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Traffic Improvement and Road Safety Audit of Kashimira Junction to Ganesh Nagar

*Kalpita N Chafekar[1], Prajakta A Pandit[2], Yash V Patel[3] , Asir Khan[4]
[1,2,3]B.Tech, Currently pursuing a degree in Civil Engineering from Universal College Of Engineering, Mumbai, India – 401208.
[4] Assistant Professor in Universal College of Engineering, Mumbai, India- 401208

***Abstract*:- This research paper is on the topic of traffic improvement and road safety audits for a specific location. The purpose of writing this paper is to improve traffic by installing an automated road divider. This will help in solving traffic congestion and also will reduce the travel time of that location. Road safety audits will improve safety and will reduce road accidents occurring due to bad road conditions. Also, it will improve road surface conditions.**

INTRODUCTION

The growth of the economy indirectly affects people's lifestyles. The urbanization process has accelerated tendency and urban traffic flow. In the past few years, it is observed that there is a rapid growth of private vehicles. The reason behind this growth is there are affordable vehicles manufactured by various companies. The major reason behind preferring private vehicles instead of public transport is the increasing crowd observed in public transport. Nowadays people prefer private vehicles because it is feasible and also comfortable to travel.

Traffic congestion is one of the worldwide urban problems, which can lengthen journey time, increase energy consumption also affects environmental pollution, and result in traffic accidents. If we take no measure to govern it, not only individual journey costs will be enhanced, but also the entire municipal transportation system will be paralyzed and urban development will be restricted. Solving traffic congestion has become a hot issue for big cities.

Automated road dividers can help in decreasing traffic congestion without enhancing the width of the road. automated road divider will help divide two-way traffic by adjusting the number of lanes as per requirements.

The total network of roads in India is 5.89 million kilometers(km) as of November 2021. (1) As per the road accident report for 2019, the total number of 449,002 accidents took place in India Leading to 151,113 deaths and 451,361 injuries. An accident occurs unexpectedly and unintentionally. The road system and the traffic operations in India are deficient in safety management. This road safety management system is poor in India, with untrained police officers collecting only incomplete records of fatal accidents and sometimes stating the road user's fault as the cause of the accident. auditing helps identify defects during and after the construction of a road. Safety being the first preference, a safety audit is important. Auditing helps improve the road conditions which helps reduce accidents also decreases travel time. (2).

LITERATURE REVIEW

Theory

The basic function of the divider is to divide two-way traffic. The divider helps avoid collisions between vehicles moving in the opposite direction. An intelligent transport system is the need of the hour as a solution for the traffic congestion issue. An Automated divider is a divider that can be operated according to the need to control traffic.
Day to day traffic is increasing in major cities like Mumbai, and to take control of traffic (to divert the traffic) Automatic road divider will be useful. In an automatic road divider, there will movement of dividers which will go up and down when it's required. (3)
Considering the main road divider(fixed) there will 2 more dividers one on each mid-part of the lane. Mid lane divider of one side will go up and at the exact time, the other lanes divider will go down.
During the peak hours, we can use 3 lanes at a time for one side going (on the lane where traffic intensity is high) vehicles and another lane/4th lane for low traffic flow.
This divider will be working on a hydraulic jack mechanism. Which will be connected with concrete blocks as a divider
And it can be handled by local traffic police. (manually)

Traffic accident risks indicate the problems occurring in the working of the traffic system. The price paid by the Indian community for accident risks problems is about 150 thousand fatalities and hundreds of thousands injured.
A road safety audit is a coherent process for checking the road safety exercise on highway improvements and of new road schemes. The main objective of this process is to minimize future road accidents occurrence once the scheme has been built and roads come into use. (4)
The auditor's task is to determine the potentially dangerous road elements and needs to ask the question " who can be hurt here and in what way? and how can we provide it from happening? "
All road users including the vulnerable users ie. Pedestrians and pedal cyclists shall be taken into account by the auditor.

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The broad perspective of the users is judged in different situations and conditions (nighttime, blinding by the sun being near to the horizon)as well. If any factor creates obscurity in the perception of road situations by users it may lead to mistaken actions thus to an accident. The auditor has to propose economically grounded solutions for the prevention of such dangerous situations. (5) (6)

For the implementation of automated road dividers:- Dahisar check Naka to Versova road. This patch is 3.16 km.
For road safety audit:- Kashimira junction to Ganesh Nagar. This is a patch of 3.36 km.

Fig.1.Route map of Dahisar check naka to Versova road. (Google Maps.) (7)

Fig.2. Route map of Kashimira junction to Ganesh Nagar. (Google Maps.) (7)

METHODS

1. Hydraulic jack

Hydraulic systems operate based on the principle that pressure applied to a fluid in a closed system distributes equally to all points of the system's volume. For our purposes, this means that any force applied to a closed hydraulic system gets multiplied throughout that system as it compresses, generating a much stronger lifting motion than other applications that apply force directly to the object being lifted. To describe this process in more detail, hydraulic jacks operate via the following procedures: A pump plunger moves oil through two cylinders, creating pressure. The system pulls the pump plunger back, causing the suction valve to draw oil into the pump chamber. The system pushes the plunger down again, transporting oil through an external discharge valve and into the cylinder chamber. The suction valve closes, which causes pressure to build within the chamber The pressure buildup causes the piston to rise, lifting your heavy object This process repeats itself until the object reaches the desired height. (8)

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Fig.3. Bottleneck jack (9)

Post-construction monitoring is issued to determine whether the contractor has constructed the works correctly, i.e. trip hazards, poor surfacing, ponding, visibility, etc. It also identifies any safety concerns that could not be identified until complete. A site visit was also undertaken during hours of darkness. Monitoring identified collision investigation, collision reduction, collision prevention.

