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Road Side Safety

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Abstract—*Road side safety is of utmost importance given the current scenario of increasing vehicles on Indian roads. Given the population increase in the recent past; mostly people are seen encroaching the highways for road side properties which results in major/minor accidents on daily basis. Most of the traffic accidents surveys puts India amongst top in the list. Designing safer roads is key for future since this condition is going to become worse with increasing population and vehicles on Indian Roads.*

Road safety barrier systems (Crash barriers) of various types are proposed to mitigate the risks arising from errant vehicles. The purpose of these devices is to enhance road safety by plummeting the consequences of crashes. However, these devises are themselves a hazard; have potential of serious injuries. Vigilant planning of various types of crash barriers and its installation locations to significantly mitigate the accident risks is the key; making it less than the risk without the crash barriers. IRC: 6-2000 has brief direction towards its design but this guidance isn't comprehensive.

This paper describes the necessities for roadside hardware that provide some degree of redirection and control ability when impacted by a vehicle; or provide measured absorption of the kinetic energy of a vehicle that is on a collision course. Following types are barriers and test levels are explored with its suitability, connections, sustainability and replacement after impact with safety level that it provides.

- Rigid Barriers
- Simi-Rigid barriers
- Flexible barriers

Keywords*: Highway safety, Road side barriers, Safety in design.*

1. INTRODUCTION

The main objective of this paper is to provide utmost safety to Road users by use of various types of Road Side Barriers systems. It is important that we specify the installation of correct barriers given the specific circumstances. Barrier erection and maintenance practices is key to achieve an acceptable level of barrier performance during vehicular impact.

2. TYPES AND SPECIFIC USE OF BARRIER SYSTEMS

For various types of roads like highways, expressways, pedestrians, race tracks, heavy vehicles tracks specific barrier selection will ensure that the energy dissipation from crash is upright and minimal damage to the vehicle and life is achieved. Following types of Barriers systems are recommended

1. Rigid barriers
2. Semi-rigid barriers
3. Flexible barriers

3. RIGID BARRIERS

Rigid Barriers are designed so that there will be no movement of the barrier system and there is no/limited transfer of the stresses to the supporting member. Local elastic strain occurs during the crash of the vehicle. This design needs to be further developed for various speeds, weights, class of vehicles and for different angles of crash using rational plastic analysis method. Crash testing is suggested to work out the barrier dimensions to ensure that the height and width is so that vehicle does not overturn but total energy dissipation takes place. It is important that barriers fail at specific force without transferring the reactions to the support structure. It can be made in combinations of rail on top of it to achieve further test level resistance. Its foundation needs design for shear and overturning.

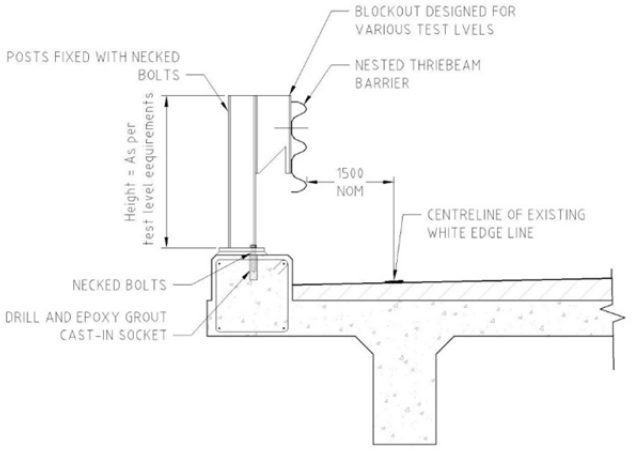

Fig. 1: Typical Cross Section- Semi-rigid Barriers

4. SEMI-RIGID BARRIERS

This system development is based on crash testing so as to appropriately design its foundation and base connection. Compared to rigid barriers this type of arrangement has minimum damage to the vehicle and also helps in bringing back the vehicle to the lane with minimal deflection. Nested Thrie-beam barrier ensures minimum deflection. For base connections of this type of barriers it is important that the reactions are not transferred to the supporting structure beyond specific limit. It is important the barrier system fails rather than entire bridge system fails due to impact. For base connection it is importance the necked bolts are used so as it fails at the reduced section and replacement is also easy post the crash. Appropriate crash-safe methods needs to be available for terminating the non- rigid road safety barrier systems. It can also be used with tensioned wire ropes anchored so as to reduce the barrier deflection. This will need detailed design for post spacing, deflection, height for various vehicle impact speeds, weights and angles.

Use of this barrier systems will not only help Indian highways from road encroachments but will also provide an obstruction for an errant vehicle entering road side properties with minimum damage to the vehicles.

5. FLEXIBLE BARRIERS

Flexible barriers have wire-rope fixed in it. Typically 4 wire-ropes is most recommended method. The design capacity of the posts holding the wires is proposed to be kept minimum to allow it to flatten during impact and all vehicle kinetic energy being absorbed by wire-ropes which needs anchorage so as to dissipate this energy. By this method we can achieve minimum damage to the vehicle and it can be again brought back into the lane without loss of life. This option is most recommended over the Pune-Mumbai expressway medians so as to avoid the errant vehicles crossing the medians and hitting the opposite lanes.

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