Identification, Analysis and Suggestions Upgrade of Accident-Related Black Spots on NH-934 NHAI-PIU Sagar, Madhya Pradesh

[1]Rakesh Upadhyay, [2]Mithun Kumar Rana, [3]Pushpendra Kumar Kushwaha

[1]M. Tech. Research Scholar, Civil Department, RKDF College of Engineering, Bhopal (M. P.), 402026, India

[2,3]Assistant Professor, Civil Department, RKDF College of Engineering, Bhopal (M. P.), 402026, India

Abstract - **As the population grows, the number of vehicles on the road also rises, leading to an increase in traffic accidents. These accidents can be attributed to either human error or road conditions. Analysis of past data shows that 66% of accidents are caused by human error, while 33% are due to road-related factors, such as road and vehicle interaction, other road users, and environmental conditions.**

In developing countries like India, the rate of accidents continues to climb each year. An accident is an unexpected event that occurs in public spaces, often causing injury to bystanders as well. Various types of collisions can occur, including head-on, right-angle, and rear-end collisions, depending on road design and driver behavior. At least one vehicle is usually involved in accidents that take place on public roads, resulting in personal injury, loss of life, and property damage.

Keywords: traffic accidents, property damage, road design, vehicle interaction, public spaces.

I. INTRODUCTION

The location in any road where the traffic accidents often occur is called the Black Spot. Black-Spot is a term used in road safety management to denote a place where road traffic accidents have historically been concentrated. The word Accident is most commonly used which legally means that accident is an unexpected happening of an event which occurs without any purpose or a conscious choice, but sometimes it is done due to the carelessness, ignorance or combination of causes.

The increase in the number of motor vehicles is due to the growth of population and fastly growth of technology and economics. As the mobility increases, the probability of accidents also increases. The basic elements in traffic accidents are road users, vehicles, road and its condition, road geometry and environmental factors etc. The fatality rate is more in developing countries as compare to developed countries. The main cause of road accidents are drunken driving, careless and rash driving, over speeding, sudden braking, skidding, traffic rule violation, sudden twists and turns while driving etc. Moreover, road accidents can affect 1% of annual gross product resources of the developing countries. Road accidents cannot be totally prevent/stop, but by using suitable traffic engineering, safety plan and management measures, the accident rate can be decrease. One of the most important factors to reduce traffic is identification of hazard locations. During recent years, road safety and fastly growth of traffic has become a major concern throughout the world. Road traffic accident is a major problem leading to fatalities, injury and property loss and severely impacting the society.

According to the statistics released by National Crime Records Bureau (NCRB), approximately 1,39,091 persons lost their lives in 4,40,042 road accidents in India during 2012. Road accidents increase means number of vehicles also increases. In India tremendous increase in the total number of registered motor vehicles in last few years. According to a report total number of registered motor vehicles increased from about 0.3 million as on 31st March 1951 to 159.5 million as on 31st March 2012.

It is estimated that the economic losses due to road accidents in India are over Rs 100 billion per year. The identification of accident location, analysis and treatment of road accident 12 black spots are widely regarded as one of the most effective approaches to road accident prevention. Black spot is a place on a road that is considered to be dangerous because several accidents have happened there. Accidents happened their because of variety of reasons, such as a sharp curves in a straight road, so oncoming traffic is concealed, if design of junction are not proper on a fast road, poor or concealed warning signs at a cross-roads. Accident black spots can be improve by improving the signage, speed restrictions, improving sightlines, straightening bends etc.

