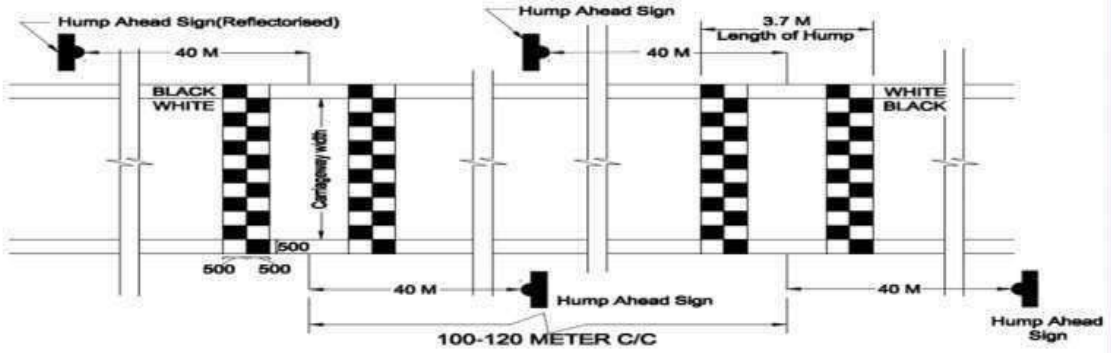


Fig. 3: Recommended placement of hump / humps in mid block section, hump marking in chequered pattern and sign board indication.

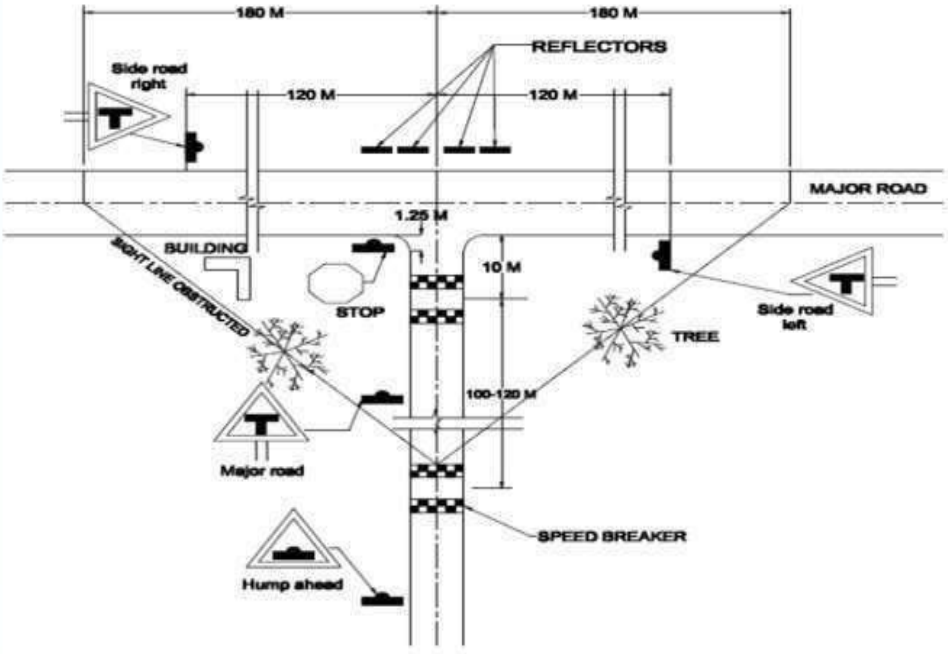
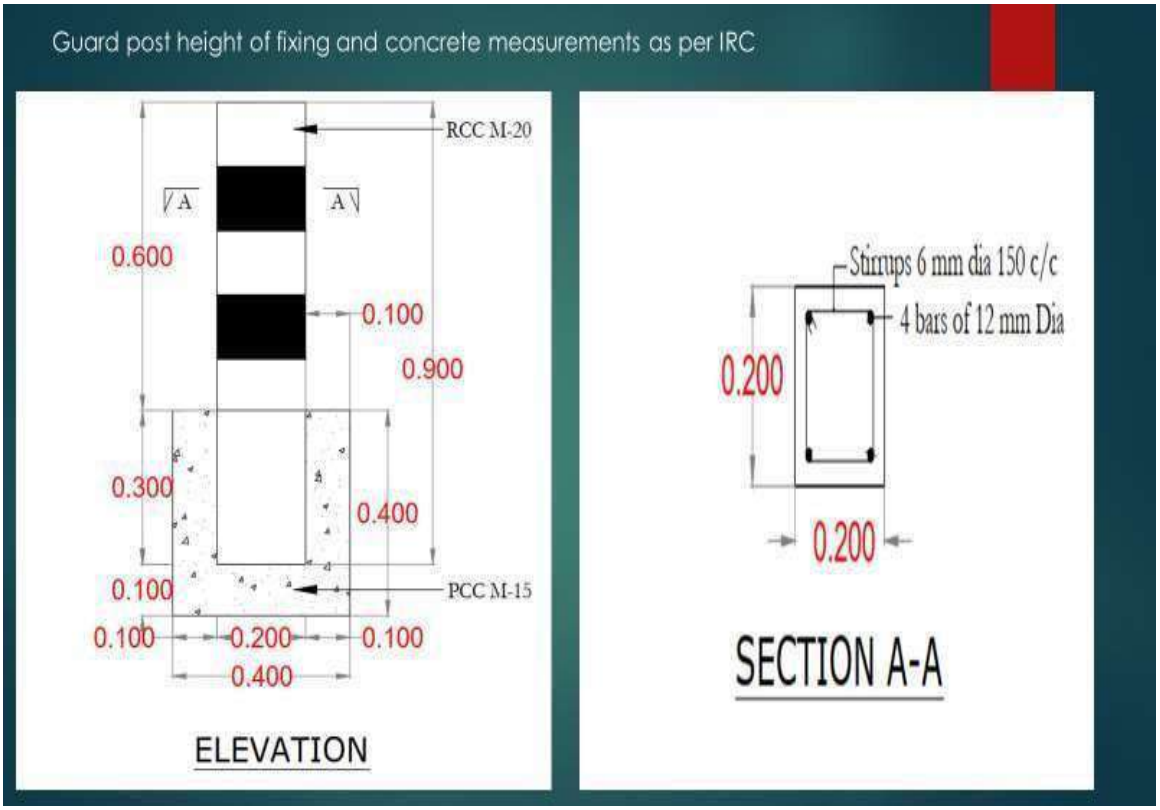


