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A Case Study on Reduction of Accidents through Improvement of Geometric Design

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***Abstract*-The investigation of misadventure is surrendered out occasionally at grave areas or street stretch which will assist with showing up at reasonable measures to successfully diminish accident rates. It is the action of the number and seriousness of mishap. These insights reports were to be kept up at 'Ghat Ki Guni', Agra Road, Jaipur, Rajasthan, India. Clumsy stretches of streets have been surveyed by discovering the mishap thickness per meter of the street. The spots of accident were set apart on the guide and the places of their grouping (BLACK SPOT) were resolved. With the assistance of information investigation of mishap event at a specific street of study for a significant stretch of time, it was feasible to anticipate with consistent precision the likelihood of mishap event each day or relative wellbeing of various classes of street client around there. The understanding of the factual information was vital to give knowledge to the issue.**

Car crash prompts death toll and property. Subsequently the traffic engineers need to attempt a major obligation of giving safe traffic timetable to the street clients and guarantee their security. Street mishaps can't be completely forestalled yet by reasonable traffic designing and the board the mishap rate can be decreased to a specific sum. For this reason coordinated investigation of auto collisions were needed to be done. Globalization has affected many non-industrial nations across the world. India is one such country, which profited the most. Expanded, monetary movement raised the use levels of individuals the nation over. This made degree for expansion in movement and transportation mishaps around there. India is going through major financial and segment development along with expanding urbanization and mechanization. Among the best ten reasons for death in the country, Road Traffic Accident was the 10th reason twenty years back, however with the expanding metropolitan territory and way of life changes. This examination was identified with street mishap investigation of 'Ghat Ki Guni', Agra Road, Jaipur, Rajasthan, India, conduct of mishap, mishap statics and discovering the necessity in
Street development and wellbeing angles.

***Index Terms*- Accident; Geometric Design;Black Spot; Investigation; Traffic.**

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I. Introduction

The process of rapid and unplanned urbanization has resulted in an unprecedented revolution in the growth of motor vehicles world-wide. The alarming increase in morbidity and mortality owing to road traffic incidents (RTI) over the past few decades is a matter of great concern globally. India accounts for more than 1, 51,113 deaths because of road accidents, according to the ministry of road transport and highway released in 2019.The existing road network in the Jaipur City is inadequate.Functionally, the road do not have any hierarchy as every individual road changes its characteristics after a particular distance. At present 5.82% of the total developed area is belonging to roads which are much below the desired level.

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Table 1: Black Spots in East Zone, Ghat Ki Guni, Jaipur

S. No.	Name of the District	Location of Accidents including chainage (km to km)	NH No.	No. of fatalities during 2011	No. of fatalities during 2012	No. of fatalities during 2013	Reason for frequent accidents	Nature of treatment required at the spot/stretches
1	T.P. Nagar Jaipur East	Ghat Ki Guni Agra Road	11	4	5	4	Roads are steeply sloped and curved and there are no street lights.	Provide street lights, install caution boards and speed breakers in accident prone areas
2	Kanauta Jaipur East	Mali ki Kothi Bagrana	11	9	11	7	Damage of railing near Highway and no railing in some area and densely populated area on both sides of the road. Main reason is stopping of heavy vehicles on main Highway.	Repair of Damage railing behind Highway and construct railing in some area where it is necessary. It is good to construct bridge on densely populated area on both sides of the road.

3	Bajaj Nagar Jaipur East	Tonk Pulia and nearby	12	1	2	3		

Moreover, the vehicular number growth is very high with just registered motor vehicles in 2005 as 4.2million to 12.4 million vehicles on 31 March 2015, an increase of around 3 fold in a span of 10 years. Most of roads in 'Ghat Ki Guni', Agra Road, Jaipur, Rajasthan, India,are heavily encroached by parked vehicles, hawkers and by the persons of road side business. This has resulted not only in an increase in the traffic volume but also in the traffic accident and put our life at risk. This paper was an attempt to analyze the road accidents in 'Ghat Ki Guni', Agra Road, Jaipur, Rajasthan, India, using annual data from the year 2016 to 2020.