II. LITERATURE SURVEY & BACKGROUND

A relative examination of black spot identification approaches and roadways accidents segmentation techniques {Elsevier, Vol.128, July-2019}

Researchers always have a difficult problem when it comes to indicating road safety-related factors throughout the planning and operational phases. The effectiveness of any approach used to pinpoint a hazardous area or black spots (BS) on the pavement would largely shows documents is segmented into distinct homogenous groups. This study is carried out to investigate and evaluate how various Black spot identification (BSID) method approaches perform in the methodological variety of road network segmentation. To achieve this, four widely used BS techniques–spatial assembling, constant length, constant volume of traffic, and the traditional segmentation technique from the Highway Safety Manual–have been compared to four different segmentation methods. The effectiveness of the strategies has been compared using two assessments. The segmentation techniques are initially assessed established based on the precision of the created safety performance function (SPF).

Investigation of black spots on NH-3 and its Renovation {MAIJ, Vol.04, June-2019}

This report is based on a thorough investigation of accidental black spots and traffic safety. The most important resolution of this investigation is to recognize comprehensives for the analysis of accidents black spots and their correction. The strategies and procedures utilized for selecting the project study stretch (Where a large number of accidents happened), collecting accident data, dividing the data for better observation, and analysing accidents black spots and accidents black zones are all covered in this study. Additionally, it makes use of some methods for profiling these accident sites as well as before-and-after research to calculate the impact of treatment on the Blacks Spots Zone. This study concludes the methodology of rectification is based on shorts-term measure, long-term measures, mitigation measure, of enhancement of geometric design dependent on the state of the road.

III. OBJECTIVES OF THE WORK

- By study we can find out the causes of accidents and suggest corrective measures at potential locations.
- To develop a methodology for Road Safety.
- To examine/check safety features adopted in the selected section of National Highway-3 and find out deficiencies in the road network due to which accidents occur.

IV. RESULT

4.1 Analyses of data

In this section, we examined both primary and secondary data from the collection. Before analysing the original data. Secondary data were secondary data were analysed. And accidental black spots were found using weighted severity index methods.

Table 1: Accident data 2016-2020

Year	Location Accident Details	Chhapri path	Bratiraha	Dalpatpur Village	Rurawan
2016	Total no of accidents	18	11	23	3
	Deaths	8	1	3	2
	Serious injury	22	5	23	7
	Minor injury	15	13	20	5
2017	Total no of accidents	9	11	18	6
	Deaths	2	0	3	2
	Serious injury	11	7	13	7
	Minor injury	8	10	23	5
2018	Total no of accidents	11	8	15	3
	Deaths	5	0	4	0
	Serious injury	14	13	10	2
	Minor injury	13	9	11	6
2019	Total no of accidents	15	7	26	4
	Deaths	10	1	6	1
	Serious injury	18	9	17	5
	Minor injury	18	11	12	9
2020	Total no of accidents	13	8	20	4
	Deaths	6	2	5	1

Serious injury	10	6	15	4
Minor injury	6	7	8	7

Collection of secondary data

The required reports of accidents for the previous five years from the relevant Police department are part of this records collection. Thus, data on the five years' worth of road accidents on NH-934 (Sagar to Mohari section) were gathered from the Office of the Superintended of Police in the District of Sagar (M.P.) as well as information on accident investigation involving the local community and police officers from the closest police station. To find the top-ranked black spots, these statistics are used.

The following Tabled 4.1 Describe the Accident data, it is clear from Table 4.1 the number of accidents, in the study area.

4.2 Profile of road accidents

The total amount of road collisions, road collisions fatalities and people injured in road collision in the study area from 2016 to 2020 as shown in Table 4.2 and also illustrated in Figure 4.1.

Shown in Table 4.2 and also illustrated in Figure 4.1.