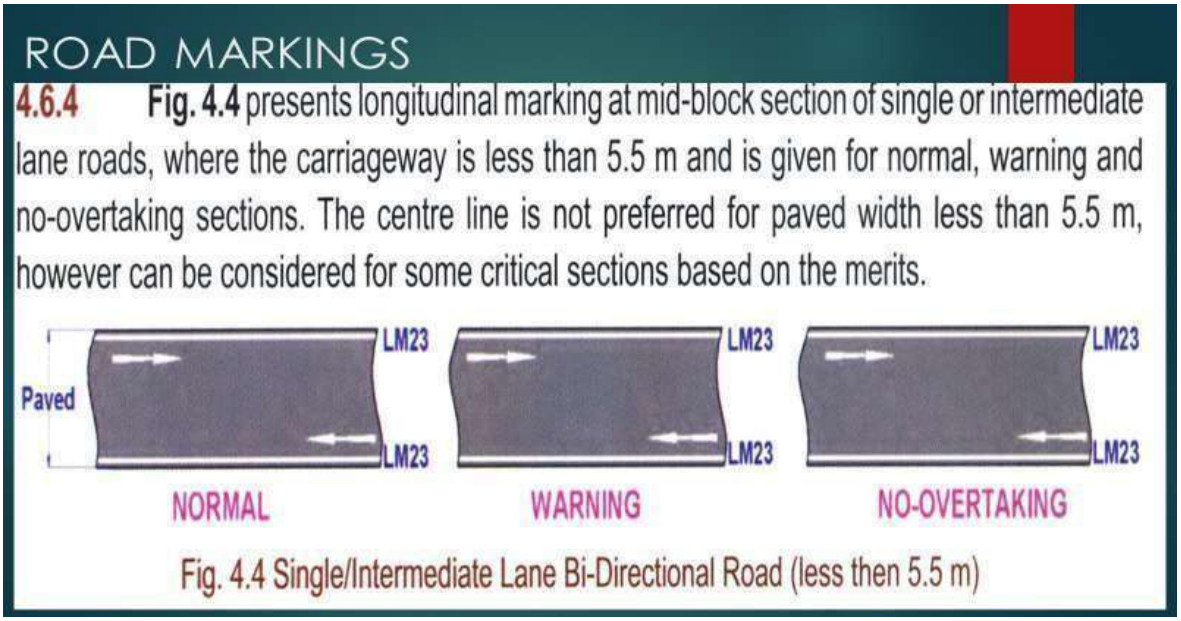
Fig. 4: Speed breakers at T-intersections.

