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No:GL(Tech)/CE/R&B/RSW/2018

Dated. 18/03/2019

CIRCULAR

Sub: Road Safety - Guidelines for providing speed breakers/humps on PWD roads

Ref: - Letter No: A1/600/KRSA/2014 dated nil of KRSA.

Road categories have specific designs with maximum permitted speeds of vehicles for convenience and safety. The control of speed becomes necessary to promote orderly movement of traffic and to enhance safety. So traffic calming techniques has emerged for safety of road users. The differences and variations in the speed, direction and mass of vehicles determine the severity of road accidents. Hence speed calming measures have a vital role in enhancing road safety by reducing driving speeds and speed differences. Speed breakers are commonly used to reduce speeds. It helps in maintaining efficient traffic flows by reducing speed differences.

Speed breakers/humps are not advisable on all roads as it adversely affect the through traffic. Speed breakers can be a source of serious hazards and accidents to the fast moving vehicles, if not provided without adequate markings and signs. The removal of speed breakers on National Highways was made effective by the Ministry of Road Transportation & Highways vide order no: F.No.RW/NH-33037/01/2016/S&R(R) dated 11.04.2016. The guidelines for speed calming measures in rural and urban roads are clearly mentioned in **IRC: 99-2018**.

However, speed breakers/humps may become necessary at certain locations like intersection of minor road with major roads, sharp curves, accident prone locations, certain school zones etc., since providing warning signs alone will not sufficient to alert drivers. Further, on existing roads where engineering parameters like geometric standards, sight distances, other road features etc. are not in conformity with the stipulated standards, traffic calming measures are unavoidable to reduce accident risk. On the other hand, speed breakers/humps without sufficient warning could become an accident cause in itself for motorists (especially two

wheelers) who suddenly encounter a hump. These could be due to worn out and weathered signages & markings.

Therefore, when speed breakers/humps are provided in such unavoidable circumstances, the same shall be done after ensuring the necessity of it. In such cases, adequate warning signs and markings as per the guidelines below shall be followed. It has also been noticed that non-standard speed breakers/humps are installed at many locations due to public pressure and urgency. In this circumstance, it has become an absolute necessity to standardize the installation of speed breakers/humps in all PWD roads. Hence the following **guidelines** are issued for strict compliance by all concerned:

1. Utmost discretion shall be exercised on the decision to provide speed breakers/humps/ rumble strips. The necessity shall be assessed based on the uniqueness of the location, category of road, social requirement, accident history, traffic volume etc. This shall be approved by an officer of PWD not below the rank of an Assistant Executive Engineer.
2. Speed breakers/humps/ rumble strips shall not generally be installed on State Highways and MDRs. At exceptional situations where speed breakers/humps/ rumble strips are to be provided, the same shall be strictly as per these guidelines. The speed breakers/humps/ rumble strips can be made with bituminous mix.
3. The Supreme Court committee in the meeting held on 30th January 2019 (Lr No. 34/CoRS/2014 (Vol4) dated 14th February 2019), directed the State Government to adopt traffic calming measures on the lower hierarchy roads at locations, where they merge with higher hierarchy roads and also at accident prone locations.

Traffic calming measures at junctions (NH-SH, NH-MDR etc.) should be recommended based on appropriate road hierarchy as follows:

(i) NH/SH Meeting NH

Treat the minor road with adequate traffic calming measure to reduce the speed of approach. The area of influence on the main road needs to be demarcated for appropriate treatment to reduce the speed to acceptable limits.

(ii) MDR Meeting NH/SH

Traffic-calming measures are installed on the minor road leading to the national highways or the state highway. The major road should also be treated visually to sensitize the drivers about the approaching intersection.

(iii) *ODR Meeting NH/SH*

These types of junctions are more vulnerable to conflicts and it is not feasible to cause a substantial speed reduction on the major road. So reduce the speeds of the vehicles on the minor roads and suggest zonal speeds of 45-50 kmph on the major road. So the vehicles travelling on the minor road will get enough time to manoeuvre and find gaps in the traffic stream.

(iv) *ODR meets Highway in a T-junction*

The vehicle on the major road is made to gradually decrease its speed to 45-50 km/h before it resumes to a higher speed on the major road. **(Fig.1)**

Note:- Before carrying out traffic calming treatment the following factors needs to be analysed

- (i) Traffic volume variation in day time and night time.
- (ii) Local traffic activities variation in day time and night time.
- (iii) Day time speeds and night time speeds of vehicular traffic.
- (iv) Local needs of pedestrian crossings and other activities
- (v) Ensure minimum sight visibility based on speed, distance etc. on curves.