<div align="center">

Table 2: Numbers of collisions

Year	Total collisions	Deaths	Injured	Non-Injured
2016	92	25	105	103
2017	67	10	75	72
2018	72	17	81	76
2019	86	30	95	94
2020	79	25	79	66

</div>

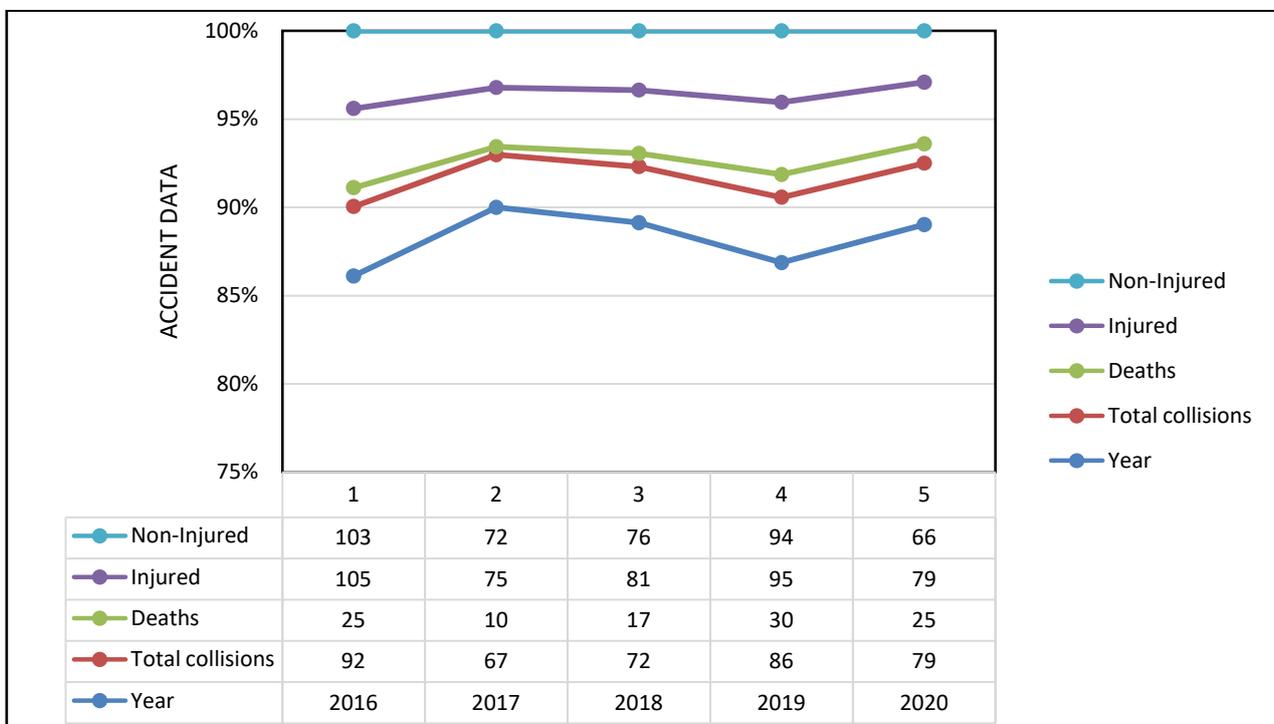|	1	2	3	4	5
Non-Injured	103	72	76	94	66
Injured	105	75	81	95	79
Deaths	25	10	17	30	25
Total collisions	92	67	72	86	79
Year	2016	2017	2018	2019	2020

Figure 4.1: Total number of road accidents persons killed & persons injured, during, 2016-2020

It is clear from Table 4.2 that over the years 2016 to 2020, the number of road collisions. Person death and person injuries have enlarged alarmingly over the year 2016 to 2020.