9. Guard Stones at Outer Edge of the Curve



10. Road Marking

Pavement markings with hot line applied Thermo plastic compound 2.50 mm thick including reflecting glass beds at 250gms per square meter, thickness of 2.5 mm is exclusive of surface applied glass beads for providing border lines entire of project road 100 mm width and 150 mm from edge of the road as per IRC 35-2015.



11. Road Studs

Bi-directional studs – Two directional roads for centre line and edge line.

The spacing and colour pattern for different conditions are shown in below Table.

Description	**Traffic Movement**	**Carriage way**	**Normal Section**			**Warning Section**		
Road Category			Centre Line	Edge Line	Traffic Lane Line	Centre Line	Edge Line	Traffic Lane Line
Single Lane Road	Two Way	<5.5 m	NA	Red-White Bidirectional at 18 m interval (Optional)	NA	NA	Red-White Bidirectional at 9 m interval (Optional)	NA

Description	Traffic Movement	Carriage way	No Overtaking Section		
Road Category			Centre Line	Edge Line	Traffic Lane Line
Single Lane Road	Two Way	<5.5 m	NA	Red-White Bidirectional at 6 m interval (Desirable)	NA

12. Cautionary/Warning Signs Installation Details

13. Location details of Hazard Marker near Culverts/Bridges.

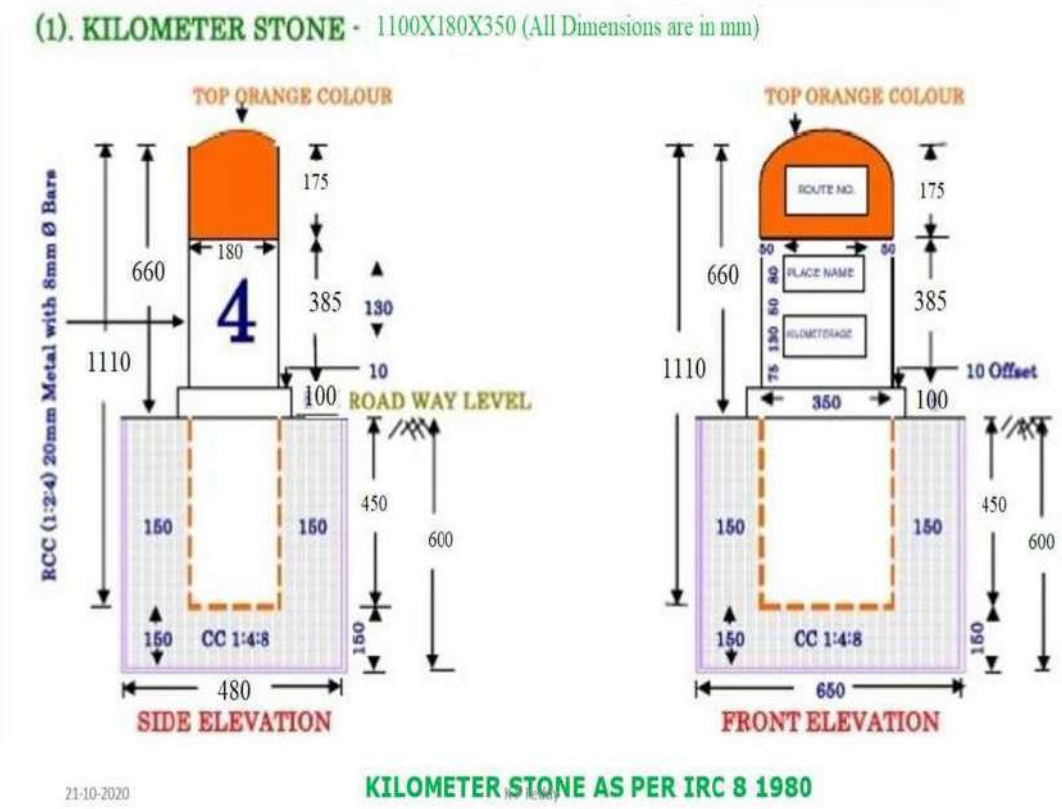
14. KM Stone:

14.1 Kilometre stones shall be located on left side of the road as one proceeds from the station from which the kilometre count starts and shall be fixed clear of the shoulders and drains.

14.2 Letters and Numerals on kilometre stones shall be of the following size.

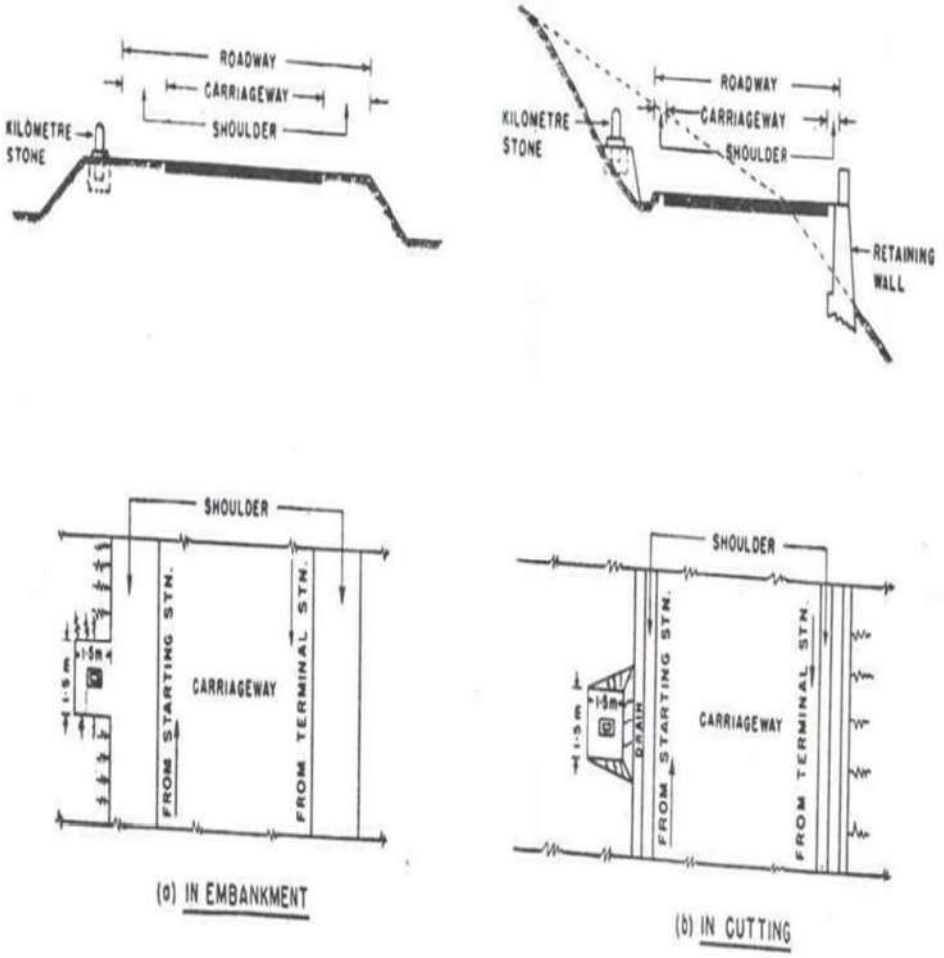
Height of Letters for Place Name	80 mm
Height of Numerals for Kilometerage	130 mm
Height of Numerals for Route Numbers	100 mm

14.3 The dimensions of the stones, size, arrangement of letters and script shall be as shown below Figures. The background colour shall be white with black letters and numerals for names of stations and distances. The semi-circular portion of km and 5th km stones of rural roads shall have orange background with route numbers painted with black colour.



