

Study on Black Spot in Moradabad

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Abstract

Traffic Management Studies is a very crucial and important part of our system, we are facing problems in traffic managing directions. Due to growing population, modern urbanization, increasing vehicle density, etc in the recent past, traffic congestion has emerged one of the main challenges for engineers, planners and policy makers in urban areas. Modern social and economic structures, shaped by car-oriented urban development and rapid growth in vehicle ownership, have established congestion as an inescapable journey of urban life. The growing impact of congestion is seen in terms of deteriorating urban air quality besides other adverse effects on quality of urban living. The main focus of this study is aimed to understand the traffic management, its measurement and mitigation. Traffic Management can be generally defined as excess of demand for road travel. Different measurements are taken to reduce the traffic congestion by managing it in variety of form. Bridges, Highways, Subways, Underpass, Flyover, Ring Road (metropolitan), Parking facilities, are made to overcome the traffic problems.

Keywords: *Design Speed, Traffic Volume, Traffic Speed, Passenger Car Unit, Traffic Capacity, Traffic Data.*

INTRODUCTION

As we know, traffic is getting vastly overpopulated day by day due to the result of the vehicle development and the increasing vehicles. Increase of the private vehicles has the situation worst with India as the 2nd largest population. The number of motorized vehicle is increasing continuously. The increase in the number of vehicles has not kept pace with corresponding increase in the total road network resulting in the number of major accidents.

The places where maximum number of accidents occurs are termed as Black Spots. It is estimated that the economic losses due to road accidents in India are over Rs. 100 billion per year with India as the second largest country with 4,865,000 Km of total road length (Every day, 3300 deaths and 6000 serious injuries occur on the road in the world.). According to the report released by National crime Records Bureau (NCRB) approximately 1,39,091 persons lost their lives in 4,40,042 road accidents in India in 2015. In India National Highways increasing to year by year.

Importance of the Study - The present study is limit to the parameters i.e.

gradients, spot speed analysis, traffic volume, pedestrians volume, speed resistance, geometric measurements of black spots, Right of way and capacity of cross and sidewalks that are selected for the development of safety co-efficient. The data for the present study was collected from concerned 10 police stations. The accident have occurred from the year 2001 to 2015 have been considered in the present study.

Need of the study - As we know, with the increasing private vehicles, traffic is drastically increasing leading to frequent major accidents. The increase in the number has not kept pace with the corresponding increase in the total road network resulting in the number of accidents. Additive risk is further increased with the increase of personalized vehicles. In order to support the required level of economic and physical development the urban areas like Moradabad have to provide for the easy and efficient flow of goods and people to overcome the problems.

Scope of the study

The scope of the present study is given below:

- From the accident records of the police department to identify some the black spots.
- To study the roadways and traffic conditions of the selected black spots.
- To identify the some of the factors causing accidents and to study their significance.
- To attempt correlation between the number of accidents and some of the selected factors causing accidents.
- By doing traffic volume study we can know the required future design corrections.

Objective

The study objectives include;

- 1) Identification of suitable black spot.
- 2) Ranking of the identified black spots.
- 3) Detailed analysis of top ranked spots and suggestion of possible improvement.

LITERATURE REVIEW

With the relevant researches and research outcomes on India, different method and philosophies are being interacted for reducing the amount of major traffic accident.

The main outcome of literature review is to produced an over view of the knowledge base on the relevant Indian researches and method for deducting the number of accident.

A series of important problem related to improvement issues have been identified regarding the planning and management of traffic and transportation and reducing the number of major accidents for the same.

1) M N Shiv Kumar et.al

The studied the causes of those according study the number of accident and find the causes and produce the ratio measurement for road accident. Thirteen years accident data was collected from four traffic police station and the black spots were selected from each police station for detailed study .attempts were made to high light technical defect in geometrical elements like cross

section, sight distances, gradient of the road, traffic volume and spot speed analysis .

To develop the safety co-efficient of black spots the considerably the parameter like sight distance ,gradients, spot speed analysis, traffic volume , pedestrians volume, skid resistance , geometric measurements of black spots , right of way capacity of cross and sidewalks. The accident prone spots are collected from 2001 to 2015 from 4 police station in and around tumkur city.

By collecting information from the traffic police department 12 major spots were selected for the studies black spots were chosen according to maximum number of accident occurred a spots . The data collected is from kyatsandra , rural, west and east police station.