4.3 Examination of primary data collection

- **Road inventory survey**

To compute the pavement geometrical constraints. Such as the breadth of the street, breadth of the traffic lane, the breadth of the walkway, side shoulders situation. Kind of roadway. Pavement surface and barricade on the roadside, a through Road inventory Survey was conducted on all of the identified locations.
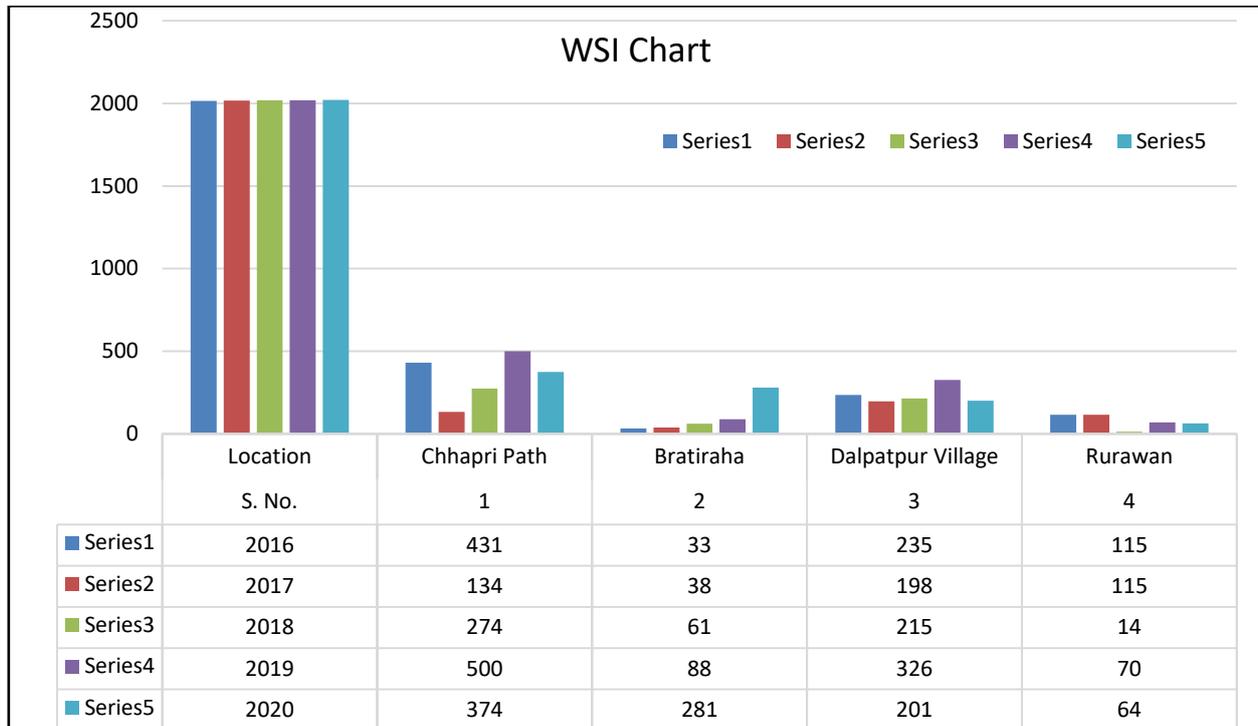

Location	Chhapri Path	Bratiraha	Dalpatpur Village	Rurawan
S. No.	1	2	3	4
Series1 2016	431	33	235	115
Series2 2017	134	38	198	115
Series3 2018	274	61	215	14
Series4 2019	500	88	326	70
Series5 2020	374	281	201	64

Figure 4.2

The entire analysis of the National Highway 86 area in the Sagar district has two lines. As specified by the road inventory survey, all segments of the carriageway range in width from 7 to 8 meters. Heavy traffic is insufficient, and the current width does not meet National Highway regulations. Most National Highway there is stretches and having no divider to distinguish the path of movement. It can be induced skull collisions due to blindness and glare problems. Also no parking area for passenger vehicles, these become stands on the main carriageway.

In Ruravan section of Highway we experimental that the bad situation of the asphalt surface for the reason that rainwater overtops to be converted into at this region.

In Sorai and Chhapri turn is sharp curve in the road, also no proper sight distance and no sign boards at the curve which cause accidents to occur at this location.

