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ACCIDENT ANALYSIS AND BLACKSPOT IDENTIFICATION OF HULASUR-BASAVAKALYANA ROAD- KARNATAKA-A CASE STUDY

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Abstract - *Roads are major source of connectivity; they provide easy accessibility from one place to another place within limited time. Transportation play a major role on development of a country. It is very useful for social and economic development of a country. India is having 2nd largest road network in world. Despite of having this huge road network there are congestion and accident happens on these categories of roads. In road accidents and crashes nearly 1.25 million people die every year all over the world. In India Nearly 53 accidents happen in every 1 hour. These accidents also affect the economy of the country. In developing countries accident rates are higher compared to a developed country. For accessing the performances of road there comes a concept of Road safety audit (RSA). Road safety audit (RSA) is engineering approach to reduce the accident rates and to protect the road user. Using RSA, one can identify/assess the blackspots and hazardous locations and providing treatment/measures based on site constraints. It is also a cost-effective process. In this report a case study was conducted for an existing state highway considering recent trends of accident. The study aims to find out the safety problems for Indian roads and providing remedial and mitigating measures to reduce the road accident in India.*

Key Words: **Road safety audit (RSA), Crash Data Analysis, Accident Rates, Blackspots, Mitigation Measures, Traffic etc.**

1. INTRODUCTION

India has the second largest road network (nearly 3.31 million km) after China. The road networks in India is more than 3,000,000 km for rural road, more than 250,000 km for urban roads and nearly 65,569 km for national highways. In India, roads carry an estimated 60% of freight traffic and 80% of passengers traffic. The share of National Highways and State Highways in the total road network is just 8-10 percent but they cater to 70 to 75 percent of total road traffic in India. Road transportation system is having more connectivity compared to other transportation modes like water, rail and air transport. Being a low priced and affordable transport system, it is majorly used which increases road traffic. This increased road traffic leads to traffic congestion and accidents. These accidents/crashes affect the economy which costs nearly 3-4% of total GDP of India. Road accidents are increasing gradually over the past years. Current road accident situation in India based on the study is given below:

- In India Nearly 53 accidents happen in every 1 hour in which 17 people die in these accidents.
- India has only about 1% of the world's vehicles but share is 6% of the world's accidents.
- The count of accidents in developing countries like India over the 1000 vehicles is 35 and in developed countries it ranges from 4 to 10.
- The economic loss to the society on account of road accidents is estimated to be about Rs.3500 crores every year.
- The three highest total number of fatalities were reported in Uttarpradesh, Tamilnadu and Maharashtra.

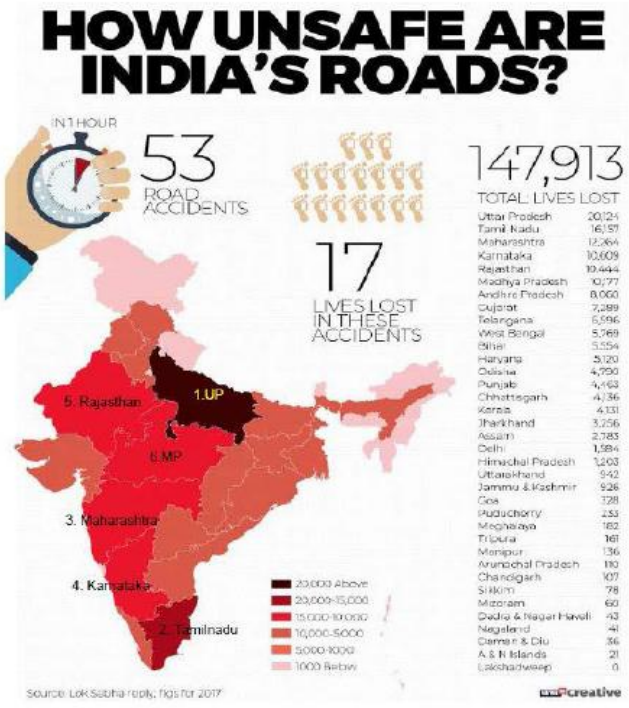

Fig-1: Road Accident in Indian roads state wise

Black spots play a major role in reducing accident rates. By identifying blackspot on a road and fix it will provide a safe traffic system to road user. In our road we identify blackspot for Hulasur-Basavakalyana road and provide mitigation measures to reduce accident in this area.