2) Snehal U Bobade et.al

This report deals with study and identification of accidental black spots on pune . Solapur National Highway (NH) and Mumbai pune expressway by method of Ranking. The yashwantrao chavan expressway (Mumbai- pune expressway) has with accessed large number of accident since it became fully operational in April

2002.According to daily DIVA , dated 3 April 2012 there were 11.05. accident in 10 years of its existence. The objectives of the study are to identify accidental black spots on Mumbai-pune expressway and solapur highway.

To improve accident data collection system especially location identification(condition) The reading taken on Mumbai pune expressway and pune , solapur normal highway than analysed by method of ranking –according to importance of the parameter . The most importance parameter had given minimum rank.

The percentage after giving rank were calculated and on the basis of value of percentage of accidental black spot was identified The separate investigation is necessary to nullify the effect of these parameters so as to reduce the severity of accident black spots.

METHODOLOGY

1) Accident Rate Method

The accident rate method compares the number of accidents at a location with the number of vehicles or vehicle miles of travel at a location. This comparison results in an accident rate. The rate is stated in

terms of “accidents per million vehicles” for intersections (and other spots), and “accidents per million vehicle-miles of travel” for segments. The locations are then ranked in descending order by accident rate.

The accident rate for a location is found by dividing the accident experience by the exposure.

: Accident Rate = Accidents/Exposure

1. Spot Accident Rate

The equation for computing accident rate for a spot location is as follows:

$R_{sp} = A/Exposure$ [million entering vehicles] Or

$R_{sp} = (A) (1,000,000)/ADT (365)(Yrs)$

Where: R_{sp} = Accident rate at a spot in accidents per million vehicles,

A = Number of accidents for the study period,

Yrs = Period of study (years or fraction of years),

ADT = Average Annual D

RANKING METHOD

It is the simplest method of accidents identification. According to this method accidents are arranged from highest to lowest in order of their value. Identifying black-spots, ranking and determining the potential safety improvement for each location among a set of sites are the main purposes of studies in traffic safety.

A location is considered to be dangerous when its priority value (P), calculated using the following formula, equals 15 or more (Ministry of Flemish Community, 2001)

$$P = X + 3*Y + 5*Z,$$

where X = total number of light injuries

Y = total number of serious injuries

Z = total number of deadly injuries

DATA COLLECTION

Table No.1: The data collection shows the number of two, three and four wheeler vehicles

Location	Two wheeler	Three wheeler	Four wheeler
Zero point to Pakbara	996	300	408
Zero point to Chaudhary Charan singh Chowk	816	228	364

Table No.2: -Causes of Road Accident at ZERO POINT Moradabad from 2008 to 2014

Year	Killed	Injuries	Total accident
2008	17	24	29
2009	25	33	28
2010	23	41	39
2011	15	35	33
2012	8	4	12
2013	7	4	11
2014	4	1	5

Source: - Traffic Police Moradabad

From day to day, road accident is emerging as a major social concern. Zero point is one of the most critical areas of Moradabad. At zero point vehicles runs on very high speed and people faces many problems to turn over there and also it is very hard to cross the road. Zero point in Moradabad at on

National Highway 24 and it is a connecting line between Pak bara, Moradabad and Rampur. Many heavy vehicles such as Cars, Buses, Trucks and Tractors runs at zero point.

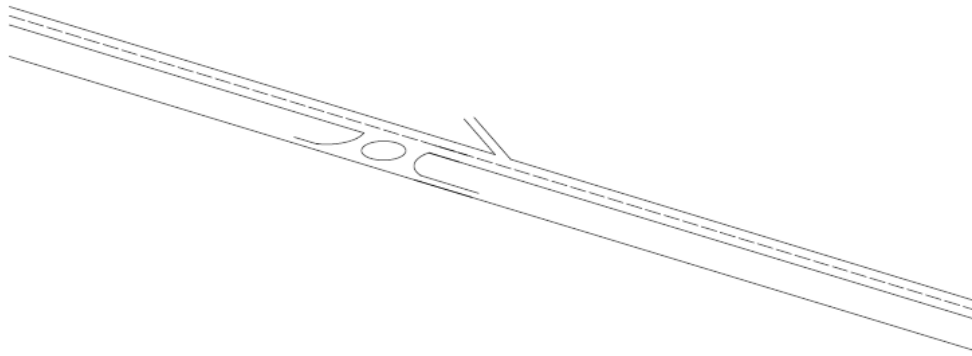


Figure: 1

Causes of accidents at zero point,
Moradabad

- False assumption of another's actions
- Turned with obstructed view
- Mis judgement of gap or others speed
- The main reason of black spot at there is due to merging and diverging of heavy vehicles.
- Lack of traffic sign and signal causing black spot.
- Lack of public awareness.

