

Rolling Barriers System for Reduction of Road Accidents on Horizontal Curves.

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Abstract - In India, the transportation system is expanded fleetly. In India, the Government and Ministry of Road Transport and Highway is looking for the rearmost ways for the safety of the roads and to reduce the accidents. Rolling Barriers consists of nonstop pipe with urethane rings constructed by the Korean company. The study of Rolling Barriers is carried out to estimate the effectiveness of RB (Rolling Barrier) and to understand the characteristics of crash bumper and to estimate the needed strength of Barriers. In lakhs accidents are recorded in India, leading 1.5 lakhs deaths. The Rolling Barriers are veritably useful to reduce the accidents in future. These Barriers are used in twisted roads, hilly areas, on roadways etc. The total study of Rolling Barriers Systems is developed in this design.

Over the last twenty five years more than 20,000 people were killed on Polish roads in run-off-road crashes (of which a clear majority involved hitting a tree). The main factors that influence the risk of being involved in such acrash are: historic developments, road class, length and element of carriageway, hazardous elements at the edge of carriageway (mainly trees), safety measures in place or lack of safety measures. To improve roadside safety we must: identify the hazards on the road network, conduct checks, conduct research (build models of the effects of selected factors on road safety, effectiveness evaluation), implement safety standards, develop guidance and principles for safe roadsides, ensure that there is collaboration between designers, road authorities and environmental organisations and institutions and exchange experience with other countries. More models should be developed that combine road hazards with the risk of accidents, with particular emphasis on the impact of road restraint systems. For years roadside environments have been one of the most neglected aspects of road safety efforts in Poland. Clarity is needed on the effects of roadsides on road safety. We must understand the hazards roadsides cause and implement effective solutions.

Keywords: rolling barrigades ,barrigades,highway security , safety on highway , accident safety

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I. INTRODUCTION

Trace safety refers to the styles and measures used to help road druggies from being killed or seriously injured road accident are one of the leading causes of death. Accident occurs due not following business rules indecorous road construction, clash of vehicles, driving beyond speed limit similar accidents beget unforeseen death or injuries Currently transportation sector in India enhancing the services fleetly. Every time roughly 1.5 lakhs peoples dies due to road accidents. Moment, India is one of the loftiest countries which growing fleetly by road networks, transportation systems etc. But in road networks, the impact of road accidents on road safety is veritably major problem currently. Road accidents causes major injuries, damage to vehicles, loss of life of people etc. Road safety is veritably big issue at public position. Road accidents are increased by 10 in 2019 as compared to the 2018. To minimize the road accidents, Rolling Barrier System is recently conception constructed with structure consists of urethane rings by Korean company. These rolling Barriers are used in hilly areas, twisted roads etc. When the vehicles hit the Barriers, rolling Barriers reduce the speed of vehicles and help it from accident. Breakers absorb the shock energy, when vehicle collapse on Barriers and shock energy converted into rotational energy.

ROLLING BARRIER:

The conception of rolling Barriers is, a structure equipped with nonstop pipes covered with urethane rings. Its general point resembles an erected abacus. As the rolling Barriers activates the rolling disunion when vehicles hit the Barriers, the rolling Barriers reduces inflexibility of business accidents. There has a rolling box which is attested with steel frame. The rolling box can rotate when it'll hit by business. It's made of special

chemical emulsion like hard rubber which is able to absorb the impact of the vehicle. In concrete or steel barrier there target to save the life of the humans but the vehicle situation would be worst and string Barriers try to reduce the impact of the vehicles. Eventually these three types of Barriers fail to achieve its target and human lost his life.



HIGHWAY SIDE ROLLING BARRIER

Road infrastructure and roadsides can be a factor causing road accidents when road user errors occur (e.g. elements that are not easily comprehended or clear, poorly organised traffic, curbed visibility, geometric parameters not adequate for the speeds) and have a strong influence on accident severity, especially where run-off-road accidents are concerned.

Run-off-road accidents and their consequences can be reduced by improving the road and street network, completing and reconstructing the existing network, developing and implementing “self-explanatory roads”, developing and implementing “forgiving roads” and providing road signs and markings that are more understandable and road user friendly.

One of the devices supporting these actions is the use of road safety barriers. Before appropriate steps are taken, it is necessary to recognise the conditions in which hazards on the road occur and the effectiveness of the equipment used. Unfortunately, this kind of research is still lacking in Poland. To change that, a research project was launched focussing on road safety devices with particular emphasis on safety barriers.