1.2. SITE SELECTED FOR STUDY

- Project Study area Hulasur-Basavakalyana (SH) comes under the jurisdiction of Planning and Road Asset Management Centre (PRAMC) Karnataka.
- The project road start from Hulasur (at Ch. 7+350, latitude: 18.031N, longitude: 77.008E) at T junction with National Highway 752K.
- The project road ends at Basavakalyana (at Km 32+800, latitude: 17.823N, longitude: 76.931E), the end point is at T junction with NH65
- The total length of the project is 25.45km.
- The project road passes through Hulasur, Belur, Betbalkunda, Basavakalyana villages.
- The project road is located in the north - east region of Karnataka.

Fig-2: Key Map of Project Road

1.1 OBJECTIVE OF THE STUDY

- To identify hazardous locations and to suggest appropriate measures to enhance the safety.
- Aimed to treat hazardous locations or sections using appropriate counter measures.
- To provide a safe, self-explaining and forgiving roads to road users.
- To reduce long term cost of the project and provide cost-effective and safe solution.

2. METHADOLOGY

Key steps for Crash Analysis:

a. Collection of Accident data of last 3 years.
b. Crash Analysis
c. Identify the blackspots

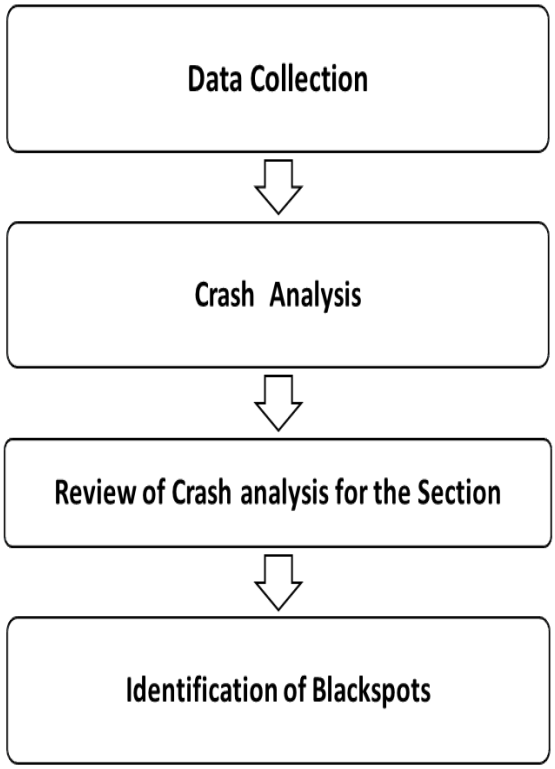

Fig- 3: Process of Accident Data Analysis

3. DATA COLLECTION

Accident data collected from the concern police department, Bidar SP office as this project comes under Bidar District, Karnataka. Researcher has requested police authorities and the PRAMC to provide the accident data along the project road. The collected data (03 years) from a period of January 2017 to December 2019. At each accident location the following parameters are recorded viz., Date, Time, Location, Nature of accident, Classification of accident, Cause, Road features, Intersection details, Vehicle responsible, number of affected persons. This data is used for further accident analysis. One hundred twenty-two (122) accidents have occurred over a period of 3 years (January 2017 to December 2019) on the project corridor. Accident raw data summary is given below in table and chart format:

Table-1: Cumulative Data of 03 Years (2017-2019)

S.No.	Description	Year 2017	Year 2018	Year 2019
1	Total No of Accident	49	28	45
2	Fatal Accident	3	6	7
3	Grievous	23	15	24
4	Minor	15	7	12
5	Non-Injured	8	0	2

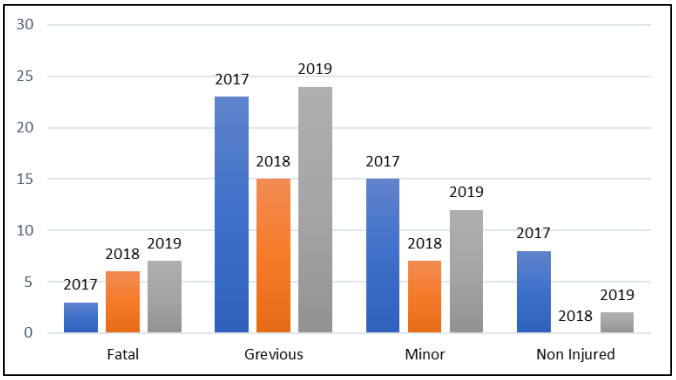

Chart-1: Cumulative Data of 03 Years (2017-2019)

Table-2: Year Wise List of Number of Affected Persons in Last 03 Years (2017-2019)

S.No.	Description	Year 2017	Year 2018	Year 2019
2	Fatal Accident	3	6	7
3	Grievous	23	22	24
4	Minor	23	48	22

