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HIGHWAY SAFETY USING ROLLER BARRIER

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Abstract : In India, the transportation system is expanded rapidly. In India, the Government and Ministry of Road Transport and Highway is looking for the latest techniques for the safety of the roads and to reduce the accidents. Rolling Barriers consists of continuous pipe with urethane rings invented by the Korean company. The study of Rolling Barriers are carried out to evaluate the effectiveness of RB (Rolling Barrier) and to understand the characteristics of crash cushioning and to evaluate the required strength of barriers. In 2019, 4.5 lakhs accidents are recorded in India, leading 1.5 lakhs deaths. The Rolling Barriers are very useful to reduce the accidents in future. These barriers are used in curved roads, hilly areas, on expressways etc. The total study of Rolling Barriers Systems are elaborated in this project.

Keywords : Rolling Barrier, KSI global, Highway Safety, Accidents, Government .

I. INTRODUCTION

Highway safety refers to the methods and measures used to prevent road users from being killed or seriously injured road accident are one of the leading cause of human death. Accident occurs due not following traffic rules improper road construction, clash of vehicles, driving beyond speed limit such accidents cause sudden death or injuries Nowadays transportation sector in India enhancing the services rapidly. Every year approximately 1.5 lakhs peoples dies due to road accidents. Today, India is one of the highest country which growing rapidly by road networks, transportation systems etc. But in road networks, the impact of road accidents on road safety is very major problem nowadays. Road accidents causes major injuries, damage to vehicles, loss of life of people etc. Road safety is very big issue at national level. Road accidents are increased by 10% in 2019 as compared to the 2018. To minimize the road accidents, Rolling Barrier System is newly concept invented with structure consists of urethane rings by Korean company. These rolling barriers are used in hilly areas, curved roads etc. When the vehicles hit the barrier, rolling barrier reduce the speed of vehicles and prevent it from accident. Rollers absorb the shock energy, when vehicle collapse on barrier and shock energy converted into rotational energy.

II. LITERATURE REVIEW

1. **G.Udayakumar** et al. 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 a new flexible barrier he also used ANsys engineering simulation software 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** et al has 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. **Nagadarshan Rao B J** 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.

4. **Muhammad Farhan** 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.

5. **Kim et al** In his paper, he stated that the longitudinal barrier help 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

6. **Rao. Et al** In his paper, he stated that in 2015 1347 accidents took place and 400 deaths took place he said that 57 accident take place every hour he said RB saves lives and prevent damage to the vehicle and said roller barrier are future of road safety and management.

7. **Reddy et al** In his paper said that 1.25 million people die due to road accidents he suggested that the installation of the guardrail in the road can minimize large no of accidents

III. ROLLING BARRIER

The concept of rolling barrier is, a structure equipped with continuous pipes covered with urethane rings. Its general feature resembles an erected abacus. As the rolling barrier activates the rolling friction when vehicles hit the barrier, the rolling barrier reduces severity of traffic accidents. There have a rolling box which is attested with stainless steel. The rolling box can rotate when it will hit by traffic. It's made of special chemical compound like hard rubber which is capable to absorb the impact of the vehicle. In concrete or steel barriers there target to save the life of the humans but the vehicle situation would be worst and cable barrier try to reduce the impact of the vehicles. Sometime these three types of barrier fail to achieve its target and human lost his life