X=Total number of light injuries

Y=Total number of serious injuries

Z =total number of deadly injuries P=
41*96+4*62+80

P= 4264

Where P denotes the priority value which helps in arranging the accidents from higher and lower.

ANALYSIS OF BLACK SPOTS

Analysis of black spots is the process of detecting hazardous location that is prone to maximum number of accidents. For detecting such location, we have to know the probability of an accident with the help of traffic volume and the size of the road.

This can be done by counting the number

RANKING METHOD

$$P = X+3*Y+5*Z$$

of pedestrians, number of two wheelers, 3 wheelers, 4 wheelers in a peak hour. With the help of this relevant data we can analyse the black spots and we can detect the expected number of future accidents at a specific location from the number of accidents that already have occurred at that

location. So we can analyse the black spots by the investigation of the relation by comparing between the characteristics of the road locations and the accidents occurring at that location and in what respect they differ from safe location.

4.3 Analysis of Black Spots at Zero Point

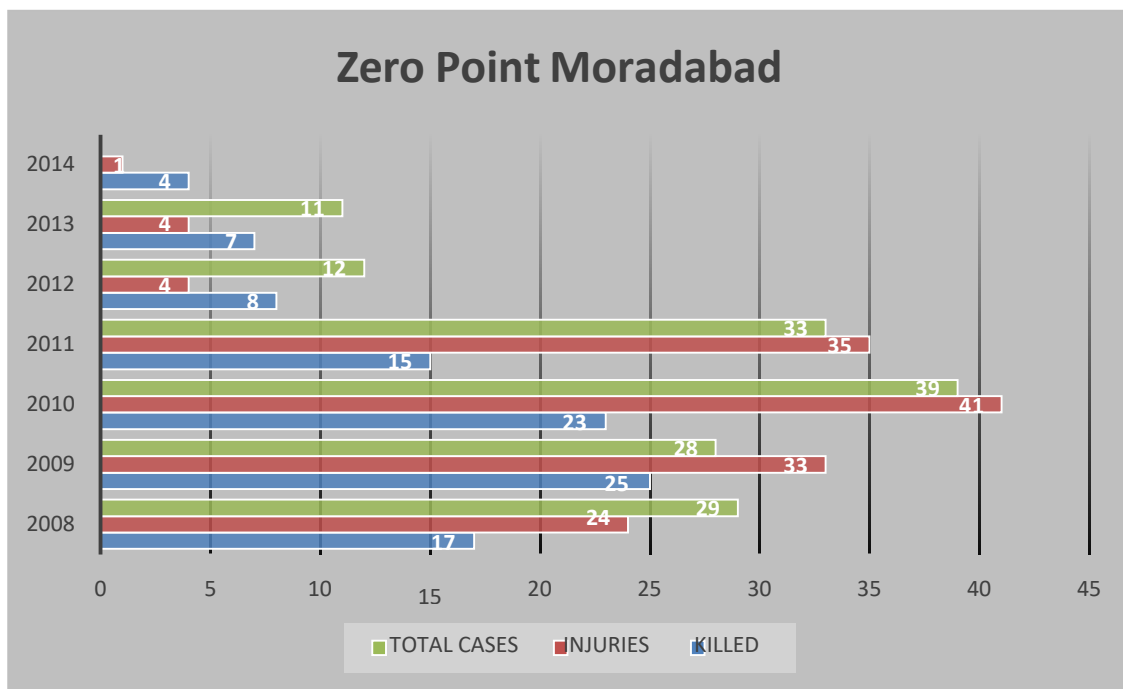


Figure 2

- A brief study of the road location at ZERO POINT shows the maximum number of vehicles crossing the road are 2 wheelers vehicles.
- The black spots arise mainly due to the collision of 2 and 3 wheeler vehicles with the heavy vehicles.
- A brief analysis shows the merging of roads at ZERO POINT with no traffic sign and signal causing the black spots.
- There is a need of speed breakers, because people are not able to control the speed of their vehicles at major concern stop which cause black spots.
- The traffic congestion is mainly due to the merging of heavy wheeler vehicles which cause the black spot.
- People have no idea of the vehicles coming on their way from opposite sides at ZERO POINT.
- Analysis of black spots at ZERO POINT shows that accidents due to human error and due to geometric

design of road such as site distance, elementary profile of the road and other causes such as vehicle merging and diverging equally contribute to major black spots.

