

Study of Road Safety Audit in Sagar at Sironja Road as Per IRC-88

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Article Info

May-June-2022

Publication Issue :

Volume 6, Issue 3

Page Number : 187-195

Article History

Accepted : 01 June 2022

Published : 10 June 2022

ABSTRACT

Accidents are a drain on the national economy and may lead to disablement, death, damage to health and property, social suffering and general degradation of environment. To minimize the no of crashes by any kind and severity expected to occur on the entity during a specific period is known as road safety. Accidents and the fatalities on road are the result of inter-play of a number of factors. Road users in India are heterogeneous in nature, ranging from pedestrians, animal- driven carts, bi- cycles, rickshaws, hand carts and tractor trolleys, to various categories of two/three wheelers, motor cars, buses, trucks, and multi-axle commercial vehicles etc., The vehicle population has been steadily increasing because of change in the style of living of people. Increase in vehicle population with limited road space used by a large variety of vehicles has heightened the need and urgency for a well thought-out policy on the issue of road safety. In India the rate of accident is directly proportional to growth of vehicle population.

Road accidents are a human tragedy, which involve high human suffering. They impose a huge socio-economic cost in terms of untimely deaths, injuries and loss of potential income. The ramifications of road accidents can be colossal and its negative impact is felt not only on individuals, their health and welfare, but also on the economy.

The objective behind the study was to determine the flaws in selected road and justify the blind spots and provide its rectifications. The research even recommended road safety features in selected case study for Sagar and analysis was done for the selected road along with connecting junctions.

Stretch I have the second highest no of accidents accounts for 32.5% of total accident. The Accident rate can be reduced by providing signalized junction, junction improvement, and shoulder Clearance, installation of humps, shifting of poles, removal of trees near the edge of pavement etc. No of accidents in stretch II accounts for 29.6% of total accidents. The accident rate can be Minimized by clearing-off shoulders, reducing speed limit, junction improvement, providing

Signals on the median, shifting structures on the shoulder. Stretch III has minimum no of accidents accounts for 3.7% of total accidents. Speed limit reduction near junction should be reduced to prevent accident.

Keywords: Road Safety, Blind Spots, Accident Prediction Model.

I. INTRODUCTION

According to MORTH-2018 states 467 k total road accidents YOY 2011 to 2018 in India placing the country with highest number of accidents in the World. Accident Severity has been increasing year by year. A road accident is an unplanned and uncontrolled occasion, which happened on a road open to an open activity bringing about individual harm, harms to the property and death toll in which no less than one moving vehicle was included. Rapid growth of population coupled with increased economic activities has favored in tremendous growth of motor vehicles. This is one of the primary factors responsible for road accidents. It is observed that few works have been carried out on statistical analysis of accidents particularly on Highways.

Road safety is one of the most important problems in our society. Every year 1.2 million of people are killed and between 20 and 50 million people are injured in road accidents. If current trends continue road traffic accidents are predicted to be third leading contributor to the global burden of Disease and injury.

India had earned the dubious distinction of having more number of fatalities due to road accidents in the world. Road safety is emerging as a major social concern around the world especially in India.

Accidents are a drain on the national economy and may lead to disablement, death, damage to health and property, social suffering and general degradation of environment. To minimize the no of crashes by any kind and severity expected to occur on the entity during a specific period is known as road safety.

Accidents and the fatalities on road are the result of inter-play of a number of factors. Road users in India are heterogeneous in nature, ranging from pedestrians, animal- driven carts, bi- cycles, rickshaws, hand carts and tractor trolleys, to various categories of two/three wheelers, motor cars, buses, trucks, and multi-axle commercial vehicles etc., The vehicle population has been steadily increasing because of change in the style of living of people. Increase in vehicle population with limited road space used by a large variety of vehicles has heightened the need and urgency for a well thought-out policy on the issue of road safety. In India the rate of accident is directly proportional to growth of vehicle population.