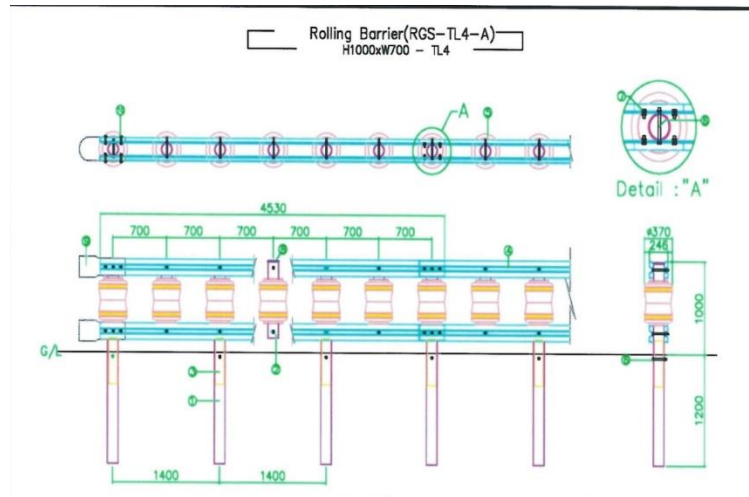
IV. METHODOLOGY

Project plan

- Selection of Project Site and acquiring details regarding project site
- Survey of project site (NH highway)
- Observing data of traffic volume and Accidents occur on highway
- Designing the layout for Highway safety Rolling barrier using KSI Method
- Testing and costing of overall project
- Result
- Conclusion

Site selection : NH 48 Gaimukh gao, Ghodbunder Road
Survey of selection site is done by the data available by **NH 48** depending on that basis a small section of curve path is been selected as a project site for designing Rolling barrier having speed limit **60kmph** Vehicle movement on the NH 48 were very high and frequently all sort of vehicles pass through so many accidents do occur the place is more curve therefore using roller barrier will reduce the accident rate
Design of the rolling barrier is provided by the South Korean company “**KSI**”. In this design all dimensions are in mm. Here given the name of roller is A. The total diameter of the roller is 370mm and the rounded stainless steel's diameter is 246mm. the distance between one posts to another post below the soil is 1400mm. A span's

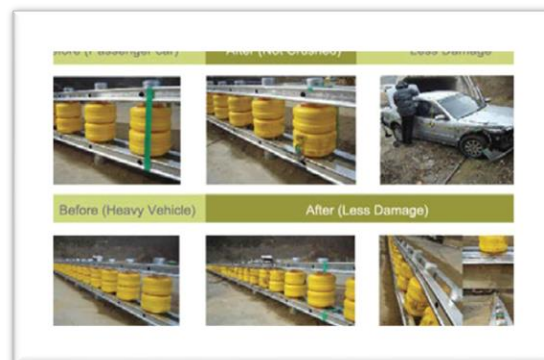
distance is 4200mm. one roller to another roller center to center distance is 700mm. the vertical distance from ground level (GL) to further is 1200mm and the height of upper side is 1000mm. There have inner post, sub post, w rail style stainless steel, shock absorber roller, post cap etc



Performance test has been carried out by KSI global to compare normal and RB to measure the degree of damage imparted to the barrier during a vehicle impact .of the crash test (test 1). It was observed that the conventional barriers experienced more damage in comparison to RB .In a similar crash test (test 2) a comparison is done between passenger car and heavy vehicle impact to RB, as shown in figure 6. It was seen that impact of passenger car delivered no damage to the RB, while slight damage is recorded in case of heavy vehicle.



SB 4 CRASH TEST



SB 5 CRASH TEST

Result

In the domain of material advancements in the last few decades we have developed exciting materials in engineering science. For materials election or fabrication of RB and cost factors will play a significant role. **Materials:** While selecting material for RB we need to see the properties required in the installed component. one of the most important properties in this regard is resilience and shock absorbing capacity, as this is the primary feature of the RB in absorbing the impact Energy imparted by the decelerating vehicle .Crash cushioning property plays an important role in fulfilling the main purpose of the RB. Another property which can add to the Functionality of the RB is thermal resistance, as a large amount of heat is generated during the impact event. Using materials that are thermal insulators will ensure the proper working

of the RB. **Cost optimisation:** Cost is another factor to decide the material of RB, as large number of rollers is to be installed at the side and the middle of the road. **Implementation of RB** The efficient implementation of the RB will cater multiple objectives as discussed above, however RB can be applied resourcefully at following sites National Highways and major roadways require its competent use. Other accident prone sites like in curved road sections, U turns etc. Gradients and slopes in the urban or state or national road arteries Inclines in parking lots and garages.

V. CONCLUSION

Accidents are the errors of humans while using motor vehicles and also nature creates problems like rain causing slippery roads. • Ultimately life is more precious than vehicles but when it comes to rolling barrier system usage, it saves life and also prevents maximum damage to the vehicles. • Rolling barriers will not only reduce the impact of collision but also help in redirecting to the actual path, by converting impact energy into rotational energy

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