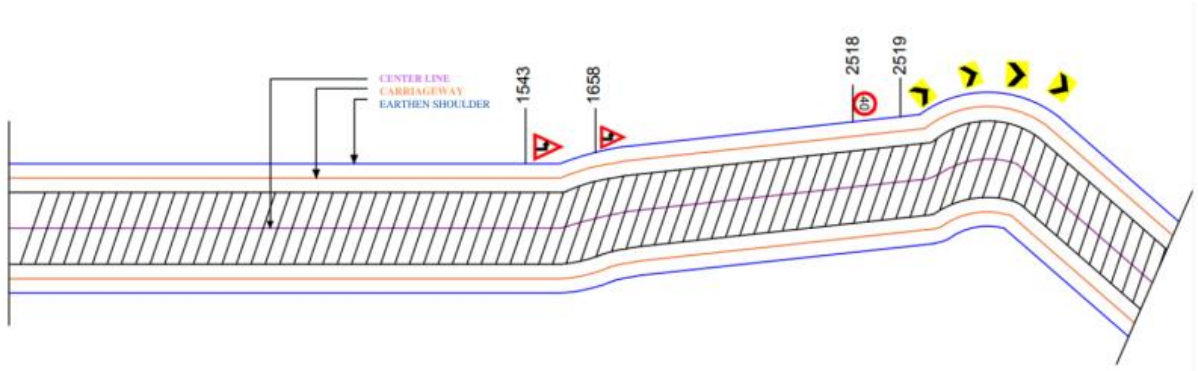

Fig.4.Road safety audit

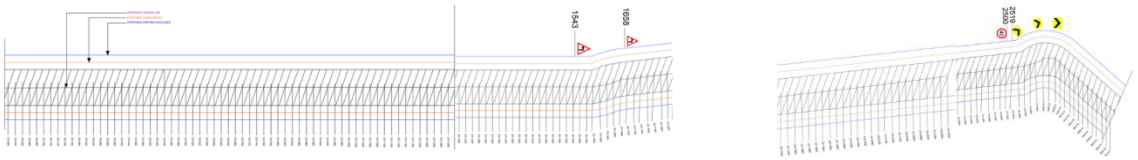

Fig 5. Chainage of road safety safety audit location

This project can be expensive as it involves high construction and maintenance costs. Excavation of the road is required to install the hydraulic jacks which can be costly. **I**nstallation and electrification of jacks can be expensive.
As we are dividing the lane, it can cause some inconvenience during construction which can lead to high traffic congestion. And it can be time-consuming for road users during construction.
If any mechanism or hydraulic jack fails to work it can cause some serious damage or accidents which can be harmful to road users.

METHODOLOGY

Research design-
Two different types of moveable road dividers

- Movable road divider using IoT
- Moveable road divider using a hydraulic jack

IOT moveable divider is a type of road divider which includes sensors on-road and sensor tags attached on vehicles to detect the number of vehicles that pass on a particular path for a specific duration. IoT requires skilled employees and teams to develop the entire system. These dividers are operated on strong network connections which can lead to failure if the connection is lost. (3)

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Moveable road dividers using hydraulic jack will be discussed in this paper further.

Procedure-

After selecting this topic, we started our research. We went through various research papers which are published by various authors. With the help of the internet, we found various books and general information regarding road dividers.

We found out Dahisar check Naka appropriately for this project as it has high traffic congestion. The majority of the population traveling for work passes through Dahisar check Naka which is a part of the western express highway.

After finalizing the location we conducted a traffic count survey. As manual counting of vehicles is not possible, we recorded a video for every one hour after every two hours.

We played the video at 0.5x speed and calculated the traffic flow.

Table 1: Traffic Count

Incoming traffic count					**Outgoing traffic count**				
Time (in min)	**Heavy vehicles**	**3 wheeler**	**2 wheeler**	**4 wheelers**	**Time (in min)**	**Heavy vehicles**	**3 wheeler**	**2 wheeler**	**4 wheelers**
0-1	1	33	40	30	0-1	3	20	25	22
1-2	7	51	41	39	1-2	6	30	47	49
2-3	8	25	28	20	2-3	2	12	32	30
3-4	6	31	39	39	3-4	5	22	36	45
4-5	4	35	43	43	4-5	7	22	37	31
5-6	4	43	46	36	5-6	8	36	35	39
6-7	5	23	49	42	6-7	2	16	41	35

Audit

A road safety audit was conducted for the Kashimira flyover to Ganesh Nagar. We recorded a video by driving the car at 20 kmph. We observed and noted the defects on the road and the surrounding region as per IRC and MORTH.

Fig.5. Information sign absent & Gore area marking absent.

Fig.6. Broken meridian and misplaced barricade.

Fig.7. There is no warning sign provided on the curve.

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Fig.8. Clogged drains cause water-logging on road.

Fig.9. The regulatory sign is confusing as there is no U-turn on the flyover.

STATEMENT OF LIMITATIONS

The main motive of installing an automated road divider is to reduce traffic. Reduction of traffic is important as it increases travel time and also affects the environment.

Safety auditing of the road will identify defects which will help regular maintenance of the road. This will reduce accidents and improve the safety of road users.

Another alternative for reduction of traffic is by constructing a flyover where there is high traffic congestion, but the drawback is Construction of flyover will require more time as well as it will be expensive as compared to automated road divider.

CONCLUSION

This project reduces the chances of traffic caused by the short width of the road. It provides high priority to the lane with more number of vehicles and helps to reduce the traffic density.

A safety audit identified a defect on the road.

ACKNOWLEDGMENTS:

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