

LOW COST ROLLING BARRIER SYSTEM

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Abstract-India is developing country. The growth of traffic increase rapidly day by day. The government is looking for the new technologies in order to reduce accidents on the road and improve the safety on the road. In India transportation system is expanded fast or rapidly. In India 2015, 501423 road accidents happened in which 146133 people died. In 2016 road accidents decreased by 4.1% in which near about 480652 road accidents occurred and 150785 people died. in 2017 road crash fatalities increased by 3% last 2 years. A small Korean company developed a new product in order to reduce the harsh impact of guard rails. The product is rolling Barrier. The latest technology for the safety of vehicles on the roads, is provided by the help of rolling Barrier concept. Providing rolling Barrier on intense curve helps in reducing many accidents of the vehicles now a day. Therefore, rolling Barrier proves be a lifesaving technology for the drivers as well as passenger of the car. The product (barrier system) developed by Korean company is very expensive because of which we can't implement it in India. So, we thought on how to reduce the cost of barrier system. So, we can implement the low cost barrier system at local level at minimal cost by replacing W beam by steel pipe which has low cost and equal strength. Also, we decided to replace the LED lights used by Korean company with radium paper which will do not the same purpose but at a very low cost. By painting rail guard with yellow color and sticking radium paper of red color so that the drivers are not distracted as well as it will help them to remain in their lane. So, overall we are making changes in the model of barrier system given by Korean company to reduce its cost which can be implement at local level. [3]

Keywords:- Government, Accidents, Safe barrier, low cost rolling barrier, highways, Expressway, etc.

1. INTRODUCTION

There are different types of road in India. Such as National Highway, State Highway, Major District Road, village Road, etc. Each street or highway built in a way that certifications and guarantee agreeable, helpful and in particular safe transportation of individual and different sorts of products and materials but road accidents happen due to various factors like length and networks of roads, population of human as well as vehicles and the safety regulations of road. On Express ways or highways, the accidents are increasing rapidly day to day which causes the human lives. At National and international forums road safety has become a major problem to worry. India is one of the highest

motorization growth the world occupied by rapid expansions of road networks. The analysis of road accidents shows that in a year 2016 it was recorded 4,50,652 accidents leading to 1,50,785 deaths. Accidents are the error of the human's while using motor vehicles and also nature creates problems like, rain causing slippery road. Ultimately life is more precious than vehicles. The government is always Taking at the latest technology that can ensure safety of road users as outlined in the construction, industry transformation plan a small Korean manufacturing company invented new concept longitudinal barrier (the Rolling barrier) which had continued pipes covered with urethane rings and it was installed at to downgraded and covered road in Busan. The accident was reduced by 50% in a year. This study aims to evaluate the effectiveness of Rolling barrier features. The rolling Barrier converts impact energy into rotational energy so that the vehicles more forward in lane rather than crashing through the barrier and getting derailed. the ETI product has the rotating barrel mode with EVA excellent shock absorption power, 3D buffering frames and dense props supporting the frame, rotating barrel comes with attached reflective sheeting for good visibility EVA has better flexibility and elasticity compared with other polythene resins and most similar features to rubber. when the car hits guardrail the rotating barrel convert shock from the rotational energy. The rolling barrier can effectively use in curved road section, ramps median and entrance or exits ramps in parking garage. [2]

2. 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.^[3]



Fig -1: NIGHT VISION

3. METHODOLOGY

1. LOCATION- After the analysis and research, we did for installing Barriers we opted the location koyananagar, karad- chiplun road, patan, satara, Maharashtra- 415207. We opted the karad chiplun road because it is one of the major district road which connect two major cities of two different districts i.e. karad and Chiplun. Also, this road also being connected to NH4 highway at karad leading to increase in significance of this road. Also, this road connects koyanadam which is the biggest dam in Maharashtra.



Fig -2: Location of Karad-Chiplun Road.

2. ROAD SURVEY- We have selected Karad-Chiplun Highway for our survey because it is one of the major road in the District of Satara and connects two important cities. Many vehicles ply on this road for the purpose of education, industry finance, etc. It connects an important Dam the biggest dam in Maharashtra which is an important tourist destination. Thousands of tourists visit this dam annually. Being such an important road it is quite an accident prone road so, we decided to implement low cost barrier system this road. We decided to implement this system in an accident zone which has been created in koyananagar due to intense curve. The

drivers can't see the vehicle coming from the front on the opposite lane thus, causing accidents. So we did various surveys on road like Map study (Provisional alignment identification), Reconnaissance survey, preliminary survey and Topographic survey, consists of determining the horizontal and vertical locations of objects on surface of road. The road being made of bituminous having sloping one in fifty and has a curved alignment, carriageway of 3 meters, sight distance of 6 feet. With a vehicle passing rate of 60-70 per hour.