4. The rounded and flat topped Speed breaker/Road Hump being the most common.
5. The width of humps may be restricted to allow the longitudinal drainage.
6. Readymade rubber speed breakers/bumps are not recommended as they act as hazards in high speed environment. This is because if the bumps get damaged by repeated striking of traffic movement, the nail remains on the pavement damages the tyres of vehicle and proper maintenance is difficult.
7. Speed breakers/humps shall be painted **(Fig.2a & 2b)** using retro reflective road marking paint with service life as per **IRC: 35-2015** for one application depending on traffic volume. The markings shall be made with retro-reflective paint and reinforced with road studs to enhance better visibility during night and shall have warning signs in advance. Typical hump details at T-Junction is shown in **Fig.3**
8. *Special Area zoning such as areas near a school or a hospital require absolutely low speeds for additional safety. School children are immature pedestrians who need utmost care. Hence it is recommended that vehicles should travel at maximum speeds of 25 kmph near schools and 30 kmph near hospitals.*

The speed breaker markings shall comprises two rows of checkered markings consisting of alternate black and white bands of 500mm width on either side of tapering. In case of both Round Top and Flat Top, triangular markings shall be marked. The width of the base of the triangular marking shall be 750mm and the height from base to apex shall be a minimum of 1850mm. The dimension of triangular block and chequer block are given in **Table 2** below. (Source: IRC:35-2015,page-107)

Table 2-Dimension of Triangular Block and Chequer Block

Marking Abbreviation	Type	Dimension in mm			Colour
		Length	Breadth	Gap in between(mm)	
BM04	Triangular block	750	1850	1000	White
BM05	Chequer block	500	500	500	White

9. One row of unidirectional Raised Pavement Marker (road studs) @ 500 mm spacing shall be provided on both sides of hump for single carriage ways and on the approach side for dual carriage ways (having dividers/medians traffic islands) as shown in the attached sketch.
10. Retro reflective Warning sign "HUMP AHEAD" shall be provided 40 m ahead of the *hump*.
11. For traffic calming on main roads only rumble strips (transverse bar marking) made of thermoplastic is only recommended to alert and to reduce the speed. Depending upon the speed, the number of sets of transverse bar markings on approach to hazardous location may vary as per **Table-3**

Table 3: Sets of bar marking based on approach speed.

Approach speed (Kmph)	Bar Marking (Number of TM08)	Distance from Hazard (d1, d2,d3 &d4) from Hazard(m)
Up to 50	1 set	d1=50
51-65	2 set	D1=50, d2=80
66-80	3 set	D1=50,d2=80,d3=120
81-100	4 set	D1=50,d2=80,d3=120,d4=180

Each set of bar marking (TM 08 of IRC:35-2015,page-103) comprises of 6 bars, 300 mm

wide 600 mm apart of 5 mm high and of 300 mm wide 1000 mm apart of 15 mm high (IRC 99 : 2018) as shown respectively.(Figs. 4, 5 &6). The choice of the above type depends on the amount of traffic calming measure needed at that intersection. Since bar marking with 15 mm demands speed reduction, a set of "SLOW" marking shall be given immediately before markings, at 20 m and 40 m from bar marking.

12. Rumble strips can also be provided at places where speed control is unavoidable in highways and arterial roads. Properly designed rumble strips can be provided. The rumble strip can be premix bituminous materials. Rumble strip may be provided across the entire width of carriageway and paved shoulders (if any). For bituminous rumble strip, raised section should be 20 to 30 mm high, 200 to 300 mm wide and spaced about one meter centre to centre of roughly 6 numbers at one location (Fig.7). These are placed across the entire carriageway including the shoulder. Proper workmanship must be exercised to achieve the required height.

On approaches to narrow bridge, rumble strips can be used in shoulder to force the driver to slow down and drive on restricted width of pavement in approaches, where shoulder gets terminated or in some case shoulder space is converted to raised footpath etc. In accident prone locations, where accidents had occurred due to departure of vehicles from shoulder on to side slope of embankment, rumble strip can be used on such a shoulder side also.

13. All existing non-standard speed breakers/humps shall be upgraded to standard ones within one year. However, markings and warning signs as above shall be provided immediately until they are upgraded.

14. Concerned Assistant Engineer shall ensure that all warning signs, studs, markings are in good conditions always based on the service life as stipulated by relevant IRC Codes. Ensure periodic and proper maintenance of speed breakers/humps/ rumble strips in order to reduce accidents and keep a record of maintenance.

15. A Road furniture Inventory should be prepared and kept in each section and subdivision


Chief Engineer


Note: All figures attached in Appendix -I

Copy to: Superintending Engineer, PWD Roads, South circle, Central Circle and North Circle.

Executive Engineer, PWD Roads, Thiruvananthapuram, Kollam, Pathanamthitta, Alappuzha, Kottayam, Muvattupuzha, Ernakulam, Idukki, Thrissur, Palakkad, Manjeri, Kozhikode, Wayanadu, Kannur, Kasargode Divisions. – For necessary direction to all subordinate offices and staff

IT Cell- for publishing in PWD website

APPENDIX-I

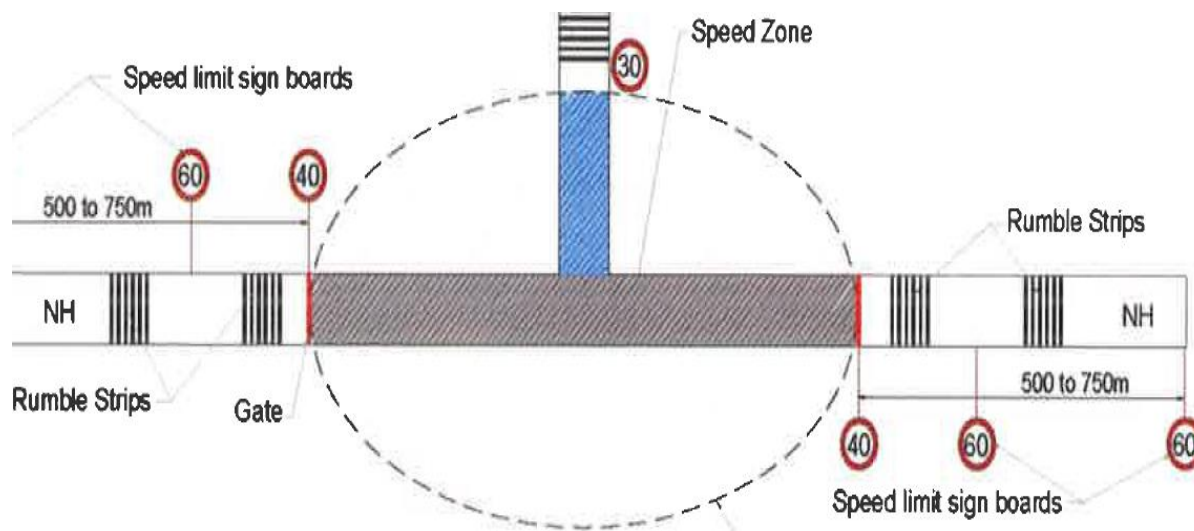


Fig 1-ODR meets Highway in a T-junction (Source:IRC:99-2018)

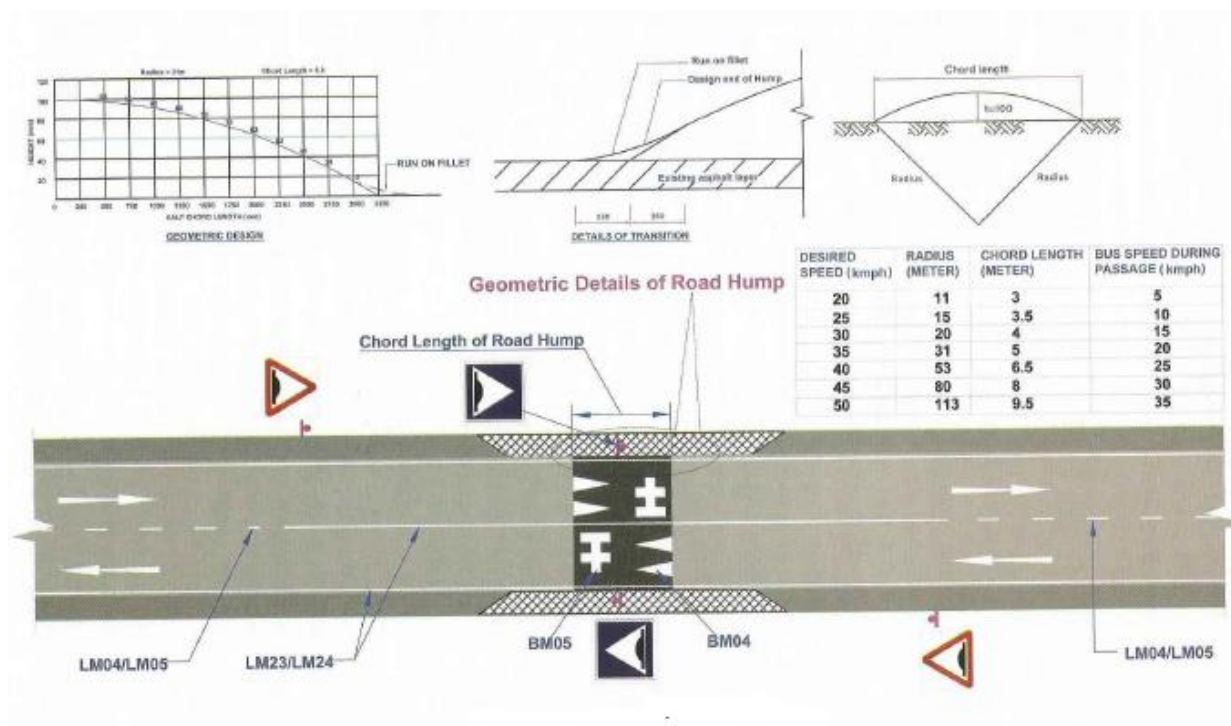


Fig. 2 (a): Typical hump type Speed breaker

(Source: IRC:35-2015)

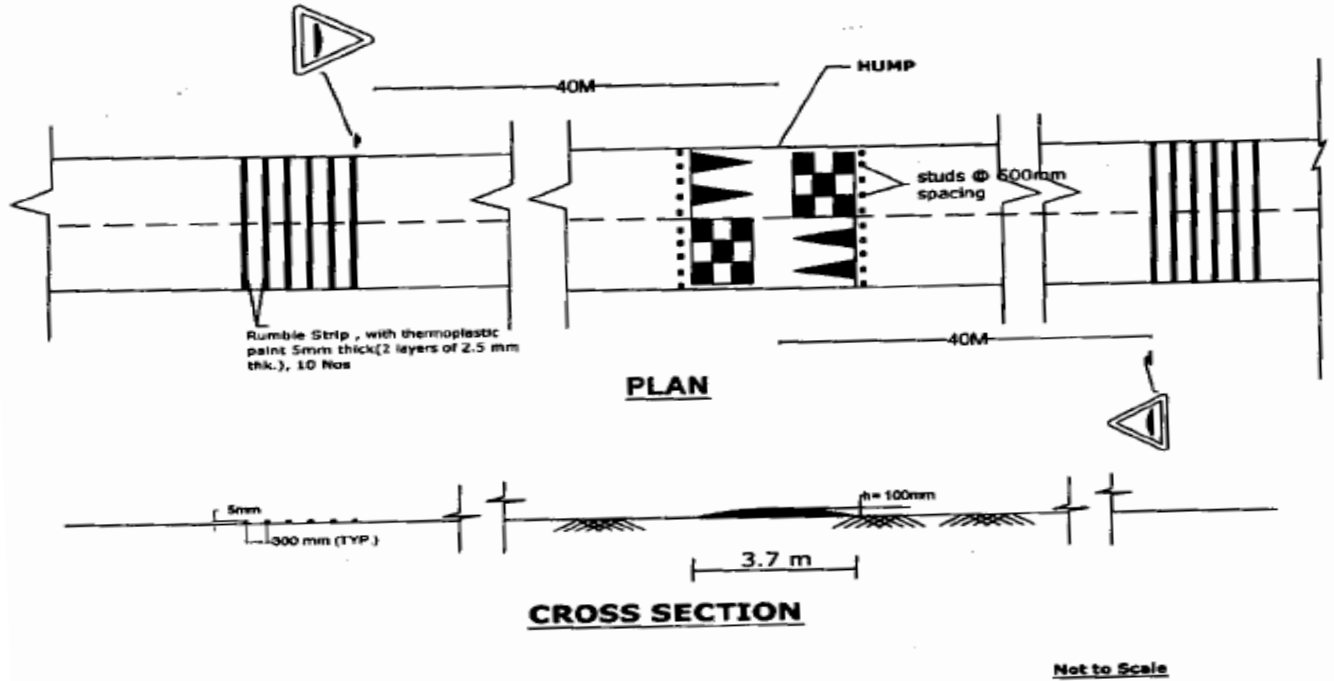


Fig. 2 (b): Typical hump type Speed breaker

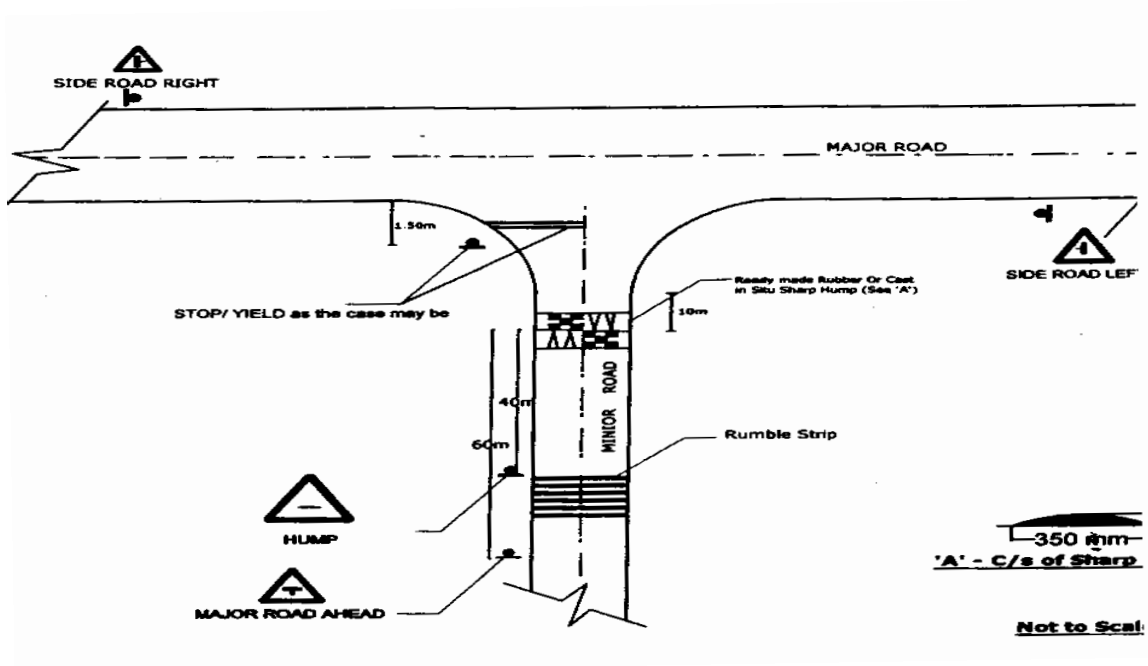
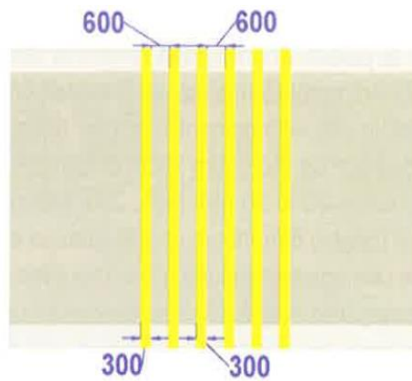


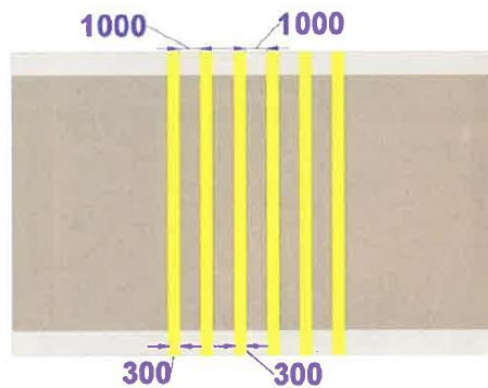
Fig. 3: Typical hump details at T-junction



Thermoplastic Marking of 300mm wide and 5mm height, at 600mm apart (one set is of 6 Strips). 5mm height is achieved through two applications of thermoplastic, applied at an interval not less than 1 hour after 1st layer gets solidified

Fig.4: Bars with height of 5mm and Gap width of 600mm

(Source:IRC:99-2018)



Thermoplastic Marking of 300 mm wide and 15 mm height, at 1000 mm apart (one set is of 6 Strips). 15 mm height is achieved through six applications of thermoplastic, applied at an interval not less than 1 hour after the previous layer gets solidified. Alternatively, made of Mastic Asphalt or any equivalent material which would provide 15 mm high

Fig.5: Bars with height of 15mm and Gap width of 1000mm

(Source:IRC:99-2018)

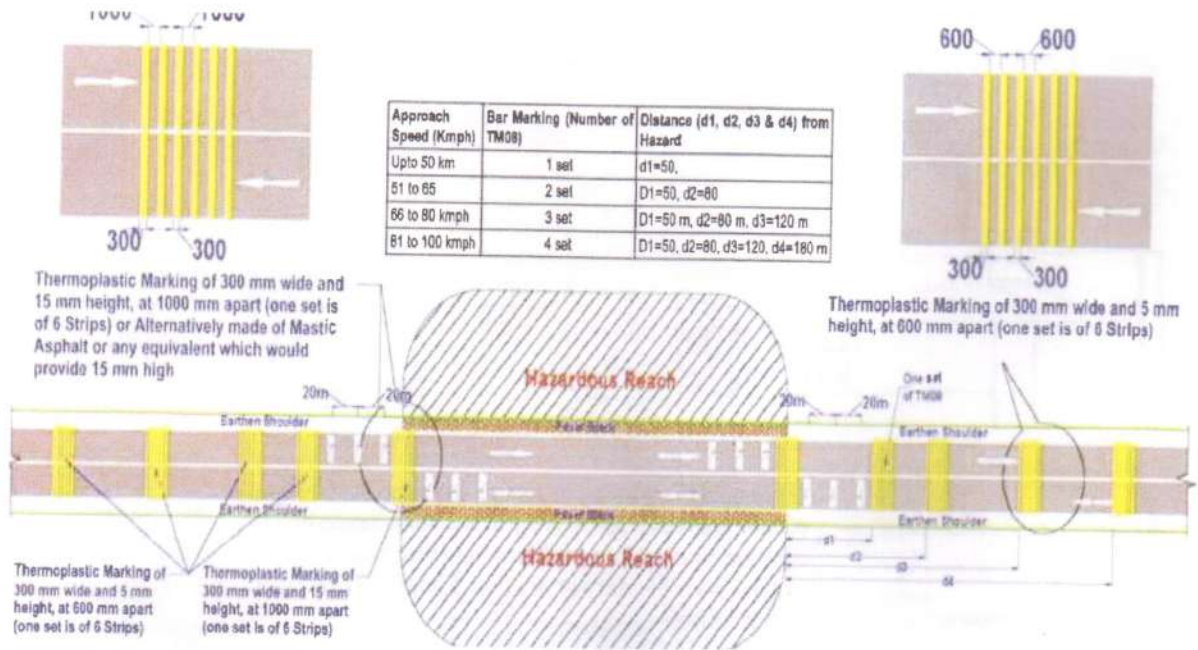


Fig.6: Transverse Bar Marking with Stricter Compliance

(Source:IRC:99-2018)

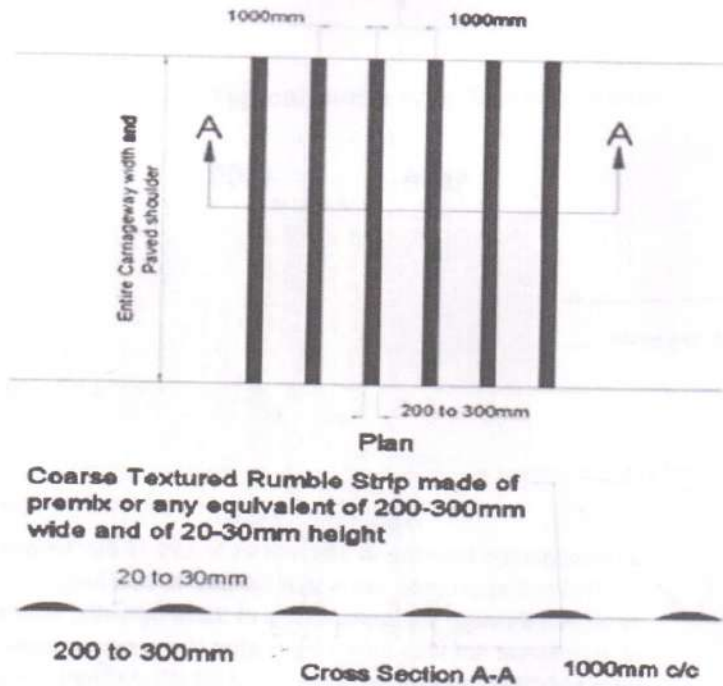


Fig.7: Rumble Strip in Bitumen (Not to Scale)

(Source:IRC:99-2018)

Chief Engineer

[Signature]