II. COLLECTION OF ACCIDENT DATA

Data of road accidents were collected in two steps. In the initial stage,data on road accidents of Jaipur City were collected from the Police Station, 'East Zone Transport Nagar Police Station', in the city for four years.The data included number of Deaths and Injury details. It was found that more than seven accidents occurred in 'Ghat Ki Guni', Agra Road, Jaipur, Rajasthan, India in last year. After analyzing the accident data, the road intersection and mid-block having maximum frequency of accident was identified. Also for determining the present status of accident and traffic pattern, data were obtained by self-examining physically at the places.Places of Accident Analysis: **Ghat Ki Guni, Jaipur**

III. ACCIDENT REPORT

Table 2: Data of Accident at Ghat Ki Guni

Year	Case Registered	Injuries	Death
2016	8	8	3
2017	6	5	1
2018	8	7	2
2018	8	11	1
2020	7	2	5

Fig. 1: Median is missing in the narrow stretch of the road

Fig. 2: Part passage of Ghat Ki Guni road stretch

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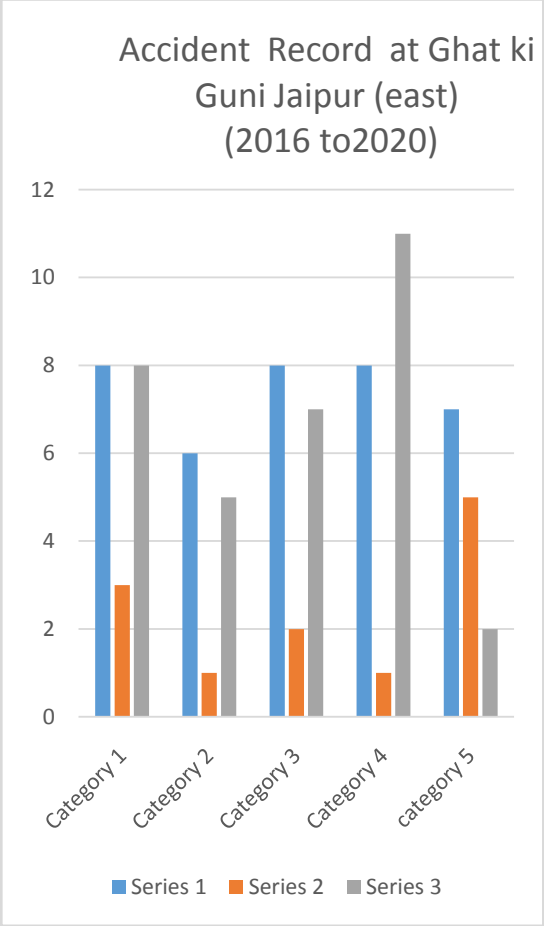

Series1-total accident registered, Series2-number of death, Series3-number of injury
Fig. 3: Chart of Accident Record

IV. FORMULA AND METHOD

Accident rate per kilometer
R= (A/L)
R=total accident rate per km for one year

A=total number of accident occurring in one year

L=length of control section in km

Accident Rate:
Accident rate is reduced to an extent satisfactorily, after construction of Ghat Ki Guni tunnel for vehicle of higher category than two wheelers i.e. LMV & HMV. Ghat Ki Guni tunnel facilitates direct entry to the vehicle of higher category than two wheelers. However, still the above accident rate is also very high though the vehicle volume only comprises the two wheelers only.

Table 3: Accident Rate Record

Year	Case Registered	Injuries	Death	Length of Roadkm	Accident rate per km
2016	8	8	3	3	2.67
2017	6	5	1	3	2
2018	8	7	2	3	2.67
2019	8	11	1	3	2.67
2020	7	2	5	3	2.37

V. CONCLUSION

Ghat Ki Guniis a narrow stretch of the road which connects the Jaipur city with NH - 11. Since this road passes through the densely populated heritage area, widening of the road was a tough and challenging job.
After a long exercise instead of widening of the existing road,therewas no option left except to construct a tunnel through the hilly area. Thereafter, a 2.8 km long tunnel was constructed for safe and uninterrupted movement of heavy traffic. There was a great relief to the traffic plying from Jaipur city to Bharatpur.The accident rate in the existing narrow strip of the road can be significantly reduced by providing proper signage, street lights and dividers to separate the incoming and outgoing two wheeler traffic.

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