FEATURES

- Made of special chemical compound like hard rubber.
- Easy to maintain due to separated barrels (recyclable).
- Stopper boards installed on the top and the lower part of the barrels to guide objects back to the road.
- Easy to adjust height, noticeable to drivers due to noticeable coloration and self-luminescence.
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- Less costs to install (less post- 1 unit per 2m).
- LED guide lamp (solar energy).
- Two Pieces.
- Material is eco-friendly.
- It reduces the speed of vehicle.
- Reduces costs in repairing & maintenance due to Roller’s resilience

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B. Advantage of Rolling Barrier System:

- Highly effective shock absorber.
- Impact severity reduction due to its conversion into rotational energy.
- Keep the vehicle on track and avoid deviation.
- Self-luminescence to help drivers control vehicles during night time
- Easy maintenance. Cost effective due to reduction in costs of repairing and maintenance due to roller's resilience.
- Easy height adjustment of barriers for passenger cars and lorry.
- Eco-friendly due to the use of Ethylene Vinyl Acetate

PROPOSED SYSTEM

Site selection: NH 48 Mumbai Pune expressway Data available on NH 48 has been selected on basis of small section of curve which is selected as a project site which is having speed of 60kmph vehicle designing the rolling barrier. Movement on the NH 48 were very high and frequently all sort of vehicles passes through it. However many accidents do occur at curve therefore using roller barrier will reduce the risk of accident. South Korean company named "KSI", has designed the rolling barrier.

In this design all dimensions are in mm. Here given the name of roller is A. 370mm is the total diameter of the roller, and the rounded stainless steel's diameter is 246mm. the distance between one posts to another post below the soil is 1400mm A spans distance is 4200mm. One roller to a different roller center to center distance is 700mm. the vertical distance from ground level (GL) to further is 1200mm and therefore the height of top is 1000mm. There have inner post, sub-post, w rail style stainlesssteel, muffler roller, post cap etc. Performance test has been allotted by KSI global to match normal and rolling barrier to live the degree of harm imparted to the barrier during a vehicle impact of the crash test (test 1). It had been observed that the traditional barriers experienced more damage as compared to rolling barrier. in a very similar crash test (test 2) a comparison is finished between railroad car and heavy vehicle impact to rolling barrier. it absolutely was seen that impact of carriage delivered no damage to the rolling barrier, while slight damage is recorded just in case of heavy vehicle.

USES OF ROLLING BARRIER

1. many drivers in India over speed their vehicles. So in such a case if they lose control the rolling Barrier keeps the vehicle in a lane. Thus, avoids it from hitting street side objects.
2. Many accidents are caused in India annually. Many people lose their lives and also their vehicles are damaged thus causing financial loss. Rolling Barriers helps to reduce accidents thus helps to save lives as well as saves money.
3. Rolling Barrier system keeps the vehicle in the lane as well as improves the aesthetic view of highway alignment. This helps our roads to look scenic and creates a hood image of Indian roads in the view of foreign tourists.
4. Many accidents are caused in India out of which major part of accidents are caused at night due to unclear vision. This system has LED lights which are very costly so we are going to replace LED lights with radium paper which reflects light at night ensuring night vision for drivers thus reducing accidents.
5. In India due to huge population there are many roads and it becomes a huge burden on government authorities to take care of roads and look after maintenance and safety. To this system being cost effective as well as efficient will help government to ensure road safety. Thus, this will help RTO and local authorities.



ADVANTAGES

1. Safety of the roads increased.
2. Maintenance is low.
3. Reduces the accidents on highway, expressways etc.
4. Useful in hilly region, curved section or roads.
5. Easy to install.
6. Rolling barrier saves vehicles from crashing on objects.

DISADVANTAGES

1. Availability of urethane resources is less.
2. Proper maintenance and inspection is required.
3. Requirement of labor for maintenance is more.
4. Heat treatment is required.