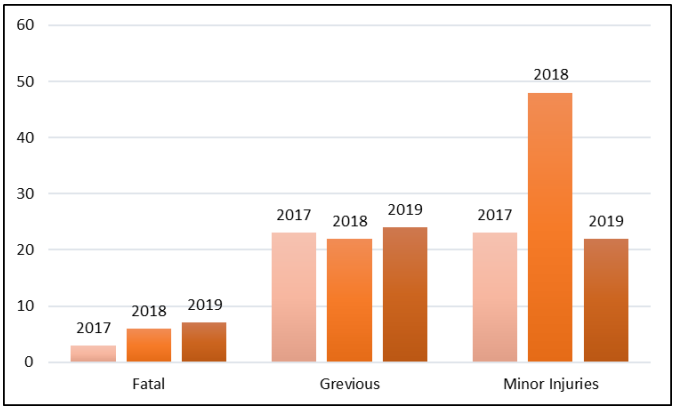

Chart-2: Year Wise List of Number of Affected Persons in Last 03 Years (2017-2019)

Table-3: Crash Data based on Nature of accident in Last 03 Years (2017-2019)

S.No.	Nature of Accident	Number of Accidents	Percentage of accidents
1	Overturning	3	2.4
2	Head on collision	31	24.8
3	Rear end collision	39	31.2
4	Collision brush/Side Wipe	1	0.8
5	Right turn collision	1	0.8
6	Skidding	29	23.2
7	Left turn merging	0	0.0
8	Other	21	16.8

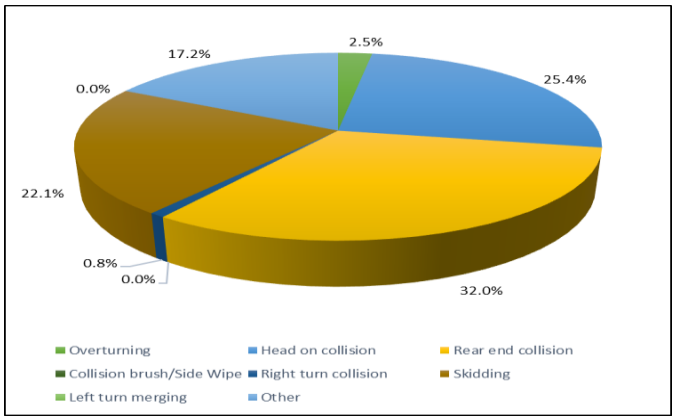

Chart-3: Crash Data based on Nature of accident in Last 03 Years (2017-2019)

Table-4: Crash Data based on time of accident Last 03 Years (2017-2019)

S.No.	Time slot	No. of Accidents	Percentage
1	3:00 to 6:59	3	2
2	7:00 to 10:59	17	14
3	11:00 to 14:59	34	27
4	15:00 to 18:59	37	30
5	19:00 to 22:59	28	22
6	23:00 to 2:59	6	5

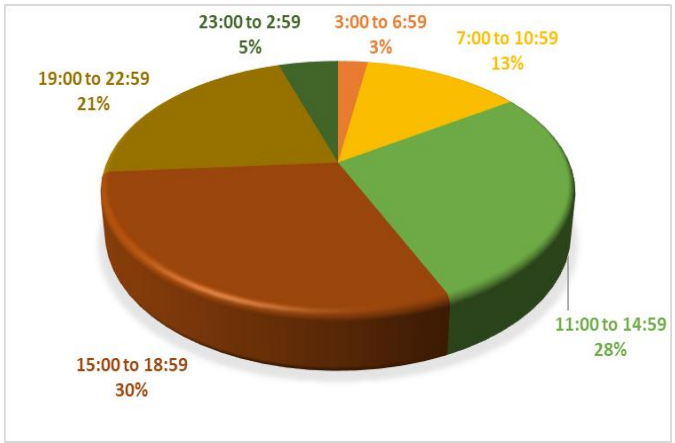

Chart-4: Crash Data based on time of accident Last 03 Years (2017-2019)

4. CRASH ANALYSIS

The main purpose of crash analysis is to improve safety by identifying crash patterns, mitigating crash severity, and reducing the number of crashes by adopting suitable countermeasures.