- There is no sign of direction provided at ZERO POINT causing black spots.

RESULTS

AND

RECOMMENDATIONS

- Below “Accident rate method” shows accidents rate on Zero Point is 1.248 per million , means every 10 days one major accident occur on Zero point.
- Zero point generated black spot which is located on National Highway. Hence the design speed is high. At zero point there is no traffic sign is installed thus we need sign 60m away from the zero point in order to seek the right path for the vehicles.
- We need some advance measures to prevent accident. For example we need precautionary sign on both the

direction in order to aware the drivers.

- As the study shows the speed of the vehicles on the Zero point is high. We need traffic speed regulation on that point to reduce the speed of the vehicles.
- There is no sign and signal for changing of lane which is causing black spots. We need urgent traffic regulating sign on both direction on national highway.

ACCIDENT RATE METHOD

$$R_{sp} = (A) (1,000,000) / ADT (365)(Yrs)$$

Where,

R_{sp} = Accident rate at a spot in accidents per million vehicles,

A = Number of accidents for the study period,

Yrs = Period of study (years or fraction of years),

ADT = Average Annual D

$$R_{sp} = 157 * 1000000 / 49230 * 365 * 7 \quad R_{sp} = 1.248$$

Where R_{sp} = accident rate at a spot in accidents per million vehicles

CONCLUSIONS

From the above study we conclude the major number of black spots occurring at severe spots and the total amount of traffic volume for the same. We studied the various methods for studying black spots like ranking method, weighted severity index, Accident rate method for calculating the amount of traffic, injuries, death and then finding the causes responsible for the black spots. Most of the road accidents occur due to heavy vehicles and public utility vehicles like auto rickshaws and taxis.

The parameters causing accidents were selected by referring it with theodolite , locating the black spots points by referring with the total station. We analyse the different location where maximum number of black spots occurred and then initiating the suitable measures for controlling black spots.

REFERENCES

- 1) Bairwa, H.R., 2002, —A Study On Accident Black Spots On National Highway, Unpublished ME Dissertation, Department of Civil Engineering, Indian Institute of Technology Roorkee.
- 2) Bhuyan, P.K, 2002, Accidents Analysis on Two-Lane Roads, Unpublished Seminar Report, Department of Civil Engineering, Indian Institute of Technology Roorkee.
- 3) Garber, N.J., Hoel, L.A., 2002, —Traffic and Highway Engineering, Third Edition, Thomson Publishing Company, New York, pp.131-172
- 4) Gopala Raju SSSV., 2007, —Assessment of Noise level due to vehicular traffic at Warangal city, India, International Journal of Environment and Pollution, Vol 30. No.1, pp.137- 153
- 5) Gopala Raju SSSV., 2012, —Identification of black spots and junction improvements in Visakhapatnam City, Indian Journal of Innovations and Development, Vol.1, No.6, pp.469-471.
- 6) Gopala Raju SSSV., 2011, —Vehicular Growth and Its Management in Visakhapatnam City– Case Study, Indian Journal of Science and Technology, Vol. 4, No. 8 , pp 903 – 906.
- 7) Lalita Thakali “Statistical models and methods for identifying hazardous location for safety improvement” <https://www.google.co.in/webhp?sourceid=chrome>
- 8) MN Sivkumar “road accident analysis - for tumkur city” <https://www.google.co.in/webhp?Sourceid=chrome-in>
- 9) P.Mallikarjunareddy “Identification Of Accident Black Spots For National Highway Using GIS” <https://www.google.co.in/webhp?sourceid=chrome-in>
- 10) Rajan J Lad “Identification of Black Spot in Urban Area” <https://www.google.co.in/webhp?sourceid=chrome-in>

- 11) Snehal U Bobade1“Identification of Accidental Black spots on National Highways and Expressways”

<https://www.google.co.in/webhp?sourceid=chrome>

- 12) Xiaobo Qua“al Black spots identification on urban expressway”

<http://www98.griffith.edu.au/dspace/bitstream/handle/10072>