These location are a hazardous location for the whole study area because of these steep curves of road which leads to many sharp turns. Improper gradient, poor drainage system for rainy water and insufficient sight distance designed for vehicles at this portion of the Highway. These all data study have helped us to improve these drawback in newly designed of four laning of NH-934 (Package –I)

- **Signage inventory**

Stream of traffic marks are very essential components of public roads since they direct, caution, and teach drivers about how to move safely and efficiently. We discovered that there were no street lighting techniques in the entire region. Not at all at intersections, no pavement marking with poor sign boards, and metal crass barriers that had been damaged by vehicle collisions, as well as the disorder of the path declinators Highway.

4.4 General factors involved in the road traffic accident (RTA) on the National

During the research area, the number of road traffic accidents (RTA) has considerably increased at concerning rates from year 2016 to 2020. The frequency of highway traffic accidents at preferred locations of the study area is shown in Table 4.4 and R.T.A. Variation Chart is given below in figure 4.3.

Based on the number of road traffic accidents (RTA) that occurred along the study section of NH-86 from Sagar to Mohari a comparison was done. According to this research report, Dalpatpur Village and its extension experienced 111 (or 27.75%) and 67 (16.75%) incidents occurred near Chhapri Turn, respectively. Mountainous and escarpment areas were the most susceptible to traffic accidents due to difficulties.

Table 3: Variation in the frequency of road traffic accidents

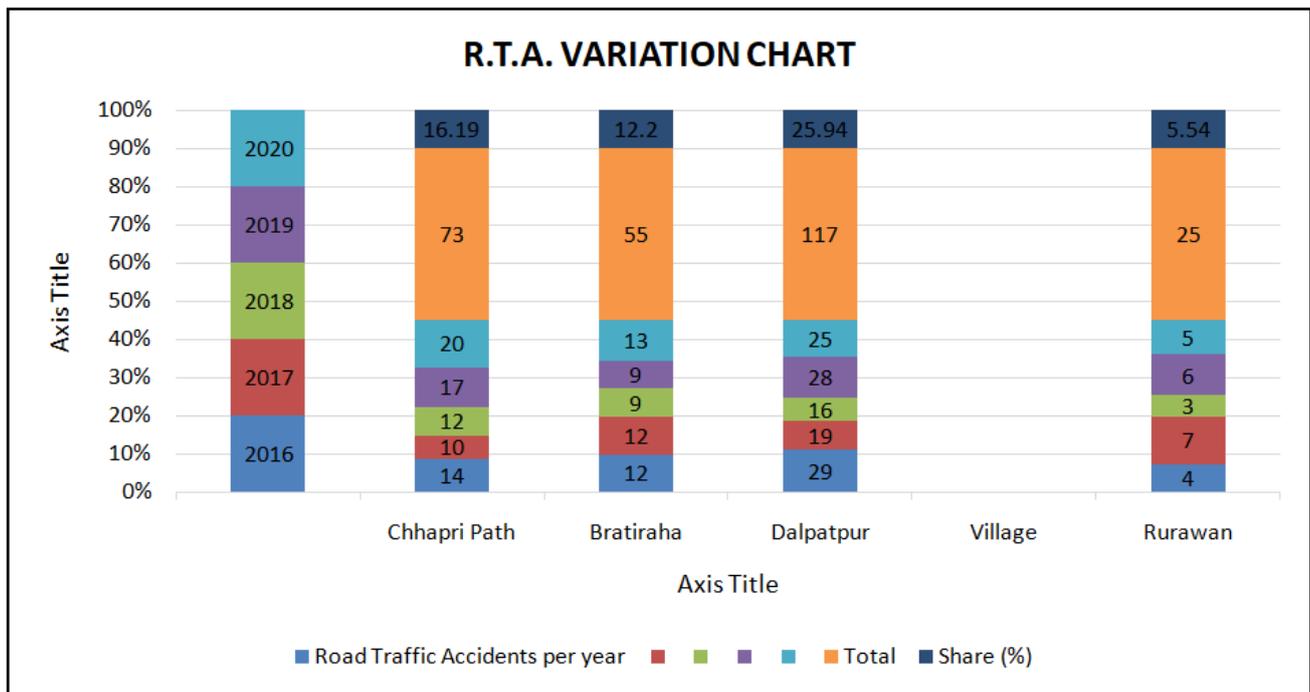| Location	Road Traffic Accidents per year					Total	Share (%)
	2016	2017	2018	2019	2020		
Chhapri Path	14	10	12	17	20	**73**	**16.19**
Bratiraha	12	12	9	9	13	**55**	**12.20**
Dalpatpur Village	29	19	16	28	25	**117**	**25.94**
Rurawan	4	7	3	6	5	**25**	**5.54**