Road accidents are a human tragedy, which involve high human suffering. They impose a huge socio-economic cost in terms of untimely deaths, injuries and loss of potential income. The ramifications of road accidents can be colossal and its negative impact is felt not only on individuals, their health and welfare, but also on the economy. Consequently, road safety has become an issue of national concern. Road Safety is a multi-sectoral and multi-dimensional issue. It incorporates the development and management of road infrastructure, provision of safer vehicles, legislation and law enforcement, mobility planning, provision of health and hospital services, child safety, urban land use planning etc. In other words, its ambit spans engineering aspects of both, roads and vehicles on one hand and the provision of health and hospital services for trauma cases in post-crash scenario.

In road safety management, an accident blackspot or black spot is a place where road traffic accidents have

historically been concentrated. It may have occurred for a variety of reasons, such as a sharp drop or corner in a straight road, so oncoming traffic is concealed, a hidden junction on a fast road, poor or concealed warning signs at a cross-road.

At each section, potential black spots along the section were identified based on the geometry of the road within that section, environmental factors, and also the 9 factors mentioned above. Unfortunately, due to high unemployment rate, many people go for gas oil and goods (cloths, food stuff, etc.) smuggling to be able to afford life expenses. Meanwhile, high speed of smuggling vehicles, particularly those used to transport gas oil, has resulted in disastrous accidents upon which a large number of casualties has been incurred. Potential black spots along Sections.



Figure 1: Blind curve

II. LITERATURE REVIEW

Azadeh Emami, Majid Sarvi, Saeed Asadi Bagloee 2019 “Using Kalman filter algorithm for short-term traffic flow prediction in a connected vehicle environment”

Author presented a Kalman filter technique to predict traffic flows approaching an intersection based on the data of connected vehicles. At the first stage of methodology the author adjusted the parameters of the Kalman equations through the use of Vissim

microscopic traffic simulator and later evaluate the performance of the model for different penetration rates of connected vehicles under various traffic conditions.

The obtained results presented that the Kalman filter performs well when the penetration rate is more than 20%.

It was apparent from the results that the proposed method has an acceptable accuracy to predict the traffic flow even in the presence of abrupt changes in traffic condition. Moreover, there was a positive correlation between the model’s accuracy and the penetration rates, in the sense that, as the penetration rate increases, the model predicts traffic flow with more resolution.

Zhengyi Cai, Manchu Xiong, Dongfang Ma and Dianhai Wang 2021 “Traffic design and signal timing of staggered intersections based on a sorting strategy”

The author identified problems generated due to staggered intersection as its geographical characteristics consists of two T-legged intersections that cause the lost time per cycle to become longer than at cross intersections under conventional signal control, thus leading to low intersection efficiency.

Further stated the way of to eliminate at the left–right type of staggered intersection by channelization and signal phasing, based on a sorting strategy and pre-signal, which reduce the amount of lost time during the signal cycle using the split distance as the sorting area.

Author used VISSIM which allows to stimulate traffic patterns whether comparing junction geometries, analyzing public transport priority schemes or considering the effects of certain signaling, for the purpose of modelling and analyzing the proposed method as well as the conventional method for comparison purposes

This research has presented a signal control design for the LR type of staggered intersection, including intersection channelization and signal phasing based on a sorting area and pre-signal. This method reduces

the lost time of the signal cycle using the split distance as a staggered area, which holds the transient queues of vehicles released into the sorting area. The sorting area is required to hold the relocated traffic queue of LVs from the minor road without queuing back, which depends on the length of the sorting area and the number of vehicles released during the green signal from the minor street. Thus, short cycles may be needed if the length of the sorting area is short.

The sorting area allows cycles to be shortened by decreasing the lost time per cycle compared with the conventional method. When analyzed using a case study based on the VISSIM simulation, the proposed method shows promise in reducing the average delays and maximum queue lengths for each movement and the entire intersection, both in the off-peak hour and peak hours. The analysis in this article was conducted for a single length of sorting area.

Md. Tufajjal Hossain, Md. Kamrul Hasan 2019 "Assessment of Traffic Congestion by Traffic Flow Analysis in Pabna Town" Author conducted this research to measure the intensity of traffic congestion of Pabna town where the primary methodology was Traffic volume survey and spot speed study.