14.1 Location details of KM Stones

Plate 6



LOCATION OF KILOMETRE STONES

15. 200 M Stones

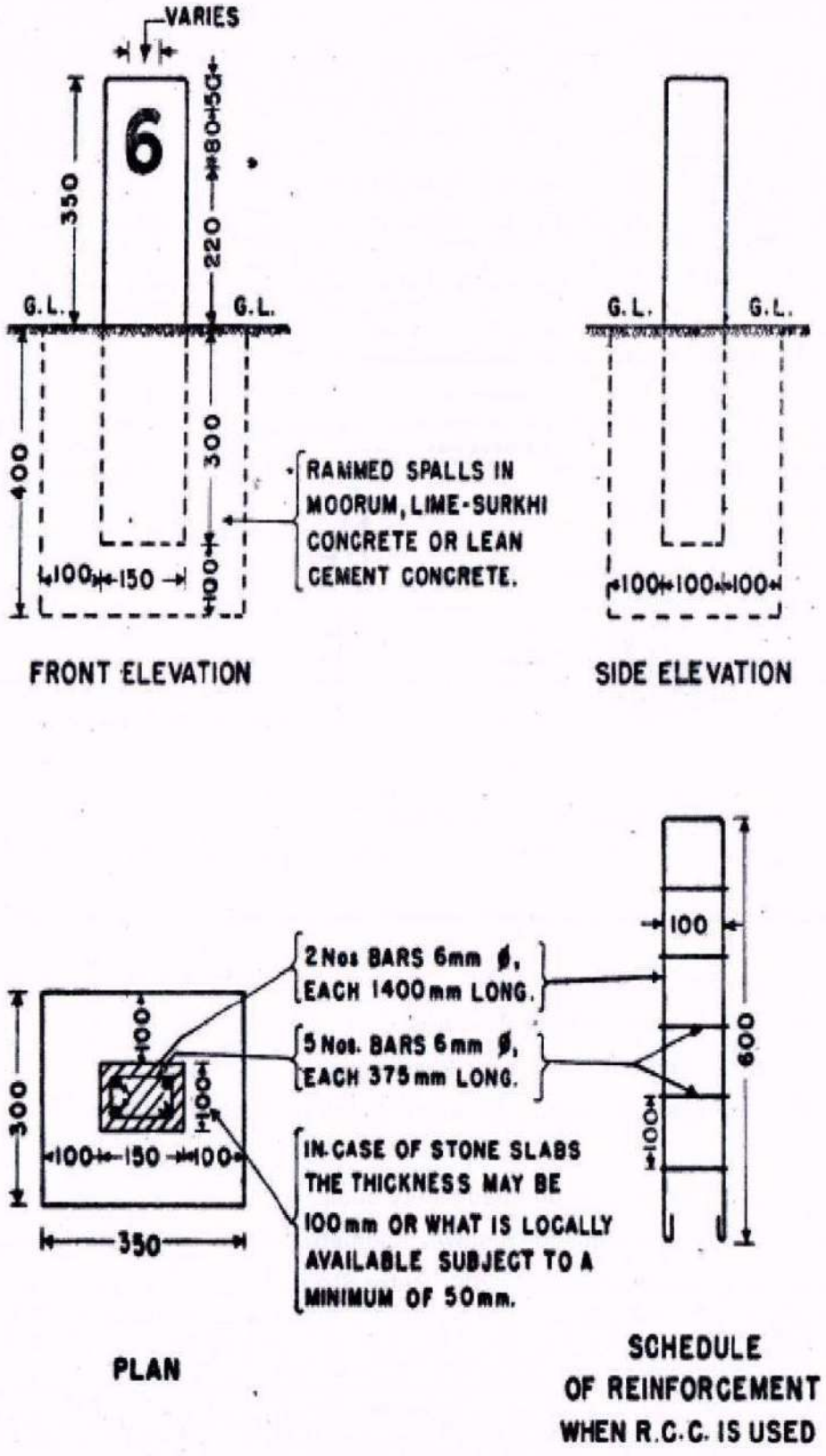


Fig. 1. Type design for 200-Metre Stones

ALL DIMENSIONS IN MILLIMETRES

15.1 Location details of 200 M Stones

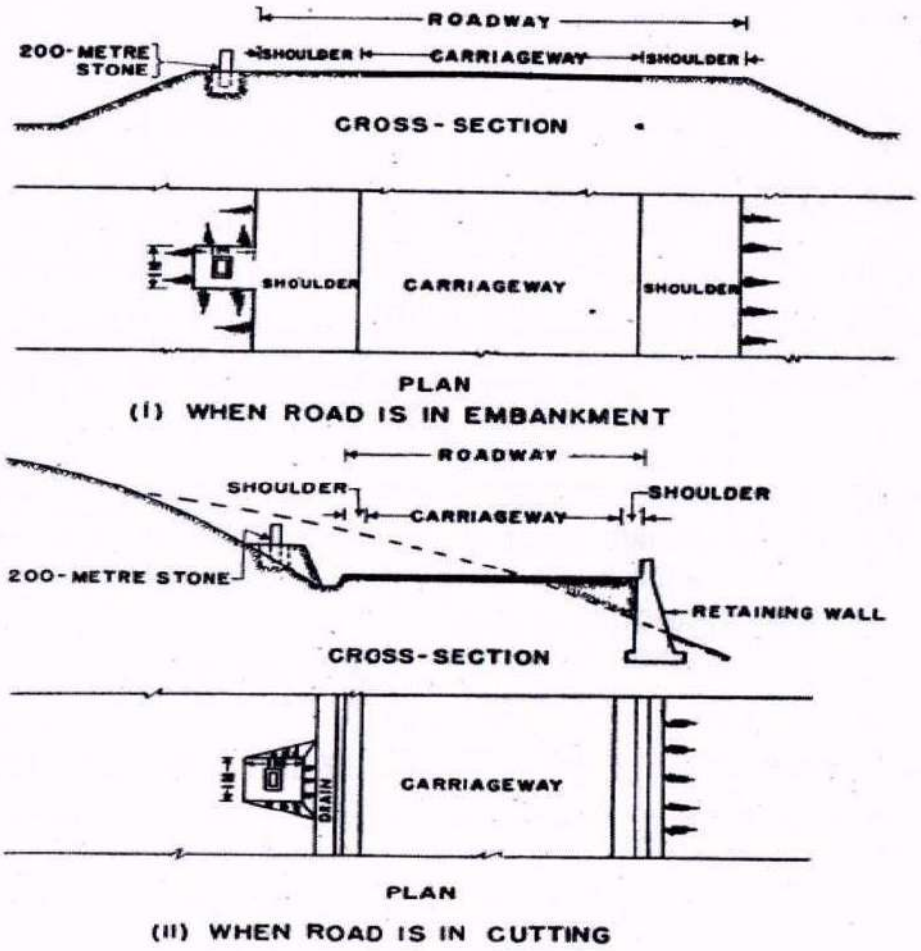


Fig. 2. Manner of locating 200-Metre Stones

References:

1. MoRD 2014 (First Revision).
2. IRC:99-2018- Traffic Calming Measures.
3. IRC:67: 2012- Code of practice for Road signs.
4. IRC:35-2015- Code of practice for Road Markings (Second Revision).

5. IRC: SP:88-2010: Manual on Road safety audit.
6. IRC:8-1980- Type designs for Highway Kilometre Stones (Second Revision)
7. IRC:26-1967 - Type designs for 200- Metre Stones

28/10/20

Design Engineer

PMC.APRRP