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Safety in Ghat Section using Rolling Barrier

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Safety in Ghat Section using Rolling Barrier

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Abstract— *This paper highlights on the need for cost effective road safety investments using 'rolling barrier' systems which can redirect the deviated automobiles onto the right path and also prevent the overturning of vehicles. The Road accidents are an outcome of the interplay of various factors, some of which are length of road networks, vehicle population, in case of our paper the topography of ghats and curvature of turns also plays a part along with human population adherence/enforcement of road safety regulations etc. This study aims to evaluate the effectiveness of the Rolling Barrier and to understand the Rolling Barrier"s characteristics of crash cushioning. The Rolling Barrier can be effectively used in curved roads sections as seen in various test done on performance of Rolling Barriers.*

Keywords—Hairbend turns, Ghat Roads, Barriers, Rolling Barriers, Shock absorbent Barriers.

I. INTRODUCTION

Most of the ghat roads in Maharashtra exist in Sahyadri ranges. This mountain range on west coast of India stretches from North of Maharashtra to Kerala in south India. This whole area gets heavy rains in monsoon season. With hard rain and hilly topographical condition this whole region is filled with ghat roads which which present challenge to drivers. The mountain ranges and hill areas of Maharashtra have a crucial role to play in determining the climate and physiography of the country and are prime determinants of socio-economic development of plain areas as the rivers have their genesis here and the protection and climatic control they provide have crucial benefits to environment as well as humans. Topographic nature of ground is another reason for spread in accident. It is observed that 50% accidents have occurred while negotiating the sharp bends. Majority of drivers are not properly trained and in ghat this can be cause of losing lots lives just by vehicle off the cliff. Basic elements in accident on road user's vehicle road and its condition environmental factors etc. Traffic accidents can cause physical, financial and mental effects for everyone involved. Drivers and passengers can suffer from minor cuts and bruises to broken limbs, whiplash, back and spinal injuries, paralysis and even death. Vehicles in traffic accidents are damaged and may be in need of minor or costly repairs or may even be completed totaled and no longer drivable.

„Safety Roller" is a safety fixture that prevents drivers and passengers from fatal accidents by not only absorbing shock energy but also converting shock energy into rotational energy. „Safety Roller" needs to be installed at sites where vehicles are exposed to frequent accidents. „Safety Roller" will safely lead a vehicle back to the road or stop the vehicle by absorbing shock energy. „Safety Roller" will effectively function for drivers to properly control vehicles with its noticeable color and self-luminescence. One Korean company developed a product to reduce the harsh impacts of guardrails & hopefully save lives. Every year approximately 1.25 million people die as a result of a road traffic crash. According to Federal Highway Administration, the guardrail can operate to deflect a vehicle back to

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the roadway, slow the vehicle down to a complete stop or let it proceed past the guardrail. The guardrail can"t completely protect against the situations drivers may find themselves. To minimize the no. of accidents a company called ETI (Evolution in Traffic Innovation) designed "Rolling Barrier System".

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II. Literature review

*1. **G. Udayakumar (IOSR Journal of Engineering 19)**:*
In his research paper he suggested idea of flexible median divider with use of polymer material for reducing the risk level of accidents on the median divider on researching on the topic. He suggested that the use of PVC barrier instead of RCC barrier he worked on parameter like flexibility collision input reduction cost effective.

*2. **Guido Bonin (North south university 19-IJLEMR)***

He suggested the use of road safety barrier in his paper he suggested the use of road safety barrier with lightweight concrete elements, by replacing conventional concrete with short elements lightweight concrete in his paper he categorized types of accidents. He suggested that the roller barrier is only the solution to reduce road accidents on the expressway

3. Mehedi Hasan(CEE 490B) :
Explanations of barriers and their proofs tells us that the rolling barrier systems are a high priority towards safety, better than other types of barriers in terms of stiffness and strength, high positive results in the crash test performances, Ultimately life is more precious than vehicles but when it comes to rolling barrier system usage, it safes life and also prevents maximum damage level of the vehicles. The rolling barrier systems are the future technology in Civil Engineering or Transportation Engineering.