The research explored that auto-rickshaw, cycle rickshaw, bicycle, and motorcycle are the popular traffic mode and traffic flow becomes so intensive during the morning, noon and evening hours. It has also revealed that Ataikula road is the most congestion-prone route than A.H road and the level of services of all intersections is F except traffic which provided a comparatively better level of services to the travelers of the town.

Research paper suggested One-way traffic flow may be a possible solution of congestion for the town. Moreover, it has been observed that most of the commercial activities of the town take place within a very narrow space comparing to its total area. Therefore, growth centers should be developed at different important locations of the town to reduce trip generation towards the downtown of the town.

III. OBJECTIVES

Main objectives of the study are as follows:

- 1 To determine the flaws in selected road.
- 2 To justify the blind spots and provide its rectifications.
- 3 To provide road safety features in selected case study for Sagar
- 4 To Analyze the selected road and connecting junctions.

IV. SITE INVESTIGATION

The only information available for accident studies is the FIR (First Information Report) lodged in the police stations. The data from these records of last ten years (2002-2011) were extracted from the FIR record filed under IPCno.279/337/338/304(A). Vehicles those involved in accidents and reported in the F.I.R. The categories of vehicles include tempo, auto, mini-truck, minibus, Tata indica, Tata-407, trecker, motor cycle, tanker, tailor (articulated vehicle), truck and bus.

Road selected for study

Single lane road in Sagar chosen For this study. The following stretches were selected for data collection. The study area is shown in fig.2

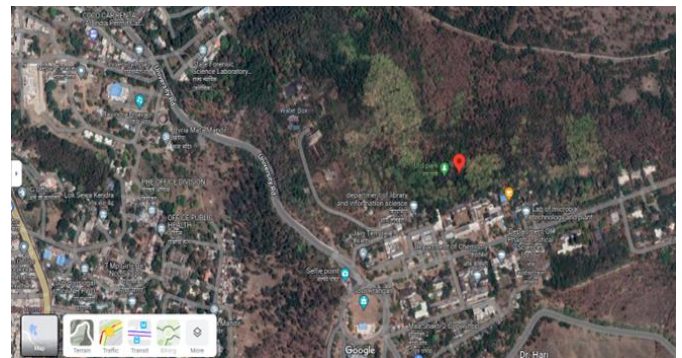


Figure 2 Study area Source: Google Map

Data collected from Police Records

With the prior permission of the concerned S.P, the accident data were collected on two-lane highways from three police stations as shown in Table3.1.

The police stations have their own FIR records of several years. The data from these records of last ten years were extracted from the FIRs filled under IPC NO.279/337/338/304 (A).A sample copy of the profomra is shown in the Table3.2

Table 1 Police stations and road sections covered

Police Station	Road section covered under the police station
Gopal ganj Police Chowki	Section I
Anusuchit Jati & Janjati	Section III
Sagar Police Station	Section IV
Civil Lines Police Station	Section II

Table 2 Proforma for accident data from FIR records

Date/Day/Time	Location of Accident	Details of Accident	Vehicle(s) Involved	Possible Reasons
12 June 2015 ,22:45	Sagar Bus Stand	Bus accident with motorist	1 Bus and 3 motorist	Carelessness of bus driver while reversing
9 February 2016, 03:21	Gour prangan Junction	Truck and Ambassador	2 Truck and 1 ambassador	Rash driving by ambassador driver
26 th January 2017	University road	Bikers collapse due to diversion on Flyover	1 bike and one scooter	Careless driving

V. ANALYSIS DATA

Accident details during 2002-2011 on this road section are shown in Table3.3. Accident data were collected year wise from each police station records then sorted out month wise. Average yearly variation of accidents stretch wise during 2002- 2011.

Table 3 Accident Rate

Name of stretch	No of accidents in a year	
	Sum of 10 year	Accident rate
4 Legged Junction at SATI gate	1354	14%

4-legged junction at durga nagar square	1876	21%
Railway over bridge	1539	19%
Staggered intersection near sabzi mandi & busstand	1775	17%

From the Table 3 it is observed that frequency and rate of accident is more for stretch-4 followed by stretch-1,2,3 respectively

Accident Investigation

Accident no-1

Accident type: Head-on collision Location: Sagar Bus Stand

Date and Time: MAR 30, 2013; 4.30PM Vehicle 1: Tata Truck no OR-06/ B-6545

Vehicle 2: Bajaj CT- 100 motor cycle no OR-05/U-3323 Fatalities/Injuries: One person dead and one person severe Injured.