Figure 4.3: The Location Map of the study area from Sagar to Mohari NH-934 having a distance of 42.3 Km

V. CONCLUSION

It is possible to identify and study accident black spots, which are regions of the road where accidents happen frequently and reduce overall road safety. A highway's "black spots" are places where accidents frequently occur. Finding the most hazardous accident black spots along the Sagar to Mahori section of the National Highway-938 was the aim of the current investigation. The accident-prone zones along a specific portion of NH 86 were categorised using the weighted severity index (WSI) approach and the frequency of road traffic accidents (RTAs). The top three areas were designated as black spots and suggested some possible enhancements to the transport system based on the WSI value from the traffic accident data collected. It has been found that the overall methodology is helpful for the detection, evaluation, and behaviour of unintentional black spots, provided there is sufficient data available.

REFERENCES

[1] National Highways Authority of India (NHAI) Reports.

[2] Madhya Pradesh Police Department Accident Reports.

[3] "Road Safety Audit and Management," World Bank, 2018.

[4] Local Road Safety Studies and Traffic Management Reports.

[5] B. B. and Joseph, K. (2011). "Causes and Consequences of Road Accidents in Kerala", International Journal of Research in IT & Management, Vol. 1, pp.83-95.

[6] Krishnamurthy, K. and Anjaneyulu, M.V.L.R. (2010). "Black spot identification, analysis and improvement measures On selected national highway stretches in Kerala, India"01.11.

[7] Ministry of Road Transportation and Highway (2011). "Road transport year book (2011-12)," New Delhi.

[8] Nagarajan, M., and Cefil, M. (2012). "Identification of Black Spots & Accident Analysis on NH-45 Using Remote Sensing & GIS", International Journal of Civil Engineering Science, Vol. 1, pp.1-7.

[9] National Crime Records Bureau (2012). "Accidental Deaths & Suicides in India 2012," New Delhi.

[10] Pavan, R.; Vyas, Madan; L. Honnappanavar and Balakrishna, B.L. (2014). "Identification of black spots for safe commuting using weighted severity index and GIS" 3rd World Conference on Applied Sciences, Engineering & Technology 27-29, Kathmandu, Nepal.

[11] Rao, B. S.; Madhu., E.; Jalihal, S. and Reddy, T. S. (1988). "Accident Study on National Highway-5 between Anakapalli to Visakhapatnam", Proceedings of the Eastern Asia Society for Transportation Studies, Vol. 5. 53.

[12] Recommendations about (1982). "The Alignment Survey and Geometric Design of Hill Roads", first revision, published by IRC.

[13] "Road Accidents in India 2010" (2011). Government of India Ministry of Road Transport and Highway Transport Research Wing, New Delhi, December.

Citation of this Article:

Rakesh Upadhyay, Mithun Kumar Rana, & Pushpendra Kumar Kushwaha. (2025). Identification, Analysis and Suggestions Upgrade of Accident-Related Black Spots on NH-934 NHAI-PIU Sagar, Madhya Pradesh. *International Research Journal of Innovations in Engineering and Technology - IRJIET*, 9(6), 106-111. Article DOI https://doi.org/10.47001/IRJIET/2025.906012

****