4.1 CRASH ANALYSIS METHOD

The data used for blackspot identification include location of accident, number of accidents (Fatal, Grievous and Minor injury) and number of affected persons (Fatal). There are two methods for determination of blackspot/Accident Prone Locations (as suggested in the NHAI methodology of identification of Blackspots):

a. Based on Accident Severity Index
b. Based on MoRTH Protocol

In our study we analysis blackspots based on the MoRTH protocol. As per MoRTH protocol:

"Road Accident Blackspot is a stretch of National Highway of about 500m in length in which either 5 road accidents (in all three years put together involving fatalities/ grievous injuries) took place during the last 3 calendar years or 10 fatalities (in all three years put together) took place during the last 3 calendar years"

Approach adopted to identified blackspots based on MoRTH protocol is described below:

- Past 3 years data from January 2017 to February 2020 is considered for Analysis
- MoRTH Analysis (based on no. of fatal/grievous accidents, no of affected fatal persons) are carried independently.
- Short sections of 100m length is considered for analysis, for selection of Blackspots drop down table method is used with over lapping sections (Example: 07+350 to 07+850 – Section 1, 07+450 to 07+950 – Section 2, 07+550 to 08+050 …… and so on till the end of project road).While formulating blackspots minimum 500m length is considered.

4.1 IDENTIFIED BLACKSPOTS

Total number of 06-blackspots locations was identified by analysis of 3-years accident data, it is given below in Table.

Table-5: Blackspot Locations

S.No.	Start of Section	End of Section	Length of Section (M)	Remarks
1	18+250	18+850	600	
2	24+950	26+150	1200	Builtup
3	26+250	28+150	1900	Builtup
4	28+350	29+450	1100	Builtup
5	29+750	30+650	900	
6	31+350	32+250	900	

Fig- 4: Blackspot Locations

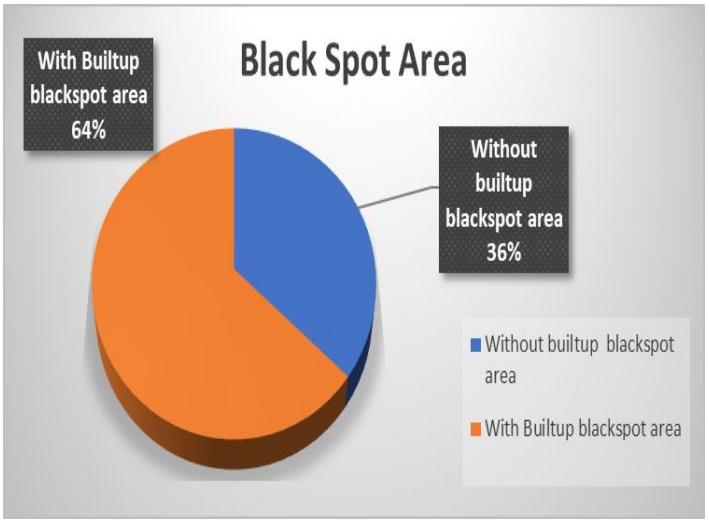

Chart-5: Graphical representation of Blackspot Locations in Built up area

5. CONCLUSIONS

In our study we found most of accident happens in built-up areas, and their approaching road sections. The main deficiency in these blackspot sections is listed below:

- Lack of pedestrian facilities forces the pedestrians to occupy/use the main carriageway which is a hazard.
- Vehicles occupying the carriageway leads to reduction of carriageway width leading to congestion.
- Presence of median opening in a curve location will have visibility issue for traffic coming in the opposite direction which is a hazard.
- Frequent median openings at shorter intervals leads to side swipe collision due to cross movements.
- Too many side roads connecting main carriageway leads to conflicts on main carriageway due to cross movements of local traffic.
- Lack of visibility leads to collision of vehicles.
- Absence of road markings at 4-lane undivided carriageway leads to hitchhiking of vehicles and may lead to collision.

Concentration of pedestrians, lack of appropriate traffic control devices and various roadside activities make these areas hazardous These areas are often generators of major traffics along the road.

Mitigation measures to be provided in built-up areas to reduce the accident is listed below:

- Traffic calming measures to be provided in the form of speed hump, Rumble strip and Transverse bar marking (TBM).
- Proper warning sign/cautionary sign like side road ahead sign, curve sign, school ahead sign, object hazard marker sign etc., mandatory sign/Regulatory sign like speed limit sign, overtaking prohibited sign etc., Informatory sign like direction sign, hospital sign, fuel station sign etc., road marking like canter line marking, edge line marking, pedestrian crossing marking etc., to be provided.
- Pedestrian facilities like footpath and PGR to be provided in built-up areas
- Parking facilities to be provided in built-up areas.
- Median openings at shorter intervals to be closed.
- Median opening at curve location to be closed.
- Crash barrier to be provided where embankment height is greater than 3 Meter.

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BIOGRAPHIES

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