*4. **Nagadarshan Rao B J(ISSN:2455-4847) :***

In his paper suggested the use of roller barrier instead of the conventional barrier system.in the year 2015 there was 2.5% increase in total road accidents and 3.2% accidents on the highway, in this paper he evaluated the property of roller barrier like crash cushioning and correction of the vehicle running direction. The said in his paper that the new idea is replacing the conventional barrier with roller barrier.

*5. **Muhammad Farhan((ISSN:2455-4847) :***

In this paper the use of roller barrier with Indian perspective has been discussed he said that in 2016 4, 80,652 accidents took place 1.50,785 deaths caused he suggested that soon the developing countries like India need to not only grow in economy but also focus on the life safety he suggested that RB will safeguard the life of humanity as the implementation other countries like having from their result

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*6. **Kyung-Whan Kim(KSCE Journal of civil engineering Jan 04) :***

In his paper, he stated that the longitudinal barrier helps in reduction of accidents by 50% in a year. When the strength performance test was done on 8-ton truck and a passenger protection test on 1.3-ton car the barrier satisfied the guidelines of installation and managing of road safety.

*7. **A.Wadekar (ISSN:2455-4847)**:*

In his paper, he stated that in 2017 14500 accidents took place in which 1400 death took place in which 1400 death took place he suggested that the developing countries like India should implement the use of shock absorbing roller barrier. 17

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8. ***Gabriel Jigaeduce(International journal of advanced Civil Engineering JUNE 11):***

In this paper he analyses and proposes the impact behavior of 2 new safety barrier system to raise impact energy absorption he concluded that crash attenuator damage to vehicle and motorist he said that lamellar and rubber roller elements should replace simpler deformable damper.

III. ***Methodology***

Theorotical Methodology

The rolling barriers do more than absorb impact energy. They convert impact energy into rotational energy to propel the vehicle forward rather than potentially breaking through an immovable barrier. The ETI product has a rotating barrel made of EVA with excellent shock absorption power, 3D buffering frames & dense props supporting the frames. Rotating Barrels comes with attached reflective sheeting for good visibility. EVA has a better flexibility & elasticity compared to other polyethylene resins & has most similar features to rubber. In fact, its lighter than rubber & most elastic than urethane. In shorts, it"s not easily damaged. When a car hits the guardrail, the rotating barrel converts shock from the vehicle to rotational energy. Upper & lower frames adjust tires of large & small vehicles to prevent the steering system from a functional loss. Railways rails & liquid props absorb shock from accidents vehicles & frames with the smooth surface adjust tires of the vehicles & guide them in the moving direction to prevent second rear – end collisions. The 3D structure of the D – shaped frame & buffering bracket distribute & absorb the second shock. Props at an interval of 0.7 m increase bearing power to prevent vehicles from further derailing. As the props are independent only damaged parts need to be replaced. This keeps maintenance costs pretty low. Roller absorbs collision shock (shock energy- rotational energy). Front rail absorbs second shock. Back rail absorbs third shock. Metal pipe inserted into strengthen post. The conventional barrier system which includes the likes of concrete barriers as well as the steel guardrails try to absorb as much shock energy from the impact of collision as possible and thus potentially break the momentum of the colliding vehicle. However, as we can see from the number of fatal accidents on the expressway, this prevailing customary system has proven to be substandard. Whereas, the rolling barriers not only absorb the impact energy but also convert it into rotational energy, assisting the vehicle to stay on track and prevent overturning. an automobile swerves from the actual path and hits the barriers laterally at any angle, the rollers convert the impact energy into rotational energy by rotating with the impact. The rotational energy not only helps to cut down the impact of the collision but also helps to propel the vehicle forward rather than potentially breaking through an immovable barrier. Upper and lower frames adjust tires of large and small vehicles to prevent the steering system from a functional loss. Props at an interval of 0.7 m increase bearing power to prevent vehicles from further derailing. As the props used in the system are independent, only damaged parts need to be replaced. This keeps maintenance costs pretty low and the efficiency of the system intact.

Test to be conducted on Rolling Barriers :-

SB5 crash test

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