Description: On 30thmarch 2013 one Bajaj motor cycle with two person collided with a aluminum loaded truck in front of captive power plant Nalco gate around 4.30PM. The motor cycle was coming from captive power plant and truck was moving on highway. The motor cycle rushed to the right side of truck front. The truck applied brake and turned towards left side. The bike fell down under the rear right wheels. The victims were severely injured. The rider lost this right leg completely and left leg scratched while other was under truck with severe knee and head injuries. The rider had used helmet and saved from head injury. The ambulance came after 30 minutes and took victims to the hospital. The victims were two brothers from Jajpur town and rider lost his life after two hour of incident. Cause of accident

was due to presence of old banyan tree on the corner of T-junction and ditches of shoulder was filled with water. The motor cycle could not notice the truck due to that big tree and collided with truck on the highway. The tyre skid mark length was 11mt. The accident diagram is shown in fig.





Figure 3 Accident diagram and photos of stretch II

Accident no: 2

Accident type: collision with tree Location: In front of police station Sagar Date and Time: JUN 13, 2012; 12.30PM Vehicle 1: Ashok Leyland trailer
Vehicle 2: Bajaj Auto

Fatalities/Injuries: Two person minor Injured

Description: The trailer was on the highway with normal speed. At a T-junction one auto with nine passenger was changing direction (left turn) from bus stop road to highway. Both vehicles became front to front. The trailer driver applied sudden brake and struck the vehicle with a old tree present at corner of junction. The auto was escaped from collision. Driver and helper became injured. The accident diagram is shown in fig 5.2.



Figure 4 Accident diagram and photos of stretch I

Accident no: 3

Accident type: collision with tree and compound wall Location: BSNL office Date and Time: JUN 12, 2012; 6.10AM Vehicle 1: Tata truck Fatalities/Injuries: One person severe Injured and one minor injured
Description: The truck was moving on NH-55. Near traffic post the truck driver could not notice traffic median due to absence of sign post and signal. The truck ran over median and hit with a tree and finally struck with compound wall. The driver became severe

injured and helper became minor injured. The vehicle, tree and the compound wall were completely smashed. The accident diagram is shown in fig 5.3.



Figure 5 Accident diagram and photos of stretch II

VI. CONCLUSION

- 1) The available literatures on accident analysis indicate that 77.5 percent of road accidents in India are caused due to driver's error.
- 2) Heavy vehicles like truck are involved in maximum no of accident on two-lane roads. It is estimated that fatalities caused by truck is 59 % followed by other (26%) and bike(7%) and jeep (5%) and bus (3%).Road safety awareness should be raised among road user.
- 3) Stretch IV has the highest no of accidents which accounts for 34.1% of total accidents .The accident rate can be decreased by road side clearance, proper maintenance of shoulders, lighting, and junction improvement. Speed limit should be brought down by providing humps near accident spots. Sight distance near curves should be obstruction free.
- 4) Stretch I have the second highest no of accidents accounts for 32.5% of total accident. The Accident rate can be reduced by providing signalized junction, junction improvement, and shoulder Clearance, installation of humps, shifting of poles, removal of trees near the edge of pavement etc.
- 5) No of accidents in stretch II accounts for 29.6% of total accidents. The accident rate can be minimized by clearing-off shoulders, reducing speed limit, junction improvement, providing Signals on the median, shifting structures on the shoulder.
- 6) Stretch III has minimum no of accidents accounts for 3.7% of total accidents.
- 7) Speed limit reduction near junction should be reduced to prevent accident

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Cite this article as :

Anupam Shrivastava, Dharmendra Prajapati, Anudeep Nema, "Study of Road Safety Audit in Sagar at Sironja Road as Per IRC-88 ", International Journal of Scientific Research in Civil Engineering (IJSRCE), ISSN : 2456-6667, Volume 6 Issue 3, pp. 187-195, May-June 2022.

URL : <https://ijsrce.com/IJSRCE226318>