3. CAUSES OF ACCIDENTS- Because of intense turn we can't see the vehicle coming from the front lane. The visibility is very less and hence, many people get injured and even lose their lives due to clashing of vehicles. The road signals like ' speed limit' and ' Road turn sign' is not being installed leading to accidents. Also, there are no Barriers provided for preventing the vehicles from derailing off the lane. This is the main reason because of which accidents are caused. After doing research and analysis we collected the accidental data of past three years from the local authorities. In past three years around 100-150 accidents occurred.

4. TO IDENTIFY LOW COST BARRIER- The Rolling Barrier system invented by Korean company is very expensive. So we decided to replace the material with low cost than aluminum string but equivalent to its strength. We are going to give yellow color top rail and bottom rail so that they can be visible at day-time as well as nighttime. We have also replaced the expensive LED lights with cheap radium paper which reflects the light falling on it at night and it will not also trouble in daytime. We are going to apply red colored radium paper on at same places at top rail and bottom rail and also on rolling Barrier.

4. RESULT

Table -1: Strength and cost analysis

	W-BEAM	STEEL PIPE
TENSILE STRENGTH	360-410 mpa	490-780 mpa
YEILD STRENGTH	2400 kg/sq.cm	3500-4200 kg/sq.cm
COST	1500/meter	1800/20 feet

From the table 1. It can be clearly seen that the steel beam which we are going to use rather than W-beam of Korean company which has more tensile strength as well as cost effective. With regard to tensile strength W-beam has the strength of 360-410 mpa whereas steel beam has of 490-780 mpa. In yield strength the W-beam has 2400 kg/sq.cm whereas steel beam has 3500-4200 kg/sq.cm. In terms of cost W-beam has the cost of 1500/meter whereas steel beam has cost of 1800/20 feet. Thus, it can be seen that steel beam is anytime better than W-beam.^[8]

Table -2: Analysis between w-beam and steel pipe.

	W-BEAM	STEEL PIPE
Impact angle (deg)	45	45
Impact speed (km/hr)	78	72
Total kinetic impact energy(kj)	292	249
Kinetic energy towards barrier (kj)	146	124
Barrier dynamic deflection max (m)	1.0	0.9
Occupant injury risk based on HIC and rollover outcomes	Medium survivable	Low survivable

5. COLOUR CO-DING

While deciding the color we are going to follow IRC guidelines/code IRC119-2015. While deciding color combination for guardrail / radium paper, it is very important to select proper color combinations. If wrong color combinations are used, then it might prove dangerous for drivers. We are going to use warm color like yellow and red which reflects maximum light at night to facilitate severs vision. We are going to give yellow color to the guard rail, Human eye senses yellow color very easily so the drivers are aware about the limit, they are beware which avoid accidents. We are going to stick red colored radium paper on rolling barrier. As, mentioned above, red being a warm color reflects maximum light at night. Also, the combination of red and

yellow is best suited for night vision. Red color makes driver aware of their limits and thus this will help in reducing accidents. The red color has largest wavelength among all colors. It can be very easily observed in extreme conditions like fog or even in dusty condition. The color white yellow and red are visible in all extreme conditions like fog, dust, darkness, etc. So not using them will lead to lower visibility thus causing accidents. Barrier are usually painted with white, red, yellow and black Colors which is also appeared by international highway codes for their high visibility. The purpose of painting is to stop guard rail from rusting and also to reflect light and increase driver’s visibility.^[6]

6. ADVANTAGES

1. Safety of the roads increased.
2. Maintenance is low.
3. Reduces the accidents on highway, expressways etc.
4. Useful in hilly reason, curved section or roads.
5. Easy to install.
6. Rolling barrier saves vehicles from crashing on objects.^[7]

7. 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.^[7]

8. WORKING

1. Rolling Barriers made up of hard rubber (Urethane rubber).
2. It converts the shock energy or impact energy into rotational energy.
3. In strengthen post, metal pipe is provided.
4. Radium are provided which is useful at night.
5. Rolling Barriers have flexibility and elasticity, so it cannot damage easily.
6. Reflective sheeting is provided for better visibility.^[7]

9. CONCLUSION

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.

10. REFERENCES

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