Components of rolling barrier system:

- Top rail:** There are two rails in rolling barrier system, which connects and supports the rollers horizontally. The upper rail is known as Top rail. It is like a guard rail, made of steel. Top rail splice is used to connect pipe with rails.
- Bottom rail:** From the two rails, the lower rail is called Bottom rail. It also connects and supports the rollers horizontally. It is like a guard rail, made of steel. Bottom rail splice is used to connect pipe with rails.
- PVC Pipe:** The rollers are installed on PVC pipes, which allows the rollers to rotate or roll freely. It is a vertical member connecting both the rails and rollers. It is made up of PVC or steel.
- Stopper boards:** It is a disc like board, which is installed between rollers and rails, at both upper and lower sides. It is used to guide objects back to road.
- Shock absorbing roller:** It is the main part of rolling barrier system. The rollers are usually made up of Urethane or recycled hard rubber. It absorbs the shock of vehicles, and convert impact energy into rotational energy.
- LED guide lamp:** A small LED guide lamp is installed on PVC pipe. It is installed on top of PVC pipe.
- Reflective band:** A reflective band is attached to the rollers to give better visibility at night. Yellow coloured reflective band/tape is used to increase visibility at night.

Materials used in rolling barrier system:

Urethane has become the material of choice in so many of today's performance driven applications because it exhibits extraordinary physical and mechanical properties that other materials simply can't match. It is a type of

an artificial rubber. Urethane is flexible and malleable. It possesses non-brittle property along with elasticity.

Polyurethane is also used for rolling barriers. Polyurethanes are linear polymers that have a molecular backbone containing carbamate groups. They are unique in combining the strength of rigid plastics with the flexibility and elasticity of rubber. It also possesses non-brittle property along with elasticity.

Use of recycled artificial rubber is also possible.

Design specifications of rolling barrier:

Design of the rolling barrier is provided by the South Korean company “KSI”. Here, the name of roller is given ‘A’. The total diameter of the roller is 370mm and the rounded stainless steel’s diameter is 246mm. The distance between one post to another post below the soil is 1400mm. A span’s distance is 4200mm. Centre to centre distance between one roller and another roller is 700mm. The vertical distance from ground level to further is 1200mm and the height of upper side is 1000mm. All details are shown in figure.

II. RESULT & DISCUSSION

In the sphere of material advancements in the last many decades we've developed instigative materials in engineering wisdom. For accoutrements election or fabrication of RB and bring factors will play a significant role.

Materials: While opting material for RB we need to see the properties needed in the installed component. one of the most important property in this regard is adaptability and shock absorbing capacity, as this is the primary point of the RB in absorbing the impact Energy communicated by the decelerating vehicle. Crash softening property plays an important part in fulfilling the main purpose of the RB. Another property which can add to the Functionality of the RB is thermal resistance, as large quantum of heat is generated during the impact event. Using accoutrements that

are thermal insulators will insure the proper working of the RB. **Cost optimization:** Cost is another factor to decide the material of RB, as large number of breakers is to be installed at the side and the middle of the road.

Implementation of RB, the effective perpetration of the RB will feed multiple objects as banded over, still RB can be applied resourcefully at following sites National Roadways and major highways bear its competent use. Other accident-prone spots like in twisted road sections, U turns etc. Gradients and pitches in the civic or state or public road arteries Inclines in parking lots and garages.

III. CONCLUSION

Accidents are the errors of humans while using motor vehicles and also nature creates problems like rain causing slippery roads. Eventually life is more precious than vehicles but when it comes to rolling barrier system operation, it saves life and also prevents maximum damage to the vehicles. Rolling barrier won't only reduce the impact of collision but also help in turning to the factual path, by converting impact energy into rotational energy. Accidents are the error of the human's while using motor vehicles and also nature creates problems like rain causing slippery roads. Fog causing low visibility, etc. Ultimately life is more precious than vehicles but when it becomes to rolling Barrier system usage, it saves life and also reduces maximum damage to vehicles leading to saving of both financial as well as human resources. Rolling Barrier reduces the impact of collision, redirects the path of vehicle, convert impact energy into rotational energy. This reduces accidents and saves lives.

In India, accidents are increasing day by day. As per the info mentioned above, an outsized number of accidents occurs on horizontal curves. 42% of collision is with barriers. the traditional barriers protect other objects from collision, but it damages the vehicle heavily and it's going to even cause death of passenger of the vehicles. The use of rolling barriers can prevent the damage and loss of lives. It absorbs the shock energy and converts it into rotational energy. The rolling barriers, made of Urethane rubber, possesses both flexible and rigid property. LED light and reflective tape gives better visibility at the hours of darkness. So, the utilization of rolling barrier system can reduce the damage due to accidents. Its initial cost is higher but it doesn't need much maintenance as compared to concrete and steel barriers. Rolling barriers are used currently in many

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