

RW/NH-29023/02/2019-S&R(P&B)
Government of India
Ministry of Road Transport & Highways
Zone-S&R (P&B)
 Transport Bhawan, 1, Parliament Street, New Delhi -110001.

Dated: 01st January, 2020

To,

1. The Chief Secretaries of all the State Governments/ UTs.
2. The Chairman, National Highways Authority of India, G-5 & 6, Sector-10, Dwarka, New Delhi-110 075.
3. The Managing Director, NHIDCL, PTI Building, New Delhi-110001.
4. The Principal Secretaries/ Secretaries of all States/ UTs Public Works Department/ Road Construction Department/ Highways Department (dealing with National Highways and other centrally sponsored schemes).
5. All Engineers-in-Chief and Chief Engineers of Public Works Department of States/ UTs/ Road Construction Department/ Highways Departments (dealing with National Highways and other centrally sponsored schemes).
6. The Director General (Border Roads), SeemaSadakBhawan, Ring Road, New Delhi-110 010.
7. All CE-ROs, ROs and ELOs of the Ministry.

Subject: - (A) Guidelines for providing type of Median on National Highways Network; and

(B) Guidelines for Metal crash barrier (Semi Rigid) to be installed on National Highways.

A. Type of Median

It has been observed that raised medians are being provided along most of the National Highways/Expressways. As per Manual of Specifications & Standards for Expressways (IRC:SP:99-2013), only depressed or flush median is to be provided on Expressways. Such types of medians are essential on high speed corridors for safety of the road users. The IRC guidelines for 4 /6 laning of highways permit use of raised median for open country areas also. Since the multi-lane highways being designed as partially controlled highway for higher speeds, raised median may be a safety hazards and may cause severe accidents/fatalities once the errant vehicle strike the raised median.

2. As such, while proposing the median for the divided multilane highways / expressways following may be followed invariably:

- (i) Only depressed or flush median shall be provided on all the Expressways. No Raised median / kerbs shall be provided on Expressways.
- (ii) In future, all multi-lane highways shall be provided with depressed/flush median depending upon availability of land. No raised/kerb median shall be provided especially in the open country/rural stretches of National Highways. In case of flush

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type medians; provision of crash barrier and antiglare measures shall also be provided for safety consideration and headlight glare respectively.

(iii) In case of narrow medians (2m or less wide), as generally provided in urban areas, New Jersey type concrete crash barriers shall be used along with anti-glare screen.

(iv) In already developed multi-lane expressway/highways with raised median especially in open country / rural areas these shall be replaced by depressed/flush median. Alternatively, crash barrier may be provided along raised median in such a way that the face of the crash barriers is flushed with the face of the raised median.

B. Metal Crash Barrier (Semi-Rigid)

3. To avoid major/fatal accident on Highway network, crash barriers of appropriate type are installed at accident prone locations especially at locations like valley sides of hilly roads, high embankments, sharp/blind curves etc. These are very useful in containing, redirecting and absorbing impact energy of the hitting vehicles and reducing the severity of the accidents. The selection of barrier is driven by no. of factors such as performance capability, deflection of the barrier on impact, site condition, compatibility, installation and maintenance cost etc. To reduce the severity of the accident, the vehicle should remain upright after the impact. When the vehicle hits the crash barrier, it is generally preferred that the crash barrier should not deflect for a distance more than the space available for the deflection. The crash barriers should have adequate height & length so that the crash barrier is able to withstand the impact of the vehicle without the entire crash barrier getting thrown off.

4. The location of various types of road side/median crash barriers and type of crash barrier (i.e. concrete/new jersey, semi-rigid/metal, flexible/wire rope barrier) shall be decided as per the relevant IRC guidelines and technical feasibility.

5. The detailed guideline and specification for erecting various traffic safety barriers have been stipulated in IRC 119-2015 'Guidelines for traffic safety barriers'. This guideline also covers the W-Beam and Thrie Beam type of semi rigid steel barrier. However, the detailed performance criteria have not been specified in this guideline. It has been decided that before erecting semi rigid crash barrier on National Highway, it should be crash tested 'Road restraint system' and should meet the requirements of EN 1317 Part-2: Performance classes, impact test acceptance criteria and test methods for safety barriers and vehicle parapets and/or to the requirement of the American Manual for Assessing Safety Hardware (MASH). The manufacturer or the contractor shall demonstrate the compliance of these requirements by submission of videos of actual crash testing along with authenticated crash test reports. The crash tests must have been conducted in accredited crash test laboratories/ institutions.

6. The selection, design, installation and maintenance of the crash barrier must consider the operation of the barrier as the entire system. This should also include all addition components such as transition, end terminals etc. All road safety barrier installed on the road network must be installed and maintained by qualified personnel. The primary criteria for the approval of the crash barrier is that it must have been successfully crash tested and result evaluated in accordance with EN 1317 part-2 and/or MASH.

7. There are various factors that play a major part in determining the type of barrier to be proposed for a particular situation/ stretch. The density of the traffic and traffic compositions are to be considered for specifying the containment level of the crash barrier to be provided. The suggestive guidelines in this regard are as under:-

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Containment level and working width depending upon the site condition may be specified in the tender document/ scope of the work as per the following suggested value:-

Type of Crash barrier	Terrain	Working Width(*)	Containment level	Remarks
Thrie Beam (single sided/ double sided on median)	Hilly	W3 ($W_N \leq 1.0\text{m}$) Or W4 ($W_N \leq 1.3\text{m}$)	H2 as per EN 1317 - part 2 OR TL4 as per MASH	Containment Level H2:- Car of 900 kg, Speed 100 Kmph, Impact angle 20 degrees and, Bus of 13,000Kg, speed 70 Kmph, impact angle 20 degrees
	Plain/ rolling	W4 ($W_N \leq 1.3\text{m}$) Or W5 ($W_N \leq 1.7\text{m}$)		Containment Level TL4:- Car of 1100 kg, Speed 100 Kmph, Impact angle 25 degrees and, Pick up of 2270 kg, speed 100kmph, impact angle 25 degrees and, Single unit truck 10,000kg, speed 90 kmph, impact angle 15 degrees
W- Beam (single sided/ double sided on median)	Hilly	W3 ($W_N \leq 1.0\text{m}$) Or W4 ($W_N \leq 1.3\text{m}$)	H1 as per EN 1317 - part 2 OR TL4 as per MASH	Containment Level H1:- Car of 900 kg, Speed 100 Kmph, Impact angle 20 degrees and, Bus of 10,000Kg, speed 70 Kmph, impact angle 15 degrees
	Plain/ rolling	W3 ($W_N \leq 1.0\text{m}$) Or W4 ($W_N \leq 1.3\text{m}$) Or W5 ($W_N \leq 1.7\text{m}$)		Containment Level TL4:- Car of 1100 kg, Speed 100 Kmph, Impact angle 25 degrees and, Pick up of 2270 kg, speed 100kmph, impact angle 25 degrees and, Single unit truck 10,000kg, speed 90 kmph, impact angle 15 degrees

(* to be specified depending upon site condition requirement)

Note:

It is important to note that the working width (W_m) mentioned above is the maximum lateral distance between the face of the barrier system before impact and the maximum dynamic lateral position of the barrier system or extreme point of the vehicle during impact unlike the dynamic deflection (D_m) which is the maximum lateral distance between the face of the barrier system before impact and the maximum dynamic lateral position of the face of the barrier system after impact.

- (i) All other requirement as per the EN 1317 and /or MASH should also be met by the crash barrier including following severity performances:-
 - (a) Impact Severity level as per EN -1317- ASI (Acceleration Severity Index) and THIV (Theoretical Head Impact Velocity) should be of Level A i.e. $ASI \leq 1.0$ or Level B i.e. $ASI < 1.4$ and $THIV \leq 33$ Kmph. Impact severity level A offers a

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greater level of safety for the occupants of an errant vehicle than level B and is preferred when other considerations are the same.

- (b) Occupant Risk as per MASH- Occupant Impact Velocity (OIV) and Occupant Ridedown Acceleration (ORDA) should be as follow

Occupant Impact Velocity Limits (m/s)		
Component	Preferred	Maximum
Longitudinal and lateral	9.1 m/s	12.2 m/s
Occupant Ridedown Acceleration Limits (G)		
Component	Preferred	Maximum
Longitudinal and lateral	15.0 G	20.49 G

8. The posts, spacers, beam and fasteners of crash barriers shall be galvanized by hot dip process unless otherwise specified. The galvanizing on all other steel parts shall conform to the relevant IS specifications. All fittings (bolts, nuts and washers) shall conformed to the IS1364 and IS 1367. All galvanizing shall be done after fabrication. Following are also suggested

- (i) New Jersey/Thrie beam type crash barrier are considered appropriate for the hilly areas/where space is constrained and lesser space is available for deflection and is recommended for installation.
- (ii) Thrie beam type crash barrier may be provided for Expressways/High speed corridor.
- (iii) W Beam Crash Barrier in hilly area may only be provided if the traffic volume is very low and most of the vehicles are of lower containment level/passenger car, van.
- (iv) The placement of the barrier should be placed as far away from the travelled way as practical.
- (v) There should be sufficient distance between the barrier and the start of the embankment slope to provide adequate support for the post for proper operation of the crash barrier. A minimum distance of 0.6m as shown in fig.1 should be provided to prevent the wheels from dropping over the edge.

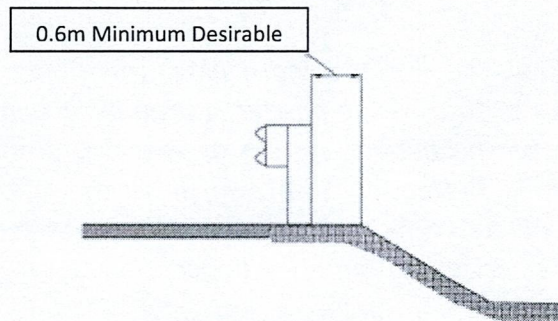


Fig 1.Recommended Barrier Placement for Optimum Performance

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- (vi) Preferably kerbs should not be present in the front of crash barrier especially in rural stretches. In case kerb are also to be provided along-with the crash barrier the kerb should be of mountable height and It should be behind crash barrier or at least face of kerb flushed with crash barrier.
9. Specifications of the crash barrier other than specified above should be in conformity with IRC: 119-2015.
10. Criteria for other type of crash barrier such as concrete crash barrier and rope crash barrier shall be as stipulated in IRC 119-2015 and other IRC guidelines/code.

Yours faithfully,

Raj Kumar
01.01.2020
(Raj Kumar)

Assistant Executive Engineer - S&R (P&B)
For Director General (Road Development) & SS

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1. All CEs in the Ministry of Road Transport & Highways
2. The Secretary General, Indian Roads Congress
3. Technical circular file of S&R (P&B) Section
4. NIC-for uploading on Ministry's